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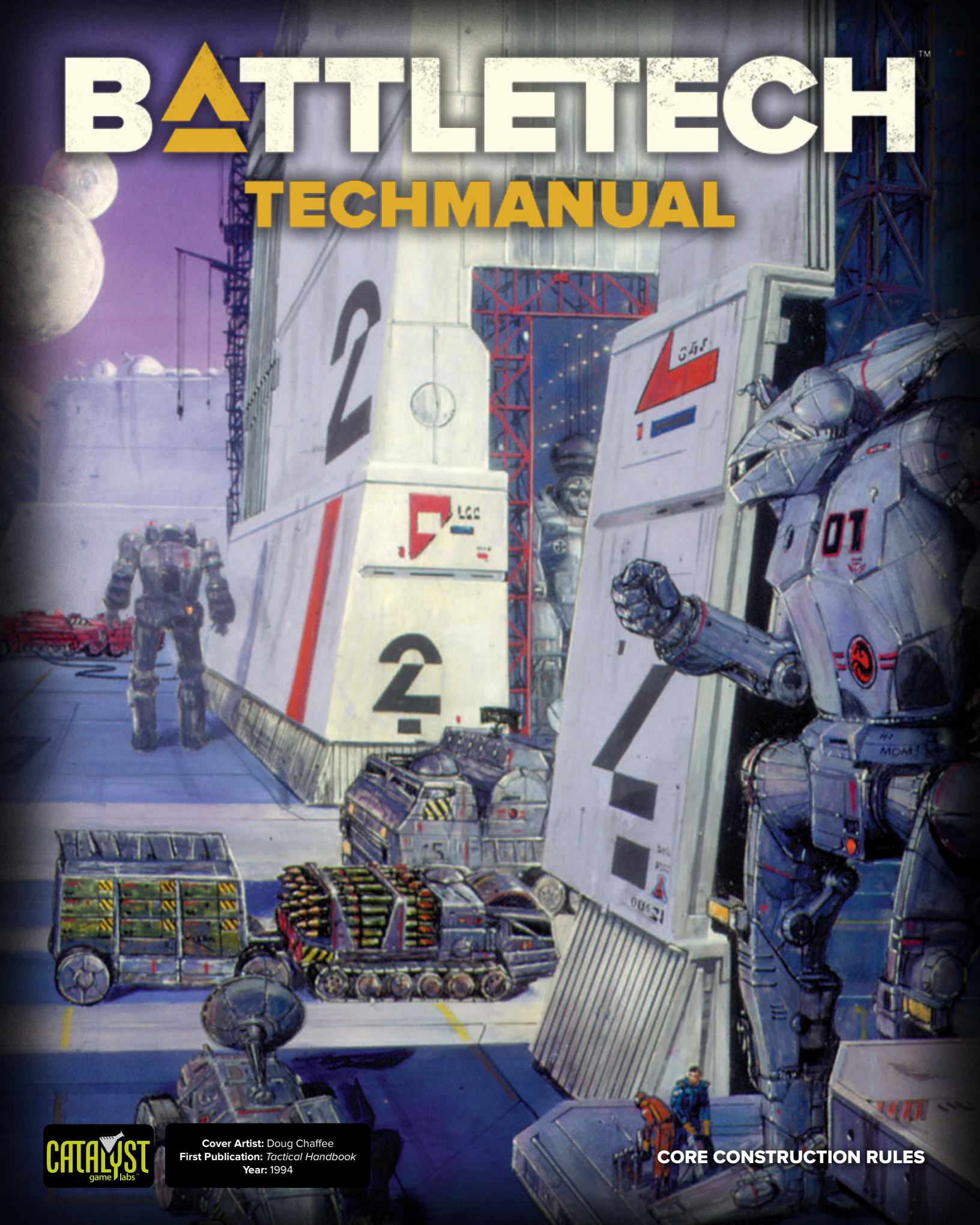
TECHMANUAL



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CORE CONSTRUCTION RULES

THE GEARHEAD'S HANDBOOK

How does a MechWarrior interface with a BattleMech? How does a ProtoMech really work? When was the Gauss rifle or the Particle Projector Cannon developed? Or how can I just make my own, cool and unique BattleMech design? If you've ever been plagued by these questions, then get on your coveralls and make sure you've got your astech certification, because you're about to dive into *BattleTech* construction!

A companion volume to *Total Warfare*,™ the *BattleTech TechManual*™ combines all the construction rules for the various units presented in that core rules set. Streamlined and updated, it contains all the core weaponry and equipment from previous rules set, as well as the newest, bleeding edge technologies. More than just a rulebook, however, the *TechManual* presents numerous sourcebook-style treatises, providing the in-universe context for these units and the technologies of their development. A must have resource for any *BattleTech* aficionado!

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On December 26, 3067, the Wolf's Dragoons are the first to feel the full fury of the Word of Blake Jihad.

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RECORD SHEETS

With *Total Warfare* (*TW*), the game of *BattleTech* was carefully reworked from its previous incarnations to clarify confusing or contradictory information—folding in many years' worth of Frequently Asked Questions (FAQs), playtesting reports and game play. At the same time, the various rules sets that defined conventional ground warfare in *BattleTech* were united under a single source for the maximum possible variety in standard rules play. For the first time in well over a decade, vehicles, battle armor, infantry and BattleMechs were reunited with aerospace fighters, conventional fighters and DropShips in a single, streamlined set of rules, enhanced for better interaction.

BattleTech TechManual (*TM*)—the second new, core rulebook published for *BattleTech*—continues on the path set down by *Total Warfare*, presenting players with a single rules source devoted to the creation of battlefield units that adhere to the standard *BattleTech* rules as presented in *Total Warfare*. Combining the construction rules from more than ten years' worth of *BattleTech* products, *TechManual* revises and clarifies the construction of *BattleTech* units, and unifies many that have become isolated in various products over the years.

This book contains a number of rules changes from previous editions. We feel confident that these are the most complete, clear and concise rules for *BattleTech* ever presented.

These rules supersede all previously published construction rules, including the *BattleTech Manual*, *BattleTech Compendium*, *BattleTech Compendium: The Rules of Warfare*, *BattleTech Master Rules* (standard and revised editions), and older editions of the *BattleTech* boxed set. Also superseded by this book are the fighter and DropShip construction rules from *AeroTech*, *BattleSpace* and *AeroTech 2* (standard and revised editions), as well as the battle armor construction rules from *BattleTech Companion*, the infantry platoon construction rules in *Combat Operations* and the Support Vehicle construction rules featured in *Combat Equipment*.

To use these rules, designers will need paper and pencils, as well as copies of the Blank Record Sheets found at the back of this book. Some may find a calculator handy as well. The *Heavy Metal* series of construction programs enables players to automate much of the process.

FICTION

As described in *Total Warfare*, fiction plays a pivotal role in bringing the *BattleTech* universe to life. Whether "story fiction" that places readers inside the heads of the characters in that universe, or "sourcebook fiction" that places the reader in the universe as though living among those characters, both work hand-in-hand to immerse players in this vibrant milieu.

Total Warfare concentrated on story fiction, including twelve different short stories, with only two sourcebook fiction sections. *TechManual* provides nine "sourcebook fiction" sections that expound upon the various aspects of military units in the *BattleTech* universe, from the point of view of various characters within that universe.

FICTION VS. RULES

It is important to remember that regardless of the critical role fiction plays in immersing players in the *BattleTech* universe, such fiction should never be construed as rules. As with *Total Warfare*, to eliminate confusion about which sections are fiction and which are rules, the fiction sections have a unique look, compared to the uniform presentation of the various rules sections.

The one exception is the *Equipment* section, which includes sourcebook fiction as well as rules. In this case, the sourcebook fiction entries for each piece of equipment are set apart in a distinctive graphic presentation, allowing readers to tell at a glance what is fiction and what are rules.

FICTION VS. ART

TechManual follows the graphic design format established by *Total Warfare*, wedding art to the book's visual presentation in order to enhance the players' experience. In this case, the graphic presentation represents that of a computer from House Kurita's Luthien Armor Works, one of the Inner Sphere's largest suppliers of military hardware (see *A Time of War*, p. 17, *Total Warfare*).

As with fiction, while art plays an important role in bringing the *BattleTech* universe to life, it should never be construed as rules.

COMPONENTS

Through *Total Warfare*, a game of *BattleTech* simulates the various combat units most commonly seen in the crossfire between the Great Houses and Clans of the Inner Sphere. This volume enables players to simulate the design process for those units that can be fielded in a standard rules *Total Warfare* game, including BattleMechs, Combat and Support vehicles, ProtoMechs, aerospace fighters, DropShips and even infantry (conventional and battle armored).

Though the units in *Total Warfare* are varied, many of the construction processes behind them function along similar lines. This chapter serves as a primer for the terms and concepts central to building these *BattleTech* units, defining the basics of each unit type as well as the core concepts of weight, space and even the principles behind rounding and the use of Blank Record Sheets.

Players who already own *Total Warfare* will note a strong similarity between this section and that book's *Components* section (see p. 21, *TW*). Just as understanding the basics of the various unit types is important for using them in the game, players should also understand the basics of each unit before attempting to create unique designs. To make this book as useful as possible, those basics are included here; subsequent sections build on that foundation to provide a complete understanding of in-universe concepts of the various unit types, as well as the rules for their construction.

UNITS

In these rules, the term "unit" refers to any single element that can be fielded in a *BattleTech* game, be it a BattleMech, IndustrialMech, ProtoMech, Combat Vehicle, conventional infantry platoon (or battle armor Point or squad), Small Craft, conventional fighter, aerospace fighter, DropShip or any Support Vehicle. In game play, units are the smallest element that moves and acts on its own.

Terminology: Unless specifically stated otherwise, the following terminology is used throughout this book:

- The word "'Mech" by itself refers to BattleMechs, OmniMechs, and IndustrialMechs.
- The word "fighter" by itself refers to conventional and aerospace fighters.
- The word "vehicle" by itself refers to all Combat and Support vehicles.
- The word "infantry" by itself refers to conventional (non-battle armor) infantry.
- The word "battle armor" or "battlesuit" refers to battle armor and exo-skeletons, military and non-military [also known as Power Armor (Light) suits, or PA(L)s for short].
- The term "aerospace unit" refers to all non-Support Vehicle aerospace units: conventional fighters, aerospace fighters, Small Craft and DropShips.

BattleMechs

BattleMechs—the most powerful ground-based war machines ever built—dominate the battlefields of the thirty-first century. These huge, humanoid vehicles stand eight to fourteen meters tall and weigh as much as 100 tons. Generally faster, more maneuverable, better armored and more heavily armed than any other combat unit, these titans are often equipped with enough firepower to flatten everything but another 'Mech.

In the armies of the thirty-first century, two broad classes of BattleMechs exist: the basic BattleMechs favored by the Inner Sphere, representing variations of and improvements on the original 'Mech technology, and the modular machines that gave the Clans their initial edge, known as OmniMechs. BattleMechs and OmniMechs are classified as light, medium, heavy or assault, indicating their relative weight and determining their overall capabilities in battle.

BattleMechs also come in two primary chassis configurations, with bipedal machines far more common than the four-legged quads.

IndustrialMechs

IndustrialMechs are rare on the battlefield, but widely used across the commercial and industrial sectors of the Inner Sphere. Born even before the first BattleMechs, by the time of the Star League era, these myomer-driven 'Mechs played a role in various aspects of life, from farming, construction and loading DropShip cargo bays to police work and so on. After the fall of the Star League, these IndustrialMechs (also known as UtilityMechs or WorkMechs) fell into disuse, their parts often scavenged to repair BattleMechs. As the Succession Wars raged on, the technology needed to build and repair 'Mechs declined and the Successor States concentrated their dwindling technological resources on the BattleMechs they needed to continue fighting.

Though the numbers of IndustrialMechs dwindled by the early half of the thirty-first century, the technological renaissance of the past few decades has finally reached beyond the military sector. These rare machines are making a strong comeback, as the civilian demand for their use drives the market and companies rush to fill the void. In some rare cases, poorer worlds have even dragooned these IndustrialMechs into military service, adding weapons in an effort to field a stronger defense force.

IndustrialMechs, like BattleMechs, come in light, medium, heavy and assault weight classes—the lattermost an obvious usurpation of the BattleMech classification—but they are rarely employed in battle and some can be as light as 10 tons in mass (half the weight of the lightest BattleMechs). IndustrialMechs may appear in bipedal or quad body types, but they do not incorporate modular Omni technology.

ProtoMechs

ProtoMechs—a strictly Clan invention—stand four to six meters tall and mass from two to nine tons. Larger than a battle armor suit but smaller than a BattleMech, these "mini-'Mechs" have abilities in common with both unit types. Their small stature means they can hide where BattleMechs cannot, and they can even move through buildings without causing excessive collateral damage.

Though tiny compared to even the smallest BattleMech, ProtoMechs can carry an impressive arsenal of weapons, and because they operate in Points of five, their coordinated fire compensates for each Proto's individual shortcomings. ProtoMechs are also extremely durable. Though they carry little armor compared to BattleMechs, they can survive the loss of limbs and even the head and remain effective.

Combat Vehicles

Most armies choose to use their BattleMech resources sparingly when they can, and so maintain forces of conventional Combat Vehicles to serve in low-intensity conflicts and as auxiliaries to BattleMech units. Classified not only by weight class the way BattleMechs are, but also by their locomotion (motive type), Combat Vehicles can be constructed as standard units or as modular OmniVehicles.

Light vehicles have a maximum weight of 35 tons, often built for speed and favored for reconnaissance. Though tracked and wheeled light vehicles exist on the battlefield, hovercraft—with their greater speeds—dominate this weight class.

Medium vehicles weigh from 40 to 55 tons and are favored as skirmishers. Medium vehicles are commonly fielded by the various House militaries to harass and pin down enemy forces until heavier units can be brought to bear.

Heavy vehicles range in weight from 60 to 75 tons. Mirroring the medium 'Mech weight class, heavy vehicles are the workhorses of all Successor State armies, and pack a serious punch with the armor to match. Commonly seen in tracked form, a heavy vehicle can stay in the fight longer than some light 'Mechs and can handle most difficult terrain.

Assault vehicles weigh from 80 to 100 tons. Though they lack the mobility of their 'Mech counterparts, the sheer volume of firepower an assault vehicle carries can bring down even heavy 'Mechs under the right conditions.

Tracked Vehicles: With a maximum weight of 100 tons and a motive system based on continuous caterpillar treads, tracked vehicles can negotiate some of the most difficult terrain. Typically mounting the bulk of their heavy weapons in turrets for a full 360 degrees of fire, tracked vehicles in the larger weight classes can often inflict a great deal of damage, even against BattleMechs.

Wheeled Vehicles: With a maximum weight of 80 tons, wheeled vehicles tend to be lighter than tracked vehicles but also typically move faster while still mounting effective weaponry. Their wheel-based locomotion is more restricted than tracks, however, so commanders usually assign wheeled vehicles to relatively open terrain and cities to serve as convoy escorts and fire-support for dismounted infantry.

Hovercraft: Much lighter on average than tracked or wheeled Combat Vehicle types, battlefield hovercraft have a maximum weight of 50 tons, and are built mostly for speed to make up for their comparatively light armor and fragile lift-fan-and-airskirt design. More advanced than tracked and wheeled vehicles, hovercraft are generally more costly as well, but their ability to rapidly close with an enemy and just as rapidly break contact makes them highly valued for reconnaissance and screening missions.

Wing-in-Ground Effect (WiGE) Vehicles: A true rarity in Combat Vehicles, often relegated to transport duties, Wing-in-Ground Effect (WiGE) vehicles are a cross between hovercraft and fixed-wing aircraft, effectively creating a unit type that can fly at an average of six meters above the prevailing terrain. Fast, and with an upper weight limit of 80 tons, these vehicles make excellent transports, but are forced to maintain constant movement to avoid stalls.

Vertical Takeoff and Landing (VTOL) Vehicles: VTOL Combat Vehicles have a maximum weight of 30 tons, making them the lightest of all Combat Vehicle types, but they are also one of the fastest. VTOLs include conventional rotary-wing craft (helicopters) and tilt-rotor aircraft whose engine mountings rotate in a 90-degree arc. Though VTOLs are highly vulnerable to damage due to their light armor and fragile rotor assemblies, their high maneuverability and ability to bypass difficult terrain makes them ideal for reconnaissance and light infantry transport duties.

BattleMech

IndustrialMech

ProtoMech

Tracked Vehicle

Wheeled Vehicle

Hovercraft

Wing in Ground Effect (WIGE)

Vertical Takeoff and Landing (VTOL)

Surface Naval Vessel

Submarine

Wheeled Support

Tracked Support

Hover Support

VTOL Support

Airship Support

Surface Naval Vehicles: Naval vessels are a rare sight in battlefields, but often appear guarding small bodies of water such as lakes and rivers near key objectives. Surface naval Combat Vehicles generally come in two classes: displacement hulls that lie directly on the water's surface, and hydrofoils that can skim the surface almost like a hovercraft. Combat hydrofoils can mass as much as 100 tons and boast great speed and firepower, while displacement hulls—with their maximum weight of 300 tons—can often provide massive fire support as seagoing tanks.

Submarine Vehicles: Submersible Combat Vehicles can weigh as much as 300 tons and provide a stealthy alternative to surface naval vessels, as well as a deterrent to underwater interlopers. These vessels are often as well armored as surface naval vessels, but decidedly more rare, due to their battlefield niche.

Support Vehicles

The Support Vehicle is one of the most varied units in *Total Warfare* game play, comprising a range of non-military and paramilitary vehicles that travel on the ground, by sea or even in the air through many of the same means as their more heavily armored and durable battlefield kin. Not intended for front-line battle, most Support Vehicles are decidedly fragile and very few are armed (those that are tend to be paramilitary vehicles, used by the various corporate security and police forces of the Inner Sphere).

Like Combat Vehicles, Support Vehicles are often defined most by their weight class and motive types, and thus use the same rough terminology in terms of light, medium, heavy and assault weight classes. In addition, Support Vehicles have a size category, with Small Support Vehicles encompassing a "super-light" weight class (under 5 tons) and Large Support Vehicles exceeding the upper limits of an equivalent Combat Vehicle design.

Wheeled: Wheeled Support Vehicles weigh from 0.100 to 4.999 tons at the Small size, 5 to 80 tons at Medium size and 80.5 to 160 tons at the Large size. Representing the simplest and most inexpensive ground vehicle type, these units operate most efficiently on established road networks, and are favored for civilian, municipal and commercial transportation.

Tracked: Tracked Support Vehicles weigh from 0.100 to 4.999 tons at the Small size, 5 to 100 tons for Medium sizes and 100.5 to 200 tons for Large sizes. Using tracks instead of wheels, these vehicles are much more adept at crossing soft or rough terrain than their wheeled counterparts and are favored for off-road rovers, agricultural and heavy industrial work.

Hover: Hover Support Vehicles weigh anywhere from 0.100 to 4.999 tons at the Small size, 5 to 50 tons at Medium size and 50.5 to 100 tons for Large units. Supported by a cushion of air, these vehicles can cross land and water with equal ease, and are favored for commercial and recreational high-speed transports. Sometimes referred to as "skimmers," hover Support Vehicles see particularly extensive use on water-rich planets, or where vast, open roadways permit high-speed inter-city transportation.

VTOL: VTOL Support Vehicles weigh anywhere from 0.100 to 4.999 tons at the Small size, 5 to 30 tons at Medium size and 30.5 to 60 tons at the Large size. Rotary wings or vectored thrust vehicles can achieve Vertical Takeoff and Landing (VTOL) capabilities, and these craft are often favored for local civil duties ranging from emergency medical airlifts to police surveillance, to aerial transportation in highly built-up areas like major cities.

WiGE: Wing-in-Ground-Effect Support Vehicles weigh anywhere from 0.100 to 4.999 tons at the Small size, 5 to 80 tons for Medium size and 80.5 to 240 tons for Large size. Essentially a cross between a hovercraft and an aircraft, these vehicles are uncommon, and are typically used as bulk transports over long distances.

Airship: Airship Support Vehicles weigh anywhere from 0.100 to 4.999 tons at the Small size and 5 to 300 tons at the Medium size. (Larger sizes are possible, but not as common and will be covered in depth in *Tactical Operations*.) These vehicles use "lighter-than-air" gases (usually inert helium) to fill lifting cells that keep them aloft, and propellers for maneuvering and station keeping. An attractive form of low-tech bulk cargo transport for various locations, commercial advertising or even passenger cruising in situations where speed is a secondary concern, Airships have more in common with aerospace units than most other Support Vehicles.

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Fixed-Wing: Fixed-Wing Support Vehicles weigh anywhere from 0.100 to 4.999 tons at the Small size class, 5 to 100 tons at the Medium size and 100.5 to 200 tons at the Large size. Though lacking the flexibility of VTOLs because of their need for prepared runways, these vehicles can operate at higher altitudes, boast greater speeds and are more rugged, earning them a favored place as a bulk transport on worlds with difficult terrain.

Naval Vessels: Naval Vessel Support Vehicles weigh anywhere from 0.100 to 4.999 tons at the Small size and 5 to 300 tons at the Medium size. (As with Airship Support Vehicles, larger sizes are possible but less common, and so will be handled in the upcoming *Tactical Operations* book.) Often eclipsed by DropShips, and rarely seen on worlds where water is sparse, naval vessels are nonetheless a cost-effective means of transporting bulk cargo. Even in the thirty-first century, these vessels range in types and sizes, with primitive paddle steamers in the rivers and streams of less developed worlds or more advanced fusion-driven submarines and hydrofoils on more sophisticated planets.

Conventional Infantry

Both the Inner Sphere and the Clans maintain armies of conventional infantry (often referred to as unarmored infantry) organized into 21- to 28-man platoons, equipped with a variety of small arms. The cheapest of all battlefield unit types, and easiest for most worlds to raise on short notice, infantry varies in mobility and firepower and are ideally suited to capturing and holding terrain in built-up areas such as cities and forests. They are also easy prey for heavier Combat Vehicles and war machines, particularly BattleMechs.

Conventional Infantry are commonly deployed as foot, motorized and jump platoons, but mechanized platoons—which use larger and more mobile transports—are also seen on battlefields far and wide.

Foot Infantry: Foot infantry have no organic transportation, carry light arms and cannot hope to successfully assault or defend against even the lightest BattleMech. These conventional infantry generally provide excellent population control, man city garrisons and mount counterinsurgency operations. Though the start-up cost for such units seems relatively high, they cost very little to maintain. In an additional advantage, most planets can call up and arm thousands of foot infantry on short notice.

Motorized Infantry: Equipped with a variety of light unarmored vehicles and often armed on par with foot infantry, motorized infantry are faster, but are still no match for BattleMechs. Motorized infantry units serve the same duties as foot infantry and also make for good forward observers or reconnaissance personnel.

A desperate battle between the Wolf's Dragoons and the Word of Blake rages on in downtown Harlech.

Fixed Wing Support

Naval Support

Foot Infantry

Motorized Infantry

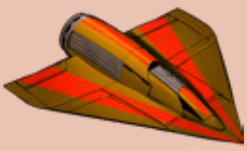
Jump Infantry

Mechanized Infantry

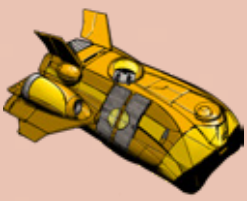
Battle Armor

Aerospace Fighter

Conventional Fighter



Small Craft



Small DropShip

Large DropShip

Jump Infantry: Jump infantry troopers are all equipped with jump packs, which can make these platoons as mobile as motorized troops in open terrain, but even faster in built-up areas. Their jump capabilities allow these troops to close quickly with enemy units, but a close assault of this type can devastate both the defender and the attacker.

Mechanized Infantry: These troops work in close conjunction with open-topped vehicles and rely on them to move around the battlefield. A wide variety of mechanized forces see battlefield service, with the most common involving tracked mini-jeeps, armored wheeled rovers and hover-sleds. These troops are generally heavier and less numerous than other infantry types, but usually make up for this fact with their enhanced mobility.

Battle Armor

Battle armored infantrymen are a class unto themselves. Wearing powered suits of armor, these troopers can carry heavy weapons into the field and deploy them with more efficiency than any conventional infantry, while boasting greater mobility and survivability. Pioneered by the Clans, but produced now by Inner Sphere armies as well, squads of these troops are rare and extremely expensive, but strong enough to endanger even BattleMechs in a way conventional infantry simply cannot.

Aerospace Fighters

The airborne analogue to the BattleMech, aerospace fighters are far more resilient than their conventional counterparts, and can operate in vacuum. This enables them to function at higher altitudes than conventional fighters, and even in deep space. This versatility has made aerospace fighters the unit of choice for commanders engaged in interplanetary campaigns, and an ideal airborne companion for BattleMech units. Aerospace fighters can mass anywhere from 10 to 100 tons, and may be constructed as standard aerospace fighters or as modular OmniFighters.

Conventional Fighters

Conventional fighters, the cheapest form of military aerospace force, weigh from 10 to 50 tons. Though limited to atmospheric use and decidedly weaker than aerospace fighters, they offer many worlds an inexpensive and less sophisticated answer to air security, ensuring that they are a common sight in most planetary garrisons.

Small Craft

Dubbed so because they are lighter than DropShips, Small Craft are aerospace craft that range from 100 to 200 tons. Used less for combat and more for shuttling supplies and passengers from near orbit to distant JumpShips, or even between planets and moons within a system, this category represents a wide range of vessels of every type and size not covered by aerospace fighters or DropShips, and is divided into two main sub-categories based on physical shape: aerodyne (aerodynamic) craft, which use wings and lifting surfaces for better atmospheric maneuverability, and spheroid (spherical) craft that can land and take off vertically.

DropShips

Massing anywhere from 200 to 100,000 tons, DropShips are one of the largest spacecraft types commonly employed by the militaries, civil agencies and corporations of the thirty-first century. Large enough to transport anything from bulk goods and passengers to BattleMechs and aerospace fighters, DropShips fill a broad range of mission roles. Military DropShips typically serve as specialized troop transports, used to ferry military forces and supplies between massive (and largely immobile) interstellar JumpShips and any planet in a target solar system. Other military DropShips act as escorts and attack ships, used to engage other DropShips. Commercial DropShips are almost always transports, shipping goods and passengers from jump points to planets and back.

Because of their broad variations, DropShips are broadly categorized not only by size (Small, Medium and Large) and shape (spheroid or aerodyne), but also by their role (troop carrier, 'Mech carrier, fighter carrier, cargo carrier, passenger liner and assault ship).

OTHER UNITS

Additional units—such as JumpShips, WarShips and space stations, as well as satellites, Rail Support Vehicles, and Large Airships and Naval Vessels—exist in the *BattleTech* universe. Rules for their use and construction will appear in *BattleTech Tactical Operations.*

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THE SHAPE OF THINGS TO COME

—Excerpt from "Battle Technology: The Evolving Face of Tactical Warfare", an essay by Hauptmann-General Tulka Garner, Kommandant of Sanglamore Academy, 11 March 3071

For almost a millennium, humans have journeyed into the far reaches of space, colonizing thousands of worlds and forming star-spanning alliances. Empowered by the technologies of fusion engines, their spacecraft carried them light-years from home, to alien worlds teeming with resources and easily bent to their will beneath the treads of mighty machinery and human ingenuity. From these humble beginnings grew the six vast star empires that made up the Inner Sphere—empires that would unite under the Star League, to bring even the far-flung worlds of the Periphery into their fold.

But even as humankind expanded into the depths of space, colonizing and settling hundreds of planets, political divisions and petty jealousies led to wars that raged across the stars. Even the final unity of the human race under the first Star League began in the fires of war, and humankind's subsequent "Golden Age" saw no end to these unrelenting conflicts.

To wage these titanic struggles, humanity once more turned to technology, and employed an arsenal of weapons ranging from small arms and tanks to aerospace fighters and spacecraft. Then, at the peak of the twenty-fifth century, the most fearsome weapon of all emerged: BattleMechs. Gigantic, often-humanoid war machines, these walking tanks could flatten cities with an arsenal of heavy weapons and could overcome almost any terrain imaginable. Ever since their debut, BattleMechs have ruled the battlefields, changing the face of armored combat forever.

In 2781, the aftermath of a bloody war between General Aleksandr Kerensky, Protector of the Star League and commander of its Defense Forces, and Stefan Amaris—usurper of House Cameron's Terran Hegemony and ruler of the Rim Worlds Republic—left the first Star League in ruins. Three years later, as the greedy lords of the five remaining Great Houses each declared themselves the heirs to the Star League and yet more war loomed, Kerensky's forces—claiming the vast majority of the highly advanced Star League Army—left for parts unknown with the bulk of the League's mightiest WarShips.

Soon afterward began the Succession Wars: three hundred years of relentless fighting waged at first with terrible weapons of mass destruction and devastating WarShip fleets. These wars ravaged hundreds of worlds, cost billions of lives and destroyed the industries and infrastructure that had once supported all of humankind. Precious, irreplaceable technologies were lost, until the House Lords found their ability to wage war endangered, their mighty WarShips gone, their dwindling armies maintained by scavenged parts. By the thirty-first century, the desperate Successor States had fallen into a pattern of endless raids and counter-raids, forming alliances, jockeying for power and the resources to keep their remaining weapons of war functional and deadly. Determined as ever to rule a reborn Star League in their own names, the House Lords assumed the greatest enemy they would ever face was each other.

They were wrong.

As the Inner Sphere sank into barbarism, Kerensky's followers built a new society in the harsh environs beyond known space. They developed a rigid caste system, designed to produce the ultimate warriors, hone the greatest scientific minds, focus the skills of technicians and laborers. For nearly three hundred years, the separate castes of Kerensky's Clans were unified by one burning ideal: that when the time was right, they would return home and reclaim the Inner Sphere. They would become the "saviors" of humanity, rebuilding the Star League in their own image.

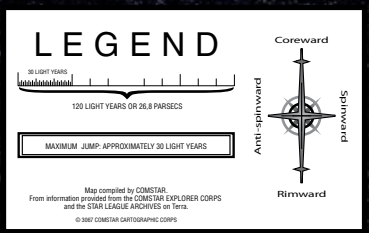
In 3048, the warlords of the Clans decided the time had come to launch their invasion. With their powerful OmniMechs and immensely strong battle armored infantry, they drove straight toward Terra, humanity's birthworld. Planet after planet fell to the Clans in less than five years, as their advanced technologies rolled over the jury-rigged war machines with which the Inner Sphere leaders still fought each other—until the shell-shocked Successor States finally united against the threat, and ComStar's army—blessed with the hoarded legacies of the nearly forgotten Star League—helped battle the Clans to a standstill.

With the return of the Clans, an arms race ensued, the renewed threat of total war sparking an explosion of new technologies and the recovery of lost techniques. The struggle to reach parity with the Clan juggernaut stumbled only where politics and internal rivalries kept the Great Houses apart—rivalries to which even the once-neutral ComStar fell victim. In the fifteen years after ComStar's victory over the Clans on Tukayyid, the cycles of war and technological growth accelerated in the Inner Sphere, enhanced by the desperate alliance known as the Second Star League. Meanwhile, in the Clan homeworlds, the descendants of the original SLDF rushed to maintain their own lead, determined to win the next Great War with the corrupted Spheroids, even as minor wars and battles raged across the stars.

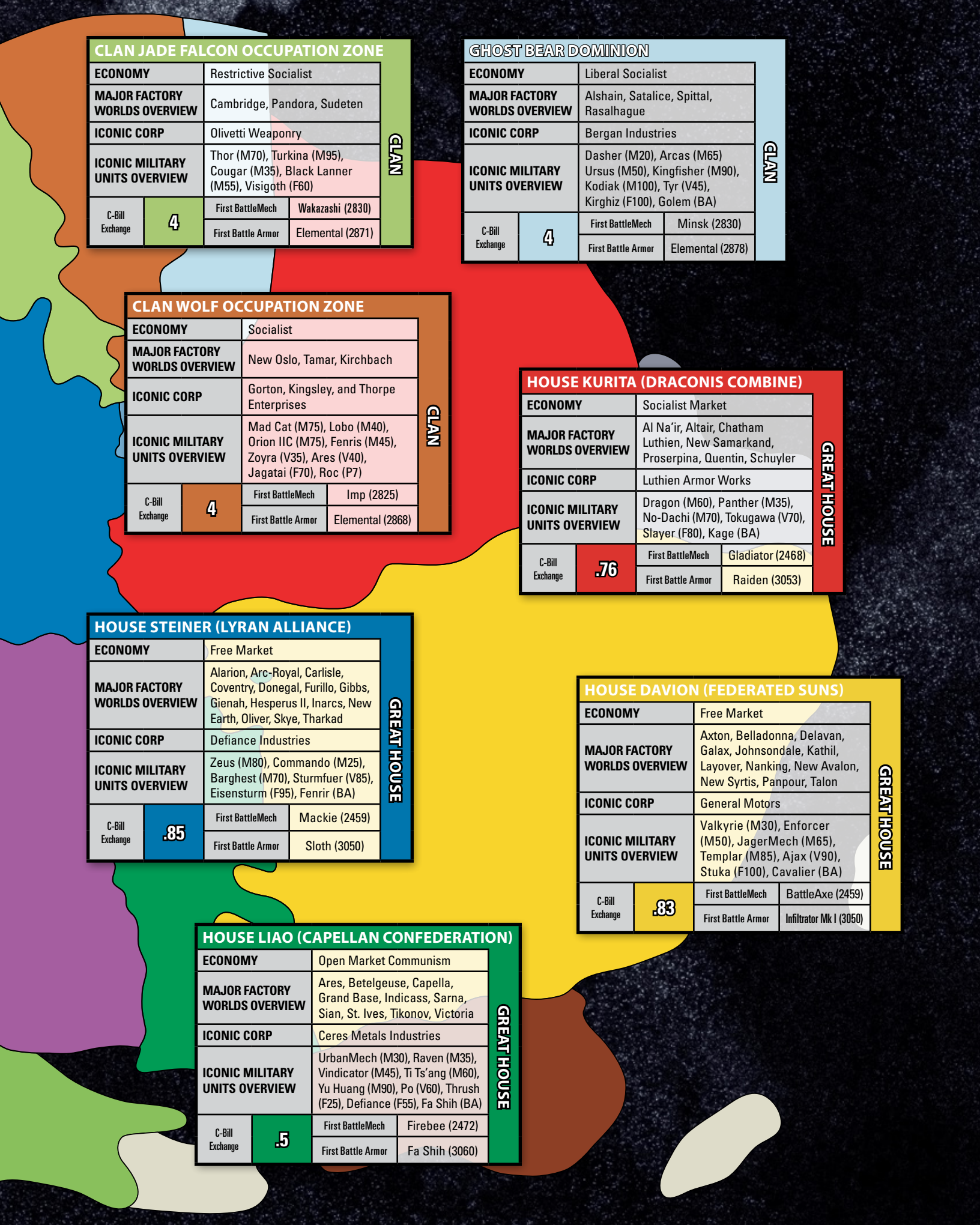
In 3067, following the devastating FedCom Civil War, the weary leaders of the Great Houses met on Tharkad and declared the Second Star League a sham. Their resources overtaxed and their armies weakened by surges of fighting, they declared themselves unable to support the loose alliance. They disbanded the Second Star League—and unwittingly unleashed a maelstrom.

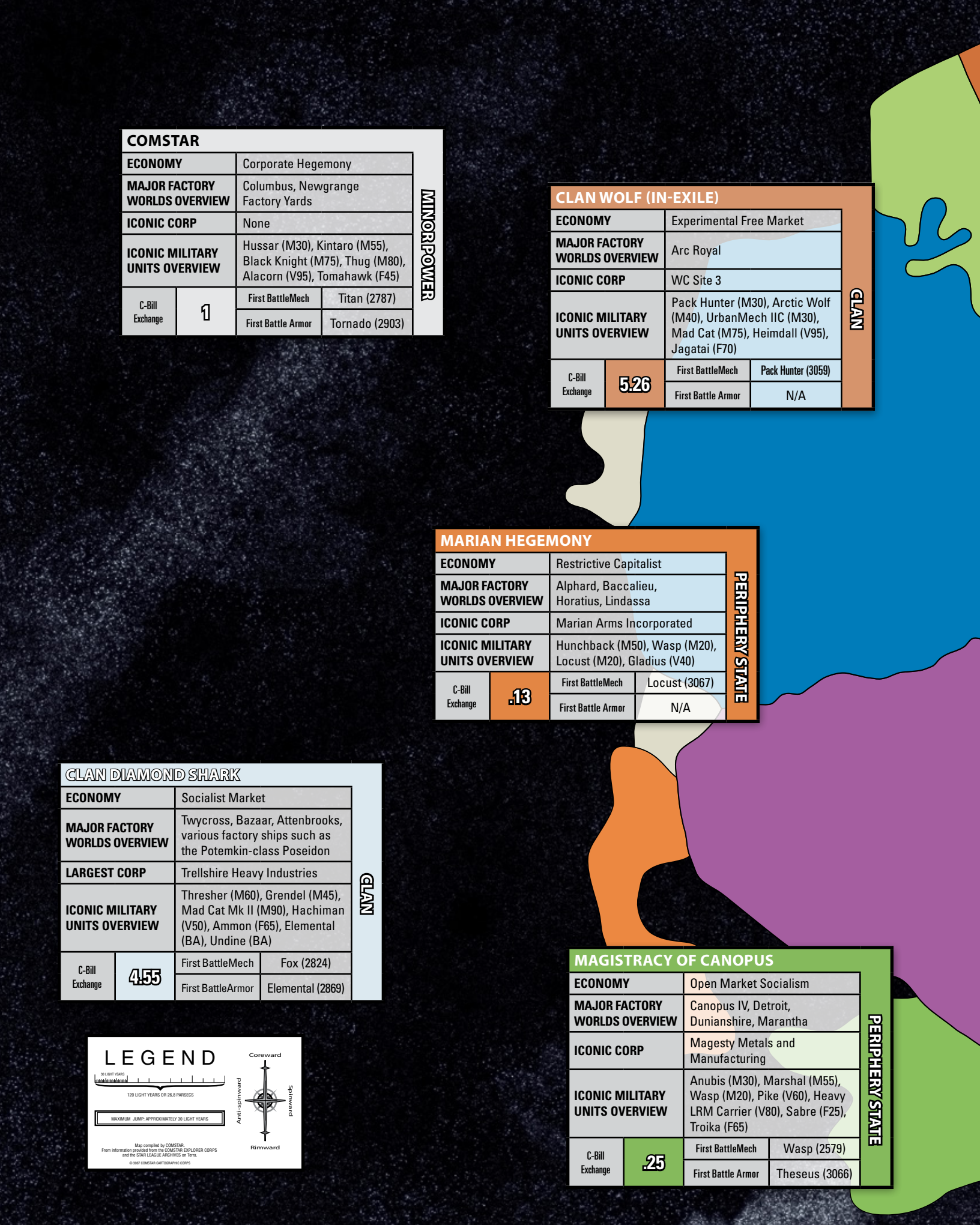
The pseudo-religious Word of Blake—splinter group of ComStar, the self-appointed protectors and controllers of interstellar communication and advanced technologies—saw their imminent ascension into the new Star League as the glorious first step toward a new Golden Age for all humankind. Having prepared for this moment in secret for fifteen years with terrible new weapons and incredible new technologies, they reacted to the disbandment of the League with swift and vengeful anger.

So began the Jihad: a Sphere-wide war that has pitted every faction against one another and even against themselves, a new age of unrelenting warfare where victory goes to whoever has the biggest and best weaponry. Now, as the Great Houses and Clans battle one another, war is everywhere. Armies of tanks and men clash beneath skies clouded by scores of aerospace fighters and descending DropShips. Combat vehicles hold the lines to cover the advance of infantry, while battle armored troops dare to oppose BattleMechs—those mighty avatars of walking death that still lord it over the modern battlefields. The tools of modern armored combat open a wide range of possibilities for the armies of the Inner Sphere and the Clans—in a universe where life is cheap, but technology isn't.



HOUSE MARIK (FREE WORLDS LEAGUE)				
ECONOMY	Open Capitalism			GREAT HOUSE
MAJOR FACTORY WORLDS OVERVIEW	Amnity, Andurien, Atreus, Gibson, Irian, Kalidasa, Kendall, Keystone, Lopez, Marik, Shiro III, Stewart, Tematagi, Thermopolis, Wallis			
ICONIC CORP	Irian Technologies			
ICONIC MILITARY UNITS OVERVIEW	Perseus (M75), Awesome (M80), Hermes II (M40), Ontos (V95), Stingray (F60), Achileus (BA)			
C-Bill Exchange	.89	First BattleMech	Icarus (2470)	
		First Battle Armor	Achileus (3057)	


CLAN JADE FALCON OCCUPATION ZONE
ECONOMY
Restrictive Socialist
MAJOR FACTORY WORLDS OVERVIEW
Cambridge, Pandora, Sudeten
ICONIC CORP
Olivetti Weaponry
ICONIC MILITARY UNITS OVERVIEW
Thor (M70), Turkina (M95), Cougar (M35), Black Lanner (M55), Visigoth (F60)
C-Bill Exchange
4
First BattleMech
Wakazashi (2830)
First Battle Armor
Elemental (2871)
CLAN
GHOST BEAR DOMINION
ECONOMY
Liberal Socialist
MAJOR FACTORY WORLDS OVERVIEW
Alshain, Satalice, Spittal, Rasalhague
ICONIC CORP
Bergan Industries
ICONIC MILITARY UNITS OVERVIEW
Dasher (M20), Arcas (M65) Ursus (M50), Kingfisher (M90), Kodiak (M100), Tyr (V45), Kirghiz (F100), Golem (BA)
C-Bill Exchange
4
First BattleMech
Minsk (2830)
First Battle Armor
Elemental (2878)
CLAN
CLAN WOLF OCCUPATION ZONE
ECONOMY
Socialist
MAJOR FACTORY WORLDS OVERVIEW
New Oslo, Tamar, Kirchbach
ICONIC CORP
Gorton, Kingsley, and Thorpe Enterprises
ICONIC MILITARY UNITS OVERVIEW
Mad Cat (M75), Lobo (M40), Orion IIC (M75), Fenris (M45), Zoyra (V35), Ares (V40), Jagatai (F70), Roc (P7)
C-Bill Exchange
4
First BattleMech
Imp (2825)
First Battle Armor
Elemental (2868)
CLAN
HOUSE KURITA (DRACONIS COMBINE)
ECONOMY
Socialist Market
MAJOR FACTORY WORLDS OVERVIEW
Al Na'ir, Altair, Chatham Luthien, New Samarkand, Proserpina, Quentin, Schuyler
ICONIC CORP
Luthien Armor Works
ICONIC MILITARY UNITS OVERVIEW
Dragon (M60), Panther (M35), No-Dachi (M70), Tokugawa (V70), Slayer (F80), Kage (BA)
C-Bill Exchange
.76
First BattleMech
Gladiator (2468)
First Battle Armor
Raiden (3053)
GREAT HOUSE
HOUSE STEINER (LYRAN ALLIANCE)
ECONOMY
Free Market
MAJOR FACTORY WORLDS OVERVIEW
Alarion, Arc-Royal, Carlisle, Coventry, Donegal, Furillo, Gibbs, Gienah, Hesperus II, Inarcs, New Earth, Oliver, Skye, Tharkad
ICONIC CORP
Defiance Industries
ICONIC MILITARY UNITS OVERVIEW
Zeus (M80), Commando (M25), Barghest (M70), Sturmfuer (V85), Eisensturm (F95), Fenrir (BA)
C-Bill Exchange
.85
First BattleMech
Mackie (2459)
First Battle Armor
Sloth (3050)
GREAT HOUSE
HOUSE DAVION (FEDERATED SUNS)
ECONOMY
Free Market
MAJOR FACTORY WORLDS OVERVIEW
Axton, Belladonna, Delavan, Galax, Johnsondale, Kathil, Layover, Nanking, New Avalon, New Syrtis, Panpour, Talon
ICONIC CORP
General Motors
ICONIC MILITARY UNITS OVERVIEW
Valkyrie (M30), Enforcer (M50), JagerMech (M65), Templar (M85), Ajax (V90), Stuka (F100), Cavalier (BA)
C-Bill Exchange
.83
First BattleMech
BattleAxe (2459)
First Battle Armor
Infiltrator Mk I (3050)
GREAT HOUSE
HOUSE LIAO (CAPELLAN CONFEDERATION)
ECONOMY
Open Market Communism
MAJOR FACTORY WORLDS OVERVIEW
Ares, Betelgeuse, Capella, Grand Base, Indicass, Sarna, Sian, St. Ives, Tikonov, Victoria
ICONIC CORP
Ceres Metals Industries
ICONIC MILITARY UNITS OVERVIEW
UrbanMech (M30), Raven (M35), Vindicator (M45), Ti Ts'ang (M60), Yu Huang (M90), Po (V60), Thrush (F25), Defiance (F55), Fa Shih (BA)
C-Bill Exchange
.5
First BattleMech
Firebee (2472)
First Battle Armor
Fa Shih (3060)
GREAT HOUSE



COMSTAR

MINOR POWER

ECONOMY	Corporate Hegemony
MAJOR FACTORY WORLDS OVERVIEW	Columbus, Newgrange Factory Yards
ICONIC CORP	None
ICONIC MILITARY UNITS OVERVIEW	Hussar (M30), Kintaro (M55), Black Knight (M75), Thug (M80), Alacorn (V95), Tomahawk (F45)

C-Bill Exchange	1	First BattleMech	Titan (2787)
		First Battle Armor	Tornado (2903)

CLAN WOLF (IN-EXILE)

CLAN

ECONOMY	Experimental Free Market
MAJOR FACTORY WORLDS OVERVIEW	Arc Royal
ICONIC CORP	WC Site 3
ICONIC MILITARY UNITS OVERVIEW	Pack Hunter (M30), Arctic Wolf (M40), UrbanMech IIC (M30), Mad Cat (M75), Heimdall (V95), Jagatai (F70)

C-Bill Exchange	5.26	First BattleMech	Pack Hunter (3059)
		First Battle Armor	N/A

MARIAN HEGEMONY

PERIPHERY STATE

ECONOMY	Restrictive Capitalist
MAJOR FACTORY WORLDS OVERVIEW	Alphard, Baccalieu, Horatius, Lindassa
ICONIC CORP	Marian Arms Incorporated
ICONIC MILITARY UNITS OVERVIEW	Hunchback (M50), Wasp (M20), Locust (M20), Gladius (V40)

C-Bill Exchange	.13	First BattleMech	Locust (3067)
		First Battle Armor	N/A

CLAN DIAMOND SHARK

CLAN

ECONOMY	Socialist Market
MAJOR FACTORY WORLDS OVERVIEW	Twycross, Bazaar, Attenbrooks, various factory ships such as the Potemkin-class Poseidon
LARGEST CORP	Trellshire Heavy Industries
ICONIC MILITARY UNITS OVERVIEW	Thresher (M60), Grendel (M45), Mad Cat Mk II (M90), Hachiman (V50), Ammon (F65), Elemental (BA), Undine (BA)

C-Bill Exchange	4.55	First BattleMech	Fox (2824)
		First BattleArmor	Elemental (2869)

MAGISTRACY OF CANOPUS

PERIPHERY STATE

ECONOMY	Open Market Socialism
MAJOR FACTORY WORLDS OVERVIEW	Canopus IV, Detroit, Dunianshire, Marantha
ICONIC CORP	Magesty Metals and Manufacturing
ICONIC MILITARY UNITS OVERVIEW	Anubis (M30), Marshal (M55), Wasp (M20), Pike (V60), Heavy LRM Carrier (V80), Sabre (F25), Troika (F65)

C-Bill Exchange	.25	First BattleMech	Wasp (2579)
		First Battle Armor	Theseus (3066)

LEGEND

30 LIGHT YEARS

120 LIGHT YEARS OR 26.8 PARSECS

MAXIMUM JUMP: APPROXIMATELY 30 LIGHT YEARS

Coreward

Anti-spinward

Spinward

Rimward

Map compiled by COMSTAR.
From information provided from the COMSTAR EXPLORER CORPS and the STAR LEAGUE ARCHIVES on Terra.

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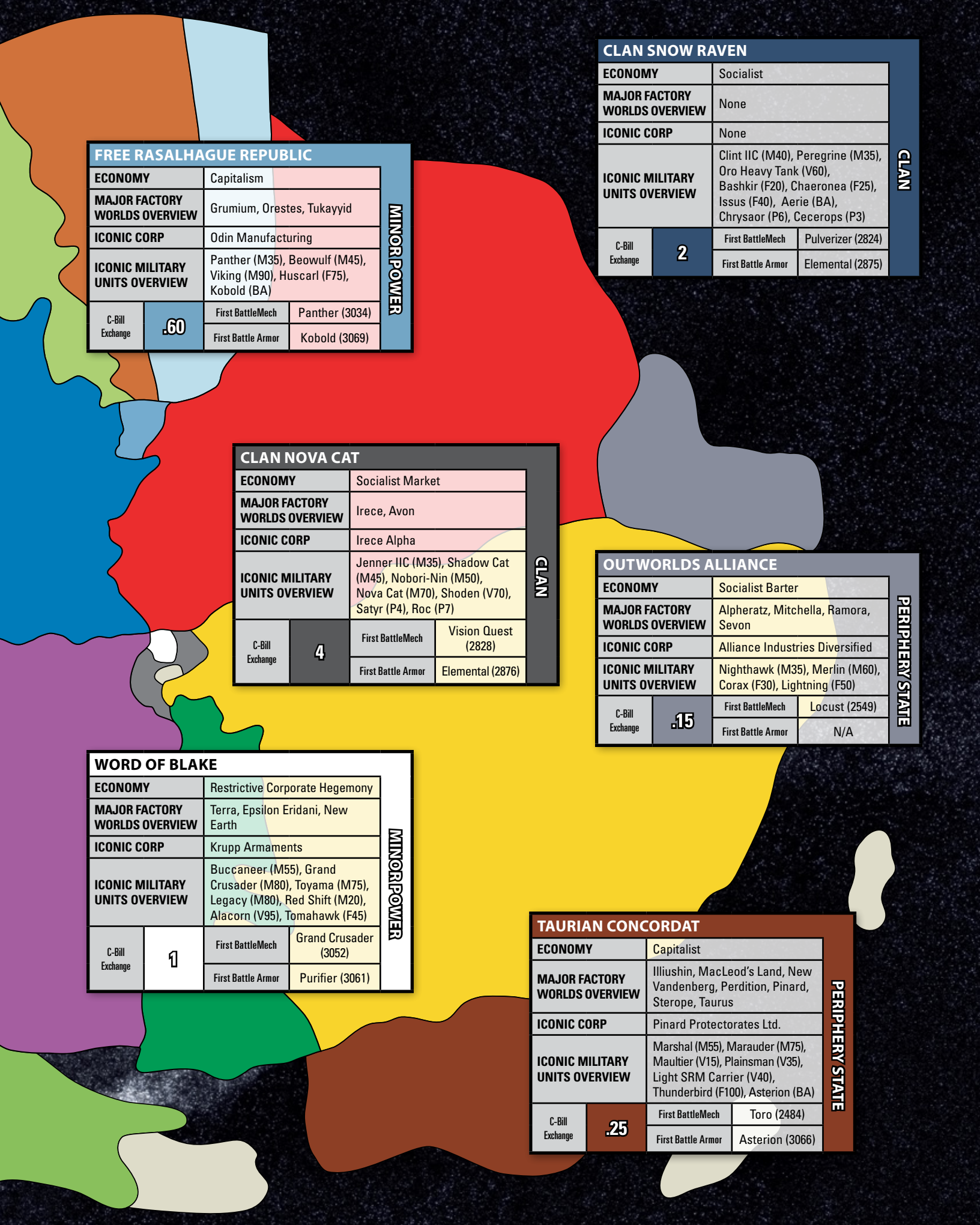


FREE RASALHAGUE REPUBLIC

MINOR POWER

ECONOMY	Capitalism
MAJOR FACTORY WORLDS OVERVIEW	Grumium, Orestes, Tukayyid
ICONIC CORP	Odin Manufacturing
ICONIC MILITARY UNITS OVERVIEW	Panther (M35), Beowulf (M45), Viking (M90), Huscarl (F75), Kobold (BA)

C-Bill Exchange	.60	First BattleMech	Panther (3034)
		First Battle Armor	Kobold (3069)

CLAN SNOW RAVEN

CLAN

ECONOMY	Socialist
MAJOR FACTORY WORLDS OVERVIEW	None
ICONIC CORP	None
ICONIC MILITARY UNITS OVERVIEW	Clint IIC (M40), Peregrine (M35), Oro Heavy Tank (V60), Bashkir (F20), Chaeronea (F25), Issus (F40), Aerie (BA), Chrysaor (P6), Cecerops (P3)

C-Bill Exchange	2	First BattleMech	Pulverizer (2824)
		First Battle Armor	Elemental (2875)

CLAN NOVA CAT

CLAN

ECONOMY	Socialist Market
MAJOR FACTORY WORLDS OVERVIEW	Irece, Avon
ICONIC CORP	Irece Alpha
ICONIC MILITARY UNITS OVERVIEW	Jenner IIC (M35), Shadow Cat (M45), Nobori-Nin (M50), Nova Cat (M70), Shoden (V70), Satyr (P4), Roc (P7)

C-Bill Exchange	4	First BattleMech	Vision Quest (2828)
		First Battle Armor	Elemental (2876)

OUTWORLDS ALLIANCE

PERIPHERY STATE

ECONOMY	Socialist Barter
MAJOR FACTORY WORLDS OVERVIEW	Alpheratz, Mitchella, Ramora, Sevon
ICONIC CORP	Alliance Industries Diversified
ICONIC MILITARY UNITS OVERVIEW	Nighthawk (M35), Merlin (M60), Corax (F30), Lightning (F50)

C-Bill Exchange	.15	First BattleMech	Locust (2549)
		First Battle Armor	N/A

WORD OF BLAKE

MINOR POWER

ECONOMY	Restrictive Corporate Hegemony
MAJOR FACTORY WORLDS OVERVIEW	Terra, Epsilon Eridani, New Earth
ICONIC CORP	Krupp Armaments
ICONIC MILITARY UNITS OVERVIEW	Buccaneer (M55), Grand Crusader (M80), Toyama (M75), Legacy (M80), Red Shift (M20), Alacorn (V95), Tomahawk (F45)

C-Bill Exchange	1	First BattleMech	Grand Crusader (3052)
		First Battle Armor	Purifier (3061)

TAURIAN CONCORDAT

PERIPHERY STATE

ECONOMY	Capitalist
MAJOR FACTORY WORLDS OVERVIEW	Illiushin, MacLeod's Land, New Vandenberg, Perdition, Pinard, Sterope, Taurus
ICONIC CORP	Pinard Protectorates Ltd.
ICONIC MILITARY UNITS OVERVIEW	Marshal (M55), Marauder (M75), Maultier (V15), Plainsman (V35), Light SRM Carrier (V40), Thunderbird (F100), Asterion (BA)

C-Bill Exchange	.25	First BattleMech	Toro (2484)
		First Battle Armor	Asterion (3066)

A Davion AS7-D Atlas *and BLR-4S* BattleMaster *exit a repair hangar, flanked by a Light Utility Truck.*

In the various rules sections that follow, players will learn how to design each of the *BattleTech* units described in the *Introduction*. These methods may vary somewhat, but most use common concepts in terms of weight, space, technology and so forth. The following rules explain how these concepts work in terms of constructing units for standard rules play (as presented in *Total Warfare*). Unless otherwise specified, all units constructed in this book rely on these basic construction concepts.

WEIGHT (MASS)

In *BattleTech*, most units are measured by their weight, or mass. The *BattleTech* universe uses the metric system, with all objects defined by their weight in kilograms or metric tons. In *TechManual* construction, units may be constructed under the kilogram standard (battlesuits, ProtoMechs, and Small Support Vehicles) or by the tonnage standard (BattleMechs, IndustrialMechs, Combat Vehicles, Medium and Large Support Vehicles and aerospace units).

In *TechManual*, nearly every unit must establish its target weight before construction can begin. This weight may be referred to as the unit's Total Mass (Unit Mass or Unit Weight) or Total Tonnage (Unit Tonnage).

UNUSED WEIGHT

Even if the completed unit falls short of this target weight, once completed, the unit must be considered to have achieved its target weight for purposes of game play performance and transport weight. Unused weight is either "lost" or treated as cargo (if the unit's construction rules so permit). For example, if a Support Vehicle designed with a target weight of 100 tons incorporates only 86 tons worth of structure, engines and other components, it still functions as a 100-ton unit and weighs 100 tons in a DropShip's cargo bay.

CONVENTIONAL INFANTRY

Under the rules in *TechManual*, conventional infantry is the only unit type that does *not* require designers to determine its weight beforehand. Instead, the weight of an infantry platoon must be determined at the end of the creation process (where it applies solely for transport reasons).

SPACE (CRITICALS)

Most—but not all—units constructed in *TechManual* make use of a secondary construction standard alternately referred to as space, critical space or weapon slots. Used to determine the maximum capacity of equipment the unit can place in a given location, space—and how it works for a given unit—is fleshed out for each particular unit type as follows.

BATTLEMECHS AND INDUSTRIALMECHS

Critical space is internal to the 'Mech's frame, where bulkier items occupy more room than smaller, sleeker components. Because 'Mechs have a specific internal arrangement that permits possible critical hits to the 'Mech's internal structure, this space is also used to locate key components, weapons and ammunition bins within a given design, graphically illustrating what amounts to the unit's "internal organs."

BATTLE ARMOR

Battle armor (battlesuits) must consider a specific weight range limit per body location when adding weapons and equipment to their inventories. In addition, battle armor uses a weapon slots system that parallels the one used by BattleMechs and IndustrialMechs, and so each item mountable on a battlesuit occupies a certain amount of internal space. Some (but not all) ammunition mounted on battle armor also consumes space.

COMBAT VEHICLES AND AEROSPACE UNITS

Using a more open construction system, Combat Vehicles and aerospace fighters track only their non-structural parts (weapons and equipment) in the form of a straight inventory of items. Combat Vehicles receive a flat number of such weapon slots based on their weight, while aerospace and conventional fighters have a static number regardless of size, and Small Craft/DropShips may expand their slot limits by expanding their targeting systems. In all of these unit types, weapons and other non-structural equipment (unless specifically stated otherwise) occupy a single "weapon slot" on the unit's inventory, regardless of their bulk, and ammunition (unless otherwise specified) is considered free.

CONVENTIONAL INFANTRY

Conventional infantry units do not track internal space.

PROTOMECHS

Like Combat Vehicles and aerospace units, core structural components (including heat sinks and jump jets) are not counted toward the unit's equipment space. This leaves only weapons and other optional items to be tracked by a weapons inventory similar to that of Combat Vehicles and aerospace units, where each item—regardless of bulk—occupies one weapon slot. However, because of their small size, ProtoMechs must bear in mind the weight of their weapons when installing them, as each body location has a specific weight range limit.

SUPPORT VEHICLES

Though built along the same lines as Combat Vehicles and aerospace units, Support Vehicles handle internal space somewhat differently. Because Support Vehicles are not built for military use, heavy weapons mounted on such units take up multiple item slots, and ammunition also consumes internal space.

TECHNOLOGY BASE

The technology base (tech base) of a given unit determines its access to components and its general level of sophistication. Most units in standard rules (as presented in *Total Warfare*) game play fall into two broad technological categories: Clan and Inner Sphere. Clan technology is more advanced, lighter, more powerful and generally more compact than Inner Sphere technology. The broader industrial capacity of the Inner Sphere and Periphery, however, means that such equipment is generally more varied, less expensive and easier to obtain and maintain.

Equipment and components are generally assigned a Clan or Inner Sphere technology base in the core construction rules, as well as in the *Equipment* section (starting on p. 200) and the Equipment Tables (starting on p. 341). Units built with a Clan Technology Base may only use equipment and components available to the Clans, while units built with an Inner Sphere Technology Base may only use equipment and components available to the Inner Sphere.

SHARED TECHNOLOGY

In some cases, a given component or item may be available to both Clan and Inner Sphere technology bases, but will have differing statistics for each (such as ER large lasers or double heat sinks). In such cases, designers *must* use the statistics appropriate to the unit's chosen technology base.

Other items and components may be available to both tech bases with *no* statistical differences (such as single heat sinks or standard 'Mech armor). These items are considered universal components, and may be used equally well by units designed under both tech bases.

PROTOMECHS

ProtoMechs may only be constructed using a Clan Technology Base.

SUPPORT VEHICLES

Support Vehicles must also be assigned to a Clan or Inner Sphere technology base at the start of construction, the same as all other unit types. However, in addition to assigning and adhering to a technology base, these units also have a Technology Rating (Tech Rating) that reflects the wider range of sophistication inherent to their design.

The Support Vehicle's Tech Rating is expressed as a letter code, A through F, which indicates the relative level of sophistication from lowest to highest (respectively). Unlike items of differing tech bases, a Support Vehicle *may* mix items of differing Tech Ratings on a component-by-component basis, but the final Tech Rating of the Support Vehicle is presumed to be that of its most advanced component for purposes of determining availability and cost multipliers.

OTHER UNITS

All other *BattleTech* units covered in this book—aerospace units, BattleMechs, battle armor, Combat Vehicles, conventional infantry and IndustrialMechs—may be constructed using either Clan or Inner Sphere tech bases. A number of these unit types may incorporate universal components, but must otherwise maintain the same technology base throughout the design process.

OMNI TECHNOLOGY

Certain units may be constructed using modular technologies first developed by the Clans. In most cases, these units are differentiated from their non-modular versions with the prefix "Omni-" and may be broadly referred to as Omni units

(or Omnis). Omni units function in combat just like their standard equivalents, but may be rapidly reconfigured between missions and are depicted as having a Primary configuration and at least one Alternate configuration that uses the same base components (structure, engines, armor and controls), but may vary in weapons and other equipment.

All equipment and components used in an Omni unit's base (core) configuration are considered "fixed" and may not change in terms of weight, space or bodily location between the base model and any of its Primary or Alternate configurations. At minimum, such fixed equipment includes the Omni unit's chassis (internal structure/structural integrity values and arrangement), engine (type, rating and size), control systems (including cockpits, actuators and fire-control systems, as well as driving and lift/dive equipment for vehicles) and armor (including type and allocation). In addition, some weapons and a minimum number of heat sinks—where applicable—may be considered part of the Omni unit's base design, with such components "fixed" to the core of the unit.

Any weight or mass left over after the fixed core components and any optional items are installed on the base design is considered open to modular pods. This pod-based equipment fills out the remainder of the unit's unused weight and/or space to complete the design, and may include additional heat sinks, weapons, ammunition and so forth.

ALLOWED UNITS

Aerospace fighters, BattleMechs, Combat Vehicles and Support Vehicles may use Omni technology regardless of whether they are constructed using Clan or Inner Sphere technology bases. Aerospace fighters (OmniFighters) and Airship, Fixed-Wing, Naval or VTOL vehicles (Combat or Support) gain no additional benefits from Omni technology in game play. BattleMechs (OmniMechs), ground-based Combat Vehicles (OmniVehicles) and ground-based Support Vehicles (Support OmniVehicles) designed as Omnis may carry a squad of battlesuits capable of using the Mechanized Battle Armor rules (see p. 227, *TW*) with no loss in performance.

Battle Armor: Battlesuits use a variation on modular technology that requires special modular mountings to be installed on a location-by-location basis at the designer's option, and so battle armor units are not considered true Omni units.

PROHIBITED UNITS

Conventional fighters, conventional infantry, DropShips, IndustrialMechs, ProtoMechs and aerospace Small Craft may not be constructed using Omni technology, regardless of the technology base chosen for them.

WEAPONS AND AMMUNITION

The various units in *Total Warfare* employ a broad range of weapons. For purposes of construction, these weapons are divided into five main categories, some of which overlap in game play.

HEAVY WEAPONS

These weapons generally weigh as little as 0.25 tons (Inner Sphere heavy weapons are never seen below 0.5 tons) and up. This class of weapons represents those commonly available to BattleMechs, IndustrialMechs, ProtoMechs, Combat Vehicles, aerospace units and Support Vehicles of Medium size or larger. Some heavy weapons may be further restricted to select unit types, such as capital missile launchers (which only DropShips may carry) or hatchets (which may only be wielded by BattleMechs and IndustrialMechs).

Ammunition for heavy weapons is generally required only for ballistic and missile weapons, and must be installed in full bins for all unit types except ProtoMechs (ProtoMech ammunition may be installed per shot). Under these rules, a full bin represents 1 ton of ammunition for most weapons, though machine guns may install half-ton bins at the designer's option. The amount of ammunition a weapon receives per bin is shown under its listing on the Weapons and Equipment Tables (starting on p. 341). Depending on a unit's construction rules, ammunition may occupy space as well as weight.

MEDIUM WEAPONS

The medium weapon category overlaps with the Support subdivision of infantry weapons, and tends to reflect man-portable versions of heavy weapons such as the SRM and the machine gun. In terms of construction, medium weapons may be mounted only on Small Support Vehicles or battle armor with anti-personnel weapon mounts.

Regardless of the weapon's type (energy, ballistic, missile and so forth), medium weapons mounted on Support Vehicles and battlesuits include a first lot of ammunition free with the weapon, equal to a single default-size bin for that weapon. Additional ammunition may be installed as well, though the amount of shots provided for a given amount of weight varies from weapon to weapon. The weight of this ammunition (and the number of shots provided per unit of ammo), are shown in the weapon's listing on the Conventional Infantry Weapons Table (starting on p. 349). Unless otherwise noted in the unit's construction rules, ammunition for a medium weapon is considered part of the weapon in terms of space occupied.

LIGHT WEAPONS

Light weapons overlap with the Standard subdivision of infantry weapons, reflecting smaller man-portable arms such as pistols, rifles and submachine guns. In terms of construction, light weapons may be mounted only on Small Support Vehicles or battle armor with anti-personnel weapon mounts.

In terms of ammunition, light weapons use the same rules as medium weapons.

BATTLE ARMOR WEAPONS

Battle armor weapons occupy a middle ground between medium and heavy weapons. Though based on medium weapons, these weapons are significantly upgraded and enhanced for use by battlesuit units only, where their enhanced targeting capabilities and more stable firing render them more effective than their conventional infantry variations.

Non-missile battle armor weapons install ammunition along the same lines as medium and light weapons, integrating all ammunition into the weapon's space and counting only as additional weight for the weapon itself. Battlesuit missile launchers receive one full volley of missiles free, but must allocate mass and space for additional volleys based on the size of the launcher used, with each full four missiles (regardless of volley size) occupying an extra slot of internal space.

CONVENTIONAL INFANTRY WEAPONS

Infantry weapons are armaments that conventional infantry troops may carry without modification. These weapons are broken into three broad sub-classes: Personal (weapons intended for extreme close-range combat, such as bows, swords and knives), Standard (small arms and rifles) and Support (heavier weapons intended for anti-armor work). Various special-features categories also apply based on the weapons' function, with Subduing weapons effective in non-lethal work or against conventional infantry, and Flame-based (incendiary) weapons capable of starting fires or generating heat against certain units. Under these construction rules, only conventional infantry units, Small Support Vehicles and battle armor with anti-personnel weapon mounts may use infantry weapons (as indicated above).

Infantry ammunition is not tracked by conventional infantry units, nor is weapon weight considered significant in their design (weapons are presumed to be part of the trooper's weight). The values for infantry weapon weights and shots per bin are primarily intended to aid in the construction of Small Support Vehicles and battle armor. However, in logistical or role-playing campaigns, players may find the data on infantry weapons useful.

AMMUNITION

Regardless of the ammunition installation rules referenced above, it should be noted that only heavy weapons and battle armor missile weapons track ammunition usage in *Total Warfare* standard rules play. However, any weapon that requires ammunition must include at least one bin of ammo when created, and may carry more at the designer's option. (Later rulebooks will address the other types in campaign and RPG-scale game play.)

GUN-1ERD Gunslinger, Second Freemen (Free Rasalhague Republic)

COST AND BATTLE VALUE

As the final phase of the construction process, designers should compute the cost and Battle Value (BV) for all units built using these rules.

COST

The cost of a unit (in C-bills, the dominant monetary system used in the *BattleTech* universe) reflects the resources required to produce it. As this information is more useful for logistical operations and roleplaying settings (both of which will be addressed in upcoming products such as *Tactical Operations* and *Strategic Operations*), computing a unit's cost may be considered an optional part of the design process.

BATTLE VALUE (BV)

The Battle Value of a unit reflects its overall combat capabilities relative to other units in game play. This value may be used to determine a more balanced mix of opposing forces during a pick-up game of *BattleTech*. Though choosing not to compute a unit's Battle Value during the design process in no way invalidates the design, it is highly recommended that the designer compute the BV prior to using the unit in any standard rules games.

ROUNDING AND PERCENTAGES

Constructing units for use in *BattleTech* games can be a lengthy and math-intensive process. As a result, designers must often round off figures generated by formulas in order to make them more manageable during the design process. The following paragraphs describe a number of basic rounding principles that designers will find throughout the various construction rules in this book.

GENERAL ROUNDING (UP, DOWN AND "NORMALLY")

Recurring rules throughout this book may request that a designer "round up," "round down" or "round normally," depending on the situation.

Rounding up means to *increase* the value to the nearest desired number (usually the nearest whole number, though some rules ask for the nearest half, the nearest tenth or even the nearest 5 or more). For example, if a value of 3.1 is achieved and a designer is asked to "round up to the nearest whole number," that 3.1 becomes a 4. [**Note:** Sometimes, the formula for rounding up may be expressed in text as, "For every X of something (or fraction thereof), add Y…." In such cases, the designer should divide the number of specified items by the value of X and round up to the nearest whole to find the value of Y.]

Rounding down means to *decrease* the value to the nearest desired number. For example, a value of 3.6 that the designer must "round down to the nearest whole" becomes a 3. [**Note:** As described above with rounding up, sometimes formulas that round down are expressed in text as "For every full X of something, add Y…." In such cases, the designer should divide

the number of specified items by the value of X and round down to the nearest whole to find the value of Y.]

Rounding normally means that when the value to be rounded falls closer to a lower target number than a higher one, the designer must round down. Conversely, values from the midpoint between two possible target numbers and up to the higher number must be rounded up. For example, a value of 3.4 that the designer must "round normally to the nearest half" becomes 3.5, because 3.5 is closer to 3.4; but a value of less than 3.25 (the midpoint between 3.0 and 3.5) would be rounded down to 3.

ROUNDING AND WEIGHT

Most units that may be constructed in this *TechManual* measure their weight by the *Tonnage Standard*. Small Support Vehicles, ProtoMechs and battlesuits use a *kilogram standard* instead (1,000 kilograms = 1 ton). When rounding weight values for units using the tonnage standard, a designer should round up all weight values to the nearest half-ton unless the unit's construction rules specifically state otherwise. Kilogram-standard units round weight up to the nearest full kilogram.

ROUNDING AND SPACE

Though rounding rarely comes up in terms of assigning space to multi-slot items during construction, item space fractions during construction are always rounded up to the nearest whole number.

ROUNDING AND ARMOR/INTERNAL STRUCTURE

Many armor types exist for various units that can result in fractional armor points during design. Unless stated otherwise under the unit's construction rules, when rounding fractional armor points, always round down to the nearest whole number. Conversely, if a designer is trying to find the weight of an amount of armor based on the number of points and comes up with a fraction, that fraction should be rounded up to the nearest half-ton (for tonnage-standard units), or to the nearest kilogram (for kilogram-standard units).

Internal structure usually appears in a fractional format only when creating Combat Vehicles and Support Vehicles, which derive their internal structure values from formulas rather than tables. Unless stated otherwise, whenever the designer encounters fractional values for internal structure points, these values are always rounded up.

ROUNDING AND COSTS/BATTLE VALUE

At the end of the cost computations for any unit, all C-bill cost values must be rounded up to the nearest 0.01 C-bill. At the end of the Battle Value computations for any unit, any fractional values must be rounded normally to the nearest whole number.

PERCENTAGES

Sometimes, the rules require a value in terms of percentages. Designers should note that a percentage value may be expressed as a straight multiplier by moving the decimal point two numbers to the left (or dividing by 100, without rounding). Multiplying this value by the value in question attains the desired percentage of that value. For example, if a rule requests the designer to find "30 percent of the unit's tonnage" and the unit's target weight (tonnage) is 65, the designer should multiply 65 (the unit's tonnage) by 0.30 (30 percent = 30 ÷ 100 = 0.30) to find the desired value. The rounding rules applied when computing a percentage may vary by situation.

RECORD SHEETS

In *Total Warfare*, game play is resolved for all units via record sheets that track the unit's relative level of damage, heat (where applicable) and a number of other statistics. At the end of the design process, each designer must translate his or her unit from its raw statistics to an appropriate record sheet in order to use it properly in a game of *BattleTech*.

Blank Record Sheets are provided at the back of this rulebook for all unit types. How they work, and which record sheets should be used for each unit type featured in this book, are outlined below.

Note: As with the *Components* section (see p. 9), players that own *Total Warfare* will notice some similarities between this section and the *Record Sheets* section of *Total Warfare* (see p. 26, *TW*). However, this section, while conveying much of the same information, focuses on the record sheet in terms of construction.

RECORD SHEET TYPES

TechManual provides 17 distinct record sheets for use in designing and using units in *Total Warfare* game play. The record sheets—and their appropriate unit types—are shown in the Record Sheets Table below. When designing a unit, it is important to use the appropriate Blank Record Sheet to track its capabilities and statistics, as well as for at-a-glance recognition of a given unit's type.

Note: The visual outline of the Armor Diagram for some pre-generated record sheets may appear slightly different than the standard Blank Record Sheet. For example, a pre-generated Tracked Vehicle Record Sheet includes graphics showing tracks, while one for a wheeled vehicle includes wheel graphics as part of the Armor Diagram. This is done to enhance the visual aesthetic of playing the game, but has no impact on the record sheet or game play.

RECORD SHEET BASICS

All of the *BattleTech* Record Sheets designed for use in *Total Warfare* standard rules play arrange their vital information and game statistics in blocks of data based on their form and function. Throughout the various record sheets, a number of common blocks appear that perform roughly the same functions regardless of the unit's type.

Unit Data

The title of the Unit Data block differs by unit type ('Mech Record Sheets call this the 'Mech Data block, aerospace and conventional fighters call this the Fighter Data block and so on), but the function of this block remains the same: It provides a direct overview of the make, model, base performance and weapons load of the unit in question.

The Unit Data block begins with the name of the unit, its model number (if any), its weight (Tonnage), Movement Points (Walking/Running/Jumping, or Cruising/Flank for vehicles) or Thrust Points (Safe/Max) for aerospace units, and Technology Base (Clan or Inner Sphere). The Weapons Inventory follows, listing the quantity, type, location on the unit's body, heat (where applicable), damage and ranges of all the unit's weapons. On some units, this inventory also lists the ammunition for a weapon beside its entry and may be used to track ammunition expenditure. (Aerospace units use

range brackets, and so instead of listing the ranges for each weapon, they give the Damage Value of the weapons at each range bracket where non-aerospace units list damage.) Unit Data blocks end with a listing of the unit's Cost (in C-bills) and its Battle Value (BV).

Armor Diagram

A common feature on almost every *BattleTech* unit's record sheet, the Armor Diagram provides a graphic representation of the unit's appearance as a guide for locating and tracking armor and internal structure (or Structural Integrity) damage during game play. To track these factors, Armor Diagram blocks use empty circles to represent points of armor and internal structure, but also leave blank lines beside the related area so the designer can write the numerical value of the location's armor or structure (as well as any "Threshold" value for aerospace units).

Based on unit type, the Armor Diagram can vary in complexity. BattleMechs and IndustrialMechs, for instance, have three distinct armor diagrams; the first represents the front armor values, the smaller second represents the rear torso armor locations, and a third, slimmer version of the first represents internal structure. Vehicles use a simpler approach, showing the armor locations in a white-background "armor" area, while the internal structure of the related section uses a gray-shaded background. ProtoMechs incorporate their Armor Diagram into the Critical Hits block, and use white circles to represent outer armor, while shaded circles represent internal structure in the very same diagram. Aerospace units present armor circles for each location, and lump all Structural Integrity circles into a gray-shaded box at the center of the diagram. Battlesuits, which do not use Hit Locations in *Total Warfare*, are presented as a single line of armor circles, with the leftmost circle gray-shaded to represent the trooper inside the suit.

Critical Hits Table

Though common to almost every unit, the Critical Hits Table and its impact on construction varies significantly by unit type. For BattleMechs and IndustrialMechs, this table is used to determine the effects of critical hits, and also to arrange the layout of weapons and other internal components, with bulkier items taking up more space—and thus more chances to get hit—on the Table. The ProtoMech, Vehicular and Aerospace Unit Critical Hits Tables, by comparison, are unaffected by the unit's loadout, and so may not be affected by the arrangement of such equipment. These units' Critical Hit Tables are standardized across each unit's type and have no bearing on construction.

Heat Data

BattleMechs, IndustrialMechs and aerospace units (other than conventional fighters) also include a Heat Data block, used to track the number, type and capacity of a unit's heat sinks. For 'Mechs and aerospace units other than DropShips, this block includes circles that each represent a functioning heat sink on the design, while a blank line with parentheses

RECORD SHEETS TABLE

Record Sheet Type	Appropriate Units
'Mech Record Sheet	Bipedal (humanoid) BattleMechs and IndustrialMechs
Four-legged 'Mech Record Sheet	Four-legged (quad) BattleMechs and IndustrialMechs
ProtoMech Record Sheet	ProtoMechs
Ground Vehicle Record Sheet	Tracked, Hover, Wheeled and WiGE Combat Vehicles; Small/Medium Tracked, Hover, Wheeled and WiGE Support Vehicles
Large Support Vehicle Record Sheet	Large-Sized Tracked, Hover, Wheeled and WiGE Support Vehicles
VTOL Vehicle Record Sheet	VTOL Combat and Support Vehicles
Naval Vehicle Record Sheet	Naval Combat Vehicles and Small/Medium Naval Support Vehicles
Battle Armor Record Sheet	Battle Armor
Conventional Infantry Record Sheet	Conventional Infantry
Generic Infantry Record Sheet	Conventional Infantry (Pre-Generated for standard rules game play)
Airship Record Sheet	Small/Medium Airship Support Vehicles
Aerospace Fighter Record Sheet	Aerospace Fighters
Conventional Fighter Record Sheet	Conventional Fighters and All Fixed-Wing Support Vehicles
Small Craft Record Sheet (Aerodyne)	Aerodynamic (Aerodyne) Small Craft
Small Craft Record Sheet (Spheroid)	Sphere-shaped (Spheroid) Small Craft
DropShip Record Sheet (Aerodyne)	Aerodynamic (Aerodyne) DropShips
DropShip Record Sheet (Spheroid)	Sphere-shaped (Spheroid) DropShips

is used to write the number of sinks and their total heat dissipation capacity (in the event double heat sinks are used). DropShips, which operate on a zero-net-heat principle, do not use heat sinks, but simply list their number of sinks (and their total heat capacity) along with the total heat potential for each arc of weapon bays.

Other Blocks

In addition to the above-mentioned data blocks, each record sheet type includes a varying degree of other blocks provided to track warrior/pilot/crew data (including relevant Gunnery and Piloting skills), note cargo storage and other special features or to follow vital game play values, such as altitude, depth and so on. Because these data blocks are generally used only during game play, they have no bearing on construction unless otherwise noted.

'MECH RECORD SHEETS

Two Blank Record Sheets provided with this book are used to track the design and use of BattleMechs or IndustrialMechs during combat. These same sheets may be used to represent regular 'Mechs and OmniMechs. Designers should be sure, however, to use the sheet associated with the correct body type before proceeding.

'Mech Data

The Unit Data block for BattleMechs and IndustrialMechs is called the 'Mech Data block. Located in the upper left corner, this section of the record sheet lists the 'Mech's most important statistics, including the BattleMech type, tonnage, MP, weapons inventory, cost and Battle Value. Weapons of identical types and location may be combined on a single line to conserve space (though heat and damage should still be shown for only one weapon, as these units resolve fire by individual weapons). Ammunition need not be listed on the Weapons Inventory, as each bin will appear—and should be tracked—on the Critical Hits Table.

Warrior Data

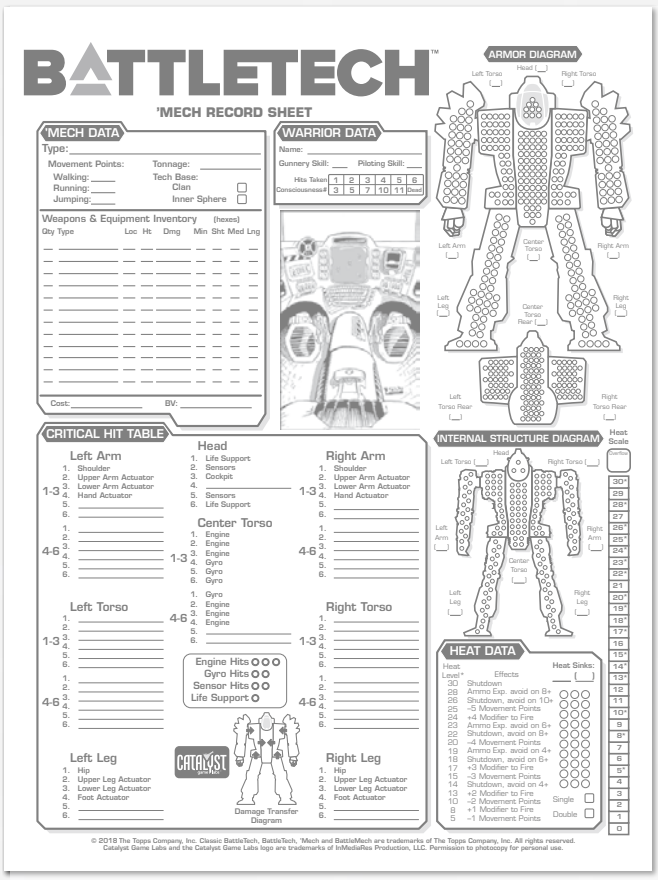
This block—located at the center-top of the record sheet—lists the name, skills and condition of the unit's pilot.

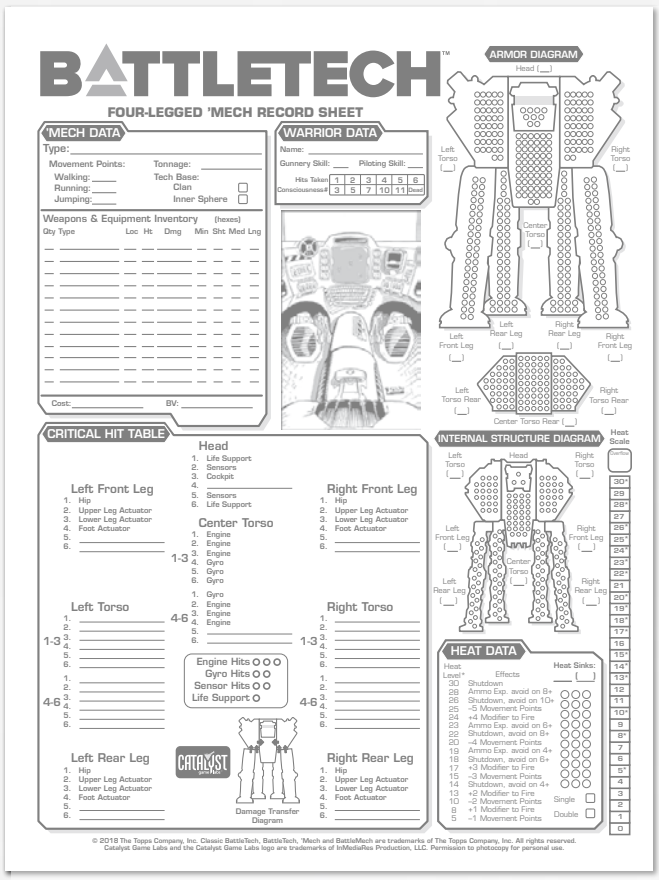
Critical Hits Table

The Critical Hits Table—filling the lower-left block on the sheet—is used to physically allocate the various components of the 'Mech's body, weapons and ammunition, and represents the internal space available to these units. Each part of the 'Mech's body, such as the Left Arm, Right Leg or Center Torso, is referred to as a location. Each line in a location (six in the head and legs, twelve in other locations) is referred to as a critical slot, or simply slot. Each slot usually represents a particular weapon or other piece of equipment susceptible to destruction. Remember that some equipment occupies so much space in the 'Mech that it requires multiple slots on the table, and in rare cases equipment may even require mounting in a specific location (such as the heavy Gauss rifle) or is considered incompatible with other equipment (such as Clan ER PPCs and lower arm/hand actuators on OmniMechs).

Armor Diagram

The Armor Diagram fills most of the right-hand side of the 'Mech record sheet. It outlines each of the body locations found





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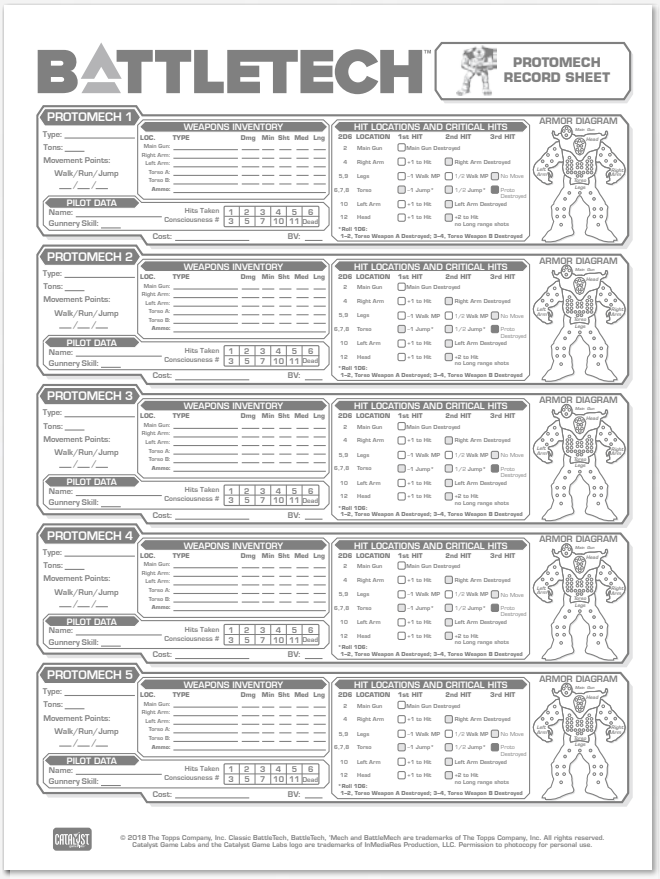
on the 'Mech, including the rear torso locations, followed by an internal structure diagram. When finalizing a 'Mech design, the designer must black out all excess armor and internal structure by location.

Heat Scale

Located below the Armor Diagram, the Heat Scale on a 'Mech Record Sheet provides a place to note the number of heat sinks on the design, as well as their type (single or double) and total heat-absorption capacity. This block uses circles the same way as the Armor Diagram; any extra sinks must be blacked out when finalizing the unit's design.



PROTOMECH RECORD SHEET

ProtoMech Record Sheets provide enough data blocks for five individual ProtoMechs per page, allowing players to track an entire ProtoMech Point at one time. Each ProtoMech receives its own overall block of data, which is in turn divided up among smaller sub-blocks as follows.

ProtoMech Data

This information, located at the top-left of each ProtoMech block, is the ProtoMech equivalent of the Unit Data block. It provides space to note the ProtoMech's model name (Type), weight (Tons) and Movement Points (Walking/Running/Jumping). Cost and BV lines are located below the Pilot Data block.

Weapons Inventory

Located to the right of the ProtoMech Data block, the Weapons Inventory provides a detailed listing of the weapons carried by each ProtoMech, with locations pre-noted (as ProtoMechs may mount only a fixed number of items per location). Similar to the 'Mech Weapons Inventory, lines are provided in this block for each weapon type (for example, ER medium laser), damage and ranges (in hexes).

Pilot Data

The Pilot Data block for the ProtoMech is shown below the ProtoMech's basic data and Weapons Inventory.

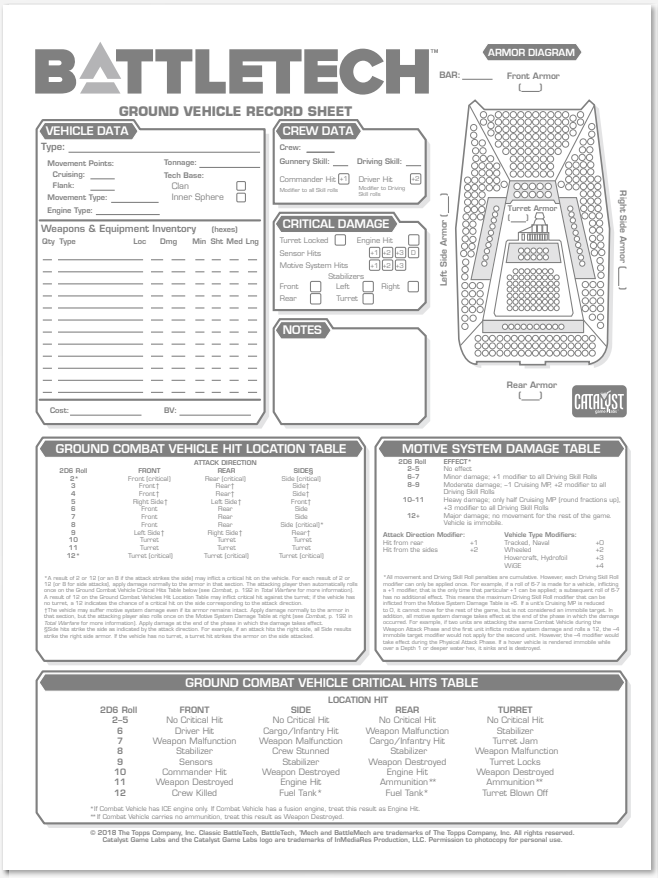
Hit Locations and Critical Hits

This sub-block incorporates a Hit Location table for each ProtoMech, as well as a list of specific effects from multiple critical hits to each location on the ProtoMech.

Armor Diagram

On the far right of each ProtoMech's block is the Armor Diagram. Similar to the 'Mech Armor Diagram, each circle here represents a point of armor or internal structure, with white circles representing armor and shaded circles representing internal structure. When finalizing a ProtoMech design, the designer must black out all excess armor and internal structure circles by location, leaving open only the points assigned to each location.

Despite improving relations, a ProtoMech-centered Blood Spirit force raids a Clan Coyote outpost.



VEHICLE RECORD SHEETS

The Vehicle Record Sheet allows players to track damage done to individual vehicles during combat. Each type of vehicle (ground, VTOL and naval) uses a different form of the Vehicle Record Sheet, but they all share the features described below. Ground-based and naval Support Vehicles in the Small and Medium size ranges use the same record sheet as Combat Vehicles of equivalent motive types. VTOL Support Vehicles of all sizes use the same record sheets as the VTOL Combat Vehicle type. Airship and Fixed-Wing Support Vehicles do not use Vehicle Record Sheets.

Vehicle Data

The Unit Data block for all vehicle types is called the Vehicle Data block. Located in the upper left corner of the sheet, this section lists the vehicle's most important statistics, including its model (Type), weight (Tonnage), MP (Cruising/Flank), Movement (Motive) Type and Engine Type (Fusion, ICE and so forth). Also listed here is the unit's Weapons Inventory, Cost, and Battle Value. Weapons of identical type and location may be combined on a single line to conserve space (though heat and damage should still be shown for only one weapon, as these units resolve fire by individual weapons). Ammunition should be listed on the inventory as well, to show how many shots each ammo-dependent weapon possesses.

Crew Data

This block lists the name of the vehicle's commander, as well as the skills and condition of its crew.

Critical Damage

The Critical Damage block for a vehicle is the equivalent of the Critical Hits Table on a 'Mech, but—as with ProtoMechs—is vastly simplified and abstracted. Varying slightly with the vehicle's motive type, these tables provide the effects of critical damage to the vehicle in game play. Designers should clearly note which type of motive system the vehicle is using to avoid confusion.

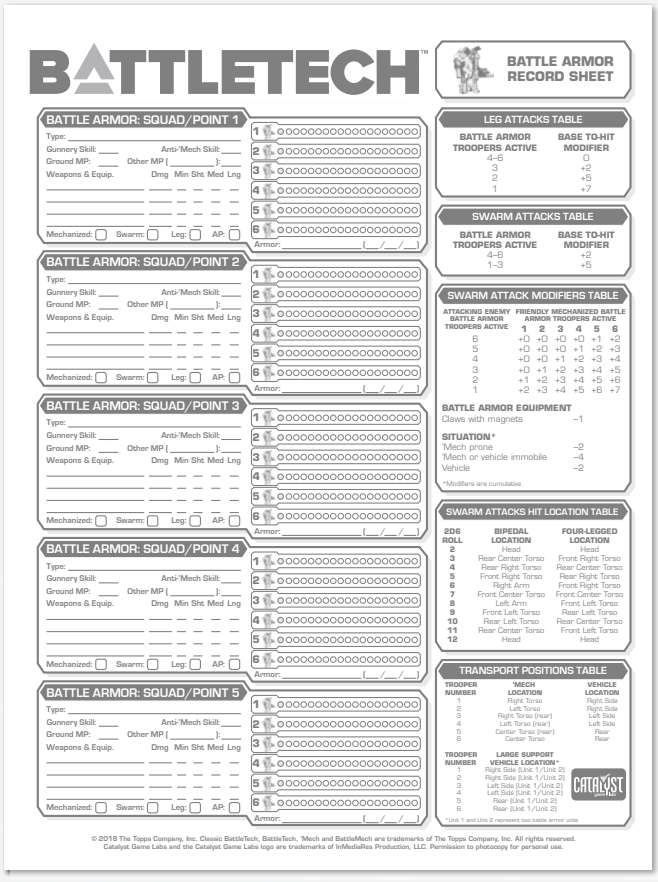
Armor Diagram

The Vehicle Armor Diagram is more compact than that of the 'Mech Record Sheet, and incorporates its internal structure values in gray-shaded sections directly attached to the white outer armor sections for each of the vehicle's body locations. When finalizing the design of a vehicle, the designer must black out all excess armor and internal structures by location. Ground-based vehicles without turrets must black out the entire turret location, armor and internal structure alike. A line near the top of the Armor Diagram is provided to note the Barrier Armor Rating (BAR) of a vehicle's armor. All Combat Vehicles automatically receive a BAR of 10, rendering them immune to penetrating critical hits. Support Vehicles must note their BAR in this line to account for their armor type.

Note: The Large Ground Vehicle Record Sheet differs from the standard Ground Vehicle Record Sheet in having two extra side body locations to allocate armor and structure.

Elevation/Depth Tracks

VTOLs and submersible naval vehicles can vary their relative elevation over (or under) the surface of the battlefield. In game play, these blocks are used to track the unit's vertical position on the map relative to the surface.



BATTLE ARMOR RECORD SHEET

Each Battle Armor Record Sheet can record the information for five Points or squads of battle armor at a time. Designed to accommodate any type of battle armor for the Inner Sphere or Clans, this sheet—like that for ProtoMechs—is broken into multiple blocks to track entire squads.

The data is highly simplified, with each block assigned to a single type of battlesuit, and incorporating the Squad Data including the suit model used (Type), Gunnery and Anti-'Mech skills of its troopers, Ground MP, Non-Ground MP (including type) and Weapons Inventory (with each weapon's type, location, damage and range, noting ammunition only for missile weapons). Additional boxes are provided to track whatever special capabilities the suits may have (Anti-'Mech Swarm, Anti-'Mech Leg Attacks, Mechanized Battle Armor rules usage, and even the ability to operate anti-personnel weapons).

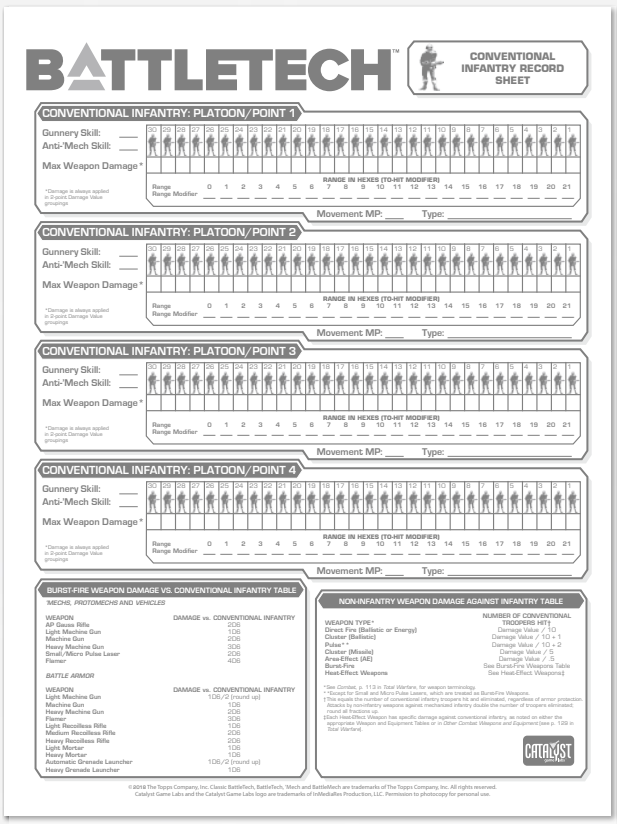
Along the right side of each Point/Squad Data block are rows of white circles, each beginning with a gray-shaded circle. These rows indicate the troopers in that squad and their armor values. Any excess troopers should be blacked out when finalizing the squad's design, as should any excess armor points per trooper. If the armor has stealth capabilities or the like (including modifiers for short, medium and long range), that information must be noted on the lines following these rows.

CONVENTIONAL INFANTRY RECORD SHEETS

Two infantry record sheets appear in *TechManual* for player use: the blank Conventional Infantry Record Sheet, and the Generic Conventional Infantry Record Sheet. The blank sheet is designed for use in creating conventional infantry platoons of the designer's choosing. The generic sheet is ready-made, with data for the basic platoon types already featured in *Total Warfare* and legal for standard rules play.

The Infantry Record Sheets are arranged along similar lines to those for battle armor, with multiple platoons (Points) shown per platoon block. Each of these blocks provides lines to note the platoon's overall Gunnery and Anti-'Mech skills, as well as their MP and Movement (Motive) Type. A row of 30 trooper icons—each representing a single soldier—makes up the rest of these blocks. As troopers in these rules have no armor points per se, each trooper represents a single point of damage the platoon can sustain. Excess troopers in each platoon must be blacked out when finalizing platoon construction, starting with the leftmost trooper in the row. [**Note:** Some platoon types field more than 30 troopers. To reflect this, the player may use multiple lines and divide the number of troopers equally among the required number of lines. For example, a Marian conventional platoon of 100 men should be treated as four 25-man platoons in combat.]

On the blank Infantry Record Sheet, two blocks of data following the platoon blocks are left blank: the Conventional Infantry Damage Table and the Conventional Infantry Range Modifiers Table blocks. These blocks are used to note how much damage a platoon may inflict for each number of active troopers, and what range modifiers are applied to their attacks at any given number of hexes. For an example of how this information is presented, designers may use the Generic Infantry Record Sheet as a guide.


BATTLETECH™ CONVENTIONAL INFANTRY RECORD SHEET

CONVENTIONAL INFANTRY: PLATOON/POINT 1
Gunnery Skill: ___
Anti-'Mech Skill: ___
Max Weapon Damage *
RANGE IN HEXES (TO-HIT MODIFIER)
Range Modifier
Movement MP: ___ Type: ___

CONVENTIONAL INFANTRY: PLATOON/POINT 2
Gunnery Skill: ___
Anti-'Mech Skill: ___
Max Weapon Damage *
RANGE IN HEXES (TO-HIT MODIFIER)
Range Modifier
Movement MP: ___ Type: ___

CONVENTIONAL INFANTRY: PLATOON/POINT 3
Gunnery Skill: ___
Anti-'Mech Skill: ___
Max Weapon Damage *
RANGE IN HEXES (TO-HIT MODIFIER)
Range Modifier
Movement MP: ___ Type: ___

CONVENTIONAL INFANTRY: PLATOON/POINT 4
Gunnery Skill: ___
Anti-'Mech Skill: ___
Max Weapon Damage *
RANGE IN HEXES (TO-HIT MODIFIER)
Range Modifier
Movement MP: ___ Type: ___

BURST-FIRE WEAPON DAMAGE VS. CONVENTIONAL INFANTRY TABLE

MECHS, PROTOMECHS AND VEHICLES

WEAPON	DAMAGE vs. CONVENTIONAL INFANTRY
AP Gauss Rifle	2D6
Light Machine Gun	1D6
Machine Gun	2D6
Heavy Machine Gun	3D6
Small/Micro Pulse Laser	2D6
Flamer	4D6

BATTLE ARMOR

WEAPON	DAMAGE vs. CONVENTIONAL INFANTRY
Light Machine Gun	1D6/2 (round up)
Machine Gun	1D6
Heavy Machine Gun	2D6
Flamer	3D6
Light Recoilless Rifle	1D6
Medium Recoilless Rifle	2D6
Heavy Recoilless Rifle	3D6
Light Mortar	1D6
Heavy Mortar	1D6
Automatic Grenade Launcher	1D6/2 (round up)
Heavy Grenade Launcher	1D6

NON-INFANTRY WEAPON DAMAGE AGAINST INFANTRY TABLE

WEAPON TYPE*	NUMBER OF CONVENTIONAL TROOPERS HIT†
Direct Fire (Ballistic or Energy)	Damage Value / 10
Cluster (Ballistic)	Damage Value / 10 + 1
Pulse* *	Damage Value / 10 + 2
Cluster (Missile)	Damage Value / 5
Area-Effect (AE)	Damage Value / .5
Burst-Fire	See Burst-Fire Weapons Table
Heat-Effect Weapons	See Heat-Effect Weapons‡

*See *Combat*, p. 113 in *Total Warfare*, for weapon terminology.
* *Except for Small and Micro Pulse Lasers, which are treated as Burst-Fire Weapons.
† This equals the number of conventional infantry troopers hit and eliminated, regardless of armor protection. Attacks by non-infantry weapons against mechanized infantry double the number of troopers eliminated; round all fractions up.
‡ Each Heat-Effect Weapon has specific damage against conventional infantry; as noted on either the appropriate Weapon and Equipment Tables or in *Other Combat Weapons and Equipment* (see p. 139 in *Total Warfare*).

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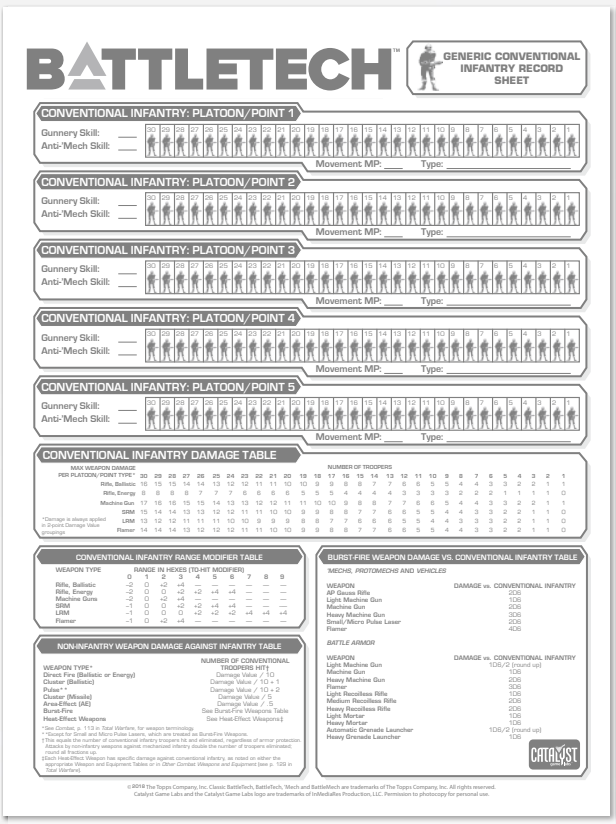
BATTLETECH™ GENERIC CONVENTIONAL INFANTRY RECORD SHEET

CONVENTIONAL INFANTRY: PLATOON/POINT 1
Gunnery Skill: ___
Anti-'Mech Skill: ___
Movement MP: ___ Type: ___

CONVENTIONAL INFANTRY: PLATOON/POINT 2
Gunnery Skill: ___
Anti-'Mech Skill: ___
Movement MP: ___ Type: ___

CONVENTIONAL INFANTRY: PLATOON/POINT 3
Gunnery Skill: ___
Anti-'Mech Skill: ___
Movement MP: ___ Type: ___

CONVENTIONAL INFANTRY: PLATOON/POINT 4
Gunnery Skill: ___
Anti-'Mech Skill: ___
Movement MP: ___ Type: ___

CONVENTIONAL INFANTRY: PLATOON/POINT 5
Gunnery Skill: ___
Anti-'Mech Skill: ___
Movement MP: ___ Type: ___

CONVENTIONAL INFANTRY DAMAGE TABLE

MAX WEAPON DAMAGE PER PLATOON/POINT TYPE*	NUMBER OF TROOPERS 30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Rifle, Ballistic	16	15	15	14	13	12	12	11	11	10	10	9	9	8	8	7	6	6	5	5	4	4	3	3	2	2	1	1	1	0
Rifle, Energy	8	8	8	8	7	7	7	6	6	6	6	5	5	5	4	4	4	4	3	3	3	3	2	2	2	1	1	1	1	0
Machine Gun	17	16	16	15	15	14	13	13	12	12	11	11	10	10	9	8	8	7	7	6	6	5	5	4	4	3	3	2	2	1
SRM	15	14	14	13	13	12	12	11	11	10	10	9	9	8	8	7	7	6	6	5	5	4	4	3	3	2	2	1	1	0
LRM	13	12	12	11	11	11	10	10	9	9	9	8	8	7	7	6	6	6	5	5	4	4	3	3	3	2	2	1	1	0
Flamer	14	14	14	13	12	12	12	11	11	10	10	9	9	8	8	7	7	6	6	5	5	4	4	3	3	3	2	2	1	0

*Damage is always applied in 2-point Damage Value groupings

CONVENTIONAL INFANTRY RANGE MODIFIER TABLE

WEAPON TYPE	RANGE IN HEXES (TO-HIT MODIFIER) 0	1	2	3	4	5	6	7	8	9
Rifle, Ballistic	-2	0	+2	+4	—	—	—	—	—	—
Rifle, Energy	-2	0	0	+2	+2	+4	—	—	—	—
Machine Guns	-2	0	+2	+4	—	—	—	—	—	—
SRM	-1	0	0	+2	+2	+4	+4	—	—	—
LRM	-1	0	0	0	+2	+2	+2	+4	+4	+4
Flamer	-1	0	+2	+4	—	—	—	—	—	—

NON-INFANTRY WEAPON DAMAGE AGAINST INFANTRY TABLE

WEAPON TYPE*	NUMBER OF CONVENTIONAL TROOPERS HIT†
Direct Fire (Ballistic or Energy)	Damage Value / 10
Cluster (Ballistic)	Damage Value / 10 + 1
Pulse* *	Damage Value / 10 + 2
Cluster (Missile)	Damage Value / 5
Area-Effect (AE)	Damage Value / .5
Burst-Fire	See Burst-Fire Weapons Table
Heat-Effect Weapons	See Heat-Effect Weapons‡

*See *Combat*, p. 113 in *Total Warfare*, for weapon terminology.
* *Except for Small and Micro Pulse Lasers, which are treated as Burst-Fire Weapons.
† This equals the number of conventional infantry troopers hit and eliminated, regardless of armor protection. Attacks by non-infantry weapons against mechanized infantry double the number of troopers eliminated; round all fractions up.
‡ Each Heat-Effect Weapon has specific damage against conventional infantry; as noted on either the appropriate Weapon and Equipment Tables or in *Other Combat Weapons and Equipment* (see p. 139 in *Total Warfare*).

BURST-FIRE WEAPON DAMAGE VS. CONVENTIONAL INFANTRY TABLE

MECHS, PROTOMECHS AND VEHICLES

WEAPON	DAMAGE vs. CONVENTIONAL INFANTRY
AP Gauss Rifle	2D6
Light Machine Gun	1D6
Machine Gun	2D6
Heavy Machine Gun	3D6
Small/Micro Pulse Laser	2D6
Flamer	4D6

BATTLE ARMOR

WEAPON	DAMAGE vs. CONVENTIONAL INFANTRY
Light Machine Gun	1D6/2 (round up)
Machine Gun	1D6
Heavy Machine Gun	2D6
Flamer	3D6
Light Recoilless Rifle	1D6
Medium Recoilless Rifle	2D6
Heavy Recoilless Rifle	2D6
Light Mortar	1D6
Heavy Mortar	1D6
Automatic Grenade Launcher	1D6/2 (round up)
Heavy Grenade Launcher	1D6

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AEROSPACE/AIRSHIP RECORD SHEETS

Similar to BattleMechs, but much more varied in design and function, Airship and Aerospace Unit record sheets account for seven of the record sheets included with this book. Based on unit type, these sheets have a different appearance, but use the same overall layout and core components. These record sheets are: Airship (for Small/Medium Airship Support Vehicles), Conventional Fighter (for conventional fighters and Fixed-Wing Support Vehicles of any size), Aerospace Fighter (for aerospace fighter units), Small Craft (one each for aerodyne and spheroid-shaped craft) and DropShip (one each for aerodyne and spheroid-shaped DropShips). Where applicable (Airships and fighters) these sheets may be used to represent regular units and their Omni equivalents. Designers should be sure, however, to use the sheet associated with the correct unit type before proceeding.

Unit Data: The Unit Data block for aerospace and Airship units varies by name with the unit type (Airship Data for Airships, Fighter Data for aerospace and conventional fighters, DropShip Data for DropShips and so forth). Located in the upper left corner, this section of the record sheet lists the unit's most important statistics, including its model (Type), weight (Tonnage), Thrust Points (Safe and Max), Weapons Inventory, Cost and Battle Value. Conventional fighters and Fixed-Wing Support Vehicles, meanwhile, can also check off boxes to indicate whether they have VSTOL or STOL capabilities. DropShips, which can possess fighter and other unit bays, may note their complement of such units, followed by the number of functioning doors on the vessel capable of releasing these units during game play.

In the Weapons Inventory, weapons of identical types and location may be combined on a single line to conserve space. Unlike 'Mechs and vehicles, however, multiple weapons in the same firing arc (or the same bay, for DropShips) must note their total combined heat and Damage Values at each range bracket, as these units generally fire their weapons by arc or bay. Unlike other units, aerospace units do not list weapon ranges in hexes, but rather list the damage their weapons can deliver at each range bracket (with a value of 0 or simply a dash for any bracket beyond the weapon's range). Ammunition should be listed on the same line as any ammo-dependent weapons (DropShips receive a separate line devoted to ammo); designers can track such munitions there or in the Notes block.

DropShips, which have access to capital missile weapons, should list damage in Standard and Capital scale. To translate Standard-scale damage into Capital-scale damage, divide the Damage Value for the weapon in Standard scale by 10 and round normally. When listing Damage Values for DropShips, the appropriate format is to list the capital value first, followed by the standard damage in parentheses.

Pilot/Crew Data

This block lists the name, skills and condition of the unit's pilot or crew.

Critical Damage

All aerospace units and DropShips include a block for tracking possible effects of critical damage; the equivalent of a Critical Hits Table, this section is pre-generated, and varies only slightly by unit type.

Armor Diagram

The Armor Diagrams for aerospace units and Airships fills most of the right-hand side of the unit's record sheet. It outlines each of the main body locations found on the unit, and surrounds a single area shaded in gray that represents the unit's structural integrity. When finalizing the design of an aerospace unit, the designer must black out all excess armor and structural integrity circles by location. Airships and Fixed-Wing Support Vehicles—like their ground-based equivalents—may possess armor of a different BAR than the normal combat-grade armor used by fighters, Small Craft and DropShips. A line to note this BAR appears in the Armor Diagram block.

External Stores Blocks (Fighters and Fixed-Wing Support Vehicles)

In the upper-right corner of the Armor Diagram for fighters are up to 20 blocks representing external stores that may be used for bombs, spare fuel tanks and even spotting gear. As the number of these available to such craft depends heavily on the unit's weight, any excess stores blocks must be blacked out when finalizing the design.

Fixed-Wing Support Vehicles can only carry external stores when equipped with external stores hardpoints.

Heat Scale

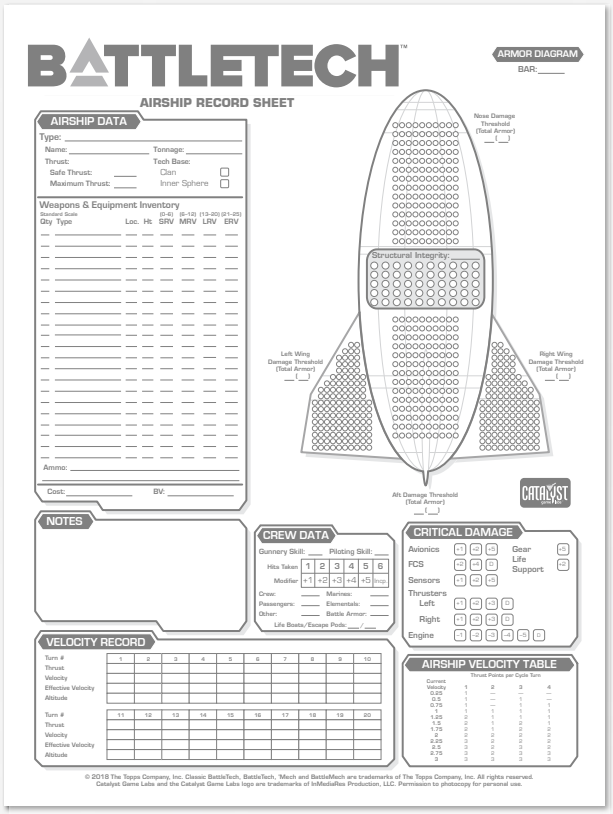
Heat Scale blocks appear only on record sheets for aerospace fighters, Small Craft and DropShips. Airships, conventional fighters and Fixed-Wing Support Vehicles do not need to track heat in the same fashion as those units.

On fighters and Small Craft, the Heat Scale provides a place to note the number of heat sinks on the design, as well as their type (single or double) and total heat-absorption capacity. This block uses circles in the same way as the Armor Diagram; any extra sinks must be blacked out when finalizing the unit's design.

DropShips, which operate on a "zero-net-heat" principle, do not use a Heat Scale, nor do they track the number of sinks on the ship using circles. Instead, these units list the number of heat sinks, check off their type (single or double) and their heat capacity in parentheses. These units also must note the total number of heat points for each arc's worth of weapons fire. Remember that DropShips may not fire an arc if doing so would exceed the unit's heat sink capacity.

Velocity Record

This block, featured on all record sheets for aerospace units, provides space to record the unit's current velocity and altitude during game play.


BATTLETECH™

AIRSHIP RECORD SHEET

ARMOR DIAGRAM

BAR: _____

AIRSHIP DATA

Type: _____

Name: _____ Tonnage: _____

Thrust: _____ Tech Base:

Safe Thrust: ____ Clan ☐

Maximum Thrust: ____ Inner Sphere ☐

Weapons & Equipment Inventory

Standard Scale (0-6) (6-12) (13-20) (21-25)

Qty Type Loc. Ht SRV MRV LRV ERV

Ammo: _____

Cost: _____ BV: _____

Nose Damage Threshold (Total Armor) __(__)

Structural Integrity: _____

Left Wing Damage Threshold (Total Armor) __(__)

Right Wing Damage Threshold (Total Armor) __(__)

Aft Damage Threshold (Total Armor) __(__)

NOTES

CREW DATA

Gunnery Skill: ___ Piloting Skill: ___

Hits Taken 1 2 3 4 5 6

Modifier +1 +2 +3 +4 +5 Incap

Crew: ____ Marines: ____

Passengers: ____ Elementals: ____

Other: ____ Battle Armor: ____

Life Boats/Escape Pods: ___/___

CRITICAL DAMAGE

Avionics +1 +2 +5

FCS +2 +4 D

Sensors +1 +2 +5

Engine 2 4 D

Gear +5

Life Support +2

Thrusters Left +1 +2 +3 D

Right +1 +2 +3 D

Engine +1 +2 +3 +4 +5 D

AIRSHIP VELOCITY TABLE

Thrust Points per Cycle Turn

Current Velocity | 1 | 2 | 3 | 4

0.25 | — | — | — | —

0.5 | — | — | — | —

0.75 | 1 | — | — | —

1 | 1 | 1 | 1 | 1

1.25 | 2 | 1 | 1 | 1

1.5 | 2 | 1 | 2 | 1

1.75 | 2 | 1 | 2 | 2

2 | 2 | 2 | 2 | 2

2.25 | 3 | 2 | 2 | 2

2.5 | 3 | 2 | 3 | 2

2.75 | 3 | 3 | 3 | 2

3 | 3 | 3 | 3 | 3

VELOCITY RECORD

Turn # 1 2 3 4 5 6 7 8 9 10

Thrust

Velocity

Effective Velocity

Altitude

Turn # 11 12 13 14 15 16 17 18 19 20

Thrust

Velocity

Effective Velocity

Altitude

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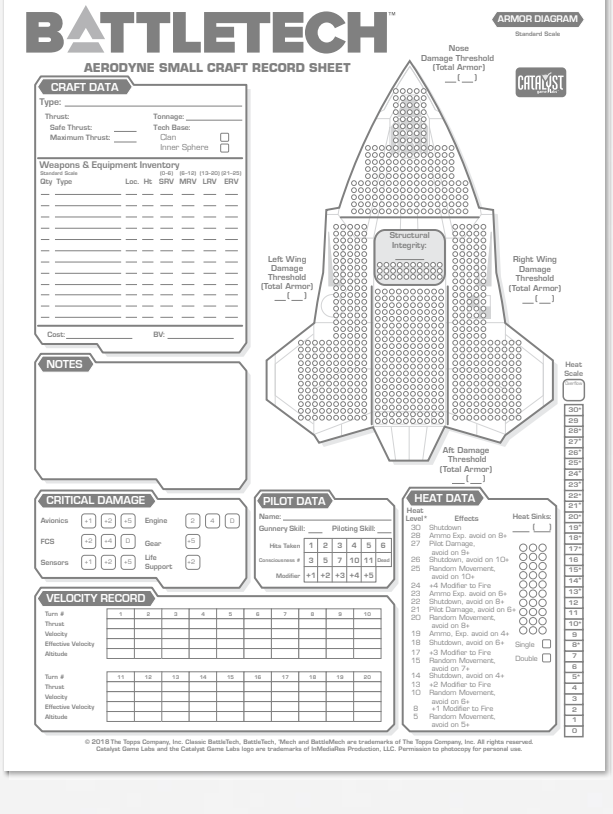
BATTLETECH™

AEROSPACE FIGHTER RECORD SHEET

EXTERNAL STORES/BOMBS

FIGHTER DATA

Type: _____

Thrust: _____ Tonnage: _____

Safe Thrust: ____ Tech Base:

Maximum Thrust: ____ Clan ☐

Inner Sphere ☐

Weapons & Equipment Inventory

Standard Scale (0-6) (6-12) (13-20) (21-25)

Qty Type Loc. Ht SRV MRV LRV ERV

Cost: _____ BV: _____

ARMOR DIAGRAM

Nose Damage Threshold (Total Armor) __(__)

Key:
HE - High Explosive
LG - Laser Guided
C - Cluster
RL - Rocket Launcher

Structural Integrity: _____

Left Wing Damage Threshold (Total Armor) __(__)

Right Wing Damage Threshold (Total Armor) __(__)

Aft Damage Threshold (Total Armor) __(__)

Heat Scale

Overflow

30* 29 28* 27 26* 25* 24 23* 22* 21 20* 19 18* 17 16 15* 14 13* 12 11 10* 9 8* 7 6 5* 4 3 2 1 0

NOTES

CRITICAL DAMAGE

Avionics +1 +2 +5

FCS +2 +4 D

Sensors +1 +2 +5

Engine 2 4 D

Gear +5

Life Support +2

PILOT DATA

Name: _____

Gunnery Skill: ___ Piloting Skill: ___

Hits Taken 1 2 3 4 5 6

Consciousness # 3 5 7 10 11 Dead

Modifier +1 +2 +3 +4 +5

HEAT DATA

Heat Level* Effects Heat Sinks: ___(___)

30 Shutdown

28 Ammo Exp. avoid on 8+

27 Pilot Damage, avoid on 9+

26 Shutdown, avoid on 10+

25 Random Movement, avoid on 10+

24 +4 Modifier to Fire

23 Ammo Exp. avoid on 6+

22 Shutdown, avoid on 8+

21 Pilot Damage, avoid on 8+

20 Random Movement, avoid on 8+

19 Ammo, Exp. avoid on 4+

18 Shutdown, avoid on 6+

17 +3 Modifier to Fire

15 Random Movement, avoid on 7+

14 Shutdown, avoid on 4+

13 +2 Modifier to Fire

10 Random Movement, avoid on 6+

8 +1 Modifier to Fire

5 Random Movement, avoid on 5+

Single ☐

Double ☐

VELOCITY RECORD

Turn # 1 2 3 4 5 6 7 8 9 10

Thrust

Velocity

Effective Velocity

Altitude

Turn # 11 12 13 14 15 16 17 18 19 20

Thrust

Velocity

Effective Velocity

Altitude

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BATTLETECH™

AERODYNE SMALL CRAFT RECORD SHEET

ARMOR DIAGRAM

Standard Scale

CRAFT DATA

Type: _____

Thrust: _____ Tonnage: _____

Safe Thrust: ____ Tech Base:

Maximum Thrust: ____ Clan ☐

Inner Sphere ☐

Weapons & Equipment Inventory

Standard Scale (0-6) (6-12) (13-20) (21-25)

Qty Type Loc. Ht SRV MRV LRV ERV

Cost: _____ BV: _____

Nose Damage Threshold (Total Armor) __(__)

Structural Integrity: _____

Left Wing Damage Threshold (Total Armor) __(__)

Right Wing Damage Threshold (Total Armor) __(__)

Aft Damage Threshold (Total Armor) __(__)

Heat Scale

Overflow

30* 29 28* 27 26* 25* 24 23* 22* 21 20* 19 18* 17 16 15* 14 13* 12 11 10* 9 8* 7 6 5* 4 3 2 1 0

NOTES

CRITICAL DAMAGE

Avionics +1 +2 +5

FCS +2 +4 D

Sensors +1 +2 +5

Engine 2 4 D

Gear +5

Life Support +2

PILOT DATA

Name: _____

Gunnery Skill: ___ Piloting Skill: ___

Hits Taken 1 2 3 4 5 6

Consciousness # 3 5 7 10 11 Dead

Modifier +1 +2 +3 +4 +5

HEAT DATA

Heat Level* Effects Heat Sinks: ___(___)

30 Shutdown

28 Ammo Exp. avoid on 8+

27 Pilot Damage, avoid on 9+

26 Shutdown, avoid on 10+

25 Random Movement, avoid on 10+

24 +4 Modifier to Fire

23 Ammo Exp. avoid on 6+

22 Shutdown, avoid on 8+

21 Pilot Damage, avoid on 8+

20 Random Movement, avoid on 8+

19 Ammo, Exp. avoid on 4+

18 Shutdown, avoid on 6+

17 +3 Modifier to Fire

15 Random Movement, avoid on 7+

14 Shutdown, avoid on 4+

13 +2 Modifier to Fire

10 Random Movement, avoid on 6+

8 +1 Modifier to Fire

5 Random Movement, avoid on 5+

Single ☐

Double ☐

VELOCITY RECORD

Turn # 1 2 3 4 5 6 7 8 9 10

Thrust

Velocity

Effective Velocity

Altitude

Turn # 11 12 13 14 15 16 17 18 19 20

Thrust

Velocity

Effective Velocity

Altitude

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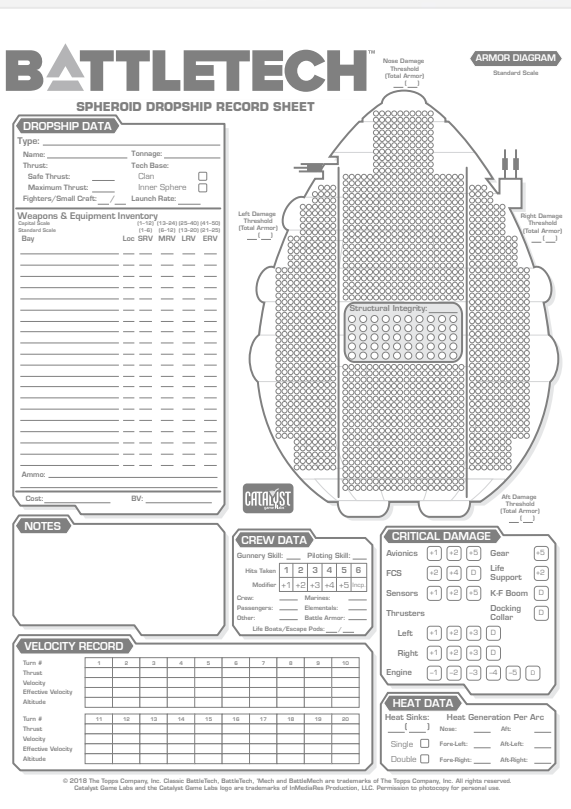
BATTLETECH™

SPHEROID DROPSHIP RECORD SHEET

ARMOR DIAGRAM

Standard Scale

DROPSHIP DATA

Type: _____

Name: _____ Tonnage: _____

Thrust: _____ Tech Base:

Safe Thrust: ____ Clan ☐

Maximum Thrust: ____ Inner Sphere ☐

Fighters/Small Craft: ___/___ Launch Rate: ____

Weapons & Equipment Inventory

Capital Scale (1-10) (11-24) (25-40) (41-50)

Standard Scale (1-6) (6-12) (13-20) (21-25)

Bay Loc SRV MRV LRV ERV

Ammo: _____

Cost: _____ BV: _____

Nose Damage Threshold (Total Armor) __(__)

Left Damage Threshold (Total Armor) __(__)

Right Damage Threshold (Total Armor) __(__)

Structural Integrity: _____

Aft Damage Threshold (Total Armor) __(__)

NOTES

CREW DATA

Gunnery Skill: ___ Piloting Skill: ___

Hits Taken 1 2 3 4 5 6

Modifier +1 +2 +3 +4 +5 Incap

Crew: ____ Marines: ____

Passengers: ____ Elementals: ____

Other: ____ Battle Armor: ____

Life Boats/Escape Pods: ___/___

CRITICAL DAMAGE

Avionics +1 +2 +5

FCS +2 +4 D

Sensors +1 +2 +5

Thrusters

Left +1 +2 +3 D

Right +1 +2 +3 D

Engine +1 +2 +3 +4 +5 D

Gear +5

Life Support +2

K-F Boom D

Docking Collar D

HEAT DATA

Heat Sinks: ___(___) Heat Generation Per Arc

Single ☐ Nose: ____ Aft: ____

Double ☐ Fore-Left: ____ Aft-Left: ____

Fore-Right: ____ Aft-Right: ____

VELOCITY RECORD

Turn # 1 2 3 4 5 6 7 8 9 10

Thrust

Velocity

Effective Velocity

Altitude

Turn # 11 12 13 14 15 16 17 18 19 20

Thrust

Velocity

Effective Velocity

Altitude

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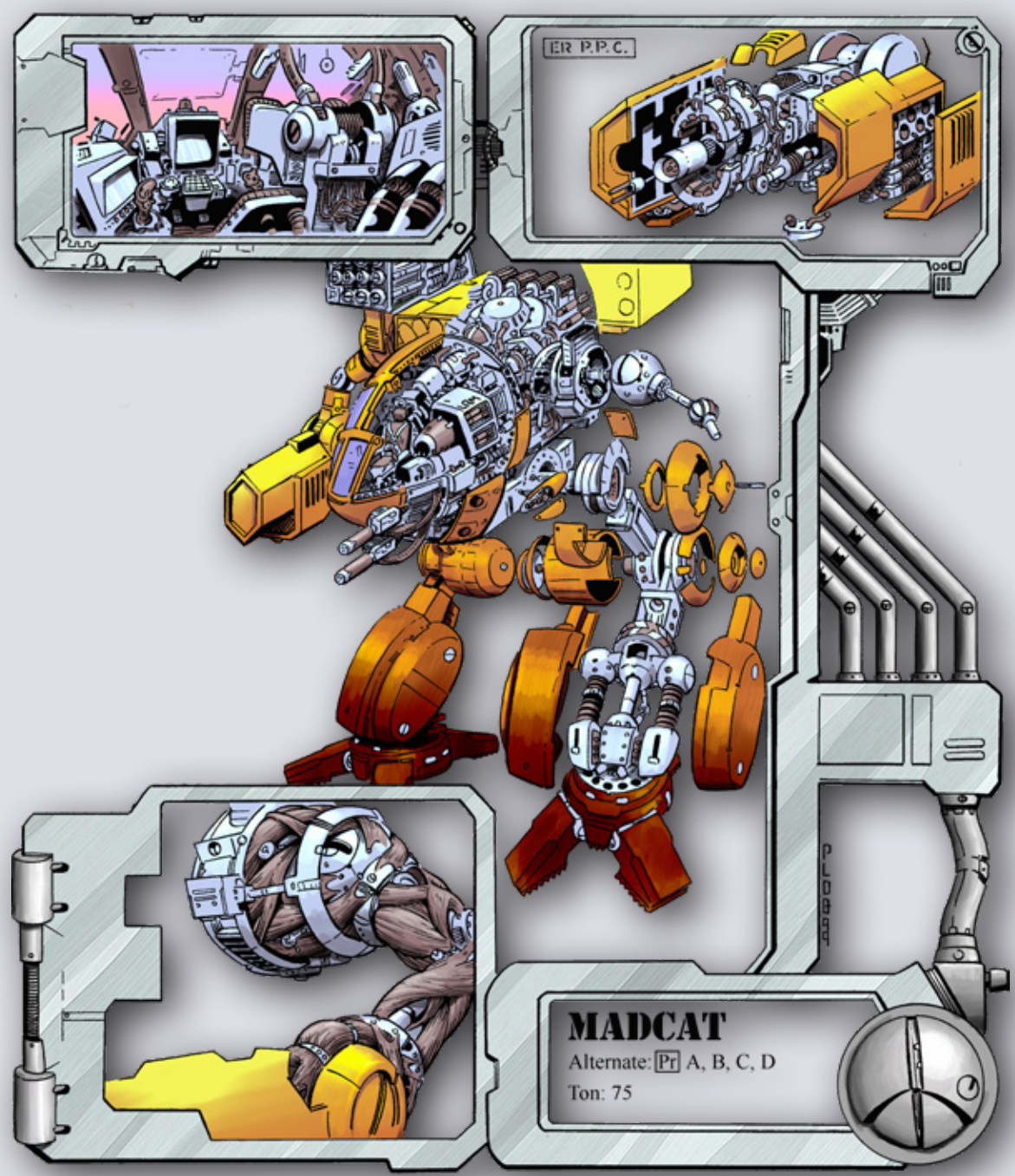


BATTLEMECH TECH: A PRIMER

—Transcript of a special tech services lecture,
"The Basics of BattleMechs," Stuttgart School of Defense, Kaumberg, 12 May 3070

Distinguished members of the media, my name is Professor Dietrich Mathers and I've been asked to provide you an overview of BattleMechs. As I understand, a number of your editors requested this lecture because Kaumberg's 'net has gotten rather toasty towards you. Apparently, legions of armchair MechWarriors are waging a holy crusade to correct technical inaccuracies in your reporting.

…I suspect I could have chosen a better phrase than "holy crusade," what with the Blakists' current misbehavior…At any rate, the more organized 'Mech-nuts' petitions must have hurt your ratings, else you wouldn't be joining me here at the Stuttgart School of Defense.

To the point, what I hope to achieve today is not to fully illuminate you regarding *all* the mysteries of BattleMech technology, but rather to explain enough so that when your future reports next involve BattleMechs, you know to ask the correct questions and get the facts. You should thus—theoretically—come away from here knowing how to avoid being flamed by pimple-faced armchair MechWarriors.

So, this is my lesson plan for the day. First, I'm going to tell you what a BattleMech is. Then I'm going to tell you about their guts, starting at the bones and then covering major components. Finally, I'm going to wrap it all up by explaining how the whole thing gets brought to life. Are we ready? Good.

TERMINOLOGY

Now, before I describe the basics, allow me to explain my terminology. First, when I say "BattleMech," I'm referring to BattleMechs and OmniMechs. If I have something to say about Omnis alone, I will say "OmniMech." But if I just say "'Mech," I'm referring to any type of 'Mech, including IndustrialMechs.

Also, I believe some of you got in trouble from the 'Mech-heads for taking your biological analogies to 'Mechs too literally. Before I begin confusing you, I'm going to warn you right now that while I *will* be using terms like "bones" and "joints" and "muscles," keep in mind I *am* talking about mechanical systems. For example, the "bones" of a BattleMech's chassis are composite structural components that can endure meganewton loads while supporting an exterior armor shell, diffusing excess electrical currents from PPC strikes, carrying a dense web of data and power lines, and anchoring myomer bundles. As a result, they appear no more like human bones than the wings of a large aircraft resemble a bird's wings.

BATTLEMECHS: THE BASICS

You would have to be a blind, deaf, and dumb inhabitant of a Deep Periphery lost colony to not know basically what a BattleMech is. But just in case, a BattleMech is a giant, armored robot toting huge guns, piloted by those modern knights called MechWarriors.

That is a simplification, of course. As many of you have learned, no doubt, there is a little more to these machines than that.

Your recent problems originate not only from people shouting at you for technical errors, but also for violating cultural taboos about the BattleMech. For example, in some 'net halls, I would be wise to wear asbestos undies if I dared to call those shining and magnificent titans of war something so crass as "giant, armored robots toting huge guns." So, to strip away the cultural baggage that BattleMechs have acquired over the past half-millennium, let me give you this *enhanced* definition of the BattleMech:

A BattleMech is an armored combat vehicle.

That's right. Don't be fooled by the sculpted armor and lifelike motions of its limbs. A BattleMech is just a tank on legs. The arms are complicated turrets, but turrets nonetheless. The legs are a complicated all-terrain propulsion system. And a BattleMech's guns and armor do not significantly differ from those found on any other armored combat vehicles in use today.

There are, of course, several subtle differences.

INTERNAL STRUCTURE

First and foremost, it is the articulated structure of the legs that set 'Mechs (Battle- or otherwise) apart from other vehicles. No other vehicle has articulated legs as capable as those of a 'Mech.

Making these legs possible is a chassis, an internal structure quite different than those of other vehicles. There is an obvious degree of articulation—joints—not found in the rigid bodies of conventional vehicles. And when the first 'Mech designers sought to harness myomers in the 24th century to better animate the limbs of their IndustrialMechs, they found the easiest approach was to mimic the layout of humans and other advanced animals: an endoskeleton.

Having an endo-skeletal frame means that many of a 'Mech's systems sit on the exterior of the frame rather than being caged within a frame, roughly similar to the way your skeleton serves as an internal support for muscles and organs. As rigid and unyielding as BattleMech armor might seem, few 'Mech designs use the armor to assist the internal structure's load-bearing duty. BattleMech armor is too thin for its width and height to be anything but a wobbly sheet.

Wait, "wobbly" was another bad word choice, wasn't it?

The Frame

So, let's start talking about internal structure components with the bones. A 'Mech typically only has about sixteen to twenty-five "bones." This is partly because some structures that might be assembled from a dozen or more bones in a human, like the ribcage, are a one-piece cage in 'Mechs. In other areas 'Mechs simply don't need the complexity of the human model, like the foot, where shock pads are used. One end result of this structural streamlining compared to the human inspiration is that 'Mechs generally have less flexibility and articulation than their organic creators.

The 'Mech's so-called bones differ between 'Mech classes. The cheap, heavy bones of IndustrialMechs, for instance, are quite different from BattleMech bones and are beyond the scope of this discussion. The bones of BattleMechs, meanwhile, fall into two major designs at the moment: standard structure and endo-steel structure.

Standard BattleMech structure uses major components that are composites of foamed aluminum—

Eh? Yes? Could you speak up a bit for the microph—?

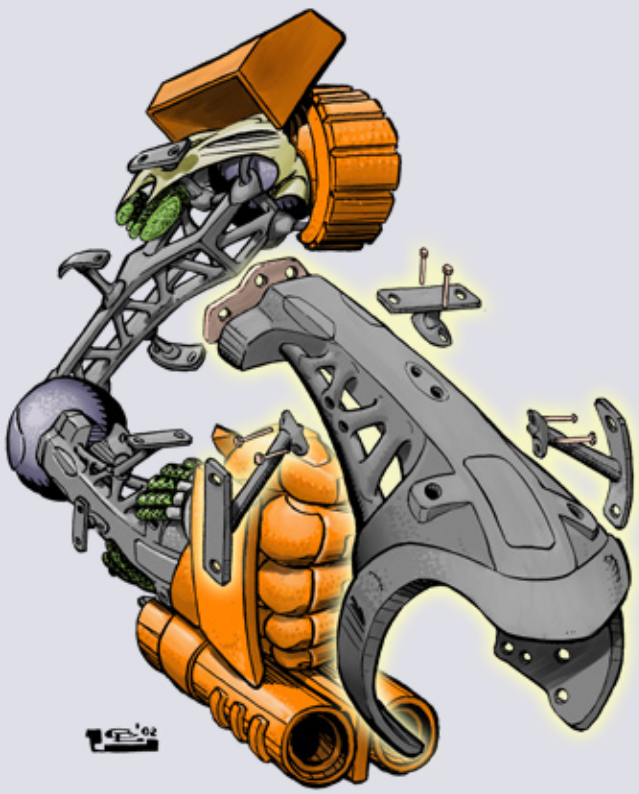
…Thank you. No, when I say "composite," I mean it in the correct engineering sense of "a material made of several distinct components." I am not referring to the experimental and fragile "composite internal structure" that you've heard of from *Solaris Tech Monthly*. I'm not going to cover experimental stuff like that today. Hopefully after we're done here, you'll be able to investigate those topics on your own.

Anyway, the major components—the major "bones" of the standard internal structure—are composite structures with a core of ultra-light foamed aluminum, shrouded in carefully oriented wraps of silicon carbide fibers. This assembly is then clad with titanium-alloyed steel. The fiber layer also has assorted structural sensors and data lines woven into it, while the exterior is rigged to mount assorted equipment. Struts extend outward from the bones to support the armor shell without interfering with the myomer rigging. Weapons frame attachments are custom-designed for each 'Mech.

Endo-Steel

Endo-steel internal structures are basically the same as standard structures in layout, but differ in materials. Endo-steel structures utilize endomorphic steel (hence their name). This endo-steel is much stronger than the steel of standard BattleMech frames, which allows their structural walls to be thinner and lighter for the same strength. The thinner walls would make the bones less stiff for the same diameter of bone, so endo-steel bones have to be noticeably larger.

Yes? I can hear you— …No. Stiffness and strength aren't the same qualities. A thick cardboard panel is stiffer, less prone to buckling, than a thin sheet of metal even though the metal is much stronger. Endo-steel is stronger, but because it is thinner, it runs into buckling problems unless you make the bones wider. That's how cardboard turns thin sheets of paper into a stiff structure: it makes the structure thicker with the corrugated paper between two outer sheets. Endo-steel uses a larger foam core inside the thinner shell.



Now, because of its composition, endo-steel is produced in zero-G to avoid chemical segregation. Er, that is, some of the alloying agents want to separate like oil and water and thus make the steel brittle and weak, but they'll stay mixed in zero-G until solidification. Structural designers also make endo-steel's foam core in zero-G, where foams form a more regular pore size and thus have superior strength. Zero-G processing makes endo-steel expensive, but the elimination of the fiber layer allows it to be produced faster than standard structures.

So, those are the bones of 'Mechs. Next: the joints that string them together.

Actuators

A 'Mech's joints are generally referred to as its actuators. This includes more than just the hinges between bones. An actuator includes the joint itself, the associated myomer bundles and the motor control units.

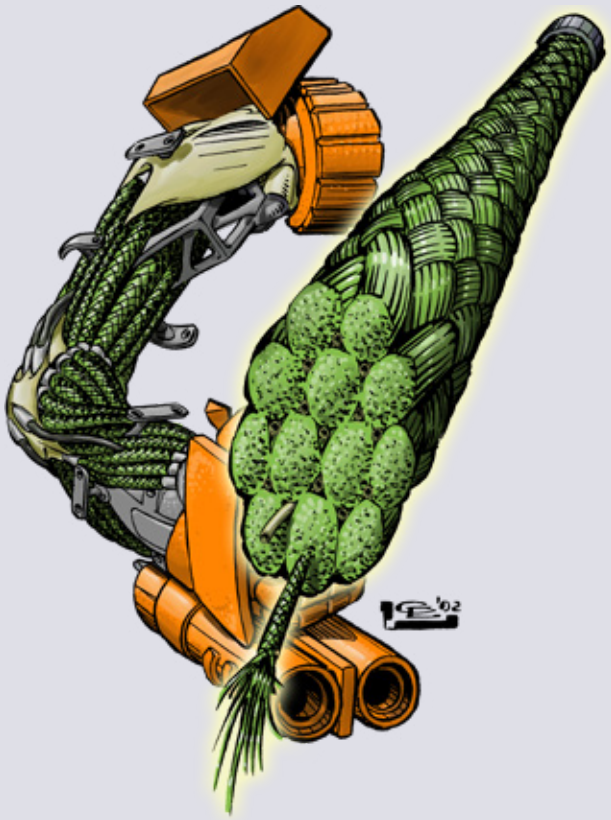
The actual joint is typically a ball joint like your hip or a hinge like your elbow, and it is the simplest component of an actuator. The joints are sealed and are usually filled with dry lubricants like graphite.

The joints are moved by the myomers, just as your joints are moved by their associated muscles. Before I get to the myomers, however, I want to describe how the myomers and joints are controlled. Each joint has an associated Motor Control Unit (MCU, for short) that sends commands—in the form of electrical power—to the myomer bundles. The MCUs are local managers that organize thousands of myomer fibers in each myomer bundle, contracting them and monitoring feedback. These MCUs are in turn commanded by higher-order control systems that interpret the MechWarrior's input for the benefit of these units.

Myomers

A 'Mech's muscles—called myomers—are made up of bundles of microscopically thin plastic tubes filled with a contracting substance. Each tube, basically made of polyacetylene, is individually extruded in microscopically thin forms and spun into the bundle. The contractile filling, called acti-strandular fiber, is crapped out by vats of genetically engineered bacteria, rather like how alcohol production occurs. This acti-strandular precursor material, strained out of the vats, is mixed with specific polymers, and then squirted into the tubes. The polyacetylene tubes are then electrified and the acti-strandular precursor material arranges itself into intricate, complex nanoscale structures akin to the contractile protein filaments in natural muscle (myosin and actin filaments).

When the acti-strandular fibers are stimulated by sufficient electrical energy, the fibers contract sharply. The process is virtually identical to the contraction of protein filaments in natural muscles, but with an electrical power source, rather than a chemical one. Also like natural muscle, the contraction is an all-or-nothing process. The level of strength generated by myomer bundles is regulated by the number of myomer fibers triggered, rather than the amount of current itself. As myomers are much more powerful by weight than natural muscle, and can be built on larger scales, it is their use that makes efficient 'Mechs pos-



sible. The relatively recent development of the NAIS's "triple strength myomers" are quite similar to normal myomers, but operate more efficiently when hot due to a simple and reversible endothermic chemical reaction within the myomers.

Now, I tried to shake some of your misconceptions about BattleMechs earlier by calling them walking tanks. At this stage, I want to do the same with myomers, because you can't simply think of them as mere plastic muscles. Myomers are electrical motors, and powerful ones at that. Even the small bundles in a 'Mech's fingers are multi-kilowatt motors, while those of the legs are vastly more powerful. But it's also important to know that myomers aren't particularly efficient electrical motors due to their high electrical resistance; without vigorous cooling, they can fry themselves.

And while we're talking about myomers as electrical motors, I'd like to take a moment to discount a theory being kicked around by—was it *Lasers and Slugs* magazine?—that an easy way to cripple 'Mechs would be to hit them with riot control stun bullets. Sorry, no. A little jolt of electricity from a bullet isn't going to make a 'Mech's myomers twitch anymore than a flashlight battery will budge the multi-megawatt motors of a fusion-electric freight train.

On a related note, there's the misconception that lightning and PPCs (which actually are nothing like lightning) should spasm a 'Mech and rip its myomers apart. 'Mechs protect themselves from these electrical dangers much like your home does with lightning rods. 'Mech armor and skeletons are designed to provide low-resistance routes for stray electricity to ground out safely without ever going through the myomers. And once the armor's gone…well, once the armor's gone, you're shooting PPCs into bundles of plastic. Damage will be done one way or another.

ARMOR

Armor is the last of the "dumb" components in a BattleMech before I get to the juicy stuff.

The Layers

Standard BattleMech armor consists of multiple layers. Only two of these layers are armor in the truest sense. The other two layers play supporting roles.

The outer layer of armor is an extremely strong, extremely hard iron alloy…a steel. It is intended to fragment projectiles and/or—hey, have you heard anyone use "and/or" aloud before?—to fragment projectiles and/or ablate protectively in the face of energy attacks. The grains of this steel, that is, its crystals, are carefully aligned for maximum strength and radiation-treated to further hardness and strength. Though phenomenally strong and hard, the steel pays for these properties by being quite brittle. In fact, the steel is brittle enough that the second layer of armor that backs the steel is a ceramic, cubic boron nitride.

The point of the boron nitride layer is to act as a catcher's mitt for the fragments and plasma of the steel. Another very strong, very hard material with a brittleness problem, boron nitride is carefully processed to avoid any porosity and incorporates an additional web of artificial diamond fibers to make the ceramic a fine backstop for the steel outer layer.

Now, during the Succession Wars, some armor manufacturers lost the fiber-making techniques and resorted to diamond powders, which could be made from natural diamonds. This spiked demand and provided a great excuse for some of the greatest jewel robberies in history. The good news is, recovery of fiber-making technology in the last half century has virtually eliminated natural diamonds as an industrial commodity, and so diamond jewelry's value has returned to normal. The bad news is, there are a lot of scams running around. Those of you who donated jewelry to the "Armor Reconstruction

Charity" and other "charitable institutions" to aid Kaumberg's recent explosion of bandit-hunters…yes, you've been had.

Now, the next layer below the boron nitride is a titanium alloy honeycomb. The honeycomb provides no armor protection per se, but is instead used to support the armor layers. The first and second armor layers are very thin—in terms of millimeters and centimeters—because 'Mechs have a lot of surface area to cover with only a proportionately light quantity of armor. Because this tends to make armor surprisingly thin for its length and width, much like a large pane of glass, the titanium honeycomb keeps the armor in place and prevents it from flexing too much under stress. Remember the endo-steel discussion and cardboard? The same principle applies here.

Finally, there's a polymer sealant layer. Because the armor is configured into multiple, separately replaceable panels, this sealant is needed to keep the 'Mech air- and water-tight. The polymers chosen for the role usually have some self-sealing capability, enough to handle small punctures and gaps. Though this pales in comparison to the Clan HarJel system, it is this layer that allows BattleMechs to operate underwater and in vacuum.

Other Materials

Of course, standard armor doesn't cover everything on a 'Mech. Armor over the actuators can be a wide range of protective materials, from ballistic/ablative fabrics to carefully articulated plates of standard armor. Cockpit canopies use a wide range of transparent armor combinations, with anything from ferroglass to alternating diamond and polymer sheets.

New Armors

The new wonder armors of the thirty-first century…and the old Star League, I guess…and the Clans…um, let me find the little animation clip here…

Ferro-fibrous Armor: One of the oldest-newest armor types is ferro-fibrous, which differs little from standard armor except to add a weave of diamond fibers to the steel layer itself. This is actually quite an accomplishment since molten iron and carbon get along *real* well, if you know what I mean.

…Or if you don't, I mean iron reacts with carbon, so the diamond would dissolve unless you're clever. The fiber protection techniques involved result in bulkier—yet lighter—armor. Pioneered in the Star League era, the technology was lost to us for a time, but the Clans (of course) have had more practice with this technology. Theirs is an even more efficient version that is somewhat denser, and may also be shaped better, to maximize internal volume. Inner Sphere ferro-fibrous, by comparison, is a bugger to shape in anything other than flat plates, thanks to its bulk.

On the other hand, various groups in the Inner Sphere have been making some groundbreaking progress by varying the amount of fiber in the armor. "Light" ferro-fibrous armor has less fiber reinforcement, making it less bulky but also less protective, while "heavy" ferro-fibrous armor uses more fiber to gain protective capabilities greater than even Clan armor, but with enormous bulk. Personally, I think the names are reversed, as the so-called "heavy ferro" is lighter by weight than the "light ferro", but I wasn't consulted during the naming process, so…

Stealth Armor: The infamous stealth armor developed by the Capellans is actually a variation on standard ferro-fibrous armor. It attempts to replicate the Star League's long-lost Null Signature System, but has to use a separate ECM suite in order to attain its capabilities. Stealth armor incorporates a number of signature-suppressing materials that eat up weight, making it only about as effective as standard armor for its weight and bulk. Its effect isn't attained through materials alone, though. Even the BattleMech's architecture needs careful attention to use stealth armor, with heat sinks rerouted so they can be suppressed, while corners and surfaces must be molded to control radar reflections and internal baffles help to mask even the massive magnetic field of the engine itself.

And so, those are the simple, "dumb" parts of 'Mechs. Though they aren't so dumb, actually; both the structure and myomers are laced with sensors, data lines, and—hey, that reminds me. The fiber layers in the armor also often include sensor and data fibers. That'll be an important point later in this lecture.

GYROSCOPE

A BattleMech's gyroscope is the device that keeps a BattleMech upright while running over rough terrain, jumping or struggling against battle damage. 'Mech actuators are too slow and clumsy for the swift, precise applications of force needed to keep a 'Mech upright, and so that force comes from the gyroscope housed in the heart of every 'Mech's torso.

A BattleMech's gyro consists of two parts, a balance-sensing mechanism and a force-generating mechanism.

Balance

The balance sensors typically consist of a small computer in the cockpit that has one or more chips incorporating balance-sensing widgets. The widgets (and I do say widget in the technical sense) operate on a number of different principles, like laser-ring gyroscopes, harmonic vibration gyroscopes—I've heard the Capellans used beads of mercury during the Third Succession War. This balance-sensing component is little different than the inertial sensors often found in your noteputer and may also function as a 'Mech's inertial navigation system.

Brute Force

The part of the gyro that everyone thinks of when the gyro is mentioned is in the torso. It's a multi-ton assembly of reaction wheels. Reaction wheels are like the traditional concept of a gyroscope: spinning rings. Calling them "reaction wheels" is just me being nitpicky. When a BattleMech starts to fall, the gyro mechanism grabs one of the fast-spinning wheels and, as a reaction, is jerked in the direction the wheel was spinning. Or it pushes against the wheel to make the wheel go faster and as a reaction is pushed in the opposite direction. Action-reaction. You can try it for yourself at home by turning your bicycle upside down and spinning one of the wheels, then grabbing it…and before anyone sues me for amputated fingers, be careful. The torso gyroscope assembly differs from manufacturer to manufacturer, but always has at least three reaction wheels set at 90 degrees to each other.

Some gyroscopes are further complicated by mounting the wheels in a free-spinning sphere. The point of this is to avoid having the reaction wheels inhibit a BattleMech's movement with unwanted gyroscopic effects. In this design, when the 'Mech needs a balance assist from the gyroscope, it locks the sphere and taps on the reaction wheels. Other gyroscopes use six reaction wheels rigidly mounted to the internal structure. They are configured in three counter-rotating pairs, which also

cancels the gyroscopic problems. One design isn't particularly better than the other.

Though the gyro system can keep a BattleMech upright fairly well, left to itself, it can be fooled fairly easily. A 'Mech is particularly bad at determining when it *should* be off-balance, which can be surprisingly useful in combat. This is where the MechWarrior and his neurohelmet come in. In fact, this is the primary purpose of the neurohelmet: telling a BattleMech when it's okay to be off-balance and to help the BattleMech regain its bearings.

Oh, and contrary to kids' books like the *The Littlest* Atlas, a gyroscope cannot be used to help you hover in mid-air over a pit trap or move you through space. The reaction wheels can only rotate a 'Mech, they can't "translate" it—that is, they can't move it up, down, sideways, back or forth. To "translate" an object, you need to push on some external object (like a wheel or foot pushing on the ground) or eject something in the other direction (like a rocket).

ENGINE

Ah, the engine. Now this manmade star is one of the components that give BattleMechs part of their allure. Well, it did at least during the Succession Wars, when fusion engines were rare.

Fusion and Fusion Fuels

Fusion reactors generate their vast quantities of power by, well, fusing light elements like hydrogen together into heavier elements like helium. Contrast this with nuclear fission, which splits heavy elements, like uranium, into lighter materials. The fuel of choice for modern fusion engines is normal hydrogen, the protium isotope if you want to be fancy.

In the past, other fuels were used by early fusion reactors—from the heavier hydrogen isotopes deuterium and tritium, to the helium-3 isotope and even lithium. But these types gradually lost ground to protium users. It was almost a century after the Terran—sorry, the *Western* Alliance—harnessed fusion that a reactor capable of burning protium was built. Though other fuels would've allowed simpler reactors, and backwater planets continued to use such primitive systems for that reason, militaries are fascinated with the newer reactor technology.

Normal hydrogen is a fairly clean nuclear fuel in terms of radioactive waste, at least compared to fusion with other fuels or fission. In fusion reactors today, this normal hydrogen is easily extracted from any number of sources, especially water. This is why most military fusion engines include a small electrolysis unit to extract hydrogen from water. Those tales you may have heard, of MechWarriors "refueling" their BattleMechs with urine? They aren't myths.

Containment and Power Generation

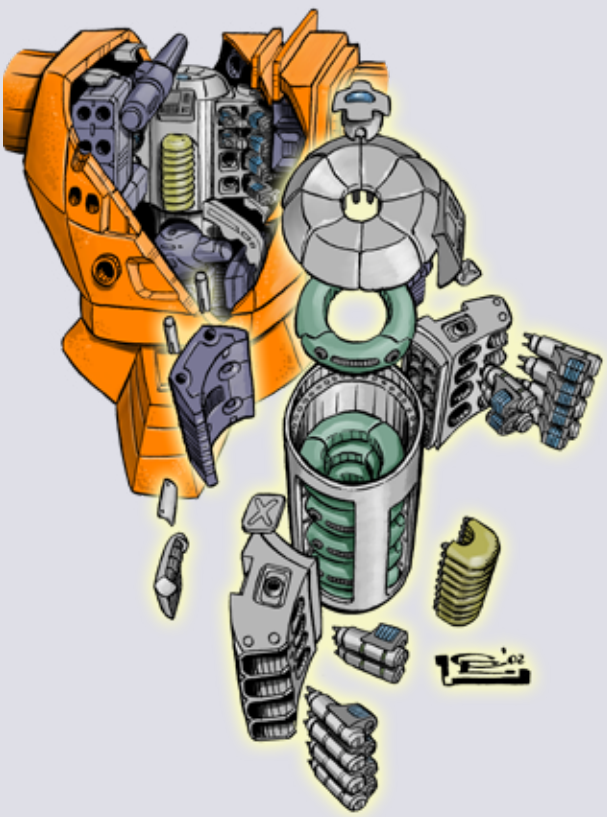
So, you've got this super-hot ball of hydrogen plasma being turned into helium. What keeps it from melting the engine? Magnetic fields. Plasma is electrically charged, so it can be pushed around by magnetic fields. There are fields in the plasma itself and fields generated outside the plasma. The plasma doesn't touch the wall. In fact, outside the plasma, the reactor chamber is a vacuum for insulation.

How does the power come out of the plasma? Two ways.

The first way is a tongue twister called "magnetohydrodynamics," MHD for short. The short and semi-correct description is that the plasma is like a dynamo, stirring up electrical currents in loops of conductors that wrap around the reactor. MHD directly converts heat from the fuel into electricity—unlike, say, a gas turbine, which burns fuel to spin a turbine, and the turbine spins a dynamo. By cutting out the middleman and operating at extreme temperatures, MHD power generation can exceed 90 percent efficiency in turning heat into electricity.

The second way of generating power is only a secondary system, called regenerative cooling. Regenerative cooling uses some of the waste heat it's handling to generate power. The typical format is a closed-cycle gas turbine or even a steam turbine. Most BattleMech designers and MechWarriors view this as part of the cooling system, even calling it "heat sinks hidden in the engine." In fact, the regenerative cooling machinery is quite different from real heat sinks, even though it can benefit from the same advances in materials that make the recovered double strength heat sinks possible. This system adds negligible volume to the engine, as it mostly uses the existing plumbing of the engine's cooling system, though weight starts to add up on larger engines when designers attempt to scavenge every last scrap of waste heat.

Since real heat sinks—especially the double strength "freezers"—take up quite a bit of volume, it would be nice if all waste heat from an engine could be handled by these so-called "integral heat sinks," but as a matter of practical engineering you can only extract so much energy from this lower-quality source. Bigger engines generate more waste heat and can handle a larger regenerative cooling system, but most 'Mechs end up with some real heat sinks placed elsewhere to handle the excess.



Shielding and Fusion Engine Types

Since Kaumberg has been enjoying a boom in technology over the past generation, I've noticed that local attempts to build municipal fusion power plants have run into trouble from environmentalists and followers of Blake. Of course, the fusion industry is hitting back with its own propaganda about what a clean and wonderful power source fusion is.

Yes, I said "propaganda." Fusion is a wonderful power source. We're on Kaumberg and a thousand other systems today rather than Terra because of fusion power, which even made the Kearny-Fuchida drive possible. Even through the bloody Age of War and the Golden Age of the old Star League, fusion power did wonders for elevating humankind away from the cold, nasty life of a caveman. But fusion isn't as perfect as you might expect. All fusion reactions generate radiation. Fusion reactors irradiate their interiors, creating an issue when the reactor is serviced or decommissioned. As a result, radiation shielding is the largest portion of a 'Mech-scale fusion engine's mass.

In standard fusion engines, the shielding is a very dense ceramic. Typically, this is tungsten carbide, which is reinforced with short ceramic fibers mixed into the carbide. This shielding isn't just thick enough to stop the radiation, but also to survive battle damage and to serve as a heat sink. By this, I mean a mass meant to soak up heat—just in case the magnetic containment bubble fails.

In BattleMechs, you'll find a few variations on engine shielding types. The famous extra-light (XL) engines slim down the tungsten-carbide reactor walls and reinforce them with a crystalline plastic similar to those of double strength heat sinks… Don't worry; I'll cover those when we get to cooling systems later.

Now, trying to make large blocks of this shielding is a trial for engine manufacturers. The scrap rate is phenomenal and accounts for some of the hideous price XL engines command in the open market. The newer so-called light engines use an innovative mix of layered shielding materials and secondary magnetic screens…

Incidentally, I recall a rumor in *Lasers and Slugs* that claims the only difference between XLs and standard engines is the shielding, and that salvaged standard engine cores can be easily refitted into XL engines. This is an exaggeration, but it's not completely false. In fact, while shielding is the major difference between the two fusion types, the XL engines also usually replace some components with advanced, lightweight parts. So, while a 300 Vlar and a 300 Vlar XL have a lot in common—enough to con-

FUSION ENGINE EXPLOSIONS:

Fusion engine explosions: an urban legend that won't die. Let's see if I can kill it on this planet, at least. Where to start?

All right. First of all, when I said earlier that the magnetic fields of a fusion engine keep the plasma from melting the engine, I was already anticipating this question. In fact, the issue is actually kind of the opposite and counter-intuitive, so I didn't bring it up. The magnetic fields do provide some protection to the reactor walls from the plasma, but primarily they protect the plasma from the cold, cold walls of the reactor chamber.

The fusion reactions in a BattleMech's fusion engine occur only under very narrow conditions of temperature and pressure. Generally, the hotter and higher the pressure, the faster the reactions, and below a certain minimum, fusion simply ceases. If you remember your ideal gas laws from chemistry…eh…the condensed version is that when you heat up a gas, it wants to expand. If it can't expand, its pressure increases. When a gas expands, its temperature drops. Remember those rules of thumb and if you have trouble remembering them, hit the 'net when this lecture is over.

When a BattleMech's fusion reactions spike a bit, the plasma gets hotter. More fusion reactions mean more heat means hotter plasma. But the magnetic confinement fields are not rigid. In fact, an ancient fusion engineering description that dates to the twentieth century says that, "Trying to hold onto plasma with magnetic fields is like trying to contain a roll of jelly with rubber bands." When the plasma gets hotter, it pushes against the magnetic fields because its pressure is rising, and the magnetic fields give a bit. The expansion cools the plasma, and the reactions drop. There's some elbow room in the reactor chamber for just this purpose.

Now, I said the fusion reactions drop when they get cooler. There are ways for the plasma to cool other than expansion. One way is when the plasma touches the relatively frigid walls of the reaction chamber. If they do, the plasma will chill so rapidly that fusion ceases instantly. That only leaves you with a puff of hot gas, with no continuing source to damage the reactor walls. When confinement fails so badly that the plasma hits the walls, the walls are usually only scuffed.

Surprising, isn't it? But remember, all the heat energy comes from the fusion reactions. It's not stored as latent heat in the plasma. In fact, there's so little plasma mass to store heat that the "dead" plasma is barely able to warm up a multi-ton reactor—even if the cooling system completely fails. You *might* scorch your hand if you touched the outer casing, but it's not enough to melt the shielding or damage critical components.

And, no, you can't just keep powering the fusion reaction while it gnaws through the reactor walls. Evaporating the lining of the reactor will mix kilograms of cold, heavy, non-fusible elements into the plasma, which is much lighter. The effect would be like dumping a ton of wet sand on a welding torch. So, the short version of all that is that when a fusion reactor gets out of hand, it usually shuts itself down and is unable to do more than warm up the reactor a bit.

And you protest, "But I saw a 'Mech explode on the news in a blinding flash of light! It had to be a nuke!" Or is it, "Well, what about that MechWarrior that buried a bunch of Clanners in a canyon with his exploding reactor?" Or would you ask, "Well, what about Tharkad City?" Okay…

Fusion reactors *do* occasionally die in spectacular manners. But most of the time, the fireworks are not actually from an exploding reactor. What typically happens is that some heavy weapon manages to puncture the reactor itself. Since the reactor interior is a vacuum, air would get sucked in and mix with the plasma, stopping the fusion reaction. Kilograms of cold air mixing with a tiny mass of plasma…well, that's the wet-sand-and-torch analogy again. And, no, there's not enough hydrogen in the reactor to really explode with the oxygen.

vert a standard into an XL—such a process is not easy and the required parts cost almost as much as new XL. Furthermore, some manufacturers don't strive for parts commonality at all, so I guess my message here is, "Techs, if you're trying to be the next Battle Magic and convert an old clunker into an XL engine, check the manufacturer's specs for both engines before you try it. A fusion engine is terrible thing to waste."

Engine Cooling Systems

In addition to the regenerative cooling system and heat sinks, fusion engines have a basic, integral cooling system separate from the regular heat sink network. This involves a set of liquid nitrogen jackets over key components and allows the engine to operate at minimal levels without outside cooling systems. Any exertions require the greater cooling capacity of the main heat sink system.

Oversized Engines

A slight digression here: For the first couple of decades in BattleMech design, engineers used oversized fusion engines—power plants that were larger than needed today for a given speed category of 'Mech. It was hoped that this would provide assorted, ill-defined boosts in combat. Unfortunately, these engines simply ran too hot or shut themselves down with overloads. The problem—in part—was that BattleMech systems could only draw so much power at one time. Ramming more down their throats didn't help.

So, now that we've found a major heat source in 'Mechs, let's talk about how to get rid of it—

Yes, question? Speak up for the microphone… No. No; just stop there. Fusion reactors are nothing like fusion bombs. Tharkad City— Yes, I know. Calm down and let me explain.

HEAT SINKS

To become fusion-powered avatars of war gods that can stalk airless wastes or battle below the waves, BattleMechs are well-sealed, well-insulated vehicles. While that prevents heat from getting in, it also prevents heat from getting out, and the endless megawatts of power consumed by a BattleMech end up as a lot of waste heat. So, BattleMechs have heat sinks.

Now, first off, there's been some confusion among the more technical journals about what BattleMech heat sinks *are*. Basically, BattleMech heat sinks are misnamed. It's an honest mistake for Kaumberg's more technically literate to miss the

THE GREAT MYTH

But while the plasma is cooling down from jillions of degrees—yes, "jillion" is a technical term, my youngest son assures me—the air is heated up to thousands of degrees and will promptly burst back out the hole in a gout of white-hot flame. Since a weapon heavy enough to puncture a reactor also generally destroys the core frame of a 'Mech, you get a blinding fireball accompanied by the 'Mech falling apart. It *looks* like a nuclear fireball bursting out of the 'Mech's chest, but it's literally just a load of hot air.

And that's a brutal way to kill a fusion engine. When you let oxygen loose inside an operating reactor, the super-hot oxygen just ravages the lining of the reactor and the delicate sensors and probes in there. It gets turned into a flash-rusted mess.

Now, I earlier said that a reason the reactor shielding is so heavy is that it serves as a heat sink during a hard shutdown without a functional cooling system. I also said that there isn't enough heat stored in the "dead" plasma to damage shielding. Well, there are circumstances where this ultimate in passive safety systems can be overwhelmed, and you can get the fabled "nuclear reactor" explosion…though it's more like a bursting balloon than a nuclear bomb. See, reactor shielding isn't a great thermal conductor, so it takes time for heat to soak through the shielding. That means the interior of the reactor can get very hot while it's waiting for the heat to soak outward. Engine designers know that and allow for that, at least for reasonable levels of heat left in the plasma. Over the centuries, some clever and stupid MechWarriors have figured out that if they overcharge the engine, then kill the magnetic containment field quickly, they can dump so much heat into the reactor walls that the reactor lining explosively evaporates. This over pressurizes the reactor, which bursts and causes a respectable explosion. Again, however, the effect is not very much like a nuclear bomb at all.

This, incidentally, is *why* you don't see fusion-powered battle armors and fusion engines much smaller than 250 kilograms. Smaller fusion engines just don't have the mass to soak up the remaining heat of a hard shutdown and can much more easily explode as described above.

And then there's the reactor explosion at Tharkad City, which was yet another sort of fusion engine explosion and illustrates why you only get fusion engine explosions after multitudes of unlikely failures. As I've read, the Tharkad Power & Heat power is—er, *was*—a multi-functional industrial facility, including the cornerstone of TP&H's radioactive waste treatment. TP&H used the facility to irradiate radioactive waste into non-radioactive or short half-life isotopes. It was also an ancient facility built during the old Star League. While the reactor was well maintained, the aging roof was carrying a heavy winter snowfall. And since it was a fusion reactor, the building wasn't reinforced like the containment domes of those primitive fission reactors outside of town here. There would be no real explosion risk to contain. The reactor vessel and shielding would handle that.

But over the decades, it seems, TP&H had expanded its profitable Star League-era facilities for producing industrial heat and processing more radioactive waste. That involved installing extra tanks of sodium coolant outside of the protected areas. It seemed reasonable and quite defensible at the time, but hadn't allowed for the centuries of penny-pinching deferred building maintenance. When the Word bombarded Tharkad City, the tremors collapsed the old roof and dumped hundreds of tons of snow and debris on hundreds of tons of molten sodium. There was a large chemical explosion, one big enough to generate a credible mushroom cloud, and a fire amongst tanks of molten salts holding dissolved radioactive wastes. Frankly, the reactor was almost a bystander to the whole episode.

misnaming because, really, you guys were using the term correctly. You grew up with primitive computers that needed heat sinks to cool their chips. 'Mech heat sinks should be called heat pumps. Those chips are obsolete and gone, but the term "heat sink" lingers in Kaumberg's lexicon. And what's a real heat sink? It's a mass meant to soak up heat. Like the shielding of a fusion engine. That's a heat sink.

But BattleMechs generate far too much heat to just depend on a block of silver to soak heat and slowly radiate it. For whatever historical reason, the required cooling units on 'Mechs are called heat sinks and I'm going to call them heat sinks in this discussion, simply to avoid any confusion.

So, before we talk about heat sink hardware further, let's look at the major sources of heat in a BattleMech. Know the enemy before looking at the solution.

Heat Sources

First and foremost, the fusion engine generates heat, even with all its efficient energy conversion. The delicate balancing act of sustaining fusion often results in a fusion engine producing more energy than is needed. Since there's more energy than needed, and it's not all converted into electricity, the excess is dumped as heat.

Second, energy weapons are not very efficient at turning electricity into laser or particle beams. A heavy laser weapon or PPC can thus create more waste heat than energy going into the target. The tubes and breeches of ballistic weapons also need good cooling in the well-insulated structure of a BattleMech.

Finally, myomers generate quite a bit of waste heat, though rarely as much as weapons. As I think I mentioned earlier, myomers are not very efficient at turning electricity into useful work, resulting in more waste heat. Incidentally, myomers are also one of the primary limitations on the temperature a BattleMech can tolerate. Despite centuries of research, only certain materials can be used to make myomers, and those materials—particularly the acti-strandular fibers—don't like high temperatures.

Collecting Heat

The first step to getting rid of heat is collecting it. To do this, hot-running equipment like the engine and weapons have networks of cooling tubes built into their frames, like the water jacket in your groundcar's engine. Myomers have a distributed network of coolant lines that look like a computer's concept of a vascular system. These coolant lines in turn connect the collection systems to the heat pumps and radiators that I'll get to in a moment.

Coolants differ between heat sinks, depending on the manufacturer. Oils, chlorofluorocarbons, water-based solutions, liquid nitrogen, gaseous nitrogen, gaseous helium and other coolants are used. No, you won't see molten metals like the Tharkad City fusion engine. Those are simply too hazardous in combat.

The coolant is then circulated by a wide variety of pumps. A lot of modern heat sinks like to eliminate traditional mechanical pumps and instead use myomer-wrapped flexible tubing that pulses the coolants along, which is much more damage-tolerant than central mechanical pumps. For additional damage tolerance, the whole network of coolant lines also includes a lot of cut-off valves to prevent catastrophic loss of coolant.

Dumping the Heat

At the other end of heat sinks are the radiators. To understand how the heat pumps work, I'm bringing these up first. Now, the radiators in BattleMechs don't look all that different from those on your car or refrigerator. They are networks of finned tubing carrying hot coolant, usually assisted by fans to pump external air or water over the radiators when those fluids are available. These radiators are always hidden under armored grills.

The reason that heat sinks use pumps is because of these radiators and the laws of thermodynamics. Remember that heat flows from hot to cold. Thus, if the heat sinks were simple coolant systems like the water pump on your car engine and your BattleMech ended up in a hot environment, its heat sinks would carry heat right back into the BattleMech rather than cooling it. Thus, we come to the heat pumps.

Heat Pumps

Arguably the heart of a heat sink, the heat pump basically collects and condenses heat until it can be easily dumped overboard, even into environments hotter than the 'Mech. You can find plenty of descriptions of heat pumps on air-conditioning 'net sites, so I'm not going to describe the physics behind different types of pumps. A multitude of different heat pumps are used today, based on the manufacturers—including vapor-compression systems like your home refrigerator, sonic cooling systems, magneto-caloric systems and others.

Alternate Materials

Standard heat sink radiators have been using graphite tubing and fins since the dawn of the BattleMech. The graphite's structure is carefully arranged for best heat flow, and oriented graphite can have a thermal conductivity about five times that of the reigning metallic champions, silver and copper. Some Periphery nations have resorted to using copper for heat sink radiators. But while these do lose some percentage of performance, such radiators work better than one might expect, because they make up for their lower conductivity with thinner construction, as the metals are tougher than the graphite.

The wonder plastics of the Star League also revolutionized BattleMech heat sinks. These semi-crystalline polymers, which are also found in XL engine shielding, don't quite have graphite's thermal conductivity, but they are dramatically lighter. They allow larger radiators to be constructed for the same mass as standard heat sinks and give us the famous "double strength freezers." Unlike many recovered pieces of technology, it's fun to note that this did *not* come from the Helm Memory Core. The New Avalon Institute of Science was experimenting with this technology prior to the Core's discovery. The Clans, meanwhile, never lost the technology behind this material and even improved on it by using more crystalline, which creates a more thermally conductive—but also more brittle—freezer. The required reinforcements keep the Clan double strength heat sinks at about the same mass, but more compact.

JUMP JETS

I didn't really want to get into all the many different optional items of equipment like weaponry and jump jets, but the Kaumberg media has been filling the 'net with far too many computer images of 'Mechs rocketing into orbit to defend us from bandits, WoBblies, and space monsters. So, I'm making an exception for jump jets here.

Most notably, jump jets can only operate for short periods before requiring a cool-down period. They can't operate continuously, and certainly not long enough to carry a BattleMech into

orbit. But even when working for short bursts, they still have great use. They can help a BattleMech clear difficult terrain or quickly maneuver around enemies.

Now, jump jets have a lot of similarities to the fusion rockets of aerospace fighters. They use a magnetically shielded reaction chamber to superheat some material, the reaction mass, and squirt it out a rocket nozzle. Like fighter engines, an electron beam, an electrical arc, is used to superheat the reaction mass.

However, jump jets do not add plasma vented from the fusion engine, unlike fighters. Aerospace fighters are interested in maximizing their engine efficiency because they have to carry all their reaction mass onboard, and thus want the exhaust as hot as possible. On the other hand, jump jets usually have an endless supply of reaction mass and don't need all the complexity of venting their fusion engine's plasma. These jets thus usually capture air as their reaction mass through a system of turbo-compressors.

This use of atmosphere also contributes to jump jets' short burns. Remember what I said about outside air getting inside an operating fusion engine and causing an explosion? Jump jets can be eaten alive by hot oxygen if they keep running too long on air. This—as well as the possibility that the 'Mech might be called to action in vacuum—is why most jump jet-equipped BattleMechs also carry a small reserve of reaction mass, like hydrogen, water or mercury, for jumps. No, it's still not enough to get them into orbit.

It's also worth noting that jump jets can't handle operating underwater. Lighting up a jet when it's filled with incompressible water generates high pressures that rupture even the toughened jump jet's casing. Even jump jets trying to operate on stored reaction mass don't work right with water plugging their nozzles.

SENSORS AND TARGETING SYSTEMS

In its entirety, a BattleMech's targeting and tracking (T&T) system includes a sophisticated set of sensors and computers to process data. These systems are getting ever more sophisticated as technology is recovered and expanded…a fact that might explain the Blakists' recent interest in targeting electronics manufacturers throughout the Inner Sphere.

Thermal imaging, light amplification, radar and magnetic anomaly sensors are all among the primary sensors used by BattleMechs, supplemented by seismic sensors, motion detectors, chemical analyzers and a multitude of others. Despite this broad range of sensor types, MechWarriors are not deluged with raw data. Sophisticated computers streamline, interpret and prioritize this information, so that by the time the warrior gets the info, it appears as simple visual cues on the usual cockpit displays or the warrior's own neurohelmet heads-up display (HUD).

The powers of a BattleMech's sensory processors stand out most strongly in their ability to recognize other units and classify them by type and as friend or foe. Any T&T suite today can inform a MechWarrior of the type of unit it detects, and can even speculate on what variant it is, and the system is surprisingly intuitive. Sometimes, this can present an interesting effect, such as the famous example of the Inner Sphere naming of the Clan *Timber Wolf* OmniMech. Upon an Inner Sphere BattleMech's first encounter with that 'Mech—which looked like a cross between the familiar *Marauder* and *Catapult* designs, the name "*Mad Cat*" was born. The ability to tell friend from foe—another key ability of the T&T suite—eases the burden of target identification for MechWarriors in the heat of battle, particularly under poor visibility conditions.

BattleMechs are also not islands unto themselves. They can share sensor data to some extent, allowing greater sensory performance than a single 'Mech can achieve. The specialized equipment of a C^3 system takes this to new heights with direct battlefield applications, but all BattleMechs can at least receive basic sensory data from a unit mate.

And that data is recorded. BattleMechs have capable "black box" systems, the so-called battleROM that stores hundreds of hours of all sensor data from a 'Mech, from its internal and external sensors and communications. The armored battleROM recorder is located in the cockpit and will survive virtually any catastrophe, from an ammo explosion to a failed orbital drop.

COCKPIT

While it is technically a ground vehicle, a BattleMech's cockpit is more akin to that of an aerospace fighter than the crew station of a normal armored vehicle. More than a control center, however, BattleMech cockpits can become homes for MechWarriors operating on extended campaigns, with sleeping and sanitary facilities available to minimize the need for egress in hostile territory. Clan cockpits—which reflect the Clan perspective on warfare as a series of short Trials—are something of an exception to this latter point. Much more compact and narrow than Inner Sphere cockpits, Clan cockpits are more like those of conventional fighters—ill-suited to longer campaigns, but capturing the Clan ideal of efficiency.

As every BattleMech manufacturer has its own opinion of an ergonomic cockpit design, there is virtually no such thing as a "standard" 'Mech cockpit. However, they *do* share a lot of common features, and there are enough similarities from design to design that MechWarriors can usually master the controls of a new BattleMech in a short period of time. A decent analogy would be automobile controls: they're always a bit different in layout, but you'll rarely get confused in a new car.

Today, one of the raging debates among cockpit designers is configurability. In the Inner Sphere, there has been a cycle of cockpit layouts that alternate between sets of multi-function displays and programmable controls, and fixed displays with single-function switches. Each of these approaches has its proponents. Fixed cockpits have minor advantages in damage tolerance, since one blown control won't take out a suite of functions, and—supposedly—reflex speed for the MechWarriors. There's no hesitation in finding the switch to activate punching mode if you (and your father before you, and your grandfather before him) have been using the same switch for years.

Adjustable cockpits also claim reflex advantages by allowing a MechWarrior to customize the controls and displays to suit his preferences, and are favored especially in these days of OmniMech design, where configurable and customizable controls are practically a necessity. Still, MechWarriors have so much to learn just to qualify as "green" today that few care to alter the defaults on any programmable controls they do have, resulting in configurations that remain strikingly similar to those used across known space. In fact, the standard train-

ing 'Mechs used by the Clans and Inner Sphere are very similar because of common origins, hence the cockpits and default configurations are similar.

Controls

Configurability aside, the controls for a machine as complicated as a BattleMech are actually surprisingly simple. And I'll say it now: it's not because the MechWarrior links directly with the BattleMech through the neurohelmet. Leave *that* notion to the cheap holovids. No, this simplicity is because the BattleMech itself does most of the work. I'll explain that when I tie all these components together.

BattleMechs typically have two or three major hand controls, control sticks. One control stick is the throttle, typically on the left side of the cockpit. The other is the main targeting control stick that aims the 'Mech's weapons. Yes, despite all the arms and adjustable guns on a 'Mech, you just point and click to fire. Some BattleMechs will add a second, left-hand weapon control stick to simultaneously aim different groups of weapons, but this rarely works well in practice.

Steering is accomplished with a pair of foot pedals. You press the right pedal, the 'Mech turns right. The foot pedals also control jump jets if the 'Mech has them. Hit both pedals at once, the jump jets trigger; mid-air steering is usually accomplished with the pedals, but complicated aerial maneuvering may be performed with the regular hand controls. Crosshairs can pick a landing spot as well as target a foe.

When hand actuators are present on a 'Mech, most of their actions require little input from the MechWarrior. As I'll describe later, 'Mechs generally have enough intelligence to recognize a simple "grab command" as aimed by a control stick and crosshairs, and can thus pick up improvised clubs or cargo without detailed input from the MechWarrior. Punching is trivial: click the punch mode switch, aim the crosshairs, and pull the punch trigger. Ditto for using clubs and hatchets. For fine hand manipulations, sensors built into the gloves of MechWarriors or separate waldo gloves can allow a 'Mech to mimic the gestures of its MechWarriors, at least when the glove sensors are activated.

Of course, BattleMechs can do more than just turn left or right, or move backwards and forwards. Talented MechWarriors have gotten assault 'Mechs to skip sideways to avoid missiles, executed handstands under carefully controlled conditions, and otherwise tapped some of the often-unused potential of a BattleMech's limbs for complicated movements. For now, you're just getting the two-kroner overview.

More complicated movements involve more complicated combinations of controls. The steering pedals don't just push back and forth. They can also tilt and twist. Throttle control levers and fire control can also provide steering and movement input. And while neurohelmets primarily serve to correct balance, they can help clarify the MechWarrior's intent to the BattleMech.

Now, you'll notice in these pictures multitudes of other switches, but those are the nitty-gritty details of 'Mech operation: comm systems, ECM, missile alerts, ammo displays, navigation controls, diagnostics, environmental controls and so forth. These systems aid the MechWarrior in a host of secondary operations and combat at the touch of a button or the quick scan of a readout.

Displays

In addition to dashboard displays, neurohelmets have often incorporated some displays. This is particularly true of the cruder

neurohelmets typical of the Succession Wars. Those behemoths rested on the shoulders and prevented a MechWarrior from turning his head. The typical trick was a 360-degree view compressed into a 160-degree display.

More advanced neurohelmets, like Clan versions, are lighter and have large visors that don't require the display. In fact, more advanced helmets can provide sensory input instead of just balance information. This "direct neural virtual reality" is usually very weak because of the risk of cooking brain cells, but a well-trained MechWarrior can use it for additional warning cues—including access the BattleMech's tactile and kinesthetic senses—and as a poor substitute for normal displays.

If there is anywhere the average MechWarrior will customize his cockpit, it's in the way all the data is presented. These preferences are often encoded on battleROM chips carried by a MechWarrior from 'Mech to 'Mech, so a preferred configuration can quickly be re-established in a new 'Mech.

Sound cues and verbal commands also play an important role in commanding a BattleMech. Most BattleMechs have always had excellent speech recognition systems, though Inner Sphere MechWarriors tend to underutilize this as a simple security protocol. As for audio cues, during the Succession Wars, BattleMechs generally just had a set of simple alarms, like missile alerts, hostile radars, and so on. Modern neurohelmets incorporate speakers that generate 3-D alarms to help a MechWarrior quickly locate an external threat.

Ejection Seats

Another feature as common to BattleMechs as to aerospace fighters, ejection seats have been part and parcel of BattleMechs since the *Mackie* first stomped onto the battlefield. When tons of ammo detonate, or a merciless foe seems intent on obliterating a MechWarrior, or when something else goes disastrously wrong with a 'Mech, the ejection seat is there to get the pilot out of the worst trouble.

Ejection seats haven't changed much in the eleven centuries since they were introduced on Terran aircraft. The seat is still propelled by rockets through blow-away cockpit panels, then deploys parachutes or rockets to land safely once clear. The seat also has some survival gear in a small compartment.

The latest variation—first seen on our own *Hatchetman* design—is ejecting cockpits, rather than shooting the MechWarrior out on a rocket seat. These ejection pods are old hat in aerospace circles, but were a breakthrough intended to minimize a MechWarrior's fears of "Dispossession" during the late Succession Wars. These systems are now useful for protecting ejected warriors from the nuclear, chemical and biological battlefields that Blake's followers have brought us, and may someday become the norm.

Storage and Passengers

Because a MechWarrior might be in his cockpit for days at a time (and in the field for weeks), most BattleMech cockpits provide some storage lockers for rations, field gear, a personal firearm and other gear. Some roomier cockpits can be lavishly fitted with amenities, including small microwave ovens and refrigerated food storage. Understandably, few Clan cockpits have such amenities, as they are built for the short haul.

Most BattleMechs also make room for a foldout passenger seat, allowing one warrior to assist others forced to bail out in the field or when transporting VIPs. Indeed, some BattleMech cockpit designs go so far as to include a full ejection seat for the passenger and even provide them with some controls, such as communications systems.

Waste Systems

Speaking of seats, many Inner Sphere BattleMechs provide one *other* seat in the cockpit: a foldout toilet. The abundant energy of a fusion reactor allows easy waste incineration with microwaves or an electrical arc. Most 'Mech toilets capture the water produced by this incineration for flushing—since the dry toilets never seem to work despite all our advances in super-slick coatings and sonic cleaners. Without a storage tank to overflow, the endurance limit on cockpit toilets is how much toilet paper the MechWarrior has.

Go ahead and laugh.

Note again that the Clans' spartan and compact cockpit styles rarely incorporate this feature, leaving their warriors to depend on bottles, baggies or self-discipline. Think on *that* concept for a while, and you may see why the Clans come off as such an irate people.

Life Support

BattleMechs don't just fight on pleasant spring days. In fact, they can—and often do—end up fighting battles in some atrocious environments. To handle this, a BattleMech's cockpit is normally sealed, pressurized and fitted with a life support system.

The cockpit's mass has a lot of gear to cover, which imposes some limits on a BattleMech's life support system. Life support cannot spare the mass for unlimited air and water recycling, though it can operate anywhere from a few hours to several days in vacuum depending on the design. If air or water exists outside the 'Mech, however, the life support system can provide fresh oxygen for an almost unlimited period as long as the fusion engine runs. In such cases, the life support system uses a thorough set of filters or an electrolysis system to draw the oxygen out of the surroundings.

Of course, filtration isn't perfect. Some chemical weapons can bypass the filtration systems that became common during the late Succession Wars—many of which we still use today. Also, the filters require maintenance for any usage, and so MechWarriors operating in presumably safe areas typically turn off the filters. Such was the case in the recent demise of the Free Worlds' Knights of the Inner Sphere while on parade, an act that single-handedly renewed interest in revamping filter technologies across the Inner Sphere.

Naturally, one of the critical features for BattleMech life support systems is climate control. In the rare instances when a cockpit gets too cool for its MechWarrior, the system has fusion-powered heaters ready to bring the temperature to something more comfortable. Most of the time, however, the problem is overheating. A hot 'Mech can transform the cockpit into a sauna despite the life support system's vigorous cooling—and a non-functional life support system can leave a warrior dead from the blistering heat in extreme cases. Modern life support systems can usually prevent heat stroke, but a MechWarrior who runs his 'Mech hot *will* swelter.

Improving technology has provided old Star League-style combat suits that offer extra protection against the heat, but

these are not yet widespread items. This is why so many warriors go into battle wearing uniforms more appropriate for the beaches of planets with minimal nudity taboos than the cockpit of an armored combat vehicle.

It's worth noting, by the way, that if the 'Mech's fusion engine is shut down for whatever reason, most life support units incorporate ports for conventional personal battery packs that can keep the life support system running for hours.

DIAGNOSTIC INTERPRETATION (DI) COMPUTER

The unsung hero of the BattleMech is the diagnostic interpretation (or DI) computer. This little gem pretty much acts as the 'Mech's autonomic and higher nervous system, and is the last component that I want to talk about before describing how BattleMechs are brought to life. The short form is, the DI computer is a network of distributed computers that monitors and coordinates the basic functions and components of a BattleMech.

By Whatever Means Necessary

When I described several components earlier, such as the armor and internal structure, I think I mentioned they were webbed with optical data lines and sensory fibers. If I didn't, well, they are. The DI computer uses these lines and fibers to keep tabs on the health of these components, tracking a 'Mech's integrity and feeding it to the battle damage assessment computer (BDA) for the warrior's information.

But the DI is more than a status indicator. It can also use these lines and webs as a back-up data feed to other components. For example, if a BattleMech's forearm is nearly severed, the DI computer can determine the status of the hand actuator dangling by a thread of armor through data lines in the armor. The BattleMech wouldn't be able to do much with the hand because the forearm myomer groups and structure are destroyed, but it *would* be able to communicate with the hand…

I probably could've picked a better example. At any rate, this "bypass capability" enables BattleMechs to continue functioning even when suffering from massive internal damage.

The DI computer itself is quite damage tolerant as well. While it does have some key hardware in the cockpit, many of its components are scattered throughout the BattleMech closer to the systems they control. These sub-processing units are heavily redundant and able to take over for damaged counterparts. For example, DI processors located in the engine may end up coordinating leg actuators after a "Golden BB" lobotomizes leg DI processors without harming the actuators.

Manager

The DI computer is the manager for all the systems in a BattleMech. Each component has its own controlling computer, brought together by the DI system. For example, the DI distributes orders to actuator MCUs that create smooth limb motions. It also compares the health of multiple systems to keep components from damaging themselves, like changing engine operation when the 'Mech suffers from heat sink damage. Or it can override the "common sense" of the individual components. For example, when the MechWarrior demands it, the DI computer will run the engine hot even when the engine control computer wants nothing more than to cool down.

So, when a MechWarrior jams the throttle forward, it is the DI computer that adjusts the engine power, applies the gyro and coordinates actuators. When a BattleMech gets shot up, it is the DI computer that reconfigures leaking heat sinks, bypasses severed myomer fibers and routes power to disconnected weapons.

Security

The DI computer handles other 'Mech functions, too, but the last one I'm going to point out is security. This typically involves the MechWarrior thinking his way through several commands while wearing a neurohelmet, as well as voice recognition or other codes. The DI computer even determines whether or not to fry a would-be thief with the neurohelmet, which reflects an Inner Sphere MechWarrior subculture paranoid about "Dispossession."

The Clans tend to skimp on this aspect of 'Mech security, since, according to *them*, there are no thieves in Clan society. Even if someone *did* steal a Clan 'Mech, the MechWarrior will simply be assigned another one.

ALIVE! IT'S ALIVE!

Ahem, excuse me. I always wanted to say that. I'm a Frankenstein fan—that's a story that just gets better with age…

So, you've got all these separate components. The structure, actuators and myomers for mobility; the protective armor; the balancing gyroscope; the fusion engine; the commanding cockpit; and the managerial DI computer. If a neurohelmet isn't a direct brain-machine link, what actually brings all those systems to life?

After my last topic, you shouldn't be surprised: it's the DI computer.

BattleMechs are very capable and smart robots, with most of their intelligence embodied in the DI computer network. But they are not truly autonomous. Partly because they have so much firepower and could cause so much destruction if something went wrong, virtually all of the higher decisions are left in the hands of MechWarriors. MechWarriors decide when the BattleMech moves, where the BattleMech moves to and whom the BattleMech shoots. Frankly, it *is* difficult to code all that decision-making for computers, at least in real-world environments. This, despite claims to the contrary by…are they here? *Kaumberg Komp Quarterly* journalists?

Anyway, the Terran Hegemony managed independent operations for its WarShip-sized Caspar robots, but even those had shortcomings that precluded their use in 'Mechs. So don't worry, folks; the MechWarrior isn't just a safety system preventing BattleMechs from taking over us puny organics.

But BattleMech computers *do* handle an incredible amount of lower-level decision-making. The T&T system, for instance, sorts, processes and interprets sensor data for the MechWarrior, who only has to look at his screens or HUD to get a concise picture of the battlefield. When targeting, a MechWarrior merely uses a control stick to aim a crosshair on a display that shows the enemy. It is up to the BattleMech to actually aim the weapons with all the calculations that entails.

It is also mostly up to the BattleMech to compensate for the recoil of its autocannons or the blasts of hostile fire while moving in the direction a MechWarrior sets. Yes, a MechWarrior can correct the BattleMech on its balance, such as telling the BattleMech when to ride with the blasts rather than leaning against them, or when to throw itself off-balance and into another BattleMech, but a lot of the decision-making gets done by the DI computer.

Speaking of movement, this is another task that the BattleMech sweats over. As massive as BattleMechs are, they cannot depend

on blind, crushing feet to create good footing. Even tanks, which have better footing and lower centers of balance than 'Mechs, will slip and slide in muck or on ice. Each footstep is chosen to compensate for outside forces and in anticipation of the terrain as best possible, which the DI computer carefully observes through a BattleMech's many sensors. BattleMechs will also attempt to move their limbs and torso to avoid collisions with terrain, like trees. The nimble twists of a light BattleMech slipping through a forest are not merely the action of a talented MechWarrior, but the 'Mech's own DI computer attempting to avoid the trees.

Of course, we've all seen vids of BattleMechs crashing through forests, or clipping a building, or falling into a ravine. This is because BattleMechs are war machines and must accept some risk to carry out the commands of their MechWarriors. When a MechWarrior is aiming at a target, his commands take priority and the BattleMech will swing its arms through the side of a building if that is what's required to fire on the target. Once the MechWarrior releases the weapon controls, the DI computer will resume avoiding solid objects as best it can.

This self-determinant behavior is even more pronounced in IndustrialMechs, where the IndustrialMech will steer itself around objects while carrying out general directional commands from the pilot. But because battles can move anywhere, BattleMechs give MechWarriors direct steering control with the blind faith that their MechWarriors won't run them off a cliff—or at least, if they do that, the MechWarriors have a good reason. BattleMechs will give collision warnings, but won't override the MechWarriors.

This is partly why it takes so long to produce a good MechWarrior. Such warriors have to learn how to think for their machine and yet learn how best to use the machine's own intelligence. Yet the 'Mech's own intelligence is why novices learn to operate 'Mechs quickly. Pardon the heresy, but it probably also accounts for incidents like the Black Pearl's last combat, where her 'Mech fired weapons even after the pilot had died. Well-trained 'Mechs can make some surprising independent decisions.

Hand actuators are another area where BattleMechs make decisions, especially in modern 'Mechs, which have more sophisticated actuator routines. As I said earlier, a MechWarrior uses point-and-click commands with his aiming controls for most hand actuator operations. Older 'Mechs depend more on mimicking the motions of the MechWarrior's hands, but any 'Mech must do that for complicated motions like combat engineering.

Neurohelmets

Earlier, I said neurohelmets primarily supply balance information to the BattleMech. I also mentioned that more sophisticated neurohelmets can provide some feedback to MechWarriors. It's time to clarify that.

The key to remember here is that current neurohelmets are not good enough to deliver real-time "mind reading" necessary for direct control of a BattleMech's movements. Even the Clans and Star League didn't manage to produce helmets that good.

When it comes to putting information *into* brains, the Star League did develop some pretty good neurohelmets, and their best were actually the big clunkers used by aerospace fighter pilots. But the input limitation remains the wireless means that neurohelmets use to pump information into brain cells. You just can't get a good, sharp image that overwhelms natural sensory signals before you start literally cooking brain cells.

On the other hand, getting information *out* is a passive process with no risk of fried brains. But while delivering information into the MechWarrior depends on the ever-flexible human brain's ability to interpret these foreign signals, neurohelmets have no such natural advantage for interpreting human thoughts. As a result, neurohelmets focus on a few specific centers of the brain with easily translated signals rather than trying to interpret the behavior of the entire motor cortex and frontal lobes.

The result is an interface that—while not fast and smooth enough for direct control over 'Mech movement—*does* make it possible for MechWarriors to communicate their intentions better and faster than with speech alone. For example, when a MechWarrior is charging his BattleMech at another 'Mech, he would use the neurohelmet to communicate, "Yes, I want you to throw yourself off balance in that direction," but at a much more visceral level. Once the MechWarrior's stupidity is confirmed, the DI computer will diligently release the gyroscope and command the actuators to throw the 'Mech forward rather than sensibly avoiding the other 'Mech.

Modern neurohelmets are getting better than their clunky Succession Wars-era predecessors. For example, when a MechWarrior designates a person to be picked up with a hand actuator, he can clarify—with a moment's thought—that he wants to encase the person in a gentle cage of fingers with all due respect for the fragility of a human. The DI computer will then execute the details of the command. MechWarriors who are talented with the particular mental discipline of communicating intentions via neurohelmets can even achieve some impressive feats with their 'Mechs—as anyone who follows the Noisiel Summer Games can attest.

Thus we see that BattleMechs are clever machines that can execute complicated motions if you can communicate the desired motion to them. In that way, the neurohelmet helps to take some of the slack from the limited physical controls of the cockpit.

So ends this lecture on the basics of BattleMechs. Those of you interested in more detail regarding weapons systems and the like may consult the handouts provided at the start of this lecture for a list of suggested reading. The Stuttgart School of Defense has all of those materials in hardcopy and electronic formats for your convenience. We'll take a short break for now and I will field a few questions at this time, but this should give you enough information to get your stories straight in your future endeavors.

Corean techs look over the fruition of Project Legion: the LGN-2X Legionnaire.

In *BattleTech*, the BattleMech ('Mech) represents the pinnacle of thirty-first century warfare. Massive, well armored and highly mobile, even the lightest of these machines may pack enough firepower to flatten a city, and small groups of them can conquer entire worlds in short order. With power equaled only by other BattleMechs, a bewildering array of these "kings of the battlefield" are built at factories and design firms throughout the Inner Sphere, Periphery and Clan space.

The following system enables players to construct unique BattleMechs for *BattleTech* games that conform to the standard rules presented in *Total Warfare*. As these rules can be fairly math-intensive, BattleMech designers are encouraged to do all work on scratch paper before committing the resulting design's specifications to an appropriate blank BattleMech Record Sheet.

BattleMech Basics

BattleMech construction relies on three primary factors: technology base, weight and space. These factors were broadly overviewed in the *Construction Basics* section (see p. 18). The notes below expand on these factors.

TECHNOLOGY BASE

In *Total Warfare* standard play, BattleMechs fall into one of two available technology bases: Inner Sphere or Clan. Inner Sphere 'Mechs may only use Inner Sphere equipment, while Clan 'Mechs may only use Clan equipment. The standard forms of internal structure, armor, cockpits, engines, gyros, heat sinks and jump jets are considered universal, and so are available to Clan and Inner Sphere technology bases.

Tech Rating

In the Weapon and Equipment Tables used for creating BattleMechs and other units in this book, all items receive a Technology Rating in addition to a Technology Base. This rating (expressed as a series of letter grades that define the level of technology, and its availability through the major eras of *BattleTech* history) helps to define the item's level of sophistication and may be used to help standardize the level of "advancement" the unit demonstrates for purposes of era-based campaigning. Beyond this, however, an item's Technology Rating has no direct bearing on BattleMech design. See *Costs and Availability* (p. 274) for more on Tech Rating.

OmniMechs

OmniMechs—BattleMechs designed for rapid reconfiguration between missions—are available to Clan and Inner Sphere technology bases. OmniMechs use the same construction rules featured here, but when an Omni is made, the designer must first establish its base configuration. This base configuration includes the OmniMech's chassis, engine, gyro, cockpit systems, armor, special myomer or speed enhancements and—if desired—any additional weapons and heat sinks "hardwired" into its design, leaving the remaining weight and space open to pods that can mix and match additional weapons and other components. "Fixed" equipment must be allocated to the Critical Hit Table per normal rules and may not vary between alternative configurations of the OmniMech. Also, a base OmniMech configuration is never considered a finished BattleMech and is generally not legal for standard rules play (as such units are essentially open frames of empty pods). Only the completed primary and alternate configurations of an OmniMech (which must always comply with the rules for constructing standard BattleMechs) are considered legal for standard rules game play.

WEIGHT

BattleMechs use the tonnage standard, with all units legal for *Total Warfare* standard play weighing 20 to 100 tons (increasing in increments of 5 tons).

Weight Classes

BattleMechs fall into four main weight classes, determined by their tonnage. Most designs in these classes share similar features, though the 'Mech's intended role on the battlefield can lead to more specialized or unusual capabilities for the class.

Light BattleMechs weigh 20 to 35 tons. Because their armor and weapon options are usually limited, they often sacrifice both for speed, and are favored as scouts or light security forces.

Medium BattleMechs weigh 40 to 55 tons, and are the most common 'Mech type used in the Inner Sphere. They commonly balance speed and firepower, and are favored as raiders and hunter/killers.

Heavy BattleMechs weigh from 60 to 75 tons. They tend to be brawlers, with average mobility and a wide range of weapons. They often serve as the battering rams of attack forces.

Assault BattleMechs weigh from 80 to 100 tons. Usually built for maximum firepower and armor, they tend to be far slower than most other 'Mechs, and so are favored more for defensive or fire support roles.

SPACE

Internal space (also called critical space) on a BattleMech is illustrated and tracked by the Critical Hits Table on the 'Mech's record sheet, which abstractly describes in detail the internal arrangement of the BattleMech's body. Certain sections of this table are already filled in, because the relevant components and equipment—actuators, cockpit systems, engines and gyros—must be in those specific body locations. As the 'Mech's various design elements are chosen—from additional heat sinks and jump jets to weapons and equipment—the designer must assign these components to different parts of its body and allocate their required number of slots on this Critical Hits Table.

Many items that may be mounted on a BattleMech take up more than one critical slot, and no slot may accommodate more than one item at a time. When installed, items that occupy multiple slots must be specially noted on the tables, as most become non-functional if they receive even a single critical hit from damage. Few items may be placed in multiple body locations, and the critical slots for all multi-slot items must be contiguous in their location(s) unless the item's construction rules specifically permit otherwise.

The Standard 'Mech Critical Space Table at right summarizes the number of open critical slots (those not automatically assigned to specific equipment in every 'Mech, such as the engine, gyro, life support and sensors) in each location of a standard BattleMech, whether built as a biped (humanoid) or a four-legged (quad) design. As with tonnage, the designer should keep in mind how many slots have been used and how many remain available in each body section. Doing this will help to avoid installing too many items or items too large for the given location.

STANDARD 'MECH CRITICAL SPACE TABLE

Humanoid Chassis		Quad Chassis	
Location	Open Critical Slots	Location	Open Critical Slots
Head	1	Head	1
Center Torso	2	Center Torso	2
Right Torso	12	Right Torso	12
Left Torso	12	Left Torso	12
Right Arm	8	Right Front Leg	2
Left Arm	8	Left Front Leg	2
Right Leg	2	Right Rear Leg	2
Left Leg	2	Left Rear Leg	2

Note: Additional space can be made in the arms by removing hand or hand and lower arm actuators, while head and torso space may be reclaimed by using certain alternative cockpit, engine, and gyro types (described later).

Reclaiming Critical Space

The Critical Space Table presumes a "default" BattleMech configuration: one built using standard engines, gyros, cockpit systems and—in the case of humanoid chassis—two complete sets of arm and hand actuators. However, the advent of Compact Engines, Compact Gyros, Small Cockpits, or the removal of hand and/or lower arm actuators (on one or both arms) can increase the amount of open space in a location. Be aware that using many of these systems can burn up a unit's available tonnage faster, or even impair its ability to function well under certain combat conditions. Designers should consider these effects carefully before opting to use such "space-saving" measures.

For humanoid-style 'Mechs, which may remove Hand and Lower Arm Actuators to reclaim actuator space, the removal of an arm's Lower Arm Actuator requires that the Hand Actuator on that arm must also be removed.

THE DESIGN PROCESS

The process of BattleMech design is organized into six simple steps, each of which is more fully described later in this section:

Step 1: Design the Chassis—determine the BattleMech's technology base, weight, type (biped or four-legged), and internal structure.

Step 2: Install Engine and Control Systems—determine the BattleMech's Engine Rating, type and size, add cockpit and jump jets.

Step 3: Add Additional Heat Sinks—determine number, type and locations (if necessary) for the BattleMech's heat sinks.

Step 4: Add Armor—determine type, amount and weight of armor, and allocate armor points.

Step 5: Install Weapons and Equipment—add weapons and other gear to the BattleMech.

Step 6: Complete the Record Sheet.

The above design process is a mere framework for designing a BattleMech. The actual process—particularly after the chassis, engine and control systems are determined—can involve a bit more flexibility as weapons, armor and heat sinks are balanced for their best fit in terms of weight and space. For instance, some designers might wish to assign armor as soon as they have chosen the engine and chassis, perhaps to maximize the 'Mech's protection before dealing with heat sinks and weapons. Others may want to choose weapons before adding more heat sinks, to see how many might be needed in addition to those that come free with the engine.

To assist in this effort, the designer may find it useful to make copies of the 'Mech Record Sheet (in the back of this book), to visually arrange the placement of weapons and equipment while tracking the use of tonnage on a piece of scratch paper. Alternatively, designers with access to the *HeavyMetal Pro* software can use it to develop their BattleMechs on their PCs.

STEP 1: DESIGN THE CHASSIS

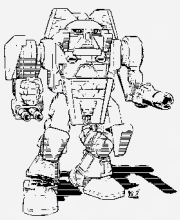
The first step in BattleMech design is the creation of the 'Mech's basic framework, or chassis. This step establishes some of the most basic aspects of the BattleMech's design, determining what kind of 'Mech it is, its technology base, its weight and the design type (biped or four-legged). These choices will restrict the designer's access to certain equipment, and will also determine the weight and bulk of the 'Mech's internal structure.

CHOOSE TECHNOLOGY BASE

BattleMechs may be constructed using Clan or Inner Sphere technology bases. 'Mechs designed using either technology base may be built as OmniMechs.

Andrew is designing a BattleMech that he has dubbed the MON-66 Mongoose. *Because he plans to create this design for an old Star League-era game, before the time of the Clans, he chooses an Inner Sphere technology base, and notes that the design will not be an OmniMech.*

Brent is designing a BattleMech, which he has named the Gladiator *(Clan name:* Executioner*). He has chosen the Clan technology base for this design, and has elected to make it an OmniMech.*

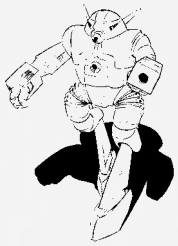


Chas is designing a four-legged BattleMech that he has chosen to name the BGS-1T Barghest. *As this will be a modern Lyran-made design, he has chosen an Inner Sphere technology base, and has opted not to make it an Omni.*

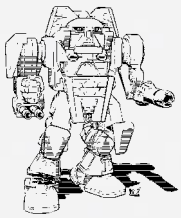
CHOOSE WEIGHT (TONNAGE)

Under these rules, BattleMechs may measure 20 to 100 tons in weight (increasing in 5-ton increments). Within these limits, the player may choose any tonnage. The total weight of the BattleMech's engine, weapons, armor and other components may not exceed this amount. Nor should it fall below; under these rules, any unspent weight left over after the creation process is classified as wasted tonnage.

Andrew decides his Mongoose *will be a lightweight scout. Light BattleMechs weigh between 20 and 35 tons, so he chooses to set his* Mongoose *at 25 tons.*



Brent's Gladiator *is to be a mass of devastating firepower few can withstand. Choosing the assault weight class, Brent decides this 'Mech will weigh in at 95 tons—nearly the heaviest mass possible.*



Chas chooses a heavy weight class for his Barghest*, giving him a range of 60 to 75 tons to choose from. He selects a total mass of 70 tons for his machine.*

ALLOCATE TONNAGE FOR INTERNAL STRUCTURE

Every BattleMech has an internal structure, which represents its skeleton and joints. The weight of this structure depends on the weight of the BattleMech, as well as on whether the designer chooses a standard or endo-steel frame. Standard structure weighs 10 percent of the BattleMech's total weight, while endo-steel weighs half as much (rounded up to the nearest half ton).

The BattleMech's total mass also determines the number of internal structure points each location receives. When using the blank 'Mech Record Sheet, the designer must mark out any excess circles on the Internal Structure Diagram, leaving behind only the number of circles in each location equal to the number of internal structure points in that location.

BattleMech internal structure points are fixed to their assigned locations, based on the weight and body type of the 'Mech itself. These points may not be redistributed elsewhere.

The maximum amount of armor points a BattleMech may carry (called its Maximum Armor Factor) is directly determined by the number of internal structure points per section. All locations except the head may carry a maximum of twice the number of armor points as they have internal structure points, including any armor placed in rear locations (see *Add Armor*, p. 54). All head locations may receive a maximum of 9 armor points.

The BattleMech Internal Structure Table at right provides the mass of internal structure (standard and endo-steel) for all legal BattleMech tonnages, as well as the number of internal structure circles each location must have. Also provided (for designer refer-

BATTLEMECH INTERNAL STRUCTURE TABLE

Total 'Mech Tonnage	Internal Structure Tonnage		Internal Structure Circles					Maximum Armor Factor (Biped/ Four-legged)
	Standard Structure	Endo Steel	Head	Torso (Center)	Torso (Left/Right)	Arms (Each)	Legs (Each)	
20	2.0	1.0	3	6	5	3	4	69/73
25	2.5	1.5	3	8	6	4	6	89/97
30	3.0	1.5	3	10	7	5	7	105/113
35	3.5	2.0	3	11	8	6	8	119/127
40	4.0	2.0	3	12	10	6	10	137/153
45	4.5	2.5	3	14	11	7	11	153/169
50	5.0	2.5	3	16	12	8	12	169/185
55	5.5	3.0	3	18	13	9	13	185/201
60	6.0	3.0	3	20	14	10	14	201/217
65	6.5	3.5	3	21	15	10	15	211/231
70	7.0	3.5	3	22	15	11	15	217/233
75	7.5	4.0	3	23	16	12	16	231/247
80	8.0	4.0	3	25	17	13	17	247/263
85	8.5	4.5	3	27	18	14	18	263/279
90	9.0	4.5	3	29	19	15	19	279/295
95	9.5	5.0	3	30	20	16	20	293/309
100	10.0	5.0	3	31	21	17	21	307/323

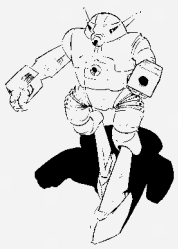
ence) is the maximum possible armor factor for BattleMechs at each tonnage, for biped and four-legged designs.

Technology Base: Standard internal structure is equally available to BattleMechs of Clan or Inner Sphere technology bases. Inner Sphere endo-steel is available only to BattleMechs with an Inner Sphere Tech Base. Clan endo-steel is available only to BattleMechs with a Clan Tech Base.

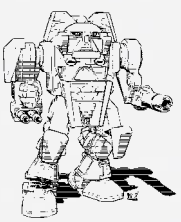
Four-legged: BattleMechs built as quads have four legs, rather than two arms and two legs. The number of internal structure points for all four legs is thus determined by the Legs (Each) column appropriate to the 'Mech's tonnage. The Arms (Each) column has no bearing on quads.

Space: If the design uses endo-steel internal structure, Inner Sphere 'Mech designs must assign 14 critical slots on the BattleMech's Critical Hit Table to endo-steel (Clan designs assign only 7 slots). The location of these slots need not be contiguous, nor do they need to be determined at this stage. However, they must be assigned by the final stages of design, while allocating weapons, heat sinks and any other equipment not otherwise preset (such as engines, gyros and cockpit systems).

OmniMechs: The type of internal structure and placement of any critical slots required must be determined upon the design of the base configuration. All complete primary and alternate configurations thereafter must use the same number in any given bodily location for their slots, although it is permissible to shift the slots within a location when designing a new configuration.



For Andrew's Mongoose, *weight is at a premium, so he chooses to install endo-steel internal structure on his BattleMech. At 25 tons in total weight, the* Mongoose's *endo-steel internal structure weighs 1.5 tons, leaving 23.5 tons to play with [25 – 1.5 = 23.5]. This endo-steel construction will require 14 slots on the Critical Hit Table, but Andrew opts to wait until later to distribute them. In the meantime, Andrew blacks out all extraneous circles from the Internal Structure Diagram on his* Mongoose's *Record Sheet, leaving only 8 open circles in the center torso, 6 circles each in the left and right torsos, 6 circles in each leg and 4 in each arm. (As all heads receive 3 points of structure automatically, Andrew leaves the head's internal structure alone.)*



To devote as much internal space as possible, Brent opts for standard internal structure on his Gladiator, *confident that the more efficient weight of Clan weaponry will allow him to arm the OmniMech to the teeth without undue expense. Standard internal structure for a 95-ton*

'Mech weighs in at 9.5 tons, leaving 85.5 tons for other systems. No slots need be filled in on the Critical Hits Table for standard structure, and Brent need only black out a few circles on the Internal Structure Diagram, leaving 30 in the center torso, 20 in each side torso, 20 in each leg and 16 in each arm.

Chas also decides on standard internal structure for his Barghest, *knowing that the big guns he plans to install down the road will be bulky in the extreme. He finds that at 70 tons, the* Barghest*'s internal structure will weigh 7 tons, and provides 22 points of internal structure in the center torso, 15 each in the left and right torsos, and 15 in each of the 'Mech's four legs. On the record sheet's Internal Structure Diagram, Chas blacks out all the excess circles in those locations.*

STEP 2: INSTALL ENGINES AND CONTROL SYSTEMS

The second step in BattleMech design is the installation of the 'Mech's engines and control systems. This step establishes the key factors in the BattleMech's mobility, including the size and performance of its engine, the mass of the gyroscopes that keep it upright, and whether or not the design is capable of jumping movement. Also determined in this step is the weight and nature of the BattleMech's cockpit systems, where the MechWarrior resides during battle.

INSTALL ENGINE

Every BattleMech constructed under these rules may carry one fusion engine to power its movement, weapon systems and other integral components. The relative output of this power plant is measured by the BattleMech's Engine Rating, which is directly determined by the 'Mech's total weight and desired speed.

To compute the Engine Rating, the designer simply multiplies the BattleMech's tonnage by its desired Walking MP. The 'Mech's Running MP is also calculated at this time by multiplying its Walking MP by 1.5 and rounding up to the nearest whole number.

Note that under these rules, no BattleMech may be constructed with an Engine Rating below 10 or above 400.

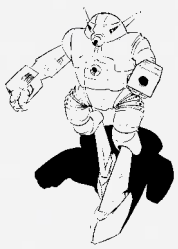
The Master Engine Table, p. 49, lists the tonnage taken up by engines of various types and ratings. BattleMechs may only use fusion engine types from this table (Compact, Standard, Light and XL engines are available). The non-fusion engines on this table are provided for the benefit of IndustrialMech and Combat Vehicle construction (which begin on pp. 64 and 94, respectively).

Tech Base: Standard fusion engines are equally available to BattleMechs of Clan or Inner Sphere tech bases. Compact, Light and Inner Sphere XL fusion engines are available only to BattleMechs with an Inner Sphere Tech Base. Clan XL engines are available only to BattleMechs with a Clan Tech Base.

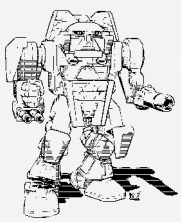
Space: In addition to varying in weight based on their rating, fusion engines can also vary in size based on their engine type. A 220-rated Compact Fusion engine, for example, weighs 50 percent more than a Standard Fusion plant of the same rating, but occupies only 3 slots in the 'Mech's center torso, rather than the traditional 6. The blank 'Mech Record Sheet presumes that a design is using a Standard Fusion engine type. To determine the placement (or removal) of critical slots for non-standard fusion engines, consult the 'Mech Engine Critical Space Table below. Any additional engine critical slots (beyond those in the 'Mech's center torso) should be placed contiguously in their locations, to minimize confusion on the Critical Hit Table.

The placement of engine critical spaces must also be determined at this time.

OmniMechs: The engine type, rating and location of its critical slots must be established when designing an OmniMech's base configuration, and Engine critical slots in the right or left torsos may be shifted within their location in that OmniMech's completed primary or alternate configurations as the designer wishes, so long as the slots remain contiguous.



Because his Mongoose *is intended primarily as a scout, high speed is Andrew's goal here. He decides to give the 'Mech a Walking MP of 8 (thus attaining a Running MP of 12; 8 MP x 1.5 = 12 MP). This means that the* Mongoose*'s Engine Rating will be 200 (25 tons x 8 MP = 200). Looking at the Master Engine Table, a standard 200-rated engine weighs 8.5 tons. Though an XL engine is tempting, Andrew goes with the standard engine mass and subtracts 8.5 tons from his 23.5 tons of unspent weight (for a remainder of 15 tons). Because it carries a standard engine, the* Mongoose *uses the standard engine slots on the Critical Hits Table, neither adding more nor reducing the number shown.*



Brent wants his Gladiator *to have decent mobility for its size, and so chooses a Walking MP of 4, yielding an Engine Rating of 380 (95 tons x 4 MP = 380). To save tonnage for weapons, he opts for an XL engine to lighten the load. The Master Engine Table shows that a 380-rated XL engine weighs 20.5 tons, leaving the* Gladiator *with 65 tons remaining (85.5 tons – 20.5 tons = 65 tons). The Running MP for the* Gladiator *is 6 (4 Walking MP x 1.5 = 6 MP). The* Gladiator *must also assign two engine critical slots to each side torso location on the 'Mech's Critical Hits Table, to reflect the larger physical size of the Clan XL engine.*

ENGINE RATING AND MOBILITY FORMULAS

Engine Rating = 'Mech Tonnage x Desired Walking MP
Running MP = Desired Walking MP x 1.5 (round up)

MASTER ENGINE TABLE

Engine Rating	Non-Fusion Engines			Fusion Engines			
	ICE	Cell	Fission	Comp.*	Std.*	Light*	XL*
10	1.0	1.0	5.0	1.0	0.5	0.5	0.5
15	1.0	1.0	5.0	1.0	0.5	0.5	0.5
20	1.0	1.0	5.0	1.0	0.5	0.5	0.5
25	1.0	1.0	5.0	1.0	0.5	0.5	0.5
30	2.0	1.5	5.0	1.5	1.0	1.0	0.5
35	2.0	1.5	5.0	1.5	1.0	1.0	0.5
40	2.0	1.5	5.0	1.5	1.0	1.0	0.5
45	2.0	1.5	5.0	1.5	1.0	1.0	0.5
50	3.0	2.0	5.0	2.5	1.5	1.5	1.0
55	3.0	2.0	5.0	2.5	1.5	1.5	1.0
60	3.0	2.0	5.0	2.5	1.5	1.5	1.0
65	4.0	2.5	5.0	3.0	2.0	1.5	1.0
70	4.0	2.5	5.0	3.0	2.0	1.5	1.0
75	4.0	2.5	5.0	3.0	2.0	1.5	1.0
80	5.0	3.0	5.0	4.0	2.5	2.0	1.5
85	5.0	3.0	5.0	4.0	2.5	2.0	1.5
90	6.0	4.0	5.5	4.5	3.0	2.5	1.5
95	6.0	4.0	5.5	4.5	3.0	2.5	1.5
100	6.0	4.0	5.5	4.5	3.0	2.5	1.5
105	7.0	4.5	6.5	5.5	3.5	3.0	2.0
110	7.0	4.5	6.5	5.5	3.5	3.0	2.0
115	8.0	5.0	7.0	6.0	4.0	3.0	2.0
120	8.0	5.0	7.0	6.0	4.0	3.0	2.0
125	8.0	5.0	7.0	6.0	4.0	3.0	2.0
130	9.0	5.5	8.0	7.0	4.5	3.5	2.5
135	9.0	5.5	8.0	7.0	4.5	3.5	2.5
140	10.0	6.0	9.0	7.5	5.0	4.0	2.5
145	10.0	6.0	9.0	7.5	5.0	4.0	2.5
150	11.0	7.0	10.0	8.5	5.5	4.5	3.0
155	11.0	7.0	10.0	8.5	5.5	4.5	3.0
160	12.0	7.5	10.5	9.0	6.0	4.5	3.0
165	12.0	7.5	10.5	9.0	6.0	4.5	3.0
170	12.0	7.5	10.5	9.0	6.0	4.5	3.0
175	14.0	8.5	12.5	10.5	7.0	5.5	3.5
180	14.0	8.5	12.5	10.5	7.0	5.5	3.5
185	15.0	9.0	13.5	11.5	7.5	6.0	4.0
190	15.0	9.0	13.5	11.5	7.5	6.0	4.0
195	16.0	10.0	14.0	12.0	8.0	6.0	4.0
200	17.0	10.5	15.0	13.0	8.5	6.5	4.5
205	17.0	10.5	15.0	13.0	8.5	6.5	4.5
210	18.0	11.0	16.0	13.5	9.0	7.0	4.5
215	19.0	11.5	17.0	14.5	9.5	7.5	5.0
220	20.0	12.0	17.5	15.0	10.0	7.5	5.0
225	20.0	12.0	17.5	15.0	10.0	7.5	5.0
230	21.0	13.0	18.5	16.0	10.5	8.0	5.5
235	22.0	13.5	19.5	16.5	11.0	8.5	5.5
240	23.0	14.0	20.5	17.5	11.5	9.0	6.0
245	24.0	14.5	21.0	18.0	12.0	9.0	6.0
250	25.0	15.0	22.0	19.0	12.5	9.5	6.5
255	26.0	16.0	23.0	19.5	13.0	10.0	6.5
260	27.0	16.5	24.0	20.5	13.5	10.5	7.0
265	28.0	17.0	24.5	21.0	14.0	10.5	7.0
270	29.0	17.5	25.5	22.0	14.5	11.0	7.5
275	31.0	19.0	27.5	23.5	15.5	12.0	8.0
280	32.0	19.5	28.0	24.0	16.0	12.0	8.0
285	33.0	20.0	29.0	25.0	16.5	12.5	8.5
290	35.0	21.0	31.0	26.5	17.5	13.5	9.0
295	36.0	22.0	31.5	27.0	18.0	13.5	9.0
300	38.0	23.0	33.5	28.5	19.0	14.5	9.5
305	39.0	23.5	34.5	29.5	19.5	15.0	10.0
310	41.0	25.0	36.0	31.0	20.5	15.5	10.5
315	43.0	26.0	38.0	32.5	21.5	16.5	11.0
320	45.0	27.0	39.5	34.0	22.5	17.0	11.5
325	47.0	28.5	41.5	35.5	23.5	18.0	12.0
330	49.0	29.5	43.0	37.0	24.5	18.5	12.5
335	51.0	31.0	45.0	38.5	25.5	19.5	13.0
340	54.0	32.5	47.5	40.5	27.0	20.5	13.5
345	57.0	34.5	50.0	43.0	28.5	21.5	14.5
350	59.0	35.5	52.0	44.5	29.5	22.5	15.0
355	63.0	38.0	55.5	47.5	31.5	24.0	16.0
360	66.0	40.0	58.0	49.5	33.0	25.0	16.5
365	69.0	41.5	60.5	52.0	34.5	26.0	17.5
370	73.0	44.0	64.0	55.0	36.5	27.5	18.5
375	77.0	46.5	67.5	58.0	38.5	29.0	19.5
380	82.0	49.5	72.0	61.5	41.0	31.0	20.5
385	87.0	52.5	76.5	65.5	43.5	33.0	22.0
390	92.0	55.5	80.5	69.0	46.0	34.5	23.0
395	98.0	59.0	86.0	73.5	49.0	37.0	24.5
400	105.0	63.0	92.0	79.0	52.5	39.5	26.5

* Compact, Standard, Light and XL apply only to fusion engine types.

'MECH ENGINE CRITICAL SPACE TABLE

Engine Type	Slots (Inner Sphere)	Slots (Clan)
Military Fusion (Standard)	6 (center torso only)	6 (center torso only)
Extra-light Fusion (XL)	12 (6 in center torso; 3 per side torso)	10 (6 in center torso; 2 per side torso)
Light Fusion	10 (6 in center torso; 2 per side torso)	Not Available
Compact Fusion	3 (center torso only)*	Not Available

*Removes lower three engine slots on blank 'Mech Record Sheet Critical Hit Table.

Chas intends to give his Barghest *excellent speed for a heavy 'Mech, and decides upon a Walking MP of 5. This requires an Engine Rating of 350 (70 tons x 5 MP = 350). As the Master Engine Table shows that this would take up an incredible 29.5 tons if he selected a standard fusion engine for the job, Chas also chooses an XL engine at a cost of 15 tons (leaving 48 tons leftover; 63 – 15 = 48). The use of an Inner Sphere XL engine—which is even bulkier than its Clan equivalent—requires Chas to assign 3 critical slots each to the left and right torso locations on the* Barghest*'s Critical Hits Table. The Running MP for the* Barghest *is 8 (5 Walking MP x 1.5 = 7.5, which rounds up to 8 MP).*

Stacy Church of the Black Widow Trinary leaps from cover to cover as she makes her last stand on Outreach.

ADD GYROSCOPE

Every BattleMech requires a powerful gyroscope to keep it upright and able to move. The exact size of this gyro depends on the 'Mech's engine rating and the type of gyro used (standard, compact, heavy-duty or extra-light). To determine the weight for a gyro, divide the BattleMech's Engine Rating by 100 and round the result up to the nearest whole number. The resulting number is the gyro's base weight (in tons). To find the gyro's final weight, multiply this tonnage by the appropriate multiplier given in the Master Gyroscope Table below (rounding up this final result to the nearest half-ton). The weight of a Compact Gyro on a BattleMech with a 160-rated engine would come to 3 tons: 160 ÷ 100 = 1.6, rounded up to 2 (base gyro weight) x 1.5 (Compact Gyro multiplier) = 3.

Tech Base: Standard gyros are equally available to BattleMechs of Clan or Inner Sphere tech bases. Compact, Heavy-Duty and XL are available only to BattleMechs with an Inner Sphere Tech Base. BattleMechs built using a Clan Tech Base do not have access to non-standard gyros.

Space: The blank 'Mech Record Sheet generally presumes that a BattleMech design is using a Standard Gyro type (which takes up 4 critical slots in the center torso). To determine the actual number of critical slots a given gyro occupies, consult the Slots column of the Master Gyroscope Table. All gyro critical slots are allocated to the center torso location only. These slots must be allocated continguously.

The placement of gyro critical slots must also be determined at this time.

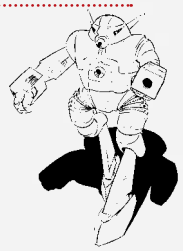
OmniMechs: The gyro type, weight and placement of its critical slots must be established when designing an OmniMech's base configuration, and may not be altered in the completed primary or alternate configurations of that OmniMech.

MASTER GYROSCOPE TABLE

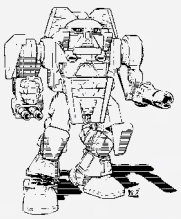
Gyroscope Type	Weight Multiplier	Slots Occupied*
Compact	1.5	2
Heavy-Duty	2.0	4
Standard	1.0	4
Extra-light (XL)	0.5	6

*All gyro slots must be allocated to the center torso

Andrew has chosen a standard gyro for his Mongoose. *With an Engine Rating of 200, the* Mongoose *would need a 2-ton gyroscope (200 ÷ 100 = 2). This leaves him with 13 tons (15 – 2 = 13).*



Because his OmniMech uses a Clan tech base, Brent may only select a standard gyro. With an Engine Rating of 380, his Gladiator *needs a 4-ton gyroscope (380 ÷ 100 = 3.8, rounded up to 4). This leaves Brent with 61 tons left over (65 – 4 = 61).*



Chas' Barghest, *with its Engine Rating of 350, would also have a base 4-ton standard gyroscope weight (350 ÷ 100 = 3.5, rounded up to 4). Because Chas also selects a standard gyro, this leaves him with 44 tons (48 – 4 = 44).*

DETERMINE JUMP CAPABILITY

At the designer's option, BattleMechs may be equipped with jump jets in their legs and/or torsos to allow for short bursts of jumping movement. The weight of these jets depends on the weight of the BattleMech, the Jumping MP desired and the type of jump jets employed (standard or improved). A BattleMech may mount only one jump jet type at a time.

Jump jets are mounted singly, with each jet providing a BattleMech with one Jumping Movement Point. For example, a BattleMech with five jump jets would have a Jumping MP of 5. The maximum number of jets a 'Mech may mount depends on its ground MPs and the type of jets used, as shown on the Jump Jets Table below. A 'Mech with standard jets, for example, may have as many jets as it does Walking MP. The weight for each mounted jump jet is given in the Jump Jets Table below (to the left of the slash).

Tech Base: Standard and Improved jump jets are equally available to BattleMechs of Clan or Inner Sphere tech bases.

Space: Jump jets may only be mounted in a BattleMech's torso and leg locations. The number of critical slots each jump jet requires is determined by the jump jet's type, as noted in the Jump Jets Table (to the right of the slash). The placement of these critical slots need not be determined at this time, but must be determined at or during the final stages of the BattleMech's design.

OmniMechs: The number, type and placement of jump jets need not be determined as part of an OmniMech's base configuration, and so do not need to be established at this stage if the designer wishes to leave jump capability as an option.

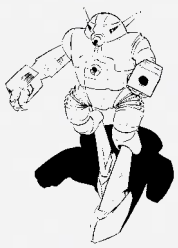
If any jump jets are established for a base configuration at this stage, they are considered permanent but may be shifted within their bodily location as the designer wishes in that OmniMech's completed primary or alternate configurations. However, additional jump jets may be placed on an alternate configuration if the base configuration does not carry the maximum possible jets for its type.

JUMP JETS TABLE

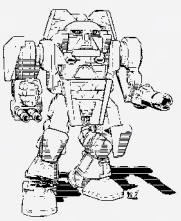
'Mech Tonnage	Jump Jet Weight (per Jump MP) / Critical Slots	
	Standard Jump Jets*	Improved Jump Jets*
10–55	0.5 tons / 1	1 ton / 2
60–85	1 ton / 1	2 tons / 2
90–100	2 tons / 1	4 tons / 2

*Max Jump = Maximum Walking MP for Standard Jump Jets; Max Jump = Maximum Running MP for Improved Jump Jets

As it is already capable of swift land speed and meant for open areas where it can use its mobility best, Andrew decides that his Mongoose *will not require jump jets at this point.*



Though his 'Mech is fast for its size, Brent anticipates it will need some help getting through difficult terrain or out of sticky situations. He thus opts to install jump jets on the Gladiator, *and decides upon a Jump MP of 4—the maximum attainable using standard jets. Because of the* Gladiator's *weight, Brent finds that the jump jets will weigh 2 tons each and occupy 1 critical slot each. He opts to install all four jets in the legs, with 2 in each leg for a total of 8 tons spent. Because Brent is building the base model of an OmniMech, he may not move or remove these jets when making alternate configurations for the machine later on. The* Gladiator *now has a Jumping MP of 4, and has 53 remaining unspent tons (61 – 8 = 53).*



Chas decides that his Barghest *is mobile enough for his tastes, and decides not to install jump jets at this time.*

Puma H, *Gamma Galaxy (Clan Steel Viper)*

ADD COCKPIT

Every BattleMech must have a cockpit, which contains the MechWarrior's control station, life-support system and electronic sensors. The weight and critical spaces these cockpit systems occupy in the BattleMech design depend on which type is chosen (Standard or Small). Standard cockpits, which allow for unfettered operations, weigh 3 tons and leave only one slot open in the head for additional equipment. The more cramped Small cockpits weigh 2 tons and leave 2 head location slots open, but impose penalties on the warrior in game play. The BattleMech Cockpit Table below outlines these basic features, including tonnage, critical slots (as well as default locations on the Head Location of the Critical Hits Table) and game play modifier.

Tech Base: Standard cockpits are equally available to BattleMechs of Clan or Inner Sphere tech bases. BattleMechs built using an Inner Sphere Tech Base may use Small cockpits as well. Small cockpits are currently unavailable to Clan-made BattleMechs.

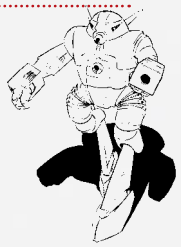
Space: Both the Small and Standard cockpit types must be located in the BattleMech's head location. The blank 'Mech Record Sheet generally presumes that the designer is using the Standard cockpit and its default slot locations, which includes 2 Sensors slots (in default slots 2 and 5), 2 Life Support slots (in default slots 1 and 6), and 1 Cockpit slot (in default slot 3), leaving slot 4 open for any additional equipment.

The Small cockpit, if used instead, removes one of the Life Support slots (default slot 6) and moves the sensors in slot 5 up to slot 4 to create 2 contiguous empty slots in the head.

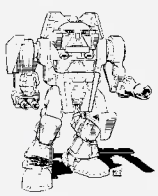
The placement of cockpit critical spaces must be determined at this time.

OmniMechs: The cockpit type and placement of its critical slots must be established when designing an OmniMech's base configuration, and may not be altered in that OmniMech's completed primary or alternate configurations.

Andrew decides to give his Mongoose *a Standard cockpit, spending 3 tons on it, and thus retains the default slot arrangement for the cockpit's systems. He has 10 tons remaining (13 – 3 = 10).*



With no access to Small cockpits, Brent installs a Standard cockpit in his Gladiator, *using the default slots on the Record Sheet Critical Hits Table as well. His OmniMech now has 50 unspent tons remaining (53 – 3 = 50).*



Though a +1 Piloting modifier would hardly impair his quad Barghest, *Chas too opts to use a Standard cockpit, leaving him with 41 unspent tons (44 – 3 = 41). He too retains the default slot arrangement on the Critical Hits Table.*

SPECIAL PHYSICAL ENHANCEMENTS (MASC/TSM)

Some designers may wish to install additional motive or musculature enhancements to their BattleMechs at this time, such as the speed-enhancing Myomer Acceleration Signal Circuitry (MASC) or the strength-boosting Triple Strength Myomer (TSM). Though this equipment is technically not part of the engine or control systems, it should be installed at this stage, and its critical slots allocated—particularly if the design is to be the base configuration of an OmniMech. Consult the BattleMech MASC and TSM Table below for tonnage and critical slot data on MASC and Triple-Strength Myomer.

MASC and Triple-Strength Myomer may not be combined on the same BattleMech.

Tech Base: BattleMechs built with an Inner Sphere technology base may make use of Inner Sphere MASC and Triple-Strength Myomer. BattleMechs built using a Clan tech base may use Clan MASC, but may not mount Triple-Strength Myomer.

Space: The number of critical slots required by MASC or Triple-Strength Myomer is shown in the BattleMech MASC and TSM Table, below. The critical slots for both systems may be placed anywhere on the Critical Hit Table, but MASC must be allocated in contiguous slots as a single item, while the critical slots for Triple-Strength Myomer may be distributed throughout the table (like endo-steel critical slots).

BATTLEMECH MASC AND TSM TABLE

System	Weight (Inner Sphere)	Weight (Clan)	Critical Slots (Inner Sphere)	Critical Slots (Clan)
MASC	5%*	4%*	5%*	4%*
Triple-Strength Myomer	0	Not Avail.	6	Not Avail.

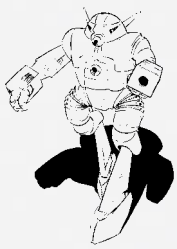
*Percentage of the BattleMech's total weight (in tons). Round this figure normally to the nearest full ton/critical slot.

BATTLEMECH COCKPIT TABLE

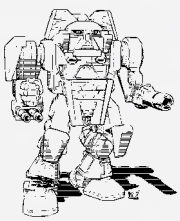
Cockpit Type	Tons	Slots (Default Locations) Cockpit	Sensors	Life Support	Gameplay Effect
Standard	3	1 (3)	2 (2 and 5)	2 (1 and 6)	None
Small	2	1 (3)	2 (2 and 4)	1 (1)	+1 modifier to all Piloting Skill Rolls

The placement of these critical slots need not be determined at this time, but must be determined at or during the final stages of the BattleMech's design.

OmniMechs: The type, weight and location of critical slots for MASC and Triple-Strength Myomer must be established when designing an OmniMech's base configuration, and may be shifted within their location (following the contiguity of the system) in that OmniMech's completed primary or alternate configurations. Unlike jump jets, neither MASC nor Triple-Strength Myomer may be "pod-mounted," so an OmniMech may not feature MASC or TSM capabilities on an alternate configuration unless the base configuration is so equipped.



Though MASC technology existed in the era in which Andrew plans to base his Mongoose, *he decides not to use that technology for added speed bursts, as the 'Mech already boasts a respectable movement rate. He likewise considers Triple-Strength Myomer inappropriate, though that has more to do with the technology not existing in the old Star League era than the fact that the lightweight* Mongoose *would make a lousy close-in brawler.*



To provide his 95-ton Gladiator *with amazing bursts of speed that can catch lighter enemies off-guard, Brent chooses to add MASC to the base design. Clan-made MASC weighs 4 percent of the BattleMech's total weight, so MASC on the* Gladiator *will weigh 4 tons (95 tons x 0.04 = 3.8 tons, rounded up to 4). As this formula also determines the equipment's size in terms of critical slots, the same value (4) applies to the number of slots needed. The* Gladiator *now has 46 unspent tons remaining (50 – 4 = 46). Brent decides to assign the 4 MASC slots to the Omni's left torso location.*

Chas resists the urge to install MASC or TSM on his Barghest, *opting to save weight and space for ranged weapons.*

PXH-4L Phoenix Hawk, *Broadsword Legion (Mercenary)*

STEP 3:
ADD ADDITIONAL HEAT SINKS

The heat sinks that dissipate heat produced by the BattleMech's movement, weapons fire and other actions may be allocated at this time. At this stage, however, the give-and-take of BattleMech design begins to come into play, and so the player can skip this step for now, leaving the heat sinks until after assigning the 'Mech's weapons and equipment.

The fusion engines used on BattleMechs automatically provide the 'Mech with 10 free heat sinks that do not take up tonnage (but may occupy critical slots, if the engine is not large enough). Additional heat sinks may be installed beyond this free amount, at a cost of 1 ton per heat sink (regardless of whether or not the heat sinks used are standard or double-strength).

Two types of heat sink are available to BattleMechs: standard heat sinks (generally known as single heat sinks) and double heat sinks. A BattleMech may only carry one type of heat sink, not a mixture of both. This includes the free sinks that come with the fusion engine. If a designer opts to equip a 'Mech with double heat sinks, the 10 heat sinks that come with the engine are automatically considered double heat sinks as well. If standard heat sinks are chosen instead, then the 10 free sinks are considered single heat sinks.

Tech Base: Standard (single) heat sinks are equally available to BattleMechs of Clan or Inner Sphere tech bases. BattleMechs built using an Inner Sphere Tech Base may use Inner Sphere double heat sinks as well. Clan-made BattleMechs may use Clan double heat sinks.

Space: Regardless of the type of heat sinks used, or how many more are added after the engine's 10 free sinks, a number of heat sinks may not require any critical slots on the Critical Hits Table, based on the size of the engine. To find the number of heat sinks that may be considered "critical-free," divide the BattleMech's engine rating by 25 and round the result down. These sinks are considered an integral part of the engine, and so can only be destroyed if the engine is destroyed.

All remaining heat sinks (even the engine's 10 free sinks) must be allocated to the Critical Hits Table, with each sink considered a separate item. Heat sinks that occupy multiple critical slots—such as Clan and Inner Sphere double heat sinks—must allocate these slots contiguously on the table. For example, if a player adds 5 heat sinks (for a total of 15) to a BattleMech with a 195-rated fusion engine, 7 of these sinks (195 ÷ 25 = 7.8, rounded down to 7) are considered integral to the engine and are not assigned critical slots. The other 8 [10 (original equipment) + 5 (extra) – 7 (integral to engine) = 8] must be assigned to critical slots.

Each standard (single) heat sink not considered integral to the engine takes up 1 critical slot, while Inner Sphere double heat sinks fill 3 slots each, and Clan double heat sinks occupy 2 slots each. The allocation of these sinks to the Critical Hits Table can wait until later, if the designer so wishes, in order to assure the best fit when mounting weapons and other equipment.

OmniMechs: A Clan or Inner Sphere OmniMech may add more heat sinks at this stage, or—at the designer's option—may stick with the 10 free sinks already provided by the fusion

HEAT SINKS TABLE

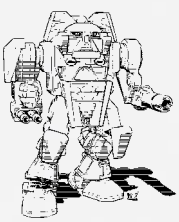
Heat Sink Type	Critical Slots	
	Inner Sphere	Clan
Single (Standard)	1	1
Double	3	2

engine. As heat sinks may be mounted in Omni-pods just like other weapons and equipment, any additional sinks can easily be left to alternate configurations.

However, said configurations must always use the same heat sink type as that used by the base chassis. In addition, all heat sinks added onto later configurations must be mounted as pods and thus occupy critical space on the OmniMech's record sheet (even if the Engine Rating would otherwise allow some of them to be "critical-free"). It is therefore generally more efficient (and well advised) for OmniMechs to incorporate their maximum complement of "critical-free" heat sinks into their base designs.

Andrew does not foresee placing a lot of firepower on his lightweight Mongoose, *so he decides to stick with the 10 free heat sinks that come with the 'Mech's engine (which he decides will be single heat sinks, to cut costs). In computing how many sinks will not require critical slots, he finds that the* Mongoose's *200-rated engine will only integrate 8 of these 10 sinks (200 ÷ 25 = 8). The remaining 2 heat sinks—which occupy 1 slot apiece—must be allocated to the* Mongoose's *Critical Hits Table someplace. Andrew decides to settle this now, rather than wait until later, and assigns one sink to each of the* Mongoose's *leg locations. Because the 10 sinks were provided free with the engine, Andrew still has 10 tons remaining.*

On the Heat Data Block of the Record Sheet, Andrew notes the Mongoose *has 10 sinks by blacking out all but 10 Heat Sink circles, checking off the box marked "Single" and writing a value of 10 in the line marked Heat Sinks, and between the parentheses on the same line.*



Anticipating some awesome firepower options on his Gladiator, *Brent decides to provide the OmniMech's base chassis with a total of 16 double-strength heat sinks. Because 10 of these come free with the engine, this decision costs 6 tons in weight, leaving the* Gladiator *with 40 tons left over (46 – 6 = 40). In addition, the OmniMech's 380-rated engine integrates all but 1 of these heat sinks (380 ÷ 25 = 15.2, rounded down to 15; 16 sinks – 15 integrated = 1), leaving that heat sink to be allocated on the 'Mech's Critical Hits Table. Brent assigns this remaining sink to the right torso location, where the Clan double heat sink takes up 2 critical slots.*

On the Heat Data Block of the Record Sheet he is using to record his OmniMech's base configuration, Brent notes the Gladiator *has 16 double heat sinks by blacking out all but 16 Heat Sink circles, checking off the box marked "Double" and writing a value of 16 in the line marked Heat Sinks, and a value of 32 (16 x 2 = 32) between the parentheses on the same line.*

Chas does not feel he has much weight to spare for heat sinks, considering his plans for firepower and armor on his Barghest. *He thus sticks with the 10 free sinks that come with the BattleMech's engine, but chooses to make them double heat sinks rather than singles. In computing how many are integrated into the engine "critical-free," Chas finds he won't need to worry about assigning any of these 3-slot Inner Sphere double heat sinks to the 'Mech's Critical Hits Table, as the 350-rated engine is large enough to easily take in all 10 (350 ÷ 25 = 14). Because the 10 sinks came with the engine, Chas still has 41 unspent tons.*

On the Heat Data Block of the Record Sheet, Chas notes the Barghest *has 10 double heat sinks by blacking out all but 10 Heat Sink circles, checking off the box marked "Double" and writing a value of 10 in the line marked Heat Sinks, and a value of 20 (10 x 2 = 20) between the parentheses on the same line.*

STEP 4: ADD ARMOR

Armor helps protect the BattleMech's internal structure and critical components. Depending on the technology base used and the type of armor selected, armor can vary in tonnage and critical space. Inner Sphere-designed BattleMechs have more options, in fact, including standard, Inner Sphere ferro-fibrous, light and heavy ferro-fibrous, and stealth armor. Clan BattleMechs may only use standard and Clan ferro-fibrous armor.

The maximum amount of armor a BattleMech may mount is based on the number of points of internal structure it has. For all locations but the head, the BattleMech may mount twice as many armor points as it has internal structure in that location—for example, if an arm has 9 points of internal structure, it may carry up to 18 points of armor. The head of all BattleMechs (regardless of size) may support up to 9 armor points. Torso locations divide this maximum between their front and rear sides. (Most designs focus more armor toward the front, as BattleMechs tend to sustain more frontal combat damage.) The maximum armor levels for any location are unaffected by the use of alternative armor or internal structure types.

Armor may be mounted in full- or half-ton lots, and provides a base amount of 16 points per ton of standard armor (8 points per half-ton). The use of alternative armor types such as ferro-fibrous can modify this amount as shown in the BattleMech Armor Table (see p. 56), allowing for generally higher points-per-ton ratios at a cost in greater bulk (and fewer open critical slots on the Critical Hits Table).

To determine the armor value provided by these alternative armor types, multiply the base armor value (16 points per ton) by

the Base Armor Multipliers shown for the appropriate armor type in the BattleMech Armor Table (see p. 56), rounding the final result down to the nearest full point. For instance, a BattleMech that uses 4 tons of Inner Sphere ferro-fibrous armor would receive 71 armor points (4 tons x 16 points per ton x 1.12 = 71.68 armor points, rounded down to 71), while 1 ton of the same armor would provide only 17 armor points (1 ton x 16 points per ton x 1.12 = 17.92, round down to 17).

Conversely, if a specific number of armor points is sought—up to the Maximum Armor Factor shown for the 'Mech's weight on the Internal Structure Table (see p. 47)—and the weight is unknown, the designer can find this weight (in tons) by *dividing* the target number of armor points by 16 times the Base Armor Multiplier. This result is rounded up to the nearest half-ton. For example, if a designer decides to mount 105 points of heavy ferro-fibrous armor, he will need 5.5 tons to accomplish that (105 points ÷ [16 x 1.24] = 5.29 tons, which rounds up to the nearest half at 5.5). However, sometimes a desired number of points—such as many Maximum Armor factors—may force the designer to "waste" weight on points that cannot be mounted. If in the previous example of the heavy ferro-fibrous armor, 105 armor points was the maximum that could be installed on the 'Mech, the actual 5.5-ton capacity of heavy ferro-fibrous armor—109 points (5.5 tons x 16 points/ton x 1.24 = 109.12 points, rounded down)—would result in 4 points of "wasted" armor.

Use the Armor Diagram on the blank 'Mech Record Sheet to indicate the number of Armor Points protecting each part of the BattleMech's body. Mark out any excess armor circles in the same way as for the Internal Structure Diagram.

BattleMechs built under these rules may not combine multiple armor types on the same design.

Tech Base: Standard armor is equally available to BattleMechs of Clan or Inner Sphere tech bases. Inner Sphere ferro-fibrous, heavy ferro-fibrous, light ferro-fibrous and stealth armor is available only to BattleMechs with an Inner Sphere Tech Base. Clan ferro-fibrous armor is available only to BattleMechs with a Clan Tech Base.

Space: Carrying ferro-fibrous or stealth armor requires the player to fill in critical slots on the BattleMech's Critical Hit Table. These critical slots need not be contiguous, and—like endo-steel internal structure—may not be "hit" in combat (critical hits to these slots get re-rolled). For all ferro-fibrous armor (Clan, Inner Sphere, heavy and light) the appropriate number of slots as indicated on the BattleMech Armor Table must be assigned to any desired locations on the Critical Hit Table.

Stealth armor, a special version available only to Inner Sphere BattleMechs, specifically requires that its 12 critical slots be placed on the Hits Table with 2 slots in each body location except for the center torso and head. This armor type also requires the installation of a Guardian ECM Suite (see p. 213).

When armor is installed that uses critical slots, the allocation of these slots need not be contiguous, nor do they need to be determined at this stage. However, they must be assigned by the final stages of design, while allocating weapons, heat sinks and any other equipment not otherwise pre-set (such as engines, gyros and cockpit systems).

OmniMechs: The type, weight, number of points and critical slots (if any) required for an OmniMech's armor must be established when designing an OmniMech's base configuration, and although the location of such slots may not be changed they may be shifted as the designer pleases within their established location in the completed primary or alternate configurations.

A Ha-Otoko *from Clan Fire Mandrill's Kindraa Sainze clashes with a* Hunchback IIC *from Kindraa Payne.*

BATTLEMECH ARMOR TABLE

Base Armor Points per Ton: 16

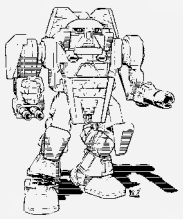
Armor Type	Base Points Multiplier	Slots (Inner Sphere)	Slots (Clan)
Standard	1.0	0	0
Stealth	1.0	12*	NA
Light Ferro-Fibrous	1.06	7	NA
Ferro-Fibrous (I.S.)	1.12	14	NA
Ferro-Fibrous (Clan)	1.2	NA	7
Heavy Ferro-Fibrous	1.24	21	NA

* Stealth armor requires 2 critical slots each in the arms, legs and side torsos of the 'Mech on which it is installed; a Guardian ECM Suite is also required to use stealth armor.

Andrew's Mongoose *is light and fast, but he still wants to protect it as best he can while giving it some bite. He therefore chooses to use standard ferro-fibrous armor. As shown on the BattleMech Internal Structure Table (p. 47), the maximum armor potential for a 25-ton humanoid BattleMech is 89 points. With that in mind, Andrew finds that attaining 89 points using Inner Sphere ferro-fibrous armor will cost his design another 5 tons (89 points ÷ [16 Base Points per Ton x 1.12 Inner Sphere Ferro-Fibrous Multiplier] = 4.967, rounded up to 5 tons). Because it is the maximum possible armor, Andrew applies 9 points to the head, 12 to each leg and 8 to each arm without a second thought; the maximum for any BattleMech's head is 9 and the maximum for all other locations is double the internal structure value.*

For the torsos, he assigns most of the armor protection up front, with 12 points to the front-center and 10 points to each front-side. The rear torso locations receive 4 to the center and 2 to each side. Verifying that all points are accounted for, Andrew adds all the armor values together: 9 [Head] + (12 + 4 [Center Torso, Front + Rear]) + (10 + 2 [Left Torso, Front + Rear]) + (10 + 2 [Right Torso, Front + Rear]) + (12 + 12 [Legs, Left + Right]) + (8 + 8 [Arms, Left + Right]) = 89. In the appropriate locations of the Armor Diagram for his Mongoose*'s Record Sheet, Andrew blacks out all extra circles, leaving only the assigned amount for each location.*

With 5 tons spent on armor now, the Mongoose *has only 5 tons remaining for weapons and other equipment (10 – 5 = 5). Andrew notes he has 14 critical slots to assign for his ferro-fibrous armor, which may be placed anywhere in the 'Mech's body and need not be contiguous. He holds off assigning these slots until the final stages of design.*



At 95 tons, Brent's Gladiator *could be massively armored (the BattleMech Internal Structure Table on p. 47 indicates a potential 293 points on a humanoid 'Mech), but Brent hopes to maintain enough weight for a large array of weaponry. Even with Clan ferro-fibrous armor, he decides that the weight of the maximum armor level is extreme at 15.5 tons (293 Points ÷ [16 Base Points per Ton x 1.2 Clan Ferro-Fibrous Multiplier] = 15.26, rounded up to 15.5 tons). Brent decides to shave a couple tons off the armor weight. Installing 13.5 tons of Clan ferro-fibrous armor, Brent determines that his* Gladiator *will have a final armor factor (total armor value) of 259 points (13.5 tons x [16 Base Points per Ton x 1.2 Clan Ferro-Fibrous Multiplier] = 259.2, rounded down to 259).*

In distributing this armor, Brent maximizes the protection on his OmniMech's head and limbs, placing 9 points on the head, 40 on each leg and 32 on each arm. On the center torso, he assigns 37 points to the front and 9 to the rear (Clan Omnis rarely present their backs in combat, he reasons), while the left and right side torsos receive 20 points to the front and 10 to the rear. Verifying that all points are accounted for, Brent adds all the armor values together: 9 [Head] + (37 + 9 [Center Torso, Front + Rear]) + (20 + 10 [Left Torso, Front + Rear]) + (20 + 10 [Right Torso, Front + Rear]) + (40 + 40 [Legs, Left + Right]) + (32 + 32 [Arms, Left + Right]) = 259. In the appropriate locations of the Armor Diagram for his Gladiator*'s Record Sheet, Brent blacks out all extra circles, leaving only the assigned amount for each location.*

Like Andrew's Mongoose, *Brent's* Gladiator *must assign slots to its ferro-fibrous armor, but because of its Clan design, this armor only requires 7 critical slots in total. Because it is an OmniMech's base chassis, however, Brent realizes he should assign these slots as soon as possible. He thus places 2 ferro-fibrous slots in the center torso, 1 in the head, 1 each in the arms and the last 2 in the right torso. With 13.5 tons of armor, the* Gladiator *has 26.5 tons of unused weight remaining.*

With internal space already at a premium—partly for the XL engine and partly for a quad body shape—Chas' Barghest *can't afford to use ferro-fibrous armor (even the light version seems dodgy to him). Instead, he selects standard armor. Like Andrew and Brent, Chas checks the BattleMech Internal Structure Table on p. 47 to find that the maximum potential armor for a 70-ton quad 'Mech is 233 points. But because that level of protection would come in at 15 tons using standard armor (233 points ÷ [16 Base Points per ton x 1.0 Standard Armor Multiplier] = 14.56, rounded up to 15 tons), Chas decides to mount a couple of tons less to leave more room for weapons. After installing 13 tons of standard armor, Chas determines that his* Barghest *will have a final total armor value of 208 points (13 tons x [16 Base Points per ton x 1.0 Standard Armor Multiplier] = 208 points).*

Chas distributes his armor points as evenly as possible on the Barghest, *maximizing only the head's protection with 9 points. Focusing more armor forward, Chas assigns 30 points to the front-center torso, 21 points each to the front left and front-right torsos, and 27 points each to the front left and front right legs. The rear-center torso receives 9 points of armor, while the rear-side torsos receive 6 each, and the rear legs receive 26 each. To verify that all points are accounted for, Chas adds all the armor values together: 9 [Head] + (30 + 9 [Center Torso, Front + Rear]) + (21 + 6 [Left Torso, Front + Rear]) + (21+ 6 [Right Torso, Front + Rear]) + (27 + 27 [Front Legs, Left + Right]) + (26 + 26 [Rear Legs, Left + Right]) = 208. In the appropriate locations of the Armor Diagram for his* Barghest*'s Record Sheet, Chas blacks out all extra circles, leaving only the assigned amount for each location.*

With 13 tons spent on armor, the Barghest *now has 28 tons remaining (41 – 13 = 28).*

STEP 5: ADD WEAPONS, AMMUNITION AND OTHER EQUIPMENT

The weapons, ammunition and equipment that may be mounted on a BattleMech are listed in the Weapons and Equipment Tables shown on p. 341. In addition to any heat, damage and range statistics, these tables provide the tonnage and critical space these items may occupy on a BattleMech, what Technology Base (Clan or Inner Sphere) is required to use them, and any references to special construction rules that might apply to installing the equipment. The Ammo column notes how many shots a given weapon or item carries per ton (only machine guns and nail/rivet guns may carry ammunition in half-ton lots). Remember that the total weight of a given BattleMech design's structure, engine, cockpit, armor, weapons and other components may never exceed the tonnage established for the 'Mech in Step 1. Any leftover weight that cannot be allocated to other equipment (due to critical space constraints or other factors) is considered "wasted" tonnage.

Weapons placed in the torso, leg or head locations may have a forward or rearward firing arc. Rear-firing weapons must be so noted when installed on the design.

For special rules on any item, consult its entry under Weapons and Heavy Equipment (pp. 200–273.)

Tech Base: The Heavy Weapon and Equipment Tables note which items are available to which technology base. Clan-made BattleMechs may use only items available to the Clans, while Inner Sphere-made BattleMechs must use only those items available to the Inner Sphere.

Space: The mounting of any weapons and equipment that occupy critical slots must be established to determine the weapons' firing arcs in game play. Torso- and head-mounted items receive the firing arc of the BattleMech's torso (or the torso's rear, if the item is mounted for rearward firing). Arm-mounted weapons receive the firing arc appropriate to that arm. Leg-mounted weapons receive either a forward or rearward firing arc, based on the designer's choice of forward or rear-firing arcs.

Almost all weapons and equipment that may be mounted on a BattleMech must be allocated to the Critical Hits Table in a contiguous series within the same location. (Any items that do not will be so noted under their specific rules.) These items therefore may not be placed in a body section that has fewer open critical slots than the equipment requires. Some items, however, may be broken up among two locations.

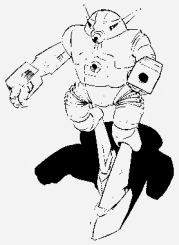
Any ranged weapon occupying 8 or more critical slots may be split between any two adjacent locations (not including the legs). If so, it automatically receives the more restrictive firing arc of the two. For example, if a BattleMech carries an AC/20 split between its left torso and left arm, that weapon uses the torso arc, not the arm arc.

Ammunition: All ammunition-dependent weapons except for machine guns (including their light and heavy versions) and nail or rivet guns require at least a ton of ammunition. Machine guns, nail guns and rivet guns may carry ammo in half-ton lots instead. Each ammo bin occupies one critical slot per ton (round up), and must be of the same ammunition type per slot. Because each slot is considered a separate bin, however, ammunition need not be contiguous.

OmniMechs: Though it is unusual, weapons and equipment may be established as fixed components of an OmniMech's base configuration just like heat sinks and jump jets. In such cases, these "fixed" items must be mounted and placed on the Critical Hits Table before completion of the base configuration, and though the location of such slots may not be changed they may be shifted as the designer wishes within their established location according to the contiguity of the system in the completed primary or alternate configurations.

On biped OmniMechs, the lower arm and hand actuators are always considered to be pod-mounted, and may be removed to provide additional slots for weapons and other equipment. If the configuration desired mounts any kind or size of Gauss rifle, autocannon or PPC in a given arm, however, the lower arm and hand actuators in that arm must be removed first.

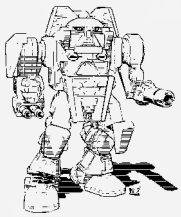
HEL-3D Helios, *Seventh FedCom RCT (Federated Suns)*



With only 5 tons left to spare, Andrew thinks hard about the weapons and equipment his Mongoose *will use. As the 'Mech is designed primarily to scout, the first choice is obvious: a Beagle Active Probe (which, he learns from the Weapons and Equipment Table on p. 341, weighs 1.5 tons for Inner Sphere units and occupies 2 critical slots in Inner Sphere 'Mechs). Deciding the* Mongoose *could then use some bite, Andrew decides to devote the remaining 3.5 tons to lasers, with 3 1-ton medium lasers and a single 0.5-ton small laser providing the 'Mech with respectable ammo-free, close-in hitting power. Each of these weapons occupies a single critical slot.*

With all tonnage used up, Andrew finds that he has to allocate not only the lasers and Active Probe to his Critical Hits Table, but also 14 slots each of endo-steel and ferro-fibrous armor. Deciding to mount the weapons first, Andrew places one medium laser in each of the Mongoose*'s arms, retaining their lower arm and hand actuators as well (in case the 'Mech should need to punch or carry cargo). Because these lasers occupy 1 slot each, and the actuators (shoulder to hand) take up 4, there are 7 open slots left in each arm. Andrew fills these remaining slots with the ferro-fibrous armor, taking care of all 14 unallocated armor slots. Andrew then places the remaining medium laser in the* Mongoose*'s center torso, and the small laser in the head. At one slot apiece, this leaves 1 open slot in the center torso and none in the head. The Beagle probe, which takes up 2 slots by itself, is placed in the 'Mech's left torso, its slots in consecutive positions for clarity. Because the side torsos are otherwise unoccupied and there remain the 14 endo-steel slots to consider, Andrew distributes these slots—7 apiece—to these locations.*

ANH-1A Annihilator, *Zeta Battalion (Wolf's Dragoons)*



Because he has been building the base chassis of an OmniMech, Brent's Gladiator *is technically a completed base configuration already, as long as all its critical slots have been assigned. The 26.5 tons left over becomes classified as "pod space" that can be filled with various weapons systems and other equipment available to 'Mechs with a Clan technology base. With its base chassis equipment already assigned, the* Gladiator *leaves 7 slots open per arm (though 2 of the "occupied" slots per arm are actually lower arm and hand actuators that can be removed for later configurations), and 6 slots in each side torso. These slots are considered "fixed" and should always be grouped contiguously by location to maximize their usefulness to later configurations.*

Retaining a copy of the base chassis' Record Sheet, Brent decides to create at least one complete configuration—the so-called Gladiator *Prime—based on the chassis he has just designed. This version mounts a Gauss rifle in the left arm (necessitating the removal of a lower arm and hand actuator), at a cost of 12 tons and the use of 6 critical slots; 2 ER large lasers in the right arm (at 4 tons and 1 slot apiece), and 2 machine guns in the right torso (at 0.25 tons and 1 critical slot each). Ammunition for the Gauss—2 tons' worth—occupies 2 critical slots (1 per ton) in the left torso, while the machine guns carry 1 ton of ammunition between them, taking up a single critical slot in the right torso. Because it is a Clan-made design, CASE—used to protect all explosive components, such as the machine gun ammo and the Gauss rifle—comes free both in tonnage and in critical space, and so need not be marked on the record sheet. (Simply noting that a design has a Clan tech base is generally sufficient to know that all explosive components are CASE-protected.)*

Tallying up the tonnage and space used, Brent finds his Gladiator *Prime has used up 23.5 tons of weapons, leaving 3 tons to spare, with 3 slots left open in the left arm (thanks to the removal of the lower arm and hand for the Gauss rifle), 5 in the right arm, 4 in the left torso and 3 in the right torso. Brent decides to devote the last 3 tons to more double heat sinks. He places one in the left arm (occupying 2 of the remaining slots) and two in the right arm (where they take up 2 slots each). The completed OmniMech configuration is now ready for battle.*

Compared with the other two, Chas' Barghest *has a simplified weapons load. With 28 tons remaining, he chooses to allocate 10 tons to a pair of ER large lasers (5 tons per laser x 2 lasers), which are mounted in the left torso (each Inner Sphere ER large laser occupies 2 critical slots). On the right torso, he tries to mount a mammoth 14-ton LB 20-X autocannon, but as the weapon takes up 11 critical slots and the right torso includes 3 critical slots from the XL engine already, Chas must split the weapon's slots between the*

right side torso and the adjacent center torso (thus, 9 of the autocannon's slots fill up the right torso and the remaining 2 fill up the unoccupied center torso slots). The remaining 4 tons available to the Barghest *are devoted to ammunition for the LB 20-X, at a rate of 1 critical slot per ton. Chas decides to place these slots in the rear legs, filling the slots in both the rear left and rear right legs. (As each slot represents 5 shots of LB 20-X ammunition, Chas obviously hopes that—with any luck—the well-armored legs will either be blown off before the bins explode, or the bins will be well-depleted by the time the armor breaches in battle.)*

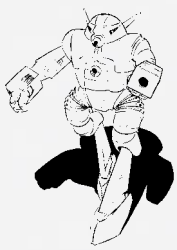
STEP 6:
COMPLETE THE RECORD SHEET

By the time the designer has chosen all structure, engine and controls for the BattleMech, and added the armor, weapons and equipment, all items must be allocated to their proper places on the blank 'Mech Record Sheet. On a completed record sheet, the designer must make sure to have selected the appropriate sheet for the 'Mech's type (biped or four-legged). The sheet must have all data filled in for the 'Mech Data block (including name, tonnage and MPs). All items and components with critical slots must be distributed on the Critical Hits Table (including armor, engine, gyro, extra heat sinks, weapons and other equipment, as well as ammunition and number of shots per bin). All extraneous armor and internal structure points must be blacked out on the Armor and Internal Structure Diagrams (including the back armor sections). Finally, heat sink data must be filled in—with extraneous heat sink circles blacked out (or new ones drawn in, if necessary)—on the Heat Data block.

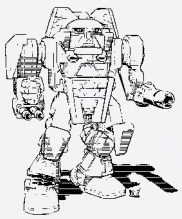
Once all of the above is completed, the BattleMech is ready for *Total Warfare* game play.

OMNIMECHS

When completing the record sheet for a BattleMech built as an OmniMech, it is highly recommended that one sheet be created specifically to serve as the base configuration, showing only the components installed on the base chassis. Copies of this base configuration sheet can then be used to quickly generate record sheets for the other configurations by adding the appropriate weapons and equipment in the open spaces.



Andrew verifies that all of the valid data blocks are completed, including the Mongoose's *full name "MON-66* Mongoose" *in the spot for the BattleMech's Type, checking off that its tech base is Inner Sphere, noting its Walking MP as 8, its Running MP as 12 and its Jumping MP as 0. He also lists the weapons properly on the 'Mech, noting the quantity per location, heat per weapon, and statistics as shown on the appropriate Weapons and Equipment Tables (for example, the* Mongoose's *center torso-mounted medium laser would be listed as "1" under QTY, "CT" under Location, "Medium Laser" under Type, "5" under Damage, "3" under Heat, "0-3" under Short Range, "4-6" under Medium Range and "7-9" under Long Range). After making sure that no extraneous circles for internal structure, armor and heat sinks are present, that the heat sink values are correct and all critical slots are assigned for all the BattleMech's weapons, Andrew is ready to compute the Battle Value and cost for his* Mongoose *and bring it to play.*



Repeating similar steps, Brent must also be sure to save a copy of his Gladiator's *Base Chassis Record Sheet with no added weapons or heat sinks beyond those determined before Step 5, to serve as a template for future configurations.*

Likewise repeating the same steps as Andrew, Chas completes his Barghest's *Record Sheet.*

Thor, Pharaoh *Keshik (Clan Cloud Cobra)*

INDUSTRIALMECHS: TARGET OF OPPORTUNITY?

BRANCHING INTO THE INDUSTRIALMECH MARKET

Mr. Gilmour, esteemed members of the board,

As you all know, the prospects for Gilmour Miltech look promising, continuing the established trend over the past four financial cycles. Analysts have determined possible growth of up to fifteen percent in the upcoming three years, given the Sphere-wide decline in major manufacturing due to the current wartime crisis. However, it doesn't take a crystal ball to know that these projections are fragile at best. Our company rests on a single main source of revenue: the maintenance and rebuilding of military assets. While this is a wide and profitable market in a wartime situation like we have today, it is also highly unstable and heavily contested—as the unexpected loss of our Talitha Militia contract due to an unforeseen invasion has clearly demonstrated.

In light of these events, this group has attempted during the past two months to develop several alternative business models, the first of which we present in this document.

For ease of reading, you will find a management summary of each technological topic with its respective chapter. Detailed figures, projection charts and investment calculations are grouped in Annexes I through IV.

INTRODUCTION

With the advent of new weapons systems and technologies in the past twenty years, the refit market for BattleMechs has been profoundly altered. Blooming in the early fifties by upgrading old machines to state-of-the-art models, this well of orders naturally begins to run dry. Customers run out of machines to upgrade, or decide to buy new, modern merchandise in the first place. While Gilmour Miltech has also taken steps in this direction, the mass market is clearly dominated by larger corporations. Meanwhile, the mercenary niche market—to which we sell our current *Cronus* series—has grown increasingly threatened over the past few years, and sales there have noticeably declined.

A similar picture shows up in the maintenance branch. Big suppliers tend more and more to sell their increasingly sophisticated products with service contracts included, leaving maintenance providers out of the loop. In addition, the flare-up of warfare with abundant use of new, more destructive weapons has further diminished the stock of military equipment left to maintain.

None of this, however, can be said of the IndustrialMech market.

At the same rate the military markets have flourished, civilian customers have been neglected. Most of this industry has remained in an early thirty-first century state and shows great potential in sales and maintenance markets. With the resources, facilities and know-how of Gilmour Miltech at hand, it would be relatively easy to quickly establish a stable foothold in this sector.

Based on a two-year focus program, concentrated mainly on refitting and reorienting our assets, calculations project that the local Talitha market alone could already account for close to sixty percent of our current export income. Bundled service contracts and maintenance support are not yet taken into consideration. Thus, our company's survival could be assured even with a hampered interstellar distribution network—a distinctly probable scenario, considering the current state of affairs.

Preliminary surveys among potential customers from governmental and industrial sectors also indicate a general tendency toward automation, despite the ongoing fighting across the Inner Sphere. Whether this is a momentary fad—image-guided attempts to keep up in an increasingly technologized environment—or a real necessity due to reduced workforce capacity remains to be seen.

On the topic of war: As military hardware is almost unattainable for private parties by now, alternatives in the security market are highly sought after. Offering products in this branch would be a viable and profitable intermediate step while we retool our BattleMech-oriented factory lanes to manufacture IndustrialMech components.

STRUCTURAL CORE

Form follows function: IndustrialMechs have to perform a specific task and are built accordingly. This is not only reflected in their outward appearance, but also drastically changes how their mainframe must be designed. It is highly unlikely our development staff can be brought up to this challenge without external know-how. A cursory job-analysis on this topic was not very promising, revealing specialists in that field to be rare on the open market. Consequently, if we are willing to go this route, we must first take appropriate measures, or else accept a minimum three-year developmental period before a first prototype.

Blueprints

Acquiring blueprints or prototypes could prove difficult as well. Current large manufacturers are understandably reluctant to part with information about their core businesses. Some see a quasi-monopoly endangered, others belong to interstellar corporations with no interest in selling, or only maintain old, automated factories with a rudimentary knowledge of how they work.

Smaller companies represent a possibility to exploit. Often specializing in one kind of IndustrialMech, they hold an incredible amount of experience and innate knowledge about the workings of such machines. Freelancers and self-proclaimed inventors present a third option, offering their plans and ideas freely, often for reasonable sums. Dealing with most of these calls for utmost caution, but then again, more than one great achievement has stemmed from risk and dubious sources.

We also cannot discount various unforeseen means of obtaining technical data through the ongoing chaos of the current wartime state, Sphere-wide, especially with regard to multi-state corporations and major factories threatened by hostile action or occupation. This raises the possibility of engineers who not only boast the necessary experience and knowledge, but who may already have completed the design task on someone else's dime, forced to relocate to a more… stable setting, which we may be able to provide.

Internal Structure

The necessary materials and resources—as well as the knowledge and hardware to process them—*are* readily available to our company. Built of basic alloys, the structural core of IndustrialMechs follows similar construction procedures to those we already use, and our own metal plants are perfectly capable of delivering the amounts and qualities needed.

Moreover, we can very well do without the import of endo-steel. Rare and extremely expensive in wartime anyway, it is an unnecessary component in IndustrialMechs. Working machines are not placed under anywhere near the same stresses as BattleMechs and they do not have to carry as much weight in the form of weaponry and armor. The advantage of endo-steel's lighter weight also does not carry over, being quickly negated by the additional bulk, which blocks space needed for sleek, nimble design or tools in general.

Armor

Armor is something of a misnomer here as the term for what goes on IndustrialMechs. Instead, IndustrialMech "armor" substitutes battlefield integrity for physical protection against the environment. Most IndustrialMechs are thus armored for daily wear and tear, some more than others, depending on their purpose.

LoaderMechs, for instance, are plated against damage from falling cargo, while MiningMechs have to keep their pilots alive and three-dimensional in the event of cave-ins. A mechanical picker will rarely be armored, contrary to its CattleMaster counterpart herding Filtvelt thunderbeasts. This lack of armor requirements allows for cost-cutting options that can enhance our bottom line, though obviously some models—particularly those in the security sector—may sport protection practically indistinguishable from BattleMech hides.

For ease of reference, this document refers to three different classes of armor protection.

Foremost is heavy industrial armor, identical in every way to standard military-grade armor produced in our own plants. Class two, designated industrial armor, is far less robust, but still efficient in its cost/protection ratio. It has been designed for use under rugged civilian conditions. Compared to standard armor, industrial-grade armor production is relatively easy. We therefore can accomplish this with ease.

On the lower end of the scale is commercial armor, a de facto standard among IndustrialMechs. Providing only the most basic protection against elements and the occasional collision, commercial-grade armor is hardly worthy of the title, but suffices for everyday tasks. It is also cheap, widely available—even on-planet—and hardly worth the effort to produce in-house when purchasing it from outside contractors will suffice.

ENGINES AND PROPULSION

Another prominent difference between a BattleMech and IndustrialMechs of any kind are their drive systems. Their engines in general and the configuration of propulsion technologies—in a direct relation to task and structural core—vary greatly.

Propulsion

IndustrialMechs are produced today mainly in the proven two- or four-legged walking designs we all know and love. Standard human-emulators, like Security-, Firefighter- or ForestryMechs still follow the same basic principles as a BattleMech. Other bipeds, however, like Loader- and ConstructionMechs, need even more stable footing and leg structure to deal with their alternating weight loads, and thus require a more shifted point of balance, even including adapted sole design or gripping mechanisms to help anchor them, as well as larger footprints.

HarvesterMechs, on the other hand, need the smallest area of support possible, minimizing the damage done to crops and soil. Meanwhile, Scavenger- and CargoMechs are spidery constructions that must be able to cross over any terrain thinkable to execute their missions. Even more radical and uncommon motive modifications exist out there, such as the foot-mounted tracks that allow some Mining- or TunnelMechs to work and move more easily in cramped emplacements. These modifications are maintenance-intensive, however, and therefore represent a potentially rewarding endeavor for our company.

The listing of examples can be extended almost indefinitely, for every existing application of IndustrialMechs. As with the structural core, Gilmour Miltech has limited knowledge in these non-trivial matters.

Engines

Whereas BattleMechs rely entirely on fusion energy to fuel their systems, an IndustrialMech can be outfitted with nearly any power source desired, based on its profile or the needs (and budget) of the customer.

Internal combustion engines (ICE) depend on various natural resources like petrochemicals, methane or hydrogen in refined form, and require oxygen to work. Relatively inexpensive and uncomplicated to manufacture and maintain, they are widely available and in common use. In fact, several planetary corporations could provide us with such engines in different power classes, tailored to our specifications, leaving our resources free for other endeavors. This is an important point to keep in mind, as the cost to import fusion engines is horrendous. Buying ICEs from local suppliers would also free up valuable shipping resources, which we could then rerout into our distribution efforts.

Still, alternative power sources are necessary for special environments. It will probably take several projects to determine when and how to install fuel cells, fission or fusion reactors. All of these require no oxygen, but differ in cost, size and weight as well as durability. In the case of fission piles, radiation becomes a significant issue, but because such engines are employed in niche markets only—such as mining or automated construction in space—we see no incentive to take any steps in that direction.

Fuel cells also should be taken into consideration. They have proven to be a viable alternative to fusion engines in civilian applications. Today's technology offers several solutions for how to combine two suitable reactants. With the added benefit of virtually no heat generation, this technology has no apparent drawbacks—at least not if regular refueling can be assured and the unit is not intended for battlefield usage.

Addendum

On the matter of jump jets: It goes without saying that IndustrialMechs powered by non-fusion or non-fission engines may not install these technologies. They also require intensive training of operators, and some worlds even demand that pilots be properly licensed for jump jet use in addition to any regular IndustrialMech-licenses they might already have. Jump jets' applicability to the IndustrialMech market is questionable, and so these remain an uncommon sight on such machines, but we should remain aware of them nonetheless.

ACTUATORS, MYOMERS AND MAIN SYSTEMS

In its inner workings, a 'Mech remains a 'Mech, whether built for warfare or civilian purposes. The actuators, myomers and joints in IndustrialMechs hardly differ from those used in equal-sized BattleMechs. Though they are perhaps less resistant to damage because of the materials chosen, they are only more prone to failure when misused or abused through constant, daily operations and neglected maintenance.

Differences exist, of course, in *how* those parts are placed and where they perform their work. As mentioned above, IndustrialMechs often differ from war machines in their basic configurations. This naturally leads to sometimes-creative alternative arrangements of actuators and similar elements. It also again underscores the imperative to employ specialists in this technical field, if we ever want to leave the niche of standard-configuration BattleMechs.

Myomers

A word must be said about myomer muscles in particular. Even if we can use standard categories from our portfolio in the

preliminary phases, we will still need to explore further development. When shifting the main focus beyond reliability, stronger and respectively faster-reacting myomers available to IndustrialMech use may come to mind.

Currently, the only such advancement available on the open market is so-called Industrial TSM, a FedSuns product derived from military triple-strength myomer. Unlike its predecessor, Industrial TSM operates at normal temperatures, but still doubles the sheer physical strength of an equipped 'Mech, multiplying its performance.

Cockpit and Sensor Systems

The often-heard statement that, "Core electronics installed in IndustrialMechs are much less sophisticated than in their BattleMech counterparts" is only partly correct, and understates the circumstances of specialization.

Obviously, a machine for civilian use mounts systems that are far less protected than those in BattleMechs. They lack the redundancy, shielding installations and other safety mechanisms expected on similar systems meant for combat. Automated fire suppressors, ejection seats—these simply have a different place in IndustrialMech design when one does the necessary investment/yield calculations.

Specific sensors on an IndustrialMech design, however, often surpass the capabilities and complexity of any blunt-instrument, military-grade equipment. Perfect examples are the Magnetic Anomaly Detector (MAD) equivalents used on some MiningMechs, which not only detect lumps of metal and veins, but also deliver specific analyses of composition, density and other relevant factors for successful mining operations.

Gyroscopes

Apart from lesser redundancy tie-ins to cut costs, IndustrialMech gyroscopes do not differ from the standard models produced by our contractors. Somewhat of an oddity, however, is the fact that a lot of IndustrialMechs—unlike BattleMechs—make little to no significant use of neurohelmet-assisted balance support. The driver of a IndustrialMech relies entirely on manual control instead—a byproduct of the technology loss seen during the Succession Wars.

Addendum

Please note that this document concerns standard models. It is, of course, possible to design IndustrialMechs with advanced fire control systems, environmental sealing and other technical upgrades. Such variants can be ready-made for whatever market demands them.

TOOLS AND EQUIPMENT

Finally, to the most telling aspect in IndustrialMech engineering: the tools of their trades, the defining equipment of these machines.

Just as IndustrialMech applications are nearly limitless, so is the range of equipment available to them. Basically, everything that can be mounted on a vehicle of any kind can be welded onto an IndustrialMech—only larger, and with greater flexibility in application and performance. This, added to the ability to cross nearly any terrain imaginable at reasonable speed, makes such a machine a valuable asset.

With most equipment arm-mountable, an IndustrialMech can play to advantages over similarly equipped conventional vehicles, such as higher dexterity, greater reach and even the ability to wield two tools simultaneously without interference. An experienced pilot can use both arms at the same time, doubling productivity when operating an IndustrialMech so equipped, though it would be more common and economical to employ different devices in each arm to eliminate any need for machine swaps.

Weaponry

It is also possible to install standard heavy weapons on IndustrialMech chassis, provided the power source delivers the output needed. Of course, energy weapons such as lasers and PPCs would require power amplifiers when powered by ICE- or fuel cell-based engines.

Unsurprisingly, such armaments are legally restricted on most worlds. Therefore it is of utmost importance to coordinate the necessary permits with our customers and their homeworld governments before delivering an armed unit to them. Our company could not weather the legal fallout and loss of reputation if, for example, a SecurityMech we manufacture ends up being used outside its specified tasks.

Let us be realistic: Not all IndustrialMechs serve peaceful purposes. Several past and current reports indicate the use of such machines in combat on rare occasions. Though this seems to occur out of sheer desperation in most cases, we confirmed rumors of small factions and insurgent groups fielding upgraded civilian 'Mechs on purpose. Also, several reports covered sightings of "upgraded" hardware: Machines with belted-on military grade weaponry or bolted-on additional armor, for example—used as cheap and readily available tools of warfare. Far from able to stop a BattleMech, but good enough to wage a guerrilla campaign, such monstrosities can hold their own against a more conventional army at practically no cost.

This recent development provides a host of new opportunities that are beyond the scope of this briefing, but further emphasize the importance of this potential new market for a dedicated and creative company like Gilmour Miltech.

CONCLUSION

From technical and organizational standpoints, Gilmour Miltech can branch into the IndustrialMech market within the demanded time frame. Building up of competitive know-how may, however, require at least another three years, if no outside help is obtained before that time.

Once we have laid this groundwork, a whole universe of opportunities should open in a promising market, assuring our company's future. A definitive recommendation will be given after the presentation of other options investigated by this team.

Laszlo Hornstein
Head of Project
Task Force Dagobert
March 31st, 3070

Part of the deception engineered by the DMI to hide Corean's activities, logging never stopped in Acheron Forest in the first years of the Jihad.

IndustrialMechs (also known as UtilityMechs or WorkMechs) are similar in many ways to the BattleMechs in *BattleTech*, but are removed from their battlefield cousins by their very nature. Representing a versatile—yet often overlooked—part of thirty-first century productivity, IndustrialMechs vary so wildly that they employ a range of generic names based on their functions (such as CargoMechs, ConstructionMechs, ForestryMechs, MiningMechs, and so forth). Even though they remain decidedly inferior to BattleMechs, every now and then these civilian-oriented 'Mechs find their way into the crossfire, and a few armed variations have even operated as light security for corporate forces and police agencies across the Inner Sphere.

The following system enables players to construct Unique IndustrialMechs for *BattleTech* games that conform to the standard rules presented in *Total Warfare*. As these rules can be fairly math-intensive, IndustrialMech designers are encouraged to do all work on scratch paper before committing the resulting design's final specifications to an appropriate blank record sheet.

INDUSTRIALMECH BASICS

As with BattleMechs, IndustrialMech construction relies on three primary factors: technology base, weight and space. These factors were broadly overviewed in the *Construction Basics* section (see p. 18). The notes below expand on these factors.

TECHNOLOGY BASE

In *Total Warfare* standard play, IndustrialMechs fall into one of two available technology bases: Inner Sphere or Clan. Inner Sphere IndustrialMechs may only use Inner Sphere equipment, while Clan IndustrialMechs (which are extremely rare) may only use Clan equipment. The standard forms of internal structure, armor, cockpits, engines, gyros, heat sinks and jump jets are considered Universal, and so are available to Clan and Inner Sphere technology bases.

Technology Rating

In the Weapons and Equipment Tables used for creating IndustrialMechs (and other units in this book), all items receive a Technology Rating in addition to a technology base. This rating, expressed as a series of letter grades that define the level of technology and its availability through the major eras of *BattleTech* history, helps to define the item's level of sophistication and may be used to help standardize the unit's level of advancement for era-based campaigning. Beyond this, however, an item's Technology Rating has no direct bearing on IndustrialMech design. See *Costs and Availability* (p. 274) for more on Tech Rating.

OmniMechs

Regardless of the technology base chosen, IndustrialMechs may not be constructed as OmniMechs.

WEIGHT

IndustrialMechs use the tonnage standard, with all units legal for *Total Warfare* standard play weighing 10 to 100 tons (increasing in increments of 5 tons).

Weight Classes

IndustrialMechs fall into four main weight classes, determined by their tonnage. Most designs in these classes share similar features, though a IndustrialMech's intended role can lead to more specialized or unusual capabilities for its class.

Light IndustrialMechs weigh 35 tons and under. Most are built in this range to keep costs low and production high. Common models often serve as basic labor 'Mechs or light security units.

Medium IndustrialMechs weigh 40 to 55 tons, and are the second most common IndustrialMech type. They commonly balance speed and carrying capability, and are favored as heavy laborers and cargo haulers.

Heavy IndustrialMechs weigh from 60 to 75 tons. These machines are rare, with average mobility, and usually haul heavy cargo loads.

Assault IndustrialMechs (the name for their weight class was copied from BattleMechs over the centuries) weigh from 80 to 100 tons. Quite rare, IndustrialMechs at this scale are typically employed for battlefield scavenge and salvage duties where their muscle is needed to haul away other damaged or crippled heavy units.

SPACE

Internal space (also called critical space) on an IndustrialMech is illustrated and tracked by the Critical Hits Table on the 'Mech's record sheet, which describes in abstract detail the internal arrangement of the IndustrialMech's body just as for BattleMechs. Certain sections of this table are already filled in, because the relevant components and equipment—actuators, cockpit systems, engines and gyros—must be placed in those specific body locations. As the 'Mech's various design elements are chosen—from additional heat sinks and jump jets to weapons and equipment—the designer must assign these components to different parts of its body and allocate their required number of slots on this Critical Hits Table.

Many items that may be mounted on an IndustrialMech take up more than one critical slot, and no slot may accommodate more than one item at a time. When installed, items that occupy multiple slots must be specially noted on the tables, as most become non-functional if they receive even a single critical hit from damage. Also, very few items may be placed in multiple body locations, and the critical slots for all multi-slot items must be contiguous unless the item's construction rules specifically permit otherwise.

The Critical Space Table used by BattleMechs (see p. 45) summarizes the number of open critical slots in each location of a standard IndustrialMech, whether built as a biped (humanoid) or a four-legged (quad) design. As with weight, the designer should keep in mind how many slots have been used and how many remain available in each body section. This will help to avoid installing too many items or items too large for a given location.

Reclaiming Critical Space

The Critical Space Table presumes a default IndustrialMech configuration, built using standard engines, gyros, cockpit systems and—in the case of humanoid chassis—two complete sets of arm and hand actuators. The removal of hand and/or lower arm actuators on one or both arms can increase the amount of open space overall at the designer's option, though doing so can impair the IndustrialMech's ability to function well under certain conditions. Designers should carefully consider the effects of exercising such "space-saving" measures.

As with BattleMechs, only biped-style IndustrialMechs may remove hand and lower arm actuators to reclaim space. To remove a lower arm actuator, the hand actuator on that same arm must also be removed.

DESIGNING INDUSTRIALMECHS

The process of IndustrialMech design is identical to that for BattleMechs, following the same six simple steps:

Step 1: Design the Chassis—Determine the IndustrialMech's technology base, weight, type (biped or four-legged) and internal structure.

Step 2: Install Engine and Control Systems—Determine the IndustrialMech's Engine Rating, type and size, add cockpit and jump jets.

Step 3: Add Heat Sinks—Determine the number and locations (if necessary) for the IndustrialMech's heat sinks.

Step 4: Add Armor—Determine type, amount and weight of armor, and allocate armor points.

Step 5: Install Weapons and Equipment—Add weapons and other gear to the IndustrialMech.

Step 6: Complete the Record Sheet.

The above design process—as with BattleMechs—is a mere framework for designing an IndustrialMech. The actual process—particularly after the chassis, engine and control systems are determined—can involve a bit more flexibility as equipment, armor and heat sinks are balanced for their best fit in terms of weight and space. For example, some designers might wish to assign armor as soon as the engine and chassis are settled, perhaps to maximize the 'Mech's protection before dealing with heat sinks and weapons. Others may want to choose equipment before adding more heat sinks, to see how many may be needed in addition to those that might come free with the engine.

To assist in this effort, the designer may find it useful to make copies of the blank 'Mech Record Sheet (in the back of this book), to visually arrange the placement of all equipment while tracking the use of tonnage on a piece of scratch paper. Alternatively, designers with access to *HeavyMetal Pro* can use that design software to develop their IndustrialMechs using a PC.

An AFFS-employed MiningMech participates in the rape of Demeter.

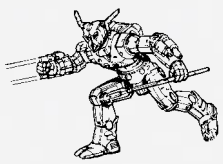
STEP 1: DESIGN THE CHASSIS

The first step in IndustrialMech design is the creation of the 'Mech's basic framework, or chassis. This step establishes some of the most basic aspects of the IndustrialMech's design, determining what kind of 'Mech it is, its technology base, weight class and design type (biped or four-legged). These choices will restrict the designer's access to certain equipment, and will also determine the weight and bulk of the 'Mech's internal structure.

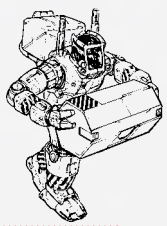
CHOOSE TECHNOLOGY BASE

IndustrialMechs may be constructed using either Clan or Inner Sphere technology bases. 'Mechs built using either tech base may not be built as OmniMechs.

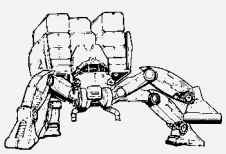
David is designing an IndustrialMech that he has dubbed the CTL-3R2 CattleMaster. *Because he plans to use this 'Mech as a rancher/hunter, to help control massive herds of exotic beasts on Lyran and Free Worlds League planets, he chooses an Inner Sphere Technology Base.*



Edward is designing a mid-size HaulerMech that he has named the Buster. *Because he wishes to use certain advanced technologies not available to the Clans, he has chosen an Inner Sphere Tech Base.*



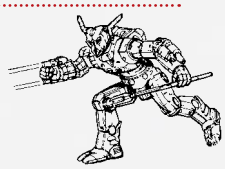
Geoffrey is designing a quadruped CargoMech that he has chosen to name the ATAE-70 Uni. *As this will be a Lyran-made cargo-hauler design, he has chosen an Inner Sphere Technology Base.*



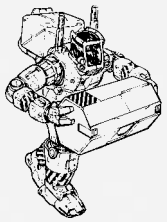
CHOOSE WEIGHT (TONNAGE)

Under these rules, IndustrialMechs may range from 10 to 100 tons in weight (measured in 5-ton increments). Within these limits, the player may choose any tonnage. The total weight of the IndustrialMech's engine, weapons, armor and other components may not exceed this amount, nor fall below it; under these rules, any unspent weight left over after the creation process and not devoted to cargo is classified as wasted mass.

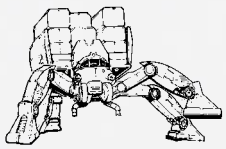
David decides his humanoid CattleMaster *will be a light IndustrialMech, weighing in at 25 tons.*



Edward's Buster *is intended to handle small to medium cargo loads, assisting in the loading and unloading of DropShips. He decides on a medium weight of 50 tons.*



Geoffrey's Uni *is intended for heavy lifting and hauling over rough terrain. He decides his quad WorkMech will occupy the heavy weight class at 70 tons.*



ALLOCATE TONNAGE FOR INTERNAL STRUCTURE

All IndustrialMechs have an internal structure, which represents their skeletons and joints. The weight of this structure depends on the weight of the IndustrialMech. Unlike BattleMechs, IndustrialMechs are restricted to only one structure type: IndustrialMech Standard. This structure takes up 20 percent of the IndustrialMech's total weight (rounded up to the nearest half-ton), or twice the weight of a standard BattleMech's internal structure.

As with BattleMechs, the IndustrialMech's total mass also determines the number of internal structure points each location receives. For IndustrialMechs 20 tons and over, these values are identical to those found on BattleMechs (see the BattleMech Internal Structure Table, p. 47). For IndustrialMechs in the 10- and 15-ton range, use the IndustrialMech Ultra-Light Internal Structure Table below. When using the blank 'Mech Record Sheet, the designer should mark out any excess circles on the Internal Structure Diagram, leaving behind only the number of circles in each location equal to the number of internal structure points in that location.

As with BattleMechs, internal structure points are fixed to their assigned locations, based on the weight and body type of the 'Mech itself. These points may not be redistributed elsewhere.

The maximum amount of armor points an IndustrialMech may carry (called its Maximum Armor Factor) is directly determined by the number of internal structure boxes it has. As with BattleMechs, all IndustrialMech locations except the head may carry up to twice the number of armor points per location as they have

INDUSTRIALMECH ULTRA-LIGHT INTERNAL STRUCTURE TABLE

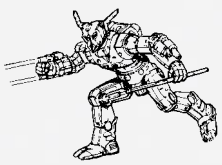
	Internal Structure Tonnage		Internal Structure Circles					
Total 'Mech Tonnage	Industrial Standard	Endo Steel	Head	Torso (Center)	Torso (Left/Right)	Arms (Each)	Legs (Each)	Maximum Armor Factor (biped/four-legged)
10	2.0	NA	3	4	3	1	2	41/45
15	3.0	NA	3	5	4	2	3	55/59

internal structure circles in that location, including any armor placed in rear locations (see *Add Armor*, p. 72). All head locations may receive a maximum of 9 armor points.

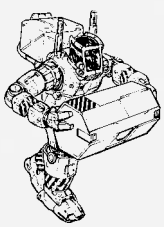
Technology Base: Standard IndustrialMech internal structure is equally available to IndustrialMechs of Clan or Inner Sphere tech bases. Remember that endo-steel and standard BattleMech internal structures are not allowed for IndustrialMech designs. (Using such technologies effectively makes the IndustrialMech a BattleMech instead.)

Four-legged: IndustrialMechs built as quads have four legs, rather than two arms and two legs. The number of internal structure points for all four legs is thus determined by the Legs (Each) column appropriate to the IndustrialMech's tonnage. The Arms (Each) column has no bearing on quads.

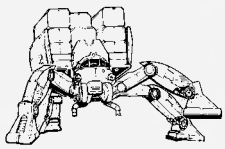
Space: IndustrialMech internal structure does not occupy any critical spaces. Because IndustrialMechs may use no other internal structure types that occupy critical slots, establishing the IndustrialMech's structure has no impact on the Critical Hits Table.



David's CattleMaster *weighs 25 tons. With no internal structure type available beyond IndustrialMech Standard, he notes the weight of said structure will be 5 tons (20 percent of 25 tons = 25 x 0.20 = 5 tons). This leaves 20 tons left over so far (25 – 5 = 20). No slots for internal structure need be allocated to the Critical Hits Table. After consulting the BattleMech Internal Structure Table on p. 47, David blacks out all extraneous circles from the Internal Structure Diagram on his* CattleMaster's *Record Sheet, leaving only 8 open circles in the center torso, 6 circles each in the left and right torsos, 6 circles in each leg and 4 in each arm. (As all heads receive 3 internal structure points automatically, David leaves the head's internal structure alone.)*



Edward's Buster *weighs 50 tons, providing an internal structure weight of 10 tons, which he determined by consulting the BattleMech Internal Structure Table and multiplying the weight of standard BattleMech structure by 2 (2 x Standard BattleMech Internal Structure at 50 tons = 2 x 5 tons = 10 tons). This weight provides 16 internal structure points in the center torso, 12 points each in the left and right torsos, 12 points in each leg and 8 points in each arm. Ed blacks out all excess internal structure circles in those locations on his* Buster's *Record Sheet. The* Buster *has 40 tons of unassigned weight so far (50 – 10 = 40 tons).*



Geoffrey's Uni *weighs in at 70 tons, so its internal structure will weigh 14 tons (20 percent of 70 = 70 x 0.2 = 14; 2 x Standard BattleMech Internal Structure at 70 tons = 2 x 7 tons = 14 tons). Because the* Uni *is a quad, he notes that it will receive 22 internal structure points in the center torso, 15 each in the left and right torsos, and 15 in each of the IndustrialMech's four legs. On the record sheet's Internal Structure Diagram, Geoff blacks out all the excess circles in those locations. The* Uni *has 56 unspent tons remaining (70 tons – 14 tons = 56 tons).*

STEP 2: INSTALL ENGINES AND CONTROL SYSTEMS

The second step in IndustrialMech design is the installation of the 'Mech's engines and control systems. This step establishes the key factors in the IndustrialMech's mobility, including the size and performance of its engine, any necessary fuel supply, the mass of the gyroscopes that keep it upright and whether or not the design is capable of jumping movement. Also determined in this step is the nature of the IndustrialMech's cockpit systems and any fire control its pilot may use during operations.

INSTALL ENGINE

All IndustrialMechs constructed under these rules may carry one engine to power their movement, equipment, weapons and other integral components. The relative output of this power plant is measured by the IndustrialMech's Engine Rating, which is directly determined by the 'Mech's total weight and desired speed in the same manner as for BattleMechs.

As with BattleMechs, the formula for determining an IndustrialMech's Engine Rating is to multiply the 'Mech's tonnage by its desired Walking MP. The IndustrialMech's Running MP is also computed at this time, by multiplying its Walking MP by 1.5 and rounding up to the nearest whole number.

Note that under these rules, no IndustrialMech may be constructed with an Engine Rating below 10 or above 400.

ENGINE RATING AND MOBILITY FORMULAS

Engine Rating = 'Mech Tonnage x Desired Walking MP
Running MP = Desired Walking MP x 1.5 (round up)

The Master Engine Table, p. 49, lists the tonnage taken up by engines of various types and ratings. IndustrialMechs may only use standard fusion engine types from this table as well as all the listed non-fusion types (ICE, Fuel Cell and Fission). The non-standard fusion engine types on the table (Compact, Light and XL) are provided for the benefit of BattleMech and Combat Vehicle construction (which begin on pp. 44 and 94, respectively).

Tech Base: ICE, Fuel Cell, Fission and Standard Fusion engines are equally available to IndustrialMechs of Clan or Inner Sphere tech bases.

Space: In IndustrialMech design, each of the engine types permitted above may boast a different tonnage at a given rating, but takes up the same amount of space in terms of critical slots occupied on the Critical Hits Table. A 220-rated fusion engine, for example, weighs half as much as an internal combustion engine (ICE) of the same rating, but uses the same default 6 slots in the IndustrialMech's center torso.

Fuel

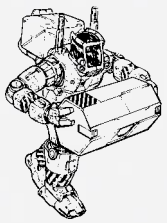
Though it is not tracked in *Total Warfare* standard play, any unit that mounts an internal combustion or fuel cell engine consumes a significant amount of fuel. For IndustrialMechs, both of these engine types incorporate a storage capacity that provides enough fuel for extended operations, measured in Walking MP and an operating range (in kilometers). Rates at which these fuels are consumed are covered in *Strategic Operations*, p. 35, but for statistical completeness, designers may find the information below useful:

IndustrialMech ICEs provide a base range of 600 kilometers, or 20,000 Walking MP. IndustrialMech Fuel Cell engines provide for a base 450-kilometer range, or 15,000 Walking MP. These fuel capacities are considered integral to the engine and so do not cost any additional weight or occupy any additional critical slots in the IndustrialMech's Critical Hit Table.

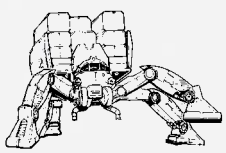
Additional fuel tanks (see p. 244) can expand these ranges, but will cost tonnage and occupy slots.

A ForestryMech tends to the large estates of an affluent Duke.

Because his CattleMaster *needs to keep up with some fairly large critters, David chooses a decent walking speed of 4 MP, which gives the WorkMech a top speed of 6 MP (4 Walking MP x 1.5 = 6 Running MP). This means that the* CattleMaster*'s Engine Rating will be 100 (25 tons x 4 Walking MP = 100). David has chosen an internal combustion engine (ICE) to keep costs low. Looking at the Master Engine Table, a standard 100-rated ICE weighs in at 6 tons. David reasons that the engine's integral range of 600 kilometers is more than sufficient for the* CattleMaster*'s purposes, and so does not add more fuel. He subtracts 6 tons from his 20 tons of unspent weight for a remainder of 14 tons. Because all IndustrialMech engines are treated as standard engines in terms of size, the* CattleMaster *uses the default engine slots on the record sheet's Critical Hits Table.*



Edward deems speed of lesser importance to his Buster*'s mission, and so settles on a Walking MP of 3, yielding an Engine Rating of 150 (50 tons x 3 Walking MP = 150). Briefly, Ed considers installing a Fission engine for 10 tons, a Fuel Cell engine at 7 tons, or even a Fusion engine at a mere 5.5 tons, but he ultimately opts to keep costs low and chooses an Internal Combustion engine. The Master Engine Table shows that a 150-rated ICE weighs 11 tons, leaving the* Buster *with 29 tons remaining (40 tons – 11 tons = 29 tons). The Running MP for the* Buster *is 5 (3 Walking MP x 1.5 = 4.5 Running MP, rounded up to 5 MP). Edward likewise decides against adding to the fuel supply at this time, feeling that a range of 600 kilometers is more than enough for his IndustrialMech design.*



Prioritizing cargo capacity over speed, Geoffrey also gives his Uni *a modest overland speed of 3 Walking MP. This requires an Engine Rating of 210 (70 tons x 3 Walking MP = 210). As the Master Engine Table shows that this would take up an incredible 18 tons if he selected an ICE for the job, Geoff instead chooses a lighter Fuel Cell engine at a cost of 11 tons (leaving 45 tons; 56 tons – 11 tons = 45 tons). The use of a Fuel Cell engine—as with all engine types available to IndustrialMechs—requires no variation in the critical slots placed on the 'Mech's Critical Hits Table. Like David and Edward, Geoff decides that the default fuel supply for this engine—450 kilometers, in this case—is good enough for the* Uni*'s needs.*

ADD GYROSCOPE

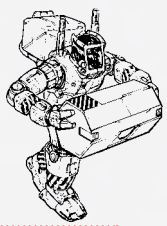
Like BattleMechs, IndustrialMechs require powerful gyroscopes (gyros) to keep them upright and mobile. The weight of these gyros (in tons) is that of the IndustrialMech's engine rating divided by 100 and rounded up to the nearest whole number. IndustrialMechs may only use standard gyros; the Compact, Heavy-Duty and XL gyros available to BattleMechs may not be installed on a IndustrialMech.

Tech Base: Standard gyros are equally available to IndustrialMechs of Clan or Inner Sphere tech bases.

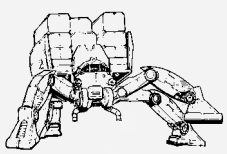
Space: The Standard Gyro (which takes up 4 critical slots in the center torso) already appears on the Critical Hits Table of the blank 'Mech Record Sheet.

Mounting a 100-rated engine, David's CattleMaster *requires a 1-ton gyro (Engine Rating 100 ÷ 100 = 1 ton). Once the gyro is installed, the* CattleMaster *will have 13 tons remaining (14 tons – 1 ton = 13 tons).*

With its 150-rated engine, Edward's Buster *requires a 2-ton gyro (Engine Rating 150 ÷ 100 = 1.5, rounded up to 2 tons). After this, the* Buster *will have 27 remaining unallocated tons of weight (29 tons – 2 tons = 27 tons).*



The Uni*'s 210-rated engine requires the IndustrialMech to carry a 3-ton gyro (Engine Rating 210 ÷ 100 = 2.1, rounded up to 3 tons). The* Uni *now has 42 unspent tons remaining (45 tons – 3 tons = 42 tons).*



DETERMINE JUMP CAPABILITY

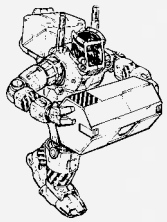
At the designer's option, fusion- or fission-powered IndustrialMechs may be equipped with jump jets in their legs and/or torsos to allow for short bursts of jumping movement. In the same fashion as for BattleMechs, the weight of these jets depends on the IndustrialMech's desired Jumping Movement Points (MP), though IndustrialMechs may use only standard jump jets. Use the Standard Jump Jets column of the Jump Jets Table for BattleMechs (see p. 51) to determine the tonnage of the IndustrialMech's jets.

Like BattleMech jump jets, the jets on IndustrialMechs are mounted singly, with each jet providing 1 Jumping MP. For example, an IndustrialMech with five jump jets would have 5 Jumping MP. The maximum number of jets an IndustrialMech may mount is equal to its maximum Walking MP.

Tech Base: Standard jump jets are equally available to IndustrialMechs of Clan or Inner Sphere tech bases.

Space: Jump jets may only be mounted in an IndustrialMech's torso and leg locations. Each jet occupies one critical slot. Their placement need not be determined at this time, but should be set by or during the final phases of the IndustrialMech's design.

None of the three IndustrialMechs being developed by David, Edward or Geoff employ fission or fusion engine types, so they may not mount jump jets.



Had Edward gone with a fission or fusion engine, he could have incorporated jump jets into his Buster *as though he were mounting them on a standard BattleMech. In such a case, with a IndustrialMech weight of 50 tons, Ed could have installed up to 3 jump jets (the maximum allowed with a Walking MP of 3), each jet weighing 0.5 ton and occupying 1 critical slot. The questionable decision to mount jump jets on an IndustrialMech intended to haul cargo, however, is academic at this point.*

ADD COCKPIT

IndustrialMech cockpits are simpler than those of their battlefield cousins, lacking the targeting and pilot ejection systems that MechWarriors take for granted. In game play, these features translate into a +1 modifier for all IndustrialMech to-hit rolls when making attacks, and an inability to eject from combat (ejection is covered in *Tactical Operations*, p. 196). These systems, however, can be added to an IndustrialMech's cockpit for an additional cost.

The standard IndustrialMech cockpit weighs 3 tons and occupies the same critical slots as the default standard BattleMech cockpit. Without the Advanced Fire Control enhancement (see below), an IndustrialMech may not use any of the following equipment: Artemis IV, Beagle Active Probe (or its Clan equivalent), C^3 or C^3i units (including Master and Slave units) or Targeting Computers (Clan or Inner Sphere).

Tech Base: Standard IndustrialMech cockpits are equally available to IndustrialMechs of Clan or Inner Sphere tech bases.

Space: As with the BattleMech cockpit, the standard IndustrialMech cockpit must be located in the BattleMech's head. The blank 'Mech Record Sheet presumes that the designer is using the standard cockpit, and so already has all cockpit slots in their default locations, including 2 Sensors slots (slots 2 and 5), 2 Life Support slots (slots 1 and 6) and 1 Cockpit slot (in slot 3), leaving Slot 4 open for any additional equipment.

IndustrialMech Cockpit Enhancements: Advanced Fire Control and Ejection

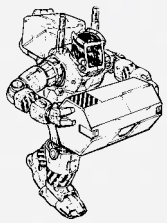
Two additions to the IndustrialMech cockpit are available at the designer's option: Advanced Fire Control and an Ejection Seat for the pilot.

Advanced Fire Control doubles the cockpit's C-bill cost, but takes up no tonnage or critical space. When installed, the IndustrialMech loses its +1 to-hit modifier to all attacks, and may use targeting computers and C^3-type equipment, essentially functioning in game play as if it had a standard BattleMech cockpit.

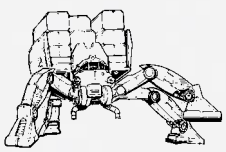
An Ejection Seat weighs half a ton and occupies 1 critical slot in the IndustrialMech's head. Ejection, an advanced rule covered in *Tactical Operations* (p. 196), enables the pilot to make a quick exit in the event of a 'Mech's catastrophic destruction. (The ejection feature comes free with all BattleMech cockpits.)

Like all IndustrialMechs, David's CattleMaster *must install a standard IndustrialMech cockpit, which weighs 3 tons (leaving 10 unused tons; 13 tons – 3 tons = 10 tons). While the WorkMech is intended for ranching, David also decides it must be capable of hunting critters if necessary, so he selects the Advanced Fire Control upgrade. This upgrade does not cost tonnage or occupy critical space, but will ultimately raise the C-bill value of the IndustrialMech and enhance its abilities in the unlikely event of combat. David decides not to install an ejection mechanism at this time; he considers the 0.5-ton and 1-critical slot costs unnecessary.*

Edward decides not to invest in Advanced Fire Control or ejection systems on his Buster. *Its unmodified IndustrialMech cockpit, at 3 tons, will leave him 24 unspent tons of weight (27 tons – 3 tons = 24 tons).*



Geoff likewise sees little use for Advanced Fire Control or ejection systems on his Uni. *After installing the 3-ton cockpit, he will have 39 tons left to spend (42 tons – 3 tons = 39 tons).*



SPECIAL PHYSICAL ENHANCEMENTS (ENVIRONMENTAL SEALING, INDUSTRIAL TSM)

The structure, actuators and musculature used by IndustrialMechs are more open than those of BattleMechs, rendering them generally incapable of operation in hostile environments such as under water or in vacuum. They are further incompatible with the MASC and Triple-Strength Myomer (TSM) technologies available to enhance BattleMech performance. However, some IndustrialMechs have been developed that incorporate sealing technologies, enabling their use in hostile environments. Some Inner Sphere IndustrialMechs even use a commercial version of Triple-Strength Myomer called Industrial TSM. Industrial TSM is as weightless as the battlefield version, but is twice as bulky and difficult to use in combat.

Consult the IndustrialMech Enviro-Sealing and Industrial TSM Table (at right) for weight and critical space data on these special enhancements.

Tech Base: Environmental Sealing technology is equally available to IndustrialMechs built using an Inner Sphere or Clan tech base. IndustrialMechs with an Inner Sphere technology base may also use Industrial TSM. Clan-made IndustrialMechs do not have access to Industrial TSM.

Space: IndustrialMech Environmental Sealing requires one critical slot per body location, regardless of the IndustrialMech's weight, body shape or technology base. These slots include the head, all three torso locations and all four limbs. These slots should be allocated at this time.

INDUSTRIALMECH ENVIRO-SEALING AND INDUSTRIAL TSM TABLE

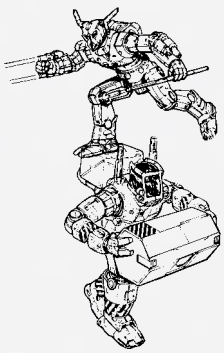
	Weight		Critical Slots	
System	(Inner Sphere)	(Clan)	(Inner Sphere)	(Clan)
Enviro-Sealing	10%*	10%*	8**	8**
Industrial TSM	0	Not Avail.	12	Not Avail.

*Percentage of the IndustrialMech's total weight (in tons). Round this figure up to the nearest full ton.

**One slot per body location.

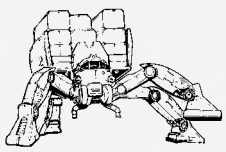
Industrial Triple-Strength Myomer occupies 12 slots on the IndustrialMech's Critical Hits Table. These slots may be distributed throughout the table, and need not be contiguous (like BattleMech TSM). Their placement should be determined at this time, but can be held off until finalizing the IndustrialMech's Record Sheet.

Though he means for it to handle some tough beasties, David believes his CattleMaster *will be fine without musculature enhancements. Instead, he decides to save space for other components.*



Edward decides that his Buster *will be even more impressive with Industrial TSM, and so he installs the equipment on his IndustrialMech. Industrial TSM occupies 12 slots in the* Buster*'s Critical Hits Table. Edward decides to place 1 Industrial TSM slot in each of the* Buster*'s legs, 2 slots in each arm and 3 slots each in the left and right torsos. Because Industrial TSM is considered to have no weight (it is treated as a direct replacement of the IndustrialMech's existing musculature), Ed still has 24 unspent tons to work with.*

Geoffrey resists the urge to install Industrial TSM on his Uni. *However, he does wish to deploy this WorkMech in hostile environments, such as airless moons, and so he elects to install Environmental Sealing instead. On the IndustrialMech Enviro-Sealing and Industrial TSM Table, he sees that Environmental Sealing weighs 10 percent of the* Uni*'s weight, or 7 tons (10 percent of 70 tons = 0.10 x 70 tons = 7 tons). Geoff also sees that he must allocate one critical space per body location to this equipment, and notes them on the Critical Hits Table.*



Geoff's Uni *now has 32 unspent tons of weight remaining (39 tons – 7 tons = 32 tons).*

STEP 3: ADD HEAT SINKS

Though not all IndustrialMechs generate heat from movement (such as those powered by internal combustion engines), they may require heat sinks if they are expected to mount any heat-generating equipment such as weapons and some industrial tools. While heat sinks may be installed and allocated at this time, the give-and-take of IndustrialMech design begins to come into play here, and so the designer may temporarily skip this step until after the 'Mech's weapons and equipment are assigned.

Unlike BattleMechs, which automatically receive 10 weight-free heat sinks as part of fusion-engine installation, the number of heat sinks provided at no tonnage cost with an IndustrialMech's engine varies with the engine type chosen. The number of these weight-free sinks is shown in the IndustrialMech Bonus Heat Sinks Table below. As with BattleMechs, these weight-free sinks may still occupy critical slots (based on the engine's rating), and additional heat sinks may be installed beyond this free amount at a cost of 1 ton per sink.

IndustrialMechs may use only single (standard) heat sinks.

INDUSTRIALMECH BONUS HEAT SINKS TABLE

IndustrialMech Engine Type	Weight-Free Heat Sinks
ICE	0
Fuel Cell	1
Fission	5
Fusion	10

Tech Base: Standard (single) heat sinks are equally available to IndustrialMechs of Clan or Inner Sphere tech bases.

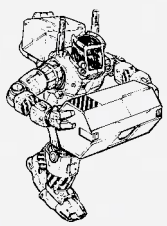
Space: As with BattleMechs, regardless of how many more sinks are added after those that came free with the engine, a number of heat sinks may not require any space on the IndustrialMechs's Critical Hits Table. To find the number of heat sinks that may be considered "critical-free," divide the IndustrialMech's Engine Rating by 25 and round the result down. These sinks are considered an integral part of the engine, and so can only be destroyed if the engine is totally destroyed.

The remaining heat sinks (even those that came as free sinks provided by the engine) must be allocated to the Critical Hits Table, with each sink considered a separate item. For example, if the designer adds 5 more heat sinks to an IndustrialMech using a 100-rated Fuel Cell engine (1 weight-free heat sink provided, for a total of 6 sinks), 4 of these sinks (100 ÷ 25 = 4) are considered integral to the engine and need not be assigned to critical slots. The remaining 2 [1 (original equipment) + 5 (extra) – 4 (critical-free) = 2] must be assigned to critical slots.

Each standard (single) heat sink not considered integral to the engine takes up one critical slot. The allocation of these sinks to the Critical Hits Table can wait until later, if the designer so wishes, in order to assure the best fit when mounting weapons and other equipment.

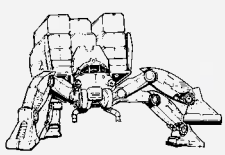
As David's CattleMaster *uses an ICE, the IndustrialMech receives no free heat sinks to start with. Because he plans to mount some weapons, however, David decides to place 1 heat sink on the design, which will slowly vent any waste heat generated by its weapons. This costs 1 ton, leaving David with 9 tons remaining (10 tons – 1 ton = 9 tons). In computing how many sinks will be integrated with the engine, he finds that the 100-rated ICE easily handles the single sink he installed (Engine Rating 100 ÷ 25 = 4 "Critical-free" sinks), and so he will not need to allocate it on the Critical Hits Table.*

On the Heat Data Block of the record sheet, David notes the CattleMaster *has 1 heat sink by blacking out all but 1 heat sink circle, checking off the box marked "Single" and writing a value of 1 in the line marked Heat Sinks and within the parentheses on the same line.*



Since his Buster *is simply expected to haul cargo, Edward decides not to invest any tonnage in heat sinks. If he had, his IndustrialMech's engine would have allowed him to integrate up to 6 heat sinks without allocating them to critical slots (150 ÷ 25 = 6).*

On the Heat Data Block of the record sheet for his Buster, *Ed notes that it has no heat sinks by blacking out all heat sink circles, checking off neither the "Single" nor the "Double" boxes and writing a value of 0 in the line marked Heat Sinks and within the parentheses on the same line. Ed still has 24 unspent tons to work with.*



Geoffrey chose a Fuel Cell engine for his Uni, *and so receives 1 heat sink free. Like Ed, he considers that a common CargoMech should not require extra sinks, and so he too opts to spend no tonnage on adding more to his design. The* Uni's *210-rated engine is large enough to easily integrate its own free sink (210 ÷ 25 = 8.4, rounded down to 8), and so he need not allocate any to the IndustrialMech's Critical Hits Table. Because the heat sink came with the engine, Geoff still has 32 unspent tons.*

Like David, on the Heat Data Block of his IndustrialMech's record sheet, Geoffrey notes the Uni's *single heat sink by blacking out all but 1 heat sink circle, checking off the box marked "Single" and writing a value of 1 in the line marked Heat Sinks and within the parentheses on the same line.*

STEP 4: ADD ARMOR

Even though IndustrialMechs are generally not built for combat, they do use armor to protect their internal structures and critical components against the elements, accidents and other hazards of wear and tear. Regardless of the technology base chosen, only three types of armor (Commercial, Industrial and Heavy Industrial) are available to IndustrialMechs, each of which varies in tonnage and capabilities.

Like BattleMechs, the maximum amount of armor points an IndustrialMech may carry is based on the number of internal structure points it has. For all locations but the head, an IndustrialMech may mount twice as many armor points in a location as it has internal structure in that location. For example, if an arm has 6 internal structure points, it may carry up to 12 points of armor in that location. The head of all IndustrialMechs (regardless of size) is the only exception, and may support up to 9 armor points. Torso locations must divide their armor between their front and rear sides. (Taking a cue from BattleMech design, most IndustrialMechs focus more armor toward the front rather than the rear, to protect against head-on collisions and the like.) The maximum armor levels for any location are unaffected by the use of alternative armor types.

IndustrialMech armor may be mounted in full- or half-ton lots, and uses the same base amount of 16 points per ton as standard BattleMech armor (8 points per half ton). The use of the three IndustrialMech armor types modifies this amount as shown in the IndustrialMech Armor Table, below. This can potentially allow for higher or lower points-per-ton ratios and other features that may prove significant in combat (such as the relative weakness of Commercial armor).

To determine the armor value provided by these alternative armor types, multiply the base armor value (16 points per ton) by the Base Armor Multipliers shown for the appropriate armor type in the IndustrialMech Armor Table below, rounding the final result down to the nearest full point. For example, a IndustrialMech that uses 3.5 tons of standard Industrial armor would receive 37 armor points (3.5 tons x 16 points per ton x 0.67 = 37.52 armor points, rounded down to 37), while 1 ton of the same armor would provide only 10 armor points (1 ton x 16 points per ton x 0.67 = 10.72, round down to 10).

Conversely, if a specific number of armor points is sought—up to the Maximum Armor Factor shown for the IndustrialMech's weight on the Internal Structure Table (see p. 47), that is—and the weight is unknown, the designer can find this weight (in tons) by *dividing* the desired number of armor points by 16 times the Base Armor Multiplier. This result is rounded *up* to the nearest half-ton. For example, if a designer decides to mount 112 points of Commercial armor, he will need 5 tons of armor to accomplish that (112 points ÷ [16 x 1.5] = 4.67 tons, which rounds up to the nearest half at 5). Note, however, that sometimes a desired number of points—such as many Maximum Armor Factors—may force the designer to "waste" weight on points that cannot be mounted. If in the above example of the Commercial armor, 105 armor points were the maximum that could be installed on the IndustrialMech, the actual 5-ton capacity of Commercial armor—120 points (5 tons x 16 points/ton x 1.5 = 120 points)—would result in 15 points of "wasted" armor.

Use the Armor Diagram on the IndustrialMech's Record Sheet to indicate the number of Armor Points protecting each part of the IndustrialMech's body. Mark out any excess boxes in the same way as for the Internal Structure Diagram. If Commercial armor is used, it should be noted clearly near the Armor Diagram (in the margins or in some other area where space permits) that the IndustrialMech has an effective Support Vehicle Barrier Armor Rating (BAR) of 5 (see p. 134). (IndustrialMech and vehicular armor with a BAR of 10 is considered identical to standard combat armor during game play.)

IndustrialMechs built under these rules may not combine multiple armor types on the same design.

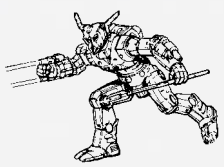
Tech Base: All three grades of IndustrialMech armor—Commercial, Industrial and Heavy Industrial—are equally available to IndustrialMechs of Clan or Inner Sphere tech bases. Regardless of their technology base, IndustrialMechs may not carry Ferro-Fibrous or Stealth armor.

Space: None of the three armor types used by IndustrialMechs under these rules occupy any slots on the Critical Hits Table.

INDUSTRIALMECH ARMOR TABLE

Base Armor Points per Ton: 16

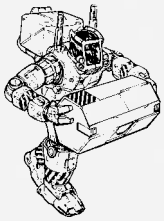
Armor Type	Base Armor Multiplier	BAR
Heavy Industrial	1.0	10
Industrial	0.67	10
Commercial	1.5	5



Deciding the rough life of the rugged frontiers and occasional combat with enraged beasts will likely cause some concern for future CattleMaster *pilots, David decides the IndustrialMech will carry standard industrial armor. But with only 9 tons left to equip the machine, he quickly decides to devote only 5 tons to this protection. At 5 tons, standard industrial armor provides 53 points of protection (5 tons x [16 Base Points per Ton x 0.67 Industrial Armor Multiplier] = 53.6, rounded down to 53 points). Prioritizing armor to the head, David applies 9 points of armor there, then adds 6 points to each leg, 4 points to each arm, and divides the remaining 24 points of armor evenly across the torso. All three front torso locations receive 6 points each, while all three rear torso facings receive 2 points each.*

Verifying that all armor points are accounted for, David adds his armor values together: 9 [Head] + (6 + 2 [Center Torso, Front + Rear]) + (6 + 2 [Left Torso, Front + Rear]) + (6 + 2 [Right Torso, Front + Rear]) + (6 + 6 [Legs, Left + Right]) + (4 + 4 [Arms, Left + Right]) = 53. In the appropriate locations of the Armor Diagram for his CattleMaster's *Record Sheet, Dave blacks out all extra circles, leaving only the assigned amount for each location. Because the armor chosen was Industrial and not Commercial armor, he does not need to note the BAR anywhere; in combat, the* CattleMaster *will weather armor damage as any other combat unit.*

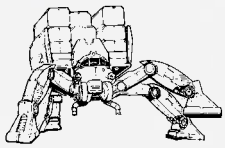
With 5 tons spent on armor now, the CattleMaster *has only 4 tons remaining for weapons and other equipment (9 tons – 5 tons = 4 tons).*



Edward sees no great need to spend lavishly on the Buster*'s armor. He thus chooses to invest only 2 tons into such protection, but decides to maximize the number of potential armor points by employing Commercial grade armor. This decision will allow him to spare 22 tons (24 tons – 2 tons = 22 tons) for other equipment, even though the* Buster *will be susceptible to penetrating critical hits by anything more powerful than a medium laser.*

The 2 tons of Commercial armor provide the Buster *with 48 points of protection (2 tons x [16 Base Points per Ton x 1.5 Commercial Armor Multiplier] = 48 points). In distributing this armor, Ed assigns 5 points to the head, 5 to each leg, 5 to each arm and 5 to the front facings of all three torso locations. He also assigns 4 points to the rear center torso and 2 points each to the left and right side torsos. Verifying that all points are accounted for, Ed adds all the armor values together: 5 [Head] + (5 + 4 [Center Torso, Front + Rear]) + (5 + 2 [Left Torso, Front + Rear]) + (5 + 2 [Right Torso, Front + Rear]) + (5 + 5 [Legs, Left + Right]) + (5 + 5 [Arms, Left + Right]) = 48. In the appropriate locations of the Armor Diagram for his* Buster*'s Record Sheet, he blacks out all extra armor circles, leaving only the assigned amount for each location.*

Because the Buster *is using Commercial armor, Ed notes on the Armor Diagram that his IndustrialMech has a BAR of 5, which indicates that even if it carries more than enough armor points in a given location, any hit that inflicts 6 points of damage or more at a time may cause a critical hit.*



Far more generous to his design than Edward, Geoff decides that he will devote a much greater quantity of armor to his Uni*, though he too favors Commercial armor, as the Cargo-Mech is not expected to appear on a live battlefield. With 32 tons left to spend, Geoff devotes 9 tons to Commercial armor, leaving 23 tons (32 – 9 = 23) to other equipment.*

At 9 tons of Commercial-grade armor, the Uni *receives 216 points of protection (9 tons x [16 Base Points per Ton x 1.5 Commercial Armor Multiplier] = 216 points)—which is near the listed maximum of 233 points for a 70-ton quad (according to the BattleMech Internal Structure Table on p. 47). Geoff distributes these armor points by placing 9 on the head, 31 on the front center torso, 20 each on the front left and front right torsos, and 27 each on all four legs. On the rear center torso, Geoffrey places 10 points of armor, with the rear side torsos receiving 9 apiece. Double-checking, he adds all the armor values together: 9 [Head] + (31 + 10 [Center Torso, Front + Rear]) + (20 + 9 [Left Torso, Front + Rear]) + (20 + 9 [Right Torso, Front + Rear]) + (27 + 27 + 27 + 27 [Legs, Front Left + Front Right + Rear Left + Rear Right]) = 216. In the appropriate locations of the Armor Diagram for his* Uni*'s Record Sheet, Geoff blacks out all extra circles, leaving only the assigned amount for each location.*

Because the Uni *is using Commercial armor, Geoff notes on the Armor Diagram that the IndustrialMech has a BAR of 5, which indicates that even if it carries more than enough armor points in a given location, any hit that inflicts 6 points of damage or more at a time may cause a critical hit.*

A Mobile Field Base does hasty repairs on a brand new Legionnaire *in Acheron Forest after its first encounter with the Blakists.*

STEP 5: ADD WEAPONS, AMMUNITION AND OTHER EQUIPMENT

The weapons, ammunition, and equipment that may be mounted on an IndustrialMech are listed in the Weapons and Equipment Tables shown on p. 341. In addition to any heat, damage and range statistics, these tables provide the tonnage and critical space such items may occupy on an IndustrialMech (the same values as for BattleMechs), as well as what technology base (Clan or Inner Sphere) is required to use them, and any special construction rules that might apply to installing the equipment. The Ammo column notes how many shots a given weapon or item carries per ton (only machine guns—including the Light and Heavy models—and nail or rivet guns may carry ammunition in half-ton lots). Remember that the total weight of a given IndustrialMech design's structure, engine, cockpit, armor, weapons and other components may never exceed the tonnage established for the IndustrialMech in Step 1. Any leftover weight that cannot be allocated to cargo space (see *Cargo Bays*, p. 239) or other equipment (due to critical space constraints or other factors) will be considered "wasted" tonnage.

Weapons placed in any torso, leg or head location may have a forward or rearward firing arc. Rear-firing weapons must be so noted when installed on the design.

For special rules on any item, consult its entry under *Weapons and Heavy Equipment* (pp. 200–273).

Small Items: Several items that may be installed on IndustrialMechs have a weight presented in kilograms, not tons. When mounting such items, the designer must keep a running total of the number of kilograms used. At the end of this step in the IndustrialMech design process, divide this quantity of kilograms by 1,000 to find their total weight in tons. When finalizing the IndustrialMech design, this result must be rounded up to the nearest half-ton.

Power Amplifiers: IndustrialMechs powered by ICE or Fuel Cell engines may carry heavy energy weapons such as lasers and PPCs, but to do so, they must also mount power amplifiers in the same manner as ICE-powered vehicles do (see p. 107). Power amplifiers weigh 10 percent of the weight of the energy weapons carried (rounded up to the nearest half-ton), but take up no critical space on the IndustrialMech's Record Sheet.

Only ICE- and Fuel Cell-powered IndustrialMechs require power amplifiers. Fission- and fusion-powered IndustrialMechs do not require this equipment for energy weapons.

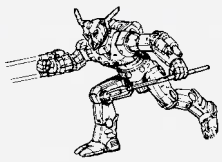
Tech Base: The Heavy Weapons and Equipment Tables note which items are available to which technology base. Clan-made IndustrialMechs may use only items available to the Clans, while Inner Sphere-made IndustrialMechs must use only those items available to the Inner Sphere. Power amplifiers, a Universal technology, are equally available to IndustrialMechs produced using Clan or Inner Sphere tech bases.

Space: The mounting of any weapons and equipment that occupy critical slots must be established to determine the weapons' firing arcs in game play. Torso- and head-mounted items receive the firing arc of the IndustrialMech's torso (or the rear arc, if the item is mounted for rearward-firing). Arm-mounted weapons receive the firing arc appropriate to that arm. Leg-mounted weapons receive either a forward or rearward-firing arc, based on the designer's choice when installing these items.

Almost all weapons and equipment that may be mounted on an IndustrialMech must be allocated to the Critical Hit Table in a contiguous series in the same location. (Any items that do not will be so noted under their specific rules.) These items may not be located in a body section that has fewer open critical slots than the equipment requires. Some items, however, may be broken up among multiple sections (and are noted as such on the Weapons and Equipment Tables).

Weapons that may be mounted in multiple locations—the AC/20, Ultra AC/20, LB 20-X AC and the heavy Gauss rifle—must be placed in adjacent body locations, and automatically receive the most restrictive firing arc. For example, if a IndustrialMech carries an AC/20 split between its left torso and left arm, that weapon uses the torso arc, not the arm arc.

Ammunition: All ammunition-dependent weapons except for machine guns (including their Light and Heavy versions) and nail or rivet guns require at least a ton of ammunition. (Machine guns, nail guns and rivet guns may carry ammo in half-ton lots instead). Each ammo bin occupies one critical slot per ton (round up), and must be of the same ammunition type per slot. Because each slot is considered a separate bin, however, ammunition need not be contiguous.

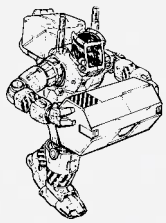


With only 4 tons left to spare, David realizes that any weapons he puts on his "Hunter" CattleMaster *will have to be small. Focusing on the lightest possible weaponry, he starts with 3 machine guns at 0.5 tons and 1 critical slot apiece, placing 2 of these in the right arm and 1 in the left. Deciding a half-ton of ammunition for all three—a total of 100 shots—will be sufficient, he places this half-ton ammo bin (and its single critical slot) in the center torso location. Dave then adds 2 small lasers to the design to give his "Hunter" some ammunition-free backup weaponry, placing both of these 0.5-ton, 1-critical slot weapons in the right arm as well.*

Because the CattleMaster *uses an ICE rather than a fission or fusion power source, the use of these small lasers requires the installation of power amplifiers. David computes that his IndustrialMech will need 0.5 tons of*

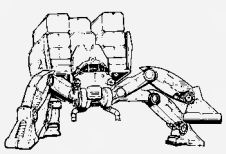
Ed-X4 Crosscut *LoggerMech, Corean Industries (House Davion)*

power amplifiers to supply the needs of its lasers (2 small lasers x 0.5 tons per laser = 1 ton of lasers; 10 percent of 1 ton = 0.1 tons, which rounds up to 0.5 tons of power amplifier weight). These amplifiers need not be assigned to the Critical Hits Table. To round out the IndustrialMech, Dave invests his last half-ton in a high-power mounted searchlight and assigns this item's single critical slot to the right arm.



In equipping his Buster *HaulerMech, Edward makes his first order of business the installation of lift hoists to aid in picking up external cargo. In the Weapons and Equipment Tables, he finds that lift hoists weigh 3 tons and occupy 3 critical slots apiece. Ed chooses to place one hoist each in the* Buster*'s arm. For added freight capacity, Ed then chooses to devote 11 tons to internal cargo bays—each ton of which will occupy a single slot on the IndustrialMech's Critical Hits Table, which he distributes at 5 slots each per side torso, plus 1 slot in the center torso.*

Ed has so far used up 17 tons, leaving only 5 tons remaining. This is perfect as he also decides to add track units to the Buster*'s design, to aid in maneuvers in tight confines (such as the inner holds of a fully stocked DropShip). Track units, according to the Weapons and Equipment Tables, weigh 10 percent of the IndustrialMech's total mass, which comes to 5 tons for the 50-ton* Buster *(10 percent x 50 tons = 0.1 x 50 tons = 5 tons), and require 1 slot per leg to install. (Ed was undoubtedly anticipating this decision when he allocated only 1 slot's worth of the* Buster*'s Industrial TSM to its legs, rather than the 2 he could have used.)*



Geoffrey has 23 remaining tons for his Uni CargoMech*. Because the IndustrialMech's primary function is to load and carry cargo, he too invests 6 tons into 2 lift hoists, which he places—1 each—in the left and right side torsos. Geoff further decides to mount them with a rearward facing, so when he places the 3-slot hoists on his Critical Hits Table (and on the IndustrialMech's Equipment Inventory), he notes this facing with an "(R)" after the item name.*

Geoff then chooses to invest all of the remaining 17 tons available to internal cargo bays, with each ton of cargo occupying 1 critical slot on the record sheet. Noting that the left and right side torsos are already down by 4 slots (thanks to the 3-slot lift hoists and the 1-slot requirement for the environmental sealing he chose earlier), he fills the remaining 8 slots per side torso with cargo bays, allocating 16 of the 17 cargo slots in one swoop. The remaining slot he places in the center torso, using up the last open slot left there.

STEP 6: COMPLETE THE RECORD SHEET

By the time the designer has chosen all structure, engine and controls for the IndustrialMech and added the armor, weapons and equipment, all items must be allocated to their proper places on the blank 'Mech Record Sheet. To complete a record sheet, the designer must first make sure he selected the appropriate sheet for the 'Mech's type (biped or four-legged). The sheet must have all data filled in for the 'Mech Data block (including name, tonnage and MPs). All equipment slots must be allocated on the Critical Hits Table (including armor, engine, gyros, extra heat sinks, weapons and other equipment, as well as ammunition and number of shots per bin). All extraneous armor and internal structure points must be blacked out on the Armor and Internal Structure diagrams (including the back armor sections). Finally, Heat Sink data should be filled in—with extraneous heat sink circles blacked out—in the Heat Data block.

Once all of the above is completed, the IndustrialMech is ready for *Total Warfare* game play.

David verifies that all of the valid data blocks are completed, including noting the CattleMaster*'s full name, "CTL-3R2 '*Hunter*' CattleMaster," in the Work-Mech's Type; checking off that its tech base is Inner Sphere; and noting its Walking MP as 4, its Running MP as 6 and its Jumping MP as 0. He also lists the weapons properly under Inventory, noting the quantity per location, heat per weapon, and statistics as shown on the appropriate Weapons and Equipment Tables (for example, the* CattleMaster*'s right arm-mounted small lasers would list a "2" under QTY, "RA" under Location, "Small Laser" under Type, "3" under Damage, "1" under Heat, "0-1" under Short Range, "2" under Medium Range and "3" under Long Range). After then making sure that no extraneous circles for internal structure, armor and heat sinks are present, that the heat sink values are correct, and that all critical slots are assigned for all the IndustrialMech's equipment, Dave is ready to compute the Battle Value and Cost for his* CattleMaster *and take it out hunting.*

Repeating similar steps to David, Edward and Geoffrey complete their own record sheets, making sure also that their use of Commercial armor is indicated by a note regarding the IndustrialMechs' BAR of 5. To save space under Inventory, they also opt to list their multi-slot cargo bins by location with the location's slot count under "QTY" and the word "Cargo" under Type. (During any game play with these units, a player would indicate the exact contents and locations of any special cargo by location and slots it on the record sheet.)

Edward also marks in his IndustrialMech's Notes Block the effects of Industrial TSM from its description in Total Warfare*, while Geoff writes down his* Uni*'s ability to operate in vacuum and underwater (courtesy of its combined Fuel Cell engine and Environmental Sealing features).*

PROJECT: PROTOMECHS

—Minutes from ProtoMech Research and Development meeting at Coventry Metal Works, Coventry

MEETING AGENDA

Project Details

Project Name: ProtoMech Exploration
Project Manager: Jenna McCoullagh
Date of Meeting: 15 November 3067
Time of Meeting 1030-1530
Location of Meeting: 207 (Bright Room)
Conference Call Details: None
Meeting Objective: Update on Proto R&D Progress and Assignment of Actions

ID	Agenda Item Description	Presenter	Purpose (P, C, PS, D)	Planned duration (or start time)
1	Review of earlier minutes	McCoullagh	C	10
2	Update on design progress/review of basics	Siegfried	C	20
3	Discussion on technological requirements for design	Johnson	D	40
4	Explore possible pilots	Shifflett	PS, D	30
5	Refreshment break			30
6	Strong points	Anderson	C	40
7	Areas for improvement	Chism	C, PS	60
8	Marketing	Shifflett	P, D	45
9	Review and assignment of change actions/due date discussion	McCoullagh	C, D	15

Key: Purpose
P = Planning
C = Communication
PS = Problem Solving
D = Deciding

Meeting minutes to be recorded by: Nicole Siegfried

Note: Excerpt of minutes to be available within 24 hrs after meeting

TRANSCRIPT

Jenna McCoullagh: Thanks, everyone, for coming. So, what have we got from last week's minutes?

Nicole Siegfried: Well, Aileen gave us a little history lesson; Smoke Jaguars developed the first ProtoMechs in response to dwindling resources, and Task Force Serpent discovered them when they sacked Huntress. Then Tom gave us an overview of the Clan pilots, but he's got a more detailed presentation today. Finally, we had the battleROMs from the *Hollander*s we supplied for Serpent. I think they show the effectiveness that ProtoMechs can have and some of the things we need to overcome.

McCoullagh: Thanks, Nicole. Then let's move on to this week's agenda; we have a lot to accomplish today. What technology do we need to build ProtoMechs?

Siegfried: Dan has that. Take it away, Sparkles.

Dan Johnson: Thanks… Starting with internal structure, Clan Protos use a special composite that's proportionately similar to that seen in BattleMechs. We believe it to be a refined combination of endo-steel and regular alloys. Now, we've found that our Endo II prototype, while still not durable enough for use in BattleMechs, *might* work in this case, but there are significant problems with bulk at this time.

Clan ProtoMechs, meanwhile, have inefficient engines for their size. We have little trouble replicating them thanks to work in other sectors. In fact, we've even looked at a fuel cell option, though its range is limited. Jump jets are also no issue, given our experience with 'Mechs and battle armor. ProtoMech armor, however, *could* be an issue.

Christine Dolan: What do you mean? We can't make armor for our ProtoMechs?

Johnson: No—it's just that we can't currently make the advanced alloy the Clans use. The best option we have is that new light ferro-fibrous armor they've been working on, though for the same weight Clan armor will be more effective. The bulk also presents problems, negating the size advantage somewhat. And we'll lose efficiency with weapons, but heat sinks derived from double-strength freezers keep us level with the Clans there.

Quinn Chism: Sounds like we have everything ready to make a go of it.

Johnson: Well, I haven't gotten to the most complex part of the ProtoMech: the cockpit.

Aileen Anderson: The cockpit? I thought that was one area where we did equal Clan technology.

Johnson: Based on an adaptation of a quad battlesuit's cockpit, maybe, but as you can see in this cutaway schematic, the cockpit of a Proto isn't really a cockpit in the traditional sense, nor is it "worn" like battle armor. Instead, the pilot curls into a ball in the torso. Rather than manipulating manual controls, the Proto is controlled solely by a complex neural interface. Of course, we've seen Clan 'Mech and battlesuit pilots with the enhanced imaging neural nets that give them a slight edge, but for ProtoMechs, this technology is even further advanced. A battlesuit-based cockpit approach is far less fluid by comparison; in fact, we may be back to needing a gyro if we use that approach.

McCoullagh: Sounds like an R&D boondoggle; we really don't have the resources for such a biology-based program.

Johnson: Actually, we have data from Dr. Burke Kale's *Prometheus* project back in '53. It's possible we can adapt that program to this, with the materials and personnel we got from the Quartermaster's Department. Tom will have more when we focus on piloting issues next.

Dolan: Wait, go back to the internal structure for a moment. Why can't we use endo-steel?

Johnson: BattleMechs and vehicles have relatively large amounts of room. Endo-steel uses a different alloy with larger parts and stronger bonds. By sacrificing bulkier systems in a 'Mech, you can use this lighter alloy to support your 'Mech with no major changes in profile. But, as you can see in this schematic, there really isn't any room for the Proto's structure to be any bulkier. Most weapons are essentially on the outside of the unit with a well-designed armored housing, so we can't even sacrifice that. The result is a larger target profile.

Siegfried: And the same with ferro-fibrous armor?

Johnson: Basically. Though armor is less problematic there because it's on the "outside." Nevertheless, the bulkiness would interfere with the Proto's mobility, and the larger profile might result in more hits on the unit because it'd wind up almost as large as a typical 20-tonner.

Siegfried: Someone in R&D also told me that the heat sinks are something special.

Johnson: Yes…and no. Even *we* can make heat sinks work more efficiently than on BattleMechs when we install them on Protos, because their reduced volume makes the process quicker. But even so, the Clan sinks put all others to shame. Proto heat sinks, if we could extrapolate them out and keep the same efficiency, would have to be twice as effective as the current Clan heat sinks to be viable. Part of this is because the heat sinks are integral to the weapons and another part is the lack of need for a whole system throughout the unit. I shudder to think how the current Proto heat sinks will lead to the next generation of Clan sinks. Hopefully, further study will enable us to use them to keep pace.

McCoullagh: Another hurdle, then. Thanks, Dan. Let's move right into the pilots, then get something to eat. Tom?

Thomas Shifflett: Thanks, Jenna. We've got a few limitations regarding ProtoMech pilots. The first, as Dan mentioned, was the E.I. neural-ware. The next is size, and lastly we need training. I think that of these, size is the easiest to tackle. Clan warriors tend to be on the large side, with the exception of aerospace pilots. That's what they've been forced to use, given the limited space inside the ProtoMech. We have an advantage here with a more diversified gene pool and no reservations about using certain parts of the population, unlike the Clans' disdain for "freeborn" warriors. We just put a size limitation on this branch of the military, as humans have done throughout time.

The E.I. will be the hardest part. Currently, the data we have shows that the effective lifespan of Clan pilots with E.I. is 2.3 years. First, we have to deal with highly invasive neural surgery. After recovery from that, pilots need physical therapy time to reclaim full control of the body and learn to use the E.I. Next, the user suffers tremendous strain from neural feedback when his vehicle gets damaged. Finally, the user develops psychosis, generally involving paranoia.

Johnson: That doesn't sound good.

Shifflett: It isn't. Some medications can attenuate the mental illness for a time, and we think prescreening from a wider pool plus traditional therapy can extend their usefulness; however, this will be by far the most expensive pilot training and maintenance program in the Inner Sphere. One thing we've looked at with Nashan Pharmaceuticals is that E.I. implants can often overcome some degenerative conditions, such as multiple sclerosis and muscular dystrophy.

Dolan: I'm not sure that really has anything to do with us…

Shifflett: On the contrary, we can offer people with these afflictions a quarter to half a decade of normal control over their bodies. Well enough to even serve on the front lines, fight for the good of humanity and all that. We could probably even get a tax write-off.

Siegfried: I'm not sure how I feel about this.

Shifflett: Beats the alternative we discussed: Children. Some studies suggested that children in preteen and early teenage brackets not only are small enough to fit in a ProtoMech-sized cockpit, but also may be more resilient against the degenerative effects of E.I. technologies, and they have the dexterity to handle the controls. But even the Clans don't start 'em *that* young. Take your pick.

McCoullagh: We're a business; not a church. Let's leave morality out of this. What about training, Tom?

Shifflett: As I touched on earlier, it will be intensive and expensive to start up. We'll have to foot the bill—at least at first—or no one will be able to operate our product. However, initially we can sell pilot and machine as a package deal.

McCoullagh: That idea sounds intriguing. Have marketing and R&D get some numbers together. Who's hungry? I had Christopher pick us up some sandwiches.

Chism: I'm starving! Hey, I heard a great joke this morning. A Capellan, a Taurian and a Canopian walk into a bord—

Anderson: You better stop the recording; we don't want to deal with the Friends of Cultural Heritage if they get ahold of these minutes.

Dolan: You can say that ag—

>>Recording Stopped<<

>>Recording Resumed<<

McCoullagh: Okay, folks, let's get going again. I have a Six-Sigma meeting after this.

Anderson: I've got the selling points for Protos here.

McCoullagh: Take it away, Aileen.

Anderson: Well, the best thing they have going for them is size. Protos are 11 percent less likely to be hit by heavy weapons fire when compared to units of similar mobility, even by so-called "smart" systems like the Streak missile system. They're also pretty rugged, able to survive in the same extreme environments as battle armor.

Most else is relative. They can be dropped from space just like BattleMechs. They can mount heavier weapons than battlesuits and their size and configuration often leads to very efficient pay-

loads. The lower- to medium-size Protos can rival the fastest and most maneuverable 'Mechs, and even the larger models can move faster than battle armor. They can frequently be equipped with ballistic weapons that rival scout 'Mechs and often have flexibility to mount a wider variety of missile tubes. Finally, the ProtoMech is much cheaper than a BattleMech, making them an ideal replacement for scouting units, especially those in second-line forces less likely to see combat.

Johnson: How much cheaper?

Anderson: After accounting for R&D costs, of course, our cost analysis projects that most Protos would range from 500,000 to 800,000 kroner per unit, where most light 'Mechs fall well over 1 million kroner.

Shifflett: What about transporting units?

Anderson: A preliminary study found that more Protos could fit into a DropShip than BattleMechs, but the exact cost or gain in number of units is still in the air. One of my engineers thinks he could fit eight Protos, two BattleMechs and two fighters on a *Leopard*, but it's too early to be sure.

Dolan: Expand that study. We need to push that forward. What drawbacks do we face?

Chism: As noted earlier, pilots are the biggest issue. That'll be even harder than filling the battle armor demand. Protos have an inherent limit on energy weapons because of their lack of integral heat sinks on the engine. Our units would carry less weaponry than Clan units, on a much more dramatic scale than battle armor and 'Mechs, as well as much more limited selection. The Clans have a variety of micro-scale weapons that we really haven't done any research on. They weren't going to be of much use on BattleMechs, nor would they be light enough to really help out our battle armor troops. The recent development of heavy and light machine guns gives us more choices, but the fact that Clan missile systems are much lighter than ours limits the number of tubes we can put on a unit versus what the Clans do. Our energy weapons may be equal as far as number, but the Clan versions are more efficient and damaging, with better heat management, so the advantage still goes to them.

Along with that, ammunition is usually much more limited, with the standard ton of ammo being anywhere from eleven to fifty percent of the unit's weight. Armor is an issue and limbs are prone to destruction, but the effect is less damaging than it is to battlesuits, and they'll be cheaper to replace than a BattleMech limb. Overall, I think the drawbacks are fewer than the advantages.

McCoullagh: It seems like it. Any suggestions?

Siegfried: This might be a good time to try some of our experimental equipment. Heck, we could mount a light PPC on one of these things.

Johnson: Now, that might make *anyone* sit up and take notice.

Dolan: That's something we need, to keep us in the forefront. I've got an overview from a marketing perspective. We're looking to target medium to large military forces. Small units won't have the resources to maintain a ProtoMech and aren't likely to want such specialized units.

Anderson: What if a small mercenary command wants to form itself around Protos, like those Killer Bees and VTOLs? We don't want to cut ourselves short of any customers.

Dolan: No, if any customer approaches us, we'll sell to them.

Shifflett: …after the usual permissions, of course.

McCoullagh: Well, not the Word of Blake or the Fifth of May or anything.

Dolan: Of course not. But we're targeting our most likely customers. We have to be efficient with our advertising kroner these days. We aren't Defiance, throwing money around when we feel like it. We'll want to start out with some recon units and probably something like the Clans' *Roc*, a versatile unit with decent mobility. We want to focus on price. If we can offer a fast scout unit and jack of all trades, both for the price of a light 'Mech, a lot of customers will take the two units that together can do both of their jobs better than one. An important question we have is where to focus selling our ProtoMechs.

Siegfried: Well, first we need to be sure we can—

Dolan: Yes, we aren't going to get ahead of ourselves, but we do need to plan ahead. Of course we'll advertise in the Lyran Alliance and also the Federated Suns. The Rim Commonality is also a good candidate; we could work out a subsidy from the Alliance for increasing the military of a border ally. A big question is the Free Worlds League.

Chism: If anyone has the cash, *they* do.

Dolan: True, but their support of the Word of Blake is hampering our sales and our raw material supply chain. Sales thinks the Principality of Regulus and the Duchy of Andurien are good markets to sell in and prevent Alliance fines. ComStar seems likely.

Shifflett: What about the Trinity Alliance?

Dolan: As long as we don't get into any more accounts payable snafus like we had a few years ago. They aren't on the list of Lyran Alliance combatants right now. Sales doesn't think the Combine has the money or stable trade routes at the moment. However, the trouble at Luthien Armor Works should help us down the road.

McCoullagh: Sounds like our targets.

Dolan: Actually, we have one more potential customer.

Siegfried: Who? Not the Wobbies!

Dolan: The Nova Cats.

Shifflett: What? A Clan?

Dolan: They have advanced technology, but limited manufacturing resources. They're also likely the only potential customer that can supply their own pilots.

Shifflett: Apart from the Wolves on Arc-Royal.

McCoullagh: Well, that's a good overview of our markets. Let's get to the action items for next week. Christine, get marketing to do some prelim plans for the Alliance, FedSuns, Rim Commonality and Free Worlds states. Dan, we need an update on the cockpits and the advanced alloys—a timeline and how it will impact the final design. And we really need you to get a more detailed study on pilots, especially how hard it will be to attract volunteers and the cost of training.

Meanwhile, Aileen, look into that transportation issue. Our customers will be interested in that. Quinn, I'd like you to get some preliminary designs from Engineering. We don't need anything too detailed, just general specifications to see how they'd stack up to existing designs.

How does that same time next month sound? Anybody need more time? All right, hopefully we can come to a conclusion for the Steering Committee by next quarter. Have a good afternoon, everyone.

Siegfried: I'll get minutes out first thing next morning.

After a round of training exercises, this Blood Spirit ProtoMech point is sent in for a routine maintenance check.

A uniquely Clan concept (the Inner Sphere has yet to mimic the technology), ProtoMechs (sometimes referred to simply as "Protos") occupy a middle ground between heavy battle armor and true BattleMechs in *BattleTech*. Intended as a frugal answer to BattleMechs for more resource-poor Clans, ProtoMechs are much smaller than BattleMechs, and most are much tougher than battlesuits. Operating in groups, ProtoMechs can be a powerful weapon in battle.

The following system enables players to construct unique ProtoMechs for *BattleTech* games that conform to the standard rules presented in *Total Warfare*. As these rules can be fairly math-intensive, ProtoMech designers are encouraged to do all work on scratch paper before committing the resulting design's final specifications to an appropriate blank record sheet.

PROTOMECH BASICS

Though ProtoMechs are thematically based on BattleMech design, their construction is slightly more simplified. Only available to a Clan Technology Base, their lighter weight and simpler space system make for a shorter process. These factors, broadly overviewed in the *Construction Basics* section (see p. 44), are expanded on below.

TECHNOLOGY BASE

Under these rules, ProtoMechs may only be constructed using a Clan Technology Base. Any weapons and equipment carried by a ProtoMech must be selected from those available to the Clans.

Tech Rating

In the Weapons and Equipment Tables used for creating ProtoMechs and other units in this book, all items receive a Technology Rating in addition to a technology base. This rating (expressed as a series of letter grades that define the level of technology, and its availability through the major eras of *BattleTech* history) helps to define the item's level of sophistication and may be used to help standardize the level of "advancement" the unit demonstrates for purposes of era-based campaigning. Beyond this, however, an item's Technology Rating has no direct bearing on ProtoMech design. See *Costs and Availability* (p. 274) for more on Tech Rating.

OmniMechs

ProtoMechs may not be constructed as OmniMechs.

WEIGHT

ProtoMechs use a kilogram standard, with all units legal for *Total Warfare* standard play weighing between 2,000 and 9,000 kilograms, increasing in increments of 1,000 kilograms. Because many items that may be mounted on Protos express their weight in tonnage, these items must be converted to the kilogram standard by multiplying their tonnage values by 1,000.

At the end of ProtoMech construction, a Proto's total mass is expressed in terms of tonnage on its record sheet for simplicity. For example, a 6,000-kilogram ProtoMech is listed on its record sheet as a 6-ton design.

Weight Classes

ProtoMechs loosely fall into four main weight classes, determined by their tonnage. Most designs in these classes share similar features, though the lighter weight of ProtoMechs (compared to BattleMechs) often blurs their distinctions.

Light ProtoMechs weigh 3 tons (3,000 kilograms) and under. Uncommon because their small sizes offer few options, common Protos in this range are typically employed as "super-battle armor" or anti-infantry units.

Medium ProtoMechs weigh 4 to 5 tons (4,000 to 5,000 kilograms), and are more common than light Protos. Large enough for more powerful engines, these tend to see extensive use as scouts.

Heavy ProtoMechs run from 6 to 7 tons (6,000 to 7,000 kilograms). More powerful than mediums, with average mobility and good firepower, heavy Protos often make good anti-vehicular units.

Assault ProtoMechs weigh from 8 to 9 tons (8,000 to 9,000 kilograms). Often eschewing speed for armor and weapons, these Protos average the same mobility as battle armor, but in swarms they can endanger even heavy BattleMechs.

SPACE

Internal space (also called critical space) on a ProtoMech is not illustrated and tracked by a Critical Hits Table like that found on 'Mech Record Sheets. Instead, all ProtoMechs—regardless of weight—have established equipment limits per body locations, with each location restricted as follows.

Arms: Each of a ProtoMech's arms may mount one weapon or piece of equipment weighing no more than 500 kilograms (0.5 ton).

Torso: A ProtoMech's torso may mount up to two weapons or pieces of equipment. The total weight of both items together may be no more than 2,000 kilograms (2 tons). Weapons in the torso may be mounted to the rear.

Main Gun: A ProtoMech may—at the designer's option—also carry a single main gun. This weapon is attached to the Proto's torso, though it is aimed and fired with both hands. The main gun may be a single weapon or piece of equipment of any weight. A missile launcher consisting of multiple tubes (see p. 88) is considered a single weapon for this purpose.

Ammo: In all of the cases noted above, ammunition does not count toward a ProtoMech's weight or space limits.

DESIGNING A PROTOMECH

The process of ProtoMech design is similar to that of BattleMechs, following the same six simple steps, outlined as follows:

Step 1: Design the Chassis—Determine the ProtoMech's weight and internal structure.

Step 2: Install Engine and Control Systems—Determine the ProtoMech's engine rating and size; add cockpits and jump jets.

Step 3: Add Heat Sinks—Determine the number of the ProtoMech's heat sinks.

Step 4: Add Armor—Determine the amount and weight of the ProtoMech's armor and allocate armor points.

Step 5: Install Weapons and Equipment—Add weapons and other gear to the ProtoMech.

Step 6: Complete the Record Sheet.

As with all unit types, the above design process is a framework for designing a ProtoMech. The actual process—particularly after the chassis, engine and control systems are determined—can involve a bit more give-and-take as equipment, armor and heat sinks are balanced for their best fit in terms of weight and equipment space. For example, some designers might wish to assign armor as soon as the engine and chassis are settled to attain maximum protection before dealing with weapons and heat sinks. Others may want to choose equipment before adding armor, to maximize firepower.

To assist in this effort, the designer may find it useful to make copies of the Blank ProtoMech Record Sheet (in the back of this book), to visually arrange the placement of the ProtoMech's equipment while tracking the use of kilograms on a piece of scratch paper. Alternatively, designers with access to a PC and *HeavyMetal Lite* can use that design software to develop their ProtoMech electronically.

STEP 1: DESIGN THE CHASSIS

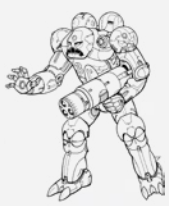
The first step in ProtoMech design is the creation of the Proto's basic framework, or chassis. This step establishes some of the most basic aspects of the ProtoMech's design, determining its maximum total weight and that of its internal structure. These choices may restrict the designer's access to certain weapons and equipment.

CHOOSE WEIGHT

ProtoMechs weigh between 2 and 9 tons (2,000 to 9,000 kilograms), measured in 1-ton (1,000-kilogram) increments. Within these limits, the player may choose any tonnage. The total weight of the Proto's engine, weapons, armor and other components may not exceed this amount, nor should it fall below; any unspent tonnage left after the creation process is considered wasted.

John is designing a light ProtoMech that he has dubbed the Siren-4. *Because he plans to use this Proto as a light scout and harasser, he chooses a weight of 3 tons (3,000 kilograms).*

Kevin is designing a heavy ProtoMech that he has named the Hydra. *Intended for good mobility and all-purpose firepower, he selects a weight of 6 tons (6,000 kilograms).*



Lara is designing an assault-class ProtoMech that she has chosen to name the Delphyne-2. *She is hoping to build this design as a fast mover with heavy firepower, and decides on a final weight of 9 tons (9,000 kilograms).*

ALLOCATE WEIGHT FOR INTERNAL STRUCTURE

Like BattleMechs and IndustrialMechs, all ProtoMechs have an internal structure, which represents their bones and joints. The weight of this structure depends on the weight of the ProtoMech. A ProtoMech's structure takes up 10 percent of its total weight (100 kilograms per 1,000 kilograms). ProtoMechs do not have access to alternate internal structure types, such as endo-steel.

The ProtoMech's mass also determines the number of internal structure points each of its location receives. The ProtoMech Structure and Armor Table below lists these values by location, with the structure points (the numbers outside the parentheses) shown, along with the maximum potential armor value per location (the numbers in parentheses). ProtoMechs have only five body locations (Head, Torso, Left Arm, Right Arm and a unified Legs location), with an optional sixth (Main Gun), versus the eight internal locations found on BattleMechs and IndustrialMechs.

Internal structure points are noted on the ProtoMech Record Sheet by gray-shaded circles. When working with the sheet, the designer should mark out any excess gray-shaded circles (and only the excess gray-shaded circles) to indicate how many points actually make up the internal structure in each hit location.

Like those of BattleMechs and IndustrialMechs, ProtoMech internal structure points are fixed to their assigned locations, based on the weight of the ProtoMech itself. These points may not be redistributed elsewhere.

Quads: ProtoMechs cannot be constructed as quadrupeds (quads).

Main Gun: At the designer's option, a ProtoMech may or may not have a main gun mount. The mount itself costs no additional weight during construction, but any weapons and armor mounted on that location would take up weight. If no main gun is mounted on the ProtoMech, all armor and structure points for the main gun should be blacked out on the unit's record sheet.

Space: ProtoMech internal structure does not occupy any spaces in the ProtoMech's equipment slots. Establishing the Proto's structure therefore has no impact on its weapons and equipment inventory.

Centaur *ProtoMechs from Clan Blood Spirit's Iota Galaxy lead the charge against a Clan Coyote* Mad Cat *and* Rabid Coyote.

PROTOMECH STRUCTURE AND ARMOR TABLE

		Internal Structure Circles (Max. Armor)					
Total ProtoMech Tonnage	Internal Structure Weight	Head	Torso	Arms (Left/Right)	Legs (Both)	Main Gun*	Maximum Armor Factor (Without/With Main Gun)
2	200 kg	1 (3)	2 (4)	1 (2)	2 (4)	1 (3)	15/18
3	300 kg	1 (3)	3 (6)	1 (2)	2 (4)	1 (3)	17/20
4	400 kg	1 (4)	4 (8)	1 (2)	3 (6)	1 (3)	22/25
5	500 kg	1 (4)	5 (10)	1 (2)	3 (6)	1 (3)	24/27
6	600 kg	2 (5)	6 (12)	2 (4)	4 (8)	1 (3)	33/36
7	700 kg	2 (5)	7 (14)	2 (4)	4 (8)	1 (3)	35/38
8	800 kg	2 (6)	8 (16)	2 (4)	5 (10)	1 (3)	40/43
9	900 kg	2 (6)	9 (18)	2 (4)	5 (10)	1 (3)	42/45

*The main gun is an optional ProtoMech component, which provides no internal structure circles (or armor) when not installed.

John's Siren-4 *weighs 3 tons (3,000 kilograms). With no other internal structure type available beyond ProtoMech Standard, he notes the weight of said structure will be 300 kilograms (10 percent of 3,000 kilograms = 3,000 kilograms x 0.1 = 300 kilograms). This leaves 2,700 kilograms so far (3,000 – 300 = 2,700). After consulting the ProtoMech Internal Structure Table, John blacks out all extraneous gray-shaded circles from the ProtoMech's Armor Diagram on his* Siren-4*'s Record Sheet, leaving only 1 open gray circle in the head, 3 open gray circles in the torso, 1 circle each in the left and right arms, and 2 circles in the legs. John decides against installing a main gun, and so blacks out all gray and white circles in the Main Gun location.*

Kevin's Hydra *weighs 6 tons (6,000 kilograms), providing an internal structure weight of 600 kilograms, which he determined by consulting the ProtoMech Internal Structure Table. This weight provides 2 structure points in the head, 6 points in the torso, 2 points each in the left and right arms, and 4 points in the legs. Kevin also decides to mount a main gun, and so receives 1 structure point in that location as well. He blacks out all of the excess gray-shaded internal structure circles in those locations on his* Hydra*'s Record Sheet. The* Hydra *has 5,400 kilograms of unassigned weight so far (6,000 – 600 = 5,400 kilograms).*

Lara's Delphyne-2 *weighs in at 9 tons (9,000 kilograms), so its internal structure will weigh 900 kilograms (10 percent of 9,000 kg = 9,000 x 0.1 = 900 kg). The ProtoMech internal Structure Table tells Lara that her* Delphyne *will receive 2 points of internal structure in the head, 9 points in the torso, 2 points in each arm and 5 in the ProtoMech's legs. Like John, Lara decides not to install a main gun, and so—while blacking out all the excess gray-shaded circles in the ProtoMech's various locations—she also blacks out all circles in the Main Gun location. The* Delphyne *has 8,100 unspent kilograms remaining (9,000 kg – 900 kg = 8,100 kg).*

Centaur *and* Roc *ProtoMechs, Alpha Galaxy (Clan Ice Hellion)*

STEP 2: INSTALL ENGINES AND CONTROL SYSTEMS

The second step in ProtoMech design is the installation of the Proto's engines and control systems. This step establishes key factors in the ProtoMech's mobility, including the size and performance of its engine, the placement of its cockpit system and whether or not the design is capable of jumping movement. ProtoMechs do not use gyros, as BattleMechs and IndustrialMechs do.

INSTALL ENGINE

Under these rules, a ProtoMech may carry one fusion engine to power its movement, equipment, weapons and other integral components. The relative output of this power plant is measured by the ProtoMech's Engine Rating, which is directly determined by the Proto's total weight and desired speed (similar to how BattleMech Engine Ratings are calculated).

To determine a ProtoMech's Engine Rating, multiply the ProtoMech's weight (in tons, not kilograms) by its desired Running MP (as opposed to its Walking MP). As with BattleMechs and IndustrialMechs, a ProtoMech's Running MP is computed by finding its desired Walking MP first, and then multiplying that value by 1.5 (rounding up to the nearest whole number). Therefore, to determine a Proto's required Engine Rating, the designer should first determine its desired Walking MP, and then compute its Running MP before computing its Engine Rating.

Note that under these rules, no ProtoMech may be constructed with an Engine Rating below 1 or above 400.

ProtoMechs largely use the same standard fusion engines found in BattleMechs, but they also have access to a wider range of engines weighing less than 1 ton (1,000 kilograms) than are listed on the Master Engine Table. To reflect this, ProtoMech fusion engines with an Engine Rating below 40 multiply their Engine Rating by 25 kilograms to find the engine's weight. For engines rated 40 and up, ProtoMechs

PROTOMECH ENGINE RATING AND MOBILITY FORMULAS

Running MP = Desired Walking MP x 1.5 (round up)

ProtoMech Engine Rating =
ProtoMech Tonnage x Running MP

ENGINE WEIGHT FORMULAS

Engine Rating	Weight
39 or less	Rating x 25 (kilograms)
40 or more	Use Master Engine Table (see p. 49)*

* For ratings not divisible by 5 in this category, round up to the next Engine Rating.

must use standard BattleMech fusion engines instead (see the Master Engine Table, p. 49). In the latter case, however, any Engine Rating not evenly divisible by 5 must be rounded up to the next nearest rating to find its appropriate engine size. For example, a ProtoMech with a computed Engine Rating of 42 rounds up to a final Engine Rating of 45.

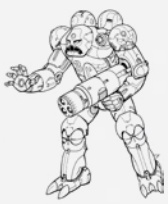
The ProtoMech Engine Rating and Mobility Formulas summarize the rules for computing a ProtoMech's Engine Rating and determining the tonnage for its engine.

ProtoMechs may use only standard fusion engines. Non-fusion engines, as well as non-standard fusion engines such as Compact, Light and XL engines, may not be installed on a ProtoMech's chassis.

Space: ProtoMech engine hits are handled as a default critical hit on the ProtoMech's Hit Locations and Critical Hits Table, and so occupy no critical slots as engines do on BattleMechs and IndustrialMechs.

John wants to give his Siren-4 *enough speed to run down almost any quarry and still escape the inevitable return fire, so he chooses a fast Walking speed of 10 MP. This gives his ProtoMech a Running speed of 15 MP (10 Walking MP x 1.5 = 15 Running MP). The Siren's Engine Rating will thus be 45 (3 tons x 15 Running MP = 45). Because this rating is 40 or higher, John consults the Master Engine Table on p. 49 and finds that a standard 45-rated fusion engine will weigh 1 ton (1,000 kilograms). After subtracting this from the Siren's unspent weight, John finds that he has 1,700 kilograms left over.*

Kevin feels speed is less a priority for his Hydra *than good armor and firepower, so he decides on an average Walking MP of 4, which yields a Running MP of 6 (4 Walking MP x 1.5 = 6 Running MP). This means his 6,000-kilogram (6-ton) Proto's engine will need an Engine Rating of 36 (6 tons x 6 Running MP = 36). This is below the 40 Rating that would place the ProtoMech's engine weight on the Master Engine Table. Instead, Kevin computes his* Hydra*'s engine mass, multiplying its rating by 25 kilograms, and finds that his final engine weight will be 900 kilograms (Engine Rating 36 x 25 kg = 900 kg). The* Hydra *now has 4,500 kilograms of unspent weight remaining (5,400 kg – 900 kg = 4,500 kg).*



Lara wants her 9-ton assault ProtoMech to have a surprising amount of speed, and so decides to give the Delphyne-2 *an impressive Walking MP of 5. This produces a Running MP of 8 (5 Walking MP x 1.5 = 7.5 Running MP, rounded up to 8), and requires an Engine Rating of 75 to accomplish. (While 9 tons x 8 Running MP = 72, the fact that 72 is greater than 40 means that Lara has to find her Proto's engine using the Master Engine Table on p. 49. This forces her to round her Engine Rating result up to the nearest listed Engine Rating, which is 75.)*

PROTOMECH JUMP JET WEIGHT TABLE

ProtoMech Weight	Jump Jet Weight
2 to 5 tons	50 kg/Jumping MP
6 to 9 tons	100 kg/Jumping MP

On the Master Engine Table, Lara finds that a 75-rated standard fusion engine weighs 2 tons (2,000 kilograms), and so she subtracts this from the Delphyne*'s unspent weight. The* Delphyne *now has 6,100 unspent kilograms left (8,100 kg – 2,000 kg = 6,100 kg).*

DETERMINE JUMP CAPABILITY

ProtoMechs may mount jump jets in the same way as BattleMechs do, except that their jets weigh considerably less per Jump MP than BattleMech jets. See the ProtoMech Jump Jet Weight Table above to find the mass of each ProtoMech jump jet, based on the Proto's total weight. Each ProtoMech jump jet provides 1 Jumping MP and is considered to be mounted in the ProtoMech's legs and/or rear torso.

Only ProtoMechs may use ProtoMech jump jets. ProtoMechs may not employ non-ProtoMech jump jets.

A ProtoMech's Jumping MP may not exceed its Walking MP, so a ProtoMech that has a Walking MP of 5 may not install more than 5 jump jets.

Space: ProtoMech jump jets do not occupy slots on the ProtoMech's Weapons Inventory. Critical hits to any jets are already built into the Proto's Hit Locations and Critical Hits Table, so their exact locations need not be determined on the record sheet.

Satisfied with the Siren-4*'s swift overland speed, and already short on kilograms for weapons, ammunition and armor, John decides not to mount jump jets on his ProtoMech at this point.*

Equally content with the ground speed of his Hydra*, and eager to save as much weight as possible for guns and armor, Kevin also elects to mount no jump jets on his ProtoMech design.*

Even though her Proto is already fast for its size, Lara decides to add an extra surprise in the form of jump jets. She decides on the maximum Jumping MP of 5 (equal to the Delphyne-2*'s Walking MP) and computes that the total weight for all 5 jump jets will come to 500 kilograms (5 Jumping MP x 100 kg/Jumping MP [for a 6- to 9-ton Proto] = 500 kilograms). Because ProtoMechs*

do not record internal space the same way as BattleMechs and IndustrialMechs do, Lara does not need to allocate these jets anywhere. Her Delphyne *now has a Jumping MP of 5, and has 5,600 unspent kilograms left (6,100 kg – 500 kg = 5,600 kg).*

ADD COCKPIT

A ProtoMech's cockpit and control system weighs 500 kilograms. This mass includes the pilot and associated support systems, including the modified form of the enhanced imaging link used to operate the machine without a gyroscope. Unlike the BattleMech cockpit, the ProtoMech cockpit does not reside in the Proto's head section, but in the torso.

Space: ProtoMech cockpits do not occupy slots on the ProtoMech's Weapons Inventory. Critical hits to any cockpit systems are already built into the Proto's Hit Locations and Critical Hits Table, so their exact locations need not be determined on the record sheet.

After installing its cockpit, John's Siren-4 *has 1,200 unspent kilograms left (1,700 kg – 500 kg = 1,200 kg).*

Kevin's Hydra *has 4,000 kilograms left after installing its cockpit systems (4,500 kg – 500 kg = 4,000 kg).*

With its cockpit, Lara's Delphyne-2 *has 5,100 unspent kilograms remaining (5,600 kg – 500 kg = 5,100 kg).*

Centaurs, *Tau Galaxy (Clan Blood Spirit)*

SPECIAL PHYSICAL ENHANCEMENTS (PROTOMECH MYOMER BOOSTER)

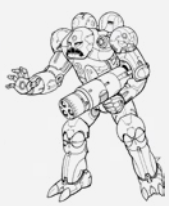
Where BattleMechs have access to MASC and Triple-Strength Myomer, ProtoMechs have one special performance-enhancing option available to them: the ProtoMech Myomer Booster. At the designer's option, this technology—essentially a Proto-scaled version of MASC—may be installed at this stage to provide the ProtoMech with a "boosted" Running MP equal to twice its normal Walking MP.

The ProtoMech Myomer Booster weighs 25 kilograms per ton of ProtoMech weight (in other words, 2.5 percent of the ProtoMech's total weight, in kilograms). A ProtoMech may carry only one Myomer Booster system.

Space: ProtoMech Myomer Boosters do not count toward the ProtoMech's Weapons and Equipment Inventory, nor do they need to be placed on the unit's Hit Locations and Critical Hits Table.

Though he is desperately low on available weight, John decides to equip his Siren-4 *with a ProtoMech Myomer Booster system. For the 3-ton (3,000-kilogram)* Siren-4, *John finds that the booster will weigh 75 kilograms (3 tons x 25 kg per ton = 75 kg). Installing this system leaves the Proto with only 1,125 unspent kilograms (1,200 kg – 75 kg = 1,125 kg), and a blinding new Running MP—with Booster engaged—of 20 MP (10 Walking MP x 2 = 20 Boosted Running MP)!*

Kevin decides his Hydra *is fine as-is, and does not install a Booster.*



Lara considers a Booster for her 9-ton (9,000-kilogram) Delphyne-2, *but decides that she can find a better use for the 225 kilograms it would entail (9 tons x 25 kg per ton = 225 kg). She, too, decides against installing one at this time, finding the 8 Running MP and 5 Walking/Jumping MP sufficient.*

STEP 3: ADD HEAT SINKS

ProtoMechs vent heat the same way conventional vehicles do, and so do not require heat sinks for movement or the use of non-energy weapons. Any ProtoMech that mounts energy weapons, however, *must* install enough sinks to dissipate the heat generated by all such weapons. A ProtoMech that carries an ER medium laser, for example, must also carry 5 heat sinks to handle the heat. Because this step depends more heavily on the weapons that will be installed, the designer may hold off assigning heat sinks until he or she has determined an appropriate weapons and equipment load.

ProtoMechs may use only their own specially made heat sinks, which function like BattleMech single heat sinks, but are significantly smaller. Each of these heat sinks weighs 250 kilograms. There is no ProtoMech equivalent to the double heat sink. ProtoMech heat sinks are incompatible with non-ProtoMechs.

Also, ProtoMechs do *not* automatically receive weight-free heat sinks as part of their fusion engine installations, unlike BattleMechs and some IndustrialMechs. ProtoMechs must therefore spend kilograms on each heat sink they require.

Space: ProtoMech heat sinks do not count toward the ProtoMech's Weapons and Equipment Inventory, nor do they need to be placed on the unit's Hit Locations and Critical Hits Table.

Noting that even one heat sink will leave his Siren-4 *with less than a ton to install weapons, ammo and armor, John nonetheless resolves that his ProtoMech will carry an ER micro laser, which requires 1 heat sink. John thus spends 250 kilograms on installing one heat sink, leaving 875 kilograms left over (1,125 kg – 250 kg = 875 kg).*

Kevin is also planning to mount a micro laser on his ProtoMech, and spends 250 of the Hydra*'s remaining 4,000 kilograms on a single heat sink, leaving 3,750 kilograms remaining (4,000 kg – 250 kg = 3,750 kg)*

Lara foresees a greater need for heat sinks on her Delphyne-2*, and installs 2 heat sinks at this time for a cost of 500 kilograms (2 heat sinks x 250 kg per sink = 500 kg). This leaves her ProtoMech with 4,600 unspent kilograms (5,100 kg – 500 kg = 4,600 kg).*

STEP 4: ADD ARMOR

Unlike most other units, ProtoMechs mount their armor (an advanced composite incompatible with non-ProtoMech units) on a point-by-point basis, rather than in half- or full-ton lots. Each armor point mounted on a ProtoMech weighs 50 kilograms and must be allocated to one of the Proto's five locations (or six, if it carries a main gun). Remember that both legs count as a single location, and note that no ProtoMech location has a front/rear facing, as BattleMechs do.

The maximum number of armor points a ProtoMech may carry per location remains tied to the ProtoMech's tonnage. This value is shown in parentheses on the ProtoMech Structure and Armor Table (see p. 82), along with the Maximum Armor Factor possible for a given ProtoMech (both with and without an optional main gun mount). Use the ProtoMech's Armor Diagram block to indicate the number of points protecting each part of the ProtoMech's body by marking out any excess white armor circles, just as was done for the gray-shaded internal structure circles.

ProtoMechs built under these rules may only use ProtoMech standard armor; no alternative armor types are currently available to these units.

Space: ProtoMech armor does not count toward the ProtoMech's Weapons and Equipment Inventory, nor does it need to be distributed on the unit's Hit Locations and Critical Hits Table.

John's Siren-4 *is light, incredibly fast and slated to carry an ER micro laser. He decides that, of his 875 remaining kilograms, he will invest 600 kilograms in armor. This will provide his ProtoMech with 12 points of armor (600 kg ÷ 50 kg per armor point = 12 armor points)—5 points less than the 17-point maximum shown on the Structure and Armor Table (p. 82) possible for a 3-ton Proto.*

John assigns the armor to his Siren-4 *as best as he can, allocating 5 points to the torso, 2 to the head, 1 each to the arms and 3 to the legs. With no main gun structure, John cannot assign armor points to that location. John then blacks out all extra white circles in the appropriate body locations of his ProtoMech's Record Sheet, leaving only the assigned points remaining in each location.*

With 600 kilograms spent on armor, John's Siren-4 *has only 275 kilograms remaining for weapons and other equipment (875 – 600 = 275).*

At 6 tons (6,000 kilograms), Kevin's Hydra *could mount up to 36 armor points—counting its main gun mount—according to the ProtoMech Structure and Armor Table on p. 82. Kevin decides that the* Hydra *will carry decent enough armor, but leave more room for weapons. He opts to install a total of 29 armor points on the Proto, with 10 points on the torso; 3 points each on the head, the main gun and both arms; and 7 points on the legs (10 + 3 + 3 + 3 + 3 + 7 = 29). The weight for 29 armor points comes to 1,450 kilograms (50 kg per point x 29 points = 1,450 kg), leaving 2,300 unspent kilograms (3,750 kg – 1,450 kg = 2,300 kg).*

In the appropriate locations of the ProtoMech Armor Diagram for his Hydra*'s Record Sheet, Kevin blacks out all extra white armor circles, leaving only those assigned to each location.*

Lara could install as many as 42 armor points on her Delphyne-2 *according to the Structure and Armor Table on p. 82. Such an effort would require investing 2,100 of her 4,600 unspent kilograms. Instead, Lara decides on a nice, round 40 points, for an even cost of 2,000 kilograms (40 points x 50 kg per point = 2,000 kg).*

Lara applies 16 armor points to the torso and the maximum number of points each to the head, each arm and legs (6, 4 and 10, respectively). After blacking out the appropriate amount of white armor dots on her ProtoMech's Record Sheet, Lara moves on, with just 2,600 unspent kilograms remaining.

Clan Blood Spirit ProtoMechs flank the remnants of a Clan Coyote star.

STEP 5: ADD WEAPONS, AMMUNITION AND OTHER EQUIPMENT

The weapons, ammunition and equipment that may be mounted on a BattleMech are listed in the Weapons and Equipment Tables shown on p. 341. In combat, these items function the same way for ProtoMechs as they do for BattleMechs in terms of heat, damage and range, and special abilities. Heat is not tracked for ProtoMechs, though—as indicated above—all energy weapons mounted on a Proto require enough sinks to cover their heat values.

Given the smaller sizes of ProtoMechs, their Clan-only Technology Base and any restrictions native to certain items (such as MASC, which only BattleMechs may use), the range of items that can be mounted on a ProtoMech is obviously limited. ProtoMechs also carry ammunition differently, as is described below. Remember that the total weight of a given ProtoMech design's structure, engine, cockpit, armor, weapons and other components may never exceed the tonnage established for the Proto in Step 1. Any leftover kilograms that cannot be spent on other equipment (due to space constraints or other factors) are considered "wasted" weight. (ProtoMechs may not carry internal cargo.)

Weapons placed in the torso may have a forward or rearward firing arc. Rear-firing weapons must be so noted when installed on the design.

For special rules on any item, consult its entry under *Weapons and Heavy Equipment* (pp. 200–273).

Weight: During construction, all weapons available to ProtoMechs weigh the same as their BattleMech-mounted kin (with the exception of missile launchers, which may be mounted in individual tubes). Because Protos use a kilogram

PROTOMECH LOCATION RESTRICTIONS TABLE

ProtoMech Location	Maximum Number of Items*	Maximum Total Weight of Items
Head	0	0
Torso	2**	2,000 kg**
Arms (Each)	1	500 kg
Legs	0	0
Main Gun	1	Unlimited

* Missile launchers composed of multiple tubes are counted as one weapon for purposes of determining item quantities.

** Maximum weight of torso items is the weight of both items taken together; torso weapons may also be mounted to the rear.

standard during construction, the weight of any items in tonnage should be converted to kilograms first; to do this, multiply their tonnage value by 1,000. Note also that ammunition for any of the ProtoMech's weapons need not be allocated in half- or full-ton lots.

Space: Regardless of their critical space in terms of BattleMech construction, all weapon and equipment items that may be mounted on a ProtoMech count as only one "slot" on the ProtoMech's Weapons Inventory. However, the amount of equipment space available in each body location is strictly limited. These limits are weight-based rather than size-based, as shown in the ProtoMech Location Restrictions Table below. Any ammunition required by an item does not count toward these limits.

Missile Launchers: Rather than mounting standard-issue missile racks, ProtoMechs may mount missile launchers in a more varied number of tubes. Missile tubes combined in such a fashion (up to the maximum normally permitted by their launcher type, such as 6 for SRMs and 20 for LRMs) may be treated as a single item of equipment and mounted as such within a single body location. When fired, these combined tubes resolve as a single launcher. For example, it a ProtoMech carries 3 combined SRM tubes in its torso, it fires the weapon in the same way as a standard SRM, but resolves damage using the 3 column of the Missile Hits Table.

The weights of ProtoMech missile tubes are noted on the ProtoMech Missiles and Ammunition Table below. Note that the weights of standard-sized launchers used on 'Mechs and vehicles may not always match the weight of a similar launcher built from individual tubes for a ProtoMech. This discrepancy is intentional, for ease of use and maximum flexibility.

PROTOMECH MISSILES TABLE

Missile Launcher	Weights
ATMs	ProtoMechs cannot mount ATMs.
LRMs	200 kg per tube
SRMs	250 kg per tube
Streak SRMs	500 kg per tube

Mixed ProtoMech Point, Beta Galaxy (Clan Ice Hellion)

Ammunition: Unlike BattleMechs and most other combat units, ProtoMechs may carry any size ammo bins desired and are not limited to full-ton or half-ton lots, nor are they limited by space constraints. Instead, ammunition must be purchased by shot (complete volleys for multi-tube missile launchers) for each weapon that uses ammunition. Ammunition bins are not assigned to critical spaces, and are essentially counted as part of the weapon's mount. They do not, however, count toward the weight limits established under the ProtoMech Location Restrictions Table.

The ammunition weights shown on the ProtoMech Ammunition Weight Table show the weight of each shot (or missile, where appropriate) of ammunition available to ProtoMech units.

For missiles, determine the full "shot weight" of a given launcher as follows: multiply the appropriate missile weight by the number of tubes in the missile group (also known as a missile volley). For example, the shot (or volley) weight for a 4-tube group of SRMs would equal 40 kilograms (4 tubes x 10 kg per missile = 40 kg per volley). After adding together the number of desired shots (volleys), round any fractional kilograms up to the nearest whole.

PROTOMECH AMMUNITION WEIGHT TABLE

Ammo Type	Kg (per Shot)
Anti-Missile System	40
Anti-Personnel Gauss	25
Heavy Machine Gun	10
Light Machine Gun	5
Standard Machine Gun	5
LRM (by missile)	8.33
SRM (by missile)	10
Streak SRM (by missile)	10
Narc Pods	150
Ultra AC/2	20
Ultra AC/5	50
Ultra AC/10	100
LB 2-X AC	20
LB 5-X AC	50
LB 10-X AC	100
Gauss Rifle	125
HAG/20	166.66
Flamer (Vehicle)	50
Plasma Cannon	100

With just 275 kilograms left to spend, John installs only one weapon on his Siren-4*: an ER micro laser. With the laser's weight of 250 kilograms, John can mount the weapon in either one of the ProtoMech's arms, or in its torso. Opting for the best-protected of these locations, John installs the laser in the Siren's torso, and notes the weapon's type, damage and ranges on the "Torso A" line for the ProtoMech Record Sheet's Weapons Inventory.*

With only 25 kilograms left (275 kg – 250 kg = 25 kg), John finds that he can install no other equipment of use to his ProtoMech at this stage. Though he may decide to go back a few steps and revise the design to use up every kilogram of weight (such as deleting the Myomer Boosters and spending the resulting total of freed-up weight on a couple more points of armor), John decides to accept the fact that his Siren-4 *is completed with 25 kilograms' worth of "wasted" weight.*

Kevin decides to center his Hydra's *firepower on an ammo-efficient Streak-SRM system, and spends 1,500 kilograms on a 3-tube Streak launcher (3 tubes x 500 kg per Streak SRM tube = 1,500 kg). While he may mount the weapon in either the torso or the main gun mount, Kevin feels the Main Gun location—which has the most flexible firing arc—is more appropriate, and notes the Streak SRM 3's statistics (type, damage per missile and ranges) on the Main Gun line of this ProtoMech's Weapons Inventory. For ammunition, Kevin installs 10 shots for the launcher, which come to 300 kilograms in weight (10 kg per missile x 3 missiles per shot/volley x 10 shots = 300 kg). Kevin notes this ammunition on the Ammo line of the ProtoMech's Inventory by writing "Streak SRM-3 (10)."*

To back up his missiles, Kevin decides to add a small but potent micro pulse laser, which weighs in at 500 kilograms. While this weapon is light enough to be mounted in the torso or the arms now (the main gun is no longer an option, as it carries the Streak-3), Kevin places the weapon in the well-armored Torso location.

With a total of 2,300 kilograms now spent on weapons, Kevin's Hydra *is effectively completed.*

Lara has 2,600 kilograms to burn on weapons for her Delphyne-2*, and plans to make the most of it. Having already installed 2 heat sinks in advance, she begins with 2 ER micro lasers at 250 kilograms apiece, placing one in each of the ProtoMech's arms.*

To give her ProtoMech more reach, Lara decides to back these lasers up with standard SRMs, and creates two 3-rack SRM launchers at 750 kilograms apiece (250 kg per SRM tube x 3 tubes per launcher = 750 kg), which she mounts in the torso slots. (While Lara could have combined the SRM tubes into a single 6-rack launcher, her decision to separate them will allow the Delphyne *an additional attack in the event of a miss, and may retain at least some of its missile capability in the event of any internal damage.) For ammo, Lara devotes 10 shots to each SRM-3 launcher, for a combined weight of 600 kilograms (10 kg per missile x 3 missiles per shot/volley x 10 shots per launcher = 300 kg per SRM-3 launcher x 2 launchers = 600 kg). She notes this ammunition on the Ammo line for her ProtoMech's Inventory by writing "SRM-3 (20)."*

Summing up the kilograms spent on her Delphyne's *weapons, Lara confirms that she has used all 2,600 kilograms remaining (250 + 250 + 750 + 750 + 600 = 2,600), effectively completing her ProtoMech.*

STEP 6: COMPLETE THE RECORD SHEET

By the time the designer has chosen all structure, engine and components for the ProtoMech and added armor, weapons and equipment, all items must be allocated to their proper places on the Blank ProtoMech Record Sheet. On a competed record sheet, the designer must be sure to have filled in all data for the ProtoMech's Data block (including name, tonnage and MPs). All weapons and equipment must be allocated on the Weapon Inventory (including weapon ranges, damage and ammunition in shots per weapon). All extraneous armor and internal structure points must be blacked out on the Armor Diagram.

Once all of the above is completed, the ProtoMech is ready for *Total Warfare* game play (though in the case of ProtoMechs, it is generally best to fill in all five ProtoMech blocks to have a fully functional Point ready for action).

John verifies that all of the valid data blocks are completed for his Siren-4*, including noting the ProtoMech's full name, "Siren 4," in the ProtoMech's Type; its Tonnage ("3"); and its Walking MP of 10, Running MP (listed as "15 (20)" to indicate standard and boosted MPs) and Jumping MP of 0. He also lists the weapons properly on the Inventory, noting "ER micro laser" under the Type column on the Torso A line, "2" under Damage, "1" under Short Range, "2" under Medium Range and "3-4" under Long Range. After making sure that no extraneous white or gray circles appear on the Armor Diagram beyond those already assigned to the ProtoMech, John is ready to compute the Battle Value and Cost for his* Siren-4 *and bring it to play.*

Repeating the same steps as John, Kevin and Lara complete their ProtoMech Record Sheets as well.

THE MECHANIZED BATTLEFIELD

—Excerpt from "The Modern Battlefield" by MAF Colonel (Ret) Ashley Hodd,
Canopian Institute of War Press, Canopus IV, 19 August 3067

"Every soldier must know, before he goes into battle, how the little battle he is to fight fits into the larger picture, and how the success of his fighting will influence the battle as a whole."
—Bernard Law Montgomery

It is said that military history is written on the tombstones of soldiers who thought themselves invincible.

More than any other combatants, MechWarriors are predisposed to this fatal flaw. You pilot the ultimate product of centuries of armored warfare, so it is not surprising that many of you affect this mindset. Unfortunately, some of you *believe* it. As students at the Canopian Institute of War, you are being trained to discard outmoded thinking in favor of a realistic view of combat. This fundamental relearning is vital in the vehicular combat arena; no other paradigm is as neglected.

In subsequent units, we shall review specific strategies and tactics regarding the so-called lesser combatants most armies refer to simply as "conventional vehicles." This briefing will present an overview of 31st-century armored combat vehicles and discuss the place of noteworthy designs in modern warfare, with a focus on practical information. The Warbook Appendix on the accompanying data disk contains technical information on all major vehicle designs currently in use, and Unit Twelve will focus on identifying them. At the conclusion of this exercise, you will

understand the technologies employed by modern combat vehicles. You will be intimately versed in their deployment and applications, and have the knowledge necessary to engage them appropriately. Above all, you will learn to respect them for the danger they represent.

Ever since the introduction of the BattleMech, armored vehicles have been incorrectly discounted as minor nuisances, insects against a giant avatar of metal and weapons. And yet, in your provincial academy, you probably learned that a Periphery MechWarrior is two to three times as likely to engage combat vehicles as are his counterparts in the Successor States. By now, your instructors should have debunked the popular myths about combat vees: that they use inferior equipment, that they are less maneuverable than BattleMechs, that they are poorly armed and armored by comparison, that their archaic approach to warfare doesn't belong on the modern battlefield. In case they haven't, let this lecture be your reminder:

There are two types of MechWarriors—those who believe the myths and those who survive. If you're in the former category, then you're in deep with Lady Luck. The combat efficacy of modern tanks and their armored kin cannot be underestimated. The sad account of *Locust* Pilot Savannah Johnson is an excellent example of the dangers of your invincibility mindset. Tri-vid footage of her battle with S. L. Lewis and his five-ton hovertank may be found in the appendices on the accompanying data disk. Before discussing the operational roles of combat vehicles, we'll explore their myths and construction in more detail.

COMBAT VEHICLES: MYTHS VS. REALITY

Myth Number 1: Combat vehicle weapons and armor are inferior to those of BattleMechs.

This statement is patently false. The truth is that combat vehicles use the same armor and equipment as your BattleMech. The Lyran Alliance's *Dragon Fire*, for example, is fitted with the same ArcShield armor that protects the Manticore heavy tanks pumped out by our own Majesty Metals corporation. The ubiquitous SHD-2H *Shadow Hawk*, a mainstay of the Succession Wars not only for us but for most of the Successor States, uses the same Armstrong J11 autocannon as the equally popular Vedette tank. Even enhanced fire control systems, such as Artemis IV and other sophisticated electronics, are similarly apportioned—you can see a key example in the Draconis Combine's Master C^3 variant on the Maxim, which uses the same enhanced communications network as the TSH-7S *Tai Sho* BattleMech.

Myth Number 2: Combat vehicles are slower and less maneuverable than BattleMechs.

The speed component is an outright lie. As mentioned earlier, the 5-ton Savannah Master easily dispels this myth using decades-old technology, and boasts a maximum speed of 216 kph—faster than most of its BattleMech contemporaries. To be fair, a few 'Mechs, like the Clans' *Dasher*, can keep up with a Savannah Master for short periods of time, but the majority of fast 'Mechs even today cannot break 150 kph—much less match speeds with a well-built hovertank.

The lack of maneuverability claim, by contrast, has some merit. Particularly in rugged and wet terrain, some armored vehicles *do* flounder. Recognizing and exploiting these impediments is a key component of your simulator training, and might keep you alive long enough to make a difference.

Hovercraft, for example, attain their high speeds by essentially floating above the ground, using powerful fans to generate thrust and lift, and by restricting their tonnage to ranges that make them viable speedsters. Air vented out the aft of the craft propels it forward, and modifying the airflow with rudders controls direction. Lift, however, is maintained beneath the craft by a flexible skirt that has a very large footprint and is notably susceptible to snags and weapons fire. Damage to this skirt causes the vehicle to lose its lift, and power must be diverted from the directional fans to compensate. This fragility also prevents hovercraft from negotiating broken ground and woods, where 'Mechs can go without much trouble.

Tracked vehicles, however, are a more common sight and can negotiate woods much better. These units maneuver by using a loop of interlocking, metal plates that makes them far less nimble than hovers but also negates any need for a weight cap. Though they remain hampered by dense woods and deep water, they can invest more mass in armor and firepower, which makes them every bit as lethal.

Wheeled vehicles, another ground vehicle type particularly adept in urban areas, might resemble lower-tech civilian automobiles, but make no mistake: these units can be swift in their element, and they incorporate off-road modifications, military-grade transmissions and control systems far more durable than their civilian equivalents. Fortunately for MechWarriors, these vehicles are the most restricted by terrain and often run afoul of their limitations.

VTOLs are another high-speed, high-maneuverability combat vehicle type. They use directional jets or rotors to provide lift, and are agile and often well armed for their size. Though they are invariably lightweight and their rotors susceptible to weapons fire, they only need worry about underlying terrain when flying too low and too fast at the same time.

Wing-in-Ground Effect craft—also called WiGEs, "Wiggies" or "Widgets"—are something of a cross between aircraft and hovercraft. As fast and maneuverable as a hovercraft—but without the fragile skirt—their limited flight capabilities make it possible for these units to coast over more difficult terrain, making them deadly when used in combat. At this time, WiGEs are an untapped battlefield resource, but as most tend to serve in transport roles, an overlooked WiGE combat vehicle could easily be hauling your doom in the form of anti-'Mech infantry.

Military naval vessels are the final common form of combat vehicle a MechWarrior might encounter, though I use the term "common" loosely. A niche vehicle type, restricted entirely to waters where most other combat vees cannot go, they are rarely encountered in the Periphery. In their element, however, even the slowest of these vessels can swim rings around a bogged-down BattleMech.

Myth Number 3: Combat vehicles are archaic and useless.

This one is true *and* false. While combat vees make use of simpler technologies than BattleMechs, they are technologies proven over a thousand years of warfare. Regardless of their motive system, many combat vehicles frequently make use of

"archaic" petrochemical-burning internal combustion engines. This significantly reduces their cost and puts them within the technical manufacturing and maintenance capabilities of most worlds, even in the Periphery. Even though these power plants cannot meet the energy requirements of particle cannon and lasers by themselves, power amplifiers easily counter that restriction by providing large capacitors to store and channel electrical energy, thereby allowing ICE-powered vehicles to compete with their fusion-powered counterparts. During the Succession Wars, military vehicles predominately used internal combustion engines, but the technological resurgence of the past two decades is bringing more fusion-powered vehicles back to the battlefield. Moreover, even with fusion power plants, combat vehicles are significantly less expensive than 'Mechs, and consequently they may be more widely deployed.

Yes, in some ways combat vehicles are less resilient, but don't let that marketing propaganda fool you. The chinks in vehicular armor are a consequence of their construction and nothing more. In fact, many vehicles mount more armor than equivalent-weight BattleMechs. If you don't show them the same respect, you'll wind up in more trouble than an off-world tourist on his first visit to the Mindstar compound.

Finally, despite their structural weaknesses, vehicular chassis also shed waste heat more efficiently; the thermal output from ballistic systems and missile launchers has a negligible effect on vehicles. Energy weapons, however, still require the addition of heat sinks.

Armed with a sophisticated array of weaponry, combat vehicles serve in the same roles as BattleMechs. In fact, newer units, like StarCorps Industries' Manteuffel attack tank, take advantage of extra-light fusion engines and StarSlab III ferro-fibrous armor, and are part of an emerging trend in vehicles that use modular Omni technology. These new OmniVehicles mount equipment in modular pods the same way Clan OmniMechs do, enabling them to be quickly reconfigured or repaired between battles, or even to ferry armored troopers in the absence of internalized bays.

CREWS

At the heart of any crew is the vehicle commander. Usually a lance corporal or equivalent, the commander is responsible for directing the gunner (or gunners), navigating the vehicle, monitoring the sensors, communications, and coordinating the efforts of her team. Take the commander out of the equation, and though the whole team suffers, the vehicle remains functional—unlike a BattleMech, which falls down if the MechWarrior gets KO'ed. In turreted units, commanders often ride above the hull, where they can monitor the entire vehicle. In the absence of a turret, a commander usually occupies a more central station.

Many vehicles also have a dedicated driver who—in addition to steering and controlling the unit's speed—makes many of the split-second tactical decisions. While this is the least glamorous of the crew positions, a good driver can mean the difference between an effective battlefield unit and a charred metal coffin.

Gunners, a mainstay of combat vehicles, control the targeting and tracking systems, monitor ammunition, and of course fire the weapons. An effective gunnery team can track multiple targets with precision and coordinate their attacks for the utmost effect. Turrets give gunners the flexibility to track their more maneuverable opponents, and to mass fire in any direction. Get behind a *Dragon*, and its firepower is reduced to a single Victory 23R laser, or a difficult (and often inaccurate) twisting shot with its autocannon. Behind a Manticore, the turret can still swing around quickly enough to deliver eighty-six percent of its firepower with no loss in accuracy—especially given that those weapons are manned by troops who have nothing to worry about beyond shooting at a BattleMech whose warrior must not only fire back, but move around and keep a multi-ton war machine upright in a war zone.

BATTLEFIELD ROLES

Far from archaic, combat vehicles are inexpensive, effective units that perform vital combat roles. Now that we've debunked the myths, we'll take a brief look at some of the operational duties a combat vehicle may undertake. Throughout this briefing, we will deal exclusively with Inner Sphere and Periphery combat vehicles. Thankfully, the ravages of the Clan invasion have not reached rimward of Terra—but, as they say, anything is possible. You are unlikely to encounter Clan units in combat, but you should be familiar with them. Unit Twenty-three will focus on the Clans in detail.

Reconnaissance/Spotters

MAF BattleMech commands often make use of the RVN-3L *Raven* (supplied by our Capellan neighbors) for scouting missions. The *Raven*'s sophisticated array of sensors make it ideal for ferreting out OpFor, but though its maximum speed of 97 kph may be effective in covering small areas, when it's necessary to reconnoiter a large operational theater, VTOLs are far more efficient. The Ferret light scout—with its maximum speed of 248.4 kph—allows it to cover terrain much faster than the *Raven*.

On the ground, Inner Sphere vehicle commands often include mobile headquarters in a similar role. These exceptional vehicles provide sophisticated communications and tracking systems capable of monitoring and coordinating several operational theaters, and when deployed in conjunction with Centipede scout cars and Sprint scout helicopters, these groups can gather valuable intelligence faster than the casinos in Crimson gather money. These advanced resources aren't generally available in the MAF, but our combination of Ferrets, *Raven*s and Pack Rat long-range patrol vehicles handles the same tasks admirably. An astute commander leverages all the resources available to her.

In addition to their reconnaissance profiles, combat vehicles are often employed as spotters, both for indirect fire and long-range artillery barrages. The high speed and maneuverability of VTOLs again makes them ideal for this task. Units like the Lockheed/CBM Warrior H-7 attack helicopter can also act as skirmishers. On the ground, hovercraft like the J. Edgar light hover tank also excel as spotters, and—like the Warrior—can double as an effective skirmisher.

Main Battle Tanks

Combat vehicles aren't just well suited to scouting and spotting. When it comes to front-line combat, many tanks eclipse all but the most powerful BattleMechs. Among the more terrifying vehicles you might encounter is Kallon Industries' Challenger X MBT—a favorite of mercs and FedSuns forces. An impressive combination of weaponry makes this ninety-ton monster potent at all ranges from 30 to 660 meters. For long-range combat, the Challenger includes a Federated 10-Shot LRM launcher, an Imperator Code Red LB 10-X autocannon, and a Poland Main Model A gauss rifle—the same weapon found on *Caesar* and *Gunslinger* 'Mechs. The Poland has an excellent track record, well deserving its reputation

as a reliable, accurate weapon. Given the Challenger's popularity with mercenary commands, it's likely that at some point in your career you will engage one of these monsters in the Magistracy's defense.

It's important to note that advanced weaponry doesn't delineate main battle tanks. The Zhukov, with its paired SarLon MaxiCannon, and the Brutus, with its signature Firmir MaxiLase heavy lasers, form the staple of many vehicle commands, particularly those of our Capellan and Free Worlds neighbors. Neither of these vehicles takes advantage of new technology. There are many schools of thought regarding these tanks. Some commands—particularly those where BattleMechs are scarce—organize their entire force around these units. Others prefer to conceal their 'Mech killers behind hills and defilades to catch complacent MechWarriors off guard. Your simulator exercises will train you to spot these tanks and engage them appropriately.

Close Range/Urban Combat

For close-range and urban combat, few BattleMechs in the Periphery can ignore the classic Rommel—built originally by the Lyran corporation Defiance Industries and faithfully duplicated by our Taurian friends on Perdition. Centered on an assault-grade autocannon, the Defiance Killer Type T, the Rommel's firepower backs up this weapon with a five-tube LRM, a small laser and a flamer for anti-infantry work. Enough armor protects this beast on nearly all sides to take two direct hits from one of its own kind and still dish it out—something an average raider 'Mech cannot do. As with front-line tanks, many serviceable urban warfare designs (like the Taurian Rommel) lack upgraded technologies, but remain powerful and numerous on the modern battlefield.

Fire Support

Fire support vehicles abound on the modern battlefield, with nearly as many operational strategies as there are vehicle designs. In the Draconis Combine, Federated Suns and Lyran Alliance, the triple-gauss Alacorn Mk VI heavy tank is the king of direct-fire support. Mounting three Norse-Storm Model-7D gauss rifles and the impressive TharHes Digital Scanlok 347 targeting and tracking system, it quickly displaced the Schrek PPC carrier across the Successor States.

Closer to home, the Schrek is still a favorite. Compared to the AWS-8Q *Awesome*, the Schrek has a 34 percent wider field of fire and equivalent speed. Though the Schrek mounts only seven and a half tons of armor, its smaller size gives it more kilograms of armor per square meter than the *Awesome*, all for less than sixty percent of the *Awesome*'s price tag, making it quite attractive to cost-conscious commands.

For indirect fire support, few vehicles compare to the MAF's new heavy LRM carrier, with its quartet of Delta Dart missile launchers. Capable of both area saturation and firing for effect, the heavy LRM carrier is the premier support vehicle in the MAF.

Transport

Combat vehicles also include cargo craft that provide transportation when operating DropShips is not fiscally viable. The Karnov UR transport is common in the MAF. Its seven tons of cargo space prevent it from being an effective vehicle transport, but it serves as an adequate infantry carrier, and its VTOL capabilities allow it to quickly deliver two platoons of foot troops to any operational theater. Other infantry carriers active in the MAF include a variety of armored personnel carriers and the omnipresent Maxim heavy hover transport.

The Maxim is perhaps the best heavy infantry carrier ever designed. Protected by five and a half tons of ArcShield armor, it can transport a full platoon of infantry at nearly 130 kph—only thirty kph slower than the Karnov. A combination of SureShot SRM launchers and heavy machine guns provide ample covering fire while deploying troops, and three Long-Fire V LRM launchers enable it to engage targets at ranges up to 630 meters.

No facet of combat vehicles is more important, and potentially more undervalued, than troop transport.

Dragoon/Cavalry

Another role in which combat vehicles excel is that of the dragoon. Thirteen hundred years ago on Terra, dragoons were soldiers trained to fight as infantry, but who traveled by horseback. On the modern battlefield, dragoons work as scouts, skirmishers and raiders. While some medium BattleMechs—notably the *Lightray*, *Men Shen* and *Phoenix Hawk*—perform well as dragoons, equivalent combat vehicles often overmatch these units on the field. The Condor, Pegasus and Regulator hovertanks are all well suited to deployment as dragoons, as are the J. Edgar and the Fulcrum. And at less than 900,000 C-bills, the stock-model Pegasus is far more economical (not to mention faster) than a similarly armed and armored JR7-D *Jenner*.

Blue-Water Naval Operations

Though they are virtually non-existent on water-poor worlds, blue-water combat vehicles are often maintained by many of the so-called Great House militaries. Submarines, hydrofoils and displacement hull vessels protect the water-rich worlds wealthy enough to support them. Unit Thirty-one will cover these special case vessels in detail.

CONCLUSION

As we've demonstrated in this briefing, combat vehicles are ready equivalents to 'Mechs in many respects. They fulfill the same operational roles, with each suited to several tasks and excelling at some while suffering at others.

Vehicles offer flexibility and performance at a fraction of the cost of BattleMechs, and consequently are much more common whenever and wherever cost is a factor. While 'Mechs may be the "kings" of the modern battlefield, theirs is a tenuous position. Combat vehicles—when deployed appropriately—can always pose a significant threat to MechWarriors, both those affecting the invincibility mindset and those with appropriate training.

You'll need to familiarize yourself with the information presented in this briefing, pass several simulated exercises and complete any additional drills designated by your instructor before moving on to the next unit. Good luck with your exercises, and try not to get yourself killed. Remember: just like House Cameron, you're not invincible.

The Twelfth Vegan Rangers and a Shadow Division clash after stumbling on each other in a secluded clearing.

Though the BattleMech may represent the most powerful expression of thirty-first century warfare, the vast majority of the great militaries of the Inner Sphere and Periphery are comprised of conventional Combat Vehicles (often called vees). Widely varied in speed, armor, firepower and mission roles, Combat Vehicles are also cheaper to build and maintain, and enough of these "common" units can even overwhelm an unprepared BattleMech regiment in the right hands. Even the Clans, who largely disdain Combat Vehicles on general principles, have come to respect the potential of these units, and have begun to develop an ever-widening range of such units to supplement their own armed forces.

The following system enables players to construct unique Combat Vehicles for *BattleTech* games that conform to the standard rules presented in *Total Warfare*. As these rules can be fairly math-intensive, designers are encouraged to do all work on scratch paper before committing the resulting vehicle's specifications to an appropriate blank Vehicle Record Sheet.

COMBAT VEHICLE BASICS

Combat Vehicle construction relies on three primary factors: movement (motive) type, technology base and weight. These factors were broadly overviewed in the *Construction Basics* section (see p. 44). The notes below expand on these factors.

MOVEMENT (MOTIVE) TYPE

Combat Vehicles in *Total Warfare* standard play come in a variety of movement (motive) types that largely determine what their maximum tonnages may be and the terrains in which they may operate. These features are broadly outlined below. Because so much is influenced by the vehicle's movement type—including its record sheet—this factor must be decided on first in the design process.

Hovercraft: Hover Combat Vehicles are among the fastest types of ground vehicle, but are also among the lightest (with a maximum weight limit of 50 tons). Favored as scouts and harassers, they cannot traverse woods, but can cross bodies of water as easily as solid land. In order to maintain this ability, however, hovercraft must tie up at least one-fifth of their total mass in engine weight, which can restrict their weapon choices.

Naval (Displacement Hull): Also called surface naval vessels, these Combat Vehicles can weigh up to 300 tons, but are restricted to operations in water of six meters (1 Depth Level) or deeper. Typically employed in swamps, rivers or close-to-shore locales, displacement hulls may be well armored and armed, but boast average speed and are ultimately susceptible to aircraft, shoreline forces or even submerged units.

Naval (Hydrofoil): The aquatic answer to the hovercraft, hydrofoils can reach 100 tons in mass and tend to be much faster than surface vessels. Ultimately, however, they remain just as tied to deeper waters as displacement hulls, and so are rarely deployed in combat except as picket defenses or blue-water scouts.

Naval (Submarine): Submarines are the bane of all naval vehicles and of any other unit type—including BattleMechs—that dares enter their domain. Though rare because few battles occur exclusively in such depths, subs can mass up to 300 tons and boast incredible firepower and armor with such weight. Compared to other units not designed for routine underwater operations, subs are highly maneuverable and capable of dealing severe damage.

Tracked: Tracked vehicles are the most common ground-based vehicles. Massing as much as 100 tons, they can negotiate

most terrain other than heavy woods and deep water using their tracks. These Combat Vehicles often move more slowly than others, with speeds for the typical tracked vehicle often matching that of an equal-sized BattleMech.

VTOL: VTOLs are the lightest—and often the fastest—of the Combat Vehicle motive types. They range up to a maximum weight of 30 tons, and may traverse any terrain, so long as they are flying *over* it and not through it. These units usually are favored for reconnaissance work or infantry deployment, but try to avoid combat as much as possible because their armor is limited and their rotors are highly susceptible to quick destruction.

Wheeled: Wheeled vehicles typically occupy the medium speed ranges of ground vehicles; slightly faster than tracks, yet often slower than hovercraft. These vehicles can weigh up to 80 tons, and cannot negotiate rough terrain, woodlands or deep waters at all. However, they are a favored battlefield unit in open terrain and urban areas.

WiGE: Wing-in-Ground-Effect (WiGE) vehicles weigh as much as 80 tons and are essentially a hybrid between hovercraft and aircraft. These rare vehicles are fast, and favored for transport operations, but require a burst of speed to attain their low-level flight capabilities.

TECHNOLOGY BASE

In *Total Warfare* standard rules play, Combat Vehicles fall into one of two available technology bases: Inner Sphere or Clan. Inner Sphere vehicles may only use Inner Sphere equipment, while Clan vehicles may only use Clan equipment. Some Combat Vehicle structural components—notably internal structure, controls, and heat sinks—are so similar between the two that they are considered universal, and are available to Clan and Inner Sphere technology bases.

Technology Rating

In the Weapons and Equipment Tables used for creating Combat Vehicles and other units in this book, all items receive a Technology Rating in addition to a tech base. This rating (expressed as a series of letter grades that define the level of technology and its availability through the major eras of *BattleTech* history) helps to define the item's level of sophistication and may be used to help standardize the level of advancement the unit demonstrates for purposes of era-based campaigning. Beyond this, however, an item's Tech Rating has no direct bearing on Combat Vehicle design. See *Costs and Availability* (p. 274) for more information on Tech Rating.

OmniVehicles

OmniVehicles—Combat Vehicles designed for rapid reconfigurations between missions—are available to both Clan and Inner Sphere technology bases. OmniVehicles use the same construction rules featured here, but when an Omni is made, the designer must first establish its base configuration. This base configuration includes the OmniVehicle's chassis, engines, control systems, armor, and—if desired—any additional weapons, heat sinks and power amplifiers that may be considered "hardwired" into its design. The remaining weight and space is then left open for "pods" that can mix and match additional weapons and other components. "Fixed" equipment must be allocated to the vehicle's inventory per normal rules and may not vary between alternative configurations of the OmniVehicle. Also, a base OmniVehicle configuration is never considered a finished unit, and is generally not legal for *Total Warfare* standard rules play (as such units are essentially open frames of empty pods). Only the completed primary and alternate configurations of an OmniVehicle (which must always comply with the rules for constructing standard Combat Vehicles) are considered legal for game play.

WEIGHT (TONNAGE)

Under these rules, Combat Vehicles use the tonnage standard, and may—based on the motive type chosen—run the gamut from 1 ton to 300 tons (increasing in increments of 1 ton).

Weight Classes

Combat Vehicles are broadly grouped into the same four main weight classes BattleMechs use, based on their tonnage. Because their tonnage maximum varies with motive types, however, some Combat Vehicle types do not commonly exist in some weight classes. Nevertheless, many designs in these weight classes share similar features across the various motive types.

Light vehicles (weighing 39 tons and under) typically sacrifice armor and firepower for speed. Because their engines and structures are better suited for use as scouts and light security, VTOLs and hovertanks often dominate this class, while wheeled and tracked units often serve as urban scouts and anti-infantry vehicles.

Medium Combat Vehicles (weighing 40 to 59 tons) usually strike a balance between armor, speed and firepower. Most of these units are tailored for raiding, mobile attack missions or infantry transport and support. Hovercraft and wheeled vehicles usually shine in these roles, though newer technologies have allowed even tracked vehicles to competitively enter this arena.

Heavy Combat Vehicles (weighing 60 to 79 tons) usually focus more on delivering solid firepower at a respectable speed. Dominated by tracked and wheeled vehicle types, these units tend to be heavy support vehicles, such as missile carriers, and main battle tanks.

Assault Combat Vehicles weight 80 tons and up, and typically possess minimal mobility, as most of their weight is devoted to armor and weaponry. Though often barely faster than conventional infantry, these vehicles make prime defensive units and picket forces, and—in the right hands—can boast enough firepower to cripple a BattleMech.

Internal Space

In Combat Vehicle design, internal space is less defined than it is for BattleMechs. Nevertheless, a direct correlation exists between the weight of the vehicle and the amount of weapons and other items it may carry. Thus, determining weight also determines the internal space (weapon slots) a Combat Vehicle receives.

DESIGNING COMBAT VEHICLES

The process of Combat Vehicle design can be organized into six simple steps, each described below:

Step 1: Design the Chassis—Determine the vehicle's motive type, tech base, weight, and internal structure.

Step 2: Install Engine and Control Systems—Determine the Combat Vehicle's Engine Rating, type and size, add control systems and any necessary lift/dive equipment.

Step 3: Add Heat Sinks—Determine number and tonnage for the Combat Vehicle's heat sinks, if any.

Step 4: Add Armor—Determine type, amount and weight of armor, and allocate armor points.

Step 5: Install Weapons and Equipment—Add weapons and other gear to the Combat Vehicle.

Step 6: Complete the Record Sheet.

The above design process is a framework for designing a Combat Vehicle. The actual process—particularly after the chassis, engine and control systems are determined—can involve a bit more flexibility as weapons, armor and heat sinks are balanced for their best fit in terms of tonnage and space. For instance, some designers might wish to assign armor as soon as the engine and chassis are settled, perhaps to maximize the vehicle's protection before dealing with heat sinks and weapons. Others may want to choose weapons before adding more heat sinks, to see how many might be needed in addition to those that come free with the engine.

To assist in this effort, the designer may find it useful to make copies of an appropriate blank Vehicle Record Sheet (in the back of this book), to visually arrange the placement of weapons and equipment while tracking the use of tonnage on a piece of scratch paper. Alternatively, designers with access to a PC and *HeavyMetal Vee* can use that design software to develop their Combat Vehicle electronically.

STEP 1: DESIGN THE CHASSIS

The first step in Combat Vehicle design is the creation of the vehicle's basic framework, or chassis. This step establishes some of the bedrock aspects of the Combat Vehicle's design, determining what kind of vehicle it is, its technology base, its weight class and its movement (motive) type. These choices will restrict the designer's access to certain equipment, and will also determine the weight and bulk of the vehicle's internal structure.

CHOOSE MOTIVE TYPE

Combat Vehicles come in a variety of motive types, which can affect their maximum tonnage, terrain restrictions and engine efficiencies. Because of this, choosing a Combat Vehicle's motive type is the first key part of the chassis design process. Even the selection of a proper blank Record Sheet for use in vehicle design hinges on the choice of motive type first.

The Combat Vehicle Motive Types Table below provides the key data that applies to Combat Vehicle design and game play. Each motive type covered by these rules is listed in the Motive Type column, and has its own Maximum Tonnage (beyond which Combat Vehicles of that motive type may not be constructed) and Restricted Terrains (areas impassable to units of that motive type in *Total Warfare* game play). The Combat Vehicle Record Table, meanwhile, determines which blank Record Sheet must be used to record the construction of a new Combat Vehicle from a given motive type.

COMBAT VEHICLE MOTIVE TYPES TABLE

Motive Type	Maximum Tonnage	Restricted Terrain
Hover	50	Woods (Light and Heavy)
Naval (Displacement Hull)	300	All except Water (Depth 1+)
Naval (Hydrofoil)	100	All except Water (Depth 1+)
Naval (Submarine)	300	All except Water (Depth 1+)
Tracked	100	Woods (Heavy), Water (Depth 1+)
VTOL	30	Any Woods, Hills, or Structures at same altitude*
Wheeled	80	Rough, Rubble, Woods (Light and Heavy), Water (Depth 1+)
Wing-in-Ground Effect (WiGE)	80	Any Woods, Hills, or Structures at same altitude

*VTOL units may not operate on the High-Altitude Map

COMBAT VEHICLE RECORD SHEET TABLE

Motive Type	Record Sheet
Hover, Tracked, Wheeled or WiGE	Ground
Naval (Displacement Hull, Hydrofoil or Submarine)	Naval
VTOL	VTOL

Michael wants to design a fast and flexible scout and attack unit, and decides on a hovercraft, which he chooses to name the Hephaestus. In preparation for the design process, he gets a copy of a blank Ground Vehicle Record Sheet ready.

Nathaniel is designing an airborne vehicle ideal for recon and attack missions, and selects a VTOL motive type. He chooses the name Yellow Jacket for this unit. Nathaniel prepares a blank VTOL Record Sheet to aid in his design.

Patrick has a more conventional battle tank in mind for his vehicle, and so decides that his unit, the Zhukov, will be a tracked vehicle. Patrick notes from the Combat Vehicle Record Sheet Table that he will use a Ground Vehicle Record Sheet for his design.

Rick is looking for a rare item in the BattleTech universe: a submersible coastal defense unit. Naming this craft the Neptune, he decides on a naval (submarine) motive type. Rick must use a Naval Vehicle Record Sheet to plan out his design.

CHOOSE TECHNOLOGY BASE

Combat Vehicles may be constructed using either Clan or Inner Sphere technology bases. Vehicles constructed using either tech base may be built as OmniVehicles.

Because he plans to create this design for a Clan game, Michael chooses a Clan Technology Base for his Hephaestus, and further decides to maximize its flexibility by developing it as an OmniVehicle.

Nathaniel chooses the Inner Sphere Technology Base for his Yellow Jacket, and has elected not to make it an OmniVehicle.

Patrick sees his Zhukov as a barebones Capellan-made design, and so he selects an Inner Sphere Technology Base and opts not to make it an Omni.

Rick chooses an Inner Sphere Technology Base for his Neptune, and also decides not to make it an Omni.

CHOOSE WEIGHT (TONNAGE)

As noted above, depending on the Combat Vehicle's chosen motive type, its maximum weight will vary greatly (see p. 96). Designers are free to choose any tonnage desired (in full-ton increments, starting from 1 ton) up to the maximum weight for their Combat Vehicles, though in the age of BattleMechs, few Combat Vehicles weigh less than 20 tons. The total weight of the Combat Vehicle's engine, weapons, armor and other components may not exceed this amount. Any unspent tonnage left after the creation process must be noted as cargo, if the Combat Vehicle still has space to spare, or is classified as wasted tonnage.

This Pinto Attack VTOL sweeps through the ruins of Harlech during the height of the Word of Blake assault on Outreach.

Space

In addition to determining the maximum total weight of all equipment and components that comprise the vehicle, a Combat Vehicle's tonnage also determines the maximum number of weapons and items that may be installed. Regardless of motive type, for all Combat Vehicles this equipment space limit is 5 items, plus 1 additional item for every 5 tons of Combat Vehicle weight (rounded down). A 22-ton VTOL, for example, may carry up to 9 items of equipment (5 + [22 ÷ 5] = 9.4, round down to 9), while a 45-ton hovertank may carry up to 14 items (5 + [45 ÷ 5] = 14). Unless otherwise noted in the equipment's rules, the open construction of Combat Vehicles allows them to treat all weapons and equipment as 1 "slot" of items, regardless of the mass or BattleMech critical space of the item in question.

Michael plans to make his Hephaestus a nimble speedster. Because it is a hover vehicle, the Hephaestus has a maximum weight limit of 50 tons. Mike decides that a nice, round 30 tons will be suitable for his needs. At this weight, he calculates that the vehicle will have 11 items of weapon and equipment space (5 + [30 tons ÷ 5] = 11 items).

As a VTOL, Nathaniel's Yellow Jacket cannot exceed a 30-ton maximum weight for its motive type. With ambitious plans in mind, he chooses to design his Jacket as a 30-tonner. The Yellow Jacket also has space for 11 items (5 + [30 tons ÷ 5] = 11 items).

Patrick decides his Zhukov will weigh in at 75 tons, on the heavy side of the 100-ton maximum permissible for tracked vehicle types. At this weight, the Zhukov has space for up to 20 items (5 + [75 tons ÷ 5] = 20 items).

Rick decides his Neptune should be large, to maximize its armor and firepower in underwater combat. He chooses a weight of 100 tons, noting that—as a submarine—he could have gone as high as 300 tons. The 100-ton weight nonetheless gives the Neptune space for 25 items (5 + [100 tons ÷ 5] = 25 items).

Mantis Light Attack VTOL, Thirty-sixth Division (Word of Blake)

ALLOCATE TONNAGE FOR INTERNAL STRUCTURE

All Combat Vehicles have an internal structure that represents their internal framework. The weight of this structure is equal to 10 percent of the Combat Vehicle's total weight (rounded up to the nearest half-ton). Unlike BattleMechs, Combat Vehicles built using these rules may not make use of weight-saving structural technologies like endo-steel.

The Combat Vehicle's total mass also determines the number of internal structure points each of its locations receives. The number of internal structure points per location (including the optional turret) is also equal to 10 percent of the vehicle's tonnage, rounded up to the nearest whole number. For example, a 45-ton Combat Vehicle would receive 5 points per location (10 percent of 45 tons = 0.10 x 45 tons = 4.5, rounded up to 5).

When using the blank Vehicle Record Sheet, the designer should mark out any excess internal structure circles—those located within the gray-shaded portions of each location in the Armor Diagram—for all locations, to leave untouched only the number of circles in each hit location equal to the internal structure value. If no turret is assigned to the vehicle (see *Turrets*, below), then all internal structure circles for the Turret location must be blacked out.

Unlike BattleMechs, a Combat Vehicle's Maximum Armor Factor is not determined by the number of internal structure points it receives, but by its total tonnage. See *Add Armor*, p. 105 for the rules governing a Combat Vehicle's Maximum Armor Factor.

The Combat Vehicle Internal Structure Locations Table below outlines which locations and record sheets apply to the various types of Combat Vehicles constructed using these rules. The internal structure points on Combat Vehicles—like those on BattleMechs, IndustrialMechs, ProtoMechs, and Support vehicles—may not be redistributed to other body locations.

Turrets: Like the Main Gun location on a ProtoMech, turrets are optional components available to all Combat Vehicle types covered by these rules except for VTOLs. If installed, a turret automatically receives the same number of internal structure points as the vehicle's other locations, but does not directly affect the structure tonnage. Turrets instead add weight in the form of an independent "turret tonnage" equal to 10 percent of the total mass of all weapons and equipment mounted in them (rounded up). As this decision may not be made until the designer is ready to add weapons and other equipment to the Combat Vehicle design, the designer need not establish the turret weight at this point, but should decide whether or not the vehicle is to have a turret. (See the rules regarding OmniVehicles below for an exception.)

All Combat Vehicles constructed under these rules may carry only 1 turret, except for VTOLs, which may not carry turrets.

Rotors: All VTOLs automatically receive a Rotor location, and must allocate internal structure boxes to that location as well. Unlike the turret for other Combat Vehicle types, rotors are not optional for VTOLs, nor may any equipment or weapons be mounted in the Rotor location.

Tractor/Trailer Vehicles: At the designer's option, Combat Vehicles with a Tracked or Wheeled motive type may be built as Tractor or Trailer Units. These units must include a hitching mechanism into their frames at no cost in weight, but 1 item slot per hitch. Hitches may be place in the front or rear locations (or even both) for both Tractor and Trailer units (Tractors with a hitch in front are effectively "push tractors", while Tractors with a hitch in the back are more conventional "pullers").

Units built as Trailers do not require an engine, control systems, or crew, unless they are also expected to operate without a suitable Tractor unit or are expected to employ heavy weapons and equipment while operating independently of a unit with an engine.

Tractors need not have the same motive type as their Trailers, but when operating as a unit, a combined Tractor/Trailer unit is treated as though it has the most restrictive motive system of the two. See the Tractor/Trailer rules in Step 2 (p. 101) to determine the speed of a combined Tractor/Trailer unit.

Tech Base: The standard structure used by Combat Vehicles is equally available to vehicles of Clan or Inner Sphere tech bases.

Space: A Combat Vehicle's standard internal structure does not affect the amount of item space available, unless the unit is built as a Tractor or Trailer unit (in which case, one item slot is occupied per hitching mechanism).

OmniVehicles: As the arrangement of internal structure circles is fixed across all Combat Vehicle types and no item space is occupied by structure, OmniVehicle designers must note at this time only whether or not the Combat Vehicle's base configuration is to mount a turret. If so, the turret tonnage must be pre-determined at this stage, based on the maximum tonnage of weapons the designer may wish to place in the Turret location.

With a weight of 30 tons, Mike determines that his Hephaestus' internal structure will weigh 3 tons (10 percent of 30 tons = 0.10 x 30 tons = 3 tons). He also determines that the Hephaestus will receive 3 internal structure points per location (10 percent of 30 tons = 0.10 x 30 tons = 3).

As the Hephaestus is an OmniVehicle, Mike must determine at this time whether or not it will have a turret, and how much said turret will weigh. He decides to equip the unit with a turret that can mount up to 5 tons' worth of weapons, and so spends an additional 0.5 tons on turret equipment (10 percent of 5 tons [expected mass of turret weapons] = 0.10 x 5 tons = 0.5 tons). This leaves the Hephaestus with 26.5 tons of unspent weight (30 tons – 3 tons [structure] – 0.5 tons [turret] = 26.5 tons).

On the Hephaestus' Armor Diagram, Mike blacks out all but 3 circles in each of the five gray-shaded areas that indicate the vehicle's internal structure.

Nathaniel's Yellow Jacket weighs 30 tons as well, and so he also computes a 3-ton weight for internal structure (10 percent of 30 tons = 3 tons). He also computes a 3-point value for each of the VTOL's internal structure locations, including the rotor (10 percent of 30 tons = 3 points per location). Because the record sheet already shows 3 points per location for the VTOL's internal structure, Nathaniel has no structure circles to black out (but if he had built his Yellow Jacket 10 tons lighter, he would have).

The Yellow Jacket has 27 unspent tons remaining (30 tons – 3 tons = 27 tons).

Patrick's Zhukov weighs 75 tons. From that he finds that its internal structure will weigh 7.5 tons (10 percent of 75 tons = 0.10 x 75 tons = 7.5 tons). The number of structure points provided per location, meanwhile, will be 8 (10 percent of 75 tons = 0.10 x 75 = 7.5, rounded up to 8 points). Because he plans on mounting a turret, Patrick blacks out all but 8 circles in each of the 5 internal structure locations on his Zhukov's Armor Diagram.

Because the Zhukov is not an OmniVehicle, however, Pat will not need to compute the turret's weight at this time, and so he still has 67.5 unspent tons remaining (75 tons – 7.5 tons = 67.5).

At 100 tons, Rick's Neptune will need to spend 10 tons on internal structure (10 percent of 100 tons = 10 tons), and will receive 10 points of internal structure per location as a result (10 percent of 100 = 10 points). Rick decides, however, that his sub will not require a turret, and so he blacks out all of the circles in the Turret location on the Neptune's Armor Diagram (including the internal structure circles in the gray-shaded area and the armor circles in the unshaded Turret area). For the other four locations (Front, Left, Right and Rear), Rick only blacks out all the excess structure circles, leaving 10 per location.

The Neptune now has 90 tons left to spend (100 tons – 10 tons = 90 tons).

A contingent of Twelfth Vegan Rangers, Saladin Hover Tanks, speed down the M6 Motorway.

STEP 2: INSTALL ENGINES AND CONTROL SYSTEMS

The second step in Combat Vehicle design is the installation of the vehicle's engines and control systems. This step establishes the key factors in the Combat Vehicle's mobility, including the size and performance of its engine, the mass of its lift/dive systems (if any) and the weight of the control systems the crew uses during battle.

INSTALL ENGINE

Under these rules, each Combat Vehicle carries one engine to power its movement, weapon systems and other integral components. The relative output of this engine is measured by the vehicle's Engine Rating, which is directly determined by the vehicle's total weight and its desired speed, as modified by its suspension factor.

To compute a Combat Vehicle's Engine Rating, the designer simply multiplies the vehicle's tonnage by its desired Cruising MP, then subtracts from this result the suspension factor appropriate to the vehicle's tonnage and motive type. A vehicle's Flank MP is also calculated at this time; multiply the Cruising MP by 1.5 and round up to the nearest whole number. The Engine Rating and Mobility Formulas Table below provides the formulas for computing Combat Vehicle Engine Ratings and also provides the suspension factors for various Combat Vehicle motive types and weights.

Under these rules, no Combat Vehicle may be constructed with an Engine Rating below 10 or above 400. An engine may never have a negative rating. If, through the formulas presented, a designer finds the desired speed and tonnage of the vehicle will produce an Engine Rating below 10, the designer must either upgrade the vehicle's speed until it reaches the minimum rating required, or consider the engine to have a final Rating of 10, regardless of the vehicle's MP. Also, if the Engine Rating attained

ENGINE RATING AND MOBILITY FORMULAS

Base Engine Rating = Vehicle Tonnage x Desired Cruising MP
Final Engine Rating = Base Engine Rating – Suspension Factor*
Flank MP = Desired Cruising MP x 1.5 (round up)

*Minimum Final Rating = 10; Maximum Final Rating = 400; Round up results to the nearest multiple of 5.

Combat Vehicle Suspension Factors			
Motive Type (Weight*)	Suspension Factor	Motive Type (Weight*)	Suspension Factor
Hovercraft		Naval	
(01-10 tons)	40	Displacement Hull (All)	30
(11-20 tons)	85	Submarine (All)	30
(21-30 tons)	130	Tracked	
(31-40 tons)	175	(All)	0
(41-50 tons)	235	VTOL	
Naval – Hydrofoil		(01-10 tons)	50
(01-10 tons)	60	(11-20 tons)	95
(11-20 tons)	105	(21-30 tons)	140
(21-30 tons)	150	Wheeled	
(31-40 tons)	195	(All)	20
(41-50 tons)	255	WiGE	
(51-60 tons)	300	(01-15 tons)	45
(61-70 tons)	345	(16-30 tons)	80
(71-80 tons)	390	(31-45 tons)	115
(81-90 tons)	435	(46-80 tons)	140
(91-100 tons)	480		

* Weight is the target tonnage for the entire Combat Vehicle

is not evenly divisible by 5, the designer must round the result up to the nearest Engine Rating.

Combat Vehicles must select their engines from the Master Engine Table (see p. 49), which lists the tonnage taken up by engines of various types and ratings. Combat Vehicles may only use ICE and Fusion engine types. Furthermore, when installing any form of fusion engine (including Compact, Standard, Light or XL engines), the listed weight must be increased by 50 percent (multiply the engine's weight on the table by 1.5, rounding up to the nearest half-ton). This reflects the weight of additional shielding and such.

Fuel Capacity and Range: Fuel consumption is not tracked in *Total Warfare* standard rules play, and fuel-using Combat Vehicles have their fuel automatically included in the mass of their engine, rather than needing to allocate weight for it. However, if you wish to calculate the range for Combat Vehicles with ICE and Fuel Cell engines, assume a fuel mass equal to 10% of the engine's mass, as found on the Master Engine Table. Range is then calculated by using the Support Vehicle fuel rules (see p. 129), referencing the appropriate engine type (see p. 127).

Hovercraft: Hovercraft Combat Vehicles have a minimum engine weight (including added shielding) equal to 20 percent of their total weight. If the desired movement rates and the vehicle's tonnage would result in an engine that weighs less than this minimum, the engine is automatically increased in weight—but not performance—to meet this requirement. For example, a 45-ton hovertank has a minimum engine weight of 9 tons (20 percent of 45 tons = 9 tons). If this vehicle then attempts to install an ICE engine that provides 6 Cruising MP, it can either accept that its 35-Rated ICE (Engine Rating 35: [45 tons x 6 Cruising MP] – 235 Suspension Factor = 35) weighs 9 tons rather than its customary 2-ton weight, or it can upgrade its speed until it finds a "legitimate" rating-to-weight ratio.

Tractor/Trailer Vehicles: Combat Vehicles with a Tracked or Wheeled motive type may be built as Trailers. Trailers do not require an engine, control systems, or crew, unless they are also expected to operate without a suitable Tractor unit or are expected to employ heavy weapons and equipment while operating independently of a unit with an engine (in which case, a minimum Engine Rating of 10 applies).

The MPs of a combined Tractor/Trailer unit may vary during gameplay. The Cruise MP of a combined Tractor/Trailer unit is equal to the sum of the Engine Rating of the primary Tractor unit (the one doing all the towing/pushing) plus the lowest Suspension Factor of the combined units, then divided by the combined weight of the Tractor and its Trailer(s) (rounded down). The Flank MP is then computed normally by multiplying the Cruise MP by 1.5, and rounding up to the nearest whole number. Thus, a 15-ton Wheeled Tractor with an Engine Rating of 55 and Suspension Factor 20, towing a 10-ton Wheeled Trailer (Suspension Factor 20), would have a combined Tractor/Trailer MP of 3 Cruise and 5 Flank MP ([Engine Rating 55 + lowest suspension factor of 20] / [15 Tractor tons + 10 Trailer tons] = 75/25 = 3 MP; 3 Cruise MP x 1.5 = 4.5MP; round up to 5 Flank MP).

WiGEs: These vehicles must be constructed with a minimum of 5 Cruising MP.

Tech Base: The standard ICE and Fusion engines used by Combat Vehicles are equally available to vehicles of Clan or Inner Sphere tech bases. Vehicles constructed with an Inner Sphere Technology Base may also use Compact, Light and Inner Sphere XL Fusion engine types, but not Clan XL engines. Vehicles constructed with a Clan Tech Base may use Clan XL engines, but not Compact, Light or Inner Sphere XL engines.

Space: If a Combat Vehicle uses an ICE or Standard Fusion engine, the maximum number of items the vehicle may carry is unaffected. Other engine types—such as Compact, Light Fusion, and Extralight (XL) engines—will cost (or add, as in the case of the Compact Fusion engine type) a number of open slots, as indicated in the Combat Vehicle Engine Space Table below.

Any reduction (or addition) of equipment slots should be determined at this time.

OmniVehicles: The engine type, rating and any reduction of equipment slots must be established when designing an OmniVehicle's base configuration, and may not be altered in the vehicle's completed primary or alternate configurations.

Because his Hephaestus is intended primarily as a recon unit, high speed is Michael's primary focus. He thus decides to give the hovertank a Cruising MP rate of 8 (thus attaining a Flank MP of 12, as 8 MP x 1.5 = 12 MP). This means that the Hephaestus' Base Engine Rating will be 240 (30 tons x 8 MP = 240). However, Mike also notes that according to the Combat Vehicle Suspension Factors Table, a hovertank weighing 21 to 30 tons has a Suspension Factor of 130. This means Mike's vehicle will have a Final Engine Rating of 110 (240 Base Engine Rating – 130 Suspension Factor = 110 Final Engine Rating).

Looking at the Master Engine Table, Michael notes that a standard 110-rated fusion engine weighs 3.5 tons, but because it is a fusion engine, he must add another 50 percent to this figure to account for added shielding, raising the engine weight to 5.5 tons (3.5 tons x 1.5 = 5.25 tons, rounded up to the nearest half-ton for 5.5). However, even then the engine weighs less than the minimum 6 tons he needs to devote to engine mass for his hover vehicle (20 percent of 30 tons = 0.2 x 30 tons = 6 tons). Rather than increase the vehicle's speed to a Cruising MP of 9 (which would produce an Engine Rating of 190, and require a 7.5-ton fusion engine), Mike accepts an automatic increase of half a ton in engine weight to "force" the engine to a 6-ton size (5.5

COMBAT VEHICLE ENGINE SPACE TABLE

Engine Type	Item Slots Lost (Inner Sphere)	(Clan)
ICE	0	0
Military Fusion (Standard)	0	0
Extralight Fusion (XL)	2	1
Light Fusion	1	Not Available
Compact Fusion	-1*	Not Available

*Using a Compact Fusion engine adds 1 free item slot to any Combat Vehicle design.

tons [engine with shielding] + 0.5 tons [added weight] = 6 tons). Because he opted to use a standard Fusion engine rather than an XL, Michael's hovertank loses no item slots to engine installation.

Upon installing the engine, Mike notes that his Hephaestus still has 20.5 unspent tons remaining (26.5 tons – 6 tons = 20.5 tons).

Nathaniel wants his Yellow Jacket to be fast, but is also thinking about packing some heavy firepower on it, so he decides on a modest VTOL Cruising speed of 6 MP. This gives the Jacket a Flank speed of 9 MP (6 Cruising MP x 1.5 = 9 Flank MP). It also yields an Engine Rating of 40 ([30 tons x 6 Cruising MP] – 140 Suspension Factor [for a 30-ton VTOL] = 40 Final Engine Rating). To keep production costs low, Nathaniel opts for an internal combustion engine. On the Master Engine Table (p. 49), he finds that a 40-rated ICE weighs only 2 tons, leaving the Yellow Jacket with 25 unspent tons remaining (27 tons – 2 tons = 25 tons).

Because he opted to use a standard IC engine rather than a Light or XL Fusion plant, Nathaniel's VTOL loses no item slots to engine installation.

Patrick plans to devote more of his Zhukov's weight to armor and weapons, and because he wants to make this vehicle a defensive battle tank, he decides on a Cruising MP of 3. This requires an Engine Rating of 225 ([75 tons x 3 Cruising MP] – 0 Suspension Factor [for tracked vehicles of any size] = 225 Final Engine Rating). Like Nathaniel, Pat plans to keep the costs low on this design, and so he also opts for an ICE over a Fusion engine. The Master Engine Table shows that a 225-Rated ICE will take up a hefty 20 tons. (By way of comparison, an identically rated standard Fusion engine would weigh 15 tons, with its added shielding, but would drive up the Zhukov's C-bill cost dramatically.)

Sticking with his choice, Pat computes that his Zhukov still has 47.5 unspent tons left (67.5 tons – 20 tons = 47.5 tons), and has a Flank MP rate of 5 (3 Cruising MP x 1.5 = 4.5 Flank MP, rounded up to 5). Like Nathaniel's VTOL, Patrick's tracked vehicle loses no item slots because it uses a standard IC engine, rather than a Light or XL Fusion plant.

For his Neptune submarine, Rick feels a Cruising MP of 3 is fine for underwater movement. Like Nathaniel and Patrick, he also opts for a cheaper ICE to do the job, and computes an Engine Rating of 270 for the vessel ([100 tons x 3 Cruising MP] – 30 Suspension Factor for submarines of any weight = 270 Final Engine Rating). The weight of a 270-rated ICE comes to 29 tons, leaving 61 tons unspent so far (90 tons – 29 tons = 61 tons). The Neptune's engine will provide a Flank MP rate of 5 (3 Cruising MP x 1.5 = 4.5, rounded up to 5 MP), so long as the boat stays in the water. The use of the IC engine does not reduce the Neptune's maximum number of items.

ADD LIFT/DIVE EQUIPMENT OR ROTORS

Some Combat Vehicles require special equipment to enable their motive systems to function properly. VTOL Combat Vehicles require rotors, while hovercraft, hydrofoils and wing-in-ground effect (WiGE) vehicles use lift equipment and submarines use dive equipment. Regardless of the name, all of these systems cost 10 percent of the Combat Vehicle's weight (rounded up to the nearest half-ton).

Tech Base: Rotors and lift/dive equipment are standardized, and equally available to vehicles of Clan or Inner Sphere tech bases.

Space: Combat Vehicle rotors or lift/dive equipment do not affect the amount of item space available.

OmniVehicles: As rotors and lift/dive equipment are required for hovercraft, hydrofoils, submarines, VTOLs and WiGEs, their weight—where applicable to the OmniVehicle's motive type—may not change between an OmniVehicle's base, primary or alternate configurations.

Michael's Hephaestus is a hovercraft, which requires lift equipment to remain aloft during movement. The weight of this equipment is 3 tons (10 percent of 30 tons = 0.1 x 30 tons = 3 tons), leaving the vehicle with 17.5 unspent tons remaining (20.5 tons – 3 tons = 17.5 tons).

Nathaniel's Yellow Jacket VTOL needs to invest 10 percent of its weight into its rotor equipment. This will leave the craft with 22 unspent tons (25 tons – 3 tons = 22 tons).

Patrick's Zhukov, as a tracked Combat Vehicle, has no need for lift or dive equipment and rotors. It thus still has 47.5 tons remaining.

At 100 tons, the dive equipment for Rick's Neptune comes to 10 tons (10 percent of 100 tons = 10 tons). The vessel still has 51 tons of unspent weight (61 tons – 10 ton = 51 tons).

Patton Tank, First Canopian Cuirassiers (Magistracy of Canopus)

DETERMINE JUMP CAPABILITY

Combat Vehicles built under these rules may not possess jump capability as BattleMechs do, and therefore may not mount jump jets.

ADD CONTROL SYSTEMS

Every Combat Vehicle must have control systems, reflecting cockpits or crew stations from which the vehicle is operated. These control systems provide sensors and basic life support, but do not include ejection systems. The weight these systems take up is equal to 5 percent of the Combat Vehicle's weight, rounded up to the nearest half-ton (regardless of motive type).

Tractor/Trailers: Combat Vehicles built as Trailer units do not require control systems unless they are also expected to operate without a suitable Tractor unit or are expected to employ heavy weapons and equipment while operating independently of a unit with an engine.

Tech Base: Vehicular control systems are standardized and equally available to vehicles of Clan or Inner Sphere tech bases.

Space: Combat Vehicle control systems do not affect the amount of internal equipment space available.

OmniVehicles: As control systems are required for all Combat Vehicle types, their tonnage—once established for the OmniVehicle's base configuration—may not change between its base, prime or alternate configurations.

Crew: Though not generally tracked in *Total Warfare* standard rules play, larger Combat Vehicles typically have larger crews. To reflect this, Combat Vehicles are presumed to have 1 crewman for every 15 tons of vehicle weight (or fraction thereof). Combat Vehicles are always assumed to have the crew stations required for all their crew members (including any supplemental crew derived from equipment).

Trailer units without engines or heavy weapons and equipment do not require crew.

The controls for Michael's Hephaestus weigh in at 1.5 tons (5 percent of 30 tons = 0.05 x 30 tons = 1.5 tons), leaving the vehicle with 16 unspent tons remaining (17.5 tons – 1.5 tons = 16 tons). Michael further computes that his Hephaestus operates on a 2-man crew (30 tons ÷ 15 tons per crewman = 2 crewmen).

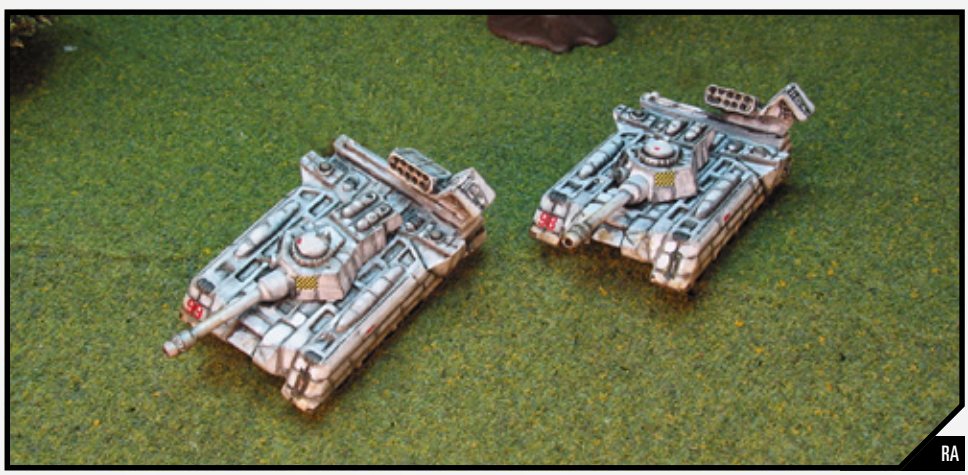
Nathaniel's Yellow Jacket VTOL requires 1.5 tons' worth of control equipment as well (5 percent of 30 tons = 0.05 x 30 tons = 1.5 tons), leaving 20.5 tons remaining (22 tons – 1.5 tons = 20.5 tons). The VTOL also requires a crew of 2 to operate (30 tons ÷ 15 tons per crewman = 2 crewmen).

Patrick's Zhukov, a significantly heavier vehicle, requires 4 tons of control systems to operate (5 percent of 75 tons = 0.05 x 75 = 3.75, which rounds up to 4 tons). This leaves the tank with 43.5 tons remaining (47.5 tons – 4 tons = 43.5 tons). Based on the crew formula, the Zhukov needs 5 crewmen to operate it (75 tons ÷ 15 tons per crewman = 5 crewmen).

The controls for Rick's 100-ton Neptune come to 5 tons (5 percent of 100 tons = 5 tons), bringing the vessel's unspent weight down to 46 tons (51 tons – 5 tons = 46 tons). To operate, the Neptune requires a crew of 7 (100 tons ÷ 15 tons per crewman = 6.67, rounded up to 7 crewmen).

SPECIAL PHYSICAL ENHANCEMENTS

Under these rules, no special physical enhancements pertaining to Combat Vehicles are widely available to either the Inner Sphere or the Clans. Combat Vehicles may not use equipment such as MASC or Triple-Strength Myomers.



A pair of Word of Blake Von Luckner Heavy Tanks patrol the edges of a thick forest.

STEP 3:
ADD HEAT SINKS

Because they handle heat differently than BattleMechs, only Combat Vehicles that use energy weapons require the installation of heat sinks to vent the waste heat such weapons generate. If a Combat Vehicle mounts no energy weapons, it requires no heat sinks. The minimum number of heat sinks required by a vehicle equals the total amount of heat generated by firing all of its energy weapons simultaneously.

As noted in the Combat Vehicle Bonus Heat Sink Table below, Combat Vehicles that use a fusion engine automatically receive 10 heat sinks at no cost in tonnage (as they are considered part of the engine). ICE-powered vehicles receive no free sinks. Additional heat sinks may be installed beyond this free amount, at a cost of 1 ton per heat sink.

Combat Vehicles may use only single (standard) heat sinks.

Tractor/Trailers: Trailer units carrying energy weapons must mount their own heat sinks like any other Combat Vehicle type.

Tech Base: The standard heat sinks used in vehicle construction are equally available to vehicles of Clan or Inner Sphere tech bases.

Space: Combat Vehicle heat sinks do not affect the amount of item space available, even if mounted in the form of OmniVehicle pods. Heat sinks are considered to be located deep within the vehicle's body.

OmniVehicles: OmniVehicles of Clan or Inner Sphere design may add more heat sinks at this stage, or—at the designer's option—may stick with whatever weight-free sinks they may receive from their fusion engines. Additional heat sinks for later alternate configurations may be mounted in Omni-pods like other weapons and equipment (at a cost in weight, but not item space). Such additional sinks may then be easily determined by the vehicle's configuration, based on its chassis and the total heat of all energy weapons on that configuration.

COMBAT VEHICLE BONUS HEAT SINKS TABLE

Combat Vehicle Engine Type	Weight-Free Heat Sinks
ICE	0
Fusion*	10

* Includes Compact, Standard, Light and XL engine types.

The fusion engine installed on Michael's Hephaestus provides 10 heat sinks without cost. Mike decides that this is sufficient for his hovertank's needs, noting that—as an OmniVehicle—he can always add more if a later configuration so requires. As heat sinks occupy no space in a Combat Vehicle design, the Hephaestus loses no item slots for having sinks.

Nathaniel's Yellow Jacket VTOL uses an ICE, and so receives no free heat sinks. Because he does not plan to install energy weapons, he elects not to add any.

Patrick's Zhukov is also being planned as a ballistic-based Combat Vehicle, and so he is equally satisfied with having no heat sinks due to the selection of an IC engine.

Rick has decided to mount energy weapons on his Neptune, but because he has chosen an internal combustion engine, he has received no free heat sinks to handle any such weapons. With his eye on a standard large laser, he decides to add 8 heat sinks to the vessel, to vent the 8 points of heat the weapon would generate. At 1 ton per heat sink, Rick finds that he has 38 unspent tons remaining (46 tons – 8 tons = 38 tons).

Heat sinks take up no item space in Combat Vehicle design, so Rick moves on to the next step.

A pair of Blood Spirit Shamash vehicles deploys with a Warhammer IIC.

STEP 4: ADD ARMOR

Armor helps protect the Combat Vehicle's internal structure and critical components. Depending on the tech base used and the type of armor selected for a Combat Vehicle, armor can vary in tonnage and item space.

Unlike BattleMechs, which limit their armor maximums by body locations, the maximum amount of armor a Combat Vehicle may mount is not based on the number of points of internal structure it has, but on its total tonnage. Regardless of the technology base chosen, a Combat Vehicle may mount a number of armor points equal to 3.5 times the vehicle's weight, plus 40 (rounded down to the nearest whole number). This limit applies regardless of the type of armor chosen, but with the exception of VTOL rotors, no Combat Vehicle's hit location has an actual maximum limit (unlike BattleMechs). VTOL rotors have a maximum armor limit of 2 points, regardless of the unit's size.

Armor may be mounted in full- or half-ton lots, and provides a base amount of 16 points per ton of standard armor (8 points per half ton). The use of alternative armor types (such as ferro-fibrous) can modify this amount as shown in the Combat Vehicle Armor Table below, allowing for generally higher points-per-ton ratios at a cost in greater bulk (and fewer item slots on the vehicle's inventory).

To determine the armor value provided by these alternative armor types, multiply the base armor value (16 points per ton) by the Base Armor Multipliers shown for the appropriate armor type in the Armor Table below, rounding the final result down to the nearest full point. For instance, a vehicle that uses 6 tons of Inner Sphere ferro-fibrous armor would receive 107 armor points (6 tons x 16 points per ton x 1.12 = 107.52 armor points, rounded down to 107), while 1 ton of the same armor would provide only 17 armor points (1 ton x 16 points per ton x 1.12 = 17.92, round down to 17).

Karnov UR Transport, Eleventh Lyran Regulars (House Steiner)

Conversely, if a specific number of armor points is sought—up to the vehicle's computed Maximum Armor Factor, that is—and the weight is unknown, the designer can find the weight (in tons) by *dividing* the target number of armor points by 16 times the Base Armor Multiplier. This result is rounded up to the nearest half-ton. For example, if a designer decides to mount 92 points of heavy ferro-fibrous armor, he will need 5 tons to accomplish that (92 points ÷ [16 x 1.24] = 4.64 tons, which rounds up to the nearest half at 5). Note, however, that sometimes a desired number of points—such as many Maximum Armor Factors—may force the designer to "waste" weight on points that cannot be mounted. If, in the example of the heavy ferro-fibrous armor, 110 armor points were the maximum that could be installed on the vehicle, the actual 6-ton capacity of heavy ferro-fibrous armor needed to attain that level would produce 119 points (6 tons x 16 points/ton x 1.24 = 119.04 points, rounded down), and would result in 9 points of "wasted" armor.

Use the Armor Diagram on the vehicle's record sheet to indicate the number of Armor Points protecting each part of the unit's body by marking out any excess armor circles in the same way as for the internal structure. Armor circles for a given location are located in the appropriate unshaded parts of the diagram.

Combat Vehicles built under these rules may not combine multiple armor types on the same design.

Tech Base: Standard armor is universally available to both the Clan and Inner Sphere technology bases. Inner Sphere-designed Combat Vehicles can also use Inner Sphere ferro-fibrous, light ferro-fibrous and heavy ferro-fibrous armors. Clan Combat Vehicles may only use standard and Clan ferro-fibrous armors.

Space: Carrying ferro-fibrous armor reduces a Combat Vehicle's allotment of item slots. The number of slots reduced by using a given armor type is shown on the Combat Vehicle Armor Table.

COMBAT VEHICLE ARMOR TABLE

Maximum Armor Factor (Points): (3.5 x Vehicle Weight) + 40
Base Armor Points per Ton: 16

Armor Type	Base Armor Multiplier	Item Slots (Inner Sphere)	Item Slots (Clan)
Standard	1.0	0	0
Light Ferro-Fibrous	1.06	1	NA
Ferro-Fibrous (I.S.)	1.12	2	NA
Ferro-Fibrous (Clan)	1.2	NA	1
Heavy Ferro-Fibrous	1.24	3	NA

OmniVehicles: The type of armor, its weight, number (and allocation) of points, and any reduction of weapon and equipment slots required must be established when designing an OmniVehicle's base configuration, and may not be altered in its completed primary or alternate configurations.

Michael's Hephaestus has 16 tons remaining. Given its weight, he computes that the maximum armor he can place on the vehicle is 145 points ([3.5 x 30 tons] + 40 = 145 points). Mounting that many points—even using Clan ferro-fibrous armor—would cost him 8 tons, however (145 points ÷ [16 Base Points per Ton x 1.2 Clan Ferro-Fibrous Multiplier] = 7.552, rounded up to 8). Unwilling to go quite that far, Mike decides to install only 5 tons of Clan ferro-fibrous armor, which gives him 96 armor points to allocate instead (5 tons of armor x 16 Base Armor Points per Ton x 1.2 Clan Ferro-Fibrous Multiplier = 96 points).

Michael decides to distribute most of this armor toward the front and sides of the vehicle, where he feels it is most likely going to be hit, and so he places 20 points of armor each in the Front, Left Side and Right Side locations. The remaining 36 points he divides evenly among the Rear and Turret locations at 18 points apiece. Verifying that all points are accounted for, Mike adds all the armor values together: 20 [Front] + (20 + 20 [Left Side, Right Side]) + 18 [Rear] + 18 [Turret] = 96. In the appropriate non-shaded locations of the Hephaestus' Armor Diagram, Michael blacks out all extra circles, leaving only the assigned amount for each location.

With 5 tons spent on armor now, the Hephaestus has only 11 tons remaining for weapons and other equipment (16 – 5 = 11). Michael also notes he has 1 fewer item slots remaining in which to assign equipment, thanks to his use of Clan ferro-fibrous armor, meaning that his vehicle can only mount 10 items now (11 slots – 1 item = 10 slots).

Still looking to keep costs low and preserve as much weight for weaponry as possible, Nathaniel chooses to mount 3.5 tons' worth of standard armor on his Yellow Jacket. Like Michael's Hephaestus, the 30-ton VTOL has a maximum armor potential of 145 points ([3.5 x 30 tons] + 40 = 145 points), but using standard armor would cost more than 9 tons to accomplish (145 points ÷ [16 Base Points per Ton x 1 Standard Armor Multiplier] = 9.06, rounded up to 9.5 tons).

The 3.5 tons Nathaniel chooses provides 56 points of armor (3.5 tons x 16 Base Points per Ton x 1.0 Standard Armor Multiplier = 56 points). He chooses to mount the majority of this armor on the Yellow Jacket's nose, with 20 points to that location. As the rotor location cannot receive more than 2 points of armor, Nathaniel places the maximum of 2 points there, before mounting 13 armor points on each of the VTOL's sides and 8 points on the rear. Verifying his numbers, he adds up the armor points: 20 [Nose] + (13 + 13 [Left and Right Sides]) + 8 [Rear] + 2 [Rotor] = 56 points. Nathaniel blocks out all the excess armor points in each location on the Yellow Jacket's Record Sheet.

Because he used standard armor rather than ferro-fibrous, the Yellow Jacket sees no loss in item space on its inventory. It now has 17 tons of unspent weight remaining (20.5 tons – 3.5 tons = 17 tons).

At 75 tons, Patrick's Zhukov could mount as much as 302 points of armor ([3.5 x 75 tons] + 40 = 302.5 points, round down to 302), but doing so would cut deeply into the 43.5 tons remaining to be spent. Pat thus decides to devote 11 tons to armor, and chooses standard armor to keep costs low. At 11 tons, the Zhukov will receive 176 armor points (11 armor tons x 16 Base Points per Ton x 1.0 Standard Armor Multiplier = 176 points).

Patrick distributes his armor points with a heavy emphasis on the Front and Turret locations, where he places 44 points each. On the sides, he assigns 32 points each, before allocating the remainder—24 points—to the rear. Verifying his numbers, he adds up the assigned armor points: 44 [Front] + (32 + 32 [Left and Right Sides]) + 24 [Rear] + 44 [Turret] = 176 points. On his Vehicle Record Sheet, Pat blacks out all the excess points for each of the Zhukov's non-shaded armor locations, based on these figures.

With 11 tons spent on armor, the Zhukov now has 32.5 unspent tons remaining (43.5 – 11 = 32.5). Because Pat chose standard armor over ferro-fibrous, the vehicle also retains all 20 of its original item slots.

Rick decides that his 100-ton Neptune can afford to spend 14.5 tons on standard armor, which will yield a total of 232 points (14.5 armor tons x 16 Base Points per Ton x 1.0 Standard Armor Multiplier = 232). Just to be sure, however, he verifies that he is not exceeding the vehicle's maximum armor potential, and finds that the submarine could take on as much as 390 points in all ([3.5 x 100 tons] + 40 = 390 points).

With no turret to place armor on, Rick has only 4 facings among which to distribute his 232 armor points. He assigns 78 points to the front, while the sides receive 58 points each and the rear receives 38. Summing up, he verifies the armor is fully assigned: 78 [Front] + (58 + 58 [Left and Right Sides]) + 38 [Rear] = 232 points. On the Neptune's Record Sheet, he then blacks out all excess armor circles in each of the affected locations, making sure to black out all armor circles for the turret.

Because Rick used standard armor rather than ferro-fibrous, the Neptune does not lose any item spaces from its inventory. It now has 23.5 tons of unspent weight remaining (38 tons – 14.5 tons = 23.5 tons).

Step 5: Add Weapons, Ammunition and Other Equipment

The weapons, ammunition and equipment that may be mounted on a Combat Vehicle are listed in the Weapons and Equipment Tables shown on p. 341. In addition to any heat, damage and range statistics, these tables provide the tonnage these items may occupy on a Combat Vehicle, what technology base (Clan or Inner Sphere) is required to use them, and any special construction rules that might apply to installing the equipment. The Ammo column notes how many shots a given weapon or item carries per ton (only machine guns and nail/rivet guns may carry ammunition in half-ton lots).

Remember that the total tonnage of a given Combat Vehicle's structure, engine, controls, armor, heat sinks, weapons and other components may never exceed the tonnage established for the vehicle in Step 1. Any leftover weight that cannot be allocated to cargo space (see *Cargo Bays*, p. 239) or other equipment (due to item slot constraints or other factors) will be considered wasted tonnage.

Weapons and items placed in any non-turret location received a fixed firing arc in that direction (a front-mounted weapon would have a front firing arc, while a left-side mounted weapon can only fire into the left side arc, and so forth). Turret-mounted weapons have a firing arc determined by the turret's facing during game play. No equipment may be mounted in a Rotor location. Items mounted in the vehicle's "Body"—indicating a central position on the unit—may not have a firing arc at all; only items that are not weapons (such as ammunition and sensors) may be placed in this area.

Tractor/Trailer units may not fire into any arc that would hit another unit in their "chain". For instance, a Tractor with a rear-mounted hitch may not fire into its Rear arc while towing Trailers, and armed Trailers with hitches in both the front and back may not fire into either of those arcs if units are attached at both ends.

For special rules on any item, consult its entry under *Weapons and Heavy Equipment* (pp. 200–273).

Tech Base: The Heavy Weapons and Equipment Tables note which items are available to which technology base. Clan-made Combat Vehicles may use only items available to the Clans, while Inner Sphere-made Combat Vehicles must use only those items available to the Inner Sphere.

Space: Because of their open construction, and unless the rules for the item specifically state otherwise, Combat Vehicles treat each weapon or equipment item mounted as a 1-slot item for purposes of tracking equipment slots, regardless of the amount of critical space occupied in a BattleMech design. Combat Vehicle items may never be broken up among multiple locations under these rules.

Ammunition: All ammunition-dependent weapons except for machine guns (including their Light and Heavy versions) and nail or rivet guns require at least a ton of ammunition. (Machine guns, nail guns and rivet guns may carry ammo in half-ton lots instead.) Each ammo bin occupies one item slot, but may be of any weight desired, so long as the ammunition is devoted to one or more of the vehicle's weapons of the same type (for example, a vehicle with 3 Autocannon/5s may store all AC/5 ammunition in a single bin of any size). All ammunition is presumed to have a Body location.

Heat Sinks: Remember that Combat Vehicles only require heat sinks for energy weapons used by the vehicle, and that the number of heat sinks required equals the waste heat produced by all of the vehicle's energy weapons firing simultaneously.

Power Amplifiers: Any ICE-powered Combat Vehicle may carry heavy energy weapons such as lasers and PPCs, but to do so, they must also mount power amplifiers. Power amplifiers weigh 10 percent of the weight of the energy weapons carried, rounded up to the nearest half-ton, but take up no item slots on the vehicle's record sheet.

Fusion-powered Combat Vehicles do not require power amplifiers for energy weapons.

Trailer units drawing power from a Tractor's power plant are subject to the Power Amplifier rules of the Tractor, and thus require power amplifiers if the Tractor is powered by an ICE. Trailers with an independent engine are subject to the standard rules for Power Amplifiers.

Turrets: Under these rules, all Combat Vehicles (except VTOLs) may possess no more than 1 turret at the designer's option. The mass of this turret's mechanisms must equal no less than 10 percent of the weight of all items (excluding ammunition) mounted within the turret itself. This turret weight must be rounded up to the nearest half ton.

OmniVehicles: Though it is unusual, weapons and equipment may be established as fixed components of an OmniVehicle's base configuration just like heat sinks, armor and the like. In such cases, these "fixed" items must be mounted (placed among the vehicle's Weapon Inventory and assigned to vehicle locations) *before* the completion of the base configuration. After this, these items may not be altered in the completed primary or alternate configurations of the OmniVehicle.

Manticore Heavy Tank, Thirty-first Division (Word of Blake)

For turret-equipped OmniVehicles, the tonnage of the turret may not be changed across configurations. This means that developing an OmniVehicle requires the designer to consider in advance how many tons' worth of equipment (not counting ammunition) may be placed in the turret location, so as to establish the weight of the turret for the base, primary and all alternate configurations of that OmniVehicle. As indicated in Step 2, turrets weigh 10 percent of the weight of all weapons located in the turret. Therefore, the weight of any equipment placed in a turret (discounting ammunition) may be no greater than 10 times the turret's weight.

With 11 tons remaining, Michael's Hephaestus OmniVehicle could ideally have it all assigned to pod space for future configurations. Instead, he opts to establish a few items of "fixed" equipment first. Considering its potential as a scout, the first item he decides to permanently mount on the hovercraft is a Clan Active Probe, at a cost of 1 ton in weight and 1 item slot. Figuring that basic infantry-transport capability may also prove useful, he further decides to allot 4 tons of the vehicle to infantry-cargo space. These 4 tons of space also count as a single item in terms of the Hephaestus' inventory. Both of these items he places in the Body location.

At this point, the Hephaestus has 6 tons remaining (11 tons – 1 ton [Probe] - 4 tons [Cargo] = 6 tons), and 8 item slots available (10 slots – 1 slot [Probe] – 1 slot [Cargo] = 8 slots). Of this space, the turret may carry up to 5 tons of equipment, thanks to its 0.5-ton turret weight (10 x 0.5 tons [turret weight] = 5 tons). At this stage, Michael considers the Hephaestus completed, and notes that it has 6 tons of available pod space (of which the turret may mount a maximum of 5 tons). The base chassis for his hovertank is now complete.

Retaining a copy of the base chassis' record sheet, Mike decides to create at least one complete configuration—the so-called Hephaestus Prime—based on the chassis he has just designed. This version will mount a pair of Clan medium pulse lasers in the turret, at a cost of 4 tons and the use of 2 item slots, plus a Clan TAG also in the turret (at 1 tons and 1 slot). With 1 ton left over, and the turret already at its 5-ton limit, Mike adds a Clan ECM suite to the Body location to enhance the vehicle's electronics package. This item weighs 1 ton and takes up 1 more slot on the vehicle's inventory, completing the design of a Primary Hephaestus.

Nathaniel's Yellow Jacket has 17 tons available now, and he has his heart set on a hard-hitting Gauss rifle as the source of all its firepower. At 15 tons, however, the Inner Sphere weapon becomes the gunship's only weapon, as Nathaniel then realizes he must install at least 2 tons of ammo to give it better battlefield endurance. The combined payload of weapon and ammunition weighs in at 17 tons—enough to complete the design—and 2 item slots, with the first slot allocated to the Gauss rifle that Nathaniel mounts in the VTOL's front, and the second slot devoted to its 2-ton, 16-shot ammunition bin.

With all tonnage used up, the completed Yellow Jacket is now ready for battle.

Patrick has decided to focus his Zhukov's firepower on a conventional mix of autocannon and missile weapons. Starting with the big guns, he chooses to place two Autocannon/10s in the vehicle's turret, each of which weighs 12 tons and claims 1 item slot on the vehicle's inventory. As Pat plans to add no more weapons to the turret, he takes this opportunity to compute the turret weight itself at this time, too. With the twin autocannons weighing 24 tons in total, Patrick finds the turret will weigh 2.5 tons (10 percent of 24 turret weapon tons = 2.4, rounded up to 2.5 tons). For ammunition, Pat decides to supply each autocannon with 10 shots at 1 ton each. Since they are identical ammo types for identical weapons, he combines these 2 tons of AC/10 ammo into a single slot in the Zhukov's inventory, and allocates them to the vehicle's body.

To round out his vehicle's firepower, Patrick decides to add a 3-ton standard SRM-6 to the design, placing the weapon in a fixed mount in the forward section for additional front-arc firepower. Providing 15 shots for this weapon at a weight cost of 1 ton and an item cost of 1 slot, Pat finds that he has used up all of the Zhukov's remaining 32.5 tons ([12 tons + 12 tons for AC/10s] + [2.5 tons for turret] + [2 tons for AC/10 ammo] + [3 tons for SRM-6] + [1 ton for SRM ammo] = 32.5 tons). He is now ready to complete the record sheet.

Rick's Neptune now has only 23.5 tons remaining for weaponry, which he plans to center on torpedo launchers befitting his vehicle's role as a submersible combat unit. Starting with the big weapons, he decides to place a 10-ton Inner Sphere LRT-20 in the Neptune's front, for devastating long-range capability. Backing this up, Rick adds two more SRT-6 launchers in the same area, at 3 tons apiece. Between these three missile launchers, he has now spent 16 tons, but each weapon occupies only one item slot on the Neptune's inventory. To supply these weapons, Rick adds 1 ton of LRM ammunition and 1 ton of SRM ammo for 1 slot apiece; though it is a stingy quantity of munitions, the Neptune's ability to fire a cloud of potentially lethal warheads almost assures that it will sink its opposition quickly.

For an added surprise—especially useful when surfaced—Rick decides to install a single large laser in the front section. The weapon itself weighs 5 tons, and the 8 heat sinks needed to dissipate its heat were thoughtfully installed already. But because an IC engine powers the Neptune, the laser will require power amplifiers to function. The weight of these amplifiers is equal to 10 percent of the weaponry they are intended to supply, and so the Neptune will require 0.5 tons' worth of power amplifiers.

Rick tallies up the weapons he has installed so far, and determines that he has completed the vehicle's design now. Of the 23.5 tons he had after armoring the submarine, he has spent

all 23.5 tons ([10 tons for LRT-20] + [6 tons for 2 SRT-6s] + [2 tons of ammunition] + [5 tons for the large laser] + [0.5 tons for the power amplifiers] = 23.5 tons). He is now ready to complete the vessel's record sheet.

STEP 6: COMPLETE THE RECORD SHEET

By the time the designer has chosen all structure, engine and controls for the Combat Vehicle, and added its armor, weapons and equipment, all of these items must be allocated to their proper places on the blank Vehicle Record Sheet. For the completed record sheet, the designer must first be sure to have selected the appropriate sheet for the Combat Vehicle's type (by motive system). The sheet must have all data filled in for the Vehicle Data block (including name, tonnage, engine and movement types, and MPs). All equipment slots must be allocated on the Weapons and Equipment Inventory (including ammunition and number of shots per bin). All extraneous armor and internal structure points must be blacked out on the Armor Diagram.

Once all of the above is completed, the Combat Vehicle is ready for *Total Warfare* game play.

OMNIVEHICLES

When completing the record sheet for a Combat Vehicle built as an OmniVehicle, it is highly recommended that the designer create one sheet specifically to serve as the base configuration, with none of the weapons or equipment installed that may appear on the primary and alternate configurations. Copies of this Base Configuration Record Sheet (noting all unused tonnage as "pod space" for the body *and* the turret separately) can then be used to quickly generate the record sheets for the other configurations.

Michael verifies that all of the valid data blocks are completed for his Hephaestus, including noting the vehicle's full name "Hephaestus" after Vehicle Type, checking off that its tech base is Clan, and noting its Cruising MP as 8 and its Flank MP as 12. He also lists the weapons properly on the Weapons Inventory, noting the quantity per location, heat per weapon and statistics as shown on the appropriate Weapons and Equipment Tables (for instance, the Hephaestus' fixed Active Probe would list a "1" under QTY, "Body" under Location, "Active Probe" under Type, "0" under Damage, "0" under Heat and "5" under Long Range). After making sure no extraneous circles for internal structure, armor and heat sinks are present, that the heat sinks' values are correct, and that all weapon slots are assigned for the vehicle's fixed components, Mike makes a copy of the record sheet to serve as his Base Configuration Record Sheet. He then uses it as the basis for his second sheet, to record the primary configuration. Once that configuration is completed, he is ready to compute its Battle Value and Cost and bring it to play.

Repeating similar steps to Michael, Nathaniel, Patrick and Rick complete the record sheets for their vehicles as well. As none of them are Omnis, they need not make copies of a Base Configuration Record Sheet.

The Word of Blake makes extensive use of combined-arms, as demonstrated by this Level II formation.

HOT PRODUCTS OF 3067

—Excerpt from *Hot Products of 3067*, Product Technologies Magazine, PTI Press, Fall 3067

PTI'S HOT PRODUCTS: 3067 (SUPPORT VEHICLE REVIEW)

Hot Products is an annual review published by Product Technologies, Inc. that provides unbiased evaluations of defense industry technologies. Products for the private, corporate and government sectors may be considered, but the focus is on military craft, paramilitary vehicles and militarized private-sector units. Anything from handheld electronics to aircraft may be covered and all major industries are included.

To ensure a qualitative analysis, *Hot Products* accepts no sponsorships or endorsements, and only production models of current-year units are tested. However, the PTI board occasionally permits pre-production designs. Manufacturers may submit any design for consideration, though PTI retains the right to refuse any submission.

This review, conducted by an impartial panel of experts, evaluates twenty-six key factors and scores them on a seven-point scale. As compared to other items in the same class, a score of 1 indicates the worst performance, while a score of 7 indicates near-perfect performance. The following three categories are presented in this summary:

Functionality: A measure of how the product performs compared to the manufacturer's specifications. Products that score high in this area meet and consistently exceed the specs.

Quality: Evaluates the durability of the product with a focus on normal use. Issues arising out of intentional misuse are not scored, though they are tabulated to assess trends. Greater durability receives a higher mark.

Value: Contrasts the product features with the MSRP. A higher ratio of features to price merits a higher score.

The complete product review may be ordered, for immediate electronic delivery, through ComStar and Word of Blake branch offices throughout the Inner Sphere. It includes the full twenty-six point test results of every product in each category. As an added bonus, all honorable mentions, "lemon" winners and purchasing recommendations are included at no extra charge.

This special supplement focuses on support units. To be eligible for consideration in this category, a unit must serve in a role that does not involve direct front-line combat, and must meet the requirements described for each category.

Each section opens with a brief discussion of the pertinent criteria along with some anecdotal information on the classification as a whole. Select units are presented for eight platforms: Airship, Fixed-Wing, Hovercraft, Naval Vessel, Tracked Vehicle, VTOL, Wheeled Vehicle, and WiGE. The term support vehicle has been used in reference to a broad range of platforms, and PTI is proud to include thirty different categories, including satellites and IndustrialMechs in the unabridged review.

PTI offers a full line of reviews for the private and corporate sectors, and in-depth analysis of military vendors. The Inner Sphere Manufacturer's Rating (ISMR) is the de facto standard for vendor reliability in the Inner Sphere. PTI's Quarterly Champions showcases the best in emerging products, and Lemon Lookout puts the spotlight on products to avoid. Corporate subscriptions are also available. Ask your sales representative for further information or visit us online.

AIRSHIPS

This specialty market covers craft massing under 300 tons. These craft must be aerostatic constructions producing lift through lighter-than-air gas. Rigid airframe craft, like zeppelins, and non-rigid airframe craft, such as blimps, are given equal consideration.

Military dirigibles frequently serve as transport craft, though recent trends indicate that surveillance applications are becoming more popular. Airships are fragile in comparison to combat craft, and maneuvering challenges often keep them out of battle. Nevertheless, many airships are armed with anti-personnel weapons, and some support airships mount anti-'Mech weapons like the Delta Dart series of LRM launchers.

Monza Light Cruise Liner (Federated-Boeing Interstellar)

One of several private-sector craft in this year's review, the Monza is the newest product from Federated-Boeing Interstellar. Based on Galax in the Federated Commonwealth, Federated-Boeing is renowned for its aerospace product lines, including the new *Overlord-A3* and upgraded *Leopard CV* DropShips. A diverse corporation, Federated-Boeing has products in many aircraft market segments.

The Boeing subsidiary on Tiber has been manufacturing large cargo airships for decades, but only began producing the Monza two years ago as a smaller extension of the Corvair line. Despite its recent market entry, the Monza is rapidly becoming a favorite pleasure craft among the power elite of the Free Worlds League. A reliable Nimakachi F-7 fission engine—smaller and lighter than the Corvair's VOX—provides quiet operation and acceptable cruising speeds, while considerable shielding eliminates any danger of radioactive contamination. Though Monzas can accommodate up to twenty-five passengers comfortably, they are usually deployed with larger first-class facilities that reduce the passenger complement to fifteen.

Boeing could not provide a production model for evaluation, but they did permit our testing team to spend a week aboard a Monza 102. This new '67 luxury model supplements the standard hand-carved wood inlays with gold filigree, and includes numerous opulent accoutrements throughout. One tester raved (at length) about the platinum-bedecked bidet in her suite. The professionalism of the service staff was on par with expectations.

Functionality: ✪✪✪✪
Quality: ✪✪✪✪✪✪✪
Value: ✪✪✪✪✪✪✪

FIXED-WING AIRCRAFT

This category focused on common aircraft massing 200 tons or less, leaving super-sized transports for a specialized review. The primary division in this market segment occurs with propulsion technology. Our team considered both jet-propelled craft, like the FB335 Long Haul, and turbo-props, like the KC-9 King Karnov.

Fixed-wing support aircraft are typically deployed in mid-air refueling, transport, relief, evacuation and similar roles. Many craft are equipped with tailgate cargo doors for ease of loading and unloading goods. Among armored support craft, StarSlab Viceroy Mk III, Kallon Light Shield SR and SimplePlate Manufacturers Type K are popular choices. Support aircraft also tend to be unarmed, though some models incorporate light weaponry to deter infantry units.

Smoke Ultralight Trike (StarCorps Industries)

Best known for the *Warhammer* BattleMech, StarCorps has been manufacturing military hardware for more than three centuries. Headquartered on Menke in the Capellan Confederation, StarCorps is a multinational corporation with production facilities throughout much of the Inner Sphere. Though it is most often identified as a defense contractor, about thirty percent of the company's customer base comes from its endeavors in private-sector markets. This year, StarCorps has two entries in *Hot Products*, both fixed-wing aircraft. This development represents a new market for StarCorps.

Gambling that recreational aircraft will experience a resurgence, now that the Federated Commonwealth Civil War is over, StarCorps introduced the Smoke Ultralight Trike in Quarter 4 of 3067. The Smoke is constructed from aluminum alloy tubes covered with a fiberglass composite, and suspended under a fifteen square meter wing. The wing is a nylon-polymer sheath over a rigid airframe, and is fully collapsible for storage and transport. The Smoke can comfortably carry its pilot and up to 100 kilograms of cargo, and comes standard with a safety package.

The base model Smoke is powered by a Pitban Model-534 jet engine, which has a low thrust-to-weight ratio that gives the craft exceptional range for its weight. The frame and wing assemblies are produced locally in most markets, while the engines are imported. Final assembly is the responsibility of the individual resellers. A fuel-cell electric-powered version of the Smoke is planned for Q3 3068. Several militaries have expressed interest in this model.

Test pilots found the unusual combination of a jet engine and ultralight design daunting; one even called it incontinence-inducing. But once the pilots acclimated to the quick take-off and rapid ascent, they rated it as the craft's best feature. Flight characteristics surpassed the manufacturer's specifications by 3.5 percent in most categories, earning the Smoke an exceptional rating.

Functionality: ✪✪✪✪✪
Quality: ✪✪✪✪✪✪✪
Value: ✪✪✪✪✪

Muskrat-379 (StarCorps Industries)

Now in its fifth year of production, StarCorps' second award-winner is the multi-purpose Muskrat-379. The Muskrat is built on a resilient, semi-monocoque fuselage, made up of graphite epoxy composites. Steel and titanium alloys are used around the engine mounts and in other high-temperature areas.

An amphibious, prop-driven aircraft with short take-off and landing capabilities, the Muskrat's standard configuration includes a crew of two and bench seating for ten passengers. As a firefighting aircraft, it makes an ideal first responder, featuring a compartmentalized water tank with a capacity of nearly twenty tons. The craft is approved for flight with its aft cargo door open, and so its first-response complement often includes smokejumpers and airborne paramedics. The Muskrat can refill its water tank from any body of water at least 300 meters across, providing added flexibility, while its comprehensive Garret R32 sensor package includes look-down radar, high-resolution cameras and infrared imaging.

Thanks to its popularity with smokejumpers, the *Muskrat* has also entered the recreational aircraft market. Solaris Skydiving recently purchased six Muskrats and converted them to jump planes for the '66 Solaris Freefly Competition. Due to a strong performance there, in Q3 of 3068 StarCorps will begin offering the Muskrat 379-B. The 379-B will replace its radar and infrared imaging with additional digital cameras and offer increased passenger capacity at the expense of its water tanks.

PTI's test pilots gave the Muskrat high marks for handling, particularly in deep flaps necessary for water dumping and jumper deployment. Airfield landings were satisfactory for a seaplane, and STOL capabilities received above-average scores from all pilots.

Functionality: ✪✪✪✪✪
Quality: ✪✪✪✪✪✪
Value: ✪✪✪✪✪

Mosquito IX Radar Plane (Malrite Company)

Many companies never recover from a weak market entry. The stigma of a poorly received initial release has left countless organizations bankrupt. DMI, Ltd. had such a start, but after being acquired by Malrite, six centuries of steady sales have erased that tainted image and garnered a small share of the surveillance aircraft market.

Aside from minor cosmetic changes the '67 Mosquito is identical to the '52 model that earned favorable reviews fifteen years ago. As with the '52 model, the '67 Mosquito impressed PTI's engineering team with its solid components, and modular SISO equipment. Airframe stress was well within prescribed tolerance and the craft is technically sound. Powered by a reliable Hermes fission engine, the Mosquito is adaptable to a variety of environments with minimal modifications. Although less popular than fusion equivalents, the line has an exemplary record, and it's technician friendly; earning favorable comments from the review panel. An excellent cargo capacity and wonderful sensor suite round out an impressive package backed by one of the industry's best warranties. Unfortunately, performance comes at a premium. The Mosquito's MSRP is 30% or more above competing products in most markets. While Malrite's PR campaign lauds this as the price of excellence, PTI cannot agree. The high price tag has left most markets with a dearth of vendors and service providers and regularly scheduled maintenance can sideline the aircraft for twice as long as competing products. If not for the high price tag, the Mosquito would undoubtedly outsell its competitors in most markets.

Functionality: ✪✪✪✪✪✪
Quality: ✪✪✪✪
Value: ✪✪

HOVERCRAFT

Units in this category must mass 100 tons or less. Hovercraft ride on cushions of air generated by lift fans and contained beneath the vehicle by a flexible polymer skirt. This set-up allows such craft to skim over the ground at altitudes as narrow as fifty centimeters (skirt-to-surface clearance). Construction materials and propulsion systems vary greatly and are not considered separately in this evaluation.

Auxiliary hovercraft have variable operational profiles that include mine-sweeping and -laying, medevac, amphibious assault, logistics, recon and coastal security. As they frequently operate outside the rear echelon, most military hovercraft have some form of anti-personnel weaponry such as the Johnston MiniGun or Slingshot machine gun. Primary armaments, when available, often include Holly or HoverTec missile launchers.

In the private sector, hovercraft serve in a number of transportation roles that leverage their unique capabilities. A surprising trend has a number of DropPort management corporations using hovercraft for DropShip crash rescues and firefighting.

Mastodon Transport (Cyclops, Incorporated)

The Mastodon entered the market in Q1 of 3067 as the newest in a class of vehicles designed to compete with bulk transports. Though it uses an expensive Vlar fusion engine, its ability to ford rivers, lakes and other bodies of water gives it an advantage in certain niche markets like archipelagos, where goods imported from the mainland must be flown in at great expense or sent by surface ship with significant delay.

At eight meters high and thirty-two meters long, the Mastodon is a massive vehicle, with an impressive cargo capacity equivalent to a small fleet of conventional trucks. Four giant drive fans propel it to a maximum speed of 64.8 kph. Cyclops engineers opted for a reliable loop-and-segment airskirt, where the skirt material is attached to the underside of the vehicle and forms a continuous loop around the craft to which segmented chambers are connected.

The Mastodon was well received by our evaluation team. Numerous tie-down points and a spacious cargo hold were notable strengths, as the vehicle's interior is wonderfully appointed for its designed role. The driver's station received top scores for layout and functionality, and its communications suite also garnered praise. Operational range was well above average for the class.

Militia forces on Skye are reportedly testing a modified Mastodon for use as an armor and infantry transport. As it may see combat, the Skye version has been upgraded with anti-personnel weaponry and several tons of Arcshield Light V3 armor. The Light V3 armor is not as thick as standard plate armor, but provides adequate protection for a noncom vehicle. The testing team did not evaluate the Skye version.

Functionality: ✪✪✪✪✪
Quality: ✪✪✪✪✪✪
Value: ✪✪✪✪✪

NAVAL VESSELS

Traditional (or blue-water) naval vessels are found on many planets in the Inner Sphere, though they are infrequently deployed in combat roles. Construction materials vary, from fiberglass-shell sport boats to armor-plated coastal patrol craft. Displacement hull craft are the most common, though numerous manufacturers like Skye Pleasure Craft and Windancer Marine Technologies each produce several reputable hydrofoil models, and a few specialty manufacturers, like Ryan Systemics, produce submarines.

Smaller craft hulls may be vacu-formed in one piece, while larger craft are usually constructed on an alloy frame wrapped in layered composite materials. Military uses for naval vessels are typically defensive in nature and include protecting waterborne installations, patrolling shipping lanes, troop transport and coastal security. The flexibility of BattleMechs has eliminated most other roles. Units up to 300 tons are considered in this category.

Silverfin Coastal Cutter (Windancer Marine Technologies)

This year's Editor's Choice vehicle is the Silverfin coastal cutter by Windancer Marine Technologies. This hydrofoil uses a proprietary blend of polymers to create a uniquely durable foil that impressed the experts. The evaluation model met or exceeded every expectation, and performed so well that the reviewers wondered if an upgraded model had been supplied for testing. To allay their concerns, the testing team arranged to demo another Silverfin from a local dealer. The demo craft competed side by side with the evaluation craft, as the team ran through all the tests a second time. Amazingly, both craft performed almost identically. The margin of difference was statistically insignificant, and cinched the Silverfin for our Editor's Choice award.

The Silverfin outperformed competing vessels in acceleration and maneuverability tests, and came in second overall in the handling category. Crew stations were well laid out and easy to use, and the bow-mounted Magnum-Sperry machine gun performed beautifully in both stationary firing and flank speed firing tests. The Silverfin doesn't skimp on important components, either. A surveillance package, turret-mounted searchlight and Faulk-150 Comset communications package all round out this impressive vehicle.

The Windancer Lightwave armor held up as advertised to a full-power shot from a Diverse Optics Type 10 laser. Though the ship needed significant repairs, its structure remained sound, and suffered only a 2.3-percent loss in maneuverability tests after damage.

Functionality: ✪✪✪✪✪
Quality: ✪✪✪✪✪
Value: ✪✪✪✪✪✪✪

TRACKED VEHICLES

The tracked vehicle category includes combat engineering vehicles, construction equipment, cargo transports, recovery vehicles and so on. To be considered for this category, units must mass less than 200 tons. Power plants are not evaluated separately due to the number of available options.

Noncombat tracked vehicles often perform battlefield engineering. Equipped with an array of rock cutters, manipulators, chainsaws and bulldozers, they are used to erect (or to demolish) temporary fortifications. Other tracked vehicles include some models of heavy BattleMech recovery units and arctic exploration craft.

CellCo Ranger UPU 3000 (Quikscell Company)

In the 3050s, the Jade Falcons' push into the Inner Sphere threatened to put Quikscell out of business. When the FedCom Civil War started, industry skeptics gave Quikscell long odds of surviving. Apparently the industry skeptics are lousy odds-makers, as Quikscell is thriving in the postwar market. Sales of their LRM and SRM carriers are up, and their government-sector products are slightly ahead of sales projections.

The '67 Ranger's success is a product of Quikscell's marketing. In a time when newer and better are almost synonymous, Quikscell marketed the Ranger as a simple solution to complex problems. The vehicle is fundamentally unremarkable, but that feature is what most endeared it to PTI's test team. Its simplified design reduces maintenance time, and common components minimize repair costs.

The Ranger received low scores on every comfort category available, but was well received otherwise. Competing units in this class featured popular targeting and tracking systems, such as the Maxell TA55, and other high-priced features. The Ranger, by comparison, is priced less than some ground cars. Though technically inferior, its performance earned it an honorable mention in this category.

Functionality: ✪✪✪
Quality: ✪✪✪✪✪✪
Value: ✪✪✪✪✪✪

Sherpa Armored Truck (Earthwerks-CC)

Earthwerks first entry in this review comes in the unusual form of a half-track. The Sherpa continues to suffer from sub-standard range for a support vehicle, costing it dearly in several categories. Surprisingly, it remains quite popular.

Powered by a Capellan produced GM petrochemical engine, the Sherpa boasts a Dynatec 270 series fire control system and two tons of military-grade Riese 100 armor. With seven tons of flatbed cargo space it is comparable to the venerable J-27 Ordance Transport. Although the latter boasts better speed, the Sherpa stood up to a Defiance P5M Laser in testing, perhaps explaining its popularity with ordinance officers to the consternation of quartermasters.

Robust construction aside, the Sherpa falls in the middle as compared to other units. The cab interior is what generations of soldiers have come to expect from military equipment. Open panel construction provides easy access to a plethora of wiring harnesses. Functional dials and readouts adorn a simplistic console, and climate controls are sub-standard. Suspension is tight, giving passengers a rough ride. When operating at flank speed over broken ground our test gunner achieved a deplorable 28% hit rate versus stationary targets.

Functionality: ✪✪✪
Quality: ✪✪✪✪✪✪
Value: ✪✪✪

VTOLS

Only craft that mass 60 tons or less are considered in this category, though such craft may employ vectored-thrust or rotary-wing propulsion styles. Vectored-thrust aircraft use special directional nozzles to control their engine exhaust, creating thrust and producing lift along different axes. Rotary-wing VTOLs use one or more primary propellers (rotors) to provide lift, with tail rotors to produce latitudinal thrust to counter the main rotor's spin.

Support VTOLs operate in an assortment of roles shared by hovercraft. Heavy-lift VTOLs, like the NETC's Skyhook, can transport 'Mechs and combat vehicles alike, though they frequently ferry supplies from protected stockpiles to the rear echelon.

RTC-215M Swiftran (Cal-Boeing)

This year's "Lemon Award" winner, the Swiftran, produced by Cal-Boeing, has a long history of sub-par performance. In an effort to correct its problems, the '67 model employed a new computerized stabilizer for its tilt-rotor operation, but unfortunately for anyone who owns one, a software glitch can cause the assembly to seize if the engines are rotated at speeds above 21.6 kph. As a result, Cal-Boeing has issued a recall for all '67 models manufactured prior to June 29. Defective units can be serviced at any authorized outlet, or a field service kit can be ordered through Cal-Boeing.

The paramedic equipment that comes standard with the Swiftran functioned adequately in tests, but Cal-Boeing has replaced the '66 model's gear with a lower-quality kit from a new subcontractor. In addition, the duraplast seats have been swapped for canvas web designs, and other similar corners have been cut. Overall, the testers found the Swiftran met all its functionality claims, but at a significant cost in quality and value.

Functionality: ✪✪✪✪✪
Quality: ✪
Value: ✪✪

Pegasus Passenger VTOL (Blackstone BattleMechs)

It's been more than twenty years since a manufacturer has a first model year product place favorably. Expectations were high when Blackstone announced the Pegasus VTOL, and to the delight of corporate executives in the Lyran Alliance, they delivered.

Designed with the working professional in mind, each seat is equipped to provide a comfortable working environment in transit. The main cabin has a fore and aft lavatory, automated beverage service, and adequate—if not spacious—leg and elbow room.

The *Pegasus* is powered by whisper-quiet electric fuel cell engines, giving passengers a peaceful commuting experience without the need for expensive sound baffling technologies. With an impressive 2,000 km range and seating for 100 passengers, the *Pegasus* is a laudable alternative to maglev commuter trains in many markets. The lack of armor has kept it out of the military sector so far, but Blackstone has hinted they may make an armored model (with reduced passenger capacity) available in 3069.

Functionality: ✪✪✪✪✪
Quality: ✪✪✪✪
Value: ✪✪✪✪✪✪

WHEELED VEHICLES

The wheeled support vehicle category encompasses units up to 80 tons in mass. From fuel tankers to troop transports, the most common support units are wheeled. Like the tracked vehicle category, they are not subdivided by power plant. As they often travel from staging areas to the front lines, many wheeled support vehicles mount anti-personnel weapons, and some mount light anti-armor and anti-'Mech weapons like the Defiance Shredder autocannon or the LongFire V missile launcher. Wheeled support vehicles are often armored to some extent.

Ibex RV (Earthwerks-FWL)

Long known for their array of dependable BattleMechs, Earthwerks entered the noncombat vehicle market eighteen years ago with the Ibex. It has won the Wheeled Support Vehicle category for an impressive six of those years, most recently in 3062.

The military Ibex features rugged Durallex A47 Series armor, superb off-road handling, adequate cargo space and an excellent top speed of 86.4 kilometers per hour. It has a roomy interior with seating for eight, and 400 kilograms of cargo space.

The test team was impressed with every aspect of the Ibex. The driver's seat burgeons with convenient accessories and controls, though unfortunately none operate the King David light gauss rifle. Earthwerks declined to comment on a rumor that fire control would be an option for the '68 model. The Ibex received excellent scores in seventeen categories, and this year's model posted a record-setting time on the off-road course.

Functionality: ✪✪✪✪✪✪
Quality: ✪✪✪✪
Value: ✪✪✪✪✪

WiGE:

In the pre-spaceflight days of Terra, aircraft engineers discovered a dramatic increase in lift that occurred when fixed-wing craft operated in close proximity to the ground. Two thousand years later Wing in Ground Effect craft remain a curiosity. Part hovercraft and part fixed-wing aircraft, these are jacks of all trades vehicles.

This category is more open than most, and PTI only restricts units based upon weight. Any craft under 80 tons is considered.

Coanda PSC (Skye Pleasure Craft)

Designed as a sport racing craft, the Coanda is not intended for military consumption. Last year, a high profile Loki operation rescued the daughter of an unnamed Skye noble, and now the rumor mill tells that military leaders are considering employing the Coanda in rapid deployment scenarios.

PTI's test team spent ten days putting the Coanda through a rigorous evaluation, and it came out on top of fifteen categories. Best in class for acceleration and maneuverability, this tiny package hums along on a high performance GM internal combustion engine with an incredible thrust to weight ratio.

Skye Pleasure Craft spared no expense on the interior, appointing the two-passenger cabin with walnut inlays, chrome accents, and an all-digital instrumentation package. Technophobes will be happy to know that an analog instrumentation package is also available. The leather bucket seats are comfortable and adjust easily, providing ample leg room. Five-point restraints, and supplemental restraint systems round out a comprehensive safety package.

Functionality: ✪✪✪✪✪
Quality: ✪✪✪✪✪
Value: ✪✪✪✪✪✪✪

Maintenance crews pepare to work on a Fifth FedCom NSR-9J Nightstar, *starting with a coolant flush.*

In *BattleTech*, the term "Support Vehicle" refers to a wide range of conventional vehicles not built to same precise military standards as BattleMechs, ProtoMechs, Combat Vehicles, and fighters. This class of unit includes civilian and industrial variants of everything from ground vehicles (tracked, wheeled, hover and WiGE), to VTOLs, airships and fixed-wing aircraft, to naval vessels such as surface ships, hydrofoils and submarines. Common almost anywhere where that industrial development exists, Support Vehicles perform such diverse functions as civilian transportation, industrial applications and even battlefield recovery.

The following system enables players to construct unique Support Vehicles for *BattleTech* games that conform to the standard rules presented in *Total Warfare*. As these rules can be fairly math-intensive, designers are encouraged to do all work on scratch paper before committing the resulting Support Vehicle's specifications to an appropriate blank Vehicle Record Sheet.

SUPPORT VEHICLE BASICS

Support Vehicle construction relies on three primary factors: motive type, technology base and weight. These factors were broadly overviewed in the *Construction Basics* section (see p. 18). The notes below expand on these factors.

MOVEMENT (MOTIVE) TYPE

Support Vehicles in *Total Warfare* standard rules play come in a variety of movement (motive) styles that largely determine what their maximum tonnages may be and the terrains in which they may operate. These features are broadly outlined below. Because so much is influenced by the vehicle's movement type—including its record sheet—this factor must be decided upon first in the design process. The more varied nature of Support Vehicles provides for more motive types than with Combat Vehicles

Airships: Airship Support Vehicles use light-than-air gases to achieve their lift, and require smaller engines to achieve thrust. These relatively slow-moving aircraft Support Vehicles may weigh as much as 300 tons, and are favored mostly as observation units or airborne cruise liners.

Fixed-Wing: Fixed-Wing Support Vehicles are essentially conventional aircraft, including propeller-driven planes and atmospheric jets. Massing up to 200 tons, they are generally favored for long-distance transport and passenger service, though some more militarized versions have been developed as radar planes, airborne refueling craft or even search and rescue units.

Hovercraft: Hover Support Vehicles are among the fastest types of ground vehicle. Weighing up to 100 tons, most of these are commercially used for cargo and passenger transport duties, though more militarized versions may be employed as police cruisers.

Naval: For Support Vehicles, the naval category encompasses submersible, hydrofoil and standard displacement hull-type vessels whose upper mass depends on their final chassis modifications (subs and displacement hulls can be as heavy as 300 tons, while naval craft with a hydrofoil modification may only mass up to 100 tons). Most of these are used for cargo and passenger transport on water-rich worlds, though fishing boats and deep-sea explorers are also common.

Tracked: Tracked vehicles are the most common type of industrial Support Vehicles. These vehicles can weigh as much as 200 tons, and can handle most terrain thanks to their tracks or treads. Typical applications for such vehicles include tractors and construction equipment, though militarized models include the likes of bridge layers and armored riot control vehicles.

VTOL: VTOLs are one of the lightest Support Vehicle motive types, with a maximum weight of 60 tons. Slower than fixed-wing aircraft but faster than most ground vehicles, these units are often employed by police and emergency crews as search and rescue units, or by commercial agencies for traffic observation, news coverage and routine short-range transport of goods or VIPs.

Wheeled: Wheeled vehicles are perhaps the most common Support Vehicle, as they encompass all manner of commercial, industrial and private-use transports. Ranging from motorcycles, economy cars and minivans to tractor-trailer rigs and even heavy road-service vehicles, these units can weigh as much as 160 tons.

WiGE: Wing-in-Ground-Effect (WiGE) Support Vehicles may weigh as much as 240 tons and are essentially a hybrid of a hovercraft and an aircraft. These rare ground vehicles are fast, and favored for long-distance transport operations, but require a burst of speed to attain their low-level flight capabilities.

Chassis Modifications

Some Support Vehicle motive types (such as naval vehicles) may also receive chassis modifications that can affect their mobility in certain terrains or even influence their maximum weight limit.

TECHNOLOGY BASE

In *Total Warfare* standard play, Support Vehicles broadly fall into one of two available technology bases: Inner Sphere or Clan. Inner Sphere vehicles may only use Inner Sphere equipment, while Clan vehicles may only use Clan equipment. However, a much wider range of standards exists for Support Vehicles than for most battlefield units. This range is expressed as the unit's Technology Rating, described below.

The distinction between Clan and Inner Sphere technology bases remains applicable even under the Technology Rating system used by Support Vehicles. Also, all of the following core Support Vehicle structural components are incompatible with those of Combat Vehicles: chassis (internal structure/Structural Integrity), engines, control systems and armor.

Technology Rating

In the Weapons and Equipment Tables used for creating Combat Vehicles and other units in this book, each item has a Technology Rating listed in addition to a tech base. This rating (expressed as a series of letter grades that define the level of technology and its availability through the major eras of *BattleTech* history) helps to determine the item's level of sophistication, and may even be used to help standardize the level of advancement the unit demonstrates for purposes of era-based campaigning.

While the Tech Rating does not generally affect the construction of most other units, in Support Vehicle design, this factor heavily influences the weight, efficiency and costs of the various components a Support Vehicle may employ. Support Vehicles are constructed using two Tech Ratings: Structural Tech Rating and Overall Tech Rating.

The Tech Rating of a Support Vehicle also influences its cost and helps determine its availability for era-based games. For more information on this, consult the *Costs and Availability* section (p. 274).

Structural Tech Rating: This Tech Rating is used for a Support Vehicle's base chassis, and fixes the vehicle's access to certain components and modifications. Based on the chassis modifications desired, a Support Vehicle designer may find it necessary to increase the Structural Tech Rating for a given motive type beyond its listed value.

Overall Tech Rating: This rating comes into play at the end of construction, after the designer has found the Tech Ratings required for the vehicle's engines and other components. The highest-rated item on a Support Vehicle defines its final Overall Tech Rating. For instance, if a Support Vehicle is constructed using chassis components and engines with a Technology Rating of C, but then mounts a Technology E item (such as a Guardian ECM Suite), the Support Vehicle will receive an Overall Tech Rating of E.

Support OmniVehicles

Support OmniVehicles—Support Vehicles built using the Omni chassis modification and designed for rapid reconfiguration between missions—are available to Clan and Inner Sphere technology bases. These Support Vehicles use the same construction rules as standard Support Vehicles, but when an Omni is made, the designer must first establish its base configuration. The base configuration of a Support OmniVehicle includes its chassis, engine, control systems, armor and—if desired—any additional equipment considered "hardwired" to its design.

The weight, item slots and arrangement for all of this "fixed" equipment is locked in for all configurations of that Support OmniVehicle, leaving any leftover tonnage and critical space open for pods that can mix and match additional weapons and equipment based on mission needs. A base Support OmniVehicle configuration is never considered a finished unit, and is generally not legal for *Total Warfare* standard rules play (as such units are essentially open frames of empty pods). Only the completed Primary and Alternate configurations of a Support OmniVehicle (which must always comply with the rules for constructing standard Combat Vehicles) are considered legal for game play.

WEIGHT (AND SIZE)

Because they represent a far broader category of unit type than Combat Vehicles, Support Vehicles are classified by size as well as weight.

Small Support Vehicles: Small Support Vehicles are classified as all Support Vehicles built below 5 tons (5,000 kilograms) in total weight. Support Vehicles built at this size use the kilogram standard for their construction.

Medium and Large Support Vehicles: Medium and Large Support Vehicles use the tonnage standard for their construction, and start at 5 tons. Based on the motive type chosen, these vehicles may run the gamut from 5 to 300 tons (increasing in half-ton increments).

Weight and Size Classes

Unlike most battlefield units, Support Vehicles are rarely grouped together by weight class, even though they may range in weight and features as broadly as their militarized analogues. In fact, while a case may be made for Support Vehicles to be classified by the same light, medium, heavy and assault weight classes that roughly equate to those of Combat Vehicles, a more distinctive difference lies in the size category.

Small Support Vehicles generally fill civilian roles as personal transports, including motorcycles, automobiles, and even one-man autogyros and powered balloons. Paramilitary versions typically include jeeps, ultra-light transports and other vehicles favored by motorized and mechanized infantry.

Medium Support Vehicles focus mostly on civilian transport duties toward the lighter end, while heavier units often perform specialized tasks in construction, demolition and recovery work. Militarized equivalents of these Support Vehicles typically fill the role of battlefield logistical support, including tankers, ammunition haulers and salvage trucks. Weight classes for such vehicles are often merely a formalized means of tracking how heavy these units are and how much work they are designed to handle.

Large Support Vehicles—when they appear—are the "ultra-heavy" versions of their medium-sized kin. In civilian roles, these are commonly super-heavy industrial vehicles or oversized bulk transports. Paramilitary versions include heavy recovery vehicles large enough to haul a BattleMech carcass on the field without much prep work.

Space

In Support Vehicle design, internal space is less defined than it is for 'Mechs, but often more restricted than for Combat Vehicles. Nevertheless, a direct correlation exists between the weight of the vehicle and the amount of weapons and other items it may carry. Determining weight therefore also determines the internal space (item slots) a Support Vehicle receives.

DESIGNING A SUPPORT VEHICLE

The process of Support Vehicle design can be organized into six simple steps, each of which is described in detail below.

Step 1: Design the Chassis—Determine the Support Vehicle's motive type, tech base (including Structural Tech Rating), weight, internal structure and chassis modifications (if any).

Step 2: Install Engine and Control Systems—Determine the Support Vehicle's engine type, modifications and size; add control systems.

Step 3: Add Heat Sinks—Determine number and weight of the Support Vehicle's heat sinks (if any).

Step 4: Add Armor—Determine type, amount and weight of armor (if any), and allocate armor points.

Step 5: Install Weapons and Equipment—Add weapons and other equipment to the Support Vehicle.

Step 6: Complete the Record Sheet.

The above design process is a mere framework for designing a Support Vehicle. The actual process—particularly after the chassis, engine and control systems are determined—can involve a bit more flexibility as equipment, armor, heat sinks and other components are balanced for their best fit in terms of weight and item slots. For instance, some designers might wish to assign armor to their Support Vehicles after all equipment is installed, emphasizing the Support Vehicle's main functions over battlefield protection that may or may not be relevant to its design. Others may want to add weapons before adding more heat sinks, to see how many may be needed before installing any.

To assist in this effort, the designer may find it useful to make copies of an appropriate blank Vehicle Record Sheet (in the back of this book), to visually arrange the placement of weapons and equipment while tracking the use of tonnage on a piece of scratch paper. Alternatively, designers with access to the appropriate *HeavyMetal* application can use that design software to develop their Support Vehicle electronically.

STEP 1: DESIGN THE CHASSIS

The first step in Support Vehicle design is the creation of the vehicle's basic framework, or chassis. This step establishes some of the most basic aspects of the Support Vehicle's design, determining what kind of vehicle it is, its motive type, technology base and weight. These choices will restrict the designer's access to certain equipment, and will also determine the weight and bulk of the vehicle's internal structure.

CHOOSE MOTIVE TYPE

Support Vehicles come in a variety of motive types (also referred to as movement types), which can affect their maximum weight, terrain restrictions and engine efficiencies. Because of this, choosing a Support Vehicle's motive type is the first key part of the chassis design process. Even the selection of a proper blank Record Sheet for use in vehicle design hinges on the choice of motive type before any other component.

The Support Vehicle Motive Types Table below provides key data that applies to Support Vehicle design and game play. Each of the motive types covered by these rules is listed in the Motive Type column, along with its upper Size-Class Limit, its own Maximum Weight (beyond which Support Vehicles of that motive type may not be constructed) and Restricted Terrain (areas impassable to units of that motive type in *Total Warfare* game play). The Support Vehicle Record Sheet Table, meanwhile, determines which Blank Record Sheet must be used to record the construction of a new Combat Vehicle from a given motive type.

Simon wants to design a fast and small ambulance for city use. He decides on a wheeled design, which he names the Simca. In preparation for the design process, he gets a copy of a Ground Vehicle Record Sheet ready.

Todd is designing an airborne Support Vehicle ideal for medivac missions close to a battle zone, and chooses a VTOL motive type for his design. He names his unit the RTC-215M Swiftran, and prepares a VTOL Record Sheet to aid in his design.

Aaron has a more industrial concept in mind for his Support Vehicle. Though he considers a tracked design, he sees his unit, the Hesiod, as more of an all-purpose utility vehicle, and decides on a wheeled design

SUPPORT VEHICLE MOTIVE TYPES TABLE

Motive Type	Size Class Limit*	Max. Weight (Tons)	Restricted Terrain**
Airship†	Medium	300	Any Woods, Hills, or Structures at same altitude‡
Fixed-Wing†	Large	200	Any Woods, Hills, or Structures at same altitude‡
Hover	Large	100	Woods (Light and Heavy)
Naval (w/ Hydrofoil modification)	Medium	100	All except Water (Depth 1+)
Naval (w/ Submarine or no mod.)	Medium	300	All except Water (Depth 1+)
Tracked	Large	200	Woods (Heavy), Water (Depth 1+)
VTOL	Large	60	Any Woods, Hills, or Structures at same altitude‡
Wheeled	Large	160	Rough, Rubble, Woods (Light and Heavy), Water (Depth 1+)
Wing-in-Ground-Effect (WiGE)	Large	240	Any Woods, Hills, or Structures at same altitude

*Large Airships and Naval Support Vehicles will be covered in *Tactical Operations*.
**Some Support Vehicle types may receive modifications that can alter their terrain restrictions.
†These Support Vehicle types use Aerospace Fighter movement and combat rules. (Airships may not operate on the High-Altitude Map; Fixed-Wing Support Vehicles may operate on the Ground Row and Row 1 of the High-Altitude Map.)
‡These units may land only in Clear or Paved Terrain. (VTOL-capable units may also land atop buildings and on helipads, but may not operate on the High-Altitude Map.)

SUPPORT VEHICLE RECORD SHEET TABLE

Motive Type	Record Street
Airship (Small or Medium Size)	Airship
Fixed-Wing (Any Size)	Conventional Fighter
Hover, Tracked, Wheeled or WiGE (Small or Medium Size)	Ground Vehicle
Hover, Tracked, Wheeled or WiGE (Large)	Large Ground Vehicle
Naval (All forms, Small or Medium Size)	Naval Vehicle
VTOL (Any Size)	VTOL

like Simon's. Aaron notes from the Support Vehicle Record Sheet Table that he will use a Ground Vehicle Record Sheet for his design.

Brian thinks his Support Vehicle will be something for the typical Inner Sphere jet-setter: a fixed-wing luxury aircraft that he has already named the Jetta Coruna 4X. He prepares a Conventional Fighter Record Sheet for the work of designing it.

Christine has chosen to create a paramilitary Airship, used to patrol the skies over busy cityscapes, looking for trouble and coordinating with ground-based units. Naming this craft the Dixon, she prepares an Airship Vehicle Record Sheet to plan out her design.

CHOOSE TECHNOLOGY BASE

Support Vehicles may be constructed using Clan or Inner Sphere technology bases. Support Vehicles created using either tech base may be built as Support OmniVehicles, but must incorporate the Omni chassis modification to do so (see *Allocate Weight for Internal Structure*, p. 121).

For various reasons, all five of our designers opt to use an Inner Sphere Technology Base for their Support Vehicles. Aaron, however, has decided to construct his Hesiod as a Support OmniVehicle, hoping to maximize its flexibility.

CHOOSE WEIGHT

Depending on the Support Vehicle's desired motive type (see p. 118) and size class (Small, Medium or Large), the maximum weight may vary greatly.

For Small vehicles, designers may choose any weight under 5 tons, up to a maximum of 4,999 kilograms (in 1-kilogram increments). Construction of such vehicles will be handled using a kilogram standard, so the designer must first convert

to kilograms any desired items with a weight listing in tons. To do this, multiply the item's tonnage by 1,000.

Medium and Large Support Vehicles begin at 5 tons and can weigh any tonnage desired up to the maximum listed for their motive type (including any relevant chassis modifications, such as a hydrofoil modification for naval vehicles). This choice of weights must be measured in half-ton increments for the unit's total weight. Construction of such vehicles will be handled using a tonnage standard, so the designer must first convert to tons any desired items with a weight listing in kilograms. To do this, divide the item's kilogram weight by 1,000.

The Master Support Vehicle Weight Table below defines the weight ranges of each Support Vehicle that may be designed under these rules, by motive type and size class. Regardless of the Support Vehicle's size and motive type, the total weight of its engine, equipment, armor and other components must not exceed the weight chosen. Any unspent weight left after the creation process is considered cargo space, if the vehicle still has equipment slots to spare, or "wasted weight" if it does not.

Space

In addition to determining the maximum total weight of all equipment and components that comprise the vehicle, the Support Vehicle's weight also determines the maximum amount of items that may be mounted on the unit. For all Support Vehicles weighing 300 tons or less (which encompasses all of the Support Vehicle types in this book), this equipment space limit is 5 base item slots, plus 1 additional slot for every 10 tons (10,000 kilograms) of Support Vehicle weight (rounded down). For example, a 22-ton Support VTOL may carry up to 7 slots for items (5 base + [22 tons ÷ 10] = 7.2, round down to 7 item slots), while a 45-ton Support hovercraft may carry up to 9 items (5 base + [45 tons ÷ 10] = 9.5, round down to 9 item slots).

Though built like Combat Vehicles to an extent, Support Vehicles mount equipment less efficiently than their battlefield kin. Rather than occupying one slot per item, equipment mounted in a Support Vehicle may occupy a variable amount of equipment slots, as indicated by the Support Vehicle Slots column on the Weapons and Equipment Tables.

MASTER SUPPORT VEHICLE WEIGHT TABLE

Support Vehicle Motive Type (Size)	Weight Range (Tons)	Minimum Tech/ Base Availability Rating	Base Chassis Value	Base Engine Value
Airship (Small)	0.100 – 4.999	A/C-D-C	0.20	0.004
Airship (Medium)	5 – 300	B/D-E-D	0.25	0.008
Fixed-Wing (Small)	0.100 – 4.999	B/C-D-C	0.08	0.005
Fixed-Wing (Medium)	5 – 100	B/C-D-C	0.10	0.010
Fixed-Wing (Large)	100.5 – 200	B/D-E-D	0.15	0.015
Hover (Small)	0.100 – 4.999	C/A-B-A	0.20	0.0025
Hover (Medium)	5 – 50	C/A-B-A	0.25	0.004
Hover (Large)	50.5 – 100	C/B-C-B	0.30	0.008
Naval (Small)	0.100 – 4.999	A/C-D-C	0.12	0.004
Naval (Medium)	5 – 300	A/C-D-C	0.15	0.007
Tracked (Small)	0.100 – 4.999	B/B-C-B	0.13	0.006
Tracked (Medium)	5 – 100	B/B-C-B	0.15	0.013
Tracked (Large)	100.5 – 200	B/C-D-C	0.25	0.025
VTOL (Small)	0.100 – 4.999	C/C-D-C	0.20	0.002
VTOL (Medium)	5 – 30	C/C-D-C	0.25	0.0025
VTOL (Large)	30.5 – 60	C/D-E-D	0.30	0.004
Wheeled (Small)	0.100 – 4.999	A/A-A-A	0.12	0.0025
Wheeled (Medium)	5 – 80	A/A-B-A	0.15	0.0075
Wheeled (Large)	80.5 – 160	A/B-C-B	0.18	0.015
WiGE (Small)	0.100 – 4.999	C/B-C-B	0.12	0.003
WiGE (Medium)	5 – 80	C/B-C-B	0.15	0.005
WiGE (Large)	80.5 – 240	C/C-D-C	0.17	0.006

Support Vehicle Item Slots

Number of Item Slots = 5 + (Support Vehicle Tons ÷ 10); Round down to the nearest whole number

Base Chassis/Engine Values

In addition to the weight ranges and Minimum Technology Ratings (see *Choose Technology Rating*, below), each motive type and size class of Support Vehicle also has a corresponding Base Chassis Value and Base Engine Value. These values are required to compute the final chassis and engine weights for these Support Vehicles, and are included here to avoid undue repetition. When choosing a weight for the Support Vehicle, the designer should note these values as well.

Simon plans to make his Simca small and fast. Because it is a wheeled Support Vehicle, the Simca has a maximum weight limit of 160 tons in the Large size, but Simon wants something in the Small category, placing the vehicle under 5 tons. Simon decides he can make his Simca work at just 2.5 tons (2,500 kilograms). At this weight, he calculates that his Support Vehicle will have 5 item slots for equipment space (5 base slots + [2.5 tons ÷ 10] = 5.25 slots, rounded down to 5 slots).

Simon also notes from the Master Support Vehicle Weights Table that the Simca will have a Base Chassis Value of 0.12 and a Base Engine Value of 0.0025.

As a VTOL, Todd's Swiftran cannot exceed a 60-ton maximum weight (at the Large size) for its motive type. Deciding that bigger doesn't equal better, he chooses a Medium-size design and places his VTOL at 25 tons in total weight. At this weight, the Swiftran will have 7 item slots to work with (5 base slots + [25 tons ÷ 10] = 7.5 slots, rounded down to 7).

Todd also jots down his Swiftran's Base Chassis Value of 0.25 and Base Engine Value of 0.0025.

Aaron decides his Hesiod will be a Medium-size wheeled vehicle that weighs in at 7 tons. At this weight, the Hesiod will have up to 5 item slots for equipment (5 base slots + [7 tons ÷ 10] = 5.7 slots, rounded down to 5 slots). It also has a Base Chassis Value of 0.15 and Base Engine Value of 0.0075.

While Brian's Coruna cannot exceed the 200-ton maximum weight of a Large Fixed-Wing Support Vehicle, he has something much smaller in mind. Choosing the Medium size class and a weight of 35 tons, he finds that his aircraft will have 8 item slots to work with (5 base slots + [35 tons ÷ 10] = 8.5 slots, rounded down to 8). The Coruna's Base Chassis Value is 0.10, while its Base Engine Value is 0.010.

Christine decides that her Dixon should be as large as she can make it, to maximize its capabilities as a floating police headquarters. She chooses the Medium size class—the largest available to Airship Support Vehicles—and a weight of 300 tons. This weight gives the Dixon a space capacity of 35 item slots (5 base slots + [300 tons ÷ 10] = 35 slots).

Christine also notes her Dixon's Base Chassis Value is 0.25 and its Base Engine Value is 0.008.

ALLOCATE WEIGHT FOR INTERNAL STRUCTURE

Support Vehicles have an internal structure, just like Combat Vehicles, representing their internal framework. The weight of this structure depends on the weight of the Support Vehicle itself, as well as its Structural Tech Rating and any special chassis modifications applied. Because more variables apply to Support Vehicle design, the weight of the vehicle's chassis is determined by a more complex formula than that used by its battlefield equivalents.

Choose Structural Tech Rating

The first step in computing a Support Vehicle's structural weight is the determination of its Structural Technology Rating. This is the Tech Rating (expressed as a letter grade A through F) used to define the sophistication of the design's core structure. The Technology Rating Table below helps to define these terms more clearly, and may be used to associate a given Support Vehicle design with a particular era of creation, but should also be seen as a general guide. For example, the Clans can and do make use of technologies rated E or lower, and certain Inner Sphere agencies do have access to the occasional homegrown item that merits a Tech Rating of F.

While choosing a Support Vehicle's Structural Tech Rating will help anchor its core design into the universe and establish a standard by which any other components installed may be measured, it merely applies to the internal structure of the vehicle; engines, armor and other equipment installed later may hail from more or less sophisticated technology levels.

For all Support Vehicle types and size classes covered by these rules, the Minimum Support Vehicle Structural Tech Rating may be found on the Master Support Vehicle Weights Table. Designers may choose a higher rating in order to save weight, but they may not choose a structural design less sophisticated than indicated by this minimum listed Tech Rating.

Monitor Naval Vessel, Kraken Unleashed (Mercenary)

TECHNOLOGY RATING TABLE

Tech Rating	Technology Level	Sample Unit Types
A	Primitive (19th to early 20th centuries)	Wheeled Support Vehicles and Small Airships
B	Low-Tech (late 20th century)	Tracked Support Vehicles and Fixed-Wing Support Vehicles
C	Common Tech (21st to 22nd centuries)	Hovercraft Support Vehicles and VTOL Support Vehicles
D	High-Tech (Age of War and Succession Wars)	Combat Vehicles and BattleMechs
E	Advanced (Star League/Post-3050 Inner Sphere)	Inner Sphere OmniMechs and OmniVehicles
F	Hyper-Advanced (Clan/Post-3065 Inner Sphere)	Clan OmniMechs and OmniVehicles

SUPPORT VEHICLE STRUCTURE TABLE

Support Vehicle Structure Weight Formulae:
Structure Weight = Base Chassis Value x Tech Rating Multiplier x Chassis Modification Multiplier(s) x Total Support Vehicle Weight

TECH RATING MULTIPLIERS

	Support Vehicle Technology Rating					
	A	B	C	D	E	F
Tech Rating Multiplier	1.60	1.30	1.15	1.00	0.85	0.66

CHASSIS MODIFICATIONS TABLE

Chassis Modification	Min. Tech Rating	Multiplier	Modification Restrictions
Amphibious	C	1.75	Not available to Hover or Naval Support Vehicles
Armored*	A	1.5	Not available to Airship Support Vehicles
Bicycle**	A	0.75	Small Wheeled and Small Hover Support Vehicles Only
Convertible	A	1.1	Wheeled, Tracked and Hover Support Vehicles Only
Dune Buggy†	B	1.5	Wheeled Support Vehicles Only
Environmental Sealing	B	2	No Restrictions
Hydrofoil	B	1.7	Naval Support Vehicles (up to 100 tons in Weight) Only
Monocycle**	B	0.5	Small Wheeled and Small Hover Support Vehicles Only
Off-Road	B	1.5	Wheeled Support Vehicles Only
Omni	E	1	No Restrictions
Prop	B	1.2	Fixed-Wing Support Vehicles Only
Snowmobile†	B	1.75	Wheeled and Tracked Support Vehicles Only
STOL	C	1.5	Fixed-Wing Support Vehicles Only
Submersible	B	1.8	Naval Support Vehicles Only
Tractor (Wheel/Track)	A	1.2	Wheeled/Tracked Support Vehicles Only
Tractor (Naval)	A	1.2	Naval Support Vehicles Only
Trailer	A	0.8	Wheeled and Tracked Support Vehicles Only
Ultra-Light*	D	0.5	Small Support Vehicles Only
VSTOL	C	2	Fixed-Wing Motive Types Only

*Armored and Ultra-Light modifications may not be combined.
**Bicycle and Monocycle modifications may not be combined.
†Snowmobile and Dune Buggy modifications may not be combined with each other or with Amphibious and/or Off-Road modifications.

CHASSIS MODIFICATION DESCRIPTIONS

Modification	Description/Features
Amphibious	May traverse or land on water of any depth (unit is considered to be afloat on the water's surface)
Armored	May mount heavier armor types (marked with an asterisk on the Support Vehicle Armor Table)
Bicycle	May enter Light Woods terrain, if otherwise restricted from doing so
Convertible	May not mount a turret; Unit receives a Crew Killed result if hit in a Turret location while top is open
Dune Buggy	Operates normally only on Sand; When not on Sand: –1 Cruising MP, and unit may not use Flank MP*
Environmental Sealing	Fission-, Fusion- and Electric-engine units may operate normally in vacuum or underwater unless breached
Hydrofoil	May operate as a hydrofoil; multiply base Cruising MP by 1.25 (round normally, rounding .5 up)
Monocycle	May enter Light Woods terrain, if otherwise restricted from doing so
Off-Road	Operates normally on and off Paved terrain; Unit still considered immobile if it enters prohibited terrain
Omni	May be constructed as an OmniVehicle (but may not use Mechanized Infantry rules)
Prop	Cannot operate above atmospheric row 1; Only moves 1 hex per turn on the high-altitude map; Goes Out of Control at Velocity 8+
Snowmobile	Operates normally only on Snow/Ice; When not on Snow or Ice: –1 Cruising MP, and may not use Flank MP*
STOL	May land and takeoff with only 300 meters (10 hexes) of runway space
Submersible	May operate as a submarine (may not use hydrofoil mod, if equipped, when submerged)
Tractor (Wheel/Track)	May tow other ground units over non-water terrain (up to towing unit's mass)
Tractor (Naval)	May tow other naval units over water (up to 5x the towing unit's mass)
Trailer	No engine required (unit may be towed by a suitable Tractor); Not required for naval units
Ultra-Light	May not mount armor better than a BAR of 5 due to lighter structure design
VSTOL	May operate as an STOL or may take off and land vertically

* No effect in standard rules play

Choose Chassis Modifications

For many Support Vehicles, special modifications may be applied to the chassis at this time that provide added features not built into the Support Vehicle's basic design. These chassis modifications not only provide a multiplier for chassis weight computations, but also may modify the Support Vehicle's Structural Tech Rating, and may be restricted to certain motive types or even incompatible with other chassis modifications.

The Support Vehicle Structure and Modifications Table below shows all of the chassis modifications applicable to the units covered by these rules, including their Chassis Value Multipliers, Minimum Tech Ratings, restrictions and basic descriptions. If a desired chassis modification has a Minimum Tech Rating higher than that of the Structural Tech Rating chosen, the designer must either forego the modification or raise the Support Vehicle's Structural Tech Rating to match.

Calculate Chassis Weight

The basic formula for finding the weight of a Support Vehicle's internal structure is to multiply its Base Chassis Value (as found on the Master Support Vehicle Weights Table) by its Tech Rating multiplier, and then multiply that result by each chassis modification multiplier that the designer wishes to apply. The result of all these factors is then multiplied by the Support Vehicle's total mass (using whichever weight standard applies—tonnage or kilograms) to find how much of the unit's total weight is devoted to its internal structure (or structural integrity, where applicable).

All modification multipliers apply in sequence; designers should not add them up if multiple modifications are employed. For example, a 50-ton (Medium size) wheeled unit with Tech Rating C that sports both the Amphibious and the Armored chassis modifications would compute its chassis weight as follows: 0.15 (Medium, wheeled) x 1.15 (Tech Rating C) x 1.75 (Amphibious) x 1.5 (Armored) x 50 tons, for a final chassis weight of 22.64 tons (rounded to 23 tons).

Remember that the final value of all computations must be rounded up to the nearest kilogram for Small Support Vehicles, or to the nearest half-ton for Support Vehicles weighing 5 tons and up.

A Support Vehicle's total weight also determines its number of internal structure points per location, in the same way as for Combat Vehicles. Regardless of the Support Vehicle's size, to find the number of internal structure points it receives per location, divide its weight (in tonnage) by 10 and round the result up to the nearest whole number. The result is the number of points the Support Vehicle receives in *each* of its locations (including the turret, if the designer chooses to install one). When using the appropriate blank Record Sheet, the designer must mark out any excess internal structure cir-

cles on the Armor Diagram for all locations to indicate the number of points that make up each hit location. If no turret is assigned to the vehicle (see *Turrets*, below), then all internal structure *and* armor circles for the Turret location must be blacked out.

Airships and Fixed-Wing Support Vehicles are an exception to this rule. As aerospace units, these unit types use a more abstract means of tracking their internal framework, called Structural Integrity (rather than internal structure). The value of this Structural Integrity for these Support Vehicle types depends on the vehicle's Safe Thrust, not necessarily its raw tonnage. Because of this, Airship and Fixed-Wing Support Vehicles do not receive internal structure circles at this stage. Instead, they determine their Structural Integrity after engine installation.

Like Internal Structure points on BattleMechs, IndustrialMech, ProtoMechs and Combat Vehicles, the structure points used by Support Vehicles may not be redistributed to other body locations.

Support Vehicles, like Combat Vehicles, determine their Maximum Armor Factors by vehicle tonnage, rather than the number of internal structure points received. See *Add Armor*, p. 134 for the rules governing a Support Vehicle's Maximum Armor Factor.

The Support Vehicle Internal Structure Locations Table below outlines the locations that apply to the various motive types and size classes of Support Vehicles constructed using these rules.

Turrets: Like those on Combat Vehicles, turrets on Support Vehicles are optional components available to all motive types covered by these rules except for Airships, Fixed-Wings and VTOLs. If installed, a turret automatically receives the same number of internal structure points as the Support Vehicle's other locations, but does not directly affect the structure weight. Turrets instead add weight in an independent "turret tonnage" equal to 10 percent of the total mass of all weapons and equipment mounted in them (rounded up to the nearest kilogram for Small Support Vehicles, or to the nearest half-ton for Support Vehicles weighing 5 tons and up). As this decision may not be made until the designer is ready to add weapons and other equipment to the Support Vehicle, the turret weight need not be established at this point. The designer should decide, however, whether or not the vehicle is to have a turret. (See the rules regarding OmniVehicles below for an exception.)

Any Support Vehicles constructed under these rules may carry only one turret, except for Airship, Fixed-Wing and VTOL Support Vehicles (which may not mount turrets).

Rotors: All VTOL Support Vehicles automatically receive a Rotor location, and must allocate internal structure points to that location as well. Unlike turrets, VTOL rotors are not optional items.

Tech Base/Rating: The internal structure types for Support Vehicles in this section are equally available to vehicles of Clan or Inner Sphere tech bases. Support Vehicle internal structure is incompatible with Combat Vehicle internal structure.

Space: Support Vehicles have no equivalent to endo-steel construction. The types of internal structure and chassis modifications presented in these rules do not affect their equipment slot spaces.

Support OmniVehicles: As the arrangement of internal structure circles is fixed across all Support Vehicle types and no equipment slots are occupied by structure, OmniVehicle designers need only note whether or not the Support Vehicle's base configuration is to mount a turret at this time. If so, the turret weight must be pre-determined at this stage as well, based on the maximum weight of weapons the designer wishes to have installed in the Turret location.

According to the Master Support Vehicle Chassis Table, Simon's Simca—a Small wheeled vehicle weighing 2,500 kilograms—has a Minimum Tech Rating of A and a Base Chassis Value of 0.12. Because the vehicle is already pretty short on weight, Simon chooses a Structural Tech Rating of D, for a Rating Multiplier of 1.0.

Simon decides that he requires no additional modifications for the Simca's chassis, and thus computes a chassis weight of 300 kilograms (0.12 Base Chassis Value x 1.0 Structural Tech Rating D x 2,500 kg = 300 kg). The Simca has 2,200 kilograms of unspent weight remaining (2,500 kg – 300 kg = 2,200 kg).

Simon sees no need for a turret and decides at this point that the Simca will not have one. Given its weight of 2,500 kilograms (2.5 tons), he computes that the Simca will have only 1 point of internal structure per location (2.5 tons ÷ 10 = 0.25 points per location, rounded up to 1). Using the Ground Vehicle Record

SUPPORT VEHICLE INTERNAL LOCATIONS TABLE

Support Vehicle Motive Type (Size)	Internal Structure Locations*
Airship (Small and Medium)**	Structural Integrity†
Fixed Wing (All Sizes)	Structural Integrity†
Hover/Tracked/Wheeled/WiGE (Small and Medium)	Front, Left, Right, Rear, Turret
Hover/Tracked/Wheeled/WiGE (Large)	Front, Front Left, Front Right, Rear Left, Rear Right, Rear, Turret
Naval (Small and Medium)**	Front, Left, Right, Rear, Turret
VTOL (All Sizes)	Front, Left, Right, Rear, Rotor

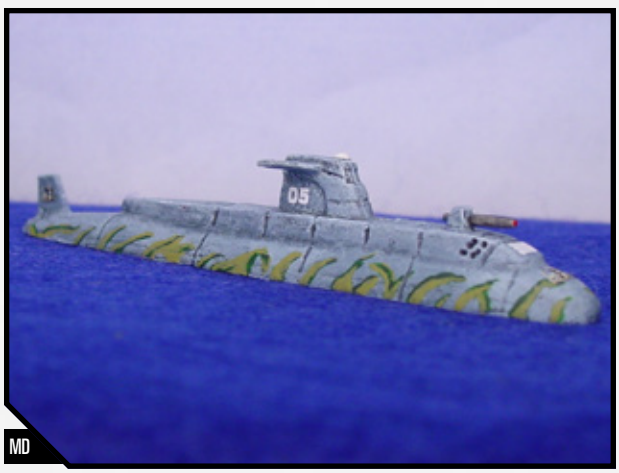
*Turret locations, where presented, are optional. Rotor locations, where presented, are not optional.
**Large Airships and Naval Support Vehicles will be covered in *Tactical Operations*.
†Structural Integrity for these vehicle types is determined upon installing the unit's engine.

Sheet, Simon blacks out all of the Turret circles (including those in the gray-shaded internal structure and the unshaded armor area), and all but 1 internal structure point in the gray-shaded areas of the vehicle's Front, Left, Right and Rear sides.

Todd's Swiftran—a Medium-sized VTOL Support Vehicle—has a Minimum Tech Rating of C and a 0.25 Base Chassis Value. Like Simon, Todd decides to use more advanced technology and gives the vehicle a Structural Tech Rating of E (Rating Multiplier 0.85). Because the Swiftran is to be a battlefield medivac unit, he chooses the Armored Chassis Modification, and so computes a chassis weight of 8 tons (0.25 Base Chassis Value x 0.85 Structural Tech Rating E x 1.5 Armored Chassis Modifier x 25 tons = 7.969, rounded up to the nearest half-ton at 8).

Todd's Swiftran may not carry a turret as it is a VTOL Support Vehicle. With the Swiftran's 25-ton weight, he finds that it will have 3 points of Internal Structure per location (25 tons ÷ 10 = 2.5 points per location, rounded up to 3). Using the VTOL Record Sheet, Todd blacks out all but 3 internal structure points in the gray-shaded areas of the vehicle's Rotor location, as well as its Front, Left, Right and Rear sides.

Because it is a Medium 7-ton wheeled Support Vehicle, Aaron's Hesiod has a Minimum Tech Rating of A and a Base Chassis Value of 0.15. Aaron wants to give the unit off-road capability, along with the flexibility of OmniVehicle design, and so adds the chassis modifications for Off-Road (Chassis Multiplier 1.5) and Omni (Chassis Multiplier 1). As the higher of these two modifications—the Omni capability—has a Minimum Tech Rating of E, Aaron's Hesiod upgrades its Minimum Tech Rating to E, and so he selects that as his Structural Tech Rating (Rating Multiplier 0.85).



Neptune Naval Vessel, Kraken Unleashed (Mercenary)

Aaron computes that his Hesiod will have a chassis weight of 1.5 tons (0.15 Base Chassis Value x 0.85 Structural Tech Rating E x 1.5 Off-Road Multiplier x 1.0 Omni Multiplier x 7 tons = 1.34 tons, rounded up to 1.5). The Hesiod has 5.5 unspent tons remaining (7 tons – 1.5 tons = 5.5 tons).

Like Simon, Aaron also decides to place no turret on his wheeled Support Vehicle, deciding that any of its configurations will find better uses for the half-ton (minimum) he'd need to assign to turret weight. With the Hesiod's 7-ton weight, he finds that it will have only 1 point of internal structure per location (7 tons ÷ 10 = 0.7 points per location, rounded up to 1). Using the Ground Vehicle Record Sheet, Aaron blacks out all but 1 internal structure point in the gray-shaded areas of the vehicle's Front, Left, Right and Rear sides, and blacks out all Turret location circles.

Brian's Jetta Coruna—a 35-ton, Medium-sized, Fixed-Wing Support Vehicle—receives a Minimum Tech Rating of B from the Master Chassis Table, with a Base Chassis Value of 0.10. For a chassis modification, Brian decides on Environmental Sealing (Chassis Modifier 2), just in case the aircraft is to be taken any place where the atmosphere is hostile. Enviro-sealing raises the Minimum Tech Rating for the Coruna's chassis to C, but Brian decides to take it one step further and chooses a Structural Tech Rating of D instead.

These factors combine to give the Jetta Coruna a chassis weight of 7 tons (0.10 Base Chassis Value x 1.0 Structural Tech Rating D x 2.0 Enviro-Sealing Multiplier x 35 tons = 7 tons). The Coruna has 28 unspent tons remaining (35 tons – 7 tons = 28 tons).

Because Brian's Coruna is a Fixed-Wing Support Vehicle, it does not have internal structures to black out at this time. Instead, Brian must first determine the vehicle's Thrust ratings in the next step before determining how many Structural Integrity circles he will need to black out.

Christine's Dixon is a Medium 300-ton Airship, and so it has a Minimum Tech Rating of B and a Base Chassis Value of 0.25. Though she expects the craft might see combat in its role as a police vehicle, she cannot choose an armored chassis modification because the Dixon is an Airship. She decides that no other chassis modifications are necessary as well, but does choose a Structural Tech Rating of D (Rating Multiplier 1) for the design.

Christine finds the Dixon's chassis weight to be 75 tons (0.25 Base Chassis Value x 1.0 Structural Tech Rating D x 300 tons = 75 tons). The Dixon has 225 tons of unspent weight remaining (300 tons – 75 tons = 225 tons).

Like Brian's Coruna, Christine's Dixon does not have internal structures to black out at this time. Instead, she must determine the craft's Thrust ratings in the next step before determining how many Structural Integrity circles she will need to black out.

STEP 2: INSTALL ENGINES AND CONTROL SYSTEMS

The second step in Support Vehicle design is the installation of the vehicle's engines and control systems. This step establishes the key factors in the Support Vehicle's mobility, including the size and performance of its engine and the weight of the control systems the crew uses during operations.

INSTALL ENGINE

Each Support Vehicle carries one engine to power its movement, equipment and other integral components. As Support Vehicles use a wider set of standards than Combat Vehicles, the formula for determining the vehicle's engine weight is slightly more complex than that for a Combat Vehicle, and factors in the Support Vehicle's engine type, Technology Rating and desired speed as well as the unit's overall weight. Support Vehicles do not use the military engines shown on the Master Engine Table (p. 49).

The Support Vehicle Engine Table below provides the formulas and compatibilities of the various engine types available to Support Vehicles, by Tech Rating. Determining the weight of a Support Vehicle's engine is simply a matter of multiplying the vehicle's total weight by its Base Engine Weight (a base multiplier of the vehicle's total weight based on its size and motive type), Movement Factor (a value derived from the unit's desired Cruise/Safe Thrust) and Engine Weight Multiplier (a value based on the type and Tech Rating of the engine chosen). This final weight (rounded to the nearest kilogram for Small Support Vehicles, and to the nearest half-ton for those weighing 5 tons and up) includes the engine, transmission and any integral cooling systems and shielding necessary to operate the engine.

If the compatibility of an engine type is noted as "N" (under its respective Compatibility column on the table) for a given Support Vehicle motive type, that engine type may not be installed on that Support Vehicle. If a given Engine Weight Multiplier for a Tech Rating is listed as "NA" (under its respective Multiplier column on the table), that engine type is unavailable at that Tech Rating.

At the designer's option, a Support Vehicle may mount an engine at a different Tech Rating than its chassis (either higher or lower). If a higher-rated engine is used, however, it will drive up the Support Vehicle's overall Tech Rating accordingly.

Minimum Engine Weights: In Support Vehicle design, Fusion engines of Tech Rating C, Fission engines of all Tech Ratings, and all hover-based Support Vehicles have minimum engine weights that must be satisfied during construction. Fusion Engines with a Tech Rating of D or higher have a minimum engine weight of 0.25 tons (250 kilograms). For Fission engines (and Fusion engines of Tech Rating C), this minimum engine weight is 5 tons (5,000 kilograms), regardless of the Support Vehicle's size, weight, speed or motive type. For Support Vehicles with a hover motive type, this minimum weight is equal to 20 percent of the vehicle's total weight, rounded up to the nearest kilogram for Small vehicles, or to the nearest half-ton for hovercraft 5 tons and over. If both of these conditions apply (for example, a hovercraft powered by a Fission engine), the higher weight result applies.

If the computed weight of the vehicle's engine is less than this minimum, the designer must either increase the vehicle's speed until an engine weight that meets the above criteria is found, or inflate the engine's weight to meet these minimums without increasing performance. For example, a 4,500-kilogram hovervan with a minimum engine weight of 900 kilograms (20 percent of 4,500 kg = 900 kg) may install an engine that provides 6 Cruising MP at 600 kg if desired. In order to meet its minimum engine size requirement, however, this engine will be "inflated" to 900 kg without changing its performance.

Tractor/Trailers: Support Vehicles built as Trailers (constructed using the Trailer chassis modification), do not require an engine or control systems unless they are also expected to operate without a suitable Tractor unit. The movement rate of any Tractor/Trailer Support Vehicle combinations is based off that of the controlling Tractor unit, and is subject to the rules for carrying external cargo as presented in *Total Warfare* (see p. 261, *TW*).

Tech Base/Rating: The engine types and Tech Ratings presented in this section are available to Support Vehicles made using either the Clan or Inner Sphere tech bases. Support Vehicles created under either technology base may not make use of the combat engines shown on the Master Engine List, including Compact, Light and XL Fusion engines.

Space: The types of engine used by Support Vehicles do not affect the Support Vehicle's equipment slot space.

Support OmniVehicles: Engine type, Tech Rating, movement points and weight must be established when designing a Support OmniVehicle's base configuration, and may not be altered in the completed Primary or Alternate configurations of that Support OmniVehicle.

AIRSHIP/FIXED WING SUPPORT VEHICLE FUEL TABLE

	Fuel Weight (kg) per Thrust Point (by Tech Rating)*					
Support Vehicle Size Class	A	B	C	D	E	F
Small (Under 5 tons)	50	30	23	15	13	10
Medium	63	38	25	20	18	15
Large	83	50	35	28	23	20

*Airships and Prop-Driven Fixed Wing Support Vehicles multiply by 0.75 (round up to nearest kg). Solar-, Fission- and Fusion-Powered Airships and Prop-Driven Fixed Wing Support Vehicles require no mass for fuel.

SUPPORT VEHICLE ENGINE TABLE

SUPPORT VEHICLE BASE MOVEMENT FORMULAE

Support Vehicle Movement Factor (Non-Airships/Fixed-Wing):	4 + (Desired Cruising MP x Desired Cruising MP)
Support Vehicle Movement Factor (Airship/Fixed-Wing):	4 + (Desired Safe Thrust x Desired Safe Thrust)*
Flank MP = Cruising MP x 1.5 (round up); Maximum Thrust = Safe Thrust x 1.5 (round up)*	

*Airships have a Maximum Safe Thrust of 2 and may choose Thrust Points in multiples of 0.25, rather than whole numbers (round all computed Max Thrusts for Airship units up to the nearest multiple of 0.25)

SUPPORT VEHICLE ENGINE WEIGHT FORMULA

Engine Weight = Base Engine Weight x Movement Factor x Engine Weight Multiplier x Total Support Vehicle Weight

BASE SUPPORT VEHICLE ENGINE COMPATIBILITIES TABLE

	Compatibility by Engine Type						
Support Vehicle Motive Type	**Steam**	**ICE**	**Battery***	**Fuel Cell***	**Solar***	**Fission**	**Fusion**
Wheeled	Y	Y	Y	Y	Y	Y	Y
Tracked	Y	Y	Y	Y	Y	Y	Y
Hover**	N	Y	Y	Y	N	Y	Y
VTOL	N	Y	Y	Y	N	Y	Y
Airship	Y	Y	Y	Y	Y	Y	Y
Fixed Wing	N	Y	Y†	Y†	Y†	Y	Y
Naval Vessel	Y	Y	Y	Y	Y	Y	Y
WiGE	N	Y	Y	Y	Y	Y	Y

*Battery, Fuel Cell and Solar engine types are classified as Electric engines.
**Hover Support Vehicles have a minimum final engine weight equal to 20 percent of their total weight.
†Fixed-Wing unit types may only use Electric engines if they have the Prop-Driven chassis modification.

SUPPORT VEHICLE ENGINE WEIGHT MULTIPLIERS AND FUEL WEIGHT PERCENTAGE TABLE

	Engine Weight Multiplier (by Tech Rating)						
Support Vehicle Engine Type	**A**	**B**	**C**	**D**	**E**	**F**	**Fuel: % of Engine per 100 km Range***
Steam	4.0	3.5	3.0	2.8	2.6	2.5	3
Internal Combustion (ICE)	NA	3.0	2.0	1.5	1.3	1.0	1**
Electric (Battery)	NA	NA	1.5	1.2	1.0	0.8	5
Electric (Fuel Cell)	NA	NA	1.2	1.0	0.9	0.7	1.5
Electric (Solar)†	NA	NA	5.0	4.5	4.0	3.5	NA
Fission†‡	NA	NA	1.75	1.5	1.4	1.3	NA
Fusion‡	NA	NA	1.5‡	1.0	0.75	0.5	NA

*Airships and Fixed-Wing Support Vehicles use Airship/Fixed Wing Support Vehicle Fuel Table below.
**ICEs running on alcohol or natural gas use 1.25 percent.
†Airships and Prop-Driven Fixed-Wing Support Vehicles using these engine types do not require fuel.
‡The minimum weight for Fission engines and Tech Rating C Fusion engines is 5 tons; the minimum weight for Tech Rating D+ Fusion Engines is 0.25 tons.

For his Simca, Simon decides that a basic Internal Combustion engine (ICE) will be cheaper and easier to employ. He also decides he wants the vehicle to be fast, so that it can reach a scene fast and get to the hospitals just as quickly. Deciding on a Cruising MP of 7 (which yields a Flank MP of 11; 7 MP x 1.5 = 10.5, rounded up to 11), Simon establishes the Simca's Base Movement Factor as 53 (4 + [7 Cruising MP x 7 Cruising MP] = 53). Furthermore, a Small wheeled vehicle weighing 2,500 kilograms has a Base Engine Value of 0.0025. Given that the Simca has a Structural Tech Rating of D, Simon decides that its engine will be just as sophisticated as the chassis (Tech Rating D). This provides an Engine Weight Multiplier of 1.5.

Given these values, Simon computes that the Engine Weight for his Simca will be 497 kg (0.0025 Base Engine Value x 53 Base Movement Factor x 1.5 Tech Rating D ICE x 2,500 kg Total Vehicle Weight = 496.875 kg, round up to 497). The Simca now has 1,703 kg remaining (2,200 kg – 497 kg = 1,703 kg).

Todd's Swiftran also uses a basic ICE, and he decides on a fast speed suitable for medivac operations at a Cruising MP of 11 (which yields a Flank MP of 17; 11 MP x 1.5 = 16.5, rounded up to 17). Todd thus establishes the Swiftran's Base Movement Factor as 125 (4 + [11 Cruising MP x 11 Cruising MP] = 125). Furthermore, the 25-ton Medium VTOL has a Base Engine Value of 0.0025. Given that the Swiftran has a Structural Tech Rating of E, Todd decides on a Tech Rating of E for its engine (for an Engine Weight Multiplier of 1.3).

Given these values, Todd finds that the Swiftran's engine weight will be 10.5 tons (0.0025 Base Engine Value x 125 Base Movement Factor x 1.3 Tech Rating E ICE x 25 tons Total Vehicle Weight = 10.156 tons, round up to 10.5).

The Swiftran now has 6.5 unspent tons remaining (17 tons – 10.5 tons = 6.5 tons).

To take advantage of the plentiful resources of most agro-worlds, Aaron decides that his Medium 7-ton Hesiod wheeled Support Vehicle will also use an ICE, but will run on alcohol rather than standard petrochemicals. Giving his Support OmniVehicle a modest Cruising MP of 4 (for a Flank MP of 6; 4 Cruising MP x 1.5 = 6 Flank MP), he finds its Base Movement Factor will be 20 (4 + [4 Cruising MP x 4 Cruising MP] = 20). He also notes that, as a Medium wheeled Support Vehicle, the Hesiod's Base Engine Value is 0.0075. Aaron further decides his Hesiod will match its sophisticated chassis Tech Rating of E, which provides an Engine Weight Multiplier of 1.3.

Thus, the Hesiod's engine weight comes to 1.5 tons (0.0075 Base Engine Value x 20 Base Movement Factor x 1.3 Tech Rating E ICE Multiplier x 7 ton Total Vehicle Weight = 1.365 tons, rounded up to 1.5). This leaves 4 unspent tons to go (5.5 tons – 1.5 tons = 4 tons).

Brian's Jetta Coruna is a 35-ton, Medium Fixed-Wing Support Vehicle. As a dedicated aircraft, it operates using Thrust Points rather than ground-based MPs. Because it is designed for cruising, Brian decides a fair Safe Thrust of 4 will be sufficient for the Coruna (giving the plane a Maximum Thrust of 6; 4 Safe Thrust x 1.5 = 6 Max Thrust). Brian plans to power this aircraft using a Fusion engine with a Tech Rating of D (the same as the chassis).

The Master Support Vehicle Weight Table shows that a Medium Fixed-Wing Support Vehicle has a Base Engine Value of 0.010, while the Movement Factor provided by its Thrust Points come to 20 (4 + [4 Safe Thrust x 4 Safe Thrust] = 20). This establishes an engine weight of 7 tons for the Coruna (0.010 Base Engine Value x 20 Movement Factor x 1.0 Tech Rating D Fusion x 35 tons Total Vehicle Weight = 7 tons), leaving it with 21 unspent tons remaining (28 tons – 7 tons = 21 tons).

As a Medium-sized, 300-ton Airship, Christine's Dixon has a Base Engine Value of 0.008. Like the Coruna, Airships use thrust Points, rather than MPs, but they cannot achieve speeds over 3 Thrust Points. While her Dixon can be built using increments of 0.25 Thrust Points (unlike any other aircraft or aerospace unit), Christine decides to give her Airship the maximum possible speed it can handle and so assigns it a Safe Thrust of 2. (The Dixon's Max Thrust thus becomes 3, as 2 Safe Thrust x 1.5 = 3 Max Thrust.)

The Dixon's Safe Thrust provides it with a Movement Factor of 8 (4 + [2 Safe Thrust x 2 Safe Thrust] = 8), which will combine with the Base Engine Value of 0.008, and the Tech Rating D Fusion engine that she decides to install here. Christine thus finds that the engine weight for her Dixon will be 19.5 tons (0.008 Base Engine Value x 8 Movement Factor x 1.0 Tech D Fusion x 300 tons Total Vehicle Weight = 19.2 tons, round up to 19.5 tons). The airship now has all of 205.5 tons remaining (225 tons – 19.5 tons = 205.5 tons).

DETERMINE FUEL CAPACITY

Steam, internal combustion and electric engines powered by batteries or fuel cells have significant fuel requirements. For most Support Vehicles, this fuel capacity is generally expressed as an operating range for the vehicle, which is computed based on the engine type and the operating range desired (as shown in the Fuel column in the Support Vehicle Engine Table). Even though fuel is not tracked in *Total Warfare* standard rules play, all Support Vehicles that require fuel must allocate some weight—in addition to their engines—to internal fuel supplies.

Non-Airship/Fixed-Wing Fuel: For all Support Vehicles except Airships and Fixed-Wing craft, fuel weight is computed by multiplying the desired range (in hundreds of kilometers) by the listed percentage of the Support Vehicle engine's final weight. This figure is rounded to the nearest kilogram for Small Support Vehicles, or to the nearest half-ton for Support Vehicles weighing 5 tons and up. For example, a Medium Support Vehicle with a 32-ton fuel cell engine and a desired operating range of 500 kilometers would add 2.5 tons of fuel to its design, rounded up to the nearest

half-ton (32 tons [engine weight] x 0.015 [1.5 percent per 100 km for fuel cells] x 5 [hundreds of kilometers desired; 500 ÷ 100 = 5] = 2.4 tons, rounded up to 2.5 tons).

Designers interested in a more exact measure of fuel capacity may also re-compute the vehicle's range based on the fuel's final weight (after rounding). To accomplish this, first determine the percentage of the engine mass the fuel weight represents (divide the fuel weight by the engine weight and multiply the result by 100 to find the percentage). Next, divide this percentage by the percentage of fuel weight needed per 100 kilometers of range, and multiply the result by 100 kilometers (rounding down). The final result is the number of kilometers the Support Vehicle can travel on a single full tank of fuel. For instance, if a Steam engine (which requires 3 percent of engine mass in fuel tanks to achieve a 100-km range) weighs 300 kilograms, and its fuel tanks weigh 12 kilograms, the percentage of its fuel weight to its engine weight is 4 ([12 kg ÷ 300 kg] x 100 = 4 percent). At 4 percent of fuel weight (relative to the engine), the vehicle may travel 133 kilometers on a full tank ([4 percent ÷ 3 percent per 100 km] x 100 km = 133.33 km, rounded down to 133).

Airships and Fixed-Wing Fuel: Airships and Fixed-Wing Vehicles, which burn fuel by Thrust Points, use a different method of computing fuel weight. For these Support Vehicles, the weight of each "Fuel Point" (in kilograms) is shown for Small and Medium units under the Fuel Weight column appropriate to the Tech Rating of the unit's engine. This fuel weight—and even the need for Fuel Points at all—may vary among these Support Vehicle types as follows:

If the Support Vehicle is a Fixed-Wing Support Vehicle that does not have the Prop-Driven chassis modification, do not modify the weight or number of its Fuel Points.

If the Support Vehicle is an Airship powered by Steam, Internal Combustion, Battery, or Fuel Cell engine types, multiply the weight for its Fuel Points by 0.75 (rounding up to the next whole kilogram). Airship Support Vehicles powered by Solar, Fission, or Fusion engine types require no Fuel Points at all.

If the Support Vehicle is a Fixed-Wing Support Vehicle with the Prop-Driven chassis modification, and is powered by Steam, Internal Combustion, Battery, or Fuel Cell types, it also multiplies the weight of its Fuel Points by 0.75 (rounded up to the nearest whole kilogram). Fixed-Wing Support Vehicles that use the Prop-Driven chassis modification and are powered by Solar, Fission, or Fusion engine types do not require Fuel Points at all.

The total weight of all Fuel Points for Airships and Fixed-Wing Support Vehicles must be rounded to the nearest kilogram for Small units, and to the nearest half-ton for units 5 tons and up.

Tech Base/Rating: Fuel tanks and fuels are standardized, and equally available to Support Vehicles of Clan or Inner Sphere tech bases, but any Fuel Points installed in Airship and Fixed-Wing Support Vehicles must always match the Technology Rating and size class used to compute the Support Vehicle's engine. (For example, a Medium Airship's Tech D-Rated IC engine may not use fuel points reserved for a Small Tech F engine.)

Space: The internal fuel tanks covered by these rules occupy no equipment slots on Support Vehicles.

Support OmniVehicles: The fuel capacity installed with a Support OmniVehicle's engine must be established when designing a Support OmniVehicle's base configuration, and may not be altered in the completed Primary or Alternate configurations of that support OmniVehicle (though some units may have access to pod-mounted external fuel tanks).

Because it uses an ICE, the Simca relies on fuel, and so requires some weight devoted to fuel tanks (though fuel is not tracked in Total Warfare). Simon notes that the Simca can attain an operating range of 100 kilometers for every 1 percent of engine weight spent on fuel tanks. Feeling that an 850-kilometer range would be sufficient, he computes that the weight of fuel tanks to

A new light "millipede" Support Vehicle is cleared for inspection.

achieve that range would equal 8.5 percent of the engine weight (850 km range ÷ 100 km = 8.5 x 1 percent per 100 km = 8.5 percent).

Because 8.5 percent of the engine weight would come to a little over 42 kilograms, however (8.5 percent of 497 kg Engine Weight = 0.085 x 497 kg = 42.245 kg Fuel Weight), Simon decides to round the figure down to an even 42 kg. In doing so, Simon feels he must recalculate the actual fuel range provided by 42 kg, by determining what exact percentage of the engine's weight the fuel comes to. He computes that 42 kg of fuel is actually 8.45 percent of the engine's weight (42 kg Fuel Weight ÷ 497 kg Engine Weight = 0.0845 x 100 percent = 8.45 percent). Since each 1 percent of the engine weight equals 100 km for an IC engine running on petrochemicals, 8.45 percent of the Simca's engine weight in fuel equates to an 845-kilometer operating range for the ambulance ([8.45 percent ÷ 1 percent per 100 km] x 100 km = 845 km).

With 42 kg spent on fuel tanks, the Simca now has 1,661 kg left over (1,703 – 42 = 1,661).

The Swiftran's ICE also needs fuel, and so requires some weight devoted to fuel tanks. Todd notes that his VTOL—like Simon's ambulance—can attain an operating range of 100 kilometers for every 1 percent of engine weight spent on fuel tanks. He decides to invest a full ton into fuel, rather than compute the weight from a desired range. Todd finds that this single ton of fuel equates to 9.52 percent of the Swiftran's engine weight (1 ton Fuel Weight ÷ 10.5 tons Engine Weight = 0.0952 x 100 percent = 9.52 percent). Since each 1 percent of the engine weight equals 100 km for an ICE running on petrochemicals, 9.52 percent of the Swiftran's engine weight in fuel tanks equates to a 952-kilometer operating range for the VTOL ([9.52 percent ÷ 1 percent per 100 km] x 100 km = 952 km).

The Swiftran's 1-ton fuel tanks leave Todd with 5.5 tons remaining (6.5 tons – 1 ton = 5.5 tons)

Aaron decides to find the Hesiod's operating range after putting the bare minimum of 0.5 tons of fuel tanks on the vehicle. At 0.5 tons in weight, the Hesiod's tanks account for 33.33 percent of the vehicle's engine weight (0.5 ton Fuel Weight ÷ 1.5 tons Engine Weight = 0.3333 x 100 percent = 33.33 percent). However, rather than achieving 100 km per each 1 percent of the engine weight, the Hesiod's use of alcohol fuel means that the vehicle requires 1.25 percent of the engine's weight to reach 100 kilometers. Applying this value to determine how much range his vehicle can attain, Aaron finds that the Hesiod can travel 2,666-kilometers per tank ([33.33 percent ÷ 1.25 percent per 100 km] x 100 km = 2,666.4 km, rounded down to 2,666).

After installing its fuel tanks, the Hesiod now has 3.5 tons remaining (4 tons – 0.5 ton = 3.5 tons).

As an aircraft, Brian's Jetta Coruna uses Fuel Points, rather than determining its fuel mass by a set overland range. Consulting the Airship/Fixed-Wing Support Vehicle Fuel Table, Brian finds that a D-rated engine on a Medium Support Vehicle receives 1 Fuel Point per 20 kilograms (0.02 tons). This value is not modified, as the Coruna is neither an Airship nor a prop-driven aircraft. Brian decides to give his Coruna plenty of range with 8.5 tons' worth of fuel. At 0.02 tons per Fuel Point, the Coruna receives 425 Fuel Points for that weight (8.5 tons ÷ 0.02 tons per Fuel point = 425 fuel points).

After spending 8.5 tons on fuel tanks, the Coruna is left with 12.5 tons of unspent weight (21 tons – 8.5 tons = 12.5 tons).

Because Christine's Dixon is an Airship powered by a Fusion engine, it requires no Fuel Points. Had the Dixon received any engine type other than Fusion, Fission or Solar-Electric, however, it would have paid only three-quarters of the weight for any fuel points required.

DETERMINE STRUCTURAL INTEGRITY (AIRSHIPS/FIXED-WINGS ONLY)

Once the weight and Thrust Points of an Airship or Fixed-Wing Support Vehicle are determined, designers of these units can determine their Structural Integrity (SI) values. This determines the overall strength of the unit's internal structure or airframe.

Airships: The Structural Integrity Value for an Airship Support Vehicle must equal the Airship's Safe Thrust Rating *or* 2 percent of the Airship's weight in tons (rounded down), whichever value is higher (to a minimum of 1). This value may not be increased once the Airship's weight and Thrust Points are established.

Fixed Wing: The Structural Integrity Value for a Fixed-Wing Support Vehicle is equal to the aircraft's Safe Thrust Rating. This value may not be increased once the aircraft's weight and Thrust Points are established.

Regardless of the Structural Integrity Value for an Airship or Fixed-Wing Support Vehicle, the structure takes up no additional weight at this stage, as it is considered part of the chassis, engines and armor.

Space: Airship and Fixed-Wing structural integrity does not affect the amount of internal equipment space available to the Support Vehicle.

Support OmniVehicles: The Structural Integrity Value of an Airship or Fixed-Wing Support Vehicle built as an Omni is fixed once established for the unit's base configuration. These values may not change between the Support OmniVehicle's base, Primary or Alternate configurations.

Because his Jetta Coruna is a Fixed-Wing Support Vehicle, it receives a Structural Integrity (SI) Value at this stage, in place of the internal structure value found on ground vehicles and VTOLs. With a Safe Thrust of 4, Brian finds that the Coruna receives an SI of 4. On the record sheet, Brian blacks out all but 4 circles in the gray-shaded Structural Integrity area at the center of the aircraft's Armor Diagram.

Christine's Dixon is a 300-ton Airship with a Safe Thrust of 2. Because it is an Airship, and because 2 percent of its tonnage comes to 6 (2 percent of 300 tons = 0.02 x 300 tons = 6), which is greater than the Safe Thrust value of 2, the Dixon receives an SI of 6. On her airship's record sheet, Christine blacks out all but 6 circles in the gray-shaded Structural Integrity area.

ADD LIFT/DIVE EQUIPMENT OR ROTORS

Support Vehicles incorporate any lift/dive equipment and rotors into their chassis modification weights, rather than computing them as a separate component. Support Vehicle designers thus need not assign weight or space to this equipment.

DETERMINE JUMP CAPABILITY

As with Combat Vehicles, Support Vehicles built under these rules may not possess jump capability and so cannot mount jump jets.

ADD CONTROL/CREW SYSTEMS

Technically speaking, the chassis of a Support Vehicle contains its basic control systems as well, but some Support Vehicles must still allocate additional mass to crew accommodations and fire-control systems (if installed).

SUPPORT VEHICLE MINIMUM CREW TABLE

Minimum Crew Formula:

Minimum Crew Needs = Base Crew Minimum + Non-Gunner Minimum Crew + Minimum Gunners + Minimum Officers

Vehicle Type	Base Crew Minimum
All Support Vehicles (Small size)	1
Airship or Naval (Medium size)	4
Other Support Vehicles (Medium size)	2
Other Support Vehicles (Large size)	3
Support Vehicle constructed as a Trailer with no Engine	0*

ADDITIONAL CREW

Non-Gunners	Minimum Crew Requirement
Communications Equipment (per ton, see p. 212)	1
Field Kitchen (per item, see p. 217)	3
MASH (per theater, see p. 228)	5

	Minimum Gunners (by Fire Control System)*		
Support Vehicle Size	None (+2 to-hit)	Basic (+1 to-hit)	Advanced (+0 to-hit)
Small	1 per weapon	1 per facing‡	1 per facing‡/‡‡
Medium/Heavy	Total Weapon Tonnage ÷ 2†	Total Weapon Tonnage ÷ 3†	Total Weapon Tonnage ÷ 4†/††

Non-Officer Crew	Minimum Officer Requirement
1 to 3 Non-Officer Crew	0
4 or more Non-Officer Crew	Total Non-Officer Crew ÷ 6 (round up)

*Gunners are required only for items that require a Gunnery Skill roll to use in combat.
†Round up
††Tech E Chassis SVs use Tonnage ÷ 5; Tech F Chassis SVs use Tonnage ÷ 6 to determine gunners
‡Turret and pintle mounts counts as separate facing
‡‡Includes the vehicle's driver

Crew: Though *Total Warfare* standard rules play does not track crew sizes and such, their impact on Support Vehicle design (as noted above) requires Support Vehicle designers to resolve the number during the design process. To determine the basic crew needs for each vehicle type, consult the Support Vehicle Minimum Crew Table below. A Support Vehicle's crew must be equal to (or, at the designer's option, greater than) the sum of its minimum crew requirements (including any supplemental crew such as officers and those needed to man special equipment such as weapons, communications, kitchens and MASH theaters). Bay personnel—for vehicle bays, and such—are not listed (the bays themselves incorporate a limited amount of bunk space for such personnel). Note that the additional crew needs for the specific items listed do not have to be met unless and until the items are mounted, and that any officer requirements must be computed after all crew is assigned.

Note that gunners are required only for any items that require a Gunnery Skill roll to use in combat, and which have a range of more than 1 hex. (Thus, automatic defensive armaments like Anti-Missile Systems, A-Pods, and the like require no gunners, nor do non-weapon items listed on the Weapons and Equipment Tables, such as Active Probes and ECM gear.)

Crew Accommodations: For Small Support Vehicles, the designer must allocate weight to seating (standard, pillion or ejection-capable) or to appropriate infantry compartment/bays for all crew and passengers, including their minimum personnel. All Support Vehicles 5 tons and over integrate seating automatically for the minimum required crewmen, but will still require appropriate compartments/bays (or even quarters) for passengers such as infantry, or for any crew added beyond the minimum. Bay personnel—those required for vehicle bays, 'Mech bays, and so forth—incorporate a limited amount of seating and/or bunk space into their design, and so need not be counted toward required accommodations.

Support Vehicles that are particularly large or which are designed to spend days of operation away from any ports of call should invest in quarters, rather than seating, when weight permits.

CONTROL AND CREW SYSTEMS SPACE TABLE

Control/Crew System	Equipment Space Required (slots)
Fire Control (Basic or Advanced)	0
Seating (Standard, Pillion, Ejection)	0
Infantry Bay/Compartment	1 (per 28-man capacity)*
Quarters, Steerage	1 (per 50 quarters)*
Quarters, Crew/2nd Class	1 (per 20 quarters)*
Quarters, Officer/1st Class	1 (per 5 quarters)*

*Round all fractions up; Accommodations for Minimum Crew Needs require no slots

Fire Control Systems: In addition, designers of armed Support Vehicles may wish to allocate weight for fire-control systems to reduce the crew's need for all mounted weapons. The impact on crew requirements for installing such fire-control systems is also shown on the Support Vehicle Crew Requirements Table, but these need not apply unless the designer chooses to mount weaponry. Because fire-control system weights are directly related to the weight of the weaponry mounted on a Support Vehicle, the designer may feel free to determine the weight of fire-control systems after installing any mounted weapons and ammunition, though in some cases—such as the design of support OmniVehicles—it may be important to establish that the vehicle will be using such systems first.

Space: Seating, whether it needs to be installed (as for Small vehicles) or is considered part of the chassis (as for the minimum crew needs of Support Vehicles 5 tons and up), and fire-control systems of any kind do not affect the amount of internal equipment space available in a Support Vehicle design. However, if the Support Vehicle installs additional quarters or compartment/bays for passengers and crew, these items *do* count toward the unit's equipment space, as shown in the Control and Crew Systems Space Table below.

Support OmniVehicles: The minimum seating and fire-control systems, once established for the Support OmniVehicle's base configuration, may not change between its base, Primary or Alternate configurations. Because the weight of any fire-control system is directly tied to the weight of the weapons mounted on the Support Vehicle, this weight determines how much pod space may be devoted to weaponry.

According to the Support Vehicle Crew Requirements Table, Simon's Simca—as a Small wheeled vehicle—has a Minimum Crew Requirement of 1. But because he plans this vehicle to serve as an ambulance, he adds 2 more crewmen to reflect stations for additional paramedics. All three crewmen receive seating at 75 kilograms per crewman, for a total of 225 kilograms spent (3 seats x 75 kg per seat = 225 kg). The Simca has 1,436 kilograms of unspent weight remaining (1,661 kg – 225 kg = 1,436 kg).

Todd's Swiftran—a Medium VTOL Support Vehicle—has a Minimum Crew Requirement of 2. Because it is not a Small vehicle, additional weight need not be assigned for these crewmen (as they are considered intrinsic to the unit's chassis and control systems). However, as the Swiftran is a medivac unit, Todd adds 10 more seats for medics. For these crew alone, the seating will weigh 750 kilograms (10 seats x 75 kg per seat = 750 kg), or 0.75 tons. Todd decides to double this amount of seats to make room for passengers as well, bringing the

total crew/passenger seat weight to 1,500 kilograms or 1.5 tons. This leaves the Swiftran with 4 tons available (5.5 tons – 1.5 tons = 4 tons).

As a Medium wheeled Support Vehicle, Aaron's Hesiod has a Minimum Crew Requirement of 2, whose seating is considered intrinsic to the vehicle's chassis and controls. Aaron decides to add no more seating.

Brian's Jetta Coruna—a Medium Fixed-Wing Support Vehicle—has a Minimum Crew Requirement of 2 from the Support Vehicle Crew Requirements Table. As a Medium-sized vehicle, he need not assign seating to these crewmen. Still mulling passenger accommodations, Brian continues on without assigning any weight to seating.

Christine's Dixon, a Medium Support Vehicle, has a Minimum Crew Requirement of 4, plus one officer (because the Dixon, as an airship 5 tons or more in weight, requires at least one officer). Because the Dixon is Medium-sized, Christine need not allocate seating for these crewmen. However, as she intends to arm and equip the Airship later on with additional systems that will require additional crew, she makes a note that she has pre-allocated seating and space for 5 crew (4 crewmen + 1 officer = 5), and leaves the assignment of additional quarters and seating until she has determined what her expanded crew needs will be. She also notes that she plans to install a fire-control system, meaning that tonnage will be also be needed to accommodate any gunners.

SPECIAL PHYSICAL ENHANCEMENTS

Under these rules, any special physical enhancements—such as Environmental Sealing, hydrofoil capability and so forth—are already incorporated into the design of the Support Vehicle's chassis. Support Vehicles have no add-on equivalents to the MASC or Triple-Strength Myomer systems BattleMechs employ.

STEP 3: ADD HEAT SINKS

Like Combat Vehicles, Support Vehicles handle heat differently than BattleMechs, and only require heat sinks if they mount heavy energy weapons. If a Support Vehicle mounts no heavy energy weapons (energy weapons not listed under the Infantry Weapons and Equipment Tables), it requires no heat sinks. If such energy weapons are mounted, however, the number of heat sinks required by the vehicle equals the total amount of heat generated by firing all such energy weapons simultaneously.

Unlike those found on Combat Vehicles, Support Vehicle engines *never* provide bonus "weight-free" heat sinks. (Any shielding and cooling capability they have covers only the engine's own needs.) This means any and all heat sinks mounted on a Support Vehicle are installed at a cost of 1 ton per heat sink.

Like Combat Vehicles, Support Vehicles may use only single (standard) heat sinks.

Tech Base/Rating: The heat sinks used in Support Vehicle construction are standardized and equally available to vehicles of Clan or Inner Sphere tech bases.

Space: Support Vehicle heat sinks take up no item slots and do not affect the amount of internal equipment space available, even when mounted as Support OmniVehicle pods. Vehicular heat sinks are considered to be located deep within the vehicle's body.

Support OmniVehicles: Support OmniVehicles of Clan or Inner Sphere design may add more heat sinks at this stage, or none at all. Additional heat sinks for later configurations may be mounted in Omni-pods as with other weapons and equipment, but at a cost in weight only (not item space). Such additional sinks may then be easily determined by the vehicle's configuration, based on its chassis and the total heat of all energy weapons on that base configuration.

Simon sees no reason whatsoever for his Simca ambulance to carry energy weapons, and so installs no heat sinks at this time.

Likewise, Todd sees no reason to arm his Swiftran with heavy energy weapons, and therefore sees no need for weighty heat sinks.

Aaron's Hesiod has limited space as it is, and is certainly not intended for combat. Therefore, he decides to place no fixed heat sinks on the Support OmniVehicle at this time, leaving that an option for anyone creating a militarized Alternate configuration.

Brian's Jetta Coruna is a civilian air-yacht, not a fighter. He plans it to mount no weapons, and he also decides it will waste no tonnage on heat sinks.

Christine anticipates the upcoming selection of weapons she has in mind for her Dixon, and so installs 6 heat sinks on the Airship to vent the combined heat of its future weaponry. These heat sinks cost her 6 tons, but occupy no item slots on the Support Vehicle's inventory. The Dixon now has 199.5 tons remaining (205.5 tons – 6 tons = 199.5 tons).

STEP 4: ADD ARMOR

Even though Support Vehicles are not built for the rigors of combat, most use some kind of armor to protect their internal structures and critical components against the elements, accidents and other hazards of wear and tear. Support Vehicle armor varies wildly with the vehicle's tech base, weight and the relative strength of the armor chosen (defined as the armor's Barrier Armor Rating, or BAR).

The "armor" most Support Vehicles carry is usually nothing of the sort, and can range from thick fabrics, wood and sheet metal to resin polymers and industrial alloys. The Support Vehicle's BAR value reflects this variance, and is used to determine whether or not heavy weapons fire penetrates the vehicle's protection regardless of how many points remain in the location. In *Total Warfare* standard rules game play, if a unit has a BAR of less than 10, any damage sustained in a single hit that exceeds the unit's BAR may inflict such a penetrating Critical Hit (see *Damage*, p. 206, *Total Warfare*), even if armor points remain in the stricken location.

The maximum amount of armor points a Support Vehicle may mount is based on its tonnage and type. This value applies to Clan and Inner Sphere Support Vehicles, regardless of the Tech Rating used. The value of this maximum is shown in the Support Vehicle Armor Table below. Regardless of the BAR or Tech Rating applicable to the armor used, it may not exceed this maximum point value. Remember, however, that this value reflects the vehicle's maximum *total* armor capacity; the number of points per location is left up to the designer. Only VTOL rotors have an upper limit: a maximum armor allowance of 2 points at any weight. Support Vehicles designed with the Armored, Amphibious, Environmental Sealing or Submersible chassis modifications have a minimum armor requirement of 1 point per location.

Support Vehicle armor may be mounted in kilogram lots for Small vehicles, but units weighing 5 tons or more must mount any armor in full- or half-ton lots. The number of points per ton may be derived from the Support Vehicle Armor Table below; divide 1,000 by the number of kilograms per point of desired armor type, and round the result down to the nearest whole number.

Conversely, if a specific number of armor points is sought—up to the Support Vehicle's computed Maximum Armor Factor—and the weight is unknown, the designer can find this weight (in kilograms) by multiplying the armor weight per point by the number of points desired. For Small Support Vehicles, this result requires no rounding. Support Vehicles weighing 5 tons and over, however, must round up to the nearest half-ton. For example, if a designer decides to mount 92 points of BAR 6, Tech Rating D armor on a Medium Support Vehicle, it will cost 3.5 tons of armor to accomplish that (92 points x 38 kg per point = 3,496 kg = 3.496 tons, which rounds up to the nearest half at 3.5). Note, however, that sometimes a desired number of points—such as many Maximum Armor Factors—may force the designer to "waste" weight on points that cannot be mounted.

Use the Armor Diagram on the Support Vehicle's record sheet to indicate the number of armor points protecting each part of the unit's body by marking out any excess armor circles in the same way as for the internal structure. Armor circles for a given location are located in the appropriate unshaded parts of the diagram.

Designers may not mix armor types on a given Support Vehicle, and Support Vehicles may only use armor types listed in the Support Vehicle Armor Table.

Tech Rating: The Tech Rating of the armor chosen for a Support Vehicle usually does not exceed that of its chassis. It is possible to mount armor at a higher Tech Rating than the chassis, but this will drive up the Support Vehicle's overall Tech Rating accordingly. Also, armor at some BAR levels may not be available to a Support Vehicle unless it possesses the Armored chassis modification. (An entry of NA on the Support Vehicle Armor Table means that armor of a given BAR does not exist for Support Vehicles at that Tech Rating.)

Space: Under these rules, no armor type available to Support Vehicles reduces their equipment slot space.

Support OmniVehicles: The type of armor, its weight, number of points and their allocation must be established when designing the base configuration of a Support OmniVehicle. These values may not be altered in the completed Primary or Alternate configurations of that OmniVehicle.

SUPPORT VEHICLE ARMOR TABLE

Vehicle Type	Total Max Armor Factor*
Airship, Naval	4 + (0.334 per ton)
WiGE	4 + (0.5 per ton)
Fixed Wing, Hover, VTOL	4 + (1 per ton)**
Tracked, Wheeled	4 + (2 per ton)

*Round down to nearest whole number.
**VTOLs: The Rotor location always has a maximum armor allowance of 2 points, regardless of size.

Barrier Armor Rating (BAR)	Weight (in kg) per Armor Point (by Tech Rating)					
	A	B	C	D	E	F
2	40	25	16	13	12	11
3	60*	38	24	19	17	16
4	NA	50	32	26	23	21
5	NA	63*	40	32	28	26
6	NA	NA	48	38	34	32
7	NA	NA	56*	45	40	37
8	NA	NA	NA	51*	45	42
9	NA	NA	NA	57*	51*	47
10	NA	NA	NA	63*	56*†	52*†

*The Armored chassis modification is required to install this armor on a chassis of this Tech Rating.
†At Tech Ratings E and F, BAR 10 Armor occupies slot space equal to that of Inner Sphere and Clan Ferro-Fibrous Armor types (respectively).

Simon decides his Simca ambulance does not require any armor, believing that any weight distributed to such reinforcements will detract from more important life-saving equipment and work space. Counting on the kindness of others not to shoot at unarmored rescue vehicles, he moves on to the next step.

Because his VTOL is planned as a medivac craft that might venture close to a war

zone, Todd invested in the Armored chassis modification, which enables him to install BAR 10 armor on the vehicle. Before mounting any armor, however, he first determines the maximum capacity for his 25-ton Swiftran and concludes that the vehicle may take on only 29 points of armor (4 base points + [1 point per ton x 25 tons] = 29 points).

At the Tech Rating of E used for the Swiftran's chassis, Todd notes that BAR 10 armor—the equivalent of Combat Vehicle armor—weighs in at 56 kilograms per point. The maximum protection of 29 points would weigh 2 tons (29 points x 56 kg per point = 1,624 kg = 1.62 tons, which rounds up to 2 tons). Noting that at 2 tons the Swiftran can also achieve the same 29 points of BAR 10 armor at Tech Rating D (29 points x 63 kg per point = 1,827 kg = 1.83 tons, which also rounds up to 2 tons), for flavor reasons Todd chooses to go with less efficient Tech Rating D armor instead.

Because the Swiftran's rotor can only have 2 armor points, Todd allocates those first. The remaining 27 points he divides among the VTOL's other locations, placing 8 points in the front, 7 points each on the sides and 5 points in the rear. After adding up the numbers to verify that he has not wasted any points (8 [Front] + (7 + 7 [Left and Right sides] + 5 [Rear] + 2 [Rotor] = 29), Todd blacks out all the excess armor points from the Armor Diagram on his Swiftran's record sheet and notes on the appropriate line that the VTOL has a BAR of 10. The Swiftran now has 2 unspent tons remaining (4 tons – 2 tons = 2 tons).

With his Hesiod Support OmniVehicle down to just 3.5 unspent tons in weight, Aaron also decides to make armor a low priority. This is hardly a problem, as the maximum armor the 7-ton wheeled Medium Support Vehicle can receive is 18 points (4 base points + [2 points per ton x 7 tons] = 18 points). Because his Hesiod is not intended for combat, Aaron chooses a BAR of 4. Unlike Todd, Aaron does not downgrade the Tech Rating of his armor relative to that of the Hesiod's chassis, and so he is mounting 18 points of BAR 4 armor with a Tech Rating of E.

At 23 kilograms per point of armor, 18 points' worth of protection will cost Aaron's Support Vehicle half a ton in weight, the minimum—and maximum—that he was willing to spend on such protection (18 points x 23 kg per point = 414 kg = 0.414 tons, rounded up to 0.5). Aaron chooses to allocate this armor mostly around the Hesiod's front and sides, at 5 points per location, with the last 3 points placed in the rear. Double-checking his figures, he adds up the armor points: (5 + 5 + 5 [Front, Left and Right sides]) + 3 [Rear] = 18 points). Aaron then blocks out all the excess armor circles in each location on his Hesiod's record sheet, being sure as well to black out all turret circles (as he has not opted to install one). He also makes sure to note the Hesiod's BAR of 4 in the appropriate location.

The Hesiod now has 3 tons of unspent weight remaining (3.5 tons – 0.5 ton = 3 tons).

Brian's 35-ton Jetta Coruna may mount up to 39 points of armor (4 base points + [1 point per ton x 35 tons] = 39 points). While he's willing to install it, he knows the Coruna is not meant to see combat, and so he decides on BAR 2 armor, the lowest level possible. Using armor with a Technology Rating of D—on a par with so many other components in his plane—Brian finds that his Coruna will receive a point of armor for every 12 kilograms invested. Because he wants to place the full 39 points, this comes to 1 ton of armor (39 points x 12 kg per point = 507 kg = 0.507 tons, which rounds up to 1 ton).

Brian distributes his armor points with a majority in the nose, where he places 15 points. Each wing receives 9 points, and the aft location gets 6 (15 [Nose] + 9 [Left Wing] + 9 [Right Wing] + 6 [Aft] = 39 points spent.) On his Fighter Record Sheet, Brian blacks out all the excess points in each location, leaving only the number of circles equal to the Coruna's assigned armor values, and notes that the aircraft has a BAR of 2.

With 1 ton spent on armor, the Coruna now has 11.5 unspent tons remaining (12.5 – 1 = 11.5).

Iveco "Burro II" Super Heavy Cargo Truck

Because it is an Airship and thus cannot receive the Armored chassis modification, the best BAR possible for Christine's Dixon at the Structural Tech Rating D is BAR 7. After determining the Maximum Armor Factor for her Dixon to be 104 (4 base points + [0.334 points per ton x 300 tons] = 104.2 points, rounded down to 104), she decides to spend the maximum.

At a BAR of 7 and Tech Rating D, armor for the Dixon weighs in at 45 kilograms per point. To achieve 104 armor points, Christine therefore must spend 5 tons on armor (104 points x 45 kg per point = 4,680 kg = 4.68 tons, rounded up to 5). The Dixon will have 194.5 tons remaining (199.5 – 5 = 194.5).

With no turret or rotors on which to place armor, Christine assigns 29 points to the Dixon's nose and 25 points each to the Airship's left wing, right wing and aft. Summing up, she verifies the armor is fully assigned: 29 [Front] + (25 + 25 [Left and Right Wings]) + 25 [Aft] = 104 points. On the Dixon's record sheet, she blacks out all excess armor circles in each of the affected locations.

Step 5: Add Weapons, Ammunition and Other Equipment

The weapons, ammunition and equipment that may be mounted on a Support Vehicle are listed in the Weapons and Equipment Tables shown on p. 341. In addition to any heat, damage and range statistics, these tables provide the weight these items take up on a Support Vehicle, how many equipment slots they occupy, what technology base (Clan or Inner Sphere) and Tech Rating (A through F) is required to use them, and any special construction rules that might apply to installing the equipment (such as location and unit type restrictions).

Remember that the total weight for a given Support Vehicle's structure, engine, controls, armor, heat sinks, weapons and other components must never exceed the weight established for the vehicle in Step 1. Any leftover weight that cannot be allocated to cargo space (see *Cargo Bays*, p. 239) or other equipment (due to item slot constraints or other factors) is considered "wasted" tonnage.

Weapons and items placed in any non-turret location receive a fixed firing arc in that direction (meaning a front-mounted weapon would have a front firing arc, while a left-side mounted weapon can only fire into the left side arc, and so on). Turret-mounted weapons have a firing arc determined by the turret's facing during game play. Pintle-mounted weapons—which differ from turrets in that they have no separate locations and are mounted more as items—have a 180-degree firing arc based on the side of the vehicle on which they are mounted.

For special rules on any item, consult its entry under *Heavy Weapons and Equipment* (pp. 200–273).

Tech Base/Rating: The Heavy Weapons and Equipment Tables note which items are available to which technology base. Clan-made Support Vehicles may use only items available to the Clans, while Inner Sphere-made Support Vehicles must use only those items available to the Inner Sphere. Within these limits, items of any Tech Rating may be chosen, but designers should remember that a Support Vehicle's Final Tech Rating—and with it, its final cost—will be determined by its highest-rated component.

Space: Though their construction is more open than that of Combat Vehicles, Support Vehicles may spend a variable number of item slots on each weapon or equipment item they carry. The number of slots each item occupies on a Support Vehicle (when permissible) is noted in the item's listing on the Weapons and Equipment Tables.

Weapons and Ammunition: Small Support Vehicles may only mount Light- and Medium-weight weapons, which are shown on the Infantry Weapons and Equipment Tables. For purposes of arming Support Vehicles, Light weapons are those listed as standard on the Infantry Equipment Table, while Medium-weight weapons are classed as "Support". Regardless of their type, these weapons require no heat sinks and come with a free clip; they may carry ammunition in multiples of their clip size. (Small and Medium weapons incorporate their ammunition into the slots devoted to the weapons themselves, and require no added slots for expanded reserves.) Both of these weapon types may be mounted in fixed locations, or on pintle and turret mounts.

When mounting Small and Medium Weapons on Support Vehicles, each such weapon occupies 1 item slot. Use the Conventional Infantry Weapons Table starting on p. 349 to determine the weapon's damage in *BT* gameplay. Because such weapons fire individually, however, the actual damage values for a Small/Medium weapon in *BT* gameplay when fired by a Support Vehicle must be rounded to the nearest whole point (rounding 0.5 up). Thus, a Support Vehicle mounting a Thunderstroke II Gauss Rifle as a Medium Weapon (Base Damage: 0.53), would inflict 1 point of damage with that weapon in *BT* gameplay (0.53 rounds up to 1), but if the vehicle used a Gyroslug Carbine instead (Base Damage: 0.35), it would inflict no *BT* damage with that weapon (0.35 rounds down to 0). Any applicable special weapon effects (such as Heavy Burst or Flame-Based Weapon capability) also apply to Light or Medium Weapons mounted on Support Vehicles.

To find the weapon's Short, Medium, and Long Range values when fired by a Support Vehicle, use the weapon's listed Base Range for Short, multiply it by 2 for Medium Range, and 3 for Long. If applicable, the Range can then be used to determine a Small or Medium Weapon's Aerospace combat range as well: a range of 9 or less equals Aerospace Short Range; 10 to 19 equates to Aerospace Medium Range; 20 to 24 is Aerospace Long Range; and 25 or more is Aerospace Extreme Range. Thus, a Support Vehicle that mounts a Thunderstroke II Gauss Rifle (Base Range: 2) has a Short Range of 2 (Base Range 2), Medium Range of 4 (Base Range 2 x 2 = 4), and a Long Range of 6 (Base Range 2 x 3 = 6). If mounted on a Support Vehicle that uses Aerospace rules (such as a Fixed Wing Support Vehicle), the Long Range of 6 would translate to an Aerospace Range of Short.

Support Vehicles weighing 5 tons or more may not mount Light or Medium-weight weapons, but may instead mount Heavy weapons, which are represented in the Weapons and Equipment Tables shown on p. 341. All ammunition-dependent weapons from this list—except for machine guns (including their Light and Heavy versions) and nail or rivet guns—require at least a ton of ammunition. (Machine guns, nail guns and rivet guns may carry ammo in half-ton lots instead.) Each ammo bin occupies one item

slot, but may be of any weight desired, so long as the ammunition is devoted to one or more of the vehicle's weapons of the same type (for example, a Support Vehicle armed with 2 Autocannon/2s may store all AC/2 ammunition in a single bin of any size). All ammunition on Medium and Large Support Vehicles is presumed to have a Body location.

Remember that, depending on the number of weapons and types of fire-control systems used, a Support Vehicle may require additional crew (and any applicable accommodations) to handle its firepower (see *Additional Crew Table*, p. 131). For Light and Medium-weight weapons, the gunners required are based on the weapon's Crew value shown in the Infantry Weapons and Equipment Tables. For Heavy weapons, gunners are required only for any item that requires a Gunnery Skill roll to use in combat, and which has a range of more than 1 hex. (Thus, automatic defensive armaments like Anti-Missile Systems, A-Pods, and the like require no gunners, nor do non-weapon items listed on the Heavy Weapons and Equipment Tables, like Active Probes and ECM gear.)

Heat Sinks: Heat sinks are required only for Heavy energy weapons used by the Support Vehicle, and the number of heat sinks required equals the heat value of all such energy weapons fired simultaneously. (Medium and Light energy weapons, which represent infantry combat weapons, do not require sinks.)

Power Amplifiers: Any Medium- or Large-sized Support Vehicle not powered by Fission or Fusion engines may carry Heavy energy weapons such as lasers and PPCs, but to do so, it must also mount power amplifiers. Power amplifiers weigh 10 percent of the weight of the energy weapons carried, rounded up to the nearest half-ton, but take up no item slots on the vehicle's record sheet. (Medium-weight and Light energy weapons, which represent infantry combat weapons, do not require power amplifiers.)

Turrets/Pintles: All Support Vehicles (except VTOLs, Fixed-Wing craft and Airships) may possess one turret at the designer's option, the mass of which must equal at least 10 percent of the weight of all weapons and equipment (excluding ammunition) mounted within. This weight must be rounded up to the nearest kilogram for Small vehicles, or to the nearest half-ton for Support Vehicles 5 tons and up. A turret counts as an extra section on the Support Vehicle, requiring its own internal structure and armor.

Pintles—available to Small vehicles only—may mount only Light and Medium weaponry, and must weigh no less than 5 percent of the weight of all weapons and equipment mounted within (rounded to the nearest kilogram). Pintles do not count as separate locations and do not receive internal structure or armor. They must be mounted instead in side locations (Left, Right, Front or Rear).

Small Items on Medium and Large Units: Several items that may be installed on Medium and Large Support Vehicles have a weight presented in kilograms rather than tons. When mounting such items, the designer must keep a running total of the number of kilograms used. At the end of this step in the Support Vehicle design process, divide this quantity of kilograms by 1,000 to find their total weight in tons. The final result must be rounded up to the nearest half-ton.

Note that if space is available for cargo, this can also be accomplished by allocating any "loose" kilograms to cargo, so a 100-ton unit that comes to 96.36 tons because of small items may simply add a 3.64-ton (3,640-kilogram) cargo bay to reach an even 100-tons.

Support OmniVehicles: Though it is unusual, weapons and equipment may be established as fixed components of a Support OmniVehicle's base configuration just like heat sinks, armor and the like. These "fixed" items must be mounted (placed in the vehicle's Weapon Inventory and assigned to vehicle locations) *before* the completion of the base configuration. Afterward, these items may not be altered in the completed Primary or Alternate configurations of the Support OmniVehicle.

For turret- or pintle-equipped OmniVehicles, the tonnage of the turret or pintle(s) may not be changed across configurations. Developing a Support OmniVehicle therefore requires the designer to consider in advance how much weight in equipment (not counting ammunition) may be placed in the turret and/or pintle location(s), so as to establish the weight of the turret and/or pintle(s) for the base, Primary and all Alternate configurations of that OmniVehicle. As indicated earlier, turrets weigh 10 percent of the weight of all weapons located in the turret. Therefore, the weight of any equipment placed in a turret (discounting ammunition) may be no greater than 10 times the turret's weight. Pintles, which weigh 5 percent of their weapons' weight, may carry no more than 20 times the pintle's weight in items.

With 1,436 kilograms remaining for his Simca and only 5 item slots, Simon decides to install 1,000 kilograms' worth of paramedic equipment, which will occupy 4 item slots (each slot of paramedic equipment weighs 0.25 tons or 250 kilograms; 250 kg x 4 = 1,000 kg). For another 300 kilograms, he adds 4 seats to represent passenger stretchers (75 kg per seat x 4 seats = 300 kg; seats occupy no item slots). Finally, Simon assigns the last 136 kilograms to cargo, taking up the last item slot in the bargain. As none of these items requires a firing arc, he places all of them in the Simca's Body location.

As a final touch, Simon adds a rear bay door at no weight or slot cost, to reflect the large doors used to quickly load and unload the ambulance's precious cargo.

Todd's Swiftran has only 2 tons of unspent weight remaining, with 7 item slots. As his vehicle is a medivac, Todd also decides to devote much of this to paramedic equipment, investing a total of 1.5 tons to 6 slots' worth of such gear (each slot of paramedic equipment weighs 0.25 tons x 6 = 1.50 tons). The remaining half-ton is diverted to a cargo bay that takes up the Swiftran's final item slot. Like Simon, Todd allocates all of these items to the VTOL's Body location, and installs a 0-ton, 0-slot door in the rear to designate where passengers are loaded and unloaded.

Aaron has 3 tons and 5 slots remaining for his Hesiod Utility Vehicle. Rather than designating any of it to "fixed" equipment, he decides to complete the base chassis of this Support OmniVehicle by noting all 3 tons and 5 item slots as pod space. To present at least one completed configuration, he designates the Primary configuration—which he calls Hesiod Configuration 1—as the cargo loadout, where all 3 tons are assigned to a 3-ton, 1-slot cargo bay in the Body location, complete with a zero-ton, zero-slot door in the rear.

For his Jetta Coruna 4X, Brian has 11.5 tons of unspent weight and 8 unspent item slots. Because he sees the Coruna as the ultimate in air travel for the wealthy elite, he installs luxurious first-class passenger quarters on the aircraft. These quarters weigh 10 tons and occupy 1 slot in the Support Vehicle's design. Brian allocates them to the unit's Body location, noting that such quarters are spacious enough for the VIP passenger to entertain a few guests in flight. He allocates the remaining 1.5 tons to a cargo bay in the Body location, which also takes up only 1 item slot. A door is added to the rear for the loading and unloading of cargo while landed.

With 194.5 tons left to go and 35 item slots open, Christine plans to arm and equip her Dixon Law Enforcement Airship. Starting with weapons, she decides on 4 standard vehicular-scale machine guns, each of which weighs 0.5 tons and occupies 1 item slot. Three of these weapons she places in the Dixon's nose, while the remaining 1 is mounted in the Aft location. Deciding to provide these weapons with ample ammunition reserves, she installs a 5-ton (1-slot) bin for a total of 1,000 shots between the weapons (200 shots per ton x 5 tons = 1,000 shots).

Christine then adds 2 vehicular-scale medium lasers (which each occupy 1 ton and 1 item slot), and mounts one laser in each of the Airship's Wing locations. Having already provided the heat sinks for these weapons, and equipped with a Fusion engine, Christine need not add power amplifiers to make these weapons functional.

A Fifth Donegal Guards Uziel *pilot waits impatiently for a supply truck to unload.*

As a final, non-lethal weapon system—also useful in fire control as well as anti-riot work—she adds 4 sprayers to the Dixon, each of which weighs 15 kilograms (0.015 tons) and occupies 1 item slot. Two each of these are mounted in the Dixon's Nose and Aft sections. For ammunition, she devotes 10 tons (and 1 item slot) to the sprayers' capacity in the form of liquid cargo in the airship's Body location. This provides the sprayers with a maximum of 9 tons of "ammo," as liquid cargo bays (see Transport Bays, p. 239) have a capacity equal to their weight, multiplied by 0.91 (10 tons × 0.91 = 9.1, rounded down to 9 tons).

For all of these weapons, Christine opts to install a Basic Fire Control system to improve their accuracy. As Basic Fire Control weighs only 5 percent of the weight of any associated Heavy or Medium weapons, she finds that the Dixon's fire-control system will weigh 0.5 tons (5 percent of all weapons' weight = 0.05 x [2 tons (Machine Guns) + 2 tons (Medium Lasers)] = 0.2 tons, round up to 0.5). The Basic Fire Control system occupies no item slots on the Dixon's design. (Note that the Sprayers, though they may be used as weapons, may not benefit from Fire Control Systems, in accordance with their rules on p. 248).

With all its armament, the Dixon has so far invested 19.56 tons and 12 slots into weapons and fire control. Because there is more yet to assign, Christine does not yet round the odd tonnage she has received (for the use of sprayers) up to the nearest half ton. She also holds off assigning additional crew for now.

Christine next decides to add 3 light vehicle bays to the design's body, each of which can be used to carry vehicles weighing up to 50 tons apiece, with 1 door provided for each (at 0 tons and 0 slots) in the Nose, Left Wing and Right Wing locations. These bays each weigh 50 tons and occupy 1 slot. She intends these bays for the deployment of riot-control ground vehicles when landed, and also for launching and landing small police aircraft while airborne, and so Christine decides to add a lift/arresting hoist to the vehicle as well (at a cost of 3 tons and 1 item slot).

Because she also sees the Dixon as a command center for police activity, she adds 6 tons' worth of communications equipment to the Dixon's Body location at an additional cost of 1 item slot. She even adds two mounted searchlights to the Support Vehicle, placing 1 each of these half-ton, 1-slot lights in the Dixon's Nose and Aft locations.

Reviewing her Airship's crew needs, Christine notes that she has already accounted for the basic crew of 4. The heavy weapons mounted by the Dixon—4 machine guns and 2 medium lasers—require 1 crewman per every 3 tons of weapon weight (each), rounded up. This means that the Dixon's heavy weapons—each of which weighs 1 ton or less—will require 1 gunner apiece. Furthermore, the 6-ton communications equipment requires 1 crewman per ton, for an added 6 crewmen. These added crewmen raise the Dixon's minimum crew to 16. Because the Dixon is a Support Vehicle over 5 tons in weight, Christine must also add officers. According to the officer requirements shown on the Support Vehicle Minimum Crew Table on p. 131, she will need 4 officers (16 crew ÷ 5 = 3.2, round up to 4), who in turn raise the Dixon's minimum crew needs to 20 (16 crew +4 officers = 20).

Because these minimum crew needs are met by the Dixon's design automatically, Christine need not install any added seating to her Airship. However, for the benefit of any additional personnel who may be required as light security or to support the vehicles and equipment that may be carried in the Dixon's bays, Christine takes the simple approach of adding 2 foot infantry compartments—at 3 tons and 1 item slot apiece—to the Dixon's Body location. Noting that each compartment provides basic seating (and little else) for 28 men, Christine reasons that these compartments will represent a minimalist amount of "cot space" for off-duty police and Airship crewmen to catch a few winks between shifts.

Added to the weight and space allocated to weapons, Christine finds that the vehicle bays, arresting hoist, communications gear, searchlights and infantry compartments combine to bring the weight of all items to 185.56 tons, with 21 slots spent. Christine allocates the remaining 8.94 tons of her Dixon's weight to general cargo in the Body location, at a cost of 1 more slot.

STEP 6: COMPLETE THE RECORD SHEET

By the time the designer has chosen all structure, engine and controls for the Support Vehicle, and added armor, weapons and equipment, all items must be allocated to their proper places on the appropriate blank Record Sheet. For a completed record sheet, the designer must make sure to have selected the appropriate sheet for the Support Vehicle's motive type. The sheet must have all data filled in for the Vehicle/Fighter/DropShip Data block (including name, tonnage, engine and movement types, and MP/Thrust). All equipment slots must be allocated on the Weapons and Equipment Inventory (including ammunition and number of shots per bin). All extraneous armor and internal structure points must be blacked out on the Armor Diagram.

Once all of the above is completed, the Support Vehicle is ready for *Total Warfare* game play.

SUPPORT OMNIVEHICLES

When completing the record sheet for a Support Vehicle built as an OmniVehicle, it is highly recommended that the designer create one sheet specifically for the base configuration, with none of the weapons or equipment installed that may appear on the Primary and Alternate configurations. Copies of this Base Configuration Record Sheet (noting all unused tonnage as pod space for the body *and* the turret separately) can then be used to quickly generate record sheets for the other configurations.

Simon verifies that all of the valid data blocks are completed for his Simca, including noting the vehicle's full name, "Simca Ambulance," on the Vehicle Type line, checking off that it uses an Inner Sphere Tech Base, noting its Cruising MP as 7 and its Flank MP as 11, and noting what engine type it uses. As the vehicle lacks weapons, he chooses to list the vehicle's critical items—the fuel range, paramedic equipment, stretchers and cargo—in the block labeled "Notes", leaving the Weapons Inventory empty. He then makes sure all the appropriate armor and internal structure circles have been blacked out and that the vehicle's BAR is noted, before going on to compute its Battle Value and Cost.

Todd performs the same steps as Simon for his Swiftran.

Because Aaron built his Hesiod as a Support OmniVehicle, he completes his record sheet first for his uncompleted base chassis design, noting only the number of tons and slots of pod space available in the Notes block. He then makes a copy of that record sheet to use for completing the Primary (Hesiod-1) configuration. Once that configuration is completed, he is ready to compute its Battle Value and Cost and bring it to play.

Brian's Jetta Coruna and Christine's Dixon Airship both follow the same process as the others in completing their record sheets, assuring that the appropriate values are entered for Safe Thrust and Max Thrust, noting any special features in the Notes block (such as the Jetta's Enviro-Sealing and the Dixon's basic fire-control system.

Christine even manages to place items on her Weapons Inventory to provide data on her Dixon's machine guns, medium lasers and sprayers. Because the Dixon is an aerospace unit (like Brian's Coruna), she draws the statistics from the Aerospace Equipment Tables, noting aerospace damage values at each range bracket instead of ranges in hexes, but disregarding heat data because Support Vehicles do not track heat as aerospace fighters do.

BOOT CAMP BASICS

—Excerpted from the journals of Recruit Stefan Palmer, Teggiwald Camp,
Squad B (Signal Corps), Acubens Planetary Militia, Free Worlds League

13 August 3068

This is my diary.

I record whatever I like, whenever I like, HOW I LIKE.

I'm here because I have to be.

I want to study literature. Or be an author.

And this just sounded like a cliché start.

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3 October 3068

Oh man, I thought I'd have more time!

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20 October 3068

Hey! We got off early today! And I found this thingie here again. Great!

We had two equipment checks today. One to start the morning, one to top off the evening. If I've learned something in these last six weeks, it's this: There are times when you better shut up and do what you're told. It might hurt your pride and go against whatever personal code you live by, but it makes life plenty easier. Lieutenant Jordi, the wet-eared platoon leader who's graciously allowed to do the more tedious parts of our formation, called the shots. Piece after piece, we dug all our gear out of our backpacks, pockets and pouches, and placed it on our canvases spread out before us:

Helmet; Filter mask; Gloves; Goggles; Tent-poles/pegs; Spade; Cleaning utensils; Tags; Emergency rations; Raincoat (with hood); Spare clothes (in airtight bag); Rifle; Spare magazines (2); Datapad with regulations (per Order of the Day)…

Impressive, how long a list that is. Even in the field, with most of my equipment back in barracks. It practically guarantees that somebody forgot something, provoking the usual reprimands and "consequences"—today being no exception. Only after Tom got back from his fifth lap around the wooden shelter, with Drik and Nat pumping their last twenty and Lieutenant Jordi calming down, did the platoon get around to some serious chow time.

You always hear people complaining about rations in holovids or when returning from their ToD's with the FWL, but I couldn't agree less. Food in the militia is always freshly prepared, warm and diverse enough. Chefs even thought about the poor guy with the gluten allergy. But even if not, usually I feel hungry enough to mow down about everything anybody shovels into my foldable plate.

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15 November 3068

These are the stories of the mighty militia warrior Stefan Palmer (1.72m, 81kg, 186Pts., fit for service) nearing the end of his basic training, as recorded on the ancient scrolls of Acubania. Cower, infidels, and listen!

"Nestled in a shallow ravine, surrounded by beautiful flora in the first stages of bloom and just a stone's throw away from a small lake, the Teggiwald lies roughly five kilometers outside the city. Soft paths suitable for runners crisscross the underbrush, tiny huts offer protection from the occasional shower, while open spaces invite a picnic in the sun. All in all, the perfect spot to enjoy life.

Or not.

The youngsters moving through the underbrush at an accelerated pace certainly didn't agree. Heavy boots soaked through and covered in mud up to the calves from the soft ground, combat fatigues clinging to the skin from sweat and damp air certainly didn't make lugging around a ten-kilogram backpack terribly recreational. Adding to the fun, each of them carried a meter-long, six-kilogram rifle, which tended to get caught in vines and branches if attention slipped for a split second. Not that avoiding them was easy when one felt like a stuffed turtle on two legs. A stuffed turtle with a cooking-pot on its head—

"Cover!"

Sighing silently, Stefan Palmer let himself drop flat behind the nearest tree stump at his group leader's hushed call. Glancing toward the front of the line, he saw the corporal waving his hands frantically. Obviously trying to signal the squad something, in that combat talk they'd been shown yesterday. Too bad neither Palmer nor the corporal had paid much attention, leaving Stefan utterly clueless as to what had prompted the halt. Probably a deer. Or they had taken a wrong turn, and now the corp was trying to cover it up with a little show…again.

Palmer gave up on wiping clear his accursed combat goggles, letting them dangle around his chin, and reached for the canteen at his side. After a minute or so of fumbling around, he gave that up, too. Whoever had designed their harness sure had gotten the easy-access part right – tested on an anatomically perfect tailor's bust by a person other than the wearer!

"Clear, let's move."

Out of the corners of his eyes, Stefan saw the corporal stuff compass and map back into his leg pockets, pick up his weapon, make the safety control by the book and rise.

BANG!

BEEEEEEEEEP

Surprise in his eyes, the corporal fell backwards, clutching at a little black box on his chest. Great. Just what they needed. It really had been an ambush this time. Rolling his eyes, Stefan snapped off a few dud shots into the woods at an "enemy" he couldn't see anyway, waiting for his own simulation gear to announce him hit. Unfortunately, the instructor called off the exercise before that happened, declaring several of the squad as wounded and therefore in need of transport for the remainder of the distance.

And thus ends the first episode of this mighty epic.

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27 November 3068

Part 2, where the hero deals with extreme hardship and does not encounter a damsel in distress:

They were in the middle of redistributing equipment when someone sounded the chemicals alert.

Five seconds for the mask, ten for the gloves, then sealing neck and ankles. Next: spreading the alarm, helping others. For once a drill Palmer could rattle through with no problems. A mere month ago, he would have objected to that part of the training as well. Citing passages from the outmoded Ares Conventions about chemical weapons being outlawed and all that.

That was before the instructor had shown them the holovids from Atreus.

It wasn't long before the recruits were sweating in their sealed garments like Taurian oxen under a Federated Sun. The

temptation to screw the gas mask's valve loose for easier breathing was great, but Master-Sergeant Grovler knew his business too well. Sharp barks kept most in line; the rest followed immediately after their instructor produced a tear gas capsule and started twirling it between his fingers. Too fresh was the memory of the literally burning sensation most of them had experienced when they thought cheating was safe during sleep in those bunkers last week!

So they pulled themselves and their "wounded" comrades through one more silent eternity of heat, panting and grunting. Past singing birds, sprouting bushes and the first, early brawash larvae wriggling out of the ground. At least the mosquitoes couldn't worry them anymore.

"Recruit Palmer!" Grovler shouted, materializing at Palmer's left side. "What is the maximum time span you will stay protected in your coveralls' sealed mode?"

"Twelve hours, Master-Sergeant!"

"Correct! And what do you need to do before you change out of it?"

"I need to await the order to do so, because I don't carry the necessary equipment to decontaminate the… aaah… equipment."

"Correct again! Recruit Isler: Please tell us where you place your anti-toxin syringe and when."

By the time his comrade started to answer, Stefan had already tuned out of the question game, an integral part of any drill training. A part that posed him no problem for a change; he was used to learning stuff thrown at him by heart. With that, he closed out most of his other perceptions too, losing himself in the slow shuffle-step the group had fallen into. Supposedly they looked look like a line of walking alien undead to outsiders. Not that he cared.

A full hour later, the band stumbled upon the gravelled square in front of the shooting range at the heart of this training area, where the rest of the platoon already waited. Exercising his right to train them as he saw fit, the instructor kept all of them stewing in their own juice for a bit more. Nature's soothing sounds didn't stand a chance against the collective grunting and gasping of thirty recruits as they finally got the order to take off their airtight masks and gloves.

Relieved for the moment, Stefan stuffed the chemical gear back into its pocket, carefully rearranging the non-standard issue chocolate bars around it again. Cleaning the lot this evening would be painful enough; no need to adorn it with a squashed pack of sugary foodstuffs.

Oh, the drama! How will it end (if it ever does)?

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28 November 3068

Sergeants and officers always seem to eat faster than the troops. Might be because they don't have to do their dishes themselves. Or just out of simple malignance. Whatever.

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29 November 3068

On dishes again:

I was down at the creek, rinsing plate and multi-purpose knife before bagging it, only to discover upon my return that my rifle had mysteriously disappeared from the spot near the backpack where I left it.

Looking up, I found the tomato-red face of Corporal Büttikofer instead, who made it loud and clear (not without distributing the usual spittle) that one's weapon was one's *personal* weapon. One's only friend as a soldier. And that it was somewhere up near treason to leave such an important hunk of metal and plastic unattended. Heavens beware! A squirrel might accidentally trip over it and shoot its nuts off!

I don't know what it is with this guy. It's not like we're greenhorns anymore. I very well know what I do!

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3 December 3068

Oooooh! Testing day! And I finally managed to tie the recorder into my helmet's visor cam. Woohoo!

Screen goes dark, comes back to life with a first-person view.

"Gentlemen! This afternoon you will be tested on basic weapon skills…"

Standing about three meters from the viewer, a young man wearing lieutenant's insignia is bellowing around.

"Master Sergeant Grovler and myself will conduct the inspection. I expect nothing but the best from you! Don't put our platoon to shame! Lieutenant Wicki's apparently got a flat three this morning. But we will do better!"

The camera swerves left and right, showing about thirty soldiers standing in a half-circle, staring blankly at their superior.

"Understood?"

"UNDERStoooood!"

The platoon answers automatically, lacking more than a bit of enthusiasm. On the other side, the lieutenant apparently decides to leave it at that, probably realizing he couldn't expect much more.

"Very well, then. Spread out. One-meter intervals. Prepare to disassemble weapons. Sixty seconds on my mark…MARK!"

As one, the men drop to the ground and start to fumble, twist, bat and screw until every one of them kneels behind a sea of meticulously placed parts—all in time. A master sergeant passes the row, asking questions here and there.

"Recruit Isler! Name three parts of your rifle."

"Barrel, trigger and aaah…magazine."

"Recruit, what is the effective combat distance of a platoon armed with such rifles?"

"Master Sergeant, Recruit Mangrove: Ninety meters."

And so it went. My knees started to hurt again from the rough gravel. Why aren't we issued padded suits? Or at least kneepads? All the good stuff is restricted to the regular army. And if something trickles through, it always goes to the combat troops. *Never* to Signal Corps.

Ah, well…

Positive thoughts! Positive thoughts! That probably means I'll be saved from the blessing of a 20-kilo flak suit…

Oh, and you know what? The end of the test you've just seen? I managed to assemble my rifle in 78 secs. Personal record! Drilling paid off.

But still, I long for a good old Intek laser. Sleek, lighter and with half the parts of what I've got now. Quartermaster says they're even cheaper than this older TK-clone and standard issue up until a year ago. Don't know what prompted the step backwards. Latrine-talk says something about the guns giving out in NEMP—whatever that is.

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5 December 3068

Now for another installment of our glorious series:

Grovler's shouting disrupted the concentration of human, animal and machine once more. Even the sun apparently decided that farther away from the instructor was better, and hid behind

the forming clouds. The recruits on the square dispersed, at first slowly, then faster as the master sergeant's voice rose higher. Palmer's squad was up for weapon manipulations first. That meant an endless series of tightly timed finger work, designed to drill behavior in weapon failure situations—or so they were told. For Palmer, it usually ended in frustration, knotted fingers and hands scratched bloody from those damned copper fake-rounds.

"Load!"
"Unload!"
"Load!"
"Reload!"
"Jaaaaammed!"
"Change magazine!"
"Failure One!"
"Failure Three!"
"Aaaand again!"

Corporal Büttikofer sure enjoyed himself, Stefan thought. Oh, how he longed for the first-aid training this afternoon. Taking turns lying comfortably on the ground, breaking out the medpack, bandaging feet, arms or legs. Sticking needles or pinching the guys where it hurt—all in the name of rescue. Great fun. Especially the pics taken in real combat with all the gore, splintered bones and mangled feet. Fun!

He could do without the patient transport, though. When in the same group as Isler, none of the twenty-one ways to haul a wounded comrade really worked. Not with a 130kg lump of flesh and fat.

"Are we dreaming sweet, Recruit Palmer?" The corporal's voice thundered from the other end of the group.

"Absolutely, Corporal. Always in your presence!"

Snapping remarks at dumb superiors was just plain fun.

And running laps after it was, too. Nothing better than a bit of physical effort to keep in shape, after all.

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8 December 3068

We had some fun today. Saw several instruments of destruction a simple recruit usually wouldn't catch sight of. One can say about Instructor Grovler what one wants, but that man's capable. And all in all, not *that* bad. Deep down. Somewhere near the molten core of Acubens.

He showed off a shoulder-fired missile launcher used by anti-armor platoons. Two linked tubes—short range, judging from the caliber—with a quick reload mechanism and infrared sights allowing an experienced tag-team to snap off a shot every five seconds. Devastating little thing. Just as much as the plethora of grenades and mines arrayed around a spit-polished Imperator 22. Smoke, frag, flashbangs, all were there. Same could be said about the mines. I even got to touch satchel charges and vibrabombs, specifically designed to work against BattleMechs!

For me, even a trooper's wet dream like the Starfire laser rifle or a Liao Mandrake simply can't stand up against anything going boom.

But in truth…nah. Even such prospects aren't worth living through five months of real groundpounder hell. Yep, Signal Corps is just fine.

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14 December 3068

It's searing hot now. Everybody's sweating liters just standing still. When we went to the firing range today, I first had to slow down my heart to an acceptable rhythm. Essential, since we were going to shoot at targets as far as 300 meters. That's difficult enough with a projectile weapon and nearly impossible when panting from exhaustion. The whole thing is HPG-aligner's work: Without a keen eye and carefully timed breath, shots go wide in all directions, shattering a perfect score in a moment of carelessness. Today however, Fortuna smiled on me and the rest of B Squad. Every last one of us achieved the goal in the commanded program with a safe margin to spare. Once more I stood true to my reputation, hitting top scores on all targets that looked vaguely human (and doing mediocre on those boring round standard marks).

But that wasn't the cool thing today.

The cool thing happened when we stepped out of the range, pulled the muffs off our ears and suddenly felt like we were in the real military.

Roaring diesel engines tore through the air, accompanied by the characteristic clanging, rasping and squeaking of hardened steel-alloy on concrete. With expressions from curious to startled, the whole platoon turned heads, fervently trying to make out the direction the noise was coming from. Bouncing back and forth from the valley's walls at first, the sound quickly became omnipresent, echoing from all directions.

A minute later, the first of three APCs turned onto the square, coming to an abrupt halt a close hand-span from Tom. Painted a mix of dark green and pitch-black, the treaded vehicles sported none of the usual militia insignias. Instead, a black cat on the front panel smiled fiendishly from her white circle at us. She did the same from the upper left arms and chest armor of the mixed bunch of infantry stomping down the lowered ramps.

I admit, even my mouth stood agape until the first of the soldiers stepped up to Grovler and saluted sloppily before announcing himself:

"Sergeant Chao, first platoon, third company, Black Cats. Command told us we could train here at your facilities?"

Black Cat mercenaries! Hell, I knew they'd been hired by Acubens' government, but I NEVER would have thought to actually see them! Those guys are pure elite. Battle-hardened, experienced and deadly. Even the militia's pride—the Acubens Grenadiers—didn't stand a chance against them. They were war personified.

Or so Tom told me.

On second glance, up close, the mercs lost quite a bit of their myth. In the tales, they were more disciplined and better equipped than the ragtag band emerging from the APCs. Any of my superiors would redline immediately if their recruits looked that way. Privileges of success, probably.

Speaking of success: After that, Instructor Grovler assembled the platoon in front of the firing range. And he wasn't happy. Marksman results were way above what he had expected, leaving him no choice but to let everyone pass. No repetitions the next weekend, no verbal reprimands right then. It really looks like all of us will make it out of soldiery into technical training next week.

This didn't stop the master sergeant from announcing a quick-march back to base instead of the promised ride in trucks, though. Exhausting recruits on Friday, hours before their free weekend began, was another of his favorite methods of education.

At least we got dessert today.

A company of Islamabad March Militia surround a heavily damaged mercenary Mad Cat MKII *during the battle for the Jalestar Aerospace complex.*

Cheap and easy to raise and maintain on any given world in the *BattleTech* universe, conventional infantry may number among the most underestimated of battlefield units in *Total Warfare* standard rules play. But without their support, few invasions can be won. Properly placed, conventional infantry can surprise enemy units with a burst of firepower, or hold objectives BattleMechs and Combat Vehicles cannot, or scout an area with minimal chance of detection, or even clear buildings of enemy presence without having to level an entire block.

The following system enables players to construct infantry platoons for *BattleTech* games that conform to the standard rules presented in *Total Warfare*. As these rules can be fairly math-intensive, designers are encouraged to do all work on scratch paper before committing the resulting platoon's specifications to an appropriate blank Conventional Infantry Record Sheet.

CONVENTIONAL INFANTRY BASICS

Infantry platoon construction is defined by two primary factors: motive type and technology base. These factors, broadly overviewed in the *Construction Basics* section (see p. 18), are expanded on below. Unlike other unit types in *Total Warfare*, weight is less of a factor for conventional infantry, except to determine how much tonnage a platoon may occupy in terms of vehicle cargo space.

MOTIVE TYPE

Combat infantry platoons in *Total Warfare* standard rules play come in a variety of motive types that largely determines their base weight as well as their maximum number of troops (per squad and per platoon). The choice of infantry motive type also influences the platoon's movement speed as well as possible terrain and transport restrictions.

Foot: The cheapest, lightest and most basic transport for conventional infantry is the infantry's own legs. Foot infantry are considered to have a generic ground movement type, and can negotiate any terrain except water (of any depth), but they are also the slowest of the infantry options. Infantry transport units may carry foot infantry.

Motorized: A broadly defined class of conventional infantry that involves equipping the troops with small one- or two-man wheeled or tracked vehicles, motorized infantry also have a generic ground movement type and can cover any terrain except for water (of any depth). Much speedier than foot infantry, and correspondingly heavier and more expensive, motorized platoons still often hitch a ride in infantry transports in order to get to and from the battlefield more quickly.

Jump: Jump infantry are foot infantry equipped with jump packs that enable them to execute short hops when desired, making them slightly more mobile than motorized platoons in battle. These platoons are somewhat lighter than motorized infantry on a per-trooper basis, but cost more and operate in smaller formations. They too may operate in any terrain except water (of any depth) and may be carried in infantry transports

Mechanized Infantry: Mechanized conventional infantry rely on larger and heavier vehicles with open positions for passengers and crew to fire small arms from. These vehicles—considered intrinsic to the platoon's make-up—enable players to equip their infantry units with light APCs without the need to separately track their vehicles. Unfortunately, in exchange for their enhanced mobility and the abstraction of their design, they lose the ability to make anti-'Mech Swarm and Leg attacks.

Hovercraft-based mechanized infantry platoons make use of larger hover vehicles that can carry as much as a squad of troops each. Their mobility allows them to traverse water, but they cannot negotiate woods of any type.

Tracked-based mechanized infantry platoons use larger, squad-size tracked vehicles. Like tracked Combat Vehicles, these mechanized infantry can traverse Depth 0 Water, but cannot handle heavy woods or deeper water terrains.

In terms of speed, wheeled mechanized infantry fall between hover and tracked platoons. Mainly dependent on militarized versions of off-road cars, these troops cannot negotiate rough terrain, rubble, any woods, or water greater than Depth 0 in combat.

TECHNOLOGY BASE

In *Total Warfare* standard rules play, conventional infantry fall into Clan or Inner Sphere technology bases. Inner Sphere infantry may only use equipment available to the Inner Sphere, while Clan infantry may only use equipment available to the Clans.

Technology Rating

In the Infantry Weapons and Equipment Tables used for creating conventional infantry, all items receive a Technology Rating in addition to a tech base. This rating (expressed as a series of letter grades that define the level of technology and its availability through the major eras of *BattleTech* history) helps to define the item's level of sophistication and may be used to standardize the level of advancement the unit demonstrates for purposes of era-based campaigning. Beyond this, however, an item's Tech Rating has no bearing on conventional infantry design. See *Costs and Availability* (p. 274) for more on Tech Rating.

Affiliation and Infantry Organization

Though not technically a matter of technology base, the sophistication of a given faction in the *BattleTech* universe and its corresponding level of technological advancement do combine to influence the arrangement of conventional infantry forces at the squad and platoon levels. For ease of reference in these rules, these effects are handled as part of a platoon's technology base.

DESIGNING INFANTRY

The process of conventional infantry design can be organized into three simple steps, each of which is described in detail in this section. These steps are:

Step 1: Establish Platoon Type—Determine the platoon's motive type, tech base and size.

Step 2: Establish Platoon Weaponry—Determine the weapons carried by the platoon's component troops, including their range, damage, base to-hits at each range and special abilities.

Step 3: Complete the Record Sheet.

The above design process is a mere framework for designing a conventional infantry platoon. The actual process—particularly after determining the motive type, tech base and platoon size—can involve a bit more give-and-take as weapons and armor are balanced for their best fit in terms of mobility, damage and protection.

STEP 1: ESTABLISH PLATOON TYPE

The first step in conventional infantry platoon design is the creation of the platoon's basic type, including its motive type, which describes the means by which it travels when not operating as a passenger aboard other units. This step establishes some of the most basic aspects of the platoon's design, determining what kind of platoon it is, its movement capabilities and technology base, and the number of troops that deploy in a full platoon. These choices will restrict the designer's access to certain equipment.

CHOOSE MOTIVE TYPE

Conventional infantry come in a variety of motive types (also referred to as movement types), which affect their maximum number of troops, terrain restrictions and Movement Points (MP). The various options available for standard rules play are described below.

In terms of construction rules, the Conventional Infantry Motive Types Table below defines the central features of each infantry platoon motive type. The Max Squad Size column indicates the maximum number of troopers (individual

CONVENTIONAL INFANTRY MOTIVE TYPES TABLE

Motive Type	Max Squad Size (Troopers)	Max Platoon Size (Troopers)	MP (Type)	Prohibited Terrain
Foot	10	30	1 (Ground)	Water (Any)
Motorized	10	30	3 (Ground)	Water (Any)
Jump	10	30	3 (Jump)	Water (Any)
Mechanized				
Hover	5	20	5 (Hover)	Woods (Any)
Tracked	7	28	3 (Tracked)	Woods (Heavy), Water (Depth 1+)
Wheeled	6	24	4 (Wheeled)	Rough, Rubble, Woods (Any), Water (Depth 1+)

soldiers) that may be allocated to each of the platoon's component squads, while the Max Platoon Size column indicates how many troopers may be assigned to the platoon overall. The MP column indicates the number of Movement Points the platoon receives for that motive type (and what motive system they are considered to be using). Finally, the Prohibited Terrain column indicates what type of battlefield terrain the platoon may not traverse during game play.

Darrell is planning to create a motorized infantry platoon. Consulting the Conventional Infantry Motive Types Table, he finds that the maximum number of troops per squad of such infantry is 10, and that the maximum number of troops for the entire platoon is 30. He also notes that his platoon will have a movement rate of 3 Ground MP, and that it may not enter water of any depth.

Eberhard decides to create some foot infantry for his games. According to the table, he too will have a maximum number of 10 troopers per squad and 30 per platoon. His foot troops, however, will have only 1 Ground MP for movement, and may enter any terrain except for water of any depth.

Glenn's infantry platoon, he decides, will be self-mechanized. He decides on the Mechanized Hover motive type for maximum speed potential, and finds that he will be limited to 5 troopers per squad and a maximum of 20 troopers per platoon. The platoon receives a 5 MP (Hover) movement rate, but may not enter woods of any kind.

Jason's platoon, he decides, will also be self-mechanized, but he goes with tracked movement, trading speed for troop size. His platoon, according to the table, will have a maximum squad size of 7 troopers and a maximum platoon size of 28. He further notes that it receives 3 MPs of Tracked movement, and may not enter heavy woods or water at Depth 1 or more.

CHOOSE TECHNOLOGY BASE (AFFILIATION) AND SIZE

The technology base for an infantry platoon determines what weapons and equipment are available to its troopers, as well as their overall size and organization. Clan conventional infantry platoons (called Points) may only use items from the Infantry Platoon Equipment Table that are available to the Clans, while Inner Sphere (and Periphery) platoons may only use technology available to the Inner Sphere.

Affiliation and Infantry Deployment

In general, Clan conventional infantry operates on a strict base-5 squad system, where 5 troopers make up a squad and 5 squads make up a Point of infantry with few variations. Inner Sphere platoons, by comparison, typically follow a base-7 squad system, with greater variations especially among self-mechanized conventional platoons.

Many of the variations in platoon sizes and arrangements come from the faction (affiliation) fielding the infantry. While the infantry types shown in *Total Warfare* represent the standards used by the majority of the Inner Sphere, some factions—particularly the Periphery realms of the Taurian Concordat and the Marian Hegemony—and the Clans use different formations that can vary their infantry troop sizes. When building infantry platoons under these rules, designers looking for more flavor may wish to explore these options, which appear in the Conventional Infantry Formations (by Tech Base) Table (see p. 147). Any platoon with an Inner Sphere Technology Base may use the Inner Sphere (General) line or the line that applies to their particular affiliation, while any platoon with a Clan Technology Base must use the Clan (All) line. Note that, regardless of affiliation, a maximum of 5 squads is allowed per platoon or sub-platoon.

When using the Conventional Infantry Record Sheet, upon determining the platoon size, all excess troopers must be blacked out on the platoon's Record Sheet line, beginning with the trooper numbered "30" and working back to the highest-numbered trooper in the platoon (or sub-platoon, in the event of oversized units, see below). Only the troopers numbered 1 through the platoon (or sub-platoon) maximum should be left visible. For instance, for a standard Inner Sphere jump infantry platoon of 21, the designer would black out troopers numbered 22 through 30.

Oversized Platoons: The Conventional Infantry Formations Table shows that most platoons fall into the listed maximum number of troopers per platoon given in the Motive Types Table on p. 145. If, however, a designer chooses the Marian Hegemony formation or a custom arrangement that yields more than 30 troops per platoon, he or she must break up the formation into sub-platoons of no more than 30 troopers each. These troops must be divided as evenly as possible, regardless of the squad size chosen, with any odd troopers assigned to the first sub-platoon. These sub-platoons may then be tracked separately on the Conventional Infantry Record Sheet for damage resolution, movement and making attacks. For instance, a full Marian Hegemony jump infantry platoon of 50 would be divided evenly into 2 sub-platoons of 25 troopers apiece, with each sub-platoon moving, attacking and suffering damage as a separate formation during game play.

An unsuspecting Word of Blake Black Knight *is stalked by infantry hidden in the nearby ruins.*

CONVENTIONAL INFANTRY FORMATIONS (BY TECH BASE) TABLE

Tech Base (Affiliation)	Force Size (Troopers per Squad / Squads per Platoon)					
	Foot	Motorized	Jump	Mech: Hover	Mech: Wheeled	Mech: Tracked
Clan (All)	5 / 5	5 / 5	5 / 4	5 / 4	5 / 4	5 / 4
Inner Sphere						
Generic / Mercenary	7 / 4	7 / 4	7 / 3	5 / 4	6 / 4	7 / 4
Capellan Confederation	7 / 4	7 / 4	7 / 3	5 / 4	6 / 4	7 / 4
Draconis Combine	7 / 4	7 / 4	7 / 3	5 / 4	6 / 4	7 / 4
Federated Suns	7 / 4	7 / 4	7 / 3	5 / 4	6 / 4	7 / 4
Free Rasalhague Republic	7 / 4	7 / 4	7 / 3	5 / 4	6 / 4	7 / 4
Free Worlds League	7 / 4	7 / 4	7 / 3	5 / 4	6 / 4	7 / 4
Lyran Alliance	7 / 4	7 / 4	7 / 3	5 / 4	6 / 4	7 / 4
ComStar / Word of Blake	6 / 6**	6 / 6**	6 / 5	5 / 4	6 / 4	6 / 4
Periphery (Major)*	7 / 4	7 / 4	7 / 3	5 / 4	6 / 4	7 / 4
Marian Hegemony	10 / 10**	10 / 10**	10 / 5**	5 / 4	5 / 4	5 / 4
Taurian Concordat	10 / 3	10 / 3	10 / 3	5 / 4	5 / 4	5 / 4
Calderon Protectorate	10 / 3	10 / 3	10 / 3	5 / 4	5 / 4	5 / 4

*Includes Circinus Federation, Magistracy of Canopus, Niops Association, Outworlds Alliance, Nueva Castile, Hanseatic League and Pirates
**Oversized Platoons such as these must be divided as evenly as possible and treated as multiple sub-platoons during game play.

Darrell picks a Generic Inner Sphere platoon affiliation, so his motorized infantry will use Inner Sphere technology. He finds that the platoon will contain 4 squads of 7 troops each, for a total of 28 troopers per platoon (7 troops per squad x 4 squads per platoon = 28). Because the number of troops is less than the platoon maximum of 30 given in the Motive Types Table, Darrell need not divide these troops into sub-platoons, and will need only one line on the Infantry Record Sheet after blacking out troopers 30 and 29 on that line.

Eberhard chooses an Inner Sphere Technology Base as well for his foot infantry platoon, but picks a Marian Hegemony formation style. He finds from the Conventional Infantry Formations Table that his platoon will consist of 10 squads of 10 troops each, yielding a total of 100 troopers in the platoon (10 troops per squad x 10 squads = 100). Because the platoon size exceeds the maximum of 30 listed on the Motive Types Table, Eberhard needs to subdivide his unit as evenly as possible into sub-platoons of 30 or less. He soon finds that the most even division breaks his platoon into 4 sub-platoons of 25 troopers each. Eberhard will use four lines on the record sheet, each with Troopers 26 through 30 blacked out.

Glenn decides his Mechanized Hover Infantry Platoon will use an Inner Sphere Tech Base. Regardless of the affiliation chosen, he finds that the platoon will always number 4 squads of 5 troops each (for a total of 20 troopers). He blacks out Troopers 21 through 30 on a single line of his Infantry Record Sheet.

Jason chooses a Clan Technology Base for his Tracked conventional infantry, and thus limits his soldiers to Clan technology. His mechanized platoon (Point) numbers 20 troopers; the Formations Table indicates it will be composed of 4 squads of 5 troops each. Jason also blacks out Troopers 21 through 30 for his Clan platoon's line on the Infantry Record Sheet.

Laser Rifle Platoon, Third Crucis Lancers (House Davion)

STEP 2: ESTABLISH PLATOON WEAPONRY

The next step in conventional infantry platoon design is to establish the platoon's armaments. This step determines the type of weapons carried by the troopers overall (considered their primary weapons), the type and number of heavier support weapons carried (if any) and whether or not these weapons affect the platoon's base movement rate.

INFANTRY WEAPON STATISTICS

The Conventional Infantry Weapons Table (see p. 349) lists the broad range of weaponry available to conventional infantry platoons (as of about 3070). Each weapon shown on this list includes its name, tech base and Technology Rating, Class/Type and Damage Type, Base Range, Damage (per weapon), Weights (for weapon and ammunition, including the number of bursts or shots per clip) and the crew needed to operate the weapon. These details are expanded on below.

Weapon Name: The formal name and brand (if applicable) for the weapon is listed here. The list groups weapons by similar types: slug-throwing pistols, submachine guns, shotguns, laser rifles and so on.

Tech Base (Rating): This column identifies the weapons' technology base (Clan or Inner Sphere) and Tech Rating (A through F). Inner Sphere platoons must use only Inner Sphere weapons, while Clan platoons only use Clan weapons. Many weapons are listed as available to both tech bases.

A weapon's Tech Rating, noted in parentheses, does not typically factor into infantry platoon construction unless the designer wishes to apply a maximum Tech Rating for the platoon. Otherwise, this statistic is primarily used for the benefit of Support Vehicle design.

Weapon Class/Type: In this column, infantry weapons are listed as having a size class (Small or Medium) and a type (Melee, Standard or Support). The class (shown to the left of the slash) indicates its size for Support Vehicle construction, and so has no bearing on infantry platoon construction. The type (listed to the right of the slash) designates the general weapon type for the platoon. Conventional infantry may designate Melee or Standard weapons only as the platoon's primary weapon type. If a secondary weapon is chosen, it may be of any weapon type (Melee, Standard, or Support).

After type, the Infantry Weapons and Equipment Table also lists the weapon's Damage Type in parentheses ("B" for Ballistic,

INFANTRY WEAPON CLASSIFICATIONS TABLE

Weapon Class/Type	Infantry Construction Effects	Infantry Game Play Effects
Class = Small or Medium	No Effect	Not Applicable
Type = Melee	Primary Infantry Weapon*	Attack only at 0 Hexes*
Type = Standard	Primary Infantry Weapon	Attack per normal rules
Type = Support	Secondary Infantry Weapon	Attack per normal rules

*Mechanized infantry may not use Melee Weapons.

Damage Type	Game Play Effect
(B)	Ballistic Weapon: Attacks as standard infantry ranged weapon
(E)	Energy Weapon: Attacks as standard infantry ranged weapon
(M)	Missile Weapon: Attacks as standard infantry ranged weapon
(P)	Point-Blank Weapon: +1 to-hit at 0 Hexes; May not be used by mechanized infantry types

Special Feature	Game Play Effect
A	Anti-Aircraft Weapon: Enables platoon to attack airborne aerospace units.*
B	Heavy Burst Weapon: –1 to-hit at hex 0; +1D6 platoon damage (vs. Conventional Infantry)**
F	Flame-Based Weapon: Every time the platoon fires, before the to-hit roll is made, the player may announce he is applying the Damage Value as heat to the target, in place of damage*†
N	Non-Penetrating Weapon: Affects only other Conventional Infantry††

*Platoon special feature applies if one or more weapons assigned.
**Platoon to-hit and damage bonus only if assigned to a minimum of 2 troopers per squad
†Including BattleMechs and IndustrialMechs; Standard damage only to units that do not track heat
†† Platoon special feature only applies if weapon is used to determine Base Range

"E" for energy, "M" for Missile and "P" for Physical/Point-blank). These letters indicate the weapons' damage type relative to other battlefield weapons in *Total Warfare*. Ballistic weapons (B) are direct-fired projectiles, while Energy weapons (E) are direct-fired lasers and the like; Missile weapons (M) feature explosive warheads and often fire in an arcing trajectory. Point-blank weapons (P) are ineffective beyond the hex of the platoon itself, and receive a penalty to attacks that reflects the troopers' need to close with a target in order to use them (see *Base Range*, below, for more details).

Special feature indicators may follow the Damage Type as well. These letter codes (located outside the parenthetical Damage Type) indicate if the listed weapon has any special effects, which apply to the entire platoon's attack if the weapon is employed as either a Primary or Secondary Weapon (though in some cases, a minimum weapon quantity per squad may be required). These special features, by code, are shown in the Infantry Weapon Classifications Table below.

Base Range: The Base Range of all infantry weapons provides a key to determining the platoon's overall effective attack range, including its to-hit modifiers from a range of 0 (the platoon's own hex), to the maximum range of its weapons (three times the weapons' Base Range). The Conventional Infantry Range Modifiers Table below enables the designer to find a platoon's base to-hit modifier with any listed conventional infantry weapon based on the weapon's Base Range and the range of the attack (in hexes). Numerical entries note the to-hit modifier that applies for an attack with a weapon at that hex range, while a dash entry ("–") indicates a range at which the platoon's weapons are considered ineffective in *Total Warfare* gameplay.

For example, if (at the end of this step) a platoon has a final Base Range of 2 for its weapon attacks, the platoon receives a –2 modifier against targets 0 hexes away, no modifier at hex ranges of 1 to 2, +2 at hex ranges 3 through 4, and +4 at a range of 5 to 6 hexes.

Damage: The value listed in the Damage column shows how many damage points an individual infantry weapon delivers on a successful attack. When creating a platoon, the sum damage for the full platoon—including Primary and Secondary Weapons—is used to determine the platoon's full Damage Value at each quantity of troopers. Damage is not rounded until the end of this step in platoon creation. These platoon Damage Values are then recorded in the Max Weapon Damage blocks that appear below each trooper's icon on the Conventional Infantry Record Sheet.

Weight of Weapon/Ammo (Shots): This column provides the weights for each listed infantry weapon and a standard clip of its ammunition, followed by values in parentheses that note the weapon's number of shots (and, where applicable, its number of bursts) per magazine. Because conventional infantry is treated more abstractly in these rules and those in *Total Warfare*, these weights do not factor into infantry platoon construction. They have instead been included on the table for the benefit of Support Vehicle and battle armor design.

CONVENTIONAL INFANTRY RANGE MODIFIERS TABLE

Base Range	To-Hit Modifiers by Range (in Hexes)																					
	0*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22+
0	+0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1	–2	0	+2	+4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2	–2	0	0	+2	+2	+4	+4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3	–2	0	0	0	+2	+2	+2	+4	+4	+4	—	—	—	—	—	—	—	—	—	—	—	—	—
4	–2	0	0	0	0	+1	+1	+2	+2	+3	+3	+4	+4	—	—	—	—	—	—	—	—	—	—
5	–1	0	0	0	0	0	+1	+1	+2	+2	+2	+3	+3	+4	+4	+4	—	—	—	—	—	—	—
6	–1	0	0	0	0	0	0	+1	+1	+1	+2	+2	+2	+4	+4	+4	+5	+5	+5	—	—	—	—
7	–1	0	0	0	0	0	0	0	+1	+1	+1	+2	+2	+2	+2	+4	+4	+4	+6	+6	+6	+6	—

*Same Hex. Modifiers for Point-Blank weapons, Heavy-Burst weapons, and weapons with a crew value other than "1" apply in addition to those listed at this range.

CONVENTIONAL INFANTRY WEAPON CREW TABLE

Crew Value	To-Hit Modifier	Weapon Limit (by Weapon Type)
1	No to-hit effect	1 per Trooper (Standard/Melee); 2 per Squad (Support)
1E	+1 to-hit at 0 Hexes	1 per Trooper (Standard/Melee); 2 per Squad (Support)
2+	+1 to-hit at 0 Hexes	1 per Crew (All Types); Maximum 2 per Squad (Support)

Crew: Normally a concern with Support Weapons, the Crew Value is used to determine the minimum number of troopers required to operate a weapon. The Crew Value serves to limit the number of Support Weapons that a platoon can carry (per squad) and can even affect the platoon's to-hit modifiers in close-range attacks. These effects are noted on the Conventional Infantry Weapon Crew Table (see p. 149).

CHOOSE PRIMARY INFANTRY WEAPONS

While all conventional infantry forces carry an array of armaments to the battlefield—combat knives, grenades, pistols and so forth—infantry forces in *Total Warfare* are constructed around the principle that the majority of troops in a platoon will carry the same standardized primary weapon (typically a rifle). When arming a platoon, this primary weapon must be established first, to determine the platoon's overall damage type (similar to how the standard auto-rifle serves as the basis for the generic Rifle, Ballistic platoon presented in *Total Warfare*).

Using the statistics outlined above, the designer determines the platoon's weaponry by selecting the desired Primary Infantry Weapon type. Only weapons listed as Melee or Standard under the Weapon Class/Type column may be chosen as Primary Infantry Weapons. All troopers in the platoon receive the same Primary Weapon at this point, though the addition of any Secondary (Support) Weapons will change this as some troopers trade in their Primary Weapons for Secondary Weapons (at right).

Darrell decides that his motorized infantry platoon will be a basic laser rifle unit. The standard laser rifle is available to the Inner Sphere and the Clans, and is listed as a Standard weapon. This means it is suitable for use as his platoon's Primary Weapon. Darrell notes that the laser rifle is given Damage Type (E), indicating an energy weapon used for standard ranged attacks, and has no special abilities. The laser rifle has a Base Range of 2, which will give the platoon a –2 to-hit modifier at a range of 0 hexes (the platoon's same hex), no modifier at a range of 1 to 2 hexes, a +2 modifier at ranges of 3 to 4 hexes, and a +4 to-hit modifier at 5 to 6 hexes. The laser rifle also provides each trooper with a Damage Value of 0.28. Finally, a Crew Value of 1 means that the use of laser rifles will not affect the platoon's to-hit numbers, and that each trooper in the platoon may carry one.

For his Marian foot infantry platoon, Eberhard chooses standard ballistic rifles as a Primary Weapon. From the Infantry Weapons List, he chooses the basic auto-rifle, which is listed as a Standard (B) weapon, for standard ranged attack capability with a Base Range of 1, and a Damage Value of 0.52 points per trooper. The Crew Value of 1 means that the auto-rifles function without added modifiers at close range and may be carried by all troopers. Eberhard notes that the Base Range will yield a –2 to-hit modifier at 0 hexes/same-hex range, no modifier at 1 hex, +2 at 2 hexes and +4 at 3 hexes.

Glenn decides his Mechanized Hover Infantry Platoon will also use ballistic rifles. Like Eberhard, he chooses the auto-rifle for a Base Range of 1 and a Damage Value of 0.52 per trooper.

For his Tracked Mechanized Clan platoon (Point), Jason decides to employ the new Gauss submachine guns (SMGs) as the Point's Primary Weapon system. Gauss submachine guns are available only to a Clan Tech Base and are listed as a Standard (B) Weapon, meaning they are usable as Primary Weapons and attack per normal infantry direct fire rules. With their Base Range of 1, the Gauss SMGs receive the same modifiers as Eberhard's and Glenn's auto-rifles, but receive a per-trooper Damage Value of 0.45.

CHOOSE SECONDARY (SUPPORT) INFANTRY WEAPONS

Secondary weapons—support weaponry intended to improve a platoon's overall hitting power and reach—are common in many conventional infantry formations, but are decidedly less numerous because their bulk and crew needs make them more difficult to transport and fire at the same time. As with Primary Weapons, the infantry forces used in *Total Warfare* are constructed around the principle that a platoon will employ only one type of Secondary Weapon at a time, if any.

Under these rules, Secondary Weapons are chosen and assigned to a platoon on a per-squad basis, with all squads in the platoon receiving an identical Secondary Weapons assignment. If one squad in the platoon receives 1 Secondary Weapon, all squads in the platoon receive 1 Secondary Weapon of the same type and statistics; if a squad receives 2 Secondary Weapons, all squads in the platoon receive 2 Secondary Weapons of the same type and statistics.

A Davion Guards' Osiris *makes the mistake of turning its back on a platoon of conventional infantry.*

Secondary Weapon Limits

The use of Secondary Weapons by an infantry platoon comes with a number of restrictions, which can affect the choice of such weapons, their quantity and the mobility of the platoon. These limits are described below.

Type Limits: The type of weapon (Melee, Standard or Support) chosen for a platoon's Secondary Weapon is related to the type chosen for the platoon's Primary Weapon. If the platoon has a Standard Primary Weapon, the designer may select a Melee, Standard or Support Weapon as a secondary. If the platoon uses a Melee Primary Weapon, it may only select a Melee or Standard Secondary Weapon. For example, if a backwoods infantry platoon chooses vibro-swords as its Primary Weapon, it cannot pick an SRM for a Secondary Weapon, but could pick an auto-rifle, which is a Standard Weapon.

Crew Limits: A platoon may employ a maximum of 2 Secondary Weapons per squad, or a number of weapons equal to the number of troopers in one squad divided by the weapon's Crew Value (rounded down), whichever is lower. A standard Inner Sphere platoon—which uses 7-man squads—may field 2 Secondary Weapons with a Crew Value of 3, as the squad has sufficient manpower for both weapons (7 troops per squad ÷ 3 crew per weapon = 2.333, rounded down to 2). A Clan Point, however, which uses 5-man squads, may only field one Secondary Weapon, as the squad has insufficient troops for more (5 troopers per squad ÷ 3 crew per weapon = 1.667, rounded down to 1). The Inner Sphere squad may not field 3 Secondary Weapons with a Crew Value of 2, even if they have the bodies for it, because doing so would exceed the maximum of 2 Secondary Weapons per squad.

Mobility Limits: At 2 Support Secondary Weapons per squad, a platoon loses an appreciable amount of mobility. Foot platoons may move or fire in a turn, but not both. Motorized, jump and mechanized (hover or wheeled) platoons suffer a –1 MP rating for carrying 2 Support Secondary Weapons per squad. Mechanized (tracked) platoons suffer no mobility restrictions for carrying 2 Support Secondary Weapons per squad.

These limits only apply when the Secondary Weapon is a Support Weapon. Platoons using Melee or Standard Secondary Weapons do not modify their mobility.

Assigning Secondary Weapons

Once chosen, Secondary Weapons are assigned to the platoon with one trooper per weapon. Even if the weapon is crewed by multiple soldiers, only one is required to aim and fire it, while the others are free to use their own Primary Weapons in combat. Troopers designated as Secondary Weapon operators may not use their Primary Weapon at the same time, and so receive the Damage Value for their assigned Secondary Weapon instead.

Darrell decides that his Motorized Laser Rifle infantry platoon will not employ Secondary Weapons.

For his Marian Foot Platoon, Eberhard decides to back up their ballistic rifles with Secondary Weapons and chooses machine guns for the job. From the Infantry Weapons List, he chooses the Support Machine Gun, which is listed as an Inner Sphere-available weapon, its type given as "Support (B)B". The Infantry Classifications Table tells Eberhard that this weapon will function normally in infantry combat as a ballistic weapon. It also notes that the "B" special feature grants the machine gun heavy-burst capability, which adds an extra 1D6 damage against other conventional infantry, as well as a –1 to-hit modifier for attacks at Range 0 (changing the Range 0 to-hit modifier from –2 to –3—but only if Eberhard assigns 2 of these weapons per squad. (Because his platoon is broken into five sub-platoons for construction and game play, each of Eberhard's sub-platoons will receive this bonus ability.)

A detachment from the Eleventh Lyran Guards secures a perimeter for the approaching Karnov UR Transport.

The Support machine guns have a Base Range of 2, and a Damage Value of 0.94 points per trooper. The Crew Value of 2 means that these weapons apply a +1 to-hit modifier at Range 0 (changing his platoon's to-hit modifier in the same hex back from –3 to –2), allowing Eberhard to easily field the maximum of 2 such weapons per each of his 10-trooper squads (10 troopers per Marian squad ÷ 2 Crew per Support Machine Gun = 5; maximum of 2 Secondary Weapons applies). Eberhard notes that the Base Range of 2 gives the Support machine guns a to-hit modifier of 0 at a range of 1 to 2 hexes, +2 at 3 to 4 hexes, and +4 at 5 to 6 hexes—essentially double the range of the standard auto-rifles carried as Primary Weapons. For these range and damage advantages, Eberhard assigns the full 2 Support machine guns per squad.

He also notes that the fact that because his platoon is Foot-based, the use of two Support Machine Guns means that it may only move or fire in a single turn, but not both.

Glenn decides his Mechanized Hover Infantry Platoon will also add Secondary Weapons to its capabilities. He picks the Corean Farshot LRM launcher. This weapon—available to the Inner Sphere Tech Base only and listed as a Support Weapon (M), with no special abilities—has a Base Range of 3 and a Damage Value of 0.19. With this base range, the LRM receives a –2 to-hit modifier at a range of 0 hexes, +0 at 1 to 3 hexes, +2 at 4 to 6 hexes and +4 at 7 to 9 hexes. Its Crew Value of 1E adds +1 to attacks at Range 0, but also assures that Glenn can fit the maximum of 2 LRMs per squad, as each launcher takes only a single trooper per squad to fire. Glenn thus assigns the maximum of 2 Farshot LRMs to each squad in his platoon. This decision reduces his platoon's mobility by –1 MP.

For his Clan platoon (Point) of Mechanized Tracked Gauss SMG troops, Jason decides on the devastating firepower of the Bearhunter Superheavy autocannon. Available only to the Clan Tech Base, and listed in the Infantry Weapons Table as "Support (B)B", Jason notes that the weapon shares the same capabilities as the Support machine gun Eberhard chose—complete with the +1D6 heavy-burst capability. However, the Bearhunter suffers at range, with a Base Range of 0 giving it no effectiveness beyond its own hex in combat. (The Infantry Range Modifiers Table shows that a Base Range of 0 equates to a +0 to-hit modifier at Range 0 and "NA" at all other ranges, indicating this maximum range.) Still, in its own hex the Bearhunter provides its shooter with a Damage Value of 2.33 points per trooper.

Though the Bearhunter's Crew Value of 2 would allow Jason to put 2 in each of the 5-man squads that make up his Clan Point, and the Mechanized Tracked motive type would suffer no effects from such equipment, Jason decides to assign only 1 Bearhunter trooper per squad in his platoon. This decision forgoes the ability to inflict an additional 1D6 damage to other conventional infantry. Even including 1 Bearhunter per squad, however, adds a +1 modifier to attacks at a range of 0 hexes.

DETERMINE FINAL RANGE AND DAMAGE VALUES

In *Total Warfare*, infantry platoons may resolve fire using only one set of ranges and to-hit modifiers, and one unified Damage Value that abstracts the entire platoon's attack based on the number of troops remaining. Once all Primary Weapons and any desired Secondary Weapons are assigned to a platoon, the designer may determine these final range and damage values for the platoon.

Determining Final Range Values

Determining which sets of range values apply to a platoon is simple. If the platoon fields 1 Secondary Weapon or less per squad, the ranges, modifiers and Damage Type that apply to the platoon's attack are those of the Primary Weapons. If the platoon fields 2 or more Secondary Weapons per squad, then it is the Secondary Weapons' range, modifiers and Damage Type that apply. Any to-hit modifiers for the use of point-blank weapon types or weapons with a Crew Value of more than 2 (or a value of "1E") apply as well, regardless of the number of Secondary Weapons.

Determining Final Damage Values

For instance, if a 4-squad Inner Sphere platoon of 28 uses a Primary Weapon worth 0.21 damage points, but also has 2 troopers per squad carrying Secondary Weapons with a Damage Value of 0.43, the sum of all damage together is equal to the damage of 8 Secondary Weapons (4 squads x 2 per squad) and 20 Primary Weapons (28 troops per platoon – 8 per platoon assigned to Secondary Weapons = 20 troops using Primary Weapons), or 8 damage points for the full platoon ([8 Secondary Weapons x 0.43] + [20 Primary Weapons x 0.21] = 7.64, rounded normally [up] to 8).

Once the total damage for the platoon is determined, the designer must then divide the Damage Value by the number of troopers to find the platoon's raw average. This average value, multiplied by each number of troopers (from 1 to the maximum deployed per platoon line), and rounded normally to the nearest whole number (rounding .5 up), will provide the Damage Value for the platoon at each number of surviving troopers. (Special features for heavy-burst and flame-based weapons remain active at all levels.)

Rifle Platoon, LAW Security (House Kurita)

Oversized Platoons

Even though oversized platoons operate as separate sub-platoons on the battlefield, the calculations for total weapon damage and damage by trooper may be computed for such units across the entire platoon and then divided evenly across the sub-platoons. A 36-man Word of Blake foot platoon, would break into two 18-trooper sub-platoons for gameplay, but would compute its damage based on the cumulative firepower of 36 troopers. Each 18-trooper sub-platoon would then receive their allotment of damage points based on the average for the whole platoon, with each sub-platoon computed evenly. If the entire 36-man platoon could dish out 0.5 points per trooper, then each 18-trooper platoon would see damage values of 1 point at a single trooper (0.5, rounded up, is 1) to 9 points at the full 18 per sub-platoon (18 troopers in the sub-platoon x 0.5 points per trooper = 9 points per sub-platoon).

Note that while the sub-divisions of oversized platoons may break up individual squads and their distribution of support weaponry, the approach for these rules follows the abstract principles that keep conventional infantry relatively easy to play in *Total Warfare*.

As Darrell has decided not to equip his Motorized Laser Rifle Platoon with Secondary Weapons, all 28 men in the platoon are using the same Primary Weapon, which provides a –2 to-hit modifier at a range of 0, a +0 modifier at ranges of 1 to 2 hexes, a +2 modifier at ranges 3 to 4 hexes and a +4 modifier at 5 to 6 hexes. He notes these numbers on the Range Modifier lines corresponding to each number of hexes, then blanks out the remainder, as the platoon's weapons become ineffective beyond 6 hexes.

He then adds up all his troopers' Damage Values and comes to a final Platoon Damage Value of 8 points (0.28 per trooper x 28 troopers = 7.84, round up to 8), which he divides among the platoon to find the average damage per trooper (8 ÷ 28 = 0.286 per trooper). Computing this new damage, trooper by trooper, and rounding normally, he computes the platoon's Damage Value for every quantity of troopers from 1 to 28, finding that the platoon will deliver no damage at 1 trooper (1 x 0.286 = 0.286, rounded normally to 0), 1 point at 2 troopers (2 x 0.286 = 0.572, rounded normally to 1), 1 point at 3 troopers (3 x 0.286 = 0.858, rounded normally to 1) and so on. For each Damage Value, he notes the number in the Max Weapon Damage box corresponding to that number of surviving troopers.

Eberhard's Marian Foot Platoon is equipped with auto-rifles as a Primary Weapon and Support machine guns as a secondary, with each 10-man squad carrying 2 Support MGs. This means that the ranges and to-hit modifiers for the Support machine guns will apply over those of the platoon's auto-rifles. He thus notes the machine guns' to-hit modifiers across the Range Modifiers row on each of his four platoon lines: –1 at 0 hexes (–2 initial, +1 for Crew Value of 2), +0 at hex ranges 1 and 2, +2 at 3 to 4 hexes and +4 at 5 and 6 hexes. Eberhard blacks out the remaining ranges.

Eberhard's platoon numbers 100 in all, at 10 squads of 10. Of these troops, 2 per squad—for a total of 20 in the platoon (2 Secondary Weapon troops per squad x 10 troopers per squad = 20)—are equipped with Support machine guns, while the rest (80 troops; 100 – 20 = 80) are equipped with the Primary Weapon (auto-rifles). With each auto-rifle's Damage Value of 0.52, and each Support machine gun's Damage Value of 0.94, Eberhard computes a final platoon Damage Value of 60 points ([20 Secondary Weapons x 0.94 Damage per Secondary Weapon] + [80 Primary Weapons x 0.52 Damage per Primary Weapon] = 60.4, rounded normally to 60). Dividing this value by 100, Eberhard finds that the average per-trooper Damage Value for his platoon comes to 0.6 (60 Total Damage ÷ 100 troopers = 0.6 Damage per trooper). Multiplying each trooper individually on the first row for his four-row Marian platoon, he determines the Damage Value of the platoon for troops numbered 1 through 25 (then repeats these values for each row).

Glenn's Mechanized Hover Platoon is comprised of 4 squads of 5 troopers each, for a total of 20 soldiers. Their Primary Weapon is the standard auto-rifle, and they are using Corean Farshot LRM launchers as a Secondary Weapon. Because Glenn has given his troops 2 Secondary Weapons per squad, the ranges and modifiers for those weapons will apply. On the Range Modifiers row for his platoon, he notes the following: –1 at 0 hexes (–2 initial, +1 for the LRM's Crew Value of 1E), +0 at hex ranges 1 through 3, +2 for hexes 4 through 6 and +4 for hexes 7 through 9. Glenn then blacks out the rest of the Range Modifiers lines from 10 through 21 hexes, as the platoon may not effectively attack at such ranges.

At 2 weapons per each of the platoon's 4 squads, the LRMs account for 8 troopers' Damage Values. The remaining 12 troopers deliver the Damage Value for the platoon's Primary Weapon (20 total troops – 8 Secondary Weapons = 12 Primary Weapon users). The LRMs have a Damage Value of 0.19 each, and the auto-rifles have a Damage Value of 0.52 points each, so the final Damage Value comes to 8 for the platoon ([8 Secondary Weapons x 0.19 Damage per Secondary Weapon] + [12 Primary Weapons x 0.52 Damage per Primary Weapon] = 7.76, rounded up to 8). Dividing this value by 20, Glenn finds that the average damage per trooper for his platoon is 0.4 (8 Damage ÷ 20 troops = 0.4 Damage per trooper). Multiplying each trooper individually, Glenn determines the Damage Value of the platoon for troops numbered 1 through 20.

A Savannha Master driver pauses briefly to coordinate with a nearby patrol.

Jason's Mechanized Tracked Point is comprised of 4 squads of 5 troopers each, for a total of 20 troops. Their Primary Weapon is the standard Clan Gauss SMG, and they employ 1 Bearhunter Superheavy AC per squad as a Secondary Weapon. Because Jason has not provided 2 Secondary Weapons per squad, the ranges and modifiers for the Primary Weapons apply, rather than those of the Bearhunters. On the Range Modifiers row for his platoon, Jason notes the following range values, based on the Gauss SMGs: –1 to-hit modifier at 0 hexes/same-hex range (–2 base modifier +1 for the Bearhunters' Crew Value of 2), no modifier at 1 hex, +2 at 2 hexes and +4 at 3 hexes. Jason then blacks out the rest of the Range Modifiers lines from 4 through 21 hexes, as the platoon may not effectively attack at such ranges.

At 1 Bearhunter per each of the platoon's 4 squads, the Secondary Weapon damage of 2.33 points each applies for only 4 troopers' Damage Values. The remaining 16 troopers (20 total troopers – 4 Bearhunter troopers = 16 remaining troopers) deliver the Damage Value for the platoon's Primary Weapons, the Gauss SMGs (0.45 each). The final platoon Damage Value comes to 17 ([4 Secondary Weapons x 2.33 Damage per Secondary Weapon] + [16 Primary Weapons x 0.45 Damage per Primary Weapon] = 16.52, round up to 17). Dividing this value by 20, Jason finds that the average damage per trooper for his Point is 0.85 (17 Damage ÷ 20 troops = 0.85 Damage per trooper). Multiplying each trooper individually, he determines the Damage Value of the platoon for troopers numbered 1 through 20.

The swarming infantry converge on the BattleMech's cockpit, banking on a quick-kill.

STEP 3: COMPLETE THE RECORD SHEET

After computing all the data for the platoon's size, MP, motive type, Damage Value and ranges, the designer may complete the Conventional Infantry Record Sheet by filling in this data, making sure that the Damage Value for each number of active troopers appears in the boxes below each trooper icon at that number (for example, the Damage Value for 15 troopers would appear below the trooper icon numbered 15) and that the modifiers are shown for each hex to which the weapons are effective. Any excess troopers in the platoon or range boxes beyond the reach of the platoon's weapons must then be blacked out. The designer should fill in the platoon's MP and movement type on their appropriate lines, as well as any special capabilities (such as heavy-burst fire or flame-based weapon capabilities). As Platoon Data blocks permit, the information may be repeated throughout the record sheet, so that the designer can track multiple platoons of the same type at the same time during game play.

Once the designer has finished all of the above, the infantry platoon is ready for *Total Warfare* game play.

PLATOON NOMENCLATURE

Though designers may choose any name desired for their infantry platoons (as with all other units), as a rule of thumb, most conventional infantry units in *BattleTech* are identified by their motive and weapon types for ease of reference. For instance, a platoon equipped with auto-rifles that moves by jumping might be called "Jump Rifle Infantry" or "Rifle Infantry (Jump)".

If such platoons are also equipped with Secondary Weapons that enhance their abilities, these Secondary Weapons may be used to differentiate the platoon instead; for example, a platoon armed with auto-rifles backed up by SRMs may call itself an SRM platoon. Because the choice of weapon and motive types dominates the platoon's function so completely and can easily affect such naming decisions, it is generally in this final step that a designer can best determine the proper nomenclature for a new conventional infantry platoon.

INFANTRY AND CARGO TRANSPORTATION

When constructing infantry using these rules, the designer may gain insight into how many troopers may be contained aboard a vehicle with a cargo capacity measured in tonnage. The capacity needed by an infantry platoon type is listed in the infantry bay rules for such vehicles, and the weights generated by these rules are intended to match them. When in doubt, however, use the weight of the platoon versus the weight assigned to cargo by the transporting vehicle(s) as a guide to determining how many troops may be placed aboard a transport. While the result may force the player to break up a platoon into groups smaller than its component squads, it is not uncommon for a platoon to be carried into battle in such a fashion aboard multiple APCs.

Oversized platoons—those that take up multiple lines on the Infantry Record Sheet—should divide this total in proportion to the troopers on each line, and record the weight for each line of troops separately. Doing so enables the platoon to better account for its component sub-platoons.

CONVENTIONAL INFANTRY WEIGHT TABLE

Motive Type	Base Weight (per Trooper)	Minimum Breakdown Level (in Troopers)
Foot	0.085 ton	1
Motorized	0.195 ton	1
Jump	0.165 ton	1
Mechanized		
Hover	1 ton	5
Tracked	1 ton	5
Wheeled	1 ton	5

The above applies only to foot, motorized and jump infantry platoons. Mechanized conventional infantry incorporate their own transports as an abstraction of their unit weight. Though they can be carried by cargo transports as well (and so should have their platoon weight computed), designers may not break them down to less than a squad in size to do so, as each squad represents both the troopers in the squad and their attached Support Vehicle.

To find the weight of a platoon, multiply the number of troopers by the Base Weight (per Trooper) provided in the Conventional Infantry Weight Table below. This table also notes the platoon type's Minimum Breakdown Level—the minimum number of troopers into which the platoon may be broken for transport purposes. Round all weights up to the nearest half ton.

Special Feature:
Adding Anti-'Mech Capability to Conventional Infantry

Although most conventional infantry are technically capable of swarming or conducting leg attacks on enemy 'Mechs, this highly risky tactic is usually performed only by those who are trained for it, and who go into battle properly equipped.

To reflect the equipping of a conventional infantry unit for Anti-'Mech attacks during platoon construction, add 15 kilograms (0.015 tons) to the base weight of each trooper in the unit, to account for the unit's Anti-'Mech Infantry kits. This kit includes the necessary climbing gear and a satchel charge; with it, the unit can possess a better Anti-'Mech Skill Rating than 8 in game play. Without it, the unit receives a fixed Anti-'Mech Skill Rating of 8 during construction (see p. 314 to alter a unit's Anti-'Mech Skill Rating).

Disregard this rule if the platoon uses any of the Mechanized Motive Types, as such units are automatically barred from Anti-'Mech attacks.

Having tracked the Range and Damage values for his platoon all through the creation process, Darrell simply verifies that all is well and notes that his Motorized Laser Rifle Platoon retains its 3 MP of Ground Movement. He also notes that the entire platoon of 28 troopers weighs 6 tons (28 troopers x 0.21 Motorized Trooper Base Weight = 5.88 tons, rounded up to 6 tons) and may be broken down to as few as 1 trooper per transport.

Eberhard makes sure his details are noted on the various platoon lines for his Marian Machine Gun Foot Platoon, including that the platoon has 1 Ground MP and that it may only move or attack (not both) in one turn, by adding "Move or Shoot" to the Movement Type line. He even adds "+1D6 v. conventional infantry" below the Max Weapon Damage header, to remind him that when his platoons fire on standard infantry, they add 1D6 points to their attack damage.

In all, Eberhard's 100-trooper infantry unit weighs 10 tons for transport purposes (100 troopers x 0.1 Foot Trooper Base Weight = 10 tons), but since Eberhard has broken his platoon up among 4 lines, he notes that each line of troopers weighs 2.5 tons (10 tons ÷ 4 platoon rows = 2.5 tons per row). They, too, may be broken down to as few as 1 trooper per transport.

Glenn fills in his data as well, noting that his Mechanized Hover LRM Platoon has 4 Hover MP (5 MP base – 1 MP for carrying 2 Support Secondary Weapons per squad). He then calculates that at 20 troopers, his platoon weighs 20 tons in all (20 troopers x 1 ton per Mechanized Hover Trooper Base Weight = 20 tons), and may only be broken down as far as 5 troopers per transport.

Jason finalizes his record sheet like his fellow platoon creators, noting that his Mechanized Tracked Bearhunter Platoon has 3 MP of Tracked-type Movement (3 MP base, unmodified for carrying Support Secondary Weapons). He then calculates that at 20 troopers, his platoon weighs 20 tons in all (20 troopers x 1 ton per Mechanized Tracked Trooper Base Weight = 20 tons), and may only be broken down as far as 5 troopers per transport.

Bored security guards look on as a squad of Kage battle armor perform exercises.

BATTLE ARMOR BASICS

[*Per your request, Dr. Parker has asked me to pull together some basic background on battle armor. The following is a transcript of an induction and orientation briefing typical of the kind given to new candidates in the NAIS Accelerated Battle Armor Training (ABAT) program. Presented in Sergeant Major Zeb Isacs Macintyre's own irrepressible style, it nonetheless serves as an informative discourse on the fundamentals of battle armor technology and its application on the modern battlefield. —J.S.*]

ZM: Good morning, campers! They call me Sergeant Major Macintyre, but *you* will address me as "Sergeant"! I don't care where you've come from or what you had to do to get here. You may be some badass Special Forces type. Maybe you're here from a line regiment and figure this for an easy gig. Or perhaps you're fresh out of boot camp and still damp around the ears. It don't matter here, because you're all starting right at the beginning. So settle down, pin your ears back and pay attention! The enemy will be giving you an exam later.

Most people think these tin cans we call battle armor are just baby BattleMechs. As you have all volunteered to become grade-A SPAM, you'll soon enough know they are dead wrong.

Over here we have a genuine Toad suit, or Elemental battle armor as the Clanners call it. Don't let the bullet holes and bloodstains faze you.

Your battle armor falls into several classes. Power armor is not much more than an armored exoskeleton, and weighs up to four hundred kilograms. You don't see it out on the battlefield much, but suits like the Nighthawk and Tornado are best for special ops work. Some don't consider them true battle armor, but don't go discounting them out of hand.

Next up, you have the light class, coming in at up to 750 kilos. Suits like the Kobold and Kage are fast and agile, so they tend to show up as scouts, though they can still lay a world of pain on anything that gets in their way. Still, they just can't carry the kind of armor needed to stand up to heavy weapons.

Toadie here is a medium-weight suit. Weighing in at a full ton, his mix of mobility, weapons and armor makes him one of the most balanced battle armor types you'll ever run into.

Up to one and a half tons, you get the heavy class. These babies can pack some serious armor and firepower, but they pay for it in speed and agility. As a result, you don't see them as much. The Clanners have started fielding the Gnome, and we have our Sloth. Both move about as well as a stuck pig, but pack a solid wallop nonetheless.

Last of all, you get the assault class. Now here, you're riding the curve of diminishing returns. At up to two tons in weight, these things are slow and as clumsy as hell. Of course, they can also carry enough armor to stop just about any mobile weapon system you care to mention—short of an orbital fire support mission from a passing WarShip—and they can pack more firepower than some light 'Mechs.

Now that this sucker is opened up, you can see the chassis don't look all that different from the powered exoskeletons you've seen used for boring civilian work. Of course, in this case, weight and strength are real important. You'll never find a civilian exoskeleton made out of this stuff. It takes some fancy zero-G manufacturing, and it's not cheap. Just like the rest of the gear on the suits you'll be playing with. Bring them back. We can afford to lose you, but we can't spare the suit. Remember that.

The chassis is just like a skeleton. Everything else mates to it. Most battlesuits are like Toad Boy here. They walk around on two legs just like you. Gather 'round. Come closer, everyone. See here? You can see these bundles of rubbery stuff attached to the chassis. That's your musculature—just like myomers on a BattleMech, except the fibers in these are shorter—designed to work on this reduced scale. Pass electricity though an actuator at one end and watch them contract. Works just like your own muscles, only this stuff is way stronger.

Don't pull that, soldier! You don't know what it's attached to.

Next up, we have the power packs right back here. These little beauties will keep you going for about a day of heavy use. Longer if you shut down everything but the essentials between fights. These things charge your life support, comms and movement. Your weapons run off their own power packs, so don't go wild spraying laser fire everywhere. I hear tell the Clans messed with using a lightweight fusion reactor to power their Toads. Didn't work out too well, apparently. You really don't want to have reactor containment fail when you've got a ball of million-degree plasma sitting between your shoulder blades. Your average recharger will fill you up in under an hour. Techs can swap the packs out in a few minutes. Some suits rigged for longer endurance carry additional power packs, and if you can hitch a lift on a friendly OmniMech you can just plug in and draw juice straight from the engine.

So the chassis supports the weight of all your gear, the myomer muscles are strong enough to move it all, and you have power to make everything work. How do you make the can you're wearing do what you want it to? The key is the suit lining, which is filled with pressure sensors. The sensors detect every movement you make and then trigger the suit's myomers to mimic the motion. What this means to you is, you don't have to think about driving or controlling the suit like a tank or a 'Mech. Just move, and the suit moves with you.

Ahh! I hear you all cry out in dismay. If it's that simple, why can't anybody just strap on a suit of battle armor and go? First off, the suit has to be adjusted to fit each person like a glove if it's going to work right. That takes time and skill. Second, the control system not only mimics your movements, but uses that fancy musculature to amplify the effect. So a lot of what you'll be doing over the next month is learning how to avoid killing yourself and your buddies by accident. And then there are suits with a jump pack built in. Jumping in one of these is a tricky skill to pick up, and the only way to do it is practice.

Understand this. Some of you are going to get hurt during your training. Maybe hurt dead. And nine times out of ten it will be during jump practice. Talking of jumping, some gizmos can boost jump range. The late, great GDL came up with a jump booster for their scout suits, and the Combine came up with its own partial wing system.

Your hands are going to be busy controlling the weapons. So you've got to use your head. There's a heads-up display inside your helmet to give you targeting info and tell you what shape you're in. All the controls are activated by voice or eye movement. Also built into that fancy heads-up display are IR and light amplification systems. Don't get too dependent on them, though. The bad guys can use all sorts of

countermeasures to fool them. Meanwhile, your comm systems are good for about fifty klicks on the battlefield, give or take.

The Gray Death added a whole pile of advanced sensors to their battle armor. Others, like our very own Infiltrator II suits, have powerful electronic countermeasures that will mask everything around them, while also playing merry hell with enemy sensors and comms.

Talking of hands, you see that ugly big claw on Mr. Toad? That's your basic battle claw. With the suit's myomers behind it, you can rip your way through ferro-fibrous armor. Some suits have lighter manipulators. Light suits usually make do with un-powered gloves. Those are dexterous enough to let you use stock infantry small arms and equipment. These manipulators are one of the things that make battle armor so scary to the 'Mech jocks. If a bunch of you can mob some poor unsuspecting BattleMech, then you can start to rip into it. Target soft spots like actuators or maintenance access points. If you get lucky, you'll cripple the 'Mech—maybe even kill it. That is, if the MechWarrior don't kill *you* first.

There are quad suits out there, too. You may have seen the Sloth they rushed out to fight the Clans. Quad suits are driven differently than the humanoids. Stick and pedal controls make it more like driving a groundcar or pushing a 'Mech around. They don't jump, and they aren't as flexible as a full-up suit like Mr. Toad, but they can be fast buggers. Some of the Clanner suits you might come up against may also have other movement modes. The Sylph can fly using a miniaturized VTOL system, and the Undine is designed for underwater ops. The boys and girls here at the NAIS are working to develop the same sort of capability, but they aren't there yet.

We'll take five, then move on to armor and weapons in detail.

ZM: Still here? Nobody sleeping at the back? Fine.

All the time you're wearing battle armor, the suit keeps an eye on your vitals. If you get yourself hurt, this neat medical system kicks in—hitting you with painkillers and stimulants. It you get hit *real* bad, it'll try to keep you alive until the medics can get to you. The combination of the two used by the Clanners can keep even a mortally wounded trooper awake and alert, allowing him to fight on even when he should be halfway to the Reaper. Bear that in mind when you face one on the field. The gent who rode in this Toad fought to the bloody, bitter end, with no less than three high-caliber AP rounds in the chest.

Armor! Something dear to my heart—and to yours, if you know what's good for you. This is half of what battle armor is all about. Thanks to the wonders of the chassis and super-strong myomers, battlesuits can carry far tougher armor than anything you'll have used before. With this stuff—and a bit of luck—you can survive BattleMech laser fire, missiles, autocannon shells and PPC bolts. Don't get cocky, though; even some punk from a planetary militia can drop you with a bolt-action rifle if he hits you just right.

As well as the basic armor, you'll find a whole range of special stealth armors. They're no good against infantry, but they *can* mess with vehicle and BattleMech sensors, especially at long range. The WoBbies even cooked up their own version of the active camouflage system used on the Star League's Nighthawks. This so-called mimetic armor, used on their Purifier suits, acts like a chameleon's skin, using a bunch of sensors to copy the colors and shades of the surrounding terrain. Unfortunately for them, the system works best when they stay still; fast enough motion strains the computers that run the color change features, and they just can't keep up.

Battle armor can be hermetically sealed, so it can operate in space or toxic environments. You can even survive under water, though without the underwater maneuvering units the Clans use, it's going to take you about an hour to slog your way out of a lake if you fall in. Life support is usually good for twelve hours in these suits, though some suits have even longer endurance. Internal heat generated by your own soft and squishy body and the suit's systems is vented away by an efficient heat transfer system, which uses the same kind of coolant found in a MechWarrior's cooling vest, aided by a liner specially designed to absorb excess perspiration and other waste fluids.

The Clanners have had much more time to mess around with battle armor, of course. Their equipment is much lighter, but their chassis are heavier because they have this HarJel stuff. When their armor takes a penetrating hit, the suit squirts this sticky black gunk into the breach. This goo will hold a seal even when fighting in space for a while. I hear tell it comes from some planet way back in the Clan homeworlds. The oceans on this world are lousy with chemicals and there are these great big clams lurking on the bottom. They just sit there, sucking up the gloop while looking for food. All the stuff they can't digest, they crap out all over the ocean floor. Bam! Instant, concentrated gloop. The Clanners go in and gather it all up and process it into HarJel.

Oh! And before I forget, look out for the Clanners' Salamander suits. Don't waste your time hitting them with flamers or inferno rounds. Little bleeders are encased in some fancy fireproof armor. You ain't going to hurt them any, but you're probably going to make them mad.

And now the subject you've all been hanging on the edge of your seats waiting for: weapons.

You'll find a lot of different weapons on battle armor. Most suits can carry one or more heavy weapons. These are heavily modified versions of infantry support weapons, which mesh with your suit's targeting systems and built-in stabilizers to be even more deadly. These weapons often supplement missile launchers and anti-personnel weapons. Some more exotic systems you probably won't have run into before include bomb racks, pop-up mines and even mine dispensers. You'll find many suits have special mounts that allow you to carry different kinds of weapons depending on the mission. Going up against forces with BattleMech support? Take a support laser. Got to clear out a nest of infantry? Try a flamer or a machine gun. Most of the weapons you get on battle armor are set up with auto-loaders and gyro stabilization so you can handle them on your own. They interface directly into your HUD targeting systems and have integral heat sinks and cooling systems, so they don't tax your suit's cooling system. The net results are guns that can match their BattleMech-mounted equivalents. Battle armor designs can mount up to four of these weapons, one in each arm and two more mounted on the body.

Weapons break down into your usual three main categories: energy weapons, ballistic and missiles.

First, energy weapons. Here you've got lasers, particle cannons and plasma weapons. The lasers are roughly equivalent to the lighter energy weaponry mounted on combat vehicles and BattleMechs. On the other hand, the particle cannon is far less powerful, which just goes to show that even battle armor has its limitations. Plasma weapons are kind of a halfway between energy and ballistic weapons. They use ammo to generate super-hot plasma, but they fire more like a particle cannon. These weapons are best used on hardened targets like BattleMechs, vehicles, and of course enemy battlesuits.

Ballistic weapons include a variety of rapid-fire machine guns, light autocannons and recoilless rifles that are real effective against unarmored infantry, and can also chew up hardened targets. We're also seeing some high-tech Gauss weapons coming down the R-and-D pipeline. My favorite is, of course, our own Magshot. Good range and penetrating power for the weight. Only problem is, it's bulky, so it can't be mounted on some suits.

Your primary anti-armor weapon, however, is still going to be missiles. They have the best range and pack a solid punch. They're bulky, though, just like the Magshot, and you never seem to have enough ammo. The Clanners have a real head start on missile tech here. They make lighter launchers and have had the time to solve all those little problems of integrating everything into their Toad design. Some missile launchers are detachable; that helps to improve the agility of Inner Sphere designs like the Longinus, which can't use its jump jets until it ditches the backpack launcher. The standard battlefield missiles are all represented. SRMs are probably the most common, and pack the most bang for your C-bill. LRMs are just beginning to appear, as have MRM types. The Clanners also have an advanced SRM based on Streak technology, which has better range, but a guidance system that's not *quite* as good as full-up Streak munitions. Not yet, at least.

So, you've got a suit of battle armor, all tricked out with weapons of awesome destruction. But what to do when you need to deal with some snot-nosed kid armed with a bolt-action rifle, without destroying the neighborhood in the process? If you look close at Toad Boy here, you can see it has a bracket on the underside of the left arm. That's your anti-personnel weapon mount. Not all suits have them. Some have two or even more. Just like the heavy weapons are modified versions of infantry support weapons, these AP weapon mounts can carry special versions of infantry small arms. Submachine guns and pulse laser rifles are a popular choice. They allow you to deal with an unfriendly without trashing everything else. Real useful if you're in a boarding party on a DropShip or JumpShip, and you don't want to go blowing big nasty holes in the hull.

Just about done now, so if you can hold off yawning in my face for five more minutes, I'd appreciate it.

There's a whole load of special equipment you can slap onto battle armor. Some have special modifications to their manipulators, for example, like mine-clearance equipment or vibro-blades—the latter being particularly nasty in close combat against squishy targets like conventional troops. The Cappies have cooked up a system of clamps that let their Fa Shih suits ride on vehicles and normal BattleMechs as if they were Omnis. They can't recharge the same way Omni-hitched battlesuits can, but it's a neat trick. Once the NAIS figures out how they did it, you can bet we'll be seeing the same tech on our own suits. The Combine came up with a special mounting that can carry a manipulator or a variety of specialized tools: Drills and cutters and such. While not much use on the battlefield, those tools are real handy for setting up prepared positions or helping salvage crews.

That wraps up your introduction to the fun-fun world of the Battle Armor Corps. I look forward to fighting alongside those of you who survive your training.

Raiden battle armor squads leap through a small facility just behind a Daimyo's castle.

Originally developed by the Clans, battle armor (also referred to as battlesuits or simply suits) represents the ultimate in infantry protection, mobility and firepower. Based on advanced variations of industrial exoskeletons, these hardened, powered suits have made it possible for otherwise insignificant numbers of infantry to inflict real damage against armored battlefield units. Soon after the start of their invasion, captured samples of Clan Elemental armor made it possible for the Successor States to field their own versions in short order, leading to a tech race that produced more than 20 models of battle armor in less than a decade.

The following system enables players to construct unique battle armor for *BattleTech* games that conforms to the standard rules presented in *Total Warfare;* this includes the exoskeletons and power armor that preceded their development (both as weapons of war and as industrial tools). As these rules can be fairly math-intensive, battle armor designers are encouraged to do all work on scratch paper before committing the resulting design's final specifications to an appropriate blank Battle Armor Record Sheet.

Note: In *Total Warfare* the term "battle armor" refers to any unit built using the rules in this section. Unless specifically stated otherwise in this section, the term "battle armor" also refers to any unit built using the rules in this section.

BATTLE ARMOR BASICS

Battle armor construction (as well as the construction of power armor and exoskeletons) relies on three primary factors: technology base, weight and space. These factors were broadly overviewed in the *Construction Basics* section (see p. 18). The notes in this section expand on these factors.

TECHNOLOGY BASE

In *Total Warfare* standard rules play, battle armor (and its kin) fall into one of two available technology bases: Inner Sphere or Clan. Unless otherwise noted, Inner Sphere battle armor may only use Inner Sphere equipment, while Clan battle armor may only use Clan equipment. Some components—such as ground MP systems, jump jets, manipulators, and the base chassis of industrial exoskeletons—are considered universal, and so are available to Clan and Inner Sphere technology bases (when noted).

Tech Rating

In the Weapons and Equipment Tables used for creating battle armor and other units in this book, all items receive a Technology Rating in addition to a technology base. This rating (expressed as a series of letter grades that define the level of technology, and its availability through the major eras of *BattleTech* history) helps determine the item's level of sophistication and may be used to help standardize the level of advancement the unit demonstrates for purposes of era-based campaigning. Beyond this, however, an item's Technology Rating has no bearing on battle armor design. See *Costs and Availability* (p. 274) for more on Tech Rating.

Modular Technology

Similar to the Omni technologies occasionally used in BattleMechs, vehicles and aerospace fighters, battle armor may incorporate modular components at certain stages of development. These modular technologies, however, are limited to the battle armor's manipulators (hands) and other items. Motive systems, chassis and armor are never considered modular, and so there are no true "Omni-Battle Armor" units.

WEIGHT

Battle armor, power armor and exoskeletons use the kilogram standard, with all units legal for *Total Warfare* standard rules play weighing 80 to 2,000 kilograms (increasing in full-kilogram increments).

Weight Classes

Battle armor is generally broken down into weight classes similar to those of other battlefield units. These weight classes help define their mission functions and also influence their battlefield capabilities and limitations.

Exoskeletons and their militarized equivalents—known as Power Armor (Light) suits, or PA(L)s—run 80 to 400 kilograms in weight. They have extremely limited armor capacity and typically carry few, if any, weapons. These suits are often employed in industrial applications (exoskeletons) or as scouts (power armor), though some power armor suits also serve as anti-infantry units. Above this weight range, a suit design is considered battle armor.

Light battle armor weighs anywhere from 401 to 750 kilograms and is more common among battlefield scout units, with comparatively light armor and minimal firepower.

Medium battle armor—which weighs 751 to 1,000 kilograms—is the most common type seen on the front lines, representing the majority of the battle armor used by the Clans and Inner Sphere alike. These suits typically strike a solid balance between mobility, armor and firepower.

Heavy battle armor weighs 1,001 to 1,500 kilograms. Often designed as anti-battle armor, these suits are generally slower, but much more thickly armored than other suit types, with firepower capable of easily taking down most lighter battle armor. Unfortunately, at this weight range, battle armor begins to lose the flexibility needed to initiate anti-BattleMech actions, and many cannot even ride on OmniMechs or Omni-Vehicles as mechanized units.

The assault class for battle armor ranges from 1,501 to 2,000 kilograms. Here, mobility is usually all but non-existent and suits cannot initiate anti-BattleMech attacks or ride on Omnis as mechanized units. Instead, these suits pack heavy armor and firepower that can inflict serious damage to most vehicles.

WEAPON SPACE

Battle armor does not use Critical Hits Tables in the same way as BattleMechs do. However, based on their weight and chassis type (humanoid or quad), battle armor has equipment limits that represent an allotment of available space for weapons and other items. These are collectively referred to as weapon slots (or weapon space).

As with BattleMechs, many items that may be mounted on battle armor take up more than one weapon slot, and no slot may accommodate more than one item at a time. When installed, items that occupy multiple slots must be allocated contiguously to the same body location (unless the item's rules specifically permit otherwise).

As with weight, the designer should keep in mind how many slots have been used and how many remain available in each body section at all times. This will help to avoid installing too many items, or installing items too large for the given location.

DESIGNING BATTLE ARMOR

Battle armor design follows the six steps below:

Step 1: Design the Chassis—Determine the battle armor's technology base, weight and body type.

Step 2: Install Motive Systems—Determine the battle armor's movement rate and type.

Step 3: Add Manipulators—Determine the number and type of the battle armor's manipulators (if any), as well as whether or not the battle armor can deploy using Mechanized Battle Armor rules or engage in anti-'Mech attacks.

Step 4: Add Armor—Determine the amount and weight of the battle armor's armor.

Step 5: Install Weapons and Equipment—Add weapons and other gear to the battle armor.

Step 6: Complete the Record Sheet.

As with all unit types, the above design process is a mere framework for designing battle armor, power armor or exoskeletons. The actual process—particularly after the chassis and motive systems are determined—can involve a bit more flexibility as equipment, armor and manipulators are balanced for their best fit in terms of weight, weapon space and effectiveness. For instance, some designers might wish to assign armor as soon as the motive systems and chassis are settled to attain maximum protection before dealing with weapons and manipulators. Others may want to choose equipment before adding armor, to maximize firepower and functionality over protection.

To assist in this effort, the designer may find it useful to make copies of the blank Battle Armor Record Sheet (in the back of this book), to visually arrange the placement of the battle armor's equipment while tracking the use of kilograms on a piece of scratch paper. Alternatively, designers with access to a PC and *Heavy Metal Battle Armor* can use that design software to develop their battle armor electronically.

Word of Blake Longinus battle armor scramble to get out of the way of a charging BattleMech.

STEP 1: DESIGN THE CHASSIS

The first step in battle armor, power armor or exoskeleton construction is the creation of the battle armor's framework, or chassis. This step establishes some of the design's most basic aspects, determining its tech base, weight class and body type (humanoid or quad). These choices will restrict the designer's access to certain equipment, and will also determine the weight of the battle armor's internal structure and controls.

CHOOSE TECHNOLOGY BASE

Battle armor (and its kin) may be constructed using Clan or Inner Sphere technology bases. Battle armor designed using either technology base may incorporate modular components.

Keith is designing the Tunnel Rat, an industrial exoskeleton intended for mining and digging operations. He decides this battle armor design will use an Inner Sphere Technology Base.

Lou chooses the Clan Technology Base for his battle armor design. He decides to name his battle armor the Sylph.

Max wants to develop the last word in Inner Sphere stealth technology for the Word of Blake. Choosing an Inner Sphere Technology Base, he calls his battle armor the Purifier.

Peter chooses an Inner Sphere Technology Base for his battle armor as well. He sees this battle armor—the Fenrir—as a fearsome mobile weapons platform.

CHOOSE WEIGHT

Battle armor may weigh anywhere from 80 to 2,000 kilograms (measured in full-kilogram increments). Within these limits, the designer may choose any weight desired. The total weight of the battle armor's chassis, weapons, armor and other components may not exceed this amount. Any unspent tonnage left after the creation process is considered wasted or—if space permits—may be used to determine the capacity of any modular mounts or cargo spaces, such as configurable turret mounts and mission equipment items.

Because the core components of a battle armor design vary by weight class, rather than the battle armor's target number of kilograms, the designer may define the suit's class—rather than its actual weight—at this point. This enables the designer to establish a minimum and maximum possible weight limit for the battle armor, within which any final kilogram weight total may be considered acceptable. The Battle Armor Structure Weights Table (see p. 163) defines these weight classes by their minimum and maximum kilogram weights under the Total Suit Weight column.

As an exoskeleton, Keith's Tunnel Rat—in accordance with the Battle Armor Structure Weights Table—has a range of 80 to 400 kilograms to work with.

Lou chooses a light battle armor weight class for his Sylph, providing a weight range of 401 to 750 kilograms.

Max has a standard medium-weight range in mind for his Purifier. According to the Battle Armor Structure Weights Table, that means he's looking for his suit to fall anywhere from 751 kilograms to a maximum of 1,000.

To maximize his armor and weapon options, Peter chooses the assault weight class for his Fenrir, which offers him a weight range of 1,501 to 2,000 kilograms.

ALLOCATE WEIGHT FOR INTERNAL STRUCTURE

Like most units, battle armor (including power armor and exoskeletons) has an internal structure, which represents its framework, joints and control systems—including the weight of the controlling trooper. The weight of this structure (chassis weight) depends on the tech base and weight class of the battle armor itself. This chassis weight is summarized in the Battle Armor Internal Structure Weight Table (see p. 163), along with the amount of weapon slots available to the battle armor, based on its body type (humanoid or quad).

Unlike 'Mechs, ProtoMechs and vehicles, the chassis weight for a suit of battle armor does not provide a certain number of internal structure points. Regardless of their weight and class, all suits constructed under these rules receive only 1 point of internal structure, which represents the trooper inside.

Technology Base: Inner Sphere battle armor (including exoskeletons and power armor) may only be constructed using an Inner Sphere chassis weight. Battle armor made with a Clan Tech Base must use a Clan chassis weight if they are built for combat at a weight of 401 kilograms or more. Clan-made battle armor chassis (including those for power armor) run heavier due to HarJel technology, a feature the Clans do not consider economical on exoskeleton designs intended for industrial use only. Thus, Clan-made exoskeletons designed for industrial work only may—at the designer's option—use an Inner Sphere chassis weight instead.

Body Type (Humanoid/Quad): Light, medium, heavy and assault-class battle armor may be constructed as quadrupeds (quads). Exoskeletons and PA(L) suits may only be constructed with a humanoid body type.

BATTLE ARMOR STRUCTURE WEIGHTS TABLE

Battle Armor Weight Class	Total Suit Weight (kg)	Chassis Weight (kg)		Weapon Slots	
		Clan	Inner Sphere	Humanoid (Arms* / Body)	Quad (Body)
PA(L) / Exoskeleton	80 – 400	130**	80	2 / 2	NA
Light	401 – 750	150	100	2 / 4	5
Medium	751 – 1000	250	175	3 / 4	7
Heavy	1001 – 1500	400	300	3 / 6	9
Assault	1501 – 2000	700	550	4 / 6	11

*Each Arm
**Clan-made industrial exoskeletons may use an Inner Sphere chassis weight at the designer's option.

Space: The internal structure of battle armor does not occupy any weapon slots in its design. Establishing the chassis weight thus has no impact on the available slot space for weapons and equipment. However, the weight class and body type (humanoid or quad) of the battle armor does affect a suit's starting number of available weapon slots, along with their respective locations.

Modular Technology: Battle armor internal structure is never considered modular under these construction rules, and so cannot be varied from mission to mission.

Keith's Tunnel Rat is an exoskeleton with an Inner Sphere Technology Base. Thus, its chassis will weigh 80 kilograms. Keith notes that the battle armor receives 1 point of internal structure to represent its pilot (the gray-shaded circle on the armor line on the record sheet). He also notes that the humanoid Tunnel Rat will have 2 weapon slots each in its Left Arm, Right Arm and Body locations. Of its potential 400 kilograms in total weight, the Rat has 320 kilos left to work with (400 kg – 80 kg = 320 kg).

A Wolf's Dragoons Elemental hops onto the wreckage of a Word of Blake Vanquisher.

Lou's Sylph is a light battle armor design built with a Clan Tech Base. On the Battle Armor Chassis Weights Table, Lou finds that its chassis will weigh 150 kilograms. Lou notes the battle armor's default 1 point of internal structure as the gray-shaded circle on the armor line in the record sheet, and that the humanoid design will have 2 weapon slots each in its Left Arm and Right Arm, and 4 weapon slots in its Body. The Sylph has up to 600 kg remaining of its original 750-kilogram maximum (750 kg – 150 kg = 600 kg).

Max chose a medium weight class for his Inner Sphere-made Purifier. Thus, its chassis will weigh 175 kilograms. After noting the single gray-shaded point of internal structure that represents its trooper on his record sheet, Max jots down the weapon slots available to his humanoid design: 3 each in the Left and Right arm locations and 4 in the Body location. Of the 1,000-kilogram maximum available to it, the Purifier has used 175 kg, leaving 825 kilograms to work with (1,000 kg – 175 kg = 825 kg).

For his assault-class, Inner Sphere Fenrir battle armor, Peter chooses a quad body type, rather than a humanoid design. The chassis weight for the Fenrir, according to the Battle Armor Chassis Weights Table, will be 550 kilos, and provides the battle armor with 11 weapon slots in its Body location. Pete also notes the standard 1 gray-shaded point on the Fenrir's armor line on the record sheet, representing its controlling trooper. The Fenrir's maximum potential weight of 2,000 kilograms has 1,450 kilos left to spend (2,000 kg – 550 kg = 1,450 kg).

STEP 2: INSTALL MOTIVE SYSTEMS

The second step in battle armor design is the installation of the battle armor's motive systems. This step establishes the key factors in the unit's mobility, including the mass of its ground motive systems (its legs, including musculature and power supply), whether or not the design is capable of non-ground movement (such as jumping, VTOL and underwater maneuvering) and how much said alternate motive systems weigh.

DETERMINE GROUND MOVEMENT

All battle armor, power armor and exoskeletons have a ground movement rate that reflects the capabilities of their myomer-powered legs. A certain minimum number of Ground MP are thus considered free with the chassis design of the battle armor, based on its weight class and body type (humanoid or quad). Additional Ground MP may be provided by investing more weight in these motive systems, up to the maximum MP allowance for the battle armor's weight class and body type. The minimum and maximum MP allowances for each suit type, and the weight cost for any additional MP over the minimum MP are shown in the Battle Armor Ground MP Table below

Technology Base: The ground motive systems featured in the Battle Armor Ground MP Table are equally available to battle armor (including power armor and exoskeletons) made using Inner Sphere or Clan technology bases.

Space: In battle armor design, additional Ground MP capability does not reduce the number of weapon slots available to a given battle armor.

Modular Technology: Battle armor ground motive systems may never be considered modular under these construction rules, and so cannot be varied from mission to mission.

As a humanoid battle armor design, Keith's Tunnel Rat exoskeleton has 1 free Ground MP and a maximum of 3 Ground MP per the Battle Armor Ground MP Table. Keith decides that his battle armor doesn't require any more speed, and spends no additional weight on more Ground MP.

Lou's Sylph has 1 free Ground MP as a humanoid design. Because he intends to incorporate a more potent alternative motive system, Lou decides that 1 Ground MP is enough for his purposes, and spends no additional weight on Ground MP.

For his Purifier, Max also decides the 1 MP of Ground movement is sufficient, and so invests no additional weight in more Ground MP.

Peter's Fenrir has 2 free MP of Ground movement, according to the Battle Armor Ground MP Table. The battle armor has a maximum limit of 4 Ground MP. Despite the 160-kilogram cost per extra MP, Pete decides to go for it, investing a full 320 kilograms into maxing out its mobility. The Fenrir will have 1,130 kg remaining after this (1,450 kg – 320 = 1,130 kg).

DETERMINE NON-GROUND MOVEMENT

At the designer's option, qualified humanoid battle armor (including power armor and exoskeletons) may mount jump jets, VTOL equipment or even underwater maneuvering units (UMUs) for an alternate mobility over and above the battle armor's Ground MP. These systems may not be combined on any single design, nor may any of these systems be installed on quad body types. Some non-Ground MP systems may be restricted based on the battle armor's weight class and technology base.

The technology base and weight (per MP) for all non-ground motive systems are shown in the Battle Armor Non-Ground Motive Systems Table (see p. 165), along with the maximum MP for each given non-Ground motive system. An entry of NA means the motive system is not available for that class and motive type.

Jump Jets: This motive system—equally available to battle armor of Clan and Inner Sphere design—enables troopers so equipped to jump as high and as far as they have Jump MP.

VTOL: Available only to medium and lighter battle armor of Clan design (including Clan industrial exoskeletons with an Inner

BATTLE ARMOR GROUND MP TABLE

	Minimum (Free) Ground MP		Maximum Ground MP		
Battle Armor Weight Class	Humanoid	Quad	Humanoid	Quad	Weight per Additional MP (kg)*
PA(L) / Exoskeleton	1	NA	3	NA	25
Light	1	2	3	5	30
Medium	1	2	3	5	40
Heavy	1	2	2	4	80
Assault	1	2	2	4	160

* Regardless of tech base

BATTLE ARMOR NON-GROUND MOTIVE SYSTEMS TABLE

	Jump Jets (Clan / IS)		VTOL System (Clan Only)		UMU System (Clan Only)	
Battle Armor Weight Class	Max Jump MP	Weight*	Max VTOL MP	Weight*	Max UMU MP	Weight*
PA(L) / Exoskeleton	3	25	7	30	5	45
Light	3	25	6	40	5	45
Medium	3	50	5	60	4	85
Heavy	2	125	NA	NA	3	160
Assault	2	250	NA	NA	2	250

* Weight in kilograms per MP, regardless of tech base

Sphere chassis weight), the Vertical Take-Off and Landing system enables battle armor so equipped to move as a VTOL.

UMUs: Available to Clan battle armor of any weight class (including Clan industrial exoskeletons with an Inner Sphere chassis weight), Underwater Maneuvering Units enable troopers so equipped to move underwater as submarine units (see *Submarines*, p. 56, *Total Warfare*).

Space: Non-Ground battle armor motive systems do not occupy equipment slots in the battle armor design.

Modular Technology: Battle armor motive systems may never be considered modular under these construction rules, and so cannot be varied from mission to mission.

Even though it is a humanoid design, and so may be equipped with non-Ground MP systems, Keith decides that jump jets would be totally inappropriate for his subterranean Tunnel Rat, and its Inner Sphere Tech Base makes it incompatible with VTOL or UMU technologies (which he feels would also be inappropriate anyway).

Lou has decided that his Sylph will take advantage of its Clan Technology Base and humanoid design to make use of the VTOL systems. As light battle armor, the Sylph can attain a maximum of 6 VTOL MP, at a cost of 40 kilograms per MP. Lou settles on 5 VTOL MP, however, hoping to save some weight for armor and other systems. He spends 200 kilograms on VTOL equipment for his battle armor (5 VTOL MPs x 40 kg per VTOL MP = 200 kg). This leaves the Sylph with up to 400 kg left to spend for its weight class.

As an Inner Sphere battle armor of humanoid design, Max's Purifier may only employ Jumping MP as a non-Ground MP option. Because his medium battle armor has only 1 Ground MP, he decides to install jump jets, to attain the maximum of 3 Jumping MP. The weight for such jets is 50 kilograms per MP, and so Max has to spend 150 kilos (3 Jumping MP x 50 kg per Jumping MP = 150 kg) for this capability. This leaves the Purifier with up to 675 kg of unspent weight (825 kg – 150 kg = 675 kg).

Because Peter's Fenrir is a quad design, it may not mount non-Ground MP systems.

SPECIAL PHYSICAL ENHANCEMENTS (JUMP BOOSTER, AND PARTIAL WING)

A number of motive enhancements are available to battle armor (and their kin) at this stage of design. Jump boosters and partial wings (the latter of which is limited to Inner Sphere factions), enhance a jump-capable battle armor's distance in certain circumstances. As these enhancements are considered equipment items, they may be installed at the latter stages of battle armor design, but because they can directly affect mobility, these systems have been included here.

The Battle Armor Special Enhancements Table (see p. 166) describes in detail the various enhancements by type, tech base, weight and weapon slot space occupied.

Jump Booster: Available to any jump-capable Clan or Inner Sphere battle armor design (and thus unavailable to quads), the jump booster adds 1 Jumping MP to the battle armor's existing jump range, even if this additional MP exceeds the unit's normal Jumping MP maximum. This enhancement requires the installation of jump jets and may not be combined with partial wings. The jump booster weighs 125 kilograms (regardless of tech base) and occupies 2 slots in the battle armor's Body location.

Partial Wing: Available only to jump-capable Inner Sphere battle armor designs (and thus unavailable to quads), the partial wing adds 1 Jumping MP to the battle armor's existing jump range in atmosphere (not in vacuum), even if this additional MP exceeds the unit's normal Jumping MP maximum. This enhancement requires the installation of jump jets and may not be combined with the jump booster. The partial wing weighs 200 kilograms and occupies 1 slot in the battle armor's Body location.

Modular Technology: Battle armor special enhancements may never be considered modular under these construction rules, and so cannot be varied from mission to mission.

BATTLE ARMOR SPECIAL ENHANCEMENTS TABLE

Enhancement Type	Tech Base	Weight (kg)	Slots
Jump Booster	Clan / IS	125	2
Partial Wing	IS	200	1

Because his Tunnel Rat has no Jumping MP, Keith may not mount any of the Jumping MP enhancements available to it as an Inner Sphere battle armor.

Lou's Sylph does not have jump jets and so cannot use the jump booster, and its Clan Tech Base means it may not install a partial wing even if it did carry jump jets.

As Inner Sphere battle armor with jump jets, Max's Purifier may use either the jump booster or the partial wing, and attain a Jumping MP of 4 into the bargain. He decides not to employ enhancements at this time, saving the weight for other components.

Because Peter's Fenrir battle armor uses an Inner Sphere Tech Base and is a quadruped design, it cannot have non-Ground MP and is incompatible with both of the Jumping MP enhancements. Pete proceeds to the next step.

STEP 3: ADD MANIPULATORS

Of more utility to battle armor (including power armor and exoskeletons) than the hand actuators on BattleMechs or ProtoMechs, manipulators can determine much of a battle armor's capabilities in combat, including its ability to engage in anti-'Mech attacks, to ride on OmniMechs (and OmniVehicles) as mechanized battle armor, to handle conventional infantry weapons or to carry cargo. Designers may install no manipulators at all, or up to two manipulators per humanoid battle armor design. Only one manipulator may be installed per arm.

Manipulators vary by weight and function, and some must be mounted in pairs, but none of the manipulators featured in these rules occupy weapon slots in the battle armor's inventory. (The modular equipment adaptor, which allows for the quick swapping of manipulators, does not count as a manipulator, and so is exempt from this rule.)

The Battle Armor Manipulator Weight Table at right provides data on the weight of each manipulator type and adaptor (applicable to battle armor of Clan and Inner Sphere design). Also listed is whether or not a chosen manipulator or adaptor type must be mounted in pairs. Manipulator or adaptor types that need not be mounted in pairs may be combined with other manipulator types, so long as these other types also need not be installed in pairs. Some manipulator types may add special adaptations to increase their functionality as well (such as vibro-claws and magnets). Limited to one such adaptation per manipulator, these enhanced manipulators are also presented on the table.

Technology Base: The manipulator systems featured in the Battle Armor Manipulator Weight Table are equally available to battle armor (including power armor and exoskeletons) made using and Inner Sphere or Clan technology base.

Quads: Quad battle armor may not use manipulators.

Space: The manipulators featured in these rules occupy no weapon slots in the battle armor's design by themselves. The modular equipment adaptor—which is not technically a manipulator in itself—is the only exception, and occupies 2 slots in each arm where it is mounted, regardless of the battle armor's technology base (see below).

Modular Technology: At the designer's option, modular equipment adaptors may be installed instead of a built-in manipulator, allowing battle armor to change manipulator types between missions. Manipulators subsequently mounted in these adap-

BATTLE ARMOR MANIPULATOR WEIGHT TABLE

Manipulator or Adaptor Type	Mass per Manipulator (kg)	Must Mount in Pairs
None	0	No
Modular Equipment Adaptor	10*	No*
Armored Glove	0	No
Basic Manipulator	0	No
Basic Manipulator (w/ Mine Clearance)	15	Yes
Battle Claw	15	No
Battle Claw (w/ Magnets)	35	Yes
Battle Claw (w/ Vibro-Claws)	50	No
Cargo Lifter	30**	Yes
Heavy Battle Claw	20	No
Heavy Battle Claw (w/ Magnets)	40	Yes
Heavy Battle Claw (w/ Vibro-Claws)	60	No
Industrial Drill	30	No
Salvage Arm	30	No

*Modular equipment adaptors occupy 2 slots in each arm of the suit in which they are mounted; they need not be mounted in pairs unless a manipulator type they are intended to use has such a requirement.

**Cargo lifter manipulators weigh 30 kilograms each for every half-ton (rounded up) of desired lifting capability.

tors must adhere to their basic rules when used, including adherence to any requirements for paired mounting. Enough weight should be left over after the design is completed to accommodate the desired manipulator types; for example, a battle armor that leaves only 45 kilograms unaccounted for after construction may not use a 50-kilogram vibroclaw-enhanced battle claw with its modular equipment adaptor, but it can install a standard battle claw that weighs only 15 kg.

DETERMINING ANTI-'MECH AND MECHANIZED BATTLE ARMOR CAPABILITIES

Once manipulators are chosen, the designer can determine what the battle armor's anti-'Mech and mechanized battle armor capabilities are. These capabilities are determined not only by the battle armor's manipulators, but by its configuration as well. To determine which capabilities battle armor may possess by its weight class, consult the Battle Armor Capabilities Table below, noting the battle armor's weight class, body type and minimum manipulator requirements. Battle armor that qualifies for a capability lists a "Yes" under that capability's column (with any special restrictions noted), while a "No" indicates the unit cannot exercise that capability. If battle armor meets multiple lines on this table based on its weight class, body type and other features (such as the use of UMUs), the most restrictive qualifications apply of all relevant classes, types and features.

Battle armor listed as qualified for a given capability still may not perform such tasks if it does not possess the required manipulators to do so. Battle armor using modular equipment adaptors that are otherwise qualified for these actions by weight class and features must install the proper manipulators in order to gain these capabilities in a scenario. Otherwise, they are considered incapable of executing anti-'Mech attacks or using Mechanized Battle Armor rules. Note that battle armor which otherwise qualifies for these actions and does not met at least one of the listed manipulator requirements shown may not engage in Anti-'Mech Attacks or use Mechanized Battle Armor rules.

Magnetic Clamps: A special item, available only to humanoid battle armors using an Inner Sphere Tech Base, and even then only up to those of Heavy weight class or lighter, is the Magnetic Clamps system. This item allows a battle armor to use Mechanized Battle Armor rules on even non-Omni units, without meeting any other manipulator requirements. This system weighs 30 kilograms and occupies 2 Weapon Slots (in any one location). Magnetic Clamps may not be used on the same battle armor as UMUs, and do not provide the ability to engage in Anti-'Mech attacks unless the battle armor also features the required manipulators to do so.

Believing that his Tunnel Rat industrial exoskeleton can best benefit from maximizing its flexibility, Keith decides to equip the design with modular equipment adaptors, and places one in each arm. The adaptors weigh 10 kilograms and occupy 2 weapon slots each, leaving the Rat with 300 kilograms (320 kg – [2 Modular Equipment Adaptors x 10 kg per adaptor] = 300 kg) and no weapon slots in the arms (2 slots per arm – 2 slots per Modular Equipment Adaptor = 0 slots per arm).

Keith also decides to install a default configuration for these modular adaptors; he places a basic manipulator in the exoskeleton's left-arm adaptor and an industrial drill on the right. These manipulators weigh 30 kilograms in total (0 kg for the basic manipulator + 30 kg for the drill), leaving the default Tunnel Rat configuration with 270 unspent kilograms.

Checking the Battle Armor Capabilities Table, Keith notes that his Tunnel Rat—as an exoskeleton that lacks some of the minimum manipulator requirements—may

BATTLE ARMOR CAPABILITIES TABLE

Battle Armor Weight Class and Features	Anti-'Mech Attacks		Mechanized Battle Armor	Minimum Manipulator Requirements*
	Swarm	Leg		
Quad Body Type (Any)	No	No	No	Not Applicable
PA(L) / Exoskeleton	Yes	Yes	Yes	2 Armored Gloves; 2(1)** Basic Manipulators; or 1 Battle Claw (Heavy or Standard)
Light	Yes	Yes	Yes	2 Armored Gloves; 2(1)** Basic Manipulators; or 1 Battle Claw (Heavy or Standard)
Medium	Yes	Yes	Yes	2(1)** Basic Manipulators; or 1 Battle Claw (Heavy or Standard)
Heavy	No	No	Yes	1 Basic Manipulator; or 1 Battle Claw (Heavy or Standard)
Assault	No	No	No	Not Applicable
Uses UMU Equipment	No	Yes†	Yes††	As Weight Class
Uses Magnetic Clamps	‡	‡	Yes‡	None

*Basic Manipulator and/or Battle Claw requirements include such modifications with Vibro-Claws, Mine-Clearance, or Magnets.
**Only 1 Basic Manipulator needed for Mechanized Battle Armor.
†Only possible against targets in Depth 1+ Water.
††So long as all other requirements are met in terms of weight class, body type and minimum manipulator requirements.
‡See *Magnetic Clamps,* above.

not engage in anti-'Mech attacks in its default industrial drill configuration. If, however, he were to swap the right-arm industrial drill with another basic manipulator, his battle armor would meet the qualifications for these capabilities.

Lou decides that his humanoid Sylph battle armor will use a single standard battle claw, which he places on the battle armor's left arm. This claw occupies no weapon slots and weighs 15 kilograms. Deciding to place no manipulator in the right arm, Lou calculates that his Sylph has up to 385 unspent kilograms remaining (400 kg – 15 kg = 385 kg).

As light humanoid battle armor with a battle claw, Lou finds that his Sylph qualifies for anti-'Mech and mechanized battle armor capabilities.

Max also wants to give his Purifier battle armor anti-'Mech and mechanized battle armor capabilities, so he also installs a single battle claw on the design, placing his claw on the right arm. At the same cost in weight—15 kilograms—the Purifier will have 660 unspent kilograms remaining (675 kg – 15 kg = 660 kg). As the medium-weight humanoid Purifier meets the minimum manipulator requirements for the desired actions, Max is content to move on to the next step.

Because Peter's Fenrir battle armor is a quad design, it may not mount manipulators, and also may not engage in anti-'Mech attacks or deploy using Mechanized Battle Armor rules.

Word of Blake forces hold their ground against Dragoon retaliation.

STEP 4: ADD ARMOR

Like ProtoMechs, battle armor (including power armor and exoskeletons) mount their armor on a point-by-point basis, rather than in half- or full-ton lots. Based on the type of armor chosen, these armor points vary in weight and many even occupy weapon slots in the battle armor's design. Unlike Protos, however, battle armor need not allocate armor points across multiple areas; in *Total Warfare* standard rules, battle armor is treated as having as a single "location" per trooper.

The maximum number of armor points battle armor may carry is based on the battle armor's weight class. Beyond this, an additional point is always applied to a given battle armor to represent the trooper inside (as noted in Step 1). On the battle armor's record sheet, a suit's armor is tracked by the white dots to the right of the gray-shaded circle that reflects the trooper. Any excess armor dots beyond the suit's armor value should be blacked out after the right-most armor point.

A single battle armor may not combine multiple armor types. Suits built as battle armor or PA(L)s, or exoskeletons using a Clan chassis weight, consider this armor fully enclosed and so may operate in hostile environments such as vacuum and underwater. Battle armor designed as exoskeletons with an Inner Sphere chassis weight are considered "open" unless they feature extended life-support (see p. 254) *and* at least 1 point of armor.

The weight, tech base, slot requirements and special abilities of all armor types available under these rules are provided in the Battle Armor Protection Table (see p. 169). This table also lists the maximum armor levels permitted for each battle armor's weight class. A dashed entry ("—") on a table column for an armor type's weight means that a battle armor of that tech base may not use that particular armor type.

Technology Base: Inner Sphere battle armor (including exoskeletons and power armor) may only be constructed using armor listed in the Inner Sphere weight column of the Battle Armor Armor Types Table. Battle armor made with a Clan Tech Base (including power armor and exoskeletons—even those constructed with an Inner Sphere chassis weight) must use only those armor types and weights listed under the Clan armor weight column.

Space: The amount of space armor takes up in terms of weapon slots on the battle armor design varies with the type of armor chosen. Armor slots may be broken up among the battle armor's various body locations.

Modular Technology: Armor is never considered modular under these construction rules, and so cannot be varied from mission to mission.

Special Abilities: Some armor types provide special abilities, which are listed in the Battle Armor Armor Types Table. A listing of "Range Modifiers" provides the to-hit modifier to attack battle armor using that armor at short, medium and long range (respectively, in parentheses). A listing of "Movement Modifiers" provides the to-hit modifier to attack battle armor that move 0, 1, 2 and 3+ hexes (respectively, in parentheses). A listing of "Invisible to Probes" indicates that when using the *Hidden Units* rules (see p. 259, *Total Warfare*), active probes may not detect battle armor with that armor type.

BATTLE ARMOR PROTECTION TABLE

MAXIMUM ARMOR LEVELS

Battle Armor Weight Class	Maximum Armor Points
PA(L) / Exoskeleton	2
Light	6
Medium	10
Heavy	14
Assault	18

BATTLE ARMOR ARMOR TYPES

	Weight (per Point, in kg)			
Armor Type	Clan	Inner Sphere	Slots Used	Special Abilities
Standard	25	50	0	None
Standard (Advanced)	—	40	5	None
Standard (Prototype)	—	100	4	None
Stealth (Basic)	30	55	3	Range Modifiers (0/+1/+2); Invisible to Probes
Stealth (Improved)	35	60	5	Range Modifiers (+1/+2/+3); Invisible to Probes
Stealth (Prototype)	—	100	4	Range Modifiers (0/+1/+2); Invisible to Probes
Stealth (Standard)	35	60	4	Range Modifiers (+1/+1/+2); Invisible to Probes
Fire Resistant	30	–	5	Suit ignores damage by heat-causing weapons
Mimetic	—	50	7	Movement Modifiers (+3/+2/+1/0)

Keith decides to provide his Tunnel Rat with some armor protection. As an exoskeleton, the battle armor may carry a maximum of 2 armor points. Because he is not expecting combat, however, Keith decides on a minimal amount of armor, and so chooses a single point of standard armor. With a weight of 50 kilograms per point, and no slot space requirement, Keith finds that his Rat has 250 unused kilograms left without manipulators (300 kg – 50 kg = 250 kg) or 220 kilograms, for the industrial drill configuration (270 – 50 = 220).

As a light battle armor design, Lou's Sylph can mount up to 6 points of armor, according to the Maximum Armor Levels shown on the Battle Armor Protection Table. Deciding on standard Clan armor, he elects to install 5 points on his design for 125 kilograms (5 points x 25 kg per point [Standard Armor, Clan] = 125 kg). The Sylph now has up to 260 kilos of unspent weight remaining (385 kg – 125 kg = 260 kg).

Max plans his for Purifier to epitomize stealth and looks to the last word in Inner Sphere stealth technology for his battle armor: mimetic armor. As medium battle armor, the Purifier may mount up to 10 points of armor, but as doing so would cost 500 kilograms (10 points x 50 kg per point of mimetic armor), Max decides on a more modest 6 points of protection, which costs him 300 kilograms. This leaves the Purifier with 360 kilograms of unspent weight (660 kg – 300 = 360 kg).

Because mimetic armor also takes up 7 weapon slots—which can be distributed throughout the design—Max must allocate slots accordingly. He decides to allocate 4 slots to the Purifier's Body location and 3 to its Right Arm, leaving the 3 Left Arm slots open for additional equipment.

Meanwhile, he also notes that the Purifier's mimetic armor has a special ability of "Movement Modifiers (+3/+2/+1/0)." This means that when the Purifier stands still, it imposes a +3 to-hit modifier on weapon attacks against it, a +2 modifier if the battle armor moves 1 MP per turn, +1 if it moves 2 MP and no modifier if it moves 3 or more MP.

Peter wants to reserve as much space and weight as possible for weapons on his Fenrir, so he opts for only 5 points of standard armor rather than the 18 points he could place on the assault-class battle armor. As standard Inner Sphere armor weighs 50 kilos per point, this costs the Fenrir 250 kilograms in weight, but occupies no slot space in the design. The Fenrir has 880 kilograms left over (1,130 kg – 250 kg = 880 kg)

STEP 5: ADD WEAPONS, AMMUNITION AND OTHER EQUIPMENT

The weapons, ammunition and equipment that may be mounted on a battle armor (or on power armor and exoskeletons) are listed in the Battle Armor Weapons and Equipment Tables shown on pp. 346–348. In addition to any damage and range statistics, these tables provide the weight and weapon slots these items may occupy on battle armor, what technology base (Clan or Inner Sphere) is required to carry them and any special construction rules that might apply to installing the equipment. The Ammo column notes how many shots a given weapon or item carries per magazine and its weight (though in *Total Warfare* game play, only missile ammunition is tracked). Remember that the total weight of a given battle armor design's structure, motive systems, manipulators, armor, weapons and other components may never exceed the weight range established for the battle armor in Step 1. Any leftover weight that cannot be allocated to mission equipment storage or other equipment (due to critical space constraints or other factors) is considered "wasted" weight.

For purposes of *Total Warfare* game play, regardless of where weapons are placed on a battle armor—be it in the body or arms—they are presumed to have a 360-degree firing arc.

For special rules on any item, consult its entry under *Weapons and Heavy Equipment* (pp. 200–273).

Tech Base: The Battle Armor Weapon and Equipment Tables note which items are available to which technology base. Clan-made battle armor may use only items available to the Clans, while Inner Sphere-made battle armor must use only those items available to the Inner Sphere.

Weight and Space: The weight and slot space occupied by all battle armor weapons and equipment are shown in the table. As most items may not be divided among locations on battle armor (unless otherwise noted), the limited slot space available to battle armor (see the Battle Armor Structure Weights Table, p. 163) must be taken into consideration at all times.

Weapon Location Restrictions: In addition to the straight weapon slot limits given by the Battle Armor Structural Weights Table, a hard limit exists on the quantity and types of weapons that may be mounted in battle armor's locations. Regardless of their weight class, the maximum number and type of weapons permitted in a battle armor's locations are outlined in the Battle Armor Weapon Limits Table below.

For purposes of this table, anti-'Mech weapons include all the weapon items listed on the Battle Armor Weapons and Equipment Table, while anti-personnel weapons are all those weapons shown under the Conventional Infantry Weapons Table (see p. 349) specifically identified as Standard (under the Weapon Type column). Battle armor may not use Melee-type conventional infantry weapons.

The listed weapon limits do not include ammunition, nor are they affected by the weight of any additional ammunition.

Non-Missile Ammunition: Unlike missile launchers, all other weaponry carried by battle armor (including power armor and exoskeletons) automatically incorporates a single default magazine of ammunition in its base weight. The size of this magazine (given in shots and bursts) varies with the weapon, as shown on the Battle Armor Weapons and Equipment Table. Though non-missile ammunition is not tracked for battle armor in *Total Warfare* standard rules play, an allowance for additional shots may be made for the benefit of a role-playing campaign setting. Any additional ammunition (including charge packs for energy weapons) may thus be added to the weapon's weight without taking up additional weapon slots on the battle armor's design. The weight for these extra magazines is also listed on the Battle Armor Weapons and Equipment Table (to the right of the slash following the magazine shot and burst counts).

Missile Launchers and Missile Ammunition: Often deployed by battle armor (including power armor and exoskeletons) as a potent secondary weapon, missile launchers are one of the largest battle armor weapon systems available. They are also the only weapon system used by battle armor that tracks ammunition use in *Total Warfare* game play. For construction purposes, these weapons are installed differently than non-missile weapon systems.

The only missile launchers available to battle armor under these rules are LRMs, MRMs, SRMs, rocket launchers and Narc launchers. Most of these weapons are available in varying launcher sizes, which determines the number of missile tubes the launcher can fire in a single turn.

BATTLE ARMOR WEAPON LIMITS TABLE

Battle Armor Location	Maximum Weapon Load
Arms (Humanoid)	1 Anti-'Mech Weapon and 1 Anti-Personnel Weapon Mount or 2 Anti-Personnel Weapon Mounts
Body (Humanoid)	2 Anti-'Mech Weapons and 2 Anti-Personnel Weapon Mounts
Body (Quad)	4 Anti-'Mech Weapons and 4 Anti-Personnel Weapon Mounts

One-shot launchers—which are limited to a single shot of missiles (also known as a volley)—include their single "shot" within their listed weight and weapon slots. These launchers are mounted as a standard weapon or as a detachable missile launcher (see *Other Weapon Mounts Options*, at right.

For launchers intended to fire multiple shots, the weight and weapon slots for the unloaded launcher are listed under the weapon's statistics. The weight of all missile ammunition (by shot) then appears under the Ammo column for each launcher size. Missile reloads require one weapon slot for every 4 shots (rounded up). For example, an SRM-3 launcher would require 1 slot to carry 2 shots (2 shots ÷ 4 shots per slot = 0.5 slots, rounded up to 1), while an LRM-5 with 5 shots would need 2 ammo slots (5 shots ÷ 4 shots per slot = 1.25 slots, rounded up to 2).

On battle armor, missile ammunition cannot be placed in a separate location or weapon mount from the launcher for which it is being carried. Missile launchers placed on modular mounts must add any ammunition slots to those of the launcher when determining their total slot sizes for mounting. Missile ammunition also may not be "shared" with other launchers, even those of the same type and size.

Modular Technology: At the designer's option, battle armor (including power armor and exoskeletons) may install modular mounts for their weapons to mimic the configurable capabilities of Omni units. Modular mounts are broken into two types. The first, Modular/Turret Mounts, are detailed on p. 262. The second, Squad Support Weapon mounts, can be found on p. 270.

Humanoid battle armor may carry one squad support weapon mount, one standard modular weapon mount per arm, and two standard modular weapon mounts in the body; they may not install turret mounts. Quad battle armor may only add a single modular turret mount (referred to as a configurable turret mount), which must be installed in the body. Regardless of the type or number of mounts chosen, the weapon limit rules on p. 170 still apply.

Mounts (other than anti-personnel mounts) may also accommodate non-weapon items. Any item listed on the Battle Armor Equipment Tables may be installed in a mount as per the usual construction rules, except for the following prohibited items: Camo System, Extended Life Support, HarJel, Jump Booster, Magnetic Clamps, Mission Equipment, Modular/Turret Mounts, Space Operations Adaptation, Squad Support Weapon.

Unless carried by armored glove manipulators, battle armor anti-personnel weapons are always fitted in modular mounts. Anti-Personnel Weapons are detailed on p. 271, and their mounts are covered on p. 262.

Other Weapon Mount Options: Quad battle armor may install a standard turret mount instead of the configurable turret mount, sacrificing the modular ability to save on bulk and weight.

Battle armor may also designate missile launchers or standard weapon mounts as detachable, enabling them to jettison their equipment once it is expended. Detachable missile launchers (see p. 254) add 10 kilograms to the launcher's base weight.

Battle armor equipped with one or more armored glove manipulators may use one additional non-Melee conventional infantry weapon with crew requirements of less than 2. The weight of this weapon or its ammunition is never counted towards a battlesuit's weight limits.

Special Abilities: When engaging in anti-'Mech attacks, battle armor may use only non-missile, arm-mounted weapons to deliver their damage.

Inner Sphere battle armor equipped with body-mounted missile launchers (in addition to any arm-mounted weapons) may not use Jumping movement or perform anti-'Mech Swarm and Leg attacks until they jettison their launchers. Thus, Inner Sphere battle armor that combine jump jets and body-mounted missile launchers must establish such launchers as detachable (see *Anti-'Mech Attacks*, p. 220, *Total Warfare*).

Deciding that his Tunnel Rat is sufficiently completed, Keith chooses to add no more equipment to the design, leaving 220 unallocated kilograms remaining on the industrial exoskeleton—which may be subsequently used by alternative manipulator configurations, such as high-capacity cargo lifters.

Lou's Sylph is intended for combat, and with its VTOL motive capability would find the bomb rack—a uniquely Clan one-shot weapon system—ideal. The bomb rack weighs 100 kilograms and occupies 2 weapon slots, which Lou allocates to the Sylph's Body location. For a Primary weapon, Lou decides the Sylph will mount a micro pulse laser, which occupies 160 kilograms and 1 weapon slot. This item he places in the battle armor's Right Arm location. With a total of 260 kilos spent on weaponry, Lou finds that he reached the maximum weight of light battle armor.

Max's Purifier has 360 kilograms remaining, and only 3 weapon slots on its left arm in which to place equipment. To improve the battle armor's flexibility, he decides to place a modular weapon mount in the arm, at a cost of 10 kilograms and 1 slot. This will allow the battle armor to carry any non-missile weapon desired in that location, so long as its weight—including ammunition—does not exceed 350 kilograms and its size does not exceed 2 slots (the remaining slots in that location).

As a Primary configuration for this modular mount, Max decides the Purifier will carry an ER small laser. On the Inner Sphere lists, this weapon weighs 350 kilograms and occupies 2 weapon slots—which perfectly fits the remaining space and weight he had available to his battle armor.

Peter has 880 kilograms to spend on weapons, and 11 weapon slots in the Body location to place them. He decides to start by making the Fenrir's armament modular, choosing the configurable turret mount for his design (see p. 262). As the configurable turret requires a certain pre-determined size for its mount—to determine its weight and slot capacity—Peter selects a 3-slot capacity for the mount, meaning the entire turret mount will weigh 80 kilograms and occupy 2 slots.

Peter can install 800 kilograms worth of weaponry that can occupy a grand total of 12 slots (3 in the Configurable Turret + 9 in the Body). Per the Weapon Limits Table, Peter can install up to 4 anti-personnel weapon mounts and 4 anti-BattleMech weapons in all this space. He decides at this point that the base configuration for his Fenrir is complete.

For one configuration, Peter decides to place an SRM-4 launcher in the configurable turret mount. The SRM weighs 240 kilograms and occupies 2 slots on its own, leaving 1 slot open in the turret for ammunition. Peter decides to give the SRM the maximum ammunition load of 4 shots, which takes up the remaining turret weapon slot, and weighs 160 kilos (4 SRM-4 shots at 40 kg per volley = 160 kg). Though the resulting weapon weight is only 400 kilograms, leaving the SRM-4 Fenrir 400 kilos shy of its 2,000-kg maximum (800 kg – 400 kg = 400 kg), Peter cannot allocate more weaponry to the Fenrir without making it a completely different design (because he reserved all the leftover weight for his configurable turret).

A Wolf's Dragoons Daishi Widowmaker *plows through a battle armor squad.*

STEP 6: COMPLETE THE RECORD SHEET

By the time the designer has chosen all chassis, motive systems and manipulators for his battle armor, power armor or exoskeleton, and added the motive systems, manipulators, armor and equipment, all items must be allocated to their proper places on the Battle Armor Record Sheet. On a completed record sheet, the designer must be sure to have filled in all data for the battle armor's Unit Data block (including name, MP and motive type). All weapons and equipment must be noted, including ranges, damage and ammunition in shots per weapon (at least the missiles). All extraneous armor points must be blacked out on the armor rows, and any modifiers for special armor types and stealth gear must be noted. In *Total Warfare* game play, all troopers in a given squad must be the same type and variant; only the use of a Squad Support Weapon—fired by one of the squad's troopers—may differentiate one trooper from another in combat. Thus, all troopers in a squad should have the same statistics, with the Squad Support Weapon trooper designated as such at the end of the design process.

Once all of the above is completed, the battle armor squad is ready for *Total Warfare* game play.

RECOMMENDED BATTLE ARMOR FORMATIONS TABLE

Tech Base (Affiliation)	Force Size (Troopers per Squad)
Clan (All)	5
Inner Sphere	
Generic / Mercenary	4
Capellan Confederation	4
Draconis Combine	4
Federated Suns	4
Free Rasalhague Republic	4
Free Worlds League	4
Lyran Alliance	4
ComStar / Word of Blake	6
Periphery (General)*	4
Marian Hegemony	5
Taurian Concordat	4
Calderon Protectorate	4

*Includes Circinus Federation, Magistracy of Canopus, Niops Association, Outworlds Alliance, Nueva Castile, Hanseatic League and Pirates

MODULAR TECHNOLOGY

When completing the record sheet for a battle armor, power armor or exoskeleton unit built using modular technology, it is highly recommended that the designer create one sheet specifically to serve as the base configuration (the one without the affected modules installed—including manipulators as well as weapons). Copies of this base configuration sheet can then be used to quickly generate record sheets for the other configurations by adding the appropriate weapons and equipment in the open spaces.

FORMATIONS

Because battle armor derives most of its capabilities from the individual suit, rather than by a sheer number of personnel, the formation of battle armor squads in combat is not as much a factor of construction as of record sheet completion. Battle armor squads (called Points among the Clans) generally range from 4 to 6 troopers each, operating independently on the squad level in combat. To determine the recommended number of troops per battle armor squad based on its affiliation, consult the Recommended Battle Armor Formations Table (see p. 172). No battle armor squad may be fielded in numbers greater than 6 troopers.

To show the number of active troopers in a given battle armor squad or Point, simply leave the corresponding number of armor rows (including the gray-shaded trooper points) untouched on the record sheet. Each row should have the same number of armor points the trooper carries, so a Point of 5 Elemental battle armor troopers (10 armor points, plus one for the trooper inside) would appear on its record sheet as five rows (each) of 10 white armor circles and 1 gray-shaded trooper's circle.

Keith verifies that all of the valid data is filled in for his Tunnel Rat squad, including the Rat's full name, its Inner Sphere tech base, its Ground MP of 1, no alternate MP type and a single white armor circle after the gray-shaded circle for each trooper. (Because it is an Inner Sphere "squad," he also blacks out all but four complete rows of armor dots.) He notes the armor type under the armor rows (Standard, no modifiers), and lists no weapons in the inventory.

After making a copy for later configuration purposes, Keith will add the industrial drill to the Weapons Inventory, and check off the Swarm, Leg and Mechanized boxes beneath the inventory, to note that the Tunnel Rat is capable of all such actions.

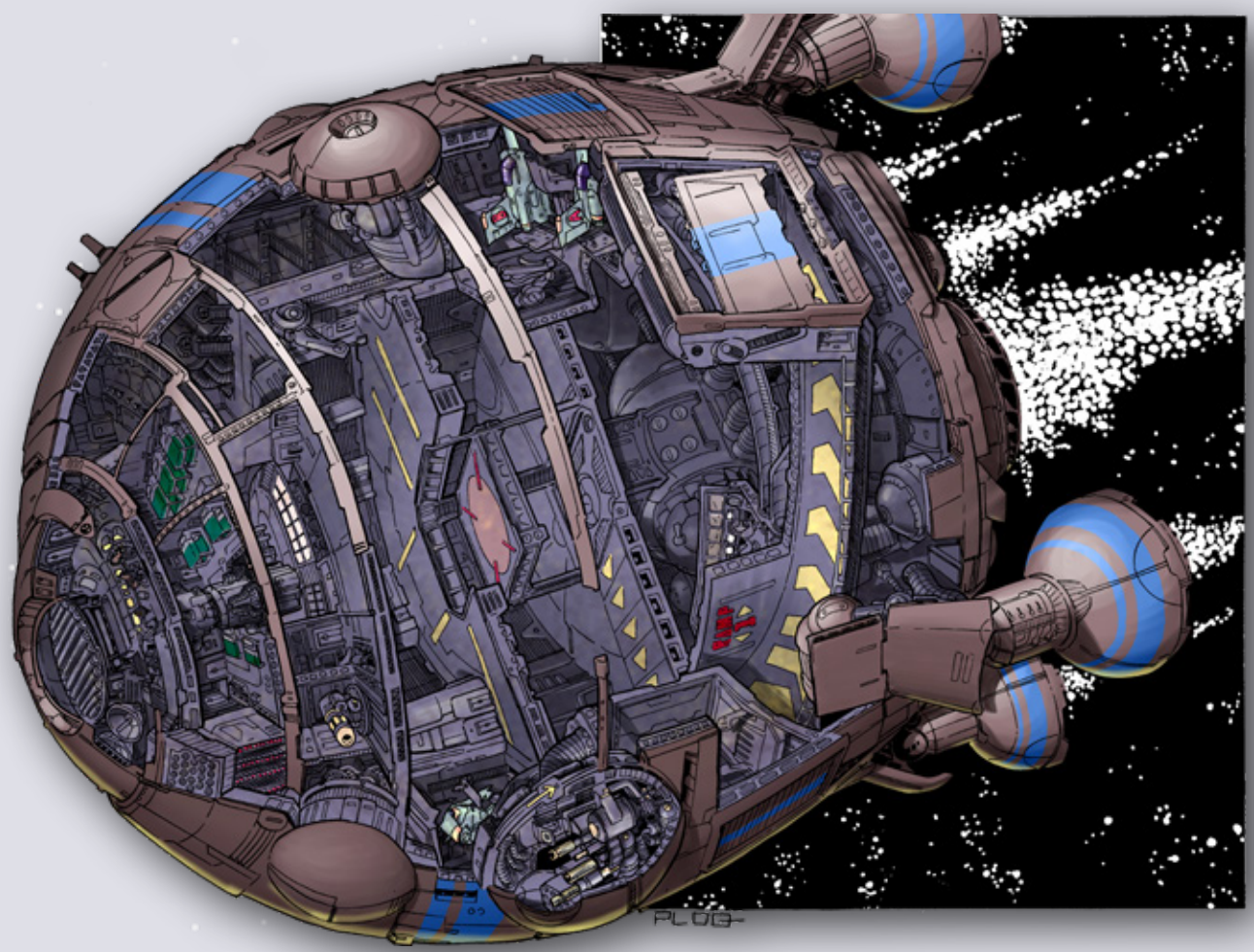
Repeating similar steps to Keith, but with a completed battle armor, Lou also notes the Sylph's alternate motive type "(VTOL): 5" and its armament, including the names of its weapons (such as the "Micro Pulse Laser"), their damage ("3" for the micro pulse laser) and ranges (blank for the micro pulse's Minimum Range, "1" for Short, "2" for Medium and "3" for Long).

As the Sylph is a Clan design, Lou duplicates the armor values with five rows of armor points, rather than four.

Because Max intends his Purifier to serve with the Word of Blake, he has opted to provide armor rows for six troopers, rather than four or five. Peter's Fenrir, intended for service with the Lyran Alliance, receives four rows' worth of armor to indicate its four troopers.

Both Max's Purifier and Peter's Fenrir also incorporate modular technologies, and so their completed record sheets approximate that of Keith's Tunnel Rat, with one sheet established as an un-configured "base" model and secondary sheets generated for loadouts. In the case of Peter's SRM-armed Fenrir, an ammo count is even noted beside the SRM's inventory listing, to show how many volleys each trooper carries, with enough space left over for the player to track during game play.

Surrounded and with little hope of survival, the NAIS cadet piloting the Owens *must stand down.*



AEROTECHNOLOGY

—Alleged aerospace technologies instructional briefing by Richard Beston, commander of the Ruby Skulls Flight, Winged Death (Death's Consorts pirate command), circa 15 March 3068

The fact that you're here means you already know how to pilot your craft. Thank the stars for that. However, we aren't the Davion Guards with a slew of veteran technicians to keep your two hundred-year old baby in prim and proper condition while wiping your ass after every crap. Hell, we aren't even those half-assed Taurians with a few workers just to keep it running and in decent condition. We're a bunch of pirates with resources few and far between, and if someone here hasn't figured that out by now, I have a few pills that will make all your troubles go away. No worries, not even about breathing after a few minutes. Any takers? I didn't think so.

So now that we 've established we're bunch of poor sons of braxxes—so poor, in fact, that we can't even afford used myomer strands for our one-armed BattleMechs—it should come as no surprise that by the time I'm through with you all, you'll be doing what the rest of us do, working on your own craft to keep it going. The rule is simple: everyone works here, and everyone fights.

Me? I started as one of the few experienced technicians with this band, working on Major Terren's *Corsair* until he had a disagreement that didn't turn out so well for him a few years ago. We were short on pilots at the time, and I'd logged a few hours of sim-time, so they threw me into his bird—and thank the heavens I'm still around to tell the tale. Well, most of me, but I didn't need that leg anyway.

Looks like many of you were just too lazy and stupid to mind your tech classes when you first signed up wherever you came from, so that's why you're here with me now on this "refresher" course. Lord help you all. If you look around, you'll see you're a pretty sorry mixed class, coming up from under all rocks of life. I see bridge bunnies, fighter jocks, myomer monkeys and even

a squad of meat bags in the back, a.k.a. Marines. No offense there, guys, but that's what the rest here'll call you, I'm just giving you a heads-up.

And since we seem to have such…diversity here, I'm going to gloss over all the important craft today, and break the group up for more specific lectures afterwards.

DROPSHIPS

Let's be honest here, DropShips are nothing more fancy than glorified shuttles. History even admits it. The first production JumpShips carried massive, multi-thousand-ton, long-range shuttles inside their hull during jumps between star systems. Technology at the time limited how big the JumpShip could get, and that limited the size of the shuttle bays they carried, which in turn limited how much cargo a Jumper could haul. Eventually, to ferry even the barest minimum of food and water to young colonies, you needed dozens of JumpShips and a huge fleet of shuttles. One day, some genius decided to jury-rig a system of massive magnetic claws and booms designed to extend K-F fields onto craft fixed to the outer hulls of his FTL ships. This innovation gave us the first efforts to concoct externally hauled Droppers, a major step toward overcoming the physical limits of interior docking space. Before the jumps, these claws would grab half a dozen shuttles, hold them flush against the hull, extend the jump field and jump. The crew would then pray all the way through their hyperspatial leap that the K-F field didn't warp in transit. After they successfully jumped and reached their desired system, the shuttles would then gloriously power up and blast off. First time they tried it, those first-born Droppers took the attached claws and a good chunk of their Jumper's hull with them, burning the rest of the ship with their thrusters to boot.

Thankfully, the same genius who had that idea put together a way to disengage the shuttles safely away from the vessel before he tried that trick again. Thus our first real DropShip was born. And humanity rejoiced.

Today, the Sphere and those test-tube Clanners field more than two and a half hundred different DropShip designs. If it primarily moves between a jump point and the planet under its own power, and moves in between systems by latching onto the outer hull of a K-F drive-equipped ship, it's technically a Dropper. They can get pretty small, but the largest ever developed is the appropriately named *Behemoth*-class—a juicy morsel of booty at 100,000 tons. Any bigger than that, and you may as well slap a K-F drive on it and call it a JumpShip; a suitably-sized boom would be just as large and it's cheaper overall in the long run.

Glorified shuttles they may be, but that doesn't make DropShips any less dangerous. A Dropper can carry a lot of weapons and a lot of armor. Some are made just to fight in space, escorting the ones that haul valuable cargo to various destinations. It'll take a good group of fighters to crack the nutshell of a well-built combat Dropper, but that's half our business right there.

DropShips are the largest spacefaring vessels we concern ourselves with out there. Yeah, there are Jumpers, but those are in a completely different class. And if any of you want to bring up WarShips, I will reiterate to you all that we are a pirate group, not a front-line regimental combat team. If you wanted to pull escort duty on a WarShip, you came to the wrong place.

Anyway, back on topic. DropShips have four key categories of components that we'll go over tonight. We'll touch on each in further detail in the near future. These categories—control, engineering, combat and cargo—pretty much cover every vehicle in existence, but are most clearly defined in DropShips.

CONTROL SYSTEMS

Pretty much every computer system dedicated to maintaining life support, weapons and navigating the ship itself falls under the jurisdiction of control. Most, including myself, argue that this is the most important category of the vessel. The key component to this category on a Dropper is the bridge; from there every hatch, system, weapon and light bulb can be controlled. Now, these bridges can be as small as a glorified shuttle cockpit for four people, or a multi-room level as big as that set-up they have in that horrid wannabe-reality show *Pegasus*, with several dozen crewmembers there, including the security team.

Most of those SOBs, in real life, do little more than stare at the screen and hit a button every few minutes when not in a crisis situation. Computers run most operations automatically, with the crew watching over the data streams on monitor stations that are often dominated by touch-screens. When combat occurs, a single touch begins the override. Of course, when this tech became scarce over the past few centuries, most folks wired up ancient keyboards to bypass their broken touchpads, along with program integrators that automatically set each station to recognize the keyboard and assign keys to a specific task. Recent decades have seen the old ways return, so more and more the keyboards are vanishing in favor of sleeker, easy-to-reconfigure touchpads. In fact, the only station that *isn't* touchpad- or keyboard-based is the pilot station. That station instead typically uses a pair of joysticks, wheels, or even dials to coordinate the various vectoring required for deep-space flight and atmospheric maneuvering, aided by a holographic HUD for multi-angle viewing of the ship's situation. It's not the post for those who get space-sick, so if you aren't sufficiently trained for it, the vertigo will literally make you puke up your guts after several minutes.

In case you haven't figured it out yet, when we're boarding Droppers, the bridge is the first thing we try to take over. On most aerodyne ships or small spheroid models, that command center is up front. Larger spheroid-class Droppers, though, like to put the bridge closer to the ship's core. Designers make these babies so they lock down and depressurize certain sections or the entire ship if necessary, to contain fires, trap boarders in a carefully laid ambush or blow out enemy marines altogether.

The scary thing about attacking these vessels is, even if we damage the bridge and most of those control stations, any stations that are left can technically be reconfigured in seconds to control the systems the other ones once did, using the touchpad system. Doors, life support and weapon systems can be overridden by secondary stations—all with little loss in efficiency, if you focus on a single task at a time.

You can even pilot off of those touchpads or keyboards, though I don't recommend anyone attempt it unless necessary. Fingertips on sensitive screens or keys, with frantic nerves and sparks flying everywhere, are not as precise as steady hands on a finely tuned set of control sticks. I've witnessed more problems created than solved by cocky, over-eager ensigns trying to play the hero on a damaged Dropper.

ENGINEERING

Some argue that engineering systems are the most important part of a Dropper, but I say at best it's a close second. I mean, I admit it's kind of hard to move through space without power or propulsion, but it doesn't matter how fast you can fly if you can't control where the damn thing is going.

Located at the core of most spheroid-shaped ships, or on the aft and bottom decks of aerodyne craft, two systems comprise the heart of every vessel's engineering section: a motor that propels the ship and a power plant that supplies energy to its computers, weapons and various subsystems. These may consist of a single combined fusion engine that supplies power and propulsion or, more often, several fusion reactors with separate or combined functions, like the *Seeker*'s Quad RanTech. The whole thing tends to be referred to as a single engine system, or just "the engine." When only generating power, the engine uses hardly any fuel and can last on internal reserves for years, and can top off from the main hydrogen tanks as needed. This is a damn good thing, mind you, as this ability to adapt the fuel to keep the engine and power plants running at top efficiency keeps our half-assed astechs and academy washouts from breaking them when they lay their dirty paws on them.

Also while down there, you might notice the place looks like an industrial nightmare, what with the slew of pipes filled with coolant and fuel, power cables and even superheated plasma ducts surrounding the engine and power plant. I almost feel bad for those guys, because once things start breaking down there in combat, you can get crisped pretty damned fast. Most well-equipped ships provide protective covering for their techs just in case, but for the third time, we're pirates, and we're not that well-equipped. Sometimes it seems most of our guys are lucky to have a loincloth to protect their would-be future heirs.

The beauty of a fusion-powered craft is that for the most part, manageable quantities of fuel can last a long time. This allows these ships to run life support and even manage the navigational thrusters with minimal need of replenishment. While the main engines work by expelling the byproduct of the fusion reaction through the ship's aft or underside to produce thrust, dozens of much smaller exhaust nozzles over the outer hull also expel superheated plasma so the pilot can adjust the heading and altitude. Airflaps and the like are utterly useless in the vacuum of space, after all. Though the main thrusters can adjust on their own, they are extremely limited for some of the intense combat maneuvers a talented pilot may need to perform.

Civvie Droppers and less sophisticated Succession War-era ships—which dropped these expensive and maintenance-intensive plasma nozzles—have learned this lesson the hard way. This is why so many to date have been retrofitted with a series of chemical propellant-based thrust motors to make up for their lack of foresight. Though not nearly as efficient, when one of these motors breaks or burns out, it's usually a matter of minutes to pull out the old one and slap on a new one. Plasma nozzles still remain the better option, though, as their activity can help a Dropper release excess plasma in a pinch.

Unlike the closed power plant system and miserly nav thrusters, the main drive system is a fuel hog, relatively speaking. Requiring a constant supply of fuel in the form of liquid hydrogen, instead of sipping a few grams now and then like the main power plant, these beasts push reaction mass through the main drive nozzles to create thrust. Large storage tanks filled with hydrogen provide the fuel to the reaction chamber via various flow mechanisms. All DropShips have at least one of these, and military vessels all have two of them to feed the beast that is the fusion engine.

Now, because fusion engines can be such pigs, all DropShips in interplanetary transit use a system with a pump that sends hydrogen to a huge chamber where it all gets fused, heating it to incredible temperatures, then vented through the main engine nozzles. This so-called "heat expansion" method allows for efficient interplanetary flight. The downside is, you can't quickly change the output of such an enormous fusion reaction, meaning the rapid engine response needed in combat ain"t gonna happen.

So those brainiacs decided to take the system put on aerospace fighters and use it on a larger scale for military Droppers. This "fast pump" system dumps excess fuel into reactor, more than can be burned, so it waters down the exhaust temperatures and your overall efficiency. Some of the smallest fighters don't even dump the extra go-juice into a reactor, they just use energy from the reactor to vaporize it with lasers or ion beams. Efficiency goes way down here, so it's not much good for interplanetary travel, but you do get an enormous increase in thrust and can quickly vary output. When a DropShip is not in combat, crews revert to the heat expansion method to conserve fuel.

Now, most DropShips carry multiple main thrusters to assist in steering or as back-up should something happen. However, if you're on the aerodyne ship, you might get the bonus of having an additional set of exhaust nozzles mounted in the belly of the craft. Bulky as hell, these are used to maintain gravitational forces on a 1-G burn in such a way that "up" inside the hull feels the same during interplanetary transit as it does on the ground. When in the atmosphere or attempting reentry, the aft thrusters and maneuvering drives take over and the craft flies like a plane, but during interplanetary transit, many of these ships fly "top-forward."

Older aerodyne models don't have this feature or lost it over the ages due to damage and age. G-force changes in these ships literally shift the deck floors to aft when in space, or "above" the engine room. Crews thus need to manually rearrange the furniture and cargo, securing stuff to the "floor" before the ship can enter atmosphere—a pain no matter how you slice it. This is why *our* aerodyne ships secure crates and necessities against the aft walls on an almost permanent basis, even when our ships *can* burn "top-forward." Face it, boys and girls: there ain't no way in hell we're going to provide a enemy with the largest profile possible just for your comfort, so get used to it.

WEAPON SYSTEMS

Like your aerospace fighters and their air-breathing counterparts, DropShip weapon systems are often put into groupings of similar types for ease of use. They call these groupings "bays." Each bay contains not only power and ammunition feeds, but a pseudo-isolated cooling system and an independent radar- and

laser-guided targeting system. All of this is tied into a fire control computer, which utilizes the main computer's sensor array, allowing it to extend its tracking capability hundreds of kilometers away even while the ship is traveling at astonishing speeds.

Depending on the amount of weapons on a ship, the weapons station might be a single person with several viewing panels to be able to watch from every angle—sometimes even the pilot, who already has the system built into his station—to many more personnel either on the bridge or in the weapon blisters, each with a pair of screens to view their primary zone of fire and any adjacent ones. While the DropShip's computer does the calculating and actual aiming with a constant stream of optimal target suggestions, the crew uses the sensor-enhanced viewscreens to select targets and fire the weapons.

Each DropShip gunnery station also provides the gunner with vital information, like recharge and reload times remaining per weapon, the weapons' heat burden and damage profiles for all targets—friend and foe. These profiles are thumb-nailed on sidebar screens for at-a-glance viewing. Though the computers can be manually overridden from the bridge stations or the bay itself, the calculations needed to take into account the massive distances and high speeds typical of aerospace combat are so difficult that no one short of a mathematical genius—and I know none of you here qualifies for that label—could make them correctly *and* fast enough to be of any use. Manual override is thus only for last resort, when your ship is running on emergency power, the main computer is shut down and you have a shuttle of marines bearing down on you getting ready to dock.

MARINES

Speaking of which, if there's another combat system most people overlook in space warfare—but which we certainly *don't*—it's marines. When you want to take any ship of worth intact, you *need* marines for the job. Equipped and trained to fight inside spacecraft at various gravity levels in a multitude of directions, these steel-balled individuals have my utmost respect. While on the offensive, these guys will load into extremely vulnerable shuttles, brave enemy fire in the void, dock under often high-velocity situations, and systematically elude a hostile crew's traps to defeat the on-board security teams and take the ship intact.

Did I say steel-balled? Try tungsten.

Marines and security teams are often spread throughout a ship's key locations. You'll generally find one or two of them at each airlock and cargo bay, with the rest guarding the bridge, engineering decks and other key control systems. Every marine squad is trained in operating a Dropper's critical systems, and most likely two of every man can operate a station, in case of casualties. So you bridge bunnies be careful when you're being boarded by a group of enemy marines; in a pinch, you are *quite* expendable.

Most marine units are equipped with special airtight suits for fighting in a vacuum, laser rifles and other recoilless weaponry. The best ones use needlers, as they can shred flesh with minimal recoil and won't risk damage to vital internal systems and power lines. The downside is that needlers are almost worthless against armor, so we only issue them if we suspect we won't come up against well-equipped defenders. If anyone's using battlesuits, you may see gyrojet weapons come into play, but the risks are huge the minute folks start hurling explosive shells that can penetrate walls and set off a passing fuel line.

CARGO

As the glorified delivery craft they are, every Dropper carries passengers or—more importantly—cargo of various sorts. Depending on the type of DropShip, cargo will either be a few dozen tons of food and medical supplies, or a mass of goodies up to three quarters of the ship's total weight. That's a lot of crap to haul.

If it's a military ship, most of the time the cargo bays are designed to carry—you guessed it—military cargo. While BattleMechs, vehicles and fighters can all be safely stored inside normal cargo bays, each requires specially designed bays to take advantage of a DropShip's ability to launch and recover manned units quickly in a wide variety of environments.

BattleMech cubicles are the most complex bays in existence. In addition to the normal latches and straps to keep those oversized, articulated dolls safe and upright during transit and combat maneuvers, each cubicle has at least one, normally two, adjustable platforms for technicians to perform maintenance and repairs on each machine. This allows crews to make sure the BattleMech inside is combat-ready, and even features an air-locking system and a retractable drop cocoon nearby to encase and release these machines for combat drops. The launch mechanism allows a Dropper to release 'Mechs during atmospheric flight or even from low orbit.

Some designers also set aside a certain amount of tonnage per BattleMech cubicle to create a larger central bay, equipped for more extensive repairs and refits, and—in our case—modifications. Resourceful crews often store additional 'Mechs inside this central bay, strapped down at special anchor points, but from there they cannot be launched during a drop situation. Our own crews like to load up as many 'Mechs in the bay as possible and hot drop the ones inside the cubicles to establish a safe landing zone. Once there, the rest of our machines unload via the heavy-duty ramps that come out from each 'Mech bay and then load back up, arms filled with swag. These, of course, are options the House militaries generally don't rely on. Instead, they use the extra bay space for bare-bones quarters the MechWarriors and their "pit crews" can use during transit. Now, if *we* had time for luxury like that, we'd be mercs, not pirates. Remember that distinction.

Fighter bays are only slightly less complicated and extensive. Though they include integral refueling and repair faculties, they lack the huge central bay BattleMechs have available to them. Each cubicle does, however, include a catapult and arresting mechanisms for launching and recovery operations in deep space, similar to that of BattleMechs, but with no need for ablative cocoons and fancy restraints. Yes, it *is* possible to carry fighters in normal cargo bays, just as it's possible to carry BattleMechs—if you're not too attached to their paint jobs and small parts. But if we did that, then we couldn't launch our fighters very safely, and would typically have to wait until landfall to unload the things on the ground. Nobody has craft to spare for such a deployment.

Now, even though most Droppers can launch and recover fighters, they do have limits. It's generally unsafe to launch or recover inside atmosphere, as weather, wind and drag condi-

tions can affect both vessels badly. I've done it, though. Twice. Both times under last-ditch emergency conditions. We avoid it like the plague now, because both times, most of my squadron mates didn't live through the experience.

That's why, once a Dropper is in the air, nobody with brains tries to leave it. A Dropper must first land, and uses a crane built into each bay to load and unload the fighters onto a flight strip. Thankfully, a DropShip's bridge always acts as an improvised control tower, feeding the fighters air traffic and weather information to prevent accidents from occurring. So if and when we get stuck out in the middle of a backwater planet with makeshift runways and no infrastructure, at least we can know if it'll be cloudy or good tanning weather. And doesn't that make us all feel better?

Vehicle bays aren't nearly as versatile as BattleMech or fighter bays. Because sane commanders won't try to combat-drop vehicles, and most are less than eight meters in height, there's no need to include adjustable repair platforms, lifting cranes or stored entry cocoons. However, most vehicle and typical cargo bay decks *do* have are retractable walls, allowing crews to reconfigure the decks to carry larger, heavier vehicles or more numerous lighter vees. One time, we actually ran down and captured a *Mule*, and when we checked the cargo bay, we found they'd reconfigured the space to carry several huge, wet-navy support patrol boats. Of course we took them, and after I assisted the ground crews in modifying them for our use, we still have them in service today. I can't say where, of course, or Lady Death will skewer me alive.

Still, that was an extreme example of these things in use. Most cargo bay decks simply have crates upon crates of supplies strapped down for transport from Point A to Point B, tracked by control stations and inventory computers usually located close to the bay's internal entry points.

FIGHTERS (AEROSPACE AND OTHERWISE)

While Droppers scream "utilitarian," nothing says "sexy" better than a sleek combat fighter, aerospace or otherwise. A hundred tons or less is the normal going rate; otherwise you can't get them faster than most military-class DropShips—and your sexy fighter is pretty much a useless deathtrap at that point. Unless you're fighting a guerrilla campaign and need to hide the craft while on the ground, there's no point in trying to camouflage it. Hell's Black Aces paint their fighters all white, and if there's some other paint scheme out there that screams, "Shoot me!" louder than that, I have yet to find out about it.

While much of BattleMech design was heavily influenced—or stolen outright—from fighter design, many of the materials used today on aerospace craft were perfected originally for use with 'Mechs. Thin bundles of myomer strands run throughout fighters to controlling atmospheric flaps and control surfaces. The high-strength alloys for armor designed to protect the *Mackie* were molded and attached to fighters. When they perfected particle projector cannons and lasers, fighter designers took them and put them on aerospace craft. Missiles and autocannons were all fine and dandy, but when you're firing at ranges of dozens of kilometers, nothing says confidence like a weapon that travels at the speed of light. Accept no substitutions here, kiddies.

In their element, even conventional fighters can hit hard and are quite sophisticated, so even though they may be flimsier by design, don't underestimate the power of the conventionals against an aerospace model. Because they're lighter and easier for most folks to build, there's generally more of them in a target's atmosphere than there may be aerospace raiders. The aerospace pilot who forgets that fact may find himself in for a rude awakening at the end of his ejection chute, just like some 'Mech jocks out there when they run afoul of enough heavy tanks.

FIGHTER CONTROLS

But while a BattleMech's cockpit resembles an early third-millennium fighter cockpit, aerospace fighters moved far beyond that point—until production capacity fell again, and we were forced back to more conventional methods. Some fighters built during the cursed Star League era for the SLDF didn't even use control sticks, like Droppers or conventional aircraft today, but a pair of special control gloves on either side of the cockpit chair. These gloves acted in conjunction with a specialized neurohelmet, with slight movements, gestures and even neural impulses from the helmet activating the altitude thrusters and control flaps to turn and maneuver a fighter in deep space and in atmosphere. While the entire cockpit became a virtual-reality field that put traditional heads-up displays to shame, the gloves—secured against high-G slips by a series of magnets—were used to control flight. A conscious effort by the pilot could send a signal to disengage the gloves immediately when necessary, automatically engaging an autopilot. This was great for long voyages. You'd set the speed and heading you wanted, and then just go to sleep until the computer alerted you to something. In combat, if you could see into one of these fighters, the pilot would look like he was having a seizures, what with all the twitches and shudders, but the computer system interpreted these "spasms" as commands to bank, fire off a lasers, hit thruster brakes and even perform a Hammerhead maneuver in deep space—all from a few twitches, less than what Jimmy there is known for in his sleep

The glove-and-neurohelmet interface never spread beyond the elite SLDF aero regiments before Amaris toppled Cameron's house of cards. The tech losses of the Succession Wars brought us back to more traditional HOTAS—"Hands On Throttle And Stick"—control methods. Also back are basic helmet-based HUD displays. Unlike the original SLDF virtual-reality HUDs, today's displays are not based on advanced neural feeds, nor are they normally displayed on any cockpit panel. Instead, the HUD is projected inside the pilot's sealed and much-simplified helmet, with data projected directly on the visor. The pilot can thus see everything no matter which way he turns his head, including sensor readings, damage reports and even the approximated damage and fuel ratings for his wingmates.

Touchpad screens are present underneath the reinforced canopy, but we all know a pilot can't reach the buttons while performing high-G burns and turns. So on the secondary control surface is a cursor switch that allows the pilot to scroll through and select options on the touchpad without removing his gloves from the controls. This is in fact a back-up system that has returned to primary use after ages of neglect. Meanwhile, pilots with a vintage Star League control system—or one made by Spheroid governments post-3065—use their more advanced helmets to move through the screens with subconscious signals. If you got a really crappy fighter, like me, you most likely have the cursor on

your secondary control stick instead. On the plus side, if your helmet's visor is cracked, the central touchpad screen can switch over to a mini-HUD mode, placing sensor and squadron readings on the secondary screens.

Many conventional atmospherics, by the way, rely on the older tried-and-true methods of sticks and screens, but even then many use the reliable helmet HUDs to get the job done right, so don't discount the abilities of conventional jets against aerospace fighters during a raid.

FIGHTER ENGINES

Aerospace fighters are powered by a fast-pumping, dual-chambered fusion power plant. Damn, that sounds cool, doesn't it? Anyway, the first chamber is a fairly conventional fusion reactor like you'll find on BattleMechs. This uses a small quantity of hydrogen from the tanks as fuel to produce enormous power. Most of that's spent in the second chamber, which superheats a lot more hydrogen like the combat drives of DropShips. Or BattleMech jump jets, for that matter. Some of the larger fighters keep fuel efficiency up by dumping reactor plasma into the second chamber.

Conventional fighters may use fusion engines similar to these, or gas-burning jet turbines, but they also function far more efficiently in their element. Bear that in mind if you're an aerospace fighter jockey engaged in battle with a swarm of conventionals: when you're in their playground, most of these guys can manage tighter turns and stay in the fight longer just because they were born to fight in the wild blue yonders, while your plane was meant to suck void more often than not.

FIGHTER WEAPONS

An aerospace fighter's weapon controls are extremely similar to those on Droppers, only designed more efficiently for a single gunner. Once a target is selected, the integral targeting systems do the rest: calculating lead and speed, while the pilot maneuvers to keep the target within his fighters' slim firing arc. Once the battle computer finishes reloading and recharging the weapons, the pilot fires with the click of a trigger—or a twitch of a finger in those fancy old SLDF gloves. The computer then unleashes a volley enhanced by its target tracking software, sometimes with a miniscule delay for optimum fire resolution.

Bear in mind that, unlike BattleMech targeting computers, those on armed spacefaring (and air-breathing) fighter craft can track prey effectively at hundreds of kilometers. Ironically, this is not in spite of the extreme speeds with which combat occurs in space and atmosphere, but because of them. Unlike ground combat, where most combatants can stop, turn and change direction at the drop of a coin, a fighter or DropShip going several thousand kilometers an hour can't change directions easily unless you dedicate a lot of thrust to that task. Up-to-date databases onboard every vessel can recognize what craft the target is and automatically calculate how long it would take that craft to change direction enough to evade fire; in most cases, it takes quite a bit of time. Yes, craft can take "evasive" maneuvers using their attitude thrusters, but these are minor and serve only to delay or screw up a calculated lead on lasers and autocannons. In addition, if you're doing this, don't expect your own computer to ever get a good bead on anything; it'll be too busy trying to take into account all the sudden movements you and your targets are doing to ever get it right.

That's all the time we have for today. We'll meet here, same time tomorrow, to delve into the wonders of specific fighters, Droppers and maybe even JumpShip technologies. For now, consider what you learned here. It may save your worthless lives someday.

By February 3067, all that remained of the Fifteenth Deneb Light Cavalry's Aero-Regiment was a flight of Chippewas.

In *BattleTech*, most aerospace combat—in space and in atmosphere—involves fighters and DropShips. Fighters can be either aerospace (capable of short-range spaceflight as well as atmospheric operations) or conventional (atmospheric only). DropShips, meanwhile, are much larger craft designed for long-range flight and heavy transport or combat, and can come in two forms: aerodyne (those that use wings and can take off and land like a regular winged aircraft) and spheroid (egg-shaped vessels designed for vertical launches and landings). Small Craft, essentially miniaturized DropShips, occupy the middle ground between fighters and larger spacecraft, and often serve as long-range shuttles or short-range escorts.

The following system enables players to construct unique fighters, Small Craft and DropShips for *BattleTech* games that conform to the standard rules presented in *Total Warfare*. As these rules can be fairly math-intensive, designers are encouraged to do all work on scratch paper before committing the resulting craft's specifications to an appropriate blank Aerospace Record Sheet.

AEROSPACE UNIT BASICS

Aerospace unit construction relies on three primary factors: unit type and shape, technology base and weight. These factors were broadly overviewed in the *Construction Basics* section (see p. 18). The notes below expand on these factors.

Throughout these construction rules, the term "aerospace unit" refers to all non-Support Vehicle units that use Thrust Points (rather than MP) and are playable under *Total Warfare*. This includes conventional fighters, aerospace fighters, Small Craft (aerodyne and spheroid), and DropShips (aerodyne and spheroid).

UNIT TYPE AND SHAPE

Aerospace craft in *Total Warfare* standard rules play come in a range of unit types that largely determine their maximum tonnages, structural designs and what equipment they may mount. These features are broadly outlined below. Because so much is influenced by the vehicle's movement type—including its record sheet—this factor must be decided upon first in the design process.

Conventional Fighters: Conventional fighters range from 5 to 50 tons in weight (increasing in increments of 5 tons) and may only operate in atmosphere. Conventional fighters use internal combustion engines (turbines) or standard fusion engines for propulsion, and may incorporate VSTOL gear for vertical landing and liftoff, but may not be constructed as OmniFighters.

Aerospace Fighters: Aerospace fighters range from 5 to 100 tons in weight (increasing in increments of 5 tons) and may operate in atmosphere or in space. Aerospace fighters may only use fusion engines and may be built as OmniFighters.

Small Craft (Aerodyne and Spheroid): Small Craft occupy a middle ground between aerospace fighters and DropShips, and may be constructed using aerodyne (aerodynamic) or spheroid (egg-shaped) body forms. Small Craft range from 100 to 200 tons in weight (increasing in 5-ton increments), and may operate in atmosphere or in space. They must use fusion engines and may not be constructed as Omnis.

DropShips (Aerodyne and Spheroid): DropShips may be constructed using aerodyne (aerodynamic) or spheroid (egg-shaped) body forms. Aerodyne DropShips range from 200 to 35,000 tons in weight, while spheroid DropShips range from 200 to 100,000 tons in weight (both body forms increase in 100-ton increments). Both DropShip forms may operate in atmosphere or in space and must use fusion engines. DropShips may not be constructed as Omnis.

TECHNOLOGY BASE

In *Total Warfare* standard rules play, aerospace units fall into one of two available technology bases: Inner Sphere or Clan. Inner Sphere aerospace units may only use Inner Sphere equipment, while Clan aerospace units may only use Clan equipment. Many standard components, however, such as armor, control systems, engines and heat sinks are considered universal, and so may be available to Clan and Inner Sphere technology bases.

Technology Rating

In the Weapons and Equipment Tables used for creating aerospace units and other units in this book, all items receive a Technology Rating in addition to a technology base. This rating (expressed as a series of letter grades that define the level of technology and its availability through the major eras of *BattleTech* history) helps to define the item's level of sophistication and may be used to help standardize the level of advancement the unit demonstrates for purposes of era-based campaigning. Beyond this, however, an item's Technology Rating has no direct bearing on aerospace design. See *Costs and Availability* (p. 274) for more on Tech Ratings.

OmniFighters

OmniFighters—aerospace fighters designed to be rapidly reconfigured between missions—are available to Clan and Inner Sphere technology bases. OmniFighters use the same construction rules as standard aerospace fighters, but when an Omni is made, the designer must first establish its base configuration. The base configuration of an OmniFighter includes its chassis, engine, control systems, armor and—if desired—any additional weapons and heat sinks "hardwired" to its design.

The tonnage, weapon slots and arrangement for all of this equipment is considered "fixed" on all configurations of that OmniFighter, leaving any leftover tonnage and critical space open to pods that can mix and match additional heat sinks, weapons and equipment based on mission needs. A base OmniFighter configuration is never considered a finished aerospace fighter and is generally not legal for *Total Warfare* standard rules play (as such units are essentially open frames of empty pods). Only the completed Primary and Alternate configurations (which must always comply with the rules for constructing standard aerospace fighters) are considered legal for game play.

Conventional fighters, Small Craft and DropShips cannot be built as Omni units under these rules.

WEIGHT (TONNAGE)

All aerospace units described in these rules use the tonnage standard, with the weight ranges legal for *Total Warfare* standard rules play described above under Unit Type and Shape.

Weight and Unit Classes

The weight classes used by most combat units become more complex with aerospace units, as they break up among the various unit types. Still, depending on the unit's weight and type, many aerospace designs can be classified along similar lines, though unusual specializations and such remain possible within the weight limits of any given design.

Fighters: Conventional and aerospace fighters fall broadly into three weight class: light (45 tons and under), medium (50 to 70 tons) and heavy (75 to 100 tons). Conventional fighters—which almost always fall in the light weight class—often get separated out into their own "conventional" class. Lighter fighter classes tend to be fast and lightly armored, acting as scouts and interceptors. The more well-rounded medium fighter class tends to be more adept at dogfights and ground support missions. Heavy fighters commonly serve as bombers and DropShip escorts, as they often boast the heaviest armor and firepower.

Small Craft: A catchall category for the range of weight between fighters and DropShips, Small Craft are most often used as shuttles, and are classified more by their roles than by weight. Most Small Craft are merely passenger or cargo shuttles, though some combat versions see use as boarding craft. A rare few have even played the role of "assault" fighters, escorting friendly DropShips or gunning down hostile vessels.

DropShips: DropShips are known by their weight classes and their roles. Small DropShips (200 to 2,499 tons) are most often deployed in small-unit actions or civilian work. Medium DropShips (weighing 2,500 to 9,999 tons) fill out the bulk of many merchant and military fleets, where they most often act as transports. Large DropShips (weighing from 10,000 to 100,000 tons) are most often deployed as bulk cargo haulers or large-force transports, typically seen during planetary invasions.

The roles DropShips most commonly play include assault ships, cargo carriers, fighter carriers, 'Mech carriers, troop carriers and passenger liners. Assault ships are DropShips that emphasize armor and firepower over transport capability, intended to engage and destroy other DropShips and Large Craft. Carriers of all kinds are essentially long-range transports, often tailored to a primary cargo type, whether regular goods (cargo carriers), aerospace support (fighter carriers), BattleMech forces ('Mech carriers) or other ground units (troop carriers). It is uncommon, but not unheard of, for passenger liners to appear in a space battle, either as the target of pirates and raiders or as a dragooned troop transport.

SPACE

Under these rules, overall unit type rather than an aerospace unit's size determines its equipment capacity and weapon limits. Space in terms of aerospace unit construction actually refers to the amount of room available for weaponry in the unit's various firing arcs.

DESIGNING AEROSPACE UNITS

Aerospace unit design follows six simple steps, each of which is described in detail later. In brief, these steps are as follows:

Step 1: Determine Chassis—Determine the aerospace unit's type, its technology base, and weight.

Step 2: Install Engine and Control Systems—Determine the aerospace unit's Thrust Points, engine weight, control components, fuel and structural integrity.

Step 3: Add Armor—Determine type, amount and weight of armor, and allocate armor points.

Step 4: Add Heat Sinks—Determine number and weight (if necessary) for the unit's heat sinks.

Step 5: Install Weapons and Equipment—Add weapons and other gear to the aerospace unit.

Step 6: Complete the Record Sheet.

The above design process is a mere framework for designing an aerospace unit. The actual process—particularly after the chassis, engine and control systems are determined—can involve a bit more flexibility as weapons, armor and heat sinks are balanced for their best fit in terms of tonnage and weapon slots. For instance, some designers might wish to assign armor after the weapons and heat sinks are established, to maximize firepower over protection. Others may want to add weapons before adding more heat sinks, to see if those that come free with the engine are sufficient for the unit's needs.

To assist in this effort, the designer may find it useful to make copies of an appropriate blank Record Sheet (in the back of this book), to visually arrange the placement of weapons and equipment while tracking the use of tonnage on a piece of scratch paper. Alternatively, designers with access to a PC and Heavy Metal Aero can use that design software to develop their aerospace unit electronically.

STEP 1: DESIGN THE CHASSIS

The first step in creating an aerospace unit is choosing the unit's chassis. This step establishes some of the most basic aspects of the craft's design, determining what kind of unit it is (aerospace fighter, conventional fighter, Small Craft or DropShip), its technology base and its tonnage. These choices will restrict the designer's access to certain equipment and can also influence the weight of the unit's structural integrity.

CHOOSE UNIT TYPE AND SHAPE

Aerospace units come in a variety of types (and shapes, in some cases) that can affect their maximum tonnage, capabilities and core construction, as well as their weapon limits per firing arc. Because of this, choosing an aerospace unit's type is the first key part of the chassis design process.

AEROSPACE UNIT TYPES TABLE

Motive Type	Weight Range (Tons)	Gameplay Restrictions*
Conventional Fighter	5-50	Atmospheric-only; Restricted to Ground Row and Row 1 on High-Altitude Map
Aerospace Fighter	5-100	Atmospheric and space-capable
Small Craft (Aerodyne)	100-200	Atmospheric and space-capable
Small Craft (Spheroid)	100-200	Atmospheric and space-capable; (In atmosphere: May only Land/Launch and Hover)
DropShip (Aerodyne)	200-35,000	Atmospheric and space-capable
DropShip (Spheroid)	200-100,000	Atmospheric and space-capable; (In atmosphere: May only Land/Launch and Hover)

*All aerospace units except for conventional fighters automatically incorporate VSTOL capability.

AEROSPACE UNIT RECORD SHEET TABLE

Unit Type	Record Sheet	Weapon Arcs
Conventional Fighter	Conventional Fighter	Nose, Left Wing*, Right Wing*, Aft
Aerospace Fighter	Aerospace Fighter	Nose, Left Wing*, Right Wing*, Aft
Small Craft (Aerodyne)	Aerodyne Small Craft	Nose, Left Wing*, Right Wing*, Aft
Small Craft (Spheroid)	Spheroid Small Craft	Nose, Fore-Left, Fore-Right, Aft-Left, Aft-Right, Aft
DropShip (Aerodyne)	Aerodyne DropShip	Nose, Left Wing*, Right Wing*, Aft
DropShip (Spheroid)	Spheroid DropShip	Nose, Fore-Left, Fore-Right, Aft-Left, Aft-Right, Aft

*Weapons placed in Wing arcs may be assigned to forward or aft firing directions.

Unit Types

The following unit types—legal for *Total Warfare* standard rules play—may be constructed under these rules: conventional fighters, aerospace fighters, Small Craft and DropShips. In addition, Small Craft and DropShips are available in two distinct shapes: aerodyne and spheroid. The choice of unit type and shape establishes the unit's weight range, whether it may operate in atmosphere only (as opposed to in space and atmosphere), whether or not it may be constructed as an Omni, and even sets the base limit for any weapons installed on the unit.

The Aerospace Unit Types Table (see p. 182) provides key data that applies to aerospace unit design and game play. Each of the unit types covered by these rules is listed in the Unit Type column, along with its Weight Range (the minimum to maximum weight at which such units may be built) and any game play restrictions (such as areas in *Total Warfare* game play where the unit may not operate). The Aerospace Unit Record Sheet Table, meanwhile, determines which blank Record Sheet the designer must use to record the construction of a new aerospace unit from a given unit type.

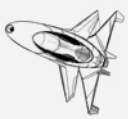
Space

Unlike Combat and Support vehicles, aerospace units derive their space limits (weapon slots) from their unit type rather than their weight. For conventional and aerospace fighters, this limit is set at 5 weapons per arc (Nose, Left Wing, Right Wing and Aft). Though the use of certain armor types may reduce this number, construction can never increase this quantity.

Small Craft and DropShips—aerodyne and spheroid—have a base limit of 12 weapons per arc (Nose, Left Wing, Right Wing and Aft for aerodynes; Nose, Fore-Left, Fore-Right, Aft-Left, Aft-Right and Aft for spheroids). Unlike fighters, these units may expand these limits later on.

Beyond these weapon limits, aerospace units may mount any number of non-weapon items, with some counting only as weight and some counting as bays. Which items take up weapon slots and which do not is explained in the appropriate sections.

Robert wants to build a conventional fighter for atmospheric dogfighting and close ground support, which he will call the 'Mechbuster.



Scott wants a fighter he can use in space as well as in atmosphere. He chooses to make an aerospace fighter that he has dubbed the Sabutai.

Bruce wants a craft ideal for space cruising and in-system passenger transport for the wealthy elite and space tourists. He chooses to create an aerodyne Small Craft, and dubs his vessel the Astrolux Star Yacht.

Chris is looking to create a large spacecraft for the Draconis Combine that will challenge enemy fighters and DropShips alike. He chooses to build a Spheroid DropShip, and dubs this craft the Nekohono'o.

Dawn plans to build a ProtoMech transport vessel for Clan use, and selects an aerodyne DropShip for her design, which she names the Arcadia.

CHOOSE TECHNOLOGY BASE

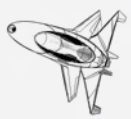
Aerospace units may be constructed using Clan or Inner Sphere technology bases. Units built with a Clan Tech Base may use items and components available to the Clans. Units made with an Inner Sphere Tech Base may use items and components available to the Inner Sphere.

Aerospace fighters created using either tech base may be built as OmniFighters. Conventional fighters, Small Craft and DropShips may not be constructed using modular technologies.

Civilian vs. Military

Regardless of technology base, DropShips and Small Craft may also be constructed as either civilian or military designs.

Robert sees his 'Mechbuster *as the standard conventional fighter for Inner Sphere planetary defense forces and chooses an Inner Sphere Tech Base for the craft. Because the Buster is not an aerospace fighter, he cannot construct it as an OmniFighter.*



Scott decides to build his Sabutai *for the Clans and so picks a Clan Technology Base. He also decides to enhance its flexibility by creating it as an OmniFighter.*

Bruce's Astrolux *is not meant for combat. He decides his civilian craft is more appropriate for the Inner Sphere and so chooses an Inner Sphere Tech Base. Because it is a Small Craft and not an aerospace fighter, Bruce may not make the* Astrolux *an Omni.*

Because he already has an Inner Sphere faction (the Draconis Combine) in mind for his Nekohono'o, *Chris decides on an Inner Sphere Tech Base for his DropShip. As a combat vessel, it automatically qualifies for military construction standards, but as a DropShip, it may not be built as an Omni.*

Dawn's Arcadia *ProtoMech transport will use Clan technology, and is by its nature a military vessel. As it is not an aerospace fighter, it may not be constructed as an Omni.*

CHOOSE WEIGHT

Depending on the aerospace unit's desired type, its maximum weight may vary greatly (see p. 184).

For conventional fighters, designers may choose any weight from 5 tons to 50 tons, in 5-ton increments.

Aerospace fighters may weigh anywhere from 5 to 100 tons, in 5-ton increments.

Small Craft may weigh anywhere from 100 to 200 tons, in 5-ton increments.

Aerodyne DropShips may weigh anywhere from 200 to 35,000 tons, in 100-ton increments.

Spheroid DropShips may weigh anywhere from 200 to 100,000 tons, in 100-ton increments.

Regardless of the aerospace unit type being constructed, the total weight of its engine, weapons, armor and other components may not exceed this amount. Any unspent tonnage left after the creation process is considered cargo, if the aerospace unit has internal space to spare, or wasted tonnage if it does not.

Robert wants his 'Mechbuster *to be a true terror of the conventional fighter class, and so he chooses a weight of 50 tons for this unit—the maximum weight limit for conventional fighters.*

Scott chooses a heavy 75-ton weight for his Sabutai *OmniFighter, hoping to make a powerful craft suitable to dogfighting and DropShip support.*

Because he intends to cram his vessel with luxury accommodations, Bruce decides his Astrolux *needs to be as big as possible for a Small Craft. He chooses a weight of 200 tons for his unit.*

For his Nekohono'o*-class DropShip, Chris chooses a fairly hefty 16,000-ton weight.*

As her Arcadia *shouldn't require much weight to carry its cargo, Dawn chooses a weight of 3,000 tons for her DropShip.*

SL-17 Shilone, *First Alliance Air Wing (Outworlds Alliance)*

STEP 2: INSTALL ENGINES AND CONTROL SYSTEMS

The second step in aerospace unit design is the installation of the unit's engines and control systems. This step establishes the key factors in the aerospace unit's mobility, including the size and performance of its engine, the weight of the control systems its pilot or crew uses during battle, and the strength (and weight, where applicable) of its structural integrity. This step also determines the craft's fuel supply, as well as its maximum possible armor level.

INSTALL ENGINE

Each aerospace unit constructed under these rules carries one engine and power plant for its movement, weapon systems and other integral components. For fighters, the relative output of this engine is expressed as an Engine Rating, which is directly determined by the craft's total weight and its desired Safe Thrust. Small Craft and DropShips, which require a much larger combined engine and power plant for long-range flight and life support, use a more direct formula to determine engine size.

For fighters (aerospace and conventional), their Engine Rating is determined first, based on their tonnage and Safe Thrust. The designer then uses this rating to select the listed engine type from the Master Engine Table (p. 49). Under these rules, no fighter may be constructed with an Engine Rating below 10 or above 400.

Small Craft and DropShips—which determine their engine weight more directly from the vessel's total mass and its Desired Safe Thrust—do not use engines from the Master Engine Table. Instead, the designer determines a Base Movement Factor based on their weight and Safe Thrust, applies a tech base multiplier to the result, and then multiplies the final result by the vessel's total weight.

Engine types and weight formulas for the various aerospace units are illustrated fully in the Aerospace Unit Engine Table (see p. 185).

Tech Base: Standard fusion engines are equally available to fighters of Clan or Inner Sphere tech bases, as are standard turbine engines (ICEs) for conventional fighters built by the Clans and the Inner Sphere. Compact, Light and Inner Sphere XL fusion engines are available only to aerospace fighters with an Inner Sphere Tech Base. Clan XL engines are available only to aerospace fighters with a Clan Tech Base.

Small Craft and DropShips created with a Clan Tech Base may only use Clan engines. Those built with an Inner Sphere Tech Base may only use Inner Sphere engines.

Space: None of the engine types that may be chosen for fighters, Small Craft or DropShips under these rules have any impact on the number of weapon items such units may mount per arc.

OmniFighters: Engine type, rating and Thrust Points must be established when designing an OmniFighter's base configuration, and may not be altered in that OmniFighter's completed Primary or Alternate configurations.

AEROSPACE UNIT ENGINE TABLE

Base Engine Rating and Movement Formulae:
Fighters
(Aerospace Fighter) Base Engine Rating = Fighter Tonnage x (Desired Safe Thrust Points – 2)
(Conventional Fighter) Base Engine Rating = Fighter Tonnage x (Desired Safe Thrust Points)
Small Craft and DropShips
Base Movement Factor = Unit Tonnage x Desired Safe Thrust
All Aerospace Units
Max Thrust = Desired Safe Thrust x 1.5 (round up)

Aerospace Unit Engine Weights:

Aerospace Unit Type	Engine Weight	Engine Types Permitted
Conventional Fighter (Clan or I.S.)	Consult Master Engine Table (p. 49)*	ICE, Fusion (as per Tech Base)
Aerospace Fighter (Clan)	Consult Master Engine Table (p. 49)*	Fusion (Std, XL) only
Aerospace Fighter (Inner Sphere)	Consult Master Engine Table (p. 49)*	Fusion (Std, Light, XL, Compact) only
Small Craft or DropShip (Clan)	Base Movement Factor x 0.061**	Fusion only
Small Craft or DropShip (Inner Sphere)	Base Movement Factor x 0.065**	Fusion only

*Find tonnage for these engines by cross-referencing the unit's Base Engine Rating with the desired engine type (note engine types permitted); Conventional fighters multiply fusion engine weights by 1.5 (round up to the nearest 0.5 ton).

**Round all weights up to the nearest 0.5-ton.

Robert decides to give his 'Mechbuster *decent mobility in the air, with a Safe Thrust of 5. This gives the conventional fighter a Max Thrust of 8 (5 Safe Thrust x 1.5 = 7.5, rounded up to 8 Max Thrust), with an Engine Rating of 250 (50 tons x (5 Safe Thrust Points) = 250 Conventional Fighter Engine Rating).*

As a conventional fighter, Robert's 'Mechbuster *may use a standard fusion engine or an ICE (turbine). Robert chooses the turbine, and consults the Master Engine Table to find that the weight of the ICE comes to 25 tons. The Buster now has 25 unspent tons remaining (50 tons – 25 tons = 25 tons).*

As his Sabutai *is an aerospace Omni-Fighter, Scott must choose a fusion engine for the craft. He decides on a solid 6 Safe Thrust Points (for a Max Thrust of 9; 6 Safe Thrust x 1.5 = 9 Max Thrust), and uses the Aerospace Fighter Formula to find its Engine Rating.*

Calculating an Engine Rating of 300 (75 tons x [6 Safe Thrust – 2] = 300), he consults the Master Engine Table for his options. With only standard and XL fusion engines available to Clan-made aerospace fighters, Scott picks an XL engine for his Sabutai, *which weighs 9.5 tons. This leaves the fighter with 65.5 unspent tons (75 tons – 9.5 tons = 65.5 tons).*

Bruce decides that a good "space cruise" acceleration of 5 Safe Thrust will do for his Astrolux, *providing a Max Thrust of 8 (5 Safe Thrust x 1.5 = 7.5, rounded up to 8 Max Thrust). However, as his unit is a Small Craft, it may not use the fighter Engine Rating formulas, but instead must compute its engine weight directly, like a DropShip. To do this, Bruce must first compute his* Astrolux's *Base Movement Factor, which comes to 1,000 for its size and desired acceleration (200 tons x 5 Safe Thrust = 1,000).*

Because the Astrolux *is an Inner Sphere design, its engine weight comes to 65 tons (1,000 Base Movement Factor x 0.065 for Inner Sphere DropShips and Small Craft = 65 tons). The* Astrolux *has 135 tons left over (200 tons – 65 tons = 135 tons).*

Chris chooses a Safe Thrust of 5 for his Nekohono'o*-class DropShip, so as to better hunt larger, slower-moving transports and the like. This provides a Max Thrust of 8 (5 Safe Thrust x 1.5 = 7.5, rounded up to 8 Max Thrust), and a Base Movement Factor of 80,000 for the vessel (16,000 tons x 5 Safe Thrust = 80,000). This in turn yields an engine weight of 5,200 tons (80,000 Base Movement Factor x 0.065 = 5,200 tons). The* Nekohono'o *now has 10,800 tons remaining (16,000 tons – 5,200 tons = 10,800 tons).*

Dawn wants her Arcadia *to excel at fast insertions, and so selects a Safe Thrust of 6 for her DropShip. This provides the 3,000-ton craft with a Max Thrust of 9 (6 Safe Thrust x 1.5 = 9 Max Thrust), and a Base Movement Factor of 18,000 (3,000 tons x 6 Safe Thrust = 18,000). As a Clan DropShip, the* Arcadia*'s engine weight comes to 1,098 tons (18,000 Base Movement Factor x 0.061 = 1,098 tons), which leaves the DropShip with 1,902 tons left to spend (3,000 tons – 1,098 tons = 1,902 tons).*

DETERMINE FUEL CAPACITY

Even though fuel use is not tracked in *Total Warfare* standard rules play, all aerospace units must allocate some mass to fuel supply, to reflect their endurance in campaign-style play (which is covered in *Strategic Operations*, p. 35). While no minimum amount need be allocated, it is generally recommended that fighters devote at least 2 tons to fuel, while Small Craft and DropShips should invest at least 5 percent of their total mass in fuel storage. This mass is in addition to that of the engine and chassis.

All aerospace units burn fuel by Thrust Points. The number of "fuel points" provided per ton is shown for all fighters, Small Craft and DropShip units on the Aerospace Fuel Table at right. This value is based on the unit's type and its total weight. Regardless of unit type, fuel may only be added in full or half-ton lots. Furthermore, an additional 2 percent of weight applies to all non-fighter aerospace units, to reflect the weight of fuel tanks and pumps (rounded up to the nearest half-ton).

Also provided in the Aerospace Fuel Table is the Strategic Fuel Use Rating, which applies to Small Craft and DropShips that can use a fuel expansion system for long-distance travel. This value sets how many tons of fuel the vessel burns in a given day at a constant 1-G (2 Thrust Point) acceleration rate (and is multiplied by the actual acceleration—in Gs—the used during long-range transits). Again, this information is not tracked in *Total Warfare* game play, but is relevant to construction, as all aerospace units require fuel. Strategic fuel use is affected depending on whether a given Small Craft or DropShip is built as a civilian or a military design.

Tech Base: Fuel use by fighters, Small Craft and DropShips remains the same regardless of the unit's tech base.

Space: The internal fuel tanks covered by these rules do not affect the weapon slots available to aerospace units.

OmniFighters: The internal fuel capacity of an OmniFighter's base configuration must be fixed, and this internal fuel cannot be altered in its completed Primary or Alternate configurations. Additional fuel may be pod-mounted, however.

AEROSPACE FUEL TABLE

Unit Type (Mass)	Fuel Points per Ton
Conventional Fighter	160
Aerospace Fighter	80
Small Craft	80
DropShip	
Up to 399 tons	80
400 to 799 tons	70
800 to 1,199 tons	60
1,200 to 1,899 tons	50
1,900 to 2,999 tons	40
3,000 to 19,999 tons	30
20,000 to 39,999 tons	20
40,000 to 100,000 tons	10

Unit Type (Mass)	Strategic Fuel Use (tons/day/G)
Conventional Fighter	NA
Aerospace Fighter	NA
Small Craft	1.84
Military DropShip (Any Tonnage)	1.84
Civilian DropShip	
100 to 999 tons	1.84
1,000 to 3,999 tons	2.82
4,000 to 8,999 tons	3.37
9,000 to 19,999 tons	4.22
20,000 to 29,999 tons	5.19
30,000 to 39,999 tons	6.52
40,000 to 49,999 tons	7.71
50,000 to 69,999 tons	8.37
70,000 to 100,000 tons	8.83

*For a fuel reserve, Robert decides to give his '*Mechbuster *the minimum recommended amount of fuel at 2 tons. This amount provides the conventional fighter with 320 fuel points (2 tons of fuel x 160 points of conventional fighter fuel per ton = 320 fuel points). As a conventional fighter, however, the '*Mechbuster *cannot use strategic fuel expansion, and so does not receive a "Tons per Burn Day" value.*

The Buster *now has 23 unspent tons remaining (25 tons – 2 tons = 23 tons).*

True to Clan style, Scott sees his Sabutai *as a short-term brawler, designed to engage and destroy its enemies quickly. For that, he plans to devote as much weight as possible to weaponry and armor, and so he decides on a mere 3-ton fuel capacity. This provides the craft with 240 fuel points (3 tons of fuel x 80 points of aerospace fighter fuel per ton = 240 points). As an aerospace fighter, the* Sabutai *may not use strategic fuel expansion, and so does not receive a "Tons per Burn Day" value.*

This leaves the fighter with 62.5 unspent tons (65.5 tons – 3 tons = 62.5 tons).

Bruce decides he wants his Astrolux *to be a good long-distance space yacht, with enough capacity for a long-distance hike. The minimum recommended fuel capacity for a Small Craft or DropShip is 5 to 10 percent of the craft's weight. For the* Astrolux, *10 percent comes to 20 tons of the craft's weight (10 percent of 200 tons = 0.10 x 200 = 20 tons). In reviewing that, Bruce notes that Small Craft have a 1.84 tons per burn day value (at 1 G). This means his luxury craft can run for nearly 11 days straight at 2 Thrust Points of acceleration (1 G) with a 20-ton fuel tank (20 tons ÷ 1.84 tons per burn day = 10.87 days of fuel at 1 G). This amount of fuel also equates to 1,600 combat fuel points, which Bruce feels is more than sufficient for touring or running from an explosive situation.*

For his craft's 20-ton fuel capacity, Bruce finds he will need an additional 0.5 tons of fuel pumps (2 percent of 20 tons of fuel = 0.02 x 20 tons = 0.4 tons, rounded up to 0.5). After installing the fuel tanks and pumps, he finds that his Astrolux has 114.5 tons remaining (135 tons – 20.5 tons = 114.5 tons).

For his Nekohono'o*-class DropShip, Chris decides on a nice round 400 tons of fuel. Though this is well below the recommended 5 to 10 percent of the DropShip's weight, he reasons that the vessel will be employed as a defensive unit close to planets and friendly JumpShips. He also notes that despite the* Nekohono'o*'s size of 16,000 tons, its military design yields the same 1.84 tons-per-burn-day rate that a Small Craft enjoys, enabling the ship to cruise at 1 G for up to 217 days before running dry—a fine endurance record for him (400 tons ÷ 1.84 tons per burn day = 217.39). This fuel capacity also provides 12,000 points of combat fuel (400 tons x 30 fuel points per ton at 16,000 tons total ship weight = 12,000 points).*

Satisfied with his craft's 400-ton fuel capacity, Chris finds he will need an additional 8 tons of fuel pumps (2 percent of 400 tons of fuel = 0.02 x 400 tons = 8 tons). After installing the fuel tanks and pumps, his Nekohono'o *has 10,392 tons remaining (10,800 tons – 408 tons = 10,392 tons).*

Dawn decides to place her Arcadia's *fuel capacity at 200 tons, falling within the recommended 5 to 10 percent minimum range. She computes from this that her 3,000-ton vessel will receive 6,000 fuel points (200 tons x 30 fuel points per ton at 3,000-ton ship weight = 6,000 fuel points). Because the* Arcadia *is a military craft, it will burn fuel at 1.84 tons per burn day under strategic fuel use. This means her DropShip can maintain a continual 1-G (2 Point) thrust rate for nearly 109 days straight before running out of fuel (200 tons ÷ 1.84 tons per burn day = 108.70 days). Dawn feels this is more than enough for her needs.*

At 200 tons of fuel tanks, the Arcadia *requires 4 tons in pumps (2 percent of 200 tons = 0.02 x 200 = 4 tons). After installing this necessary equipment, Dawn's DropShip has 1,698 tons remaining (1,902 tons – 204 tons = 1,698 tons).*

DETERMINE STRUCTURAL INTEGRITY

Once the designer has determined an aerospace unit's weight and Thrust Points, he can determine its Structural Integrity (SI) value. This defines the strength of the unit's internal structure or airframe.

Fighters: The SI value of a conventional or aerospace fighter must equal the fighter's Safe Thrust Rating or 10 percent of the fighter's tonnage (rounded down), whichever value is higher. Fighters devote no mass to this structural integrity and may not voluntarily increase its value.

Small Craft and DropShips: The Structural Integrity value of a Small Craft or DropShip must be at least equal to the unit's Maximum Thrust, but the designer may opt to increase the SI for these units to allow for the installation of more armor. The maximum SI a Small Craft or DropShip may receive is equal to 30 times its Maximum Thrust.

STRUCTURAL INTEGRITY TABLE

Aerospace Unit Type*	Minimum SI	Maximum SI	SI Weight
Conventional or Aerospace Fighter	**	**	0
Small Craft or DropShip (Aerodyne)	Max Thrust x 1	Max Thrust x 30	(SI x Tonnage) ÷ 200†
Small Craft or DropShip (Spheroid)	Max Thrust x 1	Max Thrust x 30	(SI x Tonnage) ÷ 500†

*These values apply to either Clan or Inner Sphere technology bases.

**Conventional or aerospace fighters use the higher of the fighter's Safe Thrust or 10 percent of the unit's tonnage (round down).

†Round up to the nearest half-ton.

Unlike fighters, DropShips and Small Craft must spend tonnage on their structural integrity. The formulas for computing DropShip and Small Craft SI weights vary with the unit's shape (aerodyne or spheroid) and are shown on the Structural Integrity Table (see p. 187).

Space: Regardless of the aerospace unit's type, its Structural Integrity value does not affect the amount of weapon space available to it.

OmniFighters: The mass and SI value of a fighter built as an Omni are fixed once established for the OmniFighter's base configuration. These values may not change between the OmniFighter's base, Primary or Alternate configurations.

Robert's 'Mechbuster *is a conventional fighter that weighs 50 tons and has a Safe Thrust of 5, so its Structural Integrity value will be equal to the higher of its Safe Thrust value or 10 percent of its tonnage (rounded down). As 10 percent of the fighter's tonnage (rounded down) does not exceed the craft's Safe Thrust (they're equal, in fact: 10 percent of 50 tons = 0.1 x 50 = 5), the Structural Integrity value for the fighter is equal to its Safe Thrust of 5.*

The Buster *spends no weight on structural integrity, and so still has 23 tons remaining.*

Scott's Sabutai *is a 75-ton aerospace fighter with a Safe Thrust of 6. Like Robert's* 'Mechbuster, *its Structural Integrity value will equal the higher of its Safe Thrust value or 10 percent of its tonnage (rounded down). As 10 percent of the fighter's tonnage (rounded down) comes to 7 (10 percent of 75 tons = 0.10 x 75 = 7.5, rounded down to 7) and the craft's Safe Thrust is 6, the Structural Integrity value for the fighter is equal to 10 percent of its weight, rounded down: 7.*

Like Robert's aircraft, the Sabutai *spends no weight on its structural integrity, and still has 62.5 unspent tons.*

As a Small Craft, Bruce has to compute the range of Structural Integrity values to which his Astrolux *must conform. Consulting the Structural Integrity Table, he finds that this range is 8 (Max Thrust of 8 x 1 = 8) to 240 (Max Thrust of 8 x 30 = 240). Because he must pay in tonnage for every point of structural integrity, and because he does not plan for his Small Craft to be involved in combat, Bruce selects the minimum SI for his* Astrolux*: 8. Using the formula for aerodyne DropShips and Small Craft, he determines that the weight of this structural integrity will come to 8 tons ([8 points of SI x 200 tons of craft] ÷ 200 = 8 tons), leaving 106.5 tons left over (114.5 tons – 8 tons = 106.5 tons).*

With a Max Thrust of 8, the Nekohono'o*-class DropShip has an SI range of 8 (Max Thrust of 8 x 1 = 8) to 240 (Max Thrust of 8 x 30 = 240). Deciding on a Structural Integrity value of twice the minimum (16), Chris consults the Structural Integrity Table and computes that such an SI for a spheroid DropShip will weigh 512 tons ([16 SI points x 16,000 tons of craft] ÷ 500 = 512 tons). After subtracting this from the DropShip's unspent weight, Chris finds that the* Nekohono'o *will have 9,880 tons remaining (10,392 tons – 512 tons = 9,880 tons).*

For her Arcadia*-class DropShip, Dawn computes a minimum SI of 9 (9 Max Thrust x 1 = 9) and a maximum of 270 (9 Max Thrust x 30 = 270). She decides on a Structural Integrity value of 11, and checks the formula for an aerodyne DropShip to find that this will weigh 165 tons ([11 SI points x 3,000 tons of vessel] ÷ 200 = 165 tons). Subtracting this from her DropShip's current available weight of 1,698 tons, Dawn finds that she has up to 1,533 tons left to spend on other components and equipment (1,698 tons – 165 tons = 1,533 tons).*

ADD CONTROL/CREW SYSTEMS

Every aerospace unit must have control systems, reflecting cockpits or crew stations from which the vehicle is operated. These control systems provide sensors and navigation, as well as ejection systems and basic life support for fighters. The weight of these systems is shown on the Aerospace Control Systems Table (see p. 189).

Crew: Though *Total Warfare* standard rules play does not track crew sizes and such, their impact on aerospace unit design requires designers to resolve their numbers during the design process. To determine the basic crew needs for each aerospace unit type, consult the Aerospace Control Systems Table below. An aerospace unit's crew must be equal to (or, at the designer's option, greater than) the sum of its minimum crew requirements (including any supplemental crew such as gunners). Bay personnel—for vehicle bays and such—are not listed (the bays themselves incorporate a limited amount of bunk space for such personnel).

The additional crew needs for weapons and such need not be met unless and until these items are mounted, and any officer requirements must be computed after determining all minimum crew (typically at the end of Step 5). Unlike Support Vehicles, officers are computed from among the minimum crew, and are included in that count rather than added on.

Note that gunners are required only for any items that require a Gunnery Skill roll to use in combat, and which have a range of more than 1 hex. (Thus, automatic defensive armaments like Anti-Missile Systems and the like require no gunners, nor do non-weapon items listed on the Aerospace Weapons and Equipment Tables, such as Active Probes and ECM gear.)

Pilot/Crew Accommodations: For fighters, which regularly fly out on short sorties rarely measured in hours (much less days), crew accommodations consist of little more than the fighter's cockpit. Conventional and aerospace fighters therefore may not incorporate quarters into their design.

For Small Craft and DropShips, on the other hand, the designer must allocate weight to quarters for every crewman. Unlike Support Vehicles—most of which incorporate seating for the minimum crew into their chassis—Small Craft and DropShips require quarters for all crew and passengers, with standard procedure providing First Class Quarters (10 tons apiece) to officers and Second Class Quarters (7 tons apiece) to enlisted/non-officer crew. Because bays incorporate a limited amount of bunk space into their design, bay personnel—those required for vehicle

bays, 'Mech bays and so forth—need not be counted toward required accommodations.

Tech Base: The cockpits, control systems and crew accommodations covered by these rules are equally available to aerospace units built using a Clan or Inner Sphere technology base.

Space: The cockpit, crew quarters and other control systems for an aerospace unit do not affect the amount of weapon slots available to the unit.

OmniFighters: As control systems are required for all aerospace unit types, their tonnage—once established for the OmniFighter's base configuration—may not change between its base, Primary or Alternate configurations.

Fighters: Conventional and aerospace fighters are automatically assumed to have a single pilot under these construction rules and so do not require any calculations for crew.

Small Craft and DropShips require larger crews the larger and more heavily armed they get, and also require quarters for all these crewmembers. The minimum crew required for such vessels is shown under the Minimum Crew column of the Aerospace Control Systems Table. From this figure, one out of every five crewmen (rounded up) is typically considered an officer. The number of crew may be modified based on the number of weapons mounted on the vessel as well (see *Add Weapons, Ammunition and Other Equipment*, p. 194, for more information).

While the type of quarters chosen for crewmen is generally presumed to weigh 7 tons per man, designers may opt to equip a vessel with other types instead, such as Steerage and Officer/First Class quarters. For instance, a standard Inner Sphere military DropShip with a crew of 9, plus 2 officers, might normally devote Standard crew quarters to its 9 crewmen and Officer/First Class quarters to its 2 officers. Clan military DropShips tend to be more spartan, and so may bunk their crew—officers and all—in Standard crew quarters. A long-range shuttle devoted to bare-bones operations may opt for Steerage quarters for all, to spare as much tonnage as possible for other equipment.

Robert's 'Mechbuster *is a conventional fighter that weighs 50 tons. As such, he determines that its control systems will weigh 10 percent of its tonnage (rounded up to the nearest half ton), according to the Aerospace Control Systems Table. He computes that the fighter will spend 5 tons on control systems (50 tons x 0.10 = 5 tons), and will have a minimum crew of 1 (the pilot). The* 'Mechbuster *now has 18 tons remaining (23 tons – 5 tons = 18 tons).*

AEROSPACE CONTROL SYSTEMS TABLE

Aerospace Unit	Control Systems Weight	Base Crew Minimum
Conventional Fighter	Tonnage x 0.10*	1
Aerospace Fighter	3 tons	1
Small Craft	Tonnage x 0.0075*	3**
DropShip (Civilian)	Tonnage x 0.0075*	3 + 1 per 5,000 tons (round up)**
DropShip (Military)	Tonnage x 0.0075*	4 + 1 per 5,000 tons (round up)**

*Based on total unit tonnage, round up to the nearest 0.5-ton for Fighters/Small Craft; round up to the nearest full ton for DropShips.
**Gunners add to minimum crew needs as specified under *Add Weapons, Ammunition and Other Equipment* (see p. 194).

AEROSPACE UNIT CREW NEEDS

Minimum Crew Formula:	
Minimum Crew Needs (Conventional and Aerospace Fighters only) = 1	
Minimum Crew Needs (Small Craft and DropShips only) = Base Crew Minimum + Minimum Gunners*	
Weapon Type	**Minimum Gunners****
Standard Weapons	1 per 6 weapons on the design (round up)
Capital Weapons	1 per weapon

*1 crewman per every 5, rounded up, should be considered an officer.
**Gunners are required only for items that requires a Gunnery Skill roll to use in combat, and which have a range of more than 1 hex.

Scott's Sabutai *is an aerospace fighter. According to the Aerospace Control Systems Table, this means it will receive a cockpit/control system weighing 3 tons, regardless of the fighter's size and features. This leaves the craft with 59.5 unspent tons (62.5 – 3 tons = 59.5 tons) and a minimum crew of 1 (the pilot).*

After consulting the Aerospace Control Systems Table, Bruce finds that the control systems for his Astrolux *will weigh 1.5 tons (200 tons of craft x 0.0075 = 1.5 tons). The Control Systems Table also notes that the* Astrolux *will have a minimum crew of 3 (more if gunners are added). The* Astrolux *now has 105 tons remaining (106.5 tons – 1.5 tons = 105 tons).*

Chris' Nekohono'o*-class DropShip is a military DropShip weighing 16,000 tons, which means it will require 120 tons of control systems (16,000 tons x 0.0075 = 120 tons) and has a minimum crew of 8 (4 base crew for military DropShip + [16,000 tons ÷ 5,000] = 7.2, rounded up to 8)—though gunners will add to this count. After subtracting the control tonnage from the DropShip's unspent weight, Chris finds that the* Nekohono'o *has 9,760 tons remaining (9,880 tons – 120 tons = 9,760 tons).*

For her Arcadia*-class military DropShip, Dawn determines that 23 tons of control systems will be required (3,000 tons x 0.0075 = 22.5 tons, rounded up [for DropShips] to 23), along with a minimum crew of 5 (4 base crew for military DropShip + [3,000 tons ÷ 5,000] = 4.6, rounded up to 5)—before any additional gunners. This leaves the Arcadia with 1,510 unspent tons (1,533 tons – 23 tons = 1,510 tons).*

*A '*Mechbuster *from the Seventeenth Donegal Guard practices a strafing run on a Manteuffel.*

SPECIAL ENHANCEMENTS

Conventional fighters can be built as standard aircraft or given the Very-Short Take-Off and Landing (VSTOL) ability to launch using shorter runways. If the designer opts to install this option now, the VSTOL equipment takes up 5 percent of the aerospace fighter's total tonnage (rounded up to the nearest 0.5 ton).

Aerospace fighters and aerodyne Small Craft, by virtue of their design, already incorporate VSTOL capabilities, but may mount this equipment to eliminate the +2 penalty for attempting a vertical landing in atmosphere.

Tech Base: VSTOL equipment is equally available to conventional fighters constructed using a Clan or Inner Sphere technology bases.

Space: A conventional fighter's VSTOL equipment does not affect its number of available weapon slots.

As a conventional fighter, Robert's 'Mechbuster *can receive VSTOL equipment, but as it is a 50-ton fighter, such equipment would take up 2.5 tons' worth of the fighter's 18 remaining tons (5 percent of 50 tons = 0.05 x 50 tons = 2.5 tons). With bigger plans for the remaining weight—such as armor and weaponry—Robert decides to forego a VSTOL enhancement. His* 'Mechbuster *still has 18 tons remaining.*

As an aerospace fighter, Scott's Sabutai *comes with VSTOL landing and liftoff capabilities automatically. It may not mount the VSTOL enhancement.*

Bruce's Astrolux*, Chris'* Nekohono'o *and Dawn's* Arcadia *are likewise incompatible with the conventional fighter VSTOL enhancement and do not require such equipment anyway, as they all have VSTOL landing and liftoff capabilities.*

STEP 3: ADD ARMOR

Armor helps protect the aerospace unit's structural integrity and critical components. Depending on the technology base used and the type of armor selected, armor can vary in tonnage and critical space.

The maximum amount of armor an aerospace unit may mount is based on the unit's type and body shape (conventional fighter, aerospace fighter aerodyne Small Craft/DropShip or spheroid Small Craft/DropShip) as well as its weight and structural integrity. This value—applicable for Clan and Inner Sphere aerospace units—is shown in the Aerospace Unit Maximum Armor Levels Table below. Regardless of what kind of armor the unit uses, aerospace units may not exceed their maximum point value (or armor tonnage for larger units). Note, however, that this value reflects the aerospace unit's maximum total armor; the number of points assigned per location is left up to the designer's discretion.

Aerospace unit armor may be mounted in full- or half-ton lots. The amount of points each armor type provides per ton is shown in the *Aerospace Armor Points Per Ton* (Clan/Inner Sphere) Table

(see p. 192). To determine the armor value provided by a given tonnage of armor, first find the armor's proper Points per Ton value by cross-referencing the unit type and weight against the armor's type on the Aerospace Armor Points per Ton Table. The value for a Clan-made unit (if any) appears to the left of the slash, while the Inner Sphere value (if any) appears to the right of the slash. Any armor type with "NA" listed as its Points per Ton value is not available for units built using that tech base.

With the Points per Ton value determined, finding the amount of points provided for a given tonnage is a matter of multiplying that value by the desired tonnage of armor and then rounding the final result down to the nearest whole number. If the designer wants a specific number of armor points, he may simply divide that number of points by the armor type's Points per Ton value and round the result up to the nearest half-ton. For example, if an aerospace unit is to mount 5 tons of standard armor, the designer can multiply 5 by 16 to find the result (80 points). If, on the other hand, the designer wants 170 points of standard Inner Sphere ferro-aluminum armor, he should divide the armor value of 170 by 17.92 (Points per Ton value for standard Inner Sphere ferro-aluminum) to find the tonnage needed (9.5 tons; 170 ÷ 17.92 = 9.487, rounded up to 9.5).

Using the Armor Diagram on the aerospace unit's appropriate record sheet, the designer may indicate the number of armor points protecting each of the unit's hit locations by blacking out any excess boxes beyond those assigned to that location. The armor facings for all aerospace units covered by these rules are presented on the Aerospace Unit Maximum Armor Levels Table, below.

Aerospace units built under these rules may not combine multiple armor types on the same design.

Small Craft and DropShips: To reflect the added resiliency of their structural integrity, Small Craft and DropShips receive a bonus to their armor levels beyond the tonnage assigned to armor. This bonus adds the unit's SI value to its armor levels per facing, so a DropShip with an SI of 10 would gain 10 armor points—beyond the amount purchased as armor—for each facing. This "bonus armor" is considered the same type of armor as installed on the unit, but takes up no armor tonnage, and so does not exceed the armor limits given for Small Craft and DropShip units.

Tech Base: Aerospace units built under an Inner Sphere Technology Base may only use standard Inner Sphere armor, as well as Inner Sphere ferro-aluminum, heavy ferro-aluminum and light ferro-aluminum armors. Aerospace units built with a Clan Tech Base may only use Clan standard armor and Clan ferro-aluminum armor.

Space: Carrying ferro-aluminum armor in any form affects the allotment of weapon slots on conventional and aerospace fighter units. The amount of slots taken by a given armor type (and the locations affected) are shown under the Slots column (appropriate to the unit's Tech Base) in the Aerospace Armor Weapon Space Table (Fighters Only) (see p. 192). An entry of "NA" indicates that units using that technology base may not install the listed armor type.

OmniFighters: The type, weight, number and allocation of armor points, as well as any weapon slots required for its use, must be established when designing an OmniFighter's base configuration. These values may not be altered in the fighter's completed Primary or Alternate configurations.

Robert's 'Mechbuster*—as a conventional fighter weighing 50 tons—has a maximum armor limit of 50 points (50 tons x 1 = 50 points). Choosing standard armor (to keep costs low), Rob finds that the weight for maximum armor protection comes to 3.5 tons (50 points ÷ 16 = 3.125, rounded up to 3.5). Deciding to place the maximum amount of armor on his fighter, Rob allocates 18 points to the nose, 11 points to each wing and 10 points to the aft, for a total of 50 points allocated (18 + 11 + 11 + 10 = 50). With 3.5 tons invested in its armor, the* 'Mechbuster *now has 14.5 tons remaining (1s.5 = 14.5).*

As a 75-ton aerospace fighter, Scott's Sabutai *has an upper limit of 600 points of armor (75 tons x 8 = 600 points). Choosing Clan ferro-aluminum armor for its protection, Scott decides not to push this maximum limit (which he calculates would take more than 31 tons to accomplish; 600 points ÷ 19.2 Points per Ton of Clan ferro-aluminum = 31.25, rounded up to 31.5 tons). Instead, he decides on a nice, round 10 tons of armor, which will provide his* Sabutai *with 192 armor points (10 armor tons x 19.2 Points per Ton of Clan Ferro-aluminum Armor = 192 points).*

After allocating these points—62 to the nose, 45 to each wing and 40 points to the aft—Scott notes that his fighter has 49.5 unspent tons remaining (59.5 tons – 10 tons = 49.5 tons). Because of his selection of Clan ferro-aluminum armor, however, the fighter also loses 1 open weapon slot in each wing, reducing its wings to a maximum of 4 weapons apiece.

AEROSPACE UNIT MAXIMUM ARMOR LEVELS TABLE

Unit Type	Maximum Armor Level	Armor Facings
Conventional Fighter	(Tonnage x 1) points	Nose, Left Wing, Right Wing, Aft
Aerospace Fighter	(Tonnage x 8) points	Nose, Left Wing, Right Wing, Aft
Small Craft/DropShip (aerodyne)	(Structural Integrity x 4.5) tons	Nose, Left Wing, Right Wing, Aft
Small Craft/DropShip (spheroid)	(Structural Integrity x 3.6) tons	Nose, Left Side, Right Side, Aft

AEROSPACE ARMOR POINTS PER TON (CLAN/INNER SPHERE) TABLE

Unit Type	Standard Armor	Light Ferro-Alum.	Inner Sphere Ferro-Alum.	Clan Ferro-Alum.	Heavy Ferro-Alum.
Conventional Fighter	16 / 16	NA / 16.96	NA / 17.92	19.2 / NA	NA / 19.84
Aerospace Fighter	16 / 16	NA / 16.96	NA / 17.92	19.2 / NA	NA / 19.84
Small Craft (All)	20 / 16	NA / 16.96	NA / 17.92	24 / NA	NA / 19.84
DropShips					
Spheroid: 200-12,499 tons	20 / 16	NA / 16.96	NA / 17.92	24 / NA	NA / 19.84
Aerodyne: 200-5,999 tons	20 / 16	NA / 16.96	NA / 17.92	24 / NA	NA / 19.84
Spheroid: 12,500-19,999 tons	17 / 14	NA / 14.84	NA / 15.68	20.4 / NA	NA / 17.36
Aerodyne: 6,000-9,499 tons	17 / 14	NA / 14.84	NA / 15.68	20.4 / NA	NA / 17.36
Spheroid: 20,000-34,999 tons	14 / 12	NA / 12.72	NA / 13.44	16.8 / NA	NA / 14.88
Aerodyne: 9,500-12,499 tons	14 / 12	NA / 12.72	NA / 13.44	16.8 / NA	NA / 14.88
Spheroid: 35,000-49,999 tons	12 / 10	NA / 10.60	NA / 11.2	14.4 / NA	NA / 12.4
Aerodyne: 12,500-17,499 tons	12 / 10	NA / 10.60	NA / 11.2	14.4 / NA	NA / 12.4
Spheroid: 50,000-64,999 tons	10 / 8	NA / 8.48	NA / 8.96	12 / NA	NA / 9.92
Aerodyne: 17,500-24,999 tons	10 / 8	NA / 8.48	NA / 8.96	12 / NA	NA / 9.92
Spheroid: 65,000-100,000 tons	7 / 6	NA / 6.36	NA / 6.72	8.4 / NA	NA / 7.44
Aerodyne: 25,000-35,000 tons	7 / 6	NA / 6.36	NA / 6.72	8.4 / NA	NA / 7.44

AEROSPACE ARMOR WEAPON SPACE (FIGHTERS ONLY) TABLE

Armor Type	Slots (Inner Sphere)	Slots (Clan)
Standard	0	0
Light Ferro-Aluminum	1 (Aft)	NA
Ferro-Aluminum (I.S.)	2 (1 each Wing)	NA
Ferro-Aluminum (Clan)	NA	2 (1 each Wing)
Heavy Ferro-Aluminum	4 (1 each Arc)	NA

As an aerodyne Small Craft, Bruce's Astrolux *has a maximum armor capacity measured in tons, not points—36 tons, to be exact (Structural Integrity 8 x 4.5 = 36). Nonetheless, as it is a civilian luxury craft, Bruce sees no reason to splurge so much on armor, and so chooses to install 5 tons' worth of standard armor. This amount of armor provides 80 points of protection by itself, but because the* Astrolux *is a Small Craft, it receives a bonus number of armor points equal to its SI for each of its four facings—for a total of 32 extra points (Structural Integrity 8 x 4 facings = 32). This means the craft receives a final total of 112 armor points. Bruce allocates these points—33 to the nose, 28 to each wing and 23 to the aft—and computes that his Small Craft now has 100 tons unspent remaining (105 tons – 5 tons = 100 tons).*

Chris' Nekohono'o *is a spheroid DropShip with a Structural Integrity of 16 and a total weight of 16,000 tons. This gives the craft a maximum armor weight of 57.5 tons (SI 16 x 3.5 = 57.6 tons, rounded down to 57.5). The structural integrity provides 16 free armor points for each of the vessel's four armor facings (Nose, Left Side, Right Side and Aft), for a total of 64 free points (16 points per armor facing x 4 facings = 64). Choosing Inner Sphere Ferro-Aluminum armor for his design, Chris adds 57 tons of armor, which provides an added 893 points (57 tons of armor x 15.68 points of Inner Sphere Ferro-Aluminum per ton at 16,000-ton spheroid DropShip weight = 893.76, rounded down to 893). With a total of 957 points to assign (893 + 64 = 957), Chis assigns 310 to the nose, 236 to each side and 175 to the aft facing. As the*

Nekohono'o *is a DropShip and not a fighter, it loses no weapon slots to the use of ferro-aluminum armor.*

The Nekohono'o *now has 9,703 tons remaining (9,760 tons – 57 tons = 9,703 tons).*

For her 3,000-ton Arcadia*-class aerodyne DropShip with its Structural Integrity of 11, Dawn finds the maximum armor capacity is 49.5 tons (SI 11 x 4.5 = 49.5). Deciding to install the maximum tonnage of standard armor, she finds that her craft will receive 990 points (49.5 tons of armor x 20 points per ton of Clan standard armor at 3,000-ton aerodyne DropShip weight = 990 points), plus an extra 44 from its Structural Integrity value (SI 11 x 4 armor facings = 44). With a total of 1,034 armor points to allocate (990 + 44 = 1,034), Dawn places 351 in the* Arcadia*'s nose, 211 on each wing and 261 in the aft.*

The Arcadia *now has up to 1,460.5 tons left to spend on other components (1,510 tons – 49.5 tons = 1,460.5 tons).*

STEP 4: ADD HEAT SINKS

Most aerospace units require heat sinks to dissipate the waste heat generated by their weapons, engines and other equipment. Aerospace fighters and Small Craft can push these heat sinks beyond tolerances, but conventional fighters and DropShips operate on a "zero-heat principle," which means that these units have no Heat Scale during combat and cannot generate any heat in excess of their heat sink capacity.

Depending on unit and engine type, aerospace units not only have different heat sink requirements, but also receive a varying number of "weight-free" heat sinks provided with their engines. The Aerospace Heat Sink Table below defines the minimum number of heat sinks needed by each aerospace unit type covered under these rules, as well as the bonus heat sink allotment each unit receives with its engine. Because most heat sink needs depend on knowing the unit's weapon load, designers may opt to establish the unit's heat sinks after determining what weapons (if any) the unit will carry and how much heat these weapons will generate.

Conventional fighters may only use single (standard) heat sinks. Aerospace fighters, Small Craft and DropShips may use standard (single) or double heat sinks.

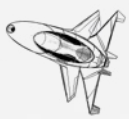
Aerospace units constructed under these rules may not combine heat sinks of different types. If the designer chooses standard (single) heat sinks for a unit, the unit's bonus "weight-free" sinks are automatically considered standard heat sinks; if double heat sinks are chosen, the bonus sinks are considered double heat sinks.

Tech Base: Standard (single) heat sinks are equally available to aerospace units of Clan or Inner Sphere tech bases, and are the only type available to conventional fighters of any tech base. Aerospace units built with an Inner Sphere tech base may use Inner Sphere double heat sinks as well. Clan-made aerospace units may use Clan double heat sinks.

Space: An aerospace unit's heat sinks do not affect the amount of weapon slots available to the unit, even if mounted as OmniFighter pods.

OmniFighters: The type of heat sinks established for an OmniFighter's base configuration may not be altered in its completed Primary or Alternate configurations, nor may the number of said heat sinks be reduced below the number established for the base configuration. However, heat sinks of the same type may be added as pods on later configurations if an Alternate configuration requires them.

*Robert's '*Mechbuster *is a conventional fighter powered by a turbine (internal combustion) engine, and thus receives no free heat sinks, nor does it require heat sinks for non-energy weapons. As Robert plans on installing energy weapons, he must add enough sinks to cover the heat of all energy weapons fired in unison, and thus chooses to add 9 single heat sinks—the only type available—to his Buster. This leaves the fighter with 5.5 remaining tons (14.5 tons – 9 tons = 5.5 tons).*



AEROSPACE UNIT HEAT SINKS TABLE

Aerospace Unit Type	Min. Heat Sink Requirement	Weight-Free Heat Sinks
Conventional Fighter (ICE)	Total of all Energy Weapon Heat	0
Conventional Fighter (Fusion)	Total of all Energy Weapon Heat	10
Aerospace Fighter	10	10
Aerodyne Small Craft or DropShip (Civilian)	None	Engine Tonnage ÷ 60*
Aerodyne DropShip (Military)	None	Engine Tonnage ÷ 20*
Spheroid Small Craft or DropShip (Civilian)	None	√ (Engine Tonnage x 1.6)*
Spheroid DropShip (Military)	None	√ (Engine Tonnage x 6.8)*

*Round down

Scott's Sabutai *is an aerospace fighter powered by a fusion engine, and thus not only receives 10 heat sinks free, but also can use double heat sinks. It is also an Omni-Fighter and not bound to any minimum heat sink requirement (beyond those of the engine, that is), but will generate heat for energy and non-energy weapons alike (unlike Robert's conventional fighter).*

Scott technically does not need to place additional sinks on the base design. Because he sees the Sabutai *as a heavy dogfighter, however, he realizes that high-heat weapons may well be the norm. He therefore chooses to designate the fighter's 10 free heat sinks as doubles, and adds 5 more double heat sinks to the base design, for a total of 15 double heat sinks. Having spent 5 tons on the added heat sinks, the Sabutai has 44.5 unspent tons remaining (49.5 tons – 5 tons = 44.5 tons).*

As a Small Craft powered by a fusion engine, Bruce's Astrolux *can use standard (single) or double heat sinks, as desired. Bruce, however, sees no need for them as he plans to leave the craft completely unarmed. Nevertheless, the* Astrolux *does receive 1 free heat sink (which Bruce decides will be a standard sink) free with its engine (65 tons of engine weight ÷ 60 = 1.08, rounded down to 1).*

As Chris plans for his Nekohono'o*-class DropShip to engage other DropShips and fighters in heavy combat, he foresees a lot of weaponry in its future. Because DropShips generate heat for energy and non-energy weapons alike, he also foresees a correspondingly high number of heat sinks to go with them. Checking the Aerospace Unit Heat Sinks Table, he finds that the 5,200-ton engine of his military spheroid DropShip provides 188 free heat sinks (√[5,200 tons engine weight x 6.8]) = 188.04 heat sinks, rounded down to 188). Chris decides to add another 107 heat sinks (at 107 tons), and declares that these will all be double heat sinks to maximize their effect, thus providing his* Nekohono'o *with 295 double heat sinks (a heat capacity of 590 points; 295 sinks x 2 points of heat capacity per sink = 590 points of heat sink capacity). The* Nekohono'o *now has up to 9,596 tons remaining (9,703 tons – 107 tons = 9,596 tons).*

As a 3,000-ton military aerodyne DropShip, Dawn's Arcadia *receives 54 free heat sinks thanks to its 1,098-ton engine (1,098 tons of engine weight ÷ 20 = 54.9, rounded down to 54). Because she expects to arm this vessel for heavy combat, she adds another 160 heat sinks to the design, bringing the* Arcadia *to a total heat sink count of 214 sinks, which she declares will be double-strength. Subtracting the 160 tons of added sinks from her remaining weight, Dawn finds that she has up to 1,300.5 tons remaining (1,460.5 tons – 160 tons = 1,300.5 tons).*

STEP 5: ADD WEAPONS, AMMUNITION AND OTHER EQUIPMENT

The weapons, ammunition and equipment that may be mounted on an aerospace unit are listed in the Weapons and Equipment Tables shown on p. 341. In addition to any heat, damage and range statistics, these tables provide the tonnage these items occupy on an aerospace unit, what technology base (Clan or Inner Sphere) is required to use them and any special construction rules that might apply to installing the equipment.

The Ammunition column for each item's entry also notes how many shots a given weapon or item caries per ton (only machine guns may carry ammunition in half-ton lots). The exception to this is large craft like DropShips, which must round up the mass of any ammunition to the nearest ton regardless of the number of rounds carried. Note, however, that all non-fighter units must carry a minimum of 10 turns of fire for each ammunition-dependent weapon (for multi-firing weapons, such as Ultra and rotary autocannons, this 10-turns rule assumes the weapon is firing at its maximum rate, so an Ultra AC would require a minimum of 20 shots, while a rotary AC would require a minimum of 60 shots). Non-fighter aerospace units armed with ATM launchers may not use the various special munitions unless they carry at least 10 shots of each ammo type per ATM launcher. For example, a unit carrying 4 ATM-12s would need 24 tons of ATM ammo—6 per launcher—to reach the required 10 shots of each ammo type per launcher, as each ton of ATM ammo equals 5 shots (2 tons of ammo per launcher x 5 shots per ton = 10 shots per ton; 3 ammo types per ATM x 2 tons per ammo type x 4 ATMs = 24 tons of ammo).

For special rules on any item, consult its entry under *Weapons and Heavy Equipment* (pp. 200–273)

Remember that the total tonnage of a given aerospace unit design's structure, engine, controls, armor, heat sinks, weapons and other components may never exceed the tonnage established for the unit in Step 1. Any leftover weight that cannot be allocated to other equipment is considered cargo or wasted tonnage, at the designer's option.

Tech Base: The Weapon and Equipment Tables (starting on p. 341) note which items are available to which technology base. Clan-made aerospace units may use only items available to the Clans, while Inner Sphere-made aerospace units must use only those items available to the Inner Sphere.

Capital Weapons: Only DropShips may mount capital missile launchers. Small Craft and fighters may not carry capital weapons under these rules.

Weapon Bays and Firing Arcs: As a means of simplifying their use in combat, the weapons usable by aerospace units are sorted into weapon classes. These weapon bay classes are: Point Defense, Laser, Pulse Laser, PPC, Plasma, Autocannon, LB-X AC, ATM, LRM, MRM, MML, SRM, Rocket Launcher and Capital Missile.

When mounted on fighters, weapons of the same class—as shown on the Aerospace Weapons Classes beginning on p. 352—may be grouped together (at the designer's option) for ease of

firing, but only if the weapons are of the same type and size. Otherwise, fighter weapons may be listed and fired separately.

To determine the maximum number of plasma weapons allowed in a bay, first find the average heat generated by that weapon attacking. Add this heat to the weapons attack value and use this figure to determine max bay damage.

Small Craft and DropShips also may group weapons of the same class together in weapon bays that are fired as a single weapon in combat. Unlike fighters, however, these aerospace units may combine weapons of different sizes (such as a mix of large and medium lasers) in a single weapon bay—so long as the weapons remain of the same class. The damage delivered by each weapon bay is then determined by adding together the values that apply at each range for the weapons in question. For example, a DropShip may combine 2 large lasers (8 damage points each, with a maximum range of Medium) with 3 medium lasers (5 damage points each, maximum range Short) in a single bay, producing a laser weapons bay that delivers 31 damage points at Short range ([3 Medium Lasers x 5 damage per Medium Laser] + [2 Large Lasers x 8 damage per Large Laser]), but only 16 at Medium range (2 Large Lasers x 8 damage per Large Laser = 16).

The only limit to the number of weapons that can be grouped together in a single weapon bay is a maximum attack value limit—after adding up all weapon damage—of 700 standard damage points (70 capital damage points) per bay. If a combination of desired weapons exceeds this amount in a single firing arc, the vessel simply requires additional weapon bays to handle the excess weaponry, with the damage capability split as evenly as possible among any additional weapon bays.

Fighters (conventional and aerospace), aerodyne Small Craft and aerodyne DropShips may divide their weapons among four firing arcs: Nose, Left Wing, Right Wing and Aft. Aerodyne Small Craft and DropShips may also opt to assign their wing-mounted weapons to a rearward facing. Spheroid Small Craft and DropShips may divide their weapons among six firing arcs: Nose, Fore-Left, Fore-Right, Aft-Left, Aft-Right and Aft. Side- and wing-mounted weapons must be identical on both sides of a given craft—so if a fighter carries 2 large lasers and an SRM-6 in its left wing, it must carry 2 large lasers and an SRM-6 in its right wing as well. In another example, a spheroid DropShip that carries 4 ER large lasers in its Aft-Left arc must carry 4 ER large lasers in its Aft-Right arc.

Ammunition for all fighter-based weapons is located in the fighter's fuselage. Small Craft and DropShips allocate their ammunition to the same bays as the weapons that use them.

Crew Quarters: In addition to the minimum crew required to man all Small Craft and DropShips, such units require gunners to man any weapons, and may also carry passengers for long-distance transportation. These crew and passengers require quarters. Rules for establishing the crew needs of a given unit appear under *Add Control and Crew Systems* in Step 3 (see p. 184). DropShip and Small Craft designers must assign quarters of some kind to all crew and passengers.

Bay personnel—which includes personnel associated with other units being transported, such as infantry, vehicles, fighters and 'Mechs—need not be allocated quarters, as their bays already incorporate basic amenities. Additional quarters for such personnel may be added as passenger quarters, reflecting an added level of comfort and support, but are not required.

Fighters—conventional and aerospace—may not incorporate quarters under these rules. They have a default life support endurance of 96 hours when operated in hostile environments that require life support (see *Tactical Operations*, p. 28).

External Consumables Pods: Fighters may add life support endurance in lieu of bombs, with each pod providing another 96 hours endurance per fighter occupant. Because of cockpit space and amenities limits, a fighter may only carry 1 pod per 25 tons (round up) of fighter mass, even though the pods only occupy 1 hard point each. Life support from these pods is consumed before any from internal reserves. If a fighter carrying external consumables pods sustains bomb critical damage, determine the damaged bomb randomly, including any external consumables pods. If an external consumables pod is damaged, the life support of that pod is lost.

External consumables pods may be dropped using the rules for Dumping Bombs (see *Total Warfare,* p. 247) in the case of emergency bomb dumps, or Dumping Ammunition (see *Total Warfare*, p. 104) in non-emergencies. Dumped consumables pods—whether full or empty—do not inflict any damage when they land.

Heat Sinks: Remember that conventional fighters need heat sinks only to handle the heat load of all energy weapons, and that the number of heat sinks required for such units must equal that of all energy weapons fired simultaneously. Aerospace fighters and Small Craft, which can push their heat limits better, may mount as many heat sinks as desired after their initial 10 free sinks are added with the engine.

DropShips may not generate heat in excess of their heat sinks. When determining weaponry and firing arcs, designers should note how many heat sinks the unit has available, to make certain that the use of any weapon bay does not exceed the craft's ability to handle the load.

Power Amplifiers (turbine-powered conventional fighters only): Conventional fighters powered by ICE (Turbine) engines may carry heavy energy weapons such as lasers and PPCs only if they also mount power amplifiers. These amplifiers weigh 10 percent of the weight of the energy weapons carried (rounded up to the nearest half-ton), but take up no equipment slots on the fighter's record sheet. Fusion-powered conventional fighters, aerospace fighters, Small Craft and DropShips do not require this equipment for energy weapons.

Transport Bays and Doors (DropShips and Small Craft only): Bays for cargo and unit transport often make up all remaining tonnage on larger aerospace units such as Small Craft and DropShips. These bays can be specific cubicles for 'Mechs, fighters and other units, or they may be generic cargo bays to store supplies, spare parts or even additional ammunition and fuel stores. How much of the generic cargo space is allocated to such needs is entirely up to the designer and can vary from mission to mission, so they need not be addressed during construction.

Transport bays—including those for fighters, BattleMechs and other units—must assign a minimum of 1 bay door each, to allow for entry and egress from the vessel. Aerodyne small craft can have no more than 2 bay doors, while spheroid small craft can have no more than 4 bay doors. For all other vessels, the maximum number of bay doors is equal to 7 plus the vessel's total weight (in tons) divided by 50,000 (rounded up). Thus, a DropShip weighing 20,000 tons would receive a maximum of 8 bay doors (7 + [20,000 ÷ 50,000] = 7.4, rounded up to 8, while a DropShip weighing 80,000 tons would be limited to 9 doors (7 + [80,000 ÷ 50,000] = 8.6, rounded up to 9).

A transport DropShip's launch rate (per turn) for onboard fighters or other launch-capable units (fighters, Small Craft, 'Mechs and ProtoMechs) is equal to twice the number of functioning bay doors associated with the launch-capable units. For example, a DropShip with 18 fighters in a single bay that has 2 doors assigned to it may launch 4 of these 18 fighters per turn (2 doors x 2 fighters per door per turn = 4 fighters per turn). Meanwhile, a DropShip that has 12 BattleMechs across two bays, each of which has 2 doors, would be able to drop 8 'Mechs per turn (2 doors per bay x 2 bays x 2 BattleMechs per door per turn = 8 BattleMechs per turn). Rules for dropping 'Mechs are in *Strategic Operations*, p. 22.

External Stores (fighters only): All combat fighters come equipped with external stores hardpoints, which may be used to carry bombs, additional fuel tanks or even special sensor and targeting equipment (like TAG). The number of hardpoints a fighter receives is equal to its tonnage, divided by 5 (rounded down).

Space: Aerospace unit fire control and power distribution systems limit the number of weapons that can be mounted in an arc. For fighters, this limit is set at 5 weapons per arc (less if the unit uses non-standard armor; see *Add Armor*, p. 190). This maximum limit may not be exceeded under these construction rules.

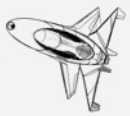
For Small Craft and DropShips, the weapon limit is 12 weapons per arc, regardless of the vessel's size. These aerospace units, however, can override this limit by investing more tonnage in their master fire control and power distribution systems. To determine the weight of these expanded fire control systems, for any firing arc that exceeds its 12-weapon limit, divide its actual number of weapons by 12 and round the result down to the nearest whole number. Then multiply this value by 10 percent (0.10) of the tonnage of all the weapons in that arc (discounting ammunition), rounding this final result up to the nearest half-ton.

For example, if a DropShip attempts to mount 13 weapons in its Nose arc for a total weight of 133 tons, it would require 13.5 tons of expanded fire control systems to do so (13 weapons ÷ 12 = 1.08, rounded down to 1; [1 x 0.1 x 133 tons of weapons = 13.3 tons, rounded up to 13.5). If the DropShip instead attempted to mount 36 weapons with a total of 276 tons in an arc, the tonnage for expanded fire control rises to 83 (36 weapons ÷ 12 = 3; 3 x 0.1 x 276 tons of weapons = 82.8 tons, rounded up to 83 tons).

Remember that only weapon items need to be tracked on aerospace units. Core components, including structure, engines, heat sinks and control systems, as well as ammunition, do not occupy weapon slots on an aerospace unit's design. For ease of reference, items on the Weapons and Equipment Tables (beginning on p. 341) note whether or not they require any aerospace weapon slot space under the Weapon Slots column.

OmniFighters: Though it is unusual, weapons and equipment may be established as fixed components of an OmniFighter's base configuration just like heat sinks, armor and the like. In such cases, these "fixed" items must be mounted and placed among the fighter's weapon slots before completing the base configuration, and they may not be altered in the OmniFighter's completed Primary or Alternate configurations.

Robert decides to arm his 'Mechbuster *with a trio of medium lasers, each weighing 1 ton and occupying 1 weapon slot. Because the* Buster *is turbine-driven, however, these weapons require 0.5 tons in power amplifiers to function (10 percent of Energy Weapon Weight = 3 tons [for 3 Medium Lasers] x 0.10 = 0.3, rounded up to 0.5). The power amplifiers need not be allocated on the 'Mechbuster, but the lasers must be placed in one of the fighter's four weapon arcs. Robert chooses to place all three in the Buster's nose, providing the fighter a respectable strafing capability.*



With 3 tons spent on the lasers and an additional 0.5 tons spent on amplifiers, Robert finds that his 'Mechbuster *has 2 tons of unspent weight remaining. Fresh out of ideas, he allocates this weight to additional fuel, adding another 320 points of fuel reserves to his fighter after briefly returning to the Install Engine step. He also notes that at 50 tons, the Buster has 10 external stores hardpoints for bombs and such (50 tons ÷ 5 = 10 hardpoints).*

As an OmniFighter, the base configuration of Scott's Sabutai *is technically finished at this phase, and so he completes and copies the unconfigured fighter's record sheet before continuing on to create a Primary configuration, essentially relegating the 44.5 unspent tons as pod space. He also notes that the 75-ton fighter has 15 external hardpoints (75 tons / 5 = 15 hardpoints).*

For the Primary configuration, Scott adds the following weapons and ammunition, all chosen from the Clan Weapons and Equipment list: 1 Gauss rifle (12 tons), 2 ER PPCs (6 tons each), 2 large pulse lasers (6 tons each) and 3 ER small lasers (0.5 tons each), plus 1 ton of Gauss rifle ammo (1 ton; provides 8 shots for the weapon), CASE (0 tons for Clan designs) and 6 more double heat sinks. The total weight of all these weapons—44.5 tons—uses up the Sabutai*'s pod space.*

To finish configuring this Sabutai *Prime, Scott places the gauss rifle in a Nose slot, backed up by one of the ER small lasers. He places the other 2 ER smalls in the Aft arc, with each taking up a weapon slot there. He then adds a PPC and a large pulse laser to each wing, at 1 slot per weapon. The gauss ammunition, CASE and extra double heat sinks do not occupy added weapons slots, and are considered to be located in the fighter's body or fuselage.*

Bruce wants the Astrolux *to be nothing short of a flying habitat, comfortable for crew and passengers alike, and has no intention of arming it for battle. He thus decides to invest 21 tons in standard quarters for the Small Craft's crew (3 Crew x 7 tons per Crew/Second-Class Quarters = 21), and an extra 70 tons in 7 first-class passenger quarters (7 passengers x 10 tons per First-Class Quarters = 70 tons). This leaves just 9 tons remaining (100 tons – [21 tons + 70 tons] = 9 tons), which Bruce allocates to cargo.*

As neither quarters nor cargo bays occupy weapon slots in aerospace unit design, Bruce simply records them under the Astrolux's *Notes block.*

Chris plans to equip his Nekohono'o *with an array of weapons, fighter and Small Craft bays, battle armor bays, and even some escape pods for emergency use. Choosing to begin with weapons, Chris remembers that DropShips have a default limit of 12 individual weapons per weapon arc, and that spheroid DropShips like his* Nekohono'o *have six such arcs to work with: Nose, Fore-Left, Fore-Right, Aft-Left, Aft-Right and Aft. Chris also knows that weapons must be grouped into bays by weapon class (such as Laser, Autocannon or LRM) and that weapons mounted on Fore or Aft Side arcs must be duplicated on the opposing side arc. Finally, Chris notes that all ammunition for these weapons must be placed in the same bays and with the same weapons as he chooses to mount, and that each weapon must have a minimum of 10 shots to be considered effective.*

Beginning with the Nose arc, Chris decides to center the DropShip's firepower on 3 Kraken-T capital missile launchers (220 tons each; 660 tons together) with 30 missiles between them (100 tons per missile; 3,000 tons together). Backing these up, he adds 2 MRM-40 launchers (12 tons each; 24 tons together) with 36 shots (1 ton per 6 shots; 6 tons for 36), and 5 Streak SRM-6s (4.5 tons each; 22.5 tons together) with 60 shots (1 ton per 15 shots; 4 tons together). This totals out to 10 individual weapons in the Nose, broken into three weapon bays (Capital Missiles, MRMs and SRMs). The weapons and their ammunition weigh a grand total of 3,716.5 tons (660 tons [3 Kraken-Ts] + 3,000 tons [Kraken ammo] + 24 tons [2 MRM-40s] + 6 tons [MRM ammo] + 22.5 tons [5 Streak SRM-6s] + 4 tons [Streak-6 ammo] = 3,716.5 tons. Because he kept below the 12-weapon limit per arc, Chris does not need to add any extra fire control systems here.

For the Fore-Left arc, Chris chooses to mount 3 MRM-30s (10 tons each; 30 tons together) with 32 shots between them (1 ton per 8 shots; 4 tons together), 2 gauss rifles (15 tons each; 30 together) with 32 shots between them (1 ton per 8 shots; 4 tons together), 2 LRM-20s with Artemis IV (11 tons each; 22 tons together) with 36 shots between them (1 ton per 6 shots; 6 tons together) and 5 ER PPCs (7 tons each; 35 tons together). The total here is 12 weapons in the Fore-Left arc, broken into four weapon bays (MRMs, Autocannon, LRMs and PPCs). These weapons weigh 131 tons in total (30 tons [3 MRM-30s] + 4 tons [MRM ammo] + 30 tons [2 Gauss Rifles] + 4 tons [Gauss ammo] + 22 tons [2 LRM-20s] + 6 tons [LRM ammo] + 35 tons [5 ER PPCs] = 131 tons. Because the Fore-Left and Fore-Right arcs must be identical, Chris doubles this weight cost to 262 tons (131 tons per Fore-Side x 2 Fore-Side arcs = 262 tons), and notes the exact same weapons array exists on the Fore-Left and Fore-Right arcs. As he has not exceeded the 12-weapon limit for this arc, Chris notes his Nekohono'o *requires no added tonnage for fire control systems.*

For the Aft-Left arc, Chris starts with a screen launcher capital weapon (40 tons) with 20 shots (10 tons per shot; 200 tons together), and adds 5 LB 10-X ACs (11 tons each; 55 tons together) with 200 shots between them (10 shots per ton; 20 tons for 200 shots), 3 Streak SRM-4s (3 tons each; 9 tons together) with 75 shots (1 ton per 25 shots; 3 tons together) and 3 ER medium lasers (1 ton each; 3 tons together). This yields a total of 12 weapons in the Aft-Left arc, spread across 4 classes (Capital Missile, LB-X ACs, SRMs and Lasers). Their total weight is 330 tons (40 tons [Screen Launcher] + 200 tons [Screen ammo] + 55 tons [5 LB 10-Xs] + 20 tons [LB-X Ammo] + 9 tons [3 Streak SRM-4s] + 3 tons [Streak-4 ammo] + 3 tons [3 ER Medium Lasers] = 330 tons). As with the Fore-Left arc, Chris doubles the weight spent on the Aft-Left arc and duplicates this weapon load on the Aft-Right arc, spending a total of 660 tons on the Aft-Side arcs together. Because he has not exceeded the 12-weapon arc limit, Chris requires no extra fire control weight.

For the Aft arc, Chris opts for a much simpler weapon load of just 7 large pulse lasers at 7 tons apiece. This provides an Aft arc with 7 individual weapons in a single weapon bay (Pulse Lasers), weighing 49 tons (7 Large Pulse Lasers x 7 tons per Laser = 49 tons).

With 4,687.5 tons spent on weapons (3716.5 tons [Nose] + 262 tons [Fore-Sides] + 660 [Aft-Sides] + 49 tons [Aft] = 4,687.5 tons), Chris goes on to add 6 fighter cubicles at 150 tons each (for a total of 900 tons; 150 tons x 6 = 900 tons), 9 Small Craft cubicles at 200 tons each (1,800 tons total; 200 tons x 9 = 1,800 tons) and 27 battle armor squad cubicles at 10 tons each (270 tons total; 10 tons x 27 = 270 tons). For each of these three bays (1 for the fighters, 1 for the Small Craft and 1 for the battle armor), he assigns 2 doors each at no weight cost. He then adds 6 escape pods to the DropShip at 7 tons apiece (42 tons total; 6 pods x 7 tons per pod = 42 tons). The total for these non-weapon items comes to 3,012 tons (900 [Fighters] + 1,800 [Small Craft] + 270 [Battle Armor] + 42 [Escape Pods] = 3,012 tons).

Next, Chris looks at his crew needs. With the Nekohono'o's *minimum of 8 crew defined earlier, Chris notes that because it carries a total of 5 capital weapons (3 Krakens + 2 Screen Launchers) and 60 standard weapons, 15 gunners are needed ([5 Capital Weapons x 1 Gunner per Capital Weapon] + [1 Gunner per 6 Standard Weapons x 60 Standard Weapons = 60 Standard Weapons ÷ 6] = 15 Gunners). This means his DropShip has a total minimum crew count of 23 (8 Minimum Crew + 15 Gunners = 23 crew). Chris decides to add 19 extra crewmen to this count, as a buffer against casualties, for a total of 42 crewmen. Of these crewmen, he finds that at least 9 should be officers (42 crew ÷ 5 = 8.4, rounded up to 9). Chris decides to double this officer count, and so determines that 18 of his 42-man crew are officers. For these crew counts (18 officers, 24 enlisted/non-officer crewmen), Chris must provide quarters, and so he assigns standard crew quarters (7 tons per person) to the enlisted crewmen and officer quarters (10 tons per person) to the officers. These quarters cost 348 tons altogether ([18 officers x 10 tons per officer] + [24 crew x 7 tons per crewman] = 348 tons).*

Tallying up the weapons, bays, escape pods and quarters he has assigned so far, Chris finds that he has spent 8,047.5 tons on extra weapons and equipment, leaving his Nekohono'o with 1,548.5 tons remaining (9,596 tons – 8,047.5 = 1,548.5 tons). Chris decides to allocate all of this to a cargo bay with 2 weight-free doors—the maximum he can add, after having already assigned 6 more to the vessel for the fighter, Small Craft and battle armor bays (maximum bay doors = 7 + 1 per 50,000 tons, rounded up = 7 + [16,000 ÷ 50,000] = 7.32 doors, round up to 8).

The DropShip's design is now complete.

For her Arcadia*-class DropShip, Dawn decides to start off with installing bays for its intended cargo: ProtoMechs. She decides that a load of 15 ProtoMech Points—75 ProtoMechs in all—will be sufficient for her craft's mission, and so spends 750 tons on 3 Stars' worth of ProtoMech cubicles (50 tons per ProtoMech Point Cubicle x 15 ProtoMech Points = 750 tons). For every 5 ProtoMech Points (which she chooses to assign to a single bay), Dawn assigns 1 weight-free door.*

Moving on to weapons, Dawn notes that DropShips have a default limit of 12 individual weapons per weapon arc, and that aerodyne DropShips like her Arcadia have four such arcs to work with: Nose, Left Wing, Right Wing and Aft. Dawn also knows that weapons must be grouped into bays by weapon class and that weapons mounted on either Wing arc must be duplicated on the opposing Wing arc. Finally, Dawn remembers that all ammunition for these weapons must be placed in the same bays and with the same weapons as she chooses to mount, and that each weapon must have a minimum of 10 shots to be considered effective.

Beginning with the Nose arc, Dawn assigns 4 heavy large lasers (4 tons each; 16 tons together), with 5 heavy medium lasers (1 ton each; 5 tons together) and 2 ATM-12s (7 tons each; 14 tons together) with 30 shots between them (1 ton per 5 shots; 6 tons together). This totals out to 11 individual weapons in the nose, which can be broken into two weapon bays (Lasers and ATMs), though Dawn elects to keep the different-sized heavy lasers in separate bays for better flexibility. The weapons and their ammunition weigh a total of 41 tons (16 tons [4 Heavy Large Lasers] + 5 tons [5 Heavy medium Lasers] + 14 tons [2 ATM-12s] + 6 tons [ATM ammo] = 41 tons. Because she kept below the 12-weapon limit per arc, Dawn does not need to add any extra fire control systems here.

For the Left Wing arc, Dawn chooses to mount 3 heavy large lasers (4 tons each; 12 tons together), 5 heavy medium lasers (1 ton each; 5 together), 2 Ultra AC/20s (12 tons each; 24 tons together) with 40 shots between them (1 ton per 5 shots; 8 tons together) and 2 ATM-9s (5 tons each; 10 tons together) with 42 shots between them (1 ton per 7 shots; 6 tons for all 42). A total of 12 weapons have now been placed in the Left Wing arc. These must be broken into at least 3 weapon bays (for Lasers, Autocannon and ATMs), but as with the Nose arc, Dawn decides to separate the heavy lasers into 2 bays based on size. These weapons weigh 65 tons in all (12 tons [3 Heavy Large Lasers] + 5 tons [5 Heavy Medium Lasers] + 24 tons [2 Ultra AC/20s] + 8 tons [Ultra AC/20 ammo] + 10 tons [2 ATM-9s] + 6 tons [ATM ammo] = 65 tons). Because the Wing arcs must be identical, Dawn doubles this weight cost to 130 tons (65 tons per Wing arc x 2 Wing arcs = 130 tons), and notes the exact same weapons array exists on the Left and Right wings. As she has not exceeded the 12-weapon limit for the Wing arcs, Dawn notes that her Arcadia requires no added tonnage for fire control systems.

For the Aft arc, Dawn installs 5 heavy medium lasers at 1 ton apiece, backed up by 3 Streak SRM-6s (3 tons each; 9 tons together) with 45 shots between them (1 ton per 15 shots; 3 tons in all). This provides an Aft arc with 8 individual weapons in 2 weapon bays (Lasers and SRMs), weighing 17 tons (5 tons [Heavy Medium Lasers] + 9 tons [3 Streak SRMs] + 3 tons [Streak-6 Ammo] = 17 tons).

Between all four weapon arcs, the Arcadia *has spent 188 tons (41 [Nose] + 130 [Wings] + 17 [Aft] = 188 tons). In addition to these weapons and the 750 tons spent on ProtoMech cubicles, Dawn also adds 2 escape pods (at 7 tons each) for the vessel's crew, for a total of 952 tons spent on weapons and equipment.*

For her DropShip's crew needs, Dawn notes that the vessel already has a minimum crew requirement of 5, before the addition of gunners. The Arcadia*'s armament consists of 43 standard weapons and no capital weapons, so 8 gunners will be required (1 Gunner per 6 Standard Weapons x 43 Standard Weapons = 43 Standard Weapons ÷ 6] = 7.17 Gunners, rounded up to 8). This means her DropShip has a total minimum crew count of 13 (5 Minimum Crew + 8 Gunners = 13 Crew). Dawn decides to add 1 extra crewman to this count, for a total of 14 crewmen. Of these crewmen, Dawn determines that at least 3 should be officers (14 crew ÷ 5 = 2.8, rounded up to 3). Settling on this minimum, she notes her* Arcadia *now has 3 officers and 11 enlisted/non-rated crewmen (including gunners). For these crewmen, Dawn must provide quarters, and so she assigns standard crew quarters (at 7 tons per person) to the enlisted personnel and officer quarters (10 tons per person) to the officers. These quarters cost 107 tons altogether ([3 officers x 10 tons per officer] + [11 crew x 7 tons per crewman] = 107 tons).*

Tallying up the weapons, bays, escape pods and quarters she has assigned, Dawn finds that she has spent 1,059 tons on extra weapons and equipment, leaving the Arcadia *with 241.5 tons remaining (1,300.5 tons – 1,059 tons = 241.5 tons). Dawn decides to allocate all of this to a cargo bay with 2 weight-free doors (for a total of 5 doors on the entire design, well below the maximum limit). This completes her DropShip's design.*

STEP 6:

COMPLETE THE RECORD SHEET

By the time the designer has chosen all structure, engine and controls for the aerospace unit, and then added armor, weapons and equipment, all items must be allocated to their proper places on the appropriate blank Record Sheet. For a completed record sheet, the designer must be sure to have selected the appropriate sheet for the aerospace unit's type (conventional fighter,

aerospace fighter, aerodyne Small Craft, spheroid Small Craft, aerodyne DropShip or spheroid DropShip). The sheet must have all data filled in for the Fighter/DropShip Data Block (including name, tonnage, engine and Thrust Points). All equipment slots must be allocated on the Weapons and Equipment Inventory (including shots per weapon, where appropriate). All extraneous armor and Structural Integrity points must be blacked out on the Armor Diagram.

In the case of aerospace units, weapons allocated in groups are treated differently on the record sheets, based on unit type. For fighters (conventional and aerospace), weapons are grouped by the same type but may be fired individually in combat. Thus, when listing the heat and damage values of a weapons group, these values should be presented as the value for a single weapon in that group (for example, a listing for 2 large lasers in a single fighter location would state "2 Large Lasers" under the Quantity and Weapon columns, but show 8 for Heat and 8 for damage at Short and Medium ranges, reflecting just one weapon fired. Small Craft and DropShips, meanwhile, always fire in full weapon bays, so if the 2 large lasers noted for the fighter were assigned to a single laser weapon bay on a DropShip, they would receive a Heat Value of 16 and a Damage Value of 16 at Short and Medium range.

Once all of the information is completed on the aerospace unit's appropriate record sheet, the designer may compute the Cost and Battle Value for the unit and bring it into *Total Warfare* game play.

OMNIFIGHTERS

When completing the record sheet for an OmniFighter, it is highly recommended that the designer create one sheet specifically to serve as the base configuration, with none of the weapons or equipment installed that may appear on the Primary and Alternate configurations. Copies of this base configuration record sheet (noting all unused tonnage as pod space) can then be used to quickly generate record sheets for the other configurations.

Robert verifies that all of the valid data blocks are completed on his Conventional Fighter Record Sheet, including the 'Mechbuster's *full name—"*'Mechbuster *(*Laser Variant*)"—in the line for the fighter's Type, checking off that its Tech Base is Inner Sphere, that its tonnage is 50, and noting its Safe Thrust as 5 and its Max Thrust as 8. He also makes sure that its Structural Integrity of 5 is demonstrated with 5 un-blacked circles in the gray-shaded central area on his fighter's Armor Diagram. He also lists the weapons properly on the fighter's inventory, noting the quantity per location, heat per weapon and Damage Values per weapon at each range bracket (Short, Medium, Long and Extreme) as shown on the appropriate Weapons and Equipment Tables (for example, the* Buster's *Nose-mounted medium lasers would be listed as "3" under QTY, "Nose" under Location, "Medium Laser" under Type, "3" under Heat, "5" under Short Range and blank under Medium, Long and Extreme ranges). After making sure that no extraneous circles for armor and heat sinks remain un-blacked, that the heat sink values are correct and the proper number of external stores boxes are left clear, Robert is ready to compute the Battle Value and cost for his* 'Mechbuster *and bring it to play.*

Repeating similar steps to Robert, Scott must also be sure to save a copy of the Aerospace Fighter Record Sheet for his Sabutai's *base chassis with no added weapons or heat sinks beyond those determined before Step 5, to serve as a template for future configurations. He then fills out the Primary configuration he has already generated using a copy of the base chassis sheet.*

Repeating the same steps as Robert, Bruce completes his Astrolux's *Aerodyne Small Craft Record Sheet. But as the* Astrolux *has no weapons, his main focus is assuring that the craft's Thrust, armor and SI are noted properly, and that its crew, passenger and cargo values are appropriately recorded in the Notes block.*

Chris begins filling out his Nekohono'o's *Spheroid DropShip Record Sheet in the same manner as Robert and Bruce, noting basic data such as tonnage, thrust ratings, vessel class name, armor, SI and heat sink values. He must enter the weapon data somewhat differently than the fighter designers, however, with each weapon bay treated as a single line of data that includes its weapon bay class (for example, "Capital Missile (Kraken-T)"), its firing arc ("Nose"), the combined heat for all weapons in the bay ("150") and the combined Damage Value of all weapons in the bay at each range bracket the weapons can reach ("30" for Short, Medium, Long and Extreme range brackets). Chris must also sum up the heat for the entire firing arc and enter this in the DropShip's Heat Data block, providing values that can be used to quickly determine which full arcs may be fired without exceeding the vessel's heat capacity.*

Other data that Chris must fill out includes the number of fighters and Small Craft the vessel may be carrying ("6/9" for this vessel), their launch rate ("4/4" here, as both the fighter and the Small Craft bays have 2 doors) and the number of lifeboats and escape pods ("0/6"). The crew values must also be filled in. Like Bruce's Astrolux, *the crew, passengers and cargo values, including the arrangement of any specialized bays, must also be described in the unit's Notes block. For instance, the* Nekohono'o's *fighter bay may be listed under Notes as: "Bay 1: Fighters (6) 2 Doors".*

For her Arcadia-*class DropShip, Dawn follows the same steps Chris used to complete his* Nekohono'o's *record sheet to fill out her Aerodyne DropShip Record Sheet.*

ABOUT THIS SECTION

This section focuses mostly on background information for the weapons and equipment commonly used by Inner Sphere and Clan forces in battlefield and support units, and can be used to construct any unit using equipment legal for *Total Warfare* standard rules games.

All equipment appears in alphabetical order within its respective sections. In general, items listed under *Heavy Equipment* are used in Combat Vehicle, Support Vehicle, IndustrialMech, BattleMech, ProtoMech, aircraft, aerospace fighter and DropShip construction (though some may be exclusive to just a few of these units), but not in the creation of battle armor or infantry. Items listed under *Battle Armor Equipment*—unless otherwise noted—may be used only in the construction of exoskeletons, power armor and battle armor. Finally, unless otherwise noted, items listed under *Infantry Equipment* may only be employed by conventional infantry, battlesuits (including exoskeletons, power armor and battle armor) and Support Vehicles under 5 tons in weight.

Construction Notes

Basic construction data follows each of these descriptions, providing the tech base, unit restrictions, table reference, game play rules and construction rules. Some of these data blocks may also include a short chart that refers the designer to specific tables or core construction rules and links particular items to particular unit types.

Tech Base data blocks cover whether or not the item(s) described above are available to the Inner Sphere, the Clans or both. Items listed for either or both tech bases feature their "raw" statistics on either the Weapon and Equipment Tables or in the relevant core construction rules.

The Unit Restrictions line provides information on what featured unit types in this book may carry the described item(s), as well as major disqualifiers (such as the restriction of handheld weapons to humanoid-style 'Mechs).

The Construction Rules line notes any special construction rules for the item that cannot be described by its raw stats from the appropriate table reference, including location restrictions, formulas for finding the weight on variable-weight items and so forth. Simpler items may not have much more information than a statement on whether the unit may or may not mount multiples of a given item, or if it is restricted to certain mounting locations, or if actuators and other components must be removed beforehand. More complex entries and core construction components may include a brief chart that refers the designer to other parts of this book.

The Table Reference line indicates which of the tables at the back of this book contain the listed items, including an item's applicable tech bases. Because the Weapon and Equipment Tables separate items by tech base, an item chosen for a unit from one tech base may not reference the statistics for the same item under a different tech base. (In other words, an Inner Sphere-made BattleMech using an ER large laser must reference the Inner Sphere Weapons and Equipment Tables, not the Clan table.)

The Game Rules line provides the most relevant rules reference in *Total Warfare* (where applicable) for a given item, as well as any special addendum that may affect a designer's choice to carry such equipment. Some items in this section may not have proper rules under *Total Warfare* (in such cases, no reference is provided). Game play functions for these items will be expanded in *Tactical Operations* or other publications, as noted in the Game Rules line.

Finally, note that the *Weapon and Equipment Tables* at the back of the book organize some equipment under the Industrial Equipment Table when that equipment does not appear in the Industrial Equipment section (see p. 241). Generally this only occurs when there is no difference in technology base and game stats and hence no need to create two entries (one on the Inner Sphere Tables and one on the Clan Tables).

WEAPONS AND EQUIPMENT

The modern battlefield has become a cornucopia of technological innovation, replete with scores of vehicles great and small, and a weapons variety that is truly vast, from the smallest handguns and blades to the heaviest autocannon and capital-grade missiles. Even modern commercial and industrial equipment has found its way into combat—often as the last-ditch tools of the truly desperate.

The following primer—while far from exhaustive—covers the basics of the types of military and industrial hardware likely to turn up in planetary-level combat today. Deliberately excluded are more advanced weaponry and equipment, such as artillery, experimental weapons and most capital guns. While no less a threat on the modern battlefield, these weapons are often deployed in larger engagements, strategic-level campaigns that will be the focus of another class.

For ease of reference, this primer is broken into three main sections, highlighting the three broad aspects of modern military and industrial equipment. The first and largest section, *Heavy Equipment*, covers the bulk of modern technologies found in the most common vehicles, 'Mechs and aerospace craft in the field today. The second, *Battle Armor Equipment*, focuses on the ever-growing niche of industrial exoskeletons, power armor and battlesuit designs. The final section, *Personal Support Equipment*, briefly explains the more common technologies employed by conventional infantry troops.

Raw statistics for the items described below may be found in the attached Weapons and Equipment Tables located in the appendices of this volume. Students focusing their studies on technical and engineering matters will find such data of particular value, but even those among you who plan to practice the time-honored traditions of battlefield warfare should be aware of the capabilities and the features of these examples of modern technologies. Knowledge, after all, is power.

—Preface to *Modern Industro-Military Systems 301*, Prof. Arastide Habeas, NAMA Publications, 3067

[Professor Habeas' primer, while certainly thorough in its chosen scope, has become rather dated in the few years since his death. In the interests of better preparing those who face today's battlefield, I have chosen to amend this report throughout with new battlefield technologies that have gone into production since the start of the Jihad. In keeping with the late Professor's intentions, however, the technical briefs on strategic weapons, such as nuclear and biochemical devices, are likewise withheld from this briefing.

—Major Elisa Brubaker, WolfNet, 13 December 3071]

HEAVY EQUIPMENT

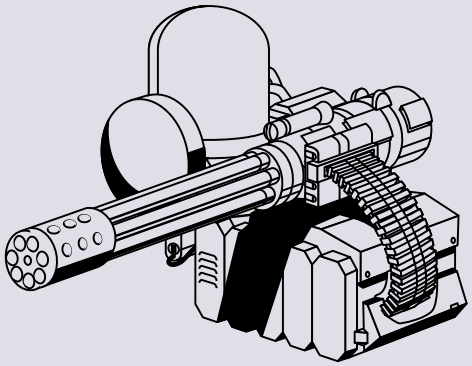
Even though some of the items presented here are relatively lightweight, the following equipment is classified as "heavy" because it is widely applied to larger vehicles, 'Mechs and other units seen both on and off the battlefield. The majority of these items may turn up just as easily on a main battle tank or BattleMech as on an aerospace fighter, DropShip or even a Clan ProtoMech. Some, however—because of their engineering or the construction standards we practice today—are employed in more limited aspects, applicable only to certain unit types.

For the historians among you, most of these featured items include notes on when the equipment was first introduced (and by which state). For the sake of simplicity, any items devised before the year 2000 will be listed as either "pre-spaceflight" if it dates back to before the mid-twentieth century, or "early spaceflight" for items developed in the latter twentieth—records of that era are somewhat spotty, after all. Items developed from 2001 to 2200 are also technically in the "early spaceflight" era, but will be shown here with dates, where feasible. Where applicable, dates are also provided as to when each item became effectively extinct (out of production for all except ComStar and the Clans), and when the technology was recovered in modern times. Bear in mind that these dates only identify when the production-model versions came into (and out of) play, not necessarily when their prototypical or experimental progenitors hit the fields.

The truly detail-oriented among you may well find rare instances where some of these items have been identified by ComStar's acclaimed *Technical Readout* series as being employed on battlefield and support units before their listed dates of introduction. When faced with such discrepancies, keep in mind that ComStar archives have contained more than a few (admittedly minor) errors over the years. Some—such as the infamous production year gaffes of the Lyran *Zeus* and the EXC-B1 *Excalibur,* first cited in ComStar's original *Technical Readouts: 3025* and *3058*, respectively—may be blamed on honest clerical or typographical errors.* More subtle bits—such as background data implying that a "final" production model's specs matched those of its initial runs—may have been part of a "disinformation" effort that ComStar archivists have only admitted to in recent years.

Finally, readers should note that all of the equipment developed initially by the Terran Hegemony found its way into the ranks of the first Star League, and from there, most of these items lived on in Clan technology. Therefore, many items known to exist among the Clans may be presented here with no Clan introduction date.

[*EDITORIAL NOTE: The correct dates for the *Zeus* and *Excalibur* debuts were 2787 and 2620, respectively. *TR: 3058* also records the *Night Hawk* as an SLDF 'Mech in 2565, half a decade before an SLDF existed to speak of. The *Hawk*, another victim of typographical error, actually came out in 2655. Hopefully, ComStar's archivists will get it right on their *next* revision. —AH]



• ANTI-MISSILE SYSTEM •
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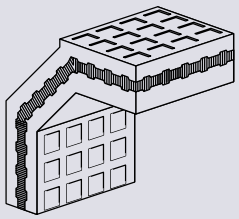

• FERRO-FIBROUS ARMOR •
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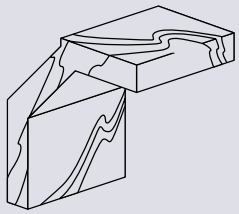

• STEALTH ARMOR •
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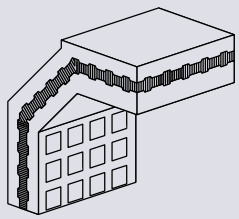

• HEAVY INDUSTRIAL ARMOR •
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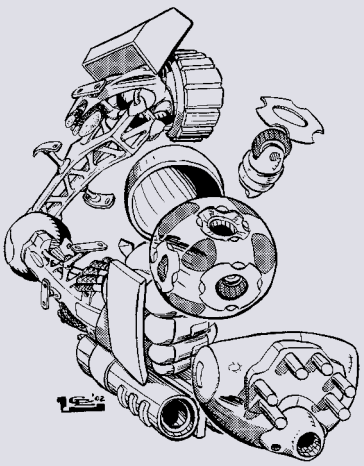
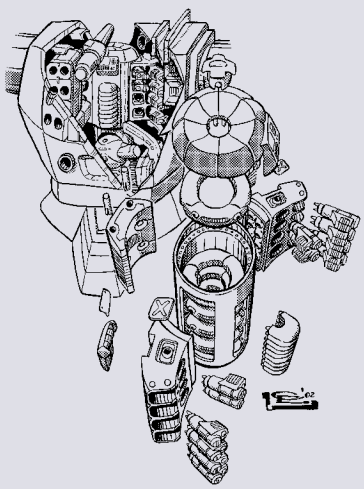


• MECH ACTUATOR •



• MILITARY-STANDARD FUSION ENGINE •
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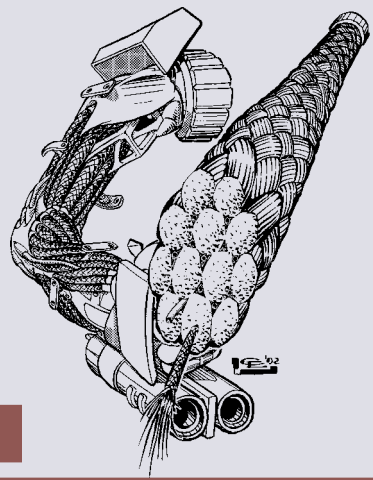

• TRIPLE-STRENGTH MYOMER •
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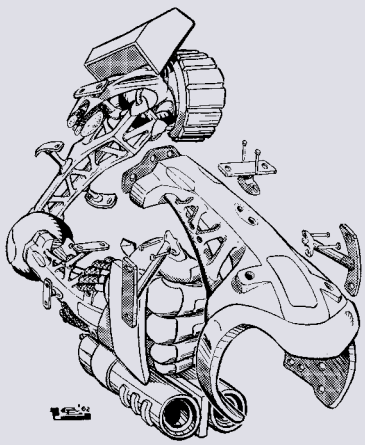
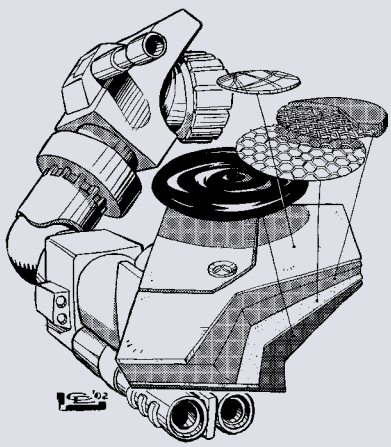


• INTERNAL STRUCTURE •
[PAGE 224]



• STANDARD ARMOR •
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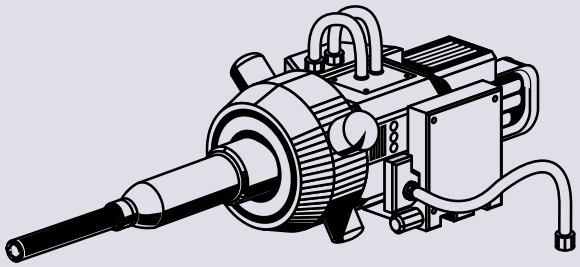
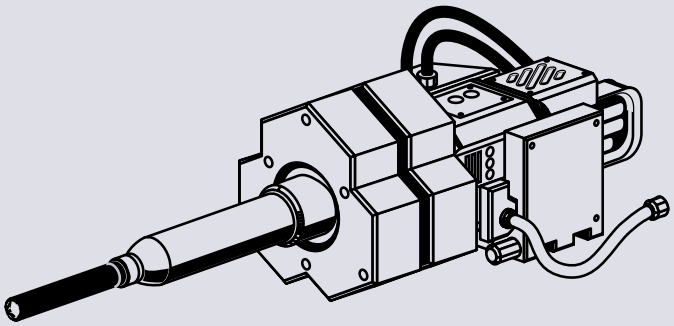
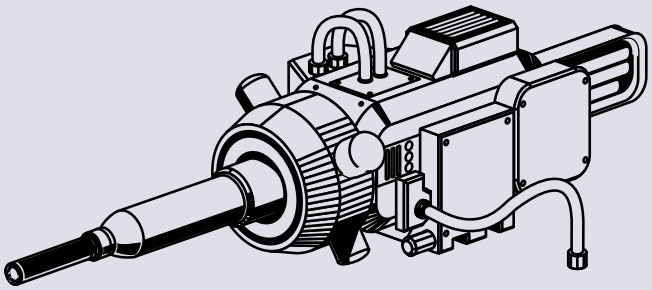


• SMALL PULSE LASER •
[PAGE 226]



• HEAVY SMALL LASER •
[PAGE 226]



• MEDIUM PULSE LASER •
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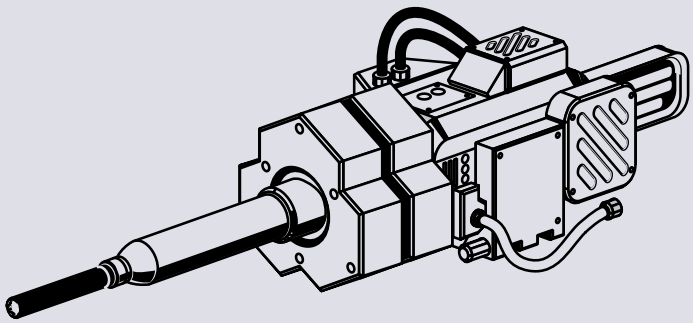

• HEAVY MEDIUM LASER •
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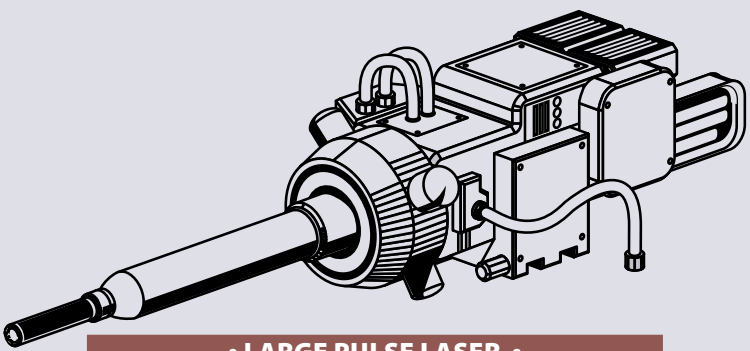

• LARGE PULSE LASER •
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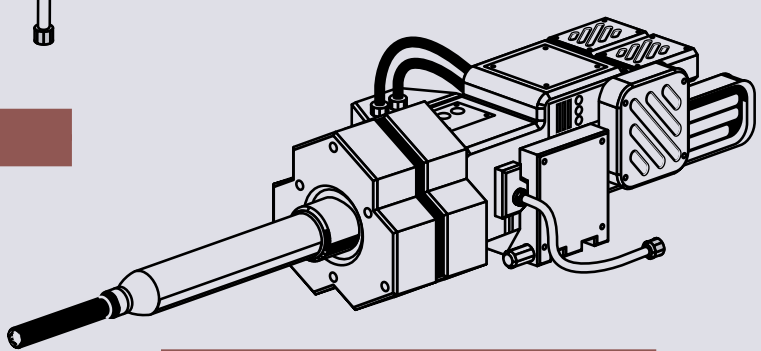

• HEAVY LARGE LASER •
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ACTIVE PROBE

Introduced: 2576 (Terran Hegemony)
Extinct: 2835 (Inner Sphere)
Recovered: 3045 (Capellan Confederation)

Broadly identified in the Inner Sphere as the Beagle Active Probe (the Clans dispensed with the name "Beagle" during their Golden Century, when they refined the technology), the active probe is a powerful electronics sensor suite enhancement capable of detecting and identifying even shut-down or camouflaged units—excepting conventional infantry—at distances much greater and with more reliability than the standard-issue battlefield sensor suites used by most combat units today. Virtually every battlefield and support unit in existence may employ these probes, but because of their range, aircraft and other aerospace units (such as DropShips) rarely make use of this technology.

Modern Inner Sphere Beagle Active Probe models are integrated with sensor suites such as the Coventry MetalWorks' Cyclops-Beagle or the Alexis Photon Target Acquisition System made by Irian BattleMechs Unlimited. Ceres Metals produces the popular Apple Churchill 2000 suite, with Beagle Probe and TAG, and our own Federated Hunter Mark XX incorporates both the Beagle Active Probe and an enhanced targeting computer interface.

Light Active Probe

The Clans' Light Active Probe is a smaller and somewhat less powerful version of the standard model. Initially thought to be a recent creation, it was later discovered to be an old Clan Mongoose experiment that the Smoke Jaguars brought to fruition some years later. Weighing just half a ton, this system has an effective range of only 90 meters, but that is still far enough to give some would-be ambushers a bad day.

ACTIVE PROBE

Tech Base: Inner Sphere (Beagle Active Probe only); Clan (Standard Active Probe and Light Active Probe)
Unit Restrictions: None
Game Rules: Units with multiple active probes may use only one at a time in game play. Fighters, Small Craft and DropShips may only use active probes when interacting with ground units.
Construction Rules: Units may mount more than one active probe, but cannot use more than one during game play.

Table Reference: Weapons and Equipment (Inner Sphere and Clan, pp. 342–343) **Game Rules:** *Total Warfare*, p. 129

ANTI-MISSILE SYSTEM

Introduced: 2617 (Terran Hegemony)
Extinct: 2796 (Inner Sphere)
Recovered: 3040 (Federated Commonwealth)

The anti-missile system (AMS) is essentially a rapid-fire, machine gun specifically used in a point-defense role. Designed to track, engage and destroy incoming missile clusters, the system proved effective enough for mass production, but is a terrible ammunition-hog. The Clan version tries to offset this flaw by using flechette-based munitions rather than slugs. This has allowed for greater ammo capacity per ton, but consumption remains a problem, and so even Clan AMS reserves tend to run dry after less than five minutes of sustained missile fire. Despite this, anti-missile systems have proven highly effective in space combat, where even larger missile classes can suffer from a cloud of point-defense fire.

Particularly popular Inner Sphere anti-missile system models include Coventry MetalWorks' Sure Fire 444, the Yori 'Mech Works' Flyswatter, Mitchell Vehicles' McArthur AMS and the Voelkers Parasol produced by Corean Enterprises. These systems all weigh half a ton, and pack enough ammunition per one-ton bin for up to twelve volleys, based on consumption. The Clan versions run about equal in mass, but boast double the munitions capacity.

ANTI-MISSILE SYSTEM

Tech Base: Inner Sphere and Clan
Unit Restrictions: None
Game Rules: Anti-missile systems are automatic and are considered active even if the pilot/crew is rendered incapable of acting in combat, but will not function if the unit's engine is shutdown.
Construction Rules: Units may mount more than one AMS, but must follow the core construction rules for the unit regarding ammunition placement and such. Though classed as a heavy weapon, the AMS is an automatic system, and does not require gunners on any unit type.

Table Reference: Weapons and Equipment (Inner Sphere and Clan, pp. 342–343) **Game Rules:** *Total Warfare*, p. 129

ANTI-PERSONNEL PODS (A-PODS)

Introduced: Circa 2850 (Clans); 3055 (ComStar/Word of Blake)

It is interesting to note that while the production-level versions of today's anti-personnel pods (A-Pods) were first developed by the Clans during their Golden Century (presumably to thwart the increasingly effective anti-'Mech infantry tactics of the Hell's Horses and Ghost Bears), the concept itself is hardly revolutionary. In fact, as far back as the dawn of the BattleMech era, Colonel Simon Kelswa himself suggested placing directional mines on the legs of BattleMechs to discourage such tactics, when he consulted for the LCAF on their own early BattleMech projects. Crude leg-mines were developed and used throughout the years with mixed results, however, making today's A-Pod—capable of showering an effective radius of roughly 15 meters with deadly shrapnel—the most effective and devastating deterrent against conventional anti-'Mech infantry.

Inspired by the elegance and simplicity of the Clan design, Inner Sphere A-Pods emerged within a few years of the Tukayyid Truce, and are equally effective for the same weight and bulk.

ANTI-BATTLE ARMOR PODS (B-PODS)

[Introduced: 3068 (Clan Wolf [in-Exile])

With battle armor designs growing in number and diversity on all sides, various factions began looking into the development of an adaptation to A-Pods that could work effectively against battle armored-troops.

Clan Wolf-in-Exile finally succeeded in 3068 (a year after this document was produced), followed shortly thereafter by the Jade Falcons. Now spreading throughout Inner Sphere and Clan technical circles (Spheroid makers include Skobel on Terra, Defiance of Furillo and IrTech), this defensive armament—available to BattleMechs and vehicles—works like A-Pods, but hurls a cloud of explosive bomblets rather than shrapnel to blast through the more hardened armor of swarming battlesuits. –EB]

A-POD/B-POD

Tech Base: Inner Sphere and Clan
Unit Restrictions: A-Pods and B-Pods may only be installed on BattleMechs, IndustrialMechs, WiGEs, VTOLs and ground-based Vehicles (Combat or Support Vehicles with a Wheeled, Tracked or Hover motive system).
Game Rules: A-Pods and B-Pods may be engaged even if the unit is shut down, but cannot be triggered if the unit's pilot/crew is rendered incapable of acting in combat.
Construction Rules: For 'Mechs, A-Pods may only be mounted in Leg locations, while B-Pods may be mounted in any location. Vehicles may mount pods in any location other than the Body.

Table Reference: Weapons and Equipment (Inner Sphere and Clan, pp. 341–343) **Game Rules:** *Total Warfare*, p. 130

ARMOR

A basic component of the modern vehicle—civilian, industrial or military—is armor. Of course, armor is a generic term, covering anything that amounts to the outer "skin" of a given design. Most personal automobiles and hovercraft, for instance, make do with "armor" that is little more than sheet metal, aluminum alloy, plastic or fiberglass. Heavier vehicles and military units, however, tend to have sturdier hides; even the commercial-grade armor used in IndustrialMechs boasts a degree of toughness. As covering the lighter grades of armor would be a volume in and of itself, this primer focuses instead on the seven armor grades most commonly seen in the field today: commercial armor, industrial armor, ProtoMech armor, standard armor, ferro-fibrous armor, stealth armor and Support Vehicle armor.

COMMERCIAL ARMOR

Introduced: Circa 2300 (Terran Alliance)

The standard commercial armor used today is typically based on simpler steel alloys barely more elaborate than layered sheet metal, and is the cheapest and most common type available to IndustrialMechs. It is significantly lighter than industrial or military armor types like standard and ferro-fibrous, but is also easily penetrated by heavy weapons fire, because it is not meant to take that kind of punishment. At the dawn of the BattleMech era, what we know today as commercial-grade armor was actually common on heavy-duty IndustrialMechs, and provided a basis for later armor types.

INDUSTRIAL ARMOR

Introduced: 2439 (Terran Hegemony)

Today's industrial-grade IndustrialMech armor descends from the same military-grade plating used on the first BattleMechs. This multi-layered industrial "skin," while not as efficient as standard BattleMech armor, allows IndustrialMechs to sustain the punishment of daily use with far less wear and tear than commercial armor allows.

PROTOMECH ARMOR

Introduced: 3060 (Clan Smoke Jaguar)

A special version of compact military armor developed exclusively for ProtoMechs, this armor offers slightly better protection than standard military armor (described in detail below). ProtoMech armor gains additional efficiency because it is formed for smaller units and reduced surface areas, which provides for greater protective properties than typical plates of BattleMech armor.

STANDARD (OR HEAVY INDUSTRIAL) ARMOR

Introduced: 2470 (Terran Hegemony)

Refinements in armor technologies led to the advent of the standard-grade military armor still used today. As tough as industrial armor, yet much more effective, this multi-layered armor is the most widely used by battlefield units of virtually every kind, including aerospace fighters and DropShips. Armor of this type is available from a broad number of manufacturers, with brand names such as ArcShield, Durallex, ProtecTech, Starshield, StarSlab and Valiant produced under licenses by factories across the Inner Sphere and Periphery.

Standard armor has also made its way back into the industrial sector with so-called heavy industrial armor. Functionally identical to standard battlefield armor—and thus equally expensive—this armor type is rarely seen, but is used for IndustrialMechs employed in harsher environments.

FERRO-FIBROUS/FERRO-ALUMINUM ARMOR

Introduced: 2571 (Terran Hegemony)
Extinct: 2810 (Inner Sphere)
Recovered: 3040 (Draconis Combine)

A more advanced form of combat armor, ferro-fibrous (and its aerospace/spacecraft analogue, ferro-aluminum) is a military-grade armor significantly lighter than standard armor. Ferro-fibrous achieves its lightweight properties through the wider use of diamond fiber filaments throughout the ceramic and steel layers (standard armor does not incorporate a diamond weave in the steel layer). While this makes ferro-fibrous far more bulky, the weight savings afforded by this armor type for the same level of protection can enable units to mount more weapons and equipment. Of course, this capability must be balanced against the limited internal space left after its installation.

Limited by design (and economics) to military vehicles and BattleMechs, ferro-fibrous armor is available in a variety of popular brand names including Durallex, Kallon Unity Weave, Lexington Limited High Grade and StarGuard.

LIGHT AND HEAVY FERRO-FIBROUS

[Introduced: 3067 (Free Worlds League [Light]), 3069 (Lyran Alliance [Heavy])

Since the publication of this article, the Free Worlds League and the Lyran Alliance respectively unveiled the first battlefield-ready runs of light and heavy ferro-fibrous/ferro-aluminum armors. The League's Kallon Industries of Asuncion and Bernardo, both involved in a secret technology trade with the Draconis Combine, shared this technology to produce new versions of the *Awesome* sporting the Combine's newer PPCs and the League's light-fibrous armor. The League's alliance with the Word of Blake and the outbreak of the Jihad soon led to a rapid proliferation of the technology that inspired the heavy-fibrous version initially produced by Durallex for the LAAF. Unfortunately, several batches of Durallex Guardian heavy ferro were produced for mercenary commands in Lyran employ who subsequently defected to the Blakists, which has also spread the Lyran innovation to other manufacturers like Valiant Systems and Kallon over the past few years.

These alternate ferro-fibrous/ferro-aluminum armors modify the diamond fiber concentrations slightly to produce grades that either

improve the weight savings over basic ferro-fibrous at a significant increase in bulk (heavy ferro-fibrous) or trim down bulk at a cost in weight (light ferro-fibrous). As of this writing, production-grade versions of these armors are appearing on only a few new variants of older battlefield unit designs, but dedicated chassis may not be far off. –EB]

STEALTH ARMOR

Introduced: 3063 (Capellan Confederation)

Based on an effort to recover the long-lost Star League-era null signature system, the Capellan Confederation's stealth armor technology is actually a complex system of heat baffles and layers of radar- and EM-absorbent materials that—while about as bulky as ferro-fibrous armor—provides the same physical protection as standard armor. Limited exclusively to BattleMechs, this system requires the use of a Guardian ECM suite to function, but when activated, the 'Mech becomes virtually invisible to hostile sensors and EW devices. Radical in form and design, stealth armor can undermine even the abilities of active probes, though this system also scrambles its user's own targeting systems and traps a great deal of waste heat when active.

SUPPORT VEHICLE ARMOR

Introduced: pre-spaceflight

Extremely varied, based on the form and type of Support Vehicle and the nature of its chassis design, Support Vehicle armor comes in all shapes, sizes and weights, with only the most sophisticated considered on par with standard battlefield armor. Rarely intended to stand up to heavy weapons fire, this armor type is outlined here for completeness.

ARMOR

Tech Base: Inner Sphere (Commercial, Industrial, Standard/Heavy Industrial, Ferro-Fibrous/Ferro-Aluminum [Light, Heavy and IS Standard], Stealth, Support Vehicle); Clan (Commercial, Industrial, Standard/Heavy Industrial, Ferro-Fibrous/Ferro-Aluminum [Clan Standard only], ProtoMech and Support Vehicle)

Unit Restrictions: See chart

Game Rules: Armor is considered structural and cannot be "deactivated" during combat through engine shutdown or pilot/crew injury.

Construction Rules: The chart below indicates the availability of the featured armor types to particular unit types, as well as their construction rules page references and main weight (and points) tables. BattleMech armor that occupies critical space may break up the slots and spread them across the overall design to make room for other components; OmniMechs may not move these spaces around once they are determined for the base design.

Armor Type	Unit Availability	Construction Rules Reference	Weight Table
Commercial	IM	p. 72 (IM)	Master Armor
Industrial	IM	p. 72 (IM)	Master Armor
Standard/Heavy Industrial	BM, IM, CV, CF, AF	p. 56 (BM), 72 (IM), 105 (CV), 191 (CF), 191 (AF)	Master Armor
ProtoMech	PM	p. 86 (PM)	ProtoMech Armor
Ferro-Fibrous, Light*	BM, CV, CF, AF	p. 56 (BM), 105 (CV), 191 (CF), 191 (AF)	Master Armor
Ferro-Fibrous, Standard*	BM, CV, CF, AF	p. 56 (BM), 105 (CV), 191 (CF), 191 (AF)	Master Armor
Ferro-Fibrous, Heavy*	BM, CV, CF, AF	p. 56 (BM), 105 (CV), 191 (CF), 191 (AF)	Master Armor
Stealth	BM	p. 56 (BM)	Master Armor
DropShip/Small Craft	SC, DS	p. 191 (SC, DS)	Master Armor
Support Vehicle (Any)	SV	p. 134 (SV)	Support Vehicle Armor

* Includes Ferro-Aluminum (for aerospace units)

Key: BM=BattleMechs, IM=IndustrialMechs, PM=ProtoMechs, CV=Combat Vehicles, SV=Support Vehicles, CF=Conventional Fighters, AF=Aerospace Fighters, SC=Small Craft, DS = DropShips

Table Reference: See Chart **Game Rules:** *See Above.*

ARTEMIS IV FIRE-CONTROL SYSTEM

Introduced: 2598 (Terran Hegemony)
Extinct: 2855 (Inner Sphere)
Recovered: 3035 (Free Worlds League)

In an effort to enhance the accuracy and lethality of standard missile racks, the first Star League developed the Artemis IV fire-control system. Mounted in a dome near the enhanced launcher, the Artemis was in essence an infrared laser designator, target lock mechanism and tight-beam microwave transmitter that—together with specialized missile control systems—helped to focus the spread of all missile volleys so enhanced. Though not as foolproof as the Streak system (as a consequence of design philosophy), the Artemis IV's constant course-correction data stream rendered standard short- and long-range missile launchers even more lethal in combat with an average increase of roughly 35 percent in the number of missiles per volley that hit the target.

The Artemis is a jealous electronics system by nature; its compatibility is solely focused on standard LRM and SRM launch systems and their one-shot varieties, and requires that all such systems on a given chassis be similarly equipped. Even then, the launchers receive the targeting benefits only when using Artemis-equipped munitions. (The launchers may also fire standard missiles, but the Artemis has no impact on accuracy.) Other targeting enhancements like the Streak system, Narc beacons or even modern special munitions do not benefit from the use of Artemis IV, though most may still be fired by an Artemis-equipped launcher. While this hardware restriction may seem an inconvenience, in practice it can simplify the munitions needs of a given combat unit by encouraging the use of only one type of missile load in the field. [NOTE: The new MML systems can also use Artemis IV . –EB]

Interestingly enough, the Clan version of the Artemis performs exactly the same as those produced in the Inner Sphere in terms of tonnage, compactness and battlefield accuracy. The Artemis IV used by the Clan-made Series XXXII Multitrack system is identical in all such aspects to, say, the one used with IMB System's RCA Instatrac XIII.

ARTEMIS IV FIRE-CONTROL SYSTEM

Tech Rating: Inner Sphere and Clan
Unit Restrictions: ProtoMechs may not install Artemis IV systems.
Construction Rules: The Artemis IV FCS is only applicable to standard LRM, SRM and MML launchers (including any one-shot or torpedo versions). If Artemis IV is added to an applicable launcher, every applicable launcher on the unit must have Artemis IV (non-applicable launchers, such as Streak SRMs, may still be installed). For example, if a unit has one Artemis IV-equipped LRM launcher, then every single standard LRM, SRM and MML launcher on the unit must have Artemis IV. Note that while Clan ATM launchers have Artemis IV integrated as part of their design, ATM launchers do not count as an applicable launcher type, meaning you can have ATMs on the same unit as LRM, SRM or MML launchers without Artemis IV.

Artemis IV must be placed in the same location as the launcher it is added to. If an applicable launcher is in a location with no other space remaining, then Artemis IV may not be mounted on that unit at all, because one of its applicable launchers cannot receive Artemis IV.

For OmniMechs with one or more fixed (i.e. non-pod-mounted) missile launchers, whether or not the fixed launchers have Artemis determines the 'Mech's usage of Artemis. This cannot be modified through alternate configurations. For example, for an OmniMech with fixed launchers without Artemis, no launcher on the 'Mech, fixed or not, may have Artemis. Conversely, for an OmniMech with Artemis-equipped fixed launchers, all its applicable launchers must be equipped with Artemis.

BattleMechs, IndustrialMechs and Support Vehicles must assign critical slots separately to Artemis IV; Combat Vehicles, fighters, Small Craft and DropShips treat Artemis as part of the weapon system it enhances, for purposes of tracking weapon slots.

Table Reference: Weapons and Equipment (Inner Sphere and Clan, pp. 341–343) **Game Rules:** *Total Warfare*, p. 130

AUTOCANNON

For what amounts to one of the most basic combat systems on the modern battlefield, autocannons (often abbreviated as ACs) are a broadly varied class of rapid-firing, auto-loading, heavy ballistic weaponry—gigantic machine guns, in other words. With calibers ranging from 30 to 90 millimeters at the lighter end, to as much as 203 millimeters or more at the heaviest, most autocannons deliver their damage by firing high-speed streams or bursts of high-explosive, armor-defeating shells through one or more barrels. While caliber and firing rate can vary greatly, four main classes have emerged over the centuries, setting the standards by which all other ACs are rated, based on their relative ballistic damage. At the lightest end is the AC/2 class, followed by the long-time standard AC/5, then the heavy punch of the AC/10 class, and finally the brutal, close-in AC/20.

At the dawn of the BattleMech era, only two proven autocannon models existed: the AC/2 and the AC/5. Production model versions of the heavier AC/10 and the 'Mech-killing AC/20 did not appear until after 2460 and 2500, respectively (though the *Mackie* sported a prototype of the AC/10 as far back as its 2443 battlefield debut).

In the centuries since, additional autocannon variants have evolved, including the cluster-style LB-X, the high-speed Ultra and the multi-barreled, high-cycle rotary. These three autocannon styles—as well as the standard models—are discussed below.

[Once again, since the publication of this document, additional autocannon types—light autocannons—have entered production and front-line service. They are described in detail below. –EB]

LB-X AUTOCANNON

Introduced: 2595 (Terran Hegemony [LB 10-X]); circa 2820 (Clans [LB 2-X, 5-X, 20-X])
Extinct: 2840 (Inner Sphere)
Recovered: 3035 (Federated Commonwealth [LB 10-X]); 3058 (Federated Suns [LB 2-X, 5-X, 20-X])

An improvement on the common autocannon intended to expand the weapon's role into anti-vehicle and anti-infantry work, the LB-X makes use of light, heat-dissipating alloys to reduce its weight and thermal buildup. These materials, coupled with a smooth-bore, multi-munition feed mechanism, make the LB more expensive than standard autocannons. However, the slight range increase and the ability to switch between standard-style bursts and explosive cluster munitions—both specially developed for this weapon system—more than mitigate this higher cost.

Inner Sphere LB-X autocannons—like the Mydron Excel LB-X series, Imperator's Code Red LB 10-X or Defiance's Disintegrator LB 20-X—boast much improved efficiency over their standard kin. Indeed, even with their recent manufacture and expense, these weapon systems might well have completely outclassed and phased out their standard counterparts (as evidently occurred in the Clan militaries) were it not for the advent of a host of alternative munitions over the past decade. Incompatible with LB-X autocannon, some of these munitions are described later in brief.

LIGHT AUTOCANNON

[Introduced: 3068 (Federated Suns [LAC/2, LAC/5])

After spending nearly a decade in the prototype stages—long enough to actually give rise to the rotary AC—light autocannons (abbreviated as LACs) only hit full-scale production with the unveiling of Yeffters Weapons' Mydron Flyswatter and Mydron Snakekiller models in 3068. Ironically, what spurred this production was the destruction of the NAIS, where these weapons were first developed. It may be a bit of poetic justice that the first models were rushed to the battlefields of New Avalon to help drive back the Blakists' first assault against the planet. Since then, however, Imperator Automatic Weaponry has begun producing its own versions for the Free Worlds League and their Robe allies.

Built smaller and with shorter ranges, light ACs exist only in the lower calibers (LAC/2 and LAC/5), but benefit from the ability to use the advanced munitions that LB-X, rotary and Ultra ACs cannot. The Clans, who have not seen much use for specialized ammunition and who still possess autocannons superior to even these versions, have shown little interest in duplicating this innovation, though the same cannot be said of the other Inner Sphere states. –EB]

ROTARY AUTOCANNON

Introduced: 3062 (Federated Suns)

Another product of our own New Avalon Institute of Science, the rotary autocannon (RAC for short) is, at its heart, an effort to obtain an even higher rate of fire than the Ultra-class autocannon outlined below. Using multiple barrels to attain up to three times the volume of an Ultra burst, this weapon is much heavier and bulkier than its standard-model cousins, and lacks the effective reach of even the Ultra AC series. Its inability to make use of most specialized munitions, coupled with its sheer expense, have prevented the rotary concept from entering the heavier-caliber brackets at this time. Balancing this, however, is the ability to clear weapon jams in the field—a feature

lacking in Ultra autocannons. This is especially welcome as the RAC is particularly prone to jams at its higher firing rates.

Initially produced solely by FedSuns manufacturers with the Mydron Tornado and Mydron RC series, the FedCom Civil War saw rotary ACs quickly proliferate to other states, particularly the Lyran Alliance and the Draconis Combine. Fortunately, the Clans have yet to field RACs of their own.

STANDARD AUTOCANNON

Introduced: Circa 2250 (Terran Alliance [AC/5]); circa 2300 (Terran Alliance [AC/2]); 2460 (Terran Hegemony [AC/10]); 2500 (Lyran Commonwealth [AC/20])
Extinct: Circa 2850 (Clans only)

Today's standard autocannon (identified as AC in shorthand) is functionally identical to the models used as far back as the days of the Terran Alliance. Designed to cope with improvements in armor technologies of the day, these weapons maintained their destructive edge through more than 800 years of battlefield evolution. Even so, their time was nearing its end when the newer Ultra and LB-X autocannon classes emerged. In fact, among the Clans these weapons have apparently ceased to exist (their last shots reportedly fired in the early 3050s, when they were mounted on machines largely regarded as refit museum pieces). Only their relatively inexpensive design, and the advent of specialized munitions usable by these weapons alone, has prevented the likes of Armstrong's J11, Mydron models A through D, SarLon's MaxiCannon and the Luxor Devastator-20 from becoming the next forgotten relics of history.

[Professor Habeas overlooks here certain early reports and design specs that suggested lighter-caliber standard ACs were once intended for ProtoMech design (perhaps as a main gun mount). However, no Proto to date has ever carried one—likely because even the lightest such weapon would have taken up more than half the weight of the heaviest ProtoMechs, at huge expense in mobility and armor. Rumors suggest the Smoke Jaguars tinkered with an old cache of standard ACs to produce LACs for this very reason. The bottom line, however, is that Professor Habeas' analysis *was* essentially correct; by the time of the invasion, the Clans had long since abandoned the standard AC series. By the turn of the century, most of the remaining weapons had either been recycled or were being used to maintain older Exodus-era low-combat units like DropShips. –EB]

ULTRA AUTOCANNON

Introduced: 2640 (Terran Hegemony [UAC/5]); circa 2820 (Clans [UAC/2, UAC/10, UAC/20])
Extinct: 2915 (Inner Sphere)
Recovered: 3035 (Federated Commonwealth [UAC/5]); 3057 (Free Worlds [UAC/2, UAC/10]); 3060 (Lyran/Free Worlds [UAC/20])

The advanced Ultra autocannon system (UAC for short) was first developed at the height of the original Star League by Kawabata Weapons, Inc. of the Terran Hegemony. Capable of higher sustained rates of fire than standard or LB-X autocannons, Ultra ACs could dish out twice the punishment in the same amount of time. Unfortunately, these weapons are prone to occasional misfires and arming failures when pushing their maximum fire rates—a factor that forced many UACs into early retirement after the fall of the original Star League. Nevertheless, the Clans (and the Inner Sphere, after encountering the Clans) found enough merit in Ultra ACs to expand the concept across all the same grades as standard-model autocannons. Even though they cannot use special munitions (their own magazines are tailored to the high-speed firing modes, which can be dangerous or detrimental to most specialty ammo), these weapons remain popular for attack and assault units.

Mydron, Imperator and Defiance—the big names in heavy autocannon technology—boast some of the most popular brand names seen today for Inner Sphere Ultra ACs. Not surprisingly, Clan-made Ultra autocannons are superior to those of the Inner Sphere in range, weight and size—explaining how they, together with LB-X models, completely supplanted the standard weapons among Clan toumans.

AUTOCANNON MUNITIONS

Having long maintained an almost romantic affinity for the classic autocannon, the Federated Suns—primarily through the NAIS—expended enormous amounts of time and resources to expand the utility of these old reliable weapons. While some efforts wound up merely refining the likes of up-and-coming autocannon models such as rotaries and Ultras, the debut of specialized ammunitions—many first test-fired in the mid-3050s—breathed new life into the older standard classes.

The Clans have yet to field any specialized autocannon munitions in combat, save for LB-X cluster munitions. The reasons why are unclear, but engineers have considered the lack of standard-style ACs in the Clan arsenal as one possible reason, coupled with the usage of different alloys and propellants than those of Spheroid autocannons that render such specialty ammo more a liability than a boon.

Armor-Piercing Ammunition: First prototyped by the FedSuns in 3053 and reaching standard production by 3059, armor-piercing (AP) ammo uses advanced ballistic materials and improved anti-armor warheads to deliver a punch hard enough to damage internal systems through otherwise fresh armor. Available solely to standard AC types, the drawback to this greater punch is the fact that the increased weight of this ammo impairs its firing accuracy and the number of rounds that can be loaded into a given bin.

Flechette Ammunition: Developed by the FedSuns in 3055 for standard ACs, flechette munitions deliver a shotgun-like blast of metal shards rather than a stream of shells. Intended for use against infantry, flechette rounds can wipe out entire platoons of conventional troops in seconds and can even ravage battle-armored squads, but this ammo type loses effectiveness against armored targets such as vehicles and 'Mechs.

Precision Ammunition: The most sophisticated of the advanced munitions for standard ACs, precision ammo was developed in 3062. This ammo type uses specialized gyrojet shells that incorporate advanced targeting circuitry, enabling them to auto-correct their aim while in flight. Highly expensive and heavy to boot, use of precision ammo—particularly in the higher calibers—can leave an attacker empty in surprisingly short order.

LB-X Cluster Ammunition: Cluster munitions for the LB-X AC series debuted, went extinct and were recovered at the same time as the LB-X class of ACs themselves. These munitions may only be used by LB-X class autocannons and do not benefit from targeting computer assistance because of their scattershot nature, but are effective against nearly all battlefield units, particularly vehicles and aircraft.

AUTOCANNON

Tech Base: Inner Sphere (standard, light, LB-X, rotary and Ultra ACs); Clan (LB-X and Ultra only)
Unit Restrictions: None
Game Rules: Autocannons may not be fired if the unit is shut down or if its pilot/crew is otherwise prevented from acting, but loaded or partially loaded AC ammo bins are always live and will explode per standard rules if critically hit during game play.
Construction Rules: OmniMechs must remove lower arm or hand actuators in any Arm location selected to carry an autocannon. Of the autocannons available, only the Standard AC/20, LB 20-X AC and Ultra AC/20 may be split among two adjacent locations (such as the Left Arm and Left Torso) on BattleMechs and IndustrialMechs. Weapons so divided must take the most restrictive firing arc of the two locations. Non-'Mech units may not divide a single weapon among multiple locations.

Only standard and light autocannons may make use of specialized ammo beyond LB-X cluster munitions. LB-X cluster munitions may be used only by LB-X AC types, which may also use standard AC ammo (but no other special ammo types). Ultra and rotary ACs may not use specialized ammo.

Table Reference: Weapons and Equipment (Inner Sphere and Clan, pp. 341–343) **Game Rules:** *Total Warfare*, p. 98

BAY DOOR

Introduced: Pre-spaceflight

Bay doors are a veritable necessity for any Support Vehicle, DropShip or other capital spacecraft that intends to carry large cargo items or other units such as BattleMechs, fighters and such within internal bays. As simple in function and design as personnel doors, these larger versions require little more than an equalizing of internal and external pressures before they can be opened to enable the transfer of units or cargo. This simplicity allows bay doors to be mounted as part of the unit's structure, though doors this large are rarely seen outside of truly large Support Vehicles and DropShips.

BAY DOOR

Tech Base: Inner Sphere and Clan
Unit Restrictions: BattleMechs and ProtoMechs may not install bay doors
Game Rules: The launch rate for any transport bays carrying fighters, Small Craft, BattleMechs, battle armor or ProtoMechs is equal to two such units from the bay per functioning bay door (per turn).
Construction Rules: Combat Vehicles, Small and Medium-sized Support Vehicles, IndustrialMechs and fighters that carry cargo or infantry (conventional or battle armored) within internal bays do not require a bay door—though they are assumed to have at least one in the rear arc.

Small Craft, DropShips and Large Support Vehicles that carry other units beyond infantry (conventional or battle armored) should have at least one bay door per transport bay.

The maximum number of bay doors per unit is 7, plus 1 for every 50,000 tons of unit weight (rounded up) [7 + (Unit Tonnage ÷ 50,000), rounded up = Max Bay Doors].

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare*, p. 86

C³ COMPUTER

Introduced: 3050 (Draconis Combine)

The Command/Control/Communications (C³) system is easily among the Inner Sphere's most potent recent inventions. It is also one of the most original, considering that it emerged not as the result of a Star League tech recovery, but as a new application of technologies. As much a revolution in battlefield technology as one of combat philosophy for its creators in the Draconis Combine, the system is essentially an elaborate tight-beam communications suite, designed to link the sensors and targeting systems of up to a full lance of friendly units in a single, closed network. The C³ system enables those within its network to draw targeting data from one another and coordinate fire with amazing ease. As long as effective weapon ranges and lines of fire permit, a member of a C³ network can essentially strike at a target with the same accuracy as the nearest friendly network member. Moreover, units that mount a C³ master computer—with the other network members using slave nodes—can use the computer's coordination as an improvised TAG system.

The system, of course, has its limits. Only units in the same network—generally a single lance, though creative deployment of multiple master computers per unit may allow for networks as large as a company—may share targeting data in this fashion. Friendly units with systems outside the network cannot simply "tap in" at will. Further, the network signals and data streams are susceptible to jamming by enemy ECMs. Worst of all, the hierarchical nature of the system means that the loss of the master computer to destruction or ECM interference crashes the entire network, leaving its surviving units to fend for themselves.

Sad to say, the biggest obstacle to optimum use of the C³ system is a matter of ego more than technology. Ironically produced by a realm with a strong sense of personal honor and a warrior's code, the concept of a communal targeting and communications network is often lost on the warriors of the DCMS. Indeed, despite efforts to force a more widespread distribution of the technology, this mentality has apparently kept an otherwise powerful system virtually marginalized on the battlefield, even as other factions adopt similar systems of their own.

IMPROVED C³ COMPUTER

Introduced: 3062 (ComStar/Word of Blake)

Also referred to as the C³i, the improved C³ computer system is ComStar's answer to House Kurita's technology—a "secret" that, apparently, was lost to the Word of Blake almost instantly upon its inception. Since then, this technology has spread across at least the Free Worlds League, and some data suggests even the Capellans may be employing C³i units of their own.

Though similar to the standard C³ in many ways, including its basic features of target coordination, the C³i can link six units together, rather than four. However, thanks to a more distributed system approach, the C³i sacrifices the ability to link multiple networks through a master computer node, and also loses the ability to mimic the TAG system. The C³i is also incompatible with the original C³ system, but because of its more egalitarian nature, its members can function even while others in their group are blocked or disabled, as no single unit mounts a command module as such.

While ComStar, the Word of Blake and the Free Worlds League have benefited from this system, along with our Combine "neighbors" and their own version, it is worth noting that the Clans apparently hold no interest in C³ technologies. This disinterest clearly stems from their own overdeveloped sense of personal honor, which precludes the notion of sharing a kill by using such technologies.

C³/C³I COMPUTER

Tech Base: Inner Sphere
Unit Restrictions: ProtoMechs, fighters, Small Craft and DropShips may not install C³ or C³i systems.
Game Rules: A unit's C³ or C³i systems are considered active in game play as long as the systems are not hit in combat, the unit's engine is not shut down and the unit is not destroyed. Otherwise, these systems continue to function, even if the pilot/crew is unable to act.
Construction Rules: C³ systems (including the C³ Master and C³ Slave) and C³i systems may not be combined on a single unit, as the two technologies are incompatible. Units with either system may mount multiples, if desired, but only one C³ Slave or C³i computer may be employed at one time in game play. (Multiple C³ Master computers may be used to maintain multiple C³ networks).

IndustrialMechs and Support Vehicles require Advanced Fire Control Systems in order to be able to mount a C³ or C³i system of any kind. BattleMechs and Combat Vehicles incorporate such fire control systems by default, and so may freely mount these systems.

The C³ Master (but not C³I units or C³ Slaves) exactly duplicates the function of Target Acquisition Gear (see p. 238). The firing arc for the TAG is based on the location the C³ Master is mounted in (which may be rear-mounted if desired).

Table Reference: Weapons and Equipment (Inner Sphere, pp. 341–342) **Game Rules:** *Total Warfare*, p. 131

CAPITAL MISSILE LAUNCHERS

Introduced: 2305 (Terran Alliance [Capital Missiles]); 2550 (Terran Hegemony [AR-10])
Extinct: 2855 (Inner Sphere)
Recovered: 3051 (Federated Commonwealth)

The only class of capital-grade weapons permitted on vessels smaller than a WarShip or space station, capital missiles are a weapon system derived from the conventional ballistic missiles of pre-spaceflight Terra. Essentially, a capital missile is a single, large missile delivering a multi-ton kinetic warhead. Self-propelled and far-reaching, they deliver their damage more by sheer mass and velocity, achieving sufficient impact force to cause internal damage to large spacecraft on a solid hit, even without first penetrating the armor. Today, capital missiles are seen as the lightest type of weapon capable of trans-atmospheric attacks (meaning surface-to-orbit and vice versa).

During the original Star League's heyday, four main capital launchers existed, three of which were custom-built (and named) for the dominant anti-WarShip missiles of the day—the Killer Whale, White Shark and Barracuda—and the fourth, the AR-10, which could fire all three missile types. Since the recovery of capital ship technologies, ComStar and Combine engineers managed to develop the tele-operated (or "-T") class capital missile for each of the pre-existing designs, as well as a new, massively powerful "Kraken-T." These tele-operated capital missiles differ from their older cousins in that they can be steered by remote from the bridge of the firing vessel, essentially making these fighter-sized missiles the functional equivalent of robotic kamikaze craft. Fortunately, the Clans have yet to duplicate the tele-operated capital missile concept, which has since proliferated among all the major shipyards across the Inner Sphere.

The Port Sydney Yards at Alarion, Technicron Yards at Tamarind and our own Federated-Boeing Interstellar shipyards over Galax are three of the Inner Sphere's biggest producers of capital missiles, though a handful of supporting industries exist in all of the major states today.

CAPITAL MISSILE LAUNCHERS

Tech Base: Inner Sphere (Killer Whale, White Shark, Barracuda, AR-10 and all "-T" launchers) and Clan (Killer Whale, White Shark, Barracuda and AR-10 launchers only)
Unit Restrictions: Only DropShips may mount capital missile launchers.
Construction Rules: Capital missile launchers require one gunner per launcher and must spend enough tonnage for a minimum of 10 shots per launcher, in accordance with the standard DropShip construction rules. An AR-10 launcher only requires a total of 10 shots, adding shots for all missile types together.

Table Reference: Weapons and Equipment (Inner Sphere and Clan, pp. 342–343) **Game Rules:** *Total Warfare*, p. 235

CELLULAR AMMUNITION STORAGE EQUIPMENT (CASE)

Introduced: 2476 (Terran Hegemony)
Extinct: 2840 (Inner Sphere)
Recovered: 3036 (Draconis Combine)

One of the oldest examples of so-called "lost" technologies, CASE (as we know it today) actually predates the Star League by nearly a hundred years. Indeed, its earliest progenitors can be traced back even farther. Developed as a damage-control technology in the event of catastrophic internal explosions, CASE—then as now—became an intrinsic part of the armor system on BattleMechs, Combat Vehicles and fighters, intended to save crews and machines for later salvage. When heat or damage triggers an ammunition explosion in a CASE-protected location, specially designed blow-away panels direct the force of the explosion outward, through the rear of the machine. Though any remaining internal structure in the affected section is typically damaged in these blasts, CASE has spared many a machine that once would have been fully consumed by an internal explosion.

Originally kept tightly controlled by the Terran Hegemony (along with many of their vital technologies), CASE has proliferated among armorers across the Inner Sphere since its recovery, and even has been adapted for non-military equipment (as a guard against the effects of freak fuel tank explosions and the like). The Clans, of course, have also retained this technology, but have refined it so well that theirs is completely seamless and weightless by Inner Sphere standards. Nevertheless, even Clan CASE remains incompatible with the compact architecture of ProtoMech designs, where even a redirected internal explosion would have catastrophic effects on the machines and their pilots.

CASE

Tech Rating: Inner Sphere and Clan
Unit Restrictions: ProtoMechs, Small Craft and DropShips may not carry CASE.
Game Rules: CASE systems are automatic, and are considered active even if the unit is shut down or its pilot/crew is rendered incapable of acting in combat.
Construction Rules: For Inner Sphere BattleMechs and IndustrialMechs, CASE must be allocated to Torso locations only. Inner Sphere Combat and Support Vehicles with CASE automatically place this equipment in the Body location at a cost of 1 equipment slot. Aircraft and aerospace fighters with CASE place this equipment in their fuselage as well, at no cost in weapon slots. Units built with a Clan internal structure (except for ProtoMechs) are presumed to incorporate CASE automatically in all locations that store ammunition or explosive equipment (such as Gauss rifles), unless otherwise specified.
OmniMechs, OmniVehicles and Support OmniVehicles designed without CASE in their base chassis may add it to later configurations as a pod.

Table Reference: Weapons and Equipment (Inner Sphere and Clan, pp. 342–343) **Game Rules:** *Total Warfare*, p. 133

COCKPIT/CONTROL SYSTEMS

The nerve center of any modern vehicle, aerospace craft or 'Mech, the cockpit is to these units what the brain is to the human body. Here the pilot resides, surrounded by controls and sensor readouts—here, just one human being (or a handful of them) can control the might of a machine weighing anywhere from a few hundred kilograms to a hundred thousand tons. More commonly known among vehicles as the driver's seat or control cabin, and known on larger space and seagoing craft as the bridge, these control centers are the most vital components in modern equipment design. The following paragraphs describe the basic control systems commonly used in the field: 'Mech cockpits, ProtoMech cockpits, aerospace cockpits, vehicular control systems and command bridges.

'MECH COCKPIT

Introduced: circa 2300 (Terran Alliance)

Born at the same time as the concept of the 'Mech, 'Mech cockpits today vary slightly from design to design, and a bit more so from IndustrialMech to BattleMech, but their ability to control and balance walking machines weighing up to 100 tons at the whims of a single pilot makes them one of the most sophisticated command centers ever made.

BattleMech cockpits, by far the most complex, universally incorporate advanced communications, targeting and tracking systems and a neurohelmet-based balance control system. These systems combine to allow the 'Mech's pilot—the MechWarrior—to keep his walking tank mobile and reactive in the thick of battle, even while directing the energies of a massive integral weapons system. Inner Sphere BattleMech cockpits even include special amenities for long-term use, such as sanitary facilities, a small stowage space and so on. Their Clan counterparts, which are meant for the short haul, are more cramped in comparison, but arranged with such efficiency that Clan pilots do not apparently suffer from the lack of such "luxuries."

IndustrialMech cockpits, by comparison, are simpler than those of BattleMechs, and give more of the pilot's decision-making ability over to the on-board computers for gross tasks. Not all of these lower-tech control centers incorporate neurohelmet technologies (and one need not be experienced to know the difference in both the look *and* feel of the machine's gait that results), nor do they generally feature advanced targeting and communications systems. They do not even feature full environmental sealing, relying on vents for breathable air and ventilation, while the emergency ejection systems found standard in BattleMech cockpits are an expensive option. Beyond these differences, however, their controls are functionally identical to those of BattleMechs. This explains why some of the best 'Mech pilots in the academies are often the "farm boys" who grew up driving the family AgroMech.

SMALL COCKPIT

[Introduced: 3067 (Federated Suns)

Mere weeks after the publication of this article, the Federated Suns debuted its first battlefield-ready versions of the "small cockpit," an effort to reduce the weight and bulk of the standard BattleMech cockpit below even Clan standards, theoretically allowing for the installation of more (or simply larger) equipment in the head. Soon afterward, the Lyran Alliance and the Word of Blake—presumably through captured schematics—unveiled their own equivalents, and subsequent battlefield salvage and reverse engineering has seen the technology proliferate further since.

More cramped than a Clan-designed cockpit, the small cockpit lacks many of the amenities MechWarriors have grown accustomed to and even rely upon, such as sanitary facilities for extended operations and a reduction of personal cargo space. Pilot discomfort and a loss of movement space thus impairs even the most seasoned MechWarrior. In exchange, however, the 'Mech can mount a full ton of extra armor, weaponry or ammunition, and the head section can mount weapons with twice the bulk previously possible. –EB]

PROTOMECH COCKPIT

Introduced: 3060 (Clan Smoke Jaguar)

It is a given that Clan military technology tends to run smaller and lighter in almost all aspects, but even a Clan BattleMech's cockpit—while snugly designed—masses as much as its Inner Sphere counterpart. The ProtoMech cockpit, on the other hand, represents the pinnacle of compactness. Weighing a mere 500 kilograms, which includes enough space for life support, a seat and the pilot, what allows the Clans to make the Proto's cockpit so small is the fact that even the most basic controls have been integrated with the pilot's implanted Enhanced Imaging neuro-technology. More sophisticated, invasive and dangerous than neurohelmets, EI technology is not presently being duplicated by any Inner Sphere power, and the various Inner Sphere nations are facing none of the resource crunch that spawned the creation of these machines to begin with. As a result, the claustrophobic, wired-cocoon ProtoMech cockpit remains a piece of hardware exclusively maintained by the Clans.

AEROSPACE COCKPITS

Introduced: Pre-spaceflight

Though aerospace craft have come a long way, the cockpit of a modern aircraft, aerospace fighter or Small Craft serves roughly the same function as that of its twentieth-century progenitors. This may be why the oft-rumored glove-based aerospace cockpits of the original SLDF died out quickly in the late 28th century. Both the classic early flight systems and those of today rely on control sticks or wheels (the latter preferred far more often in civilian atmospheric craft

COCKPIT/CONTROLS

Tech Base: Inner Sphere (BattleMech [Standard and Small], IndustrialMech, fighter [conventional and aerospace], Small Craft, DropShip, vehicle [Combat and Support]); Clan (BattleMech [Standard only], IndustrialMech, ProtoMech, fighter [conventional and aerospace], Small Craft, DropShip, vehicle [Combat and Support])

Unit Restrictions: See chart

Game Rules: Cockpits and control systems are considered structural and cannot be "deactivated" during combat through engine shutdown or pilot/crew injury.

Construction Rules: The chart below indicates the availability of the featured cockpit types to particular units, as well as their construction rules page references.

Cockpit/Controls Type	Unit Availability	Construction Rules Reference
BattleMech (Standard and Small)	BM	p. 52 (BM)
IndustrialMech	IM	p. 69 (IM)
ProtoMech	PM	p. 85 (PM)
Conventional Fighter	CF	p. 189 (CF)
Aerospace Fighter	AF	p. 189 (AF)
Small Craft	SC	p. 189 (SC)

Cockpit/Controls Type	Unit Availability	Construction Rules Reference
DropShip	DS	p. 189 (DS)
Combat Vehicle	CV	p. 103 (CV)
Support Vehicle	SV	p. 131 (SV)

Key: BM=BattleMechs, IM=IndustrialMechs, PM=ProtoMechs, CV=Combat Vehicles, SV=Support Vehicles, CF=Conventional Fighters, AF=Aerospace Fighters, SC=Small Craft, DS = DropShips

Table Reference: See Chart

applications than anyplace else) to guide the craft's course from take-off to landing. Still, the progress of weapons technologies, sensor designs and the added functionalities of VSTOL designs can allow today's aerojock to do things that no prop-driven crop duster ever could.

Today's aerospace cockpits—even those employed by conventional aircraft—feature life support systems and a broad suite of secondary monitors used to keep track of everything from local weather systems and satellite navigation data to the condition of the craft itself.

Small Craft, particularly those with long-range capability, even add features designed for the long haul, including management of fuel control systems, deep space navigation and a smart astrogational auto-pilot that uses local stellar data (rather than surface topography) to identify the vessel's position and orientation. Because they are always designed for at least two pilots, such cockpits tend to be more like miniature bridges than fighter cockpits.

VEHICULAR CONTROL SYSTEMS

Introduced: Pre-spaceflight

A vehicular control system, at its heart, is a driver's seat and dashboard, the same as one might find in a personal automobile. While the layouts may change, most are so simple that even a teenager with basic driver's training can adapt quickly from vehicle to vehicle. While the core principles do not change all that much for most vehicles, however, units designed for three-dimensional movement—such as submarines, airships and helicopters—are a bit more complex in operation.

In the case of many larger vehicles—military craft or Support Vehicles massing 15 tons or more—control systems grow increasingly complex, often requiring multiple crewmen to properly operate the vehicle. In most combat vehicles, this allows for specialized positions, such as gunners, sensor operators, loaders, engineers, navigators and co-drivers. Support Vehicles without combat capability may require navigators or radar and communications operators. The range of functions depends as much on the vehicle's size and function as on the manufacturer's design philosophy, but make no mistake about it: if all you need to do is get a vehicle to move, you can usually accomplish that with just one driver or pilot.

COMMAND BRIDGES

Introduced: early spaceflight (ca. 1960-2000)

In the case of DropShips and other large spacecraft, the modern bridge or command deck evolved from the earliest days of human space exploration. Essentially little more than a concentrated and upgraded version of any large vehicle's crew cabin, the command bridge of a spacecraft is usually a small chamber filled with screens and stations, with a captain's chair conveniently placed either in the center or aft to take in all action at a glance. Thanks to automation, computer controls and the hard work of able bodies throughout the vessel, most operations from the bridge are accomplished simply by pushing buttons, sending directions to the ship via an internal communications and control network not unlike the nervous system of the human body. These features allow a vessel commander to focus more on the act of commanding than of actually performing the various tasks involved in getting thousands of tons of DropShip to move and—if necessary—to fight.

COMMUNICATIONS EQUIPMENT

Introduced: Pre-spaceflight

Though most common to rearguard military vehicles acting as battlefield command centers, communications equipment is also seen in the police, civil service, commercial and industrial sectors. Specialized "comm gear" may be deployed in anything from a state-of-the-art newsvid van to a rescue vehicle, to a traffic control airship. The uses for such expanded communications facilities can be almost infinite, with direct point-to-point operational ranges (without bouncing) averaging 50 kilometers on the ground. Most complex systems can tap into satellite uplinks and communicate with vessels and other craft in close orbit, and larger units may even interface with HPG uplinks, to enter their transmissions into the local interstellar communications queue.

The basic suite of this type of communications gear is intrinsic to the normal systems found in military units like BattleMechs, aerospace fighters and Combat Vehicles. Some of the most popular of these include our own home-grown Achernar Electronics comm systems, or the Neil and O/P series seen across the Inner Sphere.

These systems have their limits, and not all civilian and industrial vehicles carry even this much gear. Combat and Support Vehicles that devote tonnage to these systems, however, can vastly improve their tactical command of a situation, either by monitoring remote sensors or by aiding field commanders in coordinating battlefield maneuvers.

COMMUNICATIONS EQUIPMENT

Tech Base: Inner Sphere and Clan
Unit Restrictions: None.
Game Rules: Communications equipment has no impact in *Total Warfare*; its use is expanded upon in *Tactical Operations*. A unit's communications equipment is considered active in game play as long as the system is not hit in combat, the unit's sensors and cockpit are undamaged, the engine is not shut down and the unit is not destroyed. Otherwise, these systems continue to function even if the pilot/crew is unable to act.
Construction Rules: BattleMechs, ProtoMechs, Combat Vehicles and fighters of all kinds automatically possess a basic amount of communications equipment (equivalent to 1 ton) as part of their cockpit and control systems. Small Craft and DropShips incorporate communications equipment as well (equivalent to 3 tons of such equipment) as part of their cockpit and control systems. IndustrialMechs and Support Vehicles do not carry communications equipment more sophisticated than a radio unless they invest tonnage in such gear.

Advanced units have the following basic communication equipment equivalency: satellites (1 ton), JumpShips (4 tons), WarShips and Space Stations (5 tons); rules for such units are found in *Tactical Operations* (satellites) and S*trategic Operations* (JumpShips, WarShips, and Space Stations).

Communications equipment that a unit automatically comes with stacks with a set of additional equipment to produce a total communications equipment tonnage rating. For example, a Small Craft (which receives 3 tons free) that adds a set of 3 tons of communications equipment has a total communications equipment rating of 6 tons.

For all eligible units, a set of communications equipment must be installed in full-ton lots (to a maximum of 15 tons per unit). No unit may add more than one set of communications equipment.

For BattleMechs and IndustrialMechs, communications equipment requires 1 critical slot per ton and must be allocated to the Critical Hits Table in a contiguous series within the same location; it may be operated by 1 crewman.

Combat and Support Vehicles need to allocate only 1 equipment slot to the entire set, regardless of its tonnage. Aerospace units may treat communications equipment like cargo, allocating the set to the Body/Fuselage location without occupying weapon slots. For these units, all additional communications equipment adds 1 crewman to the unit's minimum crew needs for every ton of communications gear.

ProtoMechs may not mount any additional communications equipment.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345

CONCEALED WEAPON (MODIFICATION)

Introduced: Pre-spaceflight

While often dismissed as a mere plot device for flashy spy-thriller holovids, it is actually not unheard of for some Support Vehicles to pack hidden weapons beneath fold-back or blow-away panels. Such camouflage techniques are only partly effective, however; only smaller weapons—those generally harmless against heavier combat units like BattleMechs—may be easily concealed in such a fashion. Unfortunately, those who generally go through the effort to conceal such weapons aren't law-abiding citizens or security-conscious members of the MIIO, but gangland criminals or terrorists, who target anything *but* armored objectives that can fight back.

Naturally, concealed weapon modifications are highly illegal in most circumstances, and limited by their nature and size constraints to the smaller classes of weapons and civilian or industrial Support Vehicles—such as your average SUV. Their use is unheard of among the Clans, but those of you who might see action or assignment as part of an urban pacification or peacekeeping mission would do well to remember that such modifications can hide anything from a hold-out pistol in the headlamp of a sports-cycle to a man-portable SRM in the trunk of a hovercar.

CONCEALED WEAPON

Tech Base: Inner Sphere
Unit Restrictions: Only Small Support Vehicles (under 5 tons total weight) may employ concealed weapon modifications
Game Rules: The concealed weapon modification has no impact in *Total Warfare*; its use will be covered in *A Time of War*.
Construction Rules: Only Small and Medium-class weapons may be mounted as concealed weapons. The concealed weapon modification weighs 5 percent of the weapon's base weight (not counting ammunition), rounded up to the nearest kilogram. Concealed weapon modifications occupy no equipment slots by themselves, though the weapon itself does.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345)

ECM SUITE

Introduced: 2597 (Terran Hegemony)
Extinct: 2845 (Inner Sphere)
Recovered: 3045 (Capellan Confederation)

Around the end of the Reunification War, Johnston Industries (a Terran Hegemony company, working in partnership with Yelm Weapons of Fletcher) debuted the Guardian ECM suite on the newly deployed Nightshade VTOL. This broad-spectrum jamming and electronic countermeasure system revolutionized electronic warfare (EW). In a day when most communications and targeting systems had grown accustomed to a battlefield flooded by conventional electronic noise and counter-noise, the Guardian was powerful and smart enough to scramble all hostile electronics within a spherical "bubble" roughly 180 meters across. The Guardian could even adapt to and scatter contemporary EW packages like the Beagle Active Probe, Narc Missile Beacon and Artemis IV—all while simultaneously keeping friendly channels and targeting enhancers clear.

Even today, the Guardian's recovered technology remains highly adaptable, not only capable of recognizing and countering the EW features of its Star League counterparts but also newer technologies such as the C^3 and C^3i systems. The Capellan Confederation has expanded on the Guardian's utility with their new stealth armor system, a new role that will assure this powerful piece of technology a place on the battlefield for the foreseeable future.

Predictably, the refined (and name-brand free) Clan version of the Guardian achieves the same effects with a third less weight and half as much bulk. Though the technology was largely in decline for a time among Kerensky's children, their return to the Inner Sphere and the growing preponderance of EW systems has prompted more and more Clan machines to hit the field armed with ECM systems.

ECM SUITE

Tech Base: Inner Sphere (Guardian ECM only) and Clan (Standard ECM suite only)
Unit Restrictions: None
Game Rules: Units with multiple ECM suites may use only one at a time in game play. Fighters, Small Craft and DropShips may only use ECM suites when interacting with ground units. While active, ECM suites are automatic, and are considered active even if the unit's pilot/crew is rendered incapable of acting in combat, but will shut off if the carrying unit is shut down or destroyed.
Construction Rules: BattleMechs mounting stealth armor *must* include a Guardian ECM suite as well. Units may mount more than one ECM suite, but may not use more than one at a time during game play.

Table Reference: Weapons and Equipment (Inner Sphere and Clan, pp. 341–343) **Game Rules:** *Total Warfare*, p. 134

EJECTION SEAT

Introduced: Pre-spaceflight

BattleMechs, aircraft and aerospace fighters feature ejection seats as a standard component of their cockpit design. These seats enable the pilots of these units to make a speedy escape in the event of an imminent catastrophe. Unfortunately, this technology is simply not always available or possible in other vehicles, such as Combat Vehicles, which rely more heavily on too many all-encompassing armor plates and structural supports that make a blast-off ejection system practical or reasonably safe.

Still, it is not unheard of for some Support Vehicles—ranging from high-performance fixed-wing craft and VTOLs to some of today's more extreme stunt cars and IndustrialMechs—to incorporate ejection seating in place of standard seats. In most cases, of course, these systems are after-market upgrades and are hardly what one might consider "street legal." So buyers, beware: if you're shopping for an Avanti or a Hurricane that boasts a bail-out mechanism, don't assume the manufacturer will pay your medical bills when your car—and your dramatic egress system—don't measure up to all expectations.

The IndustrialMech ejection seat is more complex and bulky, adding weight and requiring extensive modification to the typical IndustrialMech cockpit—including the addition of canopy blasting bolts and the rearrangement of the cockpit's safety cage. Because such units aren't supposed to be in a position to ever require such a speedy bail-out system (and perhaps because manufacturers fear lawsuits from ejection system misuse), this equipment is fairly uncommon in IndustrialMechs.

EJECTION SEAT

Tech Base: Inner Sphere and Clan
Unit Restrictions: Only IndustrialMechs, Small Support Vehicles and Medium/Large Support Vehicles with a Airship, Fixed-Wing or VTOL motive system may install ejection seats.
Game Rules: Ejection seats have no impact in Total Warfare. Rules for ejection appear in *Tactical Operations*, p. 196.
Construction Rules: BattleMechs, fighters and Small Craft incorporate ejection systems into their cockpit designs automatically, while DropShips must use escape pods and lifeboats.
Units mounting ejection seats must mount the type intended for their design (Support Vehicle for Support Vehicles; IndustrialMech for IndustrialMechs). The IndustrialMech ejection seat critical slot must be assigned to the unit's head. Support Vehicle ejection seats take up no equipment slots but must be noted on the unit's record sheet.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345)

ENGINES

If the cockpit is the brain of the modern vehicle, the engine is surely its heart. With so many different vehicles, 'Mech types and aerospace engines out there today, it would take an entire volume to get into the finer details about how the various engines work and what their nuances are. As that is beyond the scope of this document, engineering students are directed to their relevant coursework and the primer in the latest edition of Rayne's Power Sources. For the purposes of this briefing, engines are broadly described as follows: military-standard fusion engines (including those used in BattleMechs, Combat Vehicles and ProtoMechs), military-standard combustion engines, aerospace engines, industrial fission/fusion engines, industrial internal combustion engines and Support Vehicle engines.

MILITARY-STANDARD FUSION ENGINES

Introduced: Circa 2021 (Western Alliance, Terra)

Massive technological advances (for the era) made it possible to deploy relatively inexpensive fusion-based power supply systems small enough for vehicular use in the early twenty-first century. Naturally, one of the first applications of this technology appeared in military vehicles and aircraft. In the millennium since that time, combat fusion engines have only grown smaller, more efficient, cleaner and more powerful—enabling the practical development of the BattleMech as the titan of war it has become. Still by no means cheap to the average consumer, battlefield-rated fusion engines are manufactured across the Inner Sphere today by a relatively small number of producers. They range in mass from the half-ton (and incredibly rare) Omni-10 power plant to the truly massive (and rarely used) LTV-400, which tips the scales at 52.5 tons.

In practical application, these engines have evolved as technologies expanded, but they have proven most efficient when used to power BattleMechs (or IndustrialMechs). Combat Vehicles, by comparison, have to mount additional shielding and power conduits to handle and harness a fusion power source, which tends to add significant weight over and above the traditional 'Mech versions.

With centuries of warfare, of course, the best technological enhancements focused on these units, yielding to date three major improvements to battlefield fusion: the extralight (XL) engine, the light fusion engine and the ProtoMech engine.

Extralight (XL) engines were first fielded by the Terran Hegemony's armed forces in 2579, and achieved widespread use by the time of Kerensky's departure in 2784. The Succession Wars destroyed the last of the XL engine plants by 2865, but the technology was recovered by the Lyran Commonwealth in 3035 as one of many lost treasures of the fallen Star League. These engines reduce their overall mass by roughly half, in exchange for far greater bulk, thus allowing a given unit to carry additional weapons, armor and other equipment. The Clans' refined version matches these weight savings, but at a significant reduction in bulk that enhances the engine's overall survivability in combat.

Light engines were originally the brainchild of the Wolf's Dragoons mercenary command, as an effort to mimic the compact but lighter-weight Clan XL. This engine, which balances the XL's bulk and weight savings, tends to weigh 25 percent less than an identically-rated military-standard fusion engine, for the same volume as a comparable Clan-made reactor. Spies from the Lyran Alliance reportedly stole this technology in the late 3050s, and—despite the threat of the Dragoons' ire—the armies loyal to then-Archon Katherine Steiner-Davion began to field light engines in 3062.

[**Compact engines** emerged in 3068, a year after this document was compiled. Once again developed by Lyran engineers, this engine type was apparently an alternative approach to the "smaller, harder-to-kill engine" problem initially authorized by General Nondi Steiner during the FedCom Civil War. The compact engine has half the physical size of the standard fusion plant, but weighs fifty percent more through the use of denser shielding and a smaller, high-density fusion bottle. In the face of the Blakist Jihad, General of the Armies Adam Steiner shared this technology with ComStar and—through them—other nominal Lyran allies, including the FedSuns and the Combine. Since then, sadly, Word of Blake Robes have managed to capture and reverse-engineer the technology as well. –EB]

ProtoMech engines, the last of the major combat-rated fusion plants, are new not so much because they are particularly innovative, but because they were devised to maximize their power-to-weight ratios in the interests of improving ProtoMech viability when they debuted in 3060. Where standard combat-rated fusion engines are available only in power rating increments of five, ProtoMechs, with their smaller design mass increments, can benefit better from engines custom-built to their unique needs. Observers had identified ProtoMech engines as light as 250 kilograms in the field, though the theoretically smallest possible chassis could have an engine with a power rating of 4, weighing as little as 100 kilograms.

MILITARY-STANDARD COMBUSTION ENGINES

Introduced: Pre-spaceflight

One of the most popular, inexpensive, tried-and-true of all engine technologies has been the internal combustion engine (ICE for short). It therefore comes as no surprise that while these power plants are impractical for BattleMech use thanks to their greater size, they have nonetheless made their presence known in the wider field of combat vehicles, including tanks, VTOLs and even conventional fighters. While ton-for-ton only half as efficient as a competing fusion engine, and reliant on a constant supply of chemical fuels for long-term operation, modern combat ICEs—or at least the parts to maintain them, which technically differ little from those of civilian manufacture—can be found on virtually every inhabited world in the Inner Sphere. Advances in technology have not permitted the development of extralight or light ICEs, but their ability to operate without heat spikes and still use heavy energy weapons—after the proper installation of power amplifiers, of course—has made them a perfect match for conventional combat vehicles.

AEROSPACE ENGINES (FUSION/TURBINE)

Introduced: Pre-spaceflight (conventional aircraft), 2026 (Western Alliance, Terra – aerospace/spacecraft)

The standard military fusion and combustion engines (aerospace ICEs are called turbines) referenced above were technologies easily adopted to use by conventional military aircraft and aerospace fighters. Ultimately, their development into flight systems was simply a matter of making them light and efficient enough to be useful and economical for air and space vehicles.

At the Small Craft and DropShip scale, however, engine design had to evolve somewhat to allow for the launch of larger spacecraft for longer voyages. The first true success of this endeavor came with the launch of the Western Alliance's spacecraft, the AS *Columbia*, on a mission to Mars. While centuries would pass before Small Craft and DropShips as we know them today came to be, the development of aerospace drives as found on such vessels differs little fundamentally from those used in humankind's first tentative steps into deeper space.

INDUSTRIAL FISSION/FUSION ENGINES

Introduced: early spaceflight (ca 1960-2000 [Fission]); 2021 (Western Alliance, Terra)

Commercial and industrial-grade fission and fusion engines as we know them evolved out of the technologies that emerged in the early twenty-first century. Though humans had been splitting the atom since the late 1940s, the use of such power in smaller vehicle applications was limited almost exclusively to the massive seagoing vessels used by the militaries of the resident superpowers. Controversial in nature, fission engines—essentially steam or gas turbines driven by the fission chain reactions in certain radioactive materials—faced a long, hard fight for acceptance in industrial vehicle applications. The advent of "cleaner" fusion technology only complicated matters.

Nevertheless, both technologies have managed to survive to the present day as the preferred high-power source for modern IndustrialMechs. Shadowing the advances of combat fusion reactors, these particular commercial analogues maintain the same universal performance ratings as their military counterparts, and have comparable features for a given size of IndustrialMech and mobility. On average, for instance, a given IndustrialMech fission plant can accomplish the same amount of output as its fusion counterpart with a 75 percent increase in its overall mass, though practical limits of shielding and safety technologies have kept even the smallest vehicular IndustrialMech fission plant at 5 tons. Meanwhile, IndustrialMech fusion engines match their battlefield cousins well enough to allow for equal swaps in a pinch.

INDUSTRIAL COMBUSTION ENGINES

Introduced: Pre-spaceflight

Another industrial analogue to today's combat engine—and again utilized today almost exclusively by IndustrialMechs—are industrial-grade ICEs and fuel cell engines. Not terribly different from their military varieties (though fuel cell engines lost popularity as a battlefield power source before the age of the BattleMech), today's IndustrialMech fuel burners can match the efficiency of a BattleMech plant with little more than a significant increase in weight and the addition of supplemental fuel stores. Granted, their applications vary a bit, with fuel cell engines adaptable to submerged or vacuum environments versus cheaper fossil fuel burners, but today, various laws, centuries of design tradition and the military drive to place the best power sources in the most deserving equipment has relegated these engines to IndustrialMech use.

SUPPORT VEHICLE ENGINES

Introduced: Pre-spaceflight

Not bound by the universal rating systems and standards of military vehicle and 'Mech designs, conventional Support Vehicles have access to an extremely varied array of power supply choices. Steam engines, internal combustion, electric motors (including battery-driven and solar-powered), fission and fusion sources exist in the civilian and commercial sectors, powering everything from monocycles and hovercars to airliners and zeppelins. The shapes, sizes and weights of these power supplies vary with whatever level of technical sophistication the designers may employ, but only the most sophisticated can generally approach the potential of military-grade engines.

ENGINE

Tech Base: Inner Sphere (Fusion [Standard, IS XL, Light, Compact], ICE, Fuel Cell, Fission, DropShip/Small Craft and Support Vehicle), and Clan (Fusion [Standard, Clan XL], ICE, Fuel Cell, Fission, ProtoMech, DropShip/Small Craft and Support Vehicle)

Unit Restrictions: See chart

Game Rules: Engines are considered active in game play unless the unit is shut down or destroyed. Filled or partially filled engine fuel tanks (where applicable) are considered always live and will explode per standard rules if critically hit during game play.

Construction Rules: All units constructed under these rules—except for Combat and Support Vehicle units built as Trailers that are not designed to operate independently of a Tractor—must carry an engine. The chart below indicates the availability of the featured engine types to particular unit types, as well as their construction rules page references and main weight tables.

Engine Type	Unit Availability	Construction Rules Reference	Weight Table
Standard Fusion	BM, IM, PM, CV, CF, AF	p. 48 (BM), 67 (IM), 83 (PM), 100 (CV), 184 (CF), 184 (AF)	Master Engine
Extralight (XL) Fusion	BM, CV, AF	p. 48 (BM), 100 (CV), 184 (AF)	Master Engine
Light Fusion	BM, CV, AF	p. 48 (BM), 100 (CV), 184 (AF)	Master Engine
Compact Fusion	BM, CV, AF	p. 48 (BM), 100 (CV), 184 (AF)	Master Engine
Standard ICE/Turbine	IM, CV, CF, AF	p. 67 (IM), p. 100 (CV) p. 184 (CF) p. 184(AF)	Master Engine
Industrial Fuel Cell	IM	p. 67 (IM)	Master Engine
Industrial Fission	IM	p. 67 (IM)	Master Engine
ProtoMech	PM	p. 83 (PM)	ProtoMech Engine
DropShip/Small Craft	SC, DS	p. 184 (SC, DS)	Aerospace Engine
Support Vehicle (Any)	SV	p. 126 (SV)	Support Vehicle

Key: BM=BattleMechs, IM=IndustrialMechs, PM=ProtoMechs, CV=Combat Vehicles, SV=Support Vehicles, CF=Conventional Fighters, AF=Aerospace Fighters, SC=Small Craft, DS = DropShips

Table Reference: See Chart

Game Rules: *Total Warfare*, pp. 126 ('Mechs), 195, 197 and 199 (vehicles), and 241 (aerospace)

ENVIRONMENTAL SEALING

Introduced: Pre-spaceflight

Unlike BattleMechs, aerospace fighters, submersible vehicles and DropShips—which all incorporate this technology by design—many Support Vehicles and IndustrialMechs lack the hermetic sealing to operate in toxic environments, vacuum or even underwater. At an added cost in chassis mass, however, environmental sealing can be added to many of these units, incorporating air tanks, filters, scrubbers and airtight sealing.

This process allows for the crew cabins, cockpits and critical parts to function normally in such hostile environments, albeit at an increased cost. Even though environmental sealing protects the pilots and crews of units so equipped and enables their parts to move properly, don't expect the likes of a Tyron 25 internal combustion engine to function when completely submerged, even with full sealing. Such engines, after all, still need to take in air to burn their fuel. Achieving full functionality irrespective of environment can only be attained by vehicles and units that are not only sealed, but whose engines also don't need to breathe air (such as fuel cell, fission or fusion plants).

ENVIRONMENTAL SEALING

Tech Base: Inner Sphere and Clan

Unit Restrictions: BattleMechs, ProtoMechs, aerospace fighters, Small Craft, DropShips and submersible Support Vehicles may not install environmental sealing (as they receive it automatically).

Game Rules: IndustrialMechs with environmental sealing may enter Depth 1 Water, but cannot be fully submerged unless they incorporate both environmental sealing and a Fission, Fusion or Fuel Cell engine. Additional applications for enviro-sealing are covered in *Tactical Operations*.

Construction Rules: IndustrialMechs must spend 10 percent of their total mass (rounded up as appropriate to the unit's core construction rules) to add environmental sealing, and must assign one critical slot per body location to the sealing systems (see p. 70 under Step 2 of the IndustrialMech core construction rules). Support Vehicles may also incorporate environmental sealing into their chassis design process (see pp. 122-123).

Environmental sealing for Combat Vehicles is covered in *Tactical Operations*, p. 303.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345)

ESCAPE POD

Introduced: Circa 2000 (maritime), early spaceflight (aerospace)

Large spacecraft and Support Vehicles, with crews averaging in the dozens, tend to incorporate escape pods into their construction as a sealed sort of "mass transit" version of the ejection seat. Developed to sustain six to seven adults at one time in hazardous environments—including space and re-entry—typical escape pods come in space and underwater types, deployed by spacecraft and submarines, respectively.

Though developed for very different environments, both types average out in function. A typical DropShip escape pod weighs about seven tons (though two tons of this covers the launch mechanism). The pod typically features maneuvering jets, re-entry shielding and a parachute or parafoil for landing after blasting free of its parent ship with a maximum complement of six people. Once launched, an omni-directional beacon mounted in the pod transmits a distress signal for up to thirty days—though the pod's life support can only sustain its full complement for twenty days, and its on-board food rations tend to be good for all of twelve.

By comparison, the maritime escape pod weighs seven tons—the extra weight going into structural reinforcement and space for up to ten persons—and relies mainly on its buoyancy to ascend from its launch depth to the surface, at which point the pod can function as a common lifeboat. If the local atmosphere is breathable, the maritime escape pod can open up on the surface to avoid running out of breathable air, and stands a good chance of reaching safety long before its food supplies run out, especially as many such models come with small electric motors that can be used for propulsion once surfaced.

ESCAPE POD

Tech Base: Inner Sphere and Clan

Unit Restrictions: Only Naval Support Vehicles (including those featuring hydrofoil or submersible chassis modifications) 5 tons and over may use maritime escape pods. Only Small Craft, DropShips and Airship or Fixed-Wing Support Vehicles 5 tons and over may use aerospace escape pods.

Game Rules: Escape pods have no impact in *Total Warfare* game play. The use of these items is covered in *Strategic Operations*, pp. 26-27.

Construction Rules: Small Craft, DropShips and airborne Support Vehicle types over 5 tons may use aerospace escape pods. Naval (especially submersible) Support Vehicles over 5 tons may use maritime escape pods. Pods are not considered to occupy weapon or equipment slots on spacecraft or Support Vehicles, but should be noted in the unit's statistics.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345)

EXTERNAL STORES HARDPOINT

Introduced: Pre-spaceflight

Another feature common to military aircraft and aerospace fighters, but uncommon to airborne Support Vehicles, are external hardpoints: fixed mountings for external modules that can be used to carry external fuel tanks, or even bombs and rocket pods. Their existence on civilian and commercial air vehicles is not necessarily tightly controlled, but wary warriors should always keep in mind that a hardpoint devoted commercially to extra fuel for an airliner may just as easily pack a few tons of cluster bombs in the hands of a desperate resistance or terrorist group.

EXTERNAL STORES HARDPOINT

Tech Base: Inner Sphere and Clan
Unit Restrictions: Only Fixed-Wing Support Vehicles may install external stores hardpoints. (Conventional and aerospace fighters receive them free.)
Construction Rules: Aerospace and conventional fighters receive external stores hardpoints (also known as bomb hardpoints) for free (see *Add Weapons, Ammunition and Other Equipment* in the *Aerospace* section, p. 194). To acquire the same capability, Fixed-Wing Support Vehicles must install hardpoints. A Fixed-Wing Support Vehicle may carry a maximum of 1 hardpoint for every 10 tons of unit weight (rounded down).

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare*, p. 245

FIELD KITCHEN

Introduced: Pre-spaceflight

Seen as a luxury on battle fronts, but often a feature of the rear guard—as well as remote civilian and industrial work sites—field kitchens (referred to on some vehicles as a galley) are essentially mobile cafeterias equipped to supply the culinary needs of up to 150 troops or workers. (That's actually a textbook case; real-world kitchens can range in capability based on the supplies on hand and the skills of the chefs.) Some field commanders—notably those of the Lyran Alliance, who tend to value creature comforts more than others—often fight tooth and nail for their field kitchens, defending their value as a luxury that keeps troop morale high. But while that may sound petty, studies have shown that the responsible use of field kitchens can accomplish more to maintain troop health, ease tense nerves and reduce instances of broken discipline than field rations alone.

FIELD KITCHEN

Tech Base: Inner Sphere and Clan
Unit Restrictions: BattleMechs, IndustrialMechs and aerospace units may not carry field kitchens. (Small Craft and DropShips count this feature within the tonnage reserved for crew quarters.)
Game Rules: Its game play rules are covered in *Strategic Operations* p. 41, under Fatigue (*Outside of Game Play*).
Construction Rules: A unit may mount a maximum of 3 field kitchens at one time. Each field kitchen adds 3 crewmen to the vehicle's minimum crew requirements.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345)

FIRE CONTROL SYSTEMS

Not to be confused with the Artemis fire control systems described earlier, the fire control systems described here refer to sensors and targeting systems specifically designed for combat in modern vehicles and 'Mechs. These systems come standard with all battlefield combat units and aerospace craft, but Support Vehicles and IndustrialMechs do not automatically feature such systems, and must add them as design modifications instead. These modifications are outlined below.

BASIC FIRE CONTROL

Introduced: Pre-spaceflight

Support Vehicles use basic fire control systems to reduce crew needs and improve the accuracy of any heavy- and medium-class weapons they might mount. Still inferior to the on-board targeting and tracking systems used by true combat vehicles, they are generally sufficient for combat, but their effectiveness is generally hampered by the intrinsic EW systems of actual combat units. Before the BattleMech, these systems were state-of-the-art; today, they are standard only on IndustrialMechs, and are available as an option for armed Support Vehicles. Basic fire control is not sophisticated enough to work with the targeting computers available today to Clan and Inner Sphere units, nor can a unit equipped with only basic fire control make use of enhanced C^3 computers.

ADVANCED FIRE CONTROL

Introduced: Circa 2300 (Terran Alliance)

Advanced fire control systems are integral to all combat units and employed primarily by Support Vehicles designed for deployment in combat. They're also common among armed IndustrialMechs (though

FIRE CONTROL SYSTEM

Tech Rating: Clan and Inner Sphere (Basic Fire Control–B; Advanced Fire Control–C)
Unit Restrictions: Only Support Vehicles may install basic fire control systems (IndustrialMechs receive this system free). Only IndustrialMechs and Support Vehicles may install advanced fire control systems (BattleMechs, ProtoMechs, Combat Vehicles, fighters, Small Craft and DropShips receive this system free).
Construction Rules: Basic fire control may be installed only on Support Vehicles. Its weight is equal to 5 percent of the combined weight of all heavy- and medium-class weapons mounted on the unit, not including ammunition (rounded up to the nearest kilogram for Small-sized Support Vehicles, or to the nearest half-ton for Support Vehicles 5 tons and up). Basic fire control occupies no equipment slots, and reduces the crew needed to man each of the Support Vehicle's medium weapons to 1 (not including the Support Vehicle's Driver/Pilot).

Advanced fire control may be installed on IndustrialMechs and Support Vehicles. IndustrialMech advanced fire control takes up no weight or critical slots (but doubles the cost of the 'Mech's cockpit). Support Vehicle advanced fire control systems weigh 10 percent of the vehicle's combined heavy- and medium-class weapons, not including ammunition (rounded up to the nearest kilogram for Small-sized Support Vehicles, or to the nearest half-ton for Support Vehicles 5 tons and up). Advanced fire control also occupies no equipment slots, and reduces the crew needed to man each of the Support Vehicle's medium-class weapons to 1 (one of these gunners may also be the vehicle's Driver/Pilot).

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare*, p. 206

armed IndustrialMechs are themselves a rarity). On par with standard combat targeting and tracking systems, advanced fire control enables support units to function with equal efficiency to combat units, and even allows compatibility with the advanced capabilities of targeting computers and C^3 systems.

Though IndustrialMech models of this equipment are essentially weightless, swapping out the extant sensor suites with a military-grade version, the less-efficient Support Vehicle version of advanced fire control masses twice that of the basic version, coming to ten percent of the weight of all the vehicle's mounted heavy and medium weapons.

FLAMERS

Introduced: Pre-spaceflight (Vehicle Flamer), 2025 (Western Alliance, Terra [Standard Flamer])

Flamers are a simple weapon with a long history, designed as much for psychological warfare as for devastation. Most effective as anti-infantry weapons, today's heavy-weapon models of the flamer come in two basic types: fusion-powered plasma flamers (often regarded as the standard today), and the fuel-based chemical variety (often dubbed the "vehicle flamer"). Both are marketed by a number of well-known manufacturers across the Inner Sphere, from Flame Tech of Fletcher in the Free Worlds League to the Hotshot series out of Coventry, or the Zippo available from factories on Furillo and Hesperus II.

As anti-'Mech weaponry goes, the flamer is a poor weapon choice, lacking the range and damage potential of even the typical small laser. Most BattleMech-mounted models are the Standard type, which taps into the reactor to produce heat in the form of a plasma release, but these can deliver fire in short bursts only. Still devastatingly effective against infantry, flamer fire may raise an opposing 'Mech's heat levels as well. Compared to a solid engine hit or two, however, flamers today can do little to imperil technology now so well protected by innovations like double heat sinks.

Because of their poor range and effectiveness against other units in aerospace combat, aerospace units rarely use flamers. However, their limited range and "spray" effect has made the Standard flamer marginally effective as a point-defense weapon. Chemical-based vehicle flamers, which are functionally useless in space, almost never appear on aerospace units.

VEHICLE FLAMER

The vehicle flamer is so known because it is favored more by ICE-powered units, such as lower-cost Combat Vehicles and IndustrialMechs. Drawing on a store of chemical fuels—typically petroleum-based—these weapons may be mounted without any need for heat sinks or power amplifiers. Though technically available to BattleMechs as well (but not to aerospace units), the fact that even these flamer types can cause internal heat spikes when used—and possess an "ammunition" far less stable than the rounds in a typical machine gun's magazines—prompts most BattleMech designers to pass on the concept.

FLAMER

Tech Base: Inner Sphere and Clan

Unit Restrictions: Aerospace units cannot use Vehicle flamers. Units not powered by fusion or fission engines may not use Standard flamers.

Game Rules: Flamers may not be fired if the unit is shut down or if its pilot/crew is otherwise prevented from acting, but loaded or partially loaded Vehicular flamer ammo bins are always live and will explode per standard rules if critically hit during game play.

Construction Rules: Units powered by fusion or fission (including aerospace and ProtoMech engine types, non-standard fusion engines and Support Vehicle fusion and fission engines) may install either Standard flamers or Vehicle flamers as desired. Units powered by non-fusion/fission engine types may only use Vehicle flamers. Note that even though they are classified as energy weapons in game play, Vehicle flamers do not require power amplifiers when mounted on non-fusion/non-fission units, nor do they require heat sinks.

Table Reference: Weapons and Equipment (Inner Sphere and Clan, pp. 341–343) **Game Rules:** *Total Warfare*, p. 98

GAUSS RIFLE

In all its forms, the Gauss rifle is one of the most devastating ballistic weapons on the battlefield today. Developed by the Terran Hegemony (with prototypes in the field as early as 2587), this weapon system uses a series of magnets, rather than chemicals or powder, to propel an inert nickel-ferrous projectile through its rifle barrel. Through this process, the weapon achieves incredible muzzle velocities with almost negligible heat. Though it requires a great deal of power, and the charged capacitors represent an explosion hazard if damaged in combat, the raw kinetic damage a Gauss rifle can inflict—and the excellent ranges at which it can deliver such damage—easily surpasses these drawbacks.

ANTI-PERSONNEL GAUSS RIFLE

[Introduced: 3069 (Clan Jade Falcon)

In 3069, Clan Jade Falcon began to deploy a new, lightweight Gauss system specifically aimed at anti-personnel work. Though first carried by Falcon Elementals in a bid to give themselves a decisive edge against the host of new Spheroid battlesuits they were encountering, the anti-personnel (AP) Gauss soon found its way to 'Mech and vehicle usage. Reliable reports from the Homeworlds suggest that the weapon has since been duplicated across Clan-held space, with the Blood Spirits recently deploying this weapon on some of their newer ProtoMech designs.

Essentially a Gauss-based variation of a needler weapon, the AP Gauss fires a deadly hail of metal flechettes at supersonic speeds. Thanks in part to their added acceleration, these flechettes can scour their way through battlefield armor, unlike normal needler shot, which makes this weapon particularly deadly to battle-armored troops and conventional infantry alike. –EB]

HEAVY GAUSS RIFLE

Introduced: 3061 (Lyran Alliance)

Seeking a weapon that would not simply close the Clan-Sphere technology gap, but surpass it in terms of raw power, Lyran engineers at Defiance Industries developed the immensely powerful heavy Gauss rifle in 3061. With energy needs so great that only a nuclear engine can keep it charged, the heavy Gauss rifle actually generates—through sheer kinetic energy—enough recoil to destabilize its firing unit. Coupled with the weapon's extreme bulk, these factors have severely limited its options for vehicle and BattleMech design, as the weapon creates too much structural strain to be mounted in a turret or arm. Worse, despite all the raw power, the weapon is most devastating only at its closest ranges, because the projectile experiences dramatic loss of kinetic energy over longer distances.

HYPER-ASSAULT GAUSS RIFLE

[Introduced: 3068 (Clan Hell's Horses)

Clan Hell's Horses evidently developed the hyper-assault Gauss rifle in the midst of a hasty Homeworld re-armament effort, suggesting that the weapon was under development for some time beforehand. How they kept the secret so well is unclear, but we do know that the weapon came as a complete surprise to the Wolf Clan forces in the coreward Periphery when the Horses attacked them in 3068. Very soon afterward, this weapon system appeared in Diamond Shark and Coyote arsenals (all but confirming alliances or deals struck between those two Clans and the Horses).

Possibly inspired by reports of the Lyrans' heavy Gauss, the Horses' weapon is especially effective against vehicles, battle armor and aircraft—but it avoids the design flaws of Defiance Industries' creation in firing multiple projectiles of far lighter caliber though a battery of capacitors, making up for the lack of punch with an extremely high rate of fire—sort of a "rotary Gauss" concept. Varying the amount of capacitors to increase potential damage, the Horses have developed three distinct "HAG" models (now *there's* an unfortunate acronym!) that operate on the same principles, with each larger model offering an increase in heat and mass for a corresponding increase in sheer volume of fire. –EB]

LIGHT GAUSS RIFLE

Introduced: 3056 (Free Worlds League)

The light Gauss rifle was born as a joint project by Imperator Automatic Weaponry of Atreus and Corean Enterprises of Stewart. Sponsored personally by Captain-General Thomas Marik, their efforts were aimed at duplicating the lightweight construction of the Clan Gauss rifle system for use by Free Worlds League Military forces. While the result *was* a weapon as light as the standard Clan design and even more compact, it could only fire projectiles half as massive as a standard Star League model, effectively halving the damage. Despite a loss of hitting power, the light Gauss can fire its smaller rounds faster, farther and with greater accuracy than a standard Gauss rifle—factors that combine for a much-improved effective range.

STANDARD GAUSS RIFLE

Introduced: 2590 (Terran Hegemony)
Extinct: 2865 (Inner Sphere)
Recovered: 3040 (Federated Commonwealth, Free Worlds League, Draconis Combine)

Despite the advent of newer designs, the Star League-era Gauss rifle—first developed by Norse Technologies and deployed (originally in prototype form) on NETC's Alacorn main battle tank—remains the standard by which all others are measured. Powerful enough to tear an enemy 'Mech's head clean off at more than half a kilometer, even Clan designers found little to improve upon in the three hundred years they had to further develop it. The Clan standard model is only about 20 percent lighter and more compact than the Zeus Slingshot or Poland Main Model A—both of which match the specs of original SLDF models—all for the exact same range and damage profile.

GAUSS RIFLE

Tech Base: Inner Sphere (Standard, Light and Heavy only) and Clan (AP, Standard and Hyper-Assault only)
Prohibited Units: Heavy Gauss rifles may not be carried by any unit that does not mount a fusion or fission engine.
Game Rules: Gauss rifle capacitors remain charged (and thus explosive) throughout *Total Warfare* game play, even if the unit is shut down or its crew/pilot is unable to act.
Construction Rules: AP, Light, standard (Inner Sphere and Clan) and Hyper-Assault Gauss rifles may be mounted on any unit per its standard weapon and equipment mounting rules. Biped OmniMechs that choose to mount a Gauss rifle in the arm must remove the lower arm and hand actuator before doing so.

Heavy Gauss rifles may only be mounted by units powered by fusion or fission engines (including BattleMechs, IndustrialMechs, aerospace units, Combat Vehicles and Support Vehicles). On BattleMechs or IndustrialMechs, Heavy Gauss rifles may only be mounted in Torso locations, and their critical slots may be divided (but only among two adjacent Torso locations, side-to-center). Heavy Gauss rifles mounted on vehicles (Combat or Support) may only be installed in the Front or Rear sections, never in the sides or the turret. On aerospace fighters, Heavy Gauss rifles may only be installed in the nose or tail, never the wings.

Table Reference: Weapons and Equipment (Inner Sphere and Clan, pp. 341–343) **Game Rules:** *Total Warfare*, p. 98

GYROS

The gyroscope system of a BattleMech or IndustrialMech is one of the most critical components in the design of such units, on par with the engine systems and cockpit controls. Without this sophisticated equipment, 'Mechs would be far clumsier than today, scarcely able to maintain stability under even the simplest of actions, let alone the punishment of enemy weapons fire. The stabilizing influence of the gyro makes the BattleMech an effective war machine, and the IndustrialMech a versatile tool.

The standard 'Mech's gyro today is a refined form of the types used in the early myomer-based IndustrialMechs of the mid-24th century. By the time of the *Mackie's* development in 2439, gyro-stabilizers were a proven technology, only slightly bulkier than their modern counterparts.

COMPACT GYRO

[Introduced: 3068 (Federated Suns and Lyran Alliance)

Military gyro technologies were apparently about to surge ahead even as Habeas published this document. In late 3067, even as two other new gyro types hit the field elsewhere, Lyran producers were on the verge of releasing their new compact gyro at TharHes Industries on Tharkad and Coventry Metal Works on Coventry. The onset of the Jihad delayed deployment of these systems until 3068, long enough for the FedSuns—working from Civil War-era plans—to begin producing their own models, which a few Davion mercs helped to test. Sadly, some of these mercenaries defected to Blakist command soon afterward, and the technology has spread to other Inner Sphere powers since.

Built along the same premise as the compact fusion engine, the compact gyro increases its mass by fifty percent, in exchange for reducing its physical size by half. This makes it harder to hit a gyro through internal damage, and enables 'Mechs so equipped to pack larger weapons in the central torso area. –EB]

HEAVY-DUTY GYRO

[Introduced: 3067 (Draconis Combine)

The Draconis Combine unveiled the heavy-duty gyro sometime in mid-3067 and shared it with the Free Worlds League as part of a secret technologies exchange. Since the start of the Jihad, this technology

has spread to other Inner Sphere factions as well, and—like the other new gyro types—has yet to be duplicated by the Clans.

A vast improvement over standard gyros (though they weigh twice as much for an equivalent rating) the heavy-duty gyro is the same size as the standard model, but has a reinforced outer shell, more redundancy, and is composed of denser materials that can together withstand more damage than the standard military gyro. –EB]

EXTRALIGHT (XL) GYROS

[Introduced: 3067 (ComStar)

ComStar's enhancement of gyroscope technology—first deployed in the waning weeks of 3067 as a series of quick upgrades—increases the system's overall bulk by half in exchange for a component that weighs only half as much as the standard models. Developed to give Com Guard 'Mechs more tonnage for weapons and equipment, several of the newer and refitted 'Mechs that took part in Case White featured this technology. Apparently, enough were captured and reverse-engineered to give XL gyros to the Robes as well. –EB]

GYRO

Tech Base: Inner Sphere (Standard, Compact, Heavy-Duty and XL) and Clan (Standard only)

Unit Restrictions: Gyros are limited to BattleMechs and IndustrialMechs. IndustrialMechs may only use Standard gyros.

Construction Rules: All BattleMechs and IndustrialMechs must carry a gyro. The chart below indicates the availability of the featured gyro types to particular units, as well as their construction rules page references.

Engine Type	Unit Availability	Construction Rules Reference
Standard Gyro	BM, IM	p. 50 (BM), 69 (IM)
Compact Gyro	BM	p. 50
Heavy-Duty Gyro	BM	p. 50
Extra-Light (XL) Gyro	BM	p. 50

Key: BM=BattleMechs, IM=IndustrialMechs

Table Reference: See Chart

Game Rules: *Total Warfare,* p. 126

HATCHET

Introduced: 3022 (Lyran Commonwealth)

One of the more controversial battlefield weapons in the modern era—hailed as an innovation in the 3020s after three hundred years of stagnated military technology—the hatchet (sometimes referred to as an axe) is nothing more than a large hunk of deadweight built into a BattleMech's arm as a permanent club. In the scavenger days of the late Succession Wars, it was common for MechWarriors, low on ammunition and out of weapons, to uproot trees or yank girders from the rubble of buildings and wield them as clubs. These improvised clubs invariably required two hands to wield, thanks to typical balance and weight issues, and usually shattered or splintered after one good hit. The Lyran "invention" of the hatchet, which used heavier industrial alloys wrapped in a titanium sheath for corrosion resistance, enabled BattleMechs to wield a more effective, reusable club that could dish out the same damage one-handed.

Of course, modern military production and the recovery of Star League techniques have ended the scavenger economies of those days, but rather than relegating the hatchet and its ilk to the arenas of Solaris VII, some warriors have inexplicably fallen in love with this dubious piece of hardware. Defiance Industries of Hesperus II, in fact, maintains a tradition of producing hatchet-wielders, including such notable designs as the *Nightsky, Berserker* and (of course) the *Hatchetman*.

Practical as ever, the Clans have demonstrated no interest in melee weapons, finding them a primitive and wasteful "barbarian" alternative to simply blasting an opponent at extreme ranges.

HATCHET

Tech Base: Inner Sphere

Prohibited Units: Only humanoid BattleMechs and IndustrialMechs may carry a hatchet.

Construction Rules: 'Mechs may mount Hatchets in the arm locations only. Each arm may install a maximum of 1 Hatchet, and then only if the selected arm also possess a full set of arm and hand actuators.

The weight, critical space and base damage for a hatchet is based directly on the weight of the BattleMech/IndustrialMech wielding it. Both the tonnage and critical slots taken up by a Hatchet are equal to the 'Mech's tonnage, divided by 15, rounding up to the nearest whole number. The hatchet's base damage value is equal to the 'Mech's tonnage, divided by 5 (rounded up to the nearest whole).

Table Reference: Weapons and Equipment (Inner Sphere, pp. 341–344)

Game Rules: *Total Warfare,* p. 144

HEAT SINKS

Introduced: Circa 2022 (Western Alliance, Terra)

The waste heat generated by battlefield engines and the weapons they empower made heat management a first priority as soon as fusion power and energy weapons became commonplace. The insulated nature of combat armor—particularly on BattleMechs and aerospace fighters—meant that such heat typically became trapped within the machine, endangering crews and heat sensitive components. Heat sinks were the solution. Essentially a series of heat pumps and coolant lines run through a 'Mech, fighter or other unit, these systems collect heat from coolant jackets and coolant lines in heat-generating equipment, designed to shunt heat away from vital components and out through baffles in the unit's protective armor skin.

Virtually all fusion and fission engines incorporate a basic cooling system in their design that functions as the heart of this heat-exchange network. Though suitable for light duties, most units—from BattleMechs to Support Vehicles—usually expand these systems as needed to handle the added workload of any attached weapons and other gear.

Today's heat sink technologies are essentially a refined version of the same ones that debuted with vehicle-sized fusion plants, though their design and efficiency have been enhanced though the centuries.

DOUBLE HEAT SINKS

Introduced: 2567 (Terran Hegemony)
Extinct: 2865 (Inner Sphere)
Recovered: 3040 (Federated Suns)

Star League-era double heat sink technology vastly improved upon the standard heat sink with a larger, more powerful radiator system that enhanced the effectiveness of the existing heat pumps and coolant lines. The effect was a bulkier exchange system—roughly two hundred percent larger—for the same physical weight. The increased bulk and other factors proved too problematic for vehicle design, however, and limited its application to 'Mechs and aerospace craft. Even the more compact Clan versions have yet to overcome this limitation.

Fun fact: the Inner Sphere was well on its way to recovering double heat sink technology even before the renaissance heralded by the Gray Death Memory Core, with prototypes developed by the NAIS and sent to the field nearly a decade before the Star League-quality systems returned to widespread use. Much more compact, but ultimately too flawed because they focused less on advanced radiators and more on the use of corrosive liquid metal coolants for better efficiency, these experimental double heat sinks proved too brittle and hard to maintain for more than a few years' worth of effective function. Their deployment in the late 3030s, however, gave Davion and Steiner forces a brief advantage in the early days of the FedCom alliance.

PROTOMECH HEAT SINKS

Introduced: 3060 (Clan Smoke Jaguar)

The heat sinks used by Clan ProtoMechs, weighing in at a mere 250 kilograms apiece, might seem like an improvement of heat sink efficiency, but the plain fact is that their decreased weight comes from the smaller-sized structures they are designed to keep cool. Much as a smaller animal bleeds heat faster than a human being, the ProtoMech's compact form allows its waste heat to vent faster, with less powerful sinks. It would therefore take four or more ProtoMech heat sinks to accomplish for a vehicle-sized unit what a single standard BattleMech heat sink can do in the same time span.

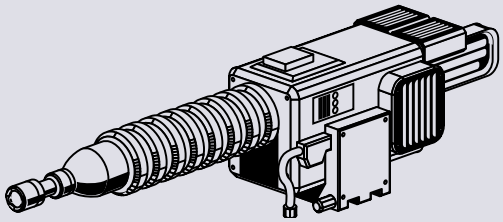
HEAT SINK

Tech Base: Inner Sphere (Standard and Double only) and Clan (Standard, Double and ProtoMech)
Prohibited Units: See chart
Table Reference: See chart
Gameplay Rules: Unless damaged by critical hits or willingly turned off, or unless the unit is destroyed, a unit's heat sinks remain active even if the unit's engine is shut down or its pilot/crew is incapable of action.
Construction Rules: The number of heat sinks required for a given unit—as well as the number provided free with the unit's engine (if any) are described in full under the *Add Heat Sinks* sections of the various units' core construction rules. The chart below summarizes the availability of the featured heat sink types to particular unit types, as well as their construction rules page references.

Heat Sink Type	Unit Availability	Construction Rules Reference
Standard (Single)	BM, IM, CV, SV, CF, AF, SC, DS	p. 53 (BM), 71 (IM), 104 (CV), 133 (SV), 193 (CF), p. 193 (AF), 193 (SC), 193 (DS)
Double	BM, AF, SC, DS	p. 53 (BM), 193 (AF), 193 (SC), 193 (DS)
ProtoMech	PM	p. 86 (PM)

Key: BM=BattleMechs, IM=IndustrialMechs, PM=ProtoMechs, CV=Combat Vehicles, SV=Support Vehicles, CF=Conventional Fighters, AF=Aerospace Fighters, SC=Small Craft, DS = DropShips

Table Reference: See Chart
Game Rules: *Total Warfare*, p. 158



• LIGHT PPC •
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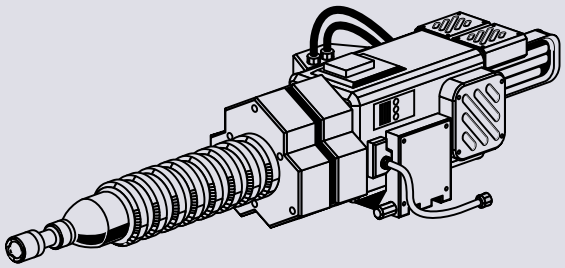

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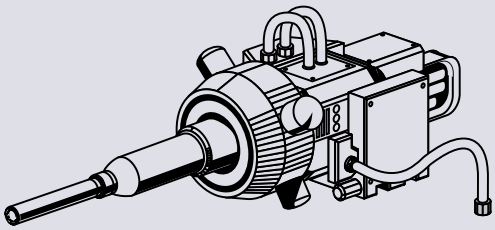

• SMALL LASER •
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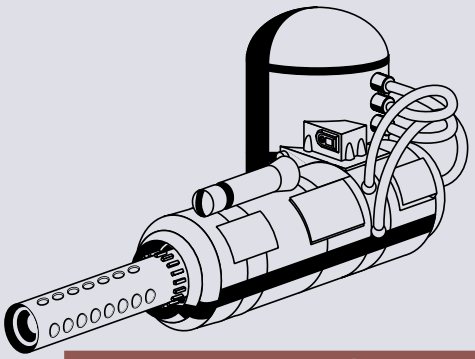

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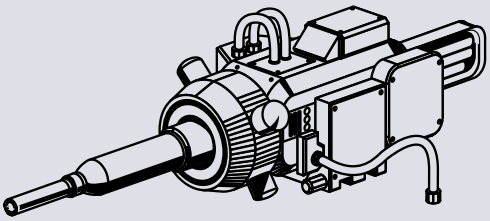

• MEDIUM LASER •
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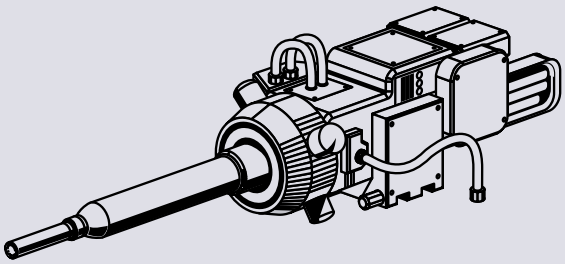

• LARGE LASER •
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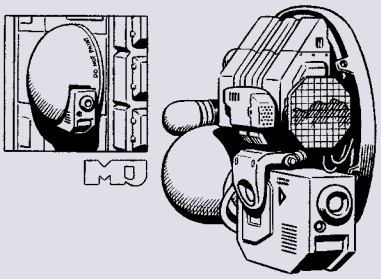

• ARTEMIS IV FCS •
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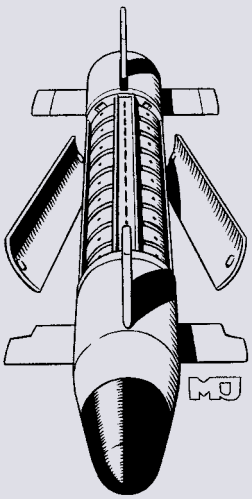

• THUNDER LRM •
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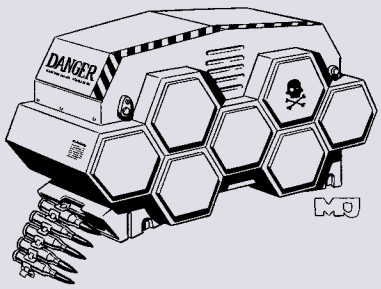

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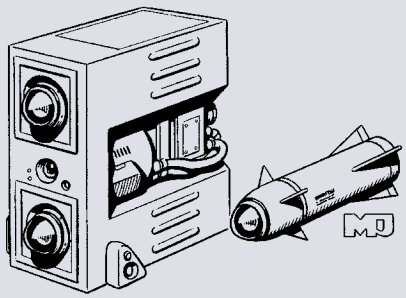

• STREAK SRM LAUNCHER •
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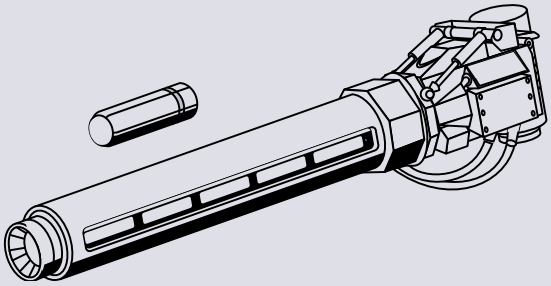

• AUTOCANNON •
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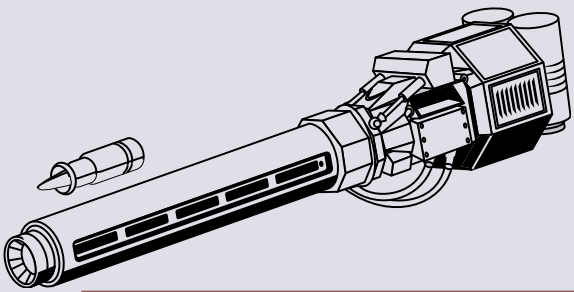

• ULTRA AUTOCANNON •
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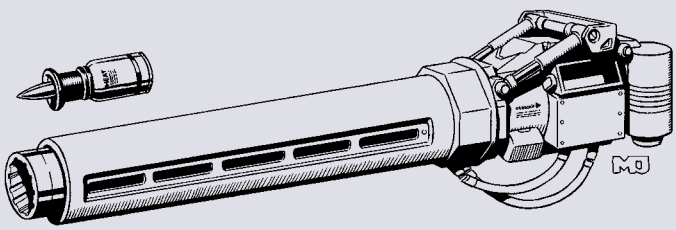

• LB-X AUTOCANNON •
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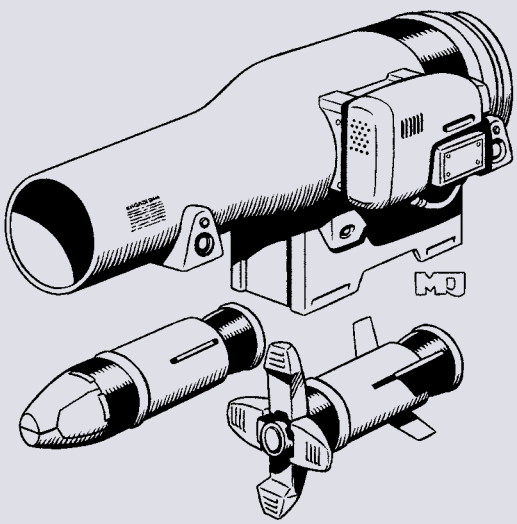

• NARC MISSILE BEACON •
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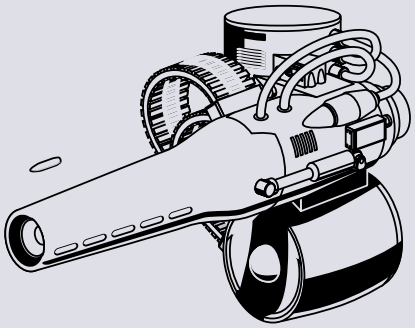

• LIGHT GAUSS RIFLE •
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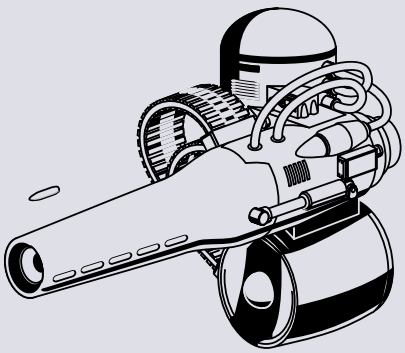

• GAUSS RIFLE •
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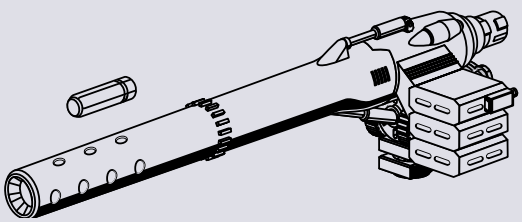

• HYPER-ASSAULT GAUSS RIFLE •
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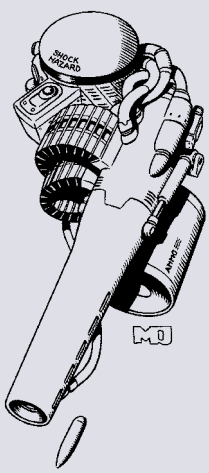


• HEAVY GAUSS RIFLE •
[PAGE 219]

Internal structure is a common term in today's 'Mech and vehicle design circles. In general, it refers to the underlying framework of a BattleMech, IndustrialMech, ProtoMech or Combat/Support Vehicle. In aerospace parlance, this same concept is known as "structural integrity," and is loosely defined as an aircraft's or aerospace fighter's airframe, or the framework of larger aerospace craft, such as DropShips and other capital ships.

The internal structure or structural integrity of a 'Mech, vehicle or fighter is the part of the unit that holds all other parts together—the skeleton, as it were (though 'Mech designs incorporate actuators and myomers as part of this package as well). If damage affects these areas, the unit is generally considered compromised—often terminally so—and so very few vehicles are ever sent into the field without at least some armor protection to avoid damage to the structure itself, be it from weapons fire or simple wear and tear.

AEROSPACE STRUCTURE (STRUCTURAL INTEGRITY)

Introduced: Pre-spaceflight (conventional aircraft), 2020s (aerospace craft/spacecraft)

Whether discussing an aircraft or aerospace fighter's airframe or the inner framework of a DropShip, the structural integrity (SI) of an aerospace craft serves as its primary means not only for mounting armor, engines and equipment, but also ensuring that the entire collection can withstand the g forces expected of the craft without coming apart. Smaller aerospace vehicles, such as fighters, actually wed their airframe design into the armor itself, essentially rendering the skeleton of the craft inseparable from its protection against weapons fire, but larger vessels—including Small Craft—devote extra tonnage to reinforcements and the like.

ENDO-STEEL INTERNAL STRUCTURE

Introduced: 2487 (Terran Hegemony)
Extinct: 2850 (Inner Sphere)
Recovered: 3035 (Draconis Combine)

Endo-steel internal structure was designed especially for use in BattleMech skeletons, about the only form of unit flexible enough to efficiently employ it. Using zero-G manufacturing techniques that uniformly blend an exotic steel alloy, the process produces 'Mech "bones" that are twice as strong per unit of weight as standard structural materials, but with a significant increase in overall bulk made necessary by larger-diameter segments. The processes to create this type of 'Mech structure were lost during the early Succession Wars, when military orbital factories became favored targets for raiders. The Draconis Combine, however, managed to recover the techniques shortly before the War of 3039, and debuted them on such newly deployed units as their *Hatamoto* series.

Clan endo-steel, of course, is more refined, allowing for a reduced loss of internal space, but even this reduction cannot overcome the limitations that prevent the use of this innovation in non-'Mech units.

INDUSTRIALMECH STRUCTURE

Introduced: 2350 (Terran Hegemony)

The IndustrialMech skeleton differs very little from that of the standard BattleMech, but is composed of heavier, somewhat less efficient materials and bulkier myomer bundles. The resulting chassis is less resilient under weapons fire, but better suited for the stress of regular sustained labor rather than physical combat. As a result, the frame of a typical IndustrialMech weighs about twice as much as that of a comparable BattleMech.

Over the years, a few performance-obsessed designers have attempted to overcome the weight issues associated with IndustrialMech chassis by using BattleMech skeletons—even endo-steel, when available—to lighten the load. This approach, however, is simply a cheat on the construction standards that have applied to 'Mech manufacturing industries since the Age of War, as it effectively builds a IndustrialMech as a BattleMech. Put simply, any 'Mech chassis built using industrial structure is formally classified as an IndustrialMech (and subject to the design standards of said vehicles). Conversely, any built using BattleMech skeletons are officially regarded as BattleMechs.

The trials of the Succession Wars and the expediency of keeping military and industrial standards separate for various logistical reasons have combined over the centuries to reinforce these effectively arbitrary standards, so that even today the two classes practically never mingle. It is simply easier (and cheaper) to produce IndustrialMechs to IndustrialMech standards, and leave the more expensive and durable BattleMech skeletons where they belong.

INTERNAL STRUCTURE

Tech Base: Inner Sphere (BattleMech [Standard and IS endo-steel], IndustrialMech, Combat Vehicle, Support Vehicle, fighter, Small Craft and DropShip); Clan (BattleMech [Standard and Clan endo-steel], IndustrialMech, ProtoMech, Combat Vehicle, Support Vehicle, fighter, Small Craft and DropShip)

Unit Restrictions: See chart

Table Reference: See chart

Game Rules: Internal structure/structural integrity is considered structural and cannot be "deactivated" during combat through engine shutdown or pilot/crew injury.

Construction Rules: The chart below indicates the availability of the featured internal structure/structural integrity types to particular unit types, as well as their construction rules page references and main weight (and points) tables. 'Mech internal structures that occupy critical space may break up their slots and spread them across the overall design to make room for other components; OmniMechs may not move these spaces around once they are determined for the base design.

Structure Type	Unit Availability	Construction Rules Reference	Weight/Points Table
BattleMech (Standard)	BM	p. 46	'Mech Structure
BattleMech (Endo-Steel)	BM	p. 46	'Mech Structure
IndustrialMech	IM	p. 66	'Mech Structure
ProtoMech	PM	p. 82	ProtoMech Structure
Combat Vehicle	CV	p. 98	Vehicle Structure
Support Vehicle	SV	p. 121	Vehicle Structure
Fighter (Structural Integrity)	CF, AF	p. 187	Aerospace Structure
Small Craft/DropShip (Structural Integrity)	SC, DS	p. 187	Aerospace Structure

Key: BM=BattleMechs, IM=IndustrialMechs, PM=ProtoMechs, CV=Combat Vehicles, SV=Support Vehicles, CF=Conventional Fighters, AF=Aerospace Fighters, SC=Small Craft, DS = DropShips

Table Reference: See Chart

PROTOMECH STRUCTURE

Introduced: 3060 (Clan Smoke Jaguar)

When it comes to internal structure design, ProtoMech technology, while quite compact in most aspects, differs very little from that of standard BattleMechs. Proportionately identical to standard BattleMech internal structure, only the small size of these units prevents their use of bulkier endo-steel technology.

BATTLEMECH STRUCTURE

Introduced: 2439 (Terran Hegemony)

The first true BattleMech chassis was, of course, that used on the Terran Hegemony's pre-Star League *Mackie* design. Today's standard internal structures—though they may look different from 'Mech to 'Mech—are essentially built to those same centuries-old specifications: a tribute to the genius of the *Mackie*'s original design team.

COMBAT VEHICLE STRUCTURE

Introduced: Circa 2470

Combat Vehicle chassis (which cover most conventional fighting vehicles from wheeled, tracked and hover tanks to VTOLs, combat watercraft and even the rare battlefield wing-in-ground-effect units) provide a framework reinforced for combat, yet open for ease of engineering. Able to be built around its component weapons and equipment—rather than having components forced into the specific and stability-challenged three-dimensional parameters of a BattleMech design—Combat Vehicle structure emphasizes flexibility as well as strength and simplicity. Modern military practices and production quality have produced Combat Vehicle chassis that are proportionately comparable to standard BattleMech internal structure when it comes to chassis-to-overall tonnage.

SUPPORT VEHICLE STRUCTURE

Introduced: Pre-spaceflight

What Support Vehicles lack in military efficiency they more than make up for in variety. Support Vehicle chassis designs may include everything from your personal motorcycle, car or ultra-light aircraft to commercial trucks, tractors and cargo jets. All these vary greatly in terms of internal structure or airframe design. Factors such as the vehicle's function, its design modifications and the level of the producing facility's modernization can all affect how much of the overall weight and chassis design goes into the internal structure alone. Indeed, at last count, there were an estimated minimum of 120 different (and broadly distinct) chassis design standards alone for wheeled vehicles massing 100 tons and under.

JUMP JETS

Introduced: 2471 (Terran Hegemony)

Found occasionally on BattleMechs, some ProtoMechs and a few rare fusion-/fission-powered IndustrialMechs, jump jets are an emergency short-range motive system that allow such units to quickly overcome restrictive terrain such as built-up areas, thick woodlands or even radical elevation shifts. Structurally placed deep within the framework of a given 'Mech, only the exhaust ports of these powerful thrusters are exposed through apertures in the rear torsos and legs, which makes them difficult to damage in combat. This "deep installation" prevents most jump-capable units from losing their enhanced maneuverability altogether in battle.

While functionally similar to the fusion-powered thrusters of aerospace fighters, jump jets lack the added boost provided by aerospace reaction mass that would otherwise allow for sustained thrust, and also cannot maintain the high levels of heat a constant burn would generate. Thus, these jets can only be engaged for a few seconds at a time—long enough to make a short leap, but not enough for true flight. Regardless, ever since their first appearance on the venerable *Wasp* design, jump jets have become a common sight on BattleMechs, deployed for every reason from a reconnaissance aid to an emergency booster for more mobility-handicapped units.

PROTOMECH JUMP JETS

Introduced: 3060 (Clan Smoke Jaguar)

Because so much of jump jet effectiveness hinges on the size and mass ratios between the thrusters and the 'Mechs they lift, the Clan version of standard BattleMech jump jets does not significantly differ from those of Spheroid brands like Chilton, Luxor Load Lifter and Rawlings. With the advent of much lighter and more compact ProtoMech designs, however, a new breed of jump jets was born to address the unique features of Proto construction. These smaller ProtoMech jump jets are far more akin to the jump packs used by battle armor than they are to 'Mech-scale jets.

IMPROVED JUMP JETS

[Introduced: 3069 (Clan Wolf and Clan Wolf [in-Exile])

Habeas' minimalist analysis here hardly addresses the fact that jump jet design and technology has varied little despite almost six

JUMP JETS

Tech Base: Inner Sphere (Standard and Improved) and Clan (Standard, Improved and ProtoMech)

Unit Restrictions: Standard and Improved jump jets are limited to BattleMechs. IndustrialMechs powered by Fission or Fusion engine types may only use Standard jump jets. ProtoMechs may only use ProtoMech jump jets. All other units may not install jump jets.

Construction Rules: BattleMechs and IndustrialMechs powered by Fission or Fusion engines may only install jump jets in the Leg and Torso locations; ProtoMechs that install ProtoMech jump jets need not state their locations. The chart below indicates the availability of the featured jump jet types to particular unit types, as well as their construction rules page references. Jump jets of different types may not be combined on a single unit.

ProtoMechs, IndustrialMechs and BattleMechs using Standard jump jets may not install more jump jets than they have Walking MP, and BattleMechs using Improved jump jets may not install more Improved jump jets than they have Running MP. The critical slots for jump jets on 'Mechs may not be broken up, but each jet may be placed in a separate location, as desired (so long as the location is a leg or torso section).

Engine Type	Unit Availability	Construction Rules Reference
Standard Jump Jets	BM, IM	p. 51 (BM), 69 (IM)
Improved Jump Jets	BM	p. 51
ProtoMech Jump Jets	PM	p. 84

Key: BM=BattleMechs, IM=IndustrialMechs, PM = ProtoMechs

Table Reference: See Chart

Game Rules: *Total Warfare*, p. 53

centuries of widespread deployment. However, even as of his writing, scientists working for Phelan Kell's exiled Wolf Clan were working on perfecting a more powerful jump jet system, designed to carry 'Mechs farther and with less heat build-up per jump. The first of these functionally improved jump jets finally reached the battlefields in 3069, and the specs were shared with the Lyrans, Draconis Combine, FedSuns and even ComStar—in the effort to provide any edge over Blakist assault forces. Curiously enough, the Crusader Wolves also fielded improved jump jets on some of their 'Mechs in 3069, with a few reportedly deployed in their offensives against Falcon-held worlds. This spontaneous appearance may have been the result of Watch agents in the Exiles' midst, to which Khan Kell may or may not be turning a blind eye during the current crises. –EB]

LASER

The laser (its name originates from the ancient acronym "Light Amplification by Stimulated Emission of Radiation") is the most basic of modern battlefield energy weapons. Designed to deliver a concentrated burst of extreme heat to a small area, military-grade lasers can put a gouge through military-grade armors in a fraction of a second. Only the fact that sustained bursts of more than a few seconds would melt the optics used to align and focus each shot prevents lasers from becoming the ultimate "shoot-and-sweep" weapon.

The vehicular-scale lasers currently employed by BattleMechs, aerospace fighters and other modern combat units are commonly defined by their size and power class. The typical laser size and power classes are known universally as micro, small, medium and large. Most of these debuted during the Age of War but only the Clans currently field effective lasers in the micro size class.

In addition, technological advancements over the past three decades have brought forth three new types of vehicular laser weapons beyond the standard models. These types include recovered and refined extended-range (ER) lasers, the rapid-cycling pulse laser series, and the Clans' high-powered, but less accurate heavy laser series.

EXTENDED-RANGE (ER) LASERS

Introduced: 2620 (Terran Hegemony [ER large]), circa 2820 (Clans [ER medium and ER small]), 3060 (Clan Smoke Jaguar [ER micro])
Extinct: 2950 (Inner Sphere)
Recovered: 3037 (Draconis Combine [ER large]), 3058 (Free Worlds [ER medium and ER small])

Newhart Industries of New Earth fielded the first production run of extended-range large lasers for the SLDF in 2620, debuting a weapon system that boasted a longer reach than any other contemporary energy weapon. Within five years, the ER large laser became Newhart's showpiece on their latest BattleMech offering, the HSR-200-D *Hussar*. The success of this 'Mech—largely attributed to the combination of its speed and its single, powerful weapon system—cemented Newhart's place as one of the Terran Hegemony's chief weapons producers.

Never expanded to other standard lasers of the day—perhaps because Hegemony designers saw little need for another tier of overlapping laser ranges—extended-range upgrades for the medium and small laser size classes did not emerge until the Clans developed them during their Golden Century. Even after the ER large laser's recovery by Combine engineers in 3037, Spheroid versions of the Clan medium and small models would not emerge until Diverse Optics unveiled their first batches for the Free Worlds League Military in 3058 (inspired, of course, by reports of the Clans and samples of captured equipment filtered to League scientists). Other major laser designers, including Martell, RAMTech and Magna, soon followed suit.

ER lasers offer enhanced range in all size classes, but at a considerably higher heat cost. Spheroid models run the small to large sizes now, while the Clans recently added the micro class for use in their ProtoMechs.

HEAVY LASERS

Introduced: 3059 (Clan Star Adder)

According to all reliable reports, scientists from one of the Home Clans—the Star Adders—pioneered the so-called heavy laser series in the waning days of 3059. The development dramatically increased the size of the barrels, focusing crystals and power feeds of extant Clan lasers to produce a weapon system capable of delivering far greater firepower per blast. Though the heavy lasers lost much of the range advantage enjoyed by Clan ER lasers (they actually fell closer to Spheroid standard range profiles), the real innovation wasn't so much the laser design itself as the fact that its creation broke what amounted to more than a century of technological stagnation among Kerensky's children.

It should be noted that while Clan heavy lasers are deadly in the extreme—a Series 6A heavy medium laser can dish out the same destructive force as an Inner Sphere PartiKill PPC—all of that firepower comes with a price measured in more than just reduced range. With the increased power, interference attributed to an intentional shielding reduction around the laser emitters (as well as a noticeable "pre-charge" phase that adds a subtle firing delay with every trigger pull) plays havoc with these weapons' accuracy.

Heavy lasers come in small, medium, and large sizes only.

PULSE LASERS

Introduced: 2609 (Terran Hegemony [large, medium and small pulse]), 3060 (Clan Smoke Jaguar [micro pulse])
Extinct: 2950 (Inner Sphere)
Recovered: 3037 (Draconis Combine)

The pulse laser uses rapid-cycling, high-energy pulses to generate multiple laser beams, creating an effect comparable to machine-gun fire. But because the staggered pulses give the protective ablation products from combat armor a chance to disperse—to expose fresh armor to subsequent pulses—the result is a burst of fire that is more effective and accurate. Originally developed by the Terran Hegemony, pulse lasers run cooler than ER lasers and pack a little more punch than standard lasers, but have a shorter effective range than either type. These weapons were popular on faster hunter/killer designs, which could close faster and benefit from the ability to land solid damage even on the fly.

Like many Star League technologies, pulse lasers were lost during the early Succession Wars and only returned after the discovery of the Gray Death Memory Core and ComStar's secret deals with the Draconis Combine in the 3030s. Today, renowned laser manufacturers such as Diverse Optics, Martell and RAMTech have been able to market pulse laser versions of their reliable standard models—often side-by-side with their progenitors.

Currently, Inner Sphere manufacturers offer pulse lasers in small, medium and large classes. Clan pulse lasers, meanwhile, come in micro to large classes.

LASER

Tech Base: Inner Sphere (small, medium and large ER, pulse and standard lasers only) and Clan (micro, small, medium and large ER, heavy and pulse lasers only)
Unit Restrictions: No restrictions
Game Rules: Lasers may not be fired if the unit is shut down or if its pilot/crew is otherwise prevented from acting.
Construction Rules: Lasers may be mounted on any unit in accordance with the unit's standard core construction rules.

Table Reference: Weapons and Equipment (Inner Sphere and Clan, pp. 341–343) **Game Rules:** *Total Warfare,* p. 98

STANDARD LASERS

Introduced: Circa 2300 (Terran Alliance [medium and small]), 2316 (Terran Hegemony [large])
Extinct: Circa 2850 (Clans only [medium and large])

Compact and straightforward, standard laser weaponry managed to survive the depredations of the Succession Wars while their extended-range and pulse-style cousins were lost. Indeed, by the end of the Fourth Succession War, there remained almost fifty distinct standard laser models still in active production, with Martell's medium laser line—considered by far the most efficient for the tonnage—manufactured on as many as six worlds.

As with their view on standard autocannon, the Clans apparently phased out standard laser production in favor of their more effective versions of the ER and pulse laser lines, but with so many aging models left in Clan stores, these "archaic" weapons—every bit as efficient as their Spheroid varieties—may still be found on vintage Clan-owned Star League units once in a while.

[Once more, as with the standard autocannon, Habeas is essentially correct. The advent of more efficient ER and pulse laser grades for the small, medium and large sizes made the standard models almost superfluous, but it should be noted that a few models remained in production as late as 2900, built to more refined standards that made them somewhat more compact before they truly faded into obsolescence. Most of these weapons were either refurbished to upgraded Clan specs or replaced entirely by the turn of the century. –EB]

LIFEBOAT

Introduced: Pre-spaceflight (maritime [and atmospheric]), circa 2000 (aerospace)

Lifeboats, like escape pods, are an emergency evacuation system for larger crewed vessels, both seafaring and spaceborne. But while they serve the same function at heart, and support the survival of the same number of people, lifeboats differ from escape pods in their approach to the mission at hand, with lifeboats being a less energy-intensive version of the escape pod.

Where aerospace escape pods are powered, for instance, their equivalent lifeboats lack anything more than the most basic life support and food stores. These craft are thus forced to drift in space until friendly craft can pick them up, unable to adjust their vectors or even manage an unpowered atmospheric re-entry. On the other hand, the use of energy collection sails enables aerospace lifeboats to send distress signals indefinitely, while its six to seven passengers can survive for 24 to 30 days on the craft's internal oxygen supply.

Maritime lifeboats are likewise simplified (but much lighter), with most amounting to rafts or rigid-hull boats not designed for an underwater launch and possessing—at best—a basic outboard motor (though many use a collapsible wind sail instead), and a food/supplies store typically stocked enough to sustain up to ten persons for a week.

It is not uncommon for a given vessel—aerospace or maritime—to employ escape pods and lifeboats at the same time. For spacecraft, this redundancy allows the crew more exit points in the event of an emergency, as well as a means to jettison under any power crises. For maritime vessels, lifeboats are often a legal requirement and a low-cost answer to escape pods—usable by any vessel as long as it remains on the surface.

[Habeas has apparently forgotten that a simpler, atmospheric-only version of these lifeboats exists—such as those used by airships. These boats weigh as much as a typical maritime lifeboat, but function instead as gliders or on chutes, drifting slowly to the ground once jettisoned, and feature flotation devices in the event of a water landing. –EB]

LIFEBOAT

Tech Base: Clan and Inner Sphere
Unit Restrictions: Only Naval Combat and Support Vehicles, as well as Support Vehicles with the Amphibious Chassis Modification may install maritime lifeboats; only Airship and Fixed-Wing Support Vehicles may install atmospheric lifeboats. Only Small Craft and DropShips may install aerospace lifeboats.
Game Rules: Escape systems are not covered in *Total Warfare* game play. These systems are covered more fully in *Tactical Operations*, p. 197. Lifeboats are never considered disabled by engine shutdown or crew injury.
Construction Rules: All applicable units that can carry lifeboats may carry as many lifeboats as desired, with each lifeboat weighing as much as shown under the Industrial Weapon and Equipment Table (1 ton each for maritime and atmospheric; 7 tons each for aerospace). Lifeboats occupy no weapon or equipment slots.
Note: Maritime lifeboats have a capacity of 10 people; atmospheric and aerospace lifeboats may support up to 7.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345).

LOOK-DOWN RADAR

Introduced: Pre-spaceflight

Look-down radar is specialized form of sensor equipment typically employed by surveillance aircraft to accurately map local topography and monitor troop movements. Unaffected by ground clutter, but susceptible to modern ECM systems, look-down radar is a useful piece of equipment, but often not deployed thanks to the preponderance of EW suites today, and because its best use requires aerial supremacy. Nevertheless, some units have appeared even in Clan arsenals with such equipment installed, such as the Clan *Spectre*-class surveillance planes that reportedly overflew the battlefields on Tukayyid in 3052.

LOOK-DOWN RADAR

Tech Base: Clan and Inner Sphere
Unit Restrictions: BattleMechs, IndustrialMechs, ProtoMechs and ground-based Combat and Support Vehicles (those with Wheeled, Tracked, Hover and WiGE motive systems) may not mount a look-down radar system.
Game Rules: Look-down radar is not covered in *Total Warfare* game play. This system is covered more fully in *Tactical Operations*, p. 340.
Construction Rules: Applicable units may carry only one look-down radar system, which must be placed in the unit's Nose (or Front) location.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345).

MACHINE GUN

Introduced: Pre-spaceflight

Favored as *the* quintessential anti-infantry weapon since the first crude models appeared in the nineteenth century, the machine gun (MG) is not an uncommon sight on BattleMechs, but favored heavily by smaller units and vehicles, such as Clan ProtoMechs, armored personnel carriers and even police SWAT trucks. Heavier and capable of a far greater volume of fire than the weapons carried by conventional infantry or battle-suited troopers, these vehicular and 'Mech-mounted machine guns can flatten entire platoons of regular troops in just one or two passes.

Recently, Clan developments have even affected even this area of modern weaponry, with the fielding of heavy and light machine gun types. Inner Sphere manufacturers have yet to duplicate these weapons.

[Since Habeas' report, the Capellans and Taurians respectively have unveiled their own equivalents of the Clan light and heavy machine gun, followed soon thereafter by other factions seeking a means to more effectively combat infantry forces. More intriguing is the FedSuns' machine gun array concept, outlined below. –EB]

HEAVY MACHINE GUN

Introduced: 3059 (Clan Smoke Jaguar)

The Clans' higher-caliber heavy MG also has a higher rate of fire that renders it a more efficient killer, but the very factors that make it deadlier are also what hampers its accuracy and effective range. [The Taurian Concordat shipped its first heavy MGs to units bound for the Pleiades in 3068, and soon shared the weapons with their Capellan and Canopian allies, as well as the Word of Blake. –EB]

LIGHT MACHINE GUN

Introduced: 3060 (Clan Smoke Jaguar)

Clearly intended for ProtoMech deployment, the light machine gun trades the boosted punch of the heavy model for an increase in range and effective accuracy. The result is a weapon that boasts roughly twice the range of the standard type, but only half the average kill rate due to reduced caliber and rates of fire. [The Capellan version hit the field in 3068, eventually shared with the Canopians and the Taurians. The various regional wars have since spilled these weapons over to other factions. –EB]

MACHINE GUN ARRAYS

[Introduced: 3068 (Federated Suns)

Ironically enough, while FedSuns weapons designers from the shattered NAIS developed the machine gun array system first, the successful theft of this technology by Taurian spies and frenzied efforts by Concordat producers to reverse-engineer it led to the first of these machine gun-linkage systems hitting the battlefields with the TDF, not the AFFS. Effectively enabling two to four machine guns of like size to operate in unison, the MG array (MGA) vastly improves the potential for accurate and effective placement of multiple machine gun fire in battle.

Curiously enough, the subsequent appearance of a Clan version, marketed by the Diamond Sharks, suggests a possible trade deal with House Davion, perhaps a continuance of the exchange that originally allowed FedSuns designers to reverse-engineer the Undine battlesuit to produce their Hauberk battle armor. –EB]

MACHINE GUN

Tech Base: Inner Sphere and Clan
Unit Restrictions: No restrictions
Game Rules: Machine guns may not be fired if the unit is shut down or if its pilot/crew is otherwise prevented from acting.
Construction Rules: Machine guns of all types may be mounted on any unit in accordance with the unit's standard core construction rules.

On all non-ProtoMech units, the machine gun array may be used to link two, three or four machine guns of the same size class, but to do so, all of the linked MGs and the array module must be placed in the same location on the unit. ProtoMech-mounted machine gun arrays may link machine guns mounted anywhere on the ProtoMech.

Machine gun ammunition may be mounted on the unit in accordance with the rules given under the *Add Weapons and Equipment* step of each unit type's core construction rules.

Table Reference: Weapons and Equipment (Inner Sphere and Clan, pp. 341–343) **Game Rules:** *Total Warfare,* p. 98 (machine guns), and p. 137 (MG array)

MASH EQUIPMENT

Introduced: Pre-spaceflight

MASH (short for "Mobile Army Surgical Hospital") equipment today continues a concept that began in the pre-spaceflight era, when mobile military posts manned primarily by medical personnel were routinely employed close to the front lines. Today's MASH equipment, by comparison, is more concentrated and portable—a specialized and semi-modular surgical bay, portable on board almost any Combat Vehicle, Support Vehicle, Small Craft or DropShip.

Packing the capabilities of a fully functional field hospital, modern MASH equipment can be deployed even more quickly than its ancient forms, literally driven to a position near the battle zone to deploy an entire hospital—complete with recovery rooms, staff quarters and operating theaters—in just a few hours.

Interestingly enough, advances in Clan medical technology have not significantly affected their use of MASH equipment.

MASH EQUIPMENT

Tech Base: Inner Sphere and Clan
Unit Restrictions: BattleMechs, IndustrialMechs, ProtoMechs, fighters and Combat/Support Vehicles with a VTOL motive system may not mount MASH equipment.
Game Rules: The use of MASH equipment is not covered in *Total Warfare* game play. Its full functionality is covered in *Strategic Operations*, pages 169 and 187. MASH equipment may not be used if its controlling unit's pilot/crew is stunned or killed.
Construction Rules: MASH equipment is mounted in two components—the core component, which provides one operating theater (and weighs 3.5 tons), plus 1 ton for each additional surgical theater beyond that. Additional theaters cannot be mounted on a unit without a core component. Regardless of the number of theaters, however, the entire MASH counts as 1 item in terms of equipment space on Combat and Support Vehicles (or as part of a transport bay on Small Craft and DropShip units).

Each operating theater provided by MASH equipment adds 5 to the minimum crew needs of the unit mounting such equipment.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345)

Today's vehicular-scale missile launchers are a broadly varied weapon class used to deliver clusters of self-propelled—and usually self-guided—munitions to a target. Not to be confused with capital-scale missile launchers (or the Arrow IV artillery missile that will be discussed in a later text), the missiles mounted on many BattleMechs and Combat Vehicles are much smaller in size and power, adapted to the electronic noise, limited sensor acuity and effective armor in the tactical battlefield.

Currently, between the Clans and the Inner Sphere, eight types of missile launchers or launcher variants are in widespread use. Their specifics are outlined below.

[A ninth launcher type, the multi-missile launcher, was under development when Blakist-backed mercenaries assaulted Outreach. Ironically, the Robes' capture of that weapon system allowed it to survive that terrible holocaust and reach wider production in the years since. –EB]

ADVANCED TACTICAL MISSILE SYSTEM (ATM)

Introduced: 3054 (Clan Coyote)

A semi-flexible weapon system presently available only to the Clans, the ATM (Advanced Tactical Missile) launcher features three selectable ammunition types specialized for specific battlefield needs, and an integrated Artemis IV-style fire control system that enhances the accuracy of each cluster fired. Because of the enhanced electronics package and specialized feed mechanisms, the ATM system cannot make use of other munitions beyond its own three types, which include standard armor-defeating missiles (balancing range over warhead yield), high-explosive warheads (sacrificing propellants for larger and more powerful warheads), and extended-range munitions (which place proportionately more propellant in each missile, for a reduced explosive yield but greater reach). ATMs are typically mounted in rack multiples of three tubes each.

Rather than attempt to match the sophistication of the ATM system itself, Inner Sphere engineers have instead focused more on the specialized munitions, preferring to mate the abilities of the warheads with the far more populous and logistically supported LRM and SRM designs already available. These variant missile rounds will be described in detail below.

LONG-RANGE MISSILES (LRM)

Introduced: 2300 (Terran Alliance)

Developed for reach, rather than punch, long-range missile racks are capable of indirect fire and a more concentrated dispersal of warheads. LRMs are typically mounted and launched in five-tube groups, with up to 20 tubes in a single rack, though Clan ProtoMechs may pack smaller sets. Standard LRM launchers are quite versatile, and can be easily upgraded with Artemis IV systems and even make use of a variety of special munitions. Inner Sphere launchers, which derive their impressive range from a ballistic launch angle, are notoriously less accurate close-in, especially when compared to their smaller and more compact Clan rivals. Nevertheless, their flexibility and solid reliability at long distances has kept LRM models like Delta Dart, Holly, Shigunga and Valiant in production for centuries.

MEDIUM-RANGE MISSILES (MRMS)

Introduced: 3058 (Draconis Combine)

DCMS engineers at Luthien Armor Works' Shigunga Missiles Division unveiled their medium-range missile (MRM) launcher system in 3058. Basing their efforts on prototype "dead-fire" missiles under development at the time, MRMs were intended to deliver a less expensive, homegrown weapon aimed at saturation fire in the mid-range bracket. Eschewing targeting and guidance systems for smaller, unguided projectiles, the MRM system was essentially a giant step backward in terms of missile technology. But while the loss of accuracy and effective range are significant, especially when coupled with the launchers' incompatibility with enhancements like Artemis or specialized munitions, MRM racks and their ammunition are lighter and more compact than LRMs of equivalent volley sizes. This means that despite their light warhead yields per missile, the MRM makes up in volume what it lacks in accuracy—and it can do so for far longer than a comparable LRM.

Initially spurned by many in the DCMS as a weapon designed for green cadets, MRMs caught on over the years, and have since appeared in regular and mercenary commands across the Inner Sphere. The Clans, however, have shown no interest in duplicating this technology.

MULTI-MISSILE LAUNCHERS (MMLS)

[Introduced: 3067 (Battle Magic [mercenary command])

The Battle Magic mercenary command was developing the multi-missile launcher (MML) system on Outreach near the close of 3067 when Wayne Waco and his followers launched their sneak attack on Harlech. Intended to maximize the usefulness of standard and specialty LRM and SRM munitions, while simultaneously simplifying the logistical needs of the cashed-strapped merc outfit, the MML was deployed in 3-, 5-, 7- and 9-tube sizes. It also featured compatibility with Artemis fire-control systems and LRM/SRM special munitions, such as Narc and Swarm missiles. This effectively produced a weapon that mimicked the Clan ATM system.

Several prototypes of these weapons were pressed into hasty service to fend off the renegade mercenary attack on Harlech, but sadly failed to save Battle Magic from utter destruction. Ironically, it was the Blakist zealots who brought the MML into full-scale production after their subsequent invasion of Outreach in 3068, apparently finding the Magic's innovation useful. Fortunately, the technology did not remain proprietary for long, as virtually all the other factions engaged against the Robes have fielded their own versions of the MML by the time of this writing. –EB]

ROCKET LAUNCHERS

Introduced: 3064 (Marian Hegemony)

As weapon technologies go, the rocket launcher system was hardly new even when the Marian Hegemony introduced it a few years ago. In fact, these weapons essentially amount to a multi-tube variation on the standard infantryman's light anti-tank weapon (LAW)—a self-contained, one-shot, unguided launch system. Why, then, did it take so long to for someone to develop it into a mainstream vehicular weapon? It's hard to say, though a guess might be a long-standing presumption that the only viable weapons on today's 'Mech-heavy battlefield are high-tech systems that can battle ambient ECM, home in on a target and still deliver powerful damage meant to defeat multi-layer combat armor.

Installed in racks of 10, 15 and 20 tubes, rocket launchers are cheap, simple and compact enough to install multiple racks at a fraction of the weight cost of a more reusable LRM. With hitting power roughly equal to a comparable-sized LRM volley, the rockets' damage potential is respectable, making them an excellent choice for the fairly low-tech armies of the Periphery. However, the Inner Sphere's larger militaries have been slow to introduce the rocket launcher system, largely because it's a one-shot weapon that loses effective range in the larger rack sizes (the latter largely attributed to the cluttering flight paths of so many unguided munitions fired in unison).

SHORT-RANGE MISSILES (SRM)

Introduced: 2370 (Terran Hegemony)

Less sophisticated than LRMs, the direct-fired short-range missile (SRM) system makes up for its limited reach with the heavier punch of its high-explosive warheads. Mounted in racks of two, four or six tubes—though, again, ProtoMechs have been known to boast irregular tube counts—SRMs are particularly effective against vehicles and infantry, and are often a favored weapon for smaller battlefield units. Their popularity has been proven by the longevity of brand names like Harvester, Holly, Hovertec and Telos, and even the Clans have managed to maintain their own models—albeit more compact and lightweight by comparison.

SINGLE-SHOT (OS) MISSILE LAUNCHERS

Introduced: 2676 (Terran Hegemony)
Extinct: 2800 (Inner Sphere)
Recovered: 3030 (Free Worlds League)

A variation on the LRM, MRM and SRM systems (including Streak launchers, torpedo launchers and even the Narc missile beacon launcher) the single-shot launcher—also known as one-shot or OS—is a curious concept that did not so much go extinct in the Succession Wars as fall into general disuse. Hardly considered lostech (even the date given for their first introduction is more to pin down when the use of one-shot launchers became common for the SLDF), the single-shot missile launcher design simply modifies a standard missile launch system with a shortened, fixed-mount ammo bin carrying a one-salvo capacity. Used only when tonnage is at a premium, one-shot launchers offer a little extra punch in a pitched fight, but with an all-or-nothing approach that can be as much a curse as the lack of a bin full of explosive munitions might be a blessing.

Of course, with the advent of the generally more potent Marian-style Rocket Launchers, the One-Shot missile concept may once more be on its way to extinction.

STREAK SHORT-RANGE MISSILES

Introduced: 2647 (Terran Hegemony [Streak-2]), circa 2820 (Clans, [Streak-4, Streak-6])
Extinct: 2845 (Inner Sphere)
Recovered: 3035 (Free Worlds League [Streak-2]), 3058 (Draconis Combine, [Streak-4, Streak-6])

The Star League development of the Streak SRM missile system was a significant enhancement of existent missile launcher technology, incorporating a kind of "smart override" feature in the targeting and firing mechanisms. Developed as a means of conserving ammunition, the Streak system literally refuses to fire unless all of the launcher's tubes simultaneously achieve a "hard lock" on their target. While this approach guarantees a hit when the weapon fires, some have seen the system's requirement for using only its own missile types (rather than any of the specialty munitions now available) as a hindrance. Combined with the Streak's increased cost—to say nothing of the unnerving risk that it may override a shot at the critical moment it is needed—this has kept the Streak system from completely replacing standard SRMs in the arsenals of Inner Sphere militaries. Even today, standard SRM launch technology continues to outnumber Streak systems in the product lines of companies across the Sphere by almost two to one.

Curiously enough, the Clans—whose Streak launchers are much lighter, smaller and capable of longer reach—have also maintained the dual SRM styles of Streak and non-Streak systems. The reasons for this, especially when they have allowed standard lasers and autocannon to fall by the wayside under similar circumstances, are not fully understood even today.

TORPEDO LAUNCHERS

Introduced: 2380 (Terran Hegemony)

Considered by many a niche class of LRM and SRM systems—and sometimes erroneously classified as a special munition for standard launchers—torpedoes are the maritime-only versions of their surface-launched kin. Though they are as effective underwater as missiles are in most respects, torpedoes are almost never seen on BattleMechs or vehicles not specifically designed for blue-water operations. The standard short-range torpedo (SRT) and long-range torpedo (LRT) launchers' munitions cannot be swapped out for standard missiles because of physical differences in the launch mechanisms. This incompatibility has, understandably, led to little love for this weapon system, and so few manufacturers mass produce them today. In fact, the Sea Devastator LRT-20 and Sea Harvester SRT-6 systems—both employed on the Galtor-produced *Neptune* combat submarine—are the best known of these weapons Inner Sphere-wide, and represent less than one percent of munitions sales by these companies.

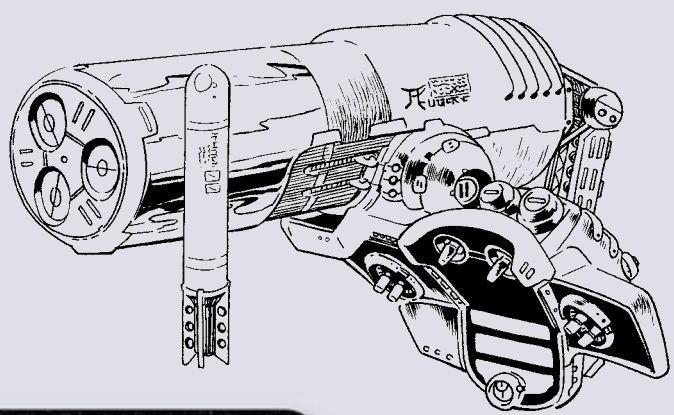
MISSILE MUNITIONS

To enhance their effectiveness and widen commanders' options on the modern battlefield, today's LRM and SRM launchers can be loaded with several types of special munitions for a variety of special-purpose missions. This variability tends to come with the limiting caveat that not all munitions work as effectively for all systems. Nor can most of these make use of specially enhanced launchers, such as the Streak system or torpedo systems, or in conjunction with targeting enhancements like the Artemis (though at least in the latter case, Artemis-equipped launchers may be able to fire these missiles).

Artemis/Narc Missiles: Developed in conjunction with the target-enhancing technologies that bear their names, Artemis- and Narc-enhanced missiles are available to standard LRM and SRM launchers [as well as the MML system —EB]. Artemis-enhanced missiles, when used with a launcher that features an Artemis IV fire-control system, focus their volleys better, delivering more missiles to the target than typical of unenhanced missiles. Narc-enhanced missiles accomplish the same goal, but only against targets previously struck by an attacker-friendly Narc or iNarc homing pod. Where neither condition applies (such as Artemis-enhanced missiles fired by a non-enhanced launcher, or Narc missiles fired on a non-"Narced" target), or when hostile ECM suites are particularly active, these missiles behave more like conventional rounds.

Fragmentation Missiles: Available for standard SRM or LRM launch systems, fragmentation munitions contain high-explosive warheads encased in brittle metal shells. Between the shell shrapnel itself and the additional debris within—including coils of wire, hard pellets, and the like—fragmentation missiles are expressly designed to maximize their potential to kill or mutilate human beings en masse. Though they have little effect on armored units, including battle armor, vehicles and 'Mechs, fragmentation missiles are devastating to conventional infantry, able to decimate platoons twice as efficiently as a flight of similarly classed standard missiles. Also a fairly ancient technology abandoned in favor of more effective armor-defeating weapons, the Free Worlds League brought fragmentation missiles back into play in 3050—no doubt inspired by lessons from the recently ended Andurien conflict.

Harpoon SRMs: A maritime hunter's weapon not designed for the battlefield, the SRM harpoon is the heaviest of its kind. Essentially little more than a kinetic, piercing head and a reinforced, detachable cable, the SRM-launched harpoon can pierce the hide of most any marine animal known in the Inner Sphere, and tow the hapless—and, hopefully, mercifully dead—creature into the vessel. While they can be quite effective against unarmored infantry, battlefield armor is effectively immune to the standard harpoon SRM, and most vehicles or 'Mechs could make quick work of the tow cable even if successfully speared.



Inferno SRMs: An enhancement of an ages-old incendiary weapon system, Inferno SRMs have been around since the early Succession Wars. These warheads combine volatile incendiary fluids with a soap-like chemical that adheres to almost any hard surface. Intended to raise the heat levels of enemy 'Mechs to dangerous heights, or to fry the crews of armored vehicles in their own metal coffins, these weapons have seen common use in many a brutal campaign. As with incendiary LRMs, these missiles are susceptible to their own user's internal heat issues as well, and so they are deployed less frequently than standard armor-defeating munitions.

Semi-Guided LRMs: In 3057, the Free Worlds League debuted the first of their newly developed semi-guided LRM munitions among select forces deployed during Operation Guerrero. One of their few true innovations after nearly a decade spent on fostering new missile technologies, this missile type incorporates the laser-homing technology of the Arrow IV guided artillery missile (discussed in a later volume). This enhancement allows friendly units equipped with target acquisition gear (TAG) to "paint" a target for the incoming flight, enhancing accuracy on the battlefield.

Swarm LRMs: The Terran Hegemony first developed Swarm missiles for the SLDF in 2621 as a means of enhancing the destructive effect of LRM munitions and scattering enemy forces. Incorporating a smarter targeting system than standard LRMs, Swarm missiles fired like standard LRMs, but any that missed a target would remain active and able to home in on any other unit within 30 meters. This ability did not discriminate, however, between friendly and enemy targets, and so the weapon could not be easily deployed when battles got close. The added expense of these missiles and the destruction of their factories by 2840 saw the Swarms fall into disuse until their recovery by the Federated Commonwealth in 3053—inspired, of course, by the fact that some of the invading Clans made widespread use of these same munitions.

Swarm-I LRMs: Another Free Worlds innovation in LRM technology, improved Swarm (Swarm-I) LRMs debuted in 3057 alongside the semi-guided missiles. Developed along the same lines as the basic Swarm system, Swarm-I munitions incorporate an Identification: Friend or Foe (IFF) system that allows the missiles to dodge or pass over friendly targets when fired into a cluster of fighting units. Though the technology did not eliminate the threat of friendly fire completely—particularly when dealing with sensor-damaged friendlies or enemy ECM—the use of Swarm-Is drastically reduced the number of such incidents often attributed to the use of standard Swarm missiles.

Tear Gas SRMs: A non-lethal weapon seldom seen on the battlefield (but common in heavy police units summoned for riot control), tear-gas SRMs are effective primarily against ill-equipped conventional infantry and other unprotected personnel. They are meant not to inflict casualties so much as to subdue and scatter unruly mobs, and are ineffective against all manner of armored vehicles. Indeed, even well-built civilian vehicles can withstand a direct hit from a tear gas round with little more damage than scuffed paint and an unseemly dent.

Thunder LRMs: Another product of the Terran Hegemony, Thunder LRMs were first employed in 2621 and subsequently lost to the Inner sphere by 2840, are designed to deliver a conventional minefield with a pull of the trigger. The Clans retained this lost technology (which they called field artillery scatterable munitions—FASCAM), which prompted the Inner Sphere to scramble to reintroduce their own, which the FedCom accomplished in 3052.

Since that time, additional variants on Thunder missiles have come into play, developed by the Capellan Confederation as an offshoot of their 3050s-era partnership with the Free Worlds League. These included the Thunder-Augmented, which could lay larger and broader minefields than a standard Thunder round; the Thunder-Inferno, which replaced the mines' explosives with incendiary chemicals; the Thunder-Vibrabomb, which used seismic sensors to select enemy units by weight and detonate only as they passed over; and the Thunder-Active, intended to deal with jump-capable units and hovercraft. These enhanced Thunder munitions first debuted in 3057, against the FedCom forces who vainly battled Capellan-backed insurgencies in the former Sarna March region, but were not employed by the Free Worlds forces at that time. Their use demonstrated not only their indiscriminate effectiveness as a weapon system, but also the devious nature of Capellan weapons design and a fundamental rift between Capellan and Free Worlds battlefield philosophy that may have been an early indication of the cracks in the two powers' alliance.

MISSILE

Tech Base: Inner Sphere (LRM, MML, MRM, SRM, rocket launchers, Streak, torpedo, and OS); Clan (ATM, LRM, SRM, Streak, torpedo, OS)
Unit Restrictions: ProtoMechs may not mount ATMs, MMLs, MRMs, rocket launchers or Single-Shot (OS) Missile Launchers
Game Rules: Missile launchers may not be fired if the unit is shut down or if its pilot/crew is otherwise prevented from acting, but loaded or partially loaded missile ammo bins are always live and will explode per standard rules if critically hit during game play.
Construction Rules: Missile launchers may be mounted on any unit in accordance with the unit's standard core construction rules. ProtoMechs must use the ProtoMech Weapons and Equipment Tables for construction data and game statistics.

On BattleMechs, IndustrialMechs and Support Vehicles, missile launchers that may be enhanced by Artemis (LRMs/LRTs, SRMs/SRTs and MMLs) must allocate both the launcher and the Artemis system to the same location and all applicable launchers on the unit must be enhanced in the same fashion. Artemis systems on such units may be given a separate critical slot as the launcher can still fire with a damaged Artemis (all other units that carry Artemis-enhanced launchers—such as Combat Vehicles, fighters and DropShips—install the combined launcher and Artemis system as a single weapon).

Omni units that mount missile launchers capable of using Artemis must adhere to the above rules, even if the launcher is hardwired to the base design. For example, an OmniMech that hardwires a standard LRM launcher in its Center Torso location in such a way as to leave no extra critical slots in that area may not subsequently add Artemis-enhanced missile launchers to a later configuration, as the Center Torso LRM has no room for its own enhancement.

The Heavy Weapons Ammunitions table at the back of this book (p. 345–346) indicates which launchers may use which special munition types featured here, as well as their game rules references, required tech base and shots-per-ton. Single-shot (OS) launchers and rocket launchers of any kind may not carry additional ammunition. Ammunition for missile launchers may be noted under the unit's standard rules, as presented under their respective *Install Weapons, Ammunition and Other Equipment* sections.

Only standard LRM and SRM launchers may be installed as Torpedo Launchers. Only Torpedo Launchers may fire Torpedoes.

Table Reference: Weapons and Equipment (Inner Sphere and Clan, pp. 341–343; for ProtoMechs, p. 343) **Game Rules:** *Total Warfare,* p. 98

MYOMER ACCELERATOR SIGNAL CIRCUITRY (MASC)

Introduced: 2740 (Terran Hegemony)
Extinct: 2795 (Inner Sphere)
Recovered: 3035 (Capellan Confederation)

The Star League developed MASC (Myomer Accelerator Signal Circuitry) as a means to coax tremendous speed boosts out of scout 'Mechs. Essentially an override for the standard movement circuitry regulating a BattleMech's leg myomers, this system can push these bundles to expand and relax much more quickly than standard tolerances ordinarily allow. The result is a short, ten-second burst of speed—as fast as double the 'Mech's normal walking rate—but the fact that the myomers and actuators are stressed beyond their normal tolerances can lead to alignment problems and bearing strain. With prolonged, continuous use, in fact, the likelihood of torn bundles and complete actuator malfunctions rises dramatically. Wiser MechWarriors thus prefer to engage MASC only intermittently, to avoid transforming their speed demon into a tangle of ruined limbs and a target for enemy units seeking easy prey.

PROTOMECH MYOMER BOOSTER

[Introduced: 3068 (Clans Blood Spirit and Ice Hellion)

A similar concept to MASC, ProtoMech myomer booster technology was field-tested by Clans Blood Spirit and Fire Mandrill in a spate of Homeworld Trials in the latter half of 3068. The technology, however, originated with the Ice Hellions, whose obsessive love for speed prompted them to develop this small-scale alteration of MASC technology for ProtoMechs and battle armor around 3066 or 3067. Unlike MASC, the ProtoMech booster can operate continuously, producing a steady running speed equal to about twice that of a given Proto's full walking rate. Only the unique nature of ProtoMech design has made this possible, with their smaller sizes making for easier heat management and their lighter chassis weights yielding a relatively more robust myomer and actuator design compared to full-size BattleMechs. Nevertheless, there remains some potential for internal damage—specifically to the pilot—when using this system, as it still taxes the machine's tolerances and those of the warrior whose brain is wired into it.

Since the ProtoMech booster's debut, the technology has spread throughout the Homeworlds and is only now working its way into the invading Clan forces through the Horses and Diamond Sharks. –EB]

MYOMER ACCELERATOR SIGNAL CIRCUITRY (MASC)

Tech Base: Inner Sphere (MASC only) and Clan (MASC and ProtoMech myomer booster)
Unit Restrictions: Only BattleMechs may install MASC. Only ProtoMechs may install the ProtoMech myomer booster.
Game Rules: These systems will not function if the unit's engine is shut down or if the pilot is unable to act (or if critically hit).
Construction Rules: For BattleMech MASC construction rules, consult the *Special Physical Enhancements* rules in Step 2 of the BattleMech Core Construction rules (p. 48). BattleMechs may not install MASC and triple-strength myomer on the same design.

For ProtoMech myomer booster rules, consult the *Special Physical Enhancements* rules in Step 2 of the ProtoMech core construction rules (p. 82).

Table Reference: Weapons and Equipment (Inner Sphere and Clan, pp. 341–343; ProtoMech, pp. 343) **Game Rules:** *Total Warfare,* p. 137 (MASC), p. 187 (ProtoMech myomer booster)

NARC MISSILE BEACON

Introduced: 2587 (Terran Hegemony)
Extinct: 2795 (Inner Sphere)
Recovered: 3035 (Free Worlds League)

Though hailed as another lost-and-found innovation of the Star League, at heart the Narc missile beacon is little more than a heavily modified and specialized single-tube SRM launcher. Rather than lobbing missiles, however, the Narc—adapted for the electro-magnetic soup of the modern battlefield—fires larger magnetic grappling munitions called (appropriately enough) "Narc pods." These pods contain powerful homing beacons capable of cutting through most standard forms of ECM—at least until the Guardian suite came along—and are used to attract friendly missiles equipped with properly attenuated sensors. Though the effect is similar to that of Artemis-enhanced missile fire, some consider Narc pods superior to the Artemis because the signal lock cannot be broken once established. An attached beacon remains fixed to its target, calling in missiles upon itself until its unwilling "host" is destroyed. Moreover, the effect of a single unit equipped with a Narc launcher can enhance the targeting of every friendly missile support unit using Narc-compatible missiles, while the Artemis can only affect the missiles of the shooter.

Even though its functions would seem to clash with many of their battle philosophies, the Clans never lost the ability to produce the Narc system, and they have even managed to reduce its size and bulk. For the Inner Sphere, it took the efforts of Free Worlds League engineers and the Gray Death Memory Core to bring the Narc back from the dead in 3035. Since then, designers have made several refinements to the system itself and the pods it can launch, expanding on the utility of this piece of EW hardware.

IMPROVED NARC LAUNCHER

Introduced: 3062 (ComStar/Word of Blake)

The ComStar-produced improved Narc launcher (often referred to as the iNarc) debuted in 3062—a full ten years after efforts to enhance the system began. Intended to improve the flexibility of the beacon launcher, the final result was an electronic warfare package that boasted a roughly 67 percent increase in effective range (longer even than the Clan model) at the cost of increased weight, bulk and pod size. Though this last point left the Narc with fewer rounds per ton—and these pods could now be easily "brushed off" during combat—the increase in size also enabled ComStar engineers to incorporate a variety of specialized warheads unveiled at the same time as the improved launcher. These enhanced pods range in capability from an enhanced version of the standard homing pod to the devastatingly cunning Nemesis pods.

NARC MUNITIONS

The special munitions outlined below have been deployed by Narc and iNarc launchers to date. Most are specialties of the iNarc system, but two—the homing and explosive pod types—are actually employed by both Narc systems with slightly different effects. To differentiate between them, each pod designation is preceded by its launcher type (Narc or iNarc).

iNarc Homing Pods: A target hit with an iNarc homing pod not only attracts more Narc-equipped missiles in a given volley fired upon it, but is also easier to hit with said missiles, as the much more powerful beacons expedite friendly lock-ons.

iNarc Explosive Pods: The larger iNarc version of the Combine-developed explosive Narc pods can deliver a more devastating charge when activated, shearing away 50 percent more armor than its smaller cousin.

iNarc ECM Pods: The ECM pod actually latches a short-range jamming field around itself and the target to which it is attached, effectively negating the benefits of many EW-based systems that may be mounted on the target, including Artemis fire control and C^3 computer systems.

iNarc Haywire Pods: The "Haywire" pod, a specialized and aggressive variation on the ECM pod, emits powerful static and electromagnetic "noise" that overpowers its target's electronic systems, including tracking

and communications. This impairs the target's weapon attacks and renders any effort to spot for indirect fire practically useless.

iNarc Nemesis Pods: The single most treacherous of ComStar's iNarc pod creations, the Nemesis pod turns an enemy's own missiles against him. When a Nemesis pod latches onto a target, the Narc-equipped missiles of units *friendly* to the target will home in it, drawn by the Nemesis' signal. Originally designed only to divert hostile Narc-equipped missiles onto other enemies, the Nemesis was soon upgraded to attract Artemis IV missiles, semi-guided missiles and even Arrow IV homing missiles from friend and foe alike. Under the right conditions, the result can potentially bring down a target in seconds beneath a hail of friendly fire.

Narc Homing Pods: A target successfully tagged by a standard Narc homing beacon can expect to receive a greater-than-average share of missiles from an incoming volley, as the electronics package essentially aids the guidance systems of Narc-equipped LRM and SRM warheads.

Narc Explosive Pods: The DCMS was the first to field Narc explosive pods in 3058—the only variation of the system not originated by ComStar or simply recovered from Star League lostech. Essentially replacing the pod's homing beacon with a shaped charge, these remotely detonated "bomblets" inspired the improved iNarc versions that came later.

NARC/INARC

Tech Base: Inner Sphere (Narc and iNarc); Clan (Narc only)
Unit Restrictions: No restrictions
Game Rules: Narc launchers may not be fired if the unit is shut down or if its pilot/crew is otherwise prevented from acting, but loaded or partially loaded Narc ammo bins are always live and will explode per standard rules if critically hit during game play.
Construction Rules: Narc launchers may be mounted on any unit in accordance with the unit's standard core construction rules.
The Heavy Weapons Ammunitions table at the back of this book (p. 345–346) indicates which launchers may use which special munition types featured here, as well as their game rules reference, required tech base and shots-per-ton. Ammunition for Narc launchers may be noted under the unit's standard rules, as presented under their respective *Install Weapons, Ammunition and Other Equipment* sections.

Table Reference: Weapons and Equipment (Inner Sphere and Clan, pp. 341–343) **Game Rules:** *Total Warfare*, p. 138

PARAMEDIC EQUIPMENT

Introduced: Pre-spaceflight

Much more than the first aid kit you keep in the glove box, the typical paramedic equipment kit consists of much the same emergency trauma gear one might see on a hospital "crash cart;" defibrillators, emergency chemical stimulants and tranquilizers, high-pressure preserving sleeves, intubation gear and the like. In the hands of a field medic, this equipment can save a life, staving off shock and stabilizing an injured patient for and during transport. It should come as no surprise that such equipment is standard issue on most rescue vehicles and ambulances, and is occasionally even mounted on MASH units for use in triage while those requiring more extensive work take up the tables in the surgical bays.

While such equipment might appear on combat units as well as Support Vehicles, it's worth noting that the average MechWarrior or vehicle crewman is trained in first aid procedures only. Combat units therefore often do not invest the weight and space in paramedic gear, favoring instead the much lighter and more portable basic first-aid field kits that can be stowed in cockpit compartments.

PARAMEDIC EQUIPMENT

Tech Base: Inner Sphere and Clan
Unit Restrictions: Only IndustrialMechs, Combat Vehicles and Support Vehicles may install Paramedic Equipment.
Game Rules: Paramedic equipment has no impact in *Total Warfare* game play. Its use is expanded upon in *Strategic Operations*, p. 176.
Construction Rules: BattleMechs, fighters, Small Craft and DropShips generally incorporate basic first aid gear in their cockpits and cabins, and so do not generally mount extended paramedic equipment. Other units generally do not mount this equipment unless the unit is intended for emergency and rescue duties. ProtoMechs have no room to install paramedic equipment.
Paramedic equipment may be mounted on any applicable unit in accordance with the unit's standard core construction rules.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345)

PARTICLE PROJECTOR CANNON (PPC)

The energy-based equivalent of the Gauss rifle, the particle projector cannon (PPC for short) is one of the most powerful non-ballistic weapons ever devised for the modern battlefield. Consisting of a magnetic accelerator, firing high-energy proton or ion bolts, PPCs can flay armor through kinetic and thermal damage. While popular belief may hold that PPCs are an electromagnetic weapon, it's worth mentioning that even though most PPC bolts look like a flash of manmade lightning, the actual electrical component of a PPC attack is little more than an intense burst of static.

In widespread use today are two primary PPC types: the standard and extended-range (or ER) versions. [Once again, Professor Habeas was unaware of the advent of three new PPC types the Draconis Combine had managed to produce for export. Even as he was putting the final touches to this document, the Combine had begun to share their light and heavy PPC models with the Free Worlds League as part of a secret tech trade. –EB]

EXTENDED-RANGE (ER) PPC

Introduced: 2751 (Terran Hegemony)
Extinct: 2860 (Inner Sphere)
Recovered: 3037 (Draconis Combine)

The extended-range version of the particle projector cannon was one of the last weapons advancements of the Star League, debuting just seven years before the start of Stefan Amaris' coup. Essentially achieving its superior range through sheer brute force, the ER version of the PPC runs fifty percent hotter than its standard-model progenitor, but gains a third more range and is effective from muzzle to maximum range—all for the same tonnage and bulk. (The Clan version, by comparison, is a bit more compact and one ton lighter, but gains an extra fifty percent of thermo-kinetic damage at no significant increase in reach.)

ER PPCs reached their apex in the final days of the Star League with Terra-based Martinson Armaments' Kinslaughter H-Class, mounted on

the SPT-N2 *Spartan*. The Draconis Combine managed to revive the technology shortly before the War of 3039, but only a handful of these weapons reached the field during that conflict. By the time of the Clan Invasion, this re-proven technology was back in broad production, with Ceres Arms, Defiance Industries and Johnston Industries all among the chief producers of the upgraded models.

HEAVY PPC

[Introduced: 3067 (Draconis Combine)

The Combine was on a veritable PPC binge in the early months of 3067, with several variant models under development and even shared with the Free Worlds League in a dubious tech trade. Reportedly, Coordinator Theodore Kurita was aware of the deal, but was trying to shield the project from the new Star League's prying eyes. Whether the Coordinator did this to preserve Combine security or merely to test the reborn Star League's intelligence capability is anyone's guess.

The heavy PPC was an effort to match the destructive force of the Clan ER PPC without overloading a BattleMech's heat sink system. The weapon achieves this effect, but at a cost in range, tonnage and size. The heavy model is nearly half again as massive as the standard and ER models, and has the same range profile as the standard PPC—complete with focusing issues at distances of less than 90 meters.

LIGHT PPC

Introduced: 3067 (Draconis Combine)

The light PPC, an effort to produce a more compact versions of the same weapon, also proved a limited success. Once more achieving the same range profile as the standard Inner Sphere PPC, this model has half the heat and damage potential as well—with a weight and size profile roughly half that of the standard PPC. Only the fact that its reach is still half again better than the Spheroid ER medium laser has kept this weapon viable.

SNUB-NOSE PPC

[Introduced: 2784 (Terran Hegemony)
Extinct: 2860 (Inner Sphere)
Recovered: 3037 (Draconis Combine)

The snub-nose PPC was a Star League-era experiment in "overcharging" the standard PPC design that died before it was fully completed and deployed. The intent of the experiment was to achieve the same devastating effect at a reduced weapon size, and to eliminate the standard model's minimum-range effect. The net result, unfortunately, was a weapon that lost effectiveness over range and lacked some of the reach of the standard PPC, *but* had a better short-range envelope nonetheless. The weapon failed to reach widespread production before the Exodus, and its lessons were integrated with early Clan efforts to refine the standard PPC (a process that finally resulted in the hard-hitting power of the Clan ER PPC). Combine engineers, however, apparently managed to revive this abandoned concept while developing their light and heavy PPC models. –EB]

STANDARD PPC

Introduced: 2460 (Terran Hegemony)
Extinct: Circa 2820 (Clan only)

The standard PPC is the favored "big gun" of lighter 'Mech classes and long-distance raiders that can't afford to pay the tonnage for big ballistics like the Gauss rifle or autocannon/20. Once considered the apex of energy weapon technology, these particle cannons have excellent reach for the tactical battlefield and can vaporize about two tons of standard military-grade armor in just three solid hits. Unfortunately, they are less effective at ranges of less than 90 meters, as the particle fields at this range are deliberately inhibited by the weapon design. This feature—hardwired to every standard PPC model from the Donals produced in the Taurian Concordat to the Parti-Kills made on New Earth—is an electronics safety feature, intended to prevent the unfocused static of a discharging PPC from overloading the firing unit's electronics. The enhancements that make ER models possible overcame this drawback, though the original models have remained popular for their lower cost and centuries of reliability.

The Clans discontinued use of the standard PPC after developing their own ER version, which is lighter and more compact than the original design. Akin to their treatment of standard autocannon and laser weapons, the heirs of Kerensky apparently relegated the somewhat "advanced-standard" models they had designed to the scrap heaps or solahma duty sometime around the 2820s, leaving only a handful to survive to the modern era—typically on DropShip hulls.

PPC

Tech Base: Inner Sphere (Standard, ER, Light, Heavy and Snub-Nosed) and Clan (ER only)
Unit Restrictions: No restrictions
Game Rules: PPCs may not be fired if the unit is shut down or if its pilot/crew is otherwise prevented from acting.
Construction Rules: PPCs may be mounted on any unit in accordance with the unit's standard core construction rules. In addition, OmniMechs must remove lower arm or hand actuators in any Arm location selected to carry a PPC of any size.

Table Reference: Weapons and Equipment (Inner Sphere and Clan, pp. 341–343) **Game Rules:** *Total Warfare,* p. 98

PINTLE MOUNT

Introduced: Pre-spaceflight

A common means of mounting infantry-scale weapons (classified in vehicle design parlance as light- and medium-class weaponry), the pintle is something of a half-turret, which provides a firing arc as wide as 180 degrees along the side of the vehicle on which it is mounted. Pintle construction today is lightweight compared to turrets, with few having the capacity to handle anything the size of a main battle tank's heavy autocannon. The limited firing arc—fine for most smaller vehicles and support units—is also considered too restrictive for today's battlefield vehicles. Pintles are therefore almost never seen on Combat Vehicles.

PINTLE MOUNT

Tech Base: Inner Sphere and Clan
Unit Restrictions: Pintle mounts may be used by any Small Support Vehicle, except those of the Fixed-Wing or Naval motive types.
Game Rules: Pintle mounts provide a 180-degree firing arc for any equipment mounted on the vehicle's sides. Pintles—and the equipment mounted on them—may not operate if the unit's engine is shut down or the crew/pilot is otherwise incapable of acting.
Construction Rules: Pintles may not be used to mount heavy weapons (see p. 20), nor may they mount armor as a turret. The weight of a pintle mount is equal to 5 percent of the weight of all weapons and equipment (excluding ammunition) mounted in the pintle, rounded up to the nearest kilogram. Pintle mounts occupy no equipment slots by themselves, though the weapons they mount will.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare,* p. 206

PLASMA WEAPONS

[At the time of this document, plasma weaponry—which uses a lasing process to flash cartridges of plastic foam into white-hot projectiles—was an infantry support weapon fielded by the Capellan Confederation for battle armor use only. That changed in 3068, when the Capellans fielded the first vehicular-scaled models during their counter-assault on the Federated Suns' Capellan March. Since then, two such weapons have entered service. Though classed as energy weapons, the plasma rifle and cannon both require ammunition to function, making them a curious hybrid of energy weapons and ballistics.

PLASMA CANNON

Introduced: 3069 (Clan Diamond Shark)

Clan Diamond Shark engineers were stymied in their own efforts to utilize fusion plasma as an effective long-range weapon when news of the Capellan innovation somehow reached them in late 3068. After some hasty, desperate efforts, the Sharks apparently managed to obtain enough samples of the Capellans' man-portable technology to reverse-engineer the process and adapt it to their own weapon design, ultimately producing their plasma cannon by mid-3069—a year after the Confederation had already begun to field its own vehicle-scale version. Compared to the Spheroid plasma rifle, the Clan version is much smaller and more compact, with a slight advantage in range for the same battlefield endurance of 10 shots per ton. However, the Clan model cannot match the armor-defeating capabilities of the House Liao innovation, and is effectively a "heat gun" in battle, able to spike a target 'Mech's heat levels without inflicting hard armor damage.

PLASMA RIFLE

Introduced: 3068 (Capellan Confederation)

The plasma rifle began as an attempt to deploy a long-range flamer technology for use as a heat-inducing "'Mech stunner" weapon system. Capellan engineers soon realized, however, that their new infantry support weapon, the plasma rifle, could be modified for a similar role if they could upgrade it to a vehicular scale. This realization led to the deployment of these bigger-sized rifles before the end of 3068, and several such weapons proved themselves on the battlefields of Taygeta and New Syrtis during the Capellan counterattack against Duke George Hasek's Capellan March forces. The Confederation promptly shared this technology with their Canopian allies on Sian, who helped turn back a Blakist assault there in 3070.

Though the Sharks managed to mimic this weapon system the following year—leading many Spheroid leaders and experts to be wary of the Clan's possible impact on future commercial-industrial relations—the Capellan version has proven deadly in the battlefield for its ability to blast away armor with PPC force while causing a heat spike that can overtax an enemy's sinks in short order. –EB]

PLASMA CANNON/PLASMA RIFLE

Tech Base: Inner Sphere (plasma rifle only) and Clan (plasma cannon only)
Unit Restrictions: None.
Game Rules: Plasma weapons may not be fired if the unit is shut down or if its pilot/crew is otherwise prevented from acting.
Construction Rules: Plasma weapons may be mounted on any applicable unit in accordance with the unit's standard core construction rules. On ProtoMechs, as well as Combat and Support Vehicles, plasma weapons are treated as energy weapons, and so must incorporate any required heat sinks or power amplifiers needed to operate energy weapons of their size and heat potential.

Table Reference: Weapons and Equipment (Inner Sphere and Clan, pp. 341–343) **Game Rules:** *Total Warfare*, p. 139

POWER AMPLIFIERS

Introduced: Circa 2300 (Terran Alliance)

Any unit not powered by a fission- or fusion-power plant that also carries heavy energy weapons, such as lasers and PPCs [and Plasma Weapons –EB], must mount power amplifiers in order to operate these weapons. These "amplifiers" are actually banks of capacitors that are constantly recharged by the operation of the vehicle's engine, harnessing and converting the raw power of ICE, fuel cell and other non-fission/non-fusion power sources. Mated to the unit's on-board weapon systems, they add roughly 10 percent to the overall mass of such energy weapons, but at a negligible increase in bulk.

It should be noted that power amplifiers are generally used for heavy weapons only—the kind typically mounted on Combat Vehicles and BattleMechs. They are not required for infantry-scale weapons, even those of the medium (support) class; the mounts for such equipment, after all, normally include an allotment of space for independent power cells.

POWER AMPLIFIERS

Tech Base: Inner Sphere and Clan
Unit Restrictions: Only units with energy weapons and using non-fusion/non-fission engine types may install power amplifiers.
Game Rules: Power amplifiers are considered integral to a unit's weapons and may not be used if the unit's engine is shut down or its pilot/crew is incapable of acting.
Construction Rules: The construction rules for adding power amplifiers are covered in the *Add Weapons, Ammunition and Equipment* step in the core construction rules for all applicable units. The rules appear on p. 74 for IndustrialMechs, p. 107 for Combat Vehicles, p. 137 for Support Vehicles, and p. 195 for conventional fighters. OmniVehicles driven by non-fission/non-fusion engines may mount power amplifiers as part of the installed weapon system. Power amplifiers occupy no weapon slots on applicable unit types.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345)

QUARTERS/SEATING

Introduced: Pre-spaceflight

Unlike a personnel bay, which is intended to haul manpower for short distances measured in hours, quarters are designed for long-term habitation, particularly by the crew of larger spacecraft or truly large and semi self-sufficient vehicles, which can find themselves in the field for days, weeks or longer. Roughly analogous to hotel accommodations, quarters come in a variety of basic styles, from the communal bunk bed set-up for crew quarters and the cramped basics of passenger steerage to more luxurious and roomy first- and second-class suites.

Seating, included here for completeness, is the equivalent of crew and passenger quarters for smaller vehicles that also should not be confused with the communal "bays" mentioned earlier. Unlike bays, seating is designed for the solitary passenger, with a little elbow and leg room, and maybe even some extras like a power port for rechargeable noteputers and personal communicators. Pillion seating, which is less enclosed than standard seating, is the kind of accommodation one might see on a hovercycle or sidecar.

QUARTERS/SEATING

Tech Base: Inner Sphere and Clan

Unit Restrictions: BattleMechs, IndustrialMechs, ProtoMechs and fighters may not install quarters or seating. Combat Vehicles may not install quarters.

Game Rules: Quarters and seating have no direct impact in *Total Warfare*; their use will be covered in future rulebooks.

Construction Rules: 'Mechs, fighters, ProtoMechs and Combat Vehicles are too small to install quarters and incorporate their required minimum crew seating automatically with their design (including drivers, gunners and such). Combat Vehicles may add seats to accommodate any crew over and above the vehicle's minimum crew needs (see Step 2 of Combat Vehicle core construction, p. 100, for more information on finding the Combat Vehicle's crew needs).

Small Support Vehicles must add seats for all crew and passengers. Medium-sized Support Vehicles may add seats and/or quarters for all passengers and crew over the vehicle's minimum requirement (see Step 2 of Support Vehicle core construction, p. 126, for more information on finding the Support Vehicle's minimum crew needs).

Small Craft and DropShips must provide quarters for all crew and passengers (except for transport bay personnel).

The weight, equipment slot space (if any) and capacity for all quarters and seating types are shown in the Quarters/Seating Table.

Quarters Type	Weight (per Quarters/Seat)	Equipment Slot Space	Capacity
Quarters, Crew	7 tons	1 slot per 20 quarters*	1 person Basic Quarters
Quarters, Steerage	5 tons	1 slot per 50 quarters*	1 person Basic Room
Quarters, 2nd Class	7 tons	1 slot per 20 quarters*	1 person Standard Suite
Quarters, 1st Class	10 tons	1 slot per 5 quarters*	1 person Luxury Suite
Seat, Combat Crew	0.5 tons	1	1 person crew station (extra)
Seat, Pillion	25 kg	0	1 person external seat
Seat, Standard	75 kg	0	1 person internal seat

*Round all fractions up

Table Reference: Weapons and Equipment (Industrial, pp. 344–345)

REMOTE SENSOR DISPENSER

Introduced: Early spaceflight

Used by military and commercial security concerns, as well as on exploratory and survey missions, the typical remote sensor dispenser (RSD) is normally found on Support Vehicles operating in defensive areas or around the perimeter of a newly established landing/survey site. Essentially a small cargo bay with a delivery system similar to a miniaturized 'Mech cocoon launcher, an RSD can carry up to thirty standard-size, short-range remote sensors. Typically, these might include infrared sensors, used to warn of approaching enemy troops and animals, electromagnetic sensors to spot vehicular activity, or even seismic sensors capable of detecting approaching BattleMechs or measuring local tectonic activity—all of which can be monitored remotely by communications equipment tuned to the proper frequencies.

REMOTE SENSOR DISPENSER

Tech Base: Inner Sphere and Clan

Unit Restrictions: No restrictions.

Game Rules: The remote sensor dispenser has no impact in Total Warfare; its use is covered in *Tactical Operations*, p. 375.

Construction Rules: RSDs may be mounted in accordance with the unit's applicable rules for installing weapons, ammunition and equipment. Every Remote Sensor Dispenser has a fixed payload of 30 sensors and cannot be equipped with additional remote sensor "ammo".

Table Reference: Weapons and Equipment (Industrial, pp. 344–345)

RETRACTABLE BLADE

Introduced: Circa 2420 (Terran Hegemony)

Though the hatchet was regarded as a great innovation in 3025, the retractable blade—occasionally used by ExplorerMechs and AgroMechs to tame stubborn undergrowth—actually predates the BattleMech. Essentially a sheathed blade of industrial-grade steel or aluminum alloy mounted on the IndustrialMech's forearm, the retractable blade is effective against armored units, but was intended for softer targets, such as foliage, loose earth and unarmored flesh. In combat, a retractable blade generally dishes out only slightly more damage than a standard punch, which is what makes the dead-weight force of the hatchet so much more formidable.

RETRACTABLE BLADE

Tech Base: Inner Sphere and Clan
Unit Restrictions: Only humanoid BattleMechs and IndustrialMechs may carry a retractable blade.
Construction Rules: The weight, critical space and base damage for a retractable is based directly on the weight of the BattleMech/IndustrialMech wielding it. The value for a retractable blade's weight is equal to the 'Mech's tonnage, divided by 20, rounded up to the nearest .5, plus an extra 0.5 tons to reflect the weight of the extension/retraction mechanism. The retractable blade also occupies a number of critical spaces equal to the unit's tonnage divided by 20 (rounding up), plus 1 extra slot for the extension/retraction mechanism. The blade's base damage value is equal to the 'Mech's tonnage, divided by 10 (rounded up to the nearest whole).

Retractable Blades may only be mounted in a 'Mech's arms. Installing a Retractable Blade does not require a hand actuator to be located in the same arm, but arms intended to use a Retractable Blade must have shoulder, upper and lower arm actuators.

Table Reference: Weapons and Equipment (Inner Sphere, pp. 341–342) **Game Rules:** *Total Warfare*, p. 139

SCREEN LAUNCHERS

Introduced: 3055 (Draconis Combine)

The launcher fires a specialized short-range missile with a canister warhead filled with particle obscurants, chaff, and wideband radio noisemakers. When fired, specialized explosives release the cloud of obscurants that can play havoc with hostile targeting sensors and fouls up incoming weapons fire through this cloud.

SCREEN LAUNCHER

Tech Base: Inner Sphere
Unit Restrictions: Only DropShips may mount screen launchers.
Construction Rules: Screen launchers require one gunner per launcher and must spend enough tonnage for a minimum of 10 shots per launcher, in accordance with the standard DropShip construction rules.

Table Reference: Weapons and Equipment (Inner Sphere, pp. 341–343) **Game Rules:** *Total Warfare*, p. 251

SEARCHLIGHT

Introduced: Pre-spaceflight

The hand-held searchlight is lightweight, inexpensive and typically pumps out a few hundred watts of illumination good to about 270 meters.

The heavier, larger version—the mounted searchlight—commonly has wattage ratings in the thousands, and can light up targets as far away as five kilometers.

SEARCHLIGHT

Tech Base: Inner Sphere and Clan
Unit Restrictions: No restrictions
Game Rules: Searchlights have no effect in *Total Warfare*. Their effect in game play is detailed in *Tactical Operations*, p. 57.
Construction Rules: All units except for Combat Vehicles and BattleMechs are presumed to incorporate at least 3 hand-held searchlights as part of their design (2 Front and 1 Rear) to reflect running lights, headlamps and taillights—though some vehicles may designate these as strobes for emergency and police vehicle units or warning beacons. BattleMechs and Combat Vehicles may instead mount one mounted searchlight at the designer's option, at no cost in weight, slots, or C-bills.

Over and above these "free" lights, additional searchlights may be mounted on all units in accordance with standard core construction rules.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345)

SWORD

Introduced: 3058 (Draconis Combine)

Lighter in weight, the BattleMech sword lacks the force of the Lyran hatchet, but curiously enough, its more elegant design allows its MechWarrior to land blows with far more accuracy.

SWORD

Tech Base: Inner Sphere only
Unit Restrictions: Only Humanoid BattleMechs and IndustrialMechs may carry a sword.
Construction Rules: 'Mechs may mount swords in the Arm locations only. Each arm may install a maximum of 1 sword, and then only if the selected arm also possess a full set of arm and hand actuators.

The weight, critical space and base damage for a sword is based directly on the weight of the BattleMech/IndustrialMech wielding it. A sword's weight (in tons) is equal to the 'Mech's tonnage, divided by 20 (rounded up to the nearest half-ton). The number of critical slots a sword requires is equal to the 'Mech's tonnage, divided by 15 (rounded up to the nearest whole number). The sword's base damage value is equal to the 'Mech's tonnage, divided by 10 (rounded up to the nearest whole), plus 1 additional point.

Table Reference: Weapons and Equipment (Inner Sphere, pp. 341–342) **Game Rules:** *Total Warfare*, p. 144

TARGET ACQUISITION GEAR (TAG)

Introduced: 2600 (Terran Hegemony)
Extinct: 2835 (Inner Sphere)
Recovered: 3044 (Federated Commonwealth)

Though it built on techniques already centuries old in 2600, Grumman Industries' Alloran In-Line target acquisition gear became the model for the artillery-spotting laser communications system today known simply by the acronym TAG. More than a simple infrared laser-based target designation system, the TAG system tied into the user's on-board targeting and tracking systems and used its own integral tight-beam laser communications array to link into the receptive guidance systems of certain friendly artillery warheads and guided bombs.

When initially fielded, the Alloran In-Line worked in tandem with the AIL Arrow IV homing missile (also developed by Grumman Industries). Lost during the early Succession Wars, this technology was finally recovered by the Federated Suns, which began fielding the resurrected TAGs to assist in artillery targeting. By the mid-3040s, the Capellan Confederation had returned the TAG to 'Mech use with their enhanced *Raven* design, which served as a spotter for the more recently recovered Arrow IV guided artillery on their *Catapult* refits. The Capellans' decade-long alliance with the Free Worlds League in the 3050s later brought about the advent of the semi-guided missiles that also use TAG as an effective target designator, further expanding the utility of this venerable equipment.

LIGHT TAG

Introduced: 3054 (Clan Wolf)

That the Clans maintained the use of TAG at all came as a bit of a shock to Inner Sphere commanders who had thought Kerensky's children universally shunned the use of artillery. Nevertheless, certain Clans—such as the Wolves—proved more tactically flexible than Spheroids tended to give them credit for. It came as less of a surprise, then, when supporting units—including vehicles and battle armored infantry—began deploying among such Clans with smaller versions of the TAG system. Half the weight of the standard TAG models used by the Inner Sphere and the Clans, the so-called light TAG has an effective targeting range roughly 20 percent shorter than the standard model.

TARGET ACQUISITION GEAR (TAG)

Tech Base: Inner Sphere (TAG only) and Clan (TAG and light TAG)
Unit Restrictions: No restrictions
Game Rules: TAG and light TAG may not be used if the unit is shut down or if its pilot/crew is otherwise prevented from acting.
Construction Rules: TAG and light TAG may be mounted on any applicable unit in accordance with the unit's standard core construction rules.

Table Reference: Weapons and Equipment (Inner Sphere and Clan, pp. 341–343) **Game Rules:** *Total Warfare,* p. 142

TARGETING COMPUTER

Introduced: 2860 (Clan Mongoose), 3062 (Federated Suns)

The Clans prize the enhanced range and accuracy of their weapons, seen by Clan warriors as an extension of themselves. With close-quarters combat considered anathema (unless outside the cockpit), all Clan technological advancements focus on making ranged combat deadlier. Their "waste-not, want-not" philosophy also screams for more precision, to minimize collateral damage even when the weapons are live.

It therefore comes as no surprise that, in addition to the enhanced variations of Star League-era missile targeting systems, the Clans also developed advanced targeting systems to aid their direct-fire weaponry. Only recently matched by our own engineers at the NAIS, the targeting computer is a sophisticated "smart" system that enhances the accuracy of lasers, particle cannons, gauss rifles and autocannons. More than just a basic sensor tracking and targeting array, the targeting computer actually helps its gunner aim physically. This is accomplished through a series of recoil compensators and gyroscopic stabilizers that combine to counter much of the routine weapon drift caused by the shooter's own lurching motions, muzzle recoil and other environmental conditions. All of this is mated to core computing elements that help the pilot adjust more quickly for atmospheric conditions and such, providing a more accurate "lead" for almost every shot.

The resulting increase in accuracy is light-years ahead of standard targeting through sensors alone. Not only can it make direct-fire shots more accurate, but experienced gunners using this system can even narrow their targeting focus to particular body areas on many targets for more surgical precision. Understandably, this ability works best with more precise weaponry; cluster-shot LB-X autocannons, rapid-cycling pulse lasers and Ultra or rotary ACs firing in their faster modes lose the acuity necessary for this kind of finesse.

TARGETING COMPUTER

Tech Base: Inner Sphere and Clan
Unit Restrictions: ProtoMechs, Small Craft and DropShips may not mount targeting computers.
Construction Rules: IndustrialMechs and Support Vehicles that do not feature an advanced fire-control system may not mount a targeting computer.

The weight of a targeting computer is based on the weight of all non-missile heavy weapons of the pulse and/or direct-fire Types (not counting machine guns, flamers or TAG systems) used by the unit. Ammunition, power amplifiers, heat sinks and turret/pintle mechanisms are not counted in this weight. Inner Sphere units compute this weight as equal to the tonnage of such weapons, divided by 4. Clan units compute targeting computer weight by dividing the total weight of all applicable weapons by 5. This weight is rounded up to the nearest full ton.

For BattleMechs and IndustrialMechs, the targeting computer occupies as many critical slots as its tonnage (for example, a 4-ton targeting computer takes up 4 critical slots), which must be allocated contiguously and may not be divided among multiple locations (per standard equipment rules). Combat and Support Vehicles allocate targeting computers to a single slot, regardless of weight (placed in the Body location). Fighters also treat the targeting computer as a single item located in the Body (Fuselage), with no loss in weapon slots.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare,* p. 143

Introduced: Varies

Even before they became the standard by which all military DropShip amenities are now known, various military and civilian support vehicles—from armored personnel carriers to motor homes—have devoted internal spaces to short- and long-term human habitation or cargo. Today, "bays" is the generic term used to describe a cluster of similar storage spaces for vehicles, personnel or bulk cargo carried by larger vehicles and spacecraft (as opposed to quarters, described earlier in this section). To further differentiate them, transport bays are often clearly defined in the vehicle's or vessel's statistics, to express the personnel or equipment they can service and maintain, based on the dominant number of cubicle-style facilities.

Understandably, larger transport bays—capable of hauling vehicles or BattleMechs by the lance—are much more common to larger units such as DropShips than to your basic ground vehicle. But almost all unit types in the field today allocate some amount of internal space toward transport bays of some size.

BattleMechs and ProtoMechs are the exceptions to this concept. Though rumors abound that some forces (notably the Hell's Horses Clan) have attempted to allocate transport bay space to such units, conventional wisdom and common sense have kept such "walking APCs" to mere speculation. After all, the theory goes that one builds a BattleMech or a ProtoMech solely for the business of doing battle. Wasting weight on prepared transport bays, with the intent to haul precious cargo into a hellish crossfire, defeats the whole purpose.

CARGO BAY

Though impractical mount on BattleMechs or ProtoMechs, bulk cargo bays are a common sight on nearly any other type of long-haul mobile unit, including Combat Vehicles, Support Vehicles, DropShips and other capital spacecraft. Even some models of IndustrialMechs and the occasional aerospace and conventional fighter have been known to devote space and tonnage to internalized cargo bays.

Most cargo bays are generic—little more than an open space within the unit's framework, with clamps and other anchor points for retention straps. Precious little else goes into these bays, as the aim is simply to maximize load space at any given time. Variations include fixed-cubicle style "container storage bays," liquid stores, insulated stores, refrigerated stores and even bays developed primarily to haul livestock in something approaching safety (if not necessarily comfort). The weight and volume devoted to these bays varies with the needs and design of the hauling unit.

Vehicle engine and chassis designs today account for such bays as "fully-loaded" items, and thus do not gain appreciable speeds or better handling from running with empty cargo stores. The reasons for this engineering standard are beyond the scope of this discussion.

TRANSPORT BAY

Tech Base: Inner Sphere and Clan

Unit Restrictions: BattleMechs may only carry Standard, Liquid, or Insulated Cargo Bays; IndustrialMechs may only carry Standard, Liquid, Insulated, or Container Cargo Bays; ProtoMechs may not carry Transport Bays of any kind.

Construction Rules: Transport bays of any kind can be mounted on any applicable unit that has enough weight capacity and equipment space to do so. With the exception of container storage bays, IndustrialMechs must allocate one critical slot per ton (or fraction thereof) of cargo capacity assigned. Combat and Support Vehicles with transport bays need only allocate 1 slot for each distinct type of transport bay (though bays may be broken into separate slots, if desired).

Fighters, Small Craft and DropShips must separate any and all transport bays by type, but need not allocate them to equipment slots on the unit's design.

The weight, equipment slot space (if any) and capacity for all transport bay types are shown in the table below. Note that infantry bays may be designated as bays or as compartments, with the weight for each (respectively) shown under the Weight column. Infantry and battle armor bays, and cubicles for other units, incorporate basic accommodations for the units' crews and technical support, and so do not require the installation of additional passenger or crew quarters. However, crew for the unit carrying the bay cannot be housed in those bays.

Transport Bay Type	Weight	Equipment Slot Space	Capacity	Total Bay Personnel
Cargo, Container	10 tons	1 per container ('Mech or Vehicle)	10 tons per container	NA
Cargo, Standard	Variable	1 per ton ('Mech)* / 1 (Vehicle)	Weight x 1.0 (Bulk Items)	NA
Cargo, Liquid	Variable	1 per ton ('Mech)* / 1 (Vehicle)	Weight x 0.91 (Fluid Items)	NA
Cargo, Insulated or Refrigerated	Variable	1 per ton ('Mech)* / 1 (Vehicle)	Weight x 0.87 (Fluid/Bulk Items)	NA
Cargo, Livestock	Variable	NA ('Mech) / 1 (Vehicle)	Weight x 0.83 (Animals)	NA
Infantry Compartment (All)†	Variable	NA ('Mech) / 1 (Vehicle)	Weight x 1.0 (Infantry or Battle Armor)	NA
Infantry Bay, Foot	5 tons	NA ('Mech) / 1 (Vehicle)**	28 troopers (Foot Infantry)	28 (IS), 25 (C)
Infantry Bay, Jump	6 tons	NA ('Mech) / 1 (Vehicle)**	21 troopers (Jump Infantry)	21 (IS), 20 (C)
Infantry Bay, Motorized	7 tons	NA ('Mech) / 1 (Vehicle)**	28 troopers (Motorized Infantry)	28 (IS), 25 (C)
Infantry Bay, Mechanized	8 tons	NA ('Mech) / 1 (Vehicle)**	5-7 troopers (Mechanized)	7 (IS), 5 (C)
Battle Armor Bay (IS)	8 tons	NA ('Mech) / 1 (Vehicle)**	4 Battle Armor Troopers	6
Battle Armor Bay (Clan)	10 tons	NA ('Mech) / 1 (Vehicle)**	5 Battle Armor Troopers	6
Battle Armor Bay (IS)	12 tons	NA ('Mech) / 1 (Vehicle)**	6 Battle Armor Troopers	6
'Mech (per Cubicle)	150 tons	NA ('Mech) / 1 (Vehicle)	1 BattleMech or IndustrialMech	2
Fighter (per Cubicle)	150 tons	NA ('Mech) / 1 (Vehicle)	1 aero unit (up to 100 tons)	2
ProtoMech (per 5 Cubicles)	50 tons	NA ('Mech) / 1 (Vehicle)	5 ProtoMechs	6
Small Craft (per Cubicle)	200 tons	NA ('Mech) / 1 (Vehicle)	1 aero unit (up to 200 tons)	5
Vehicle, Light (per Cubicle)	50 tons	NA ('Mech) / 1 (Vehicle)	1 Vehicle (up to 50 tons)	5
Vehicle, Heavy (per Cubicle)	100 tons	NA ('Mech) / 1 (Vehicle)	1 Vehicle (up to 100 tons)	8
Vehicle, Superheavy (per Cubicle)	200 tons	NA ('Mech) / 1 (Vehicle)	1 Vehicle (up to 200 tons)	15

* Round up to the nearest whole number.
** All infantry bays of the same type on a Combat or Support Vehicle may be combined into a single, unified corresponding infantry bay slot.
† Cannot be mounted on DropShips, Airships (over 301 tons), Naval (over 301 tons), Mobile Structures and Advanced Aerospace units.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare;* p. 261 (Cargo), p. 89 (Carrying Units) and pp. 213-214 (infantry formation sizes).

INFANTRY COMPARTMENT/BAY

Infantry compartments are not bays per se, but cargo space for personnel, with maybe a flat shelf for a community seat and hooks in the wall for gear. Used mainly by vehicular units rather than in spacecraft, compartments can transport infantry and their equipment over short distances but lack any amenities beyond the space needed to breathe.

Infantry bays, on the other hand, include basic life support (air filters and conditioning that draw from the vehicle's external environment or an internal ship-wide life support apparatus), basic sleeping arrangements (such as bunks, cots or simple pads), a communal waste facility, and even food and equipment stowage compartments that allow for a bit more comfort and longer hauls. Infantry bays can even provide proper anchorage for the infantry unit's gear, based on its type.

The tonnage that vehicles and DropShips must devote to these compartments or bays varies with the type and quantity of infantry being transported.

'MECH/FIGHTER BAY

'Mech and fighter bays consist of one or more cubicles designed for the long-range transport of 'Mechs, aerospace fighters, conventional fighters or Fixed-Wing Support Vehicles massing up to 100 tons. Because the cubicles are quite heavy and large, 'Mech and fighter bays are much more common to DropShips and truly large support vehicles. Each component cubicle in these bays includes maintenance and/or launch facilities for a single 'Mech (or aerospace craft, as appropriate), as well as basic facilities and bunking for said unit's crew and technical support personnel.

PROTOMECH BAY

Obviously common only among Clan DropShips and (presumably) Clan Support Vehicles of sufficient size and function, the ProtoMech bay is comprised of cubicles that may carry a full Clan Point of five ProtoMechs each. Like 'Mech cubicles, those within a ProtoMech bay include sufficient facilities for their pilots and supporting techs.

SMALL CRAFT BAY

Only seen on truly large Support Vehicles, DropShips and other capital spacecraft, Small Craft bays provide landing, launch, shelter and maintenance facilities for aerospace craft and Fixed-Wing Support Vehicles ranging up to 200 tons in mass. Typically designed for the long-range transport of a single Small Craft, the cubicles in these bays include maintenance facilities and basic quarters for the craft's crew and support personnel (though larger crews might find the accommodations rather cramped).

VEHICLE BAY (LIGHT, HEAVY, SUPER-HEAVY)

Though simpler than 'Mech/fighter bays (because they lack orbital launch, drop or recovery systems), vehicular bays provide the same basic shelter and maintenance facilities conventional vehicles might require and are most commonly seen as part of a DropShip's design. Many of the cubicles used in these bays are actually configurable with relative ease, though practiced engineers find it easier to work more creatively within a vessel's design specs rather than dismantling and resetting cubicle walls and the like. Still, the range of vehicle bay cubicles boils down to three main classes: light vehicle cubicles, with a capacity of 50 tons or less in individual vehicle mass; heavy vehicle cubicles, which can accommodate Combat and Support Vehicles up to 100 tons in mass; and super-heavy vehicle cubicles, which are designed to hold a single Support Vehicle of up to 200 tons—including small craft, if the user's in a pinch.

TRIPLE-STRENGTH MYOMER

Introduced: 3050 (Capellan Confederation)

The legend of the development of triple-strength myomer (TSM, for those of you into shorthand), is a long and sordid one. During the Fourth Succession War, FedSuns intelligence allowed the Capellan Confederation access to the NAIS development as part of an elaborate ploy. These enhanced myomers provided great physical strength to the 'Mechs that used them, but the resulting musculature was extremely susceptible to a chemical catalyst that led NAIS researchers to label them unstable in combat. While this flaw worked into the FedSuns' gambit on Sian in the waning days of the war, it also placed a potentially powerful innovation in Confederation hands. Indeed, in 3050, after more than two decades of research, House Liao once more fielded BattleMechs enhanced with TSM—BattleMechs immune to the effects of the catalyst gas, that could actually control when the powerful musculature engaged in battle.

(Ironically, FedSuns engineers had also completed refinements to the technology by this time, fielding it on a few one-off 'Mechs in time for the Clan invasion. However, in true conservative fashion, they were loath to declare their catalyst-proof TSM "production-ready" at the time, as the operating range for the myomers' enhancements was considered too narrow. Thus, credit for the first fully functional TSM units in our time goes to our Capellan neighbors. Sorry, kids.)

The production-quality TSM the Capellans introduced is much bulkier than standard musculature, but employs heat as its performance-enhancing catalyst. As a 'Mech's internal heat levels rise and the TSM activates, the 'Mech gains a boost in muscle strength that enables it to double its lifting capabilities and the power of physical attacks like punches and kicks. Indeed, even at lower "overheat" levels, TSM can provide a brief speed boost where other 'Mechs might begin to grow more sluggish.

(One interesting note: the Clans have demonstrated little interest in acquiring this technology to date, likely because TSM's most obvious use is to enhance prowess in physical combat—a form of BattleMech warfare the Clans generally disdain.)

[This last is not entirely true. Habeas forgot to mention certain confirmed rumors that the Ice Hellions, at least, somehow obtained samples of the older TSM and its catalyzing element through other Inner Sphere sources. It's a good bet that lessons from these samples went into the production of their recent myomer booster innovations, and more surprises may be in the works even as we speak. –EB]

INDUSTRIAL TSM

Introduced: 3045 (Federated Suns)

Though the NAIS largely shelved TSM as a poor choice for military technology, the revolutionary advancement *was* recognized for its capabilities off the battlefield (and thus, theoretically, far from its combustible catalyst). Industrial TSM—an early progenitor of the "corrected" military TSM—first appeared in the design of several FedSuns Construction- and CargoMechs

TRIPLE-STRENGTH MYOMER/INDUSTRIAL TSM

Tech Base: Inner Sphere

Unit Restrictions: Only BattleMechs may install triple-strength myomer. Only IndustrialMechs may install Industrial TSM.

Game Rules: Triple-strength myomers (standard and Industrial) are considered inactive if the unit is shut down, and may not be used if the pilot is otherwise prevented from acting.

Construction Rules: The installation of triple-strength myomer in BattleMechs is covered under *Special Physical Enhancements (MASC/TSM)* in Step 2 of the BattleMech core construction rules (see p. 48). Industrial TSM is installed using the *Special Physical Enhancements (Environmental Sealing, Industrial TSM)* in Step 2 of the IndustrialMech core construction rules (see p. 67).

Table Reference: Weapons and Equipment (Inner Sphere, pp. 341–342 [Triple-Strength Myomer], industrial, pp. 344–345 [Industrial TSM]) **Game Rules:** *Total Warfare*, p. 143

during the mid-3040s. Even thicker than the Confederation's refined military-grade version, this enhanced industrial myomer is "active" at start-up, requiring no internal heat levels to engage. Thus, a IndustrialMech equipped with Industrial TSM (occasionally referred to as I-TSM) operates with double the effective lifting and physical combat capability of any non-enhanced 'Mech in the same tonnage. However, I-TSM improves only raw physical strength, not speed. Indeed, the enhanced capabilities of I-TSM can actually produce spastic motions as the myomers contract more violently than standard, resulting in clumsier motion overall for IndustrialMechs equipped with this technology.

TURRET MOUNT

Introduced: Pre-spaceflight

Like the pintle mount, the turret mount allows weapons and equipment a broader arc of operation than a simple fixed-location mount. Unlike the pintle, the turret mount is designed and available for heavy weapons as well as lighter weapon types and other equipment. Favored on Combat Vehicles for their full-field firing range, the turret mount has completely replaced the pintle mount in modern engineering for all heavy weapons, and even many more lightly equipped Support Vehicles sport full turret mounts to maximize their flexibility.

TURRET MOUNT

Tech Base: Inner Sphere and Clan

Unit Restrictions: Turret mounts may only be used by ground-based and naval Combat and Support Vehicles (those using a Wheeled, Tracked, Hover, WiGE or Naval motive system).

Construction Rules: Turrets are mounted on Combat and Support Vehicles in accordance with their standard core construction rules (beginning on pp. 94 and 116, respectively). Under these rules, Combat and Support Vehicles may mount no more than 1 turret per unit. Turrets weigh 10 percent as much as all equipment mounted within the turret, except for armor, ammunition, heat sinks and power amplifiers (rounded up to the nearest kilograms for Small Support Vehicles, or to the nearest half-ton for vehicles weighing 5 tons and up). Turrets occupy no equipment slots and are treated as a location on the vehicle design, which receives internal structure values and may also receive armor.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare,* p. 99

INDUSTRIAL EQUIPMENT

A category that is literally endless, entire encyclopedia sets could be devoted to what falls within the category of "construction equipment." For the purposes of this primer, however, the salient points cover such equipment most commonly found on IndustrialMechs and Support Vehicles (though such equipment can be found on combat vehicles, albeit such is extremely rare). Finally, while some of the equipment within this category wouldn't normally fall under a definition of "construction," due to their usual employment with IndustrialMechs and Support Vehicles that fall within a "construction" definition, they are included here.

BACKHOE

Introduced: Pre-spaceflight

The backhoe is a common commercial and industrial tool, designed primarily for excavating soil. It is a frequent sight on Support Vehicles and IndustrialMechs, but almost never appears on BattleMechs or battlefield units. Typically forged from thick industrial steel, the bucket of a backhoe—while large and ungainly—can pack quite a wallop as an improvised physical combat weapon for an IndustrialMech, but it is functionally useless in combat otherwise.

The Clans' relative disdain of IndustrialMechs means that Clan-made backhoes only ever turn up on their Support Vehicles.

BACKHOE

Tech Base: Inner Sphere and Clan

Unit Restrictions: Only BattleMechs, IndustrialMechs, ground-based Combat and Support Vehicles (those with Wheeled, Tracked, Hover and WiGE motive systems) and Naval Combat and Support Vehicles (including submersibles and hydrofoils) may use a backhoe.

Game Rules: Note that Hover and WiGE units may not use a Backhoe unless they have first landed (stopped in the previous turn and spent 0 MP in that turn) and are adjacent to the target. Naval units equipped with Backhoes may only use them while stationary (spending 0 MP in that turn) and directly adjacent to a target.

Construction Rules: Combat and Support Vehicles may mount only one backhoe each in the Front, Back or Turret locations, but only if the location(s) selected does not also include a bulldozer, chainsaw, combine, dual saw, heavy-duty pile driver, mining drill, rock cutter or wrecking ball.

Humanoid BattleMechs and IndustrialMechs may mount backhoes in the arms only, but are limited to one backhoe per arm and must remove the hand actuator on the chosen arm to do so. Quad BattleMechs and IndustrialMechs may mount backhoes in the Side Torso locations only, and are limited to one backhoe per location. As with vehicles, 'Mechs of any type may not place a backhoe in any location that also includes a chainsaw, combine, dual saw, heavy-duty pile driver, mining drill, rock cutter or wrecking ball.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare,* p. 130

BRIDGELAYER (LIGHT, MEDIUM, HEAVY)

Introduced: Pre-spaceflight

Another piece of equipment almost never seen on battlefield units (though rear-guard support vehicles with these often find themselves perilously close to the action), the bridgelayer is a collapsible platform with a reach of generally 30 meters at full extension and enough width to accommodate a typical assault class battle tank over water. This bridge is sturdy enough to allow personnel or even vehicles to cross over rivers, ravines, and ditches, as long as it can cross such gaps.

Essentially made up of folding panels of structural steel and auto-extending supports, a bridgelayer is typically classified as light, medium, or heavy—which refer both to the equipment's weight and to its capacity. Light bridgelayers weigh 1 ton and can support up to 16 tons of weight at full extension. Medium 'layers weigh 2 tons and can support up to 40 tons of traffic. And Heavy 'layers can support up to 90 tons of personnel and equipment on their 6-ton frames. In addition, bridgelayers also make use of integral flotation devices—a standard almost regardless of manufacturer.

BRIDGELAYER

Tech Base: Inner Sphere and Clan

Unit Restrictions: Only quad BattleMechs, quad IndustrialMechs, ground- and naval-based Combat and Support Vehicles (those with a Tracked, Wheeled, Hover, WiGE, or Naval motive systems—including Submersibles and Hydrofoils) may install a bridgelayer.

Game Rules: Note that Hover and WiGE units may not use a Bridgelayer unless they have first landed (stopped in the previous turn and spent 0 MP in that turn) and are adjacent to the target. Naval units equipped with Bridgelayers may only use them while stationary (spending 0 MP in that turn) and surfaced (at Depth 0) directly adjacent to a target.

Construction Rules: Combat Vehicles, Support Vehicles and quadruped BattleMechs/IndustrialMechs may mount only one bridgelayer per location. 'Mech units may mount bridgelayers in torso locations only (with a forward facing).

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare,* p. 130

BULLDOZER

Introduced: Pre-spaceflight

Bulldozers are another piece of common commercial and industrial equipment. Essentially a shaped hunk of thick industrial steel with reinforced mountings, they enable a typical wheeled or tracked ground vehicle to literally plow through loose and semi-loose rubble. Obviously, their design and function are impractical for use in any walking machinery, including BattleMechs, IndustrialMechs and Protos, as well as aerospace vehicles and wet-naval craft. They are also fairly rare on Combat Vehicles, which usually have the armor up front to deal with a few piles of wreckage here and there. The odds are that a 'dozer-equipped unit encountered on the battlefield—Clan or Spheroid—is likely to be an industrial or engineering Support Vehicle.

BULLDOZER

Tech Base: Inner Sphere and Clan

Unit Restrictions: Only Combat and Support Vehicles with a Wheeled or Tracked motive system may install a bulldozer.

Construction Rules: Combat and Support Vehicles may mount only one bulldozer blade per unit, and the bulldozer must be placed in the Front location. A unit with a bulldozer may not mount a backhoe, chainsaw, combine, dual saw, heavy-duty pile driver, mining drill, rock cutter or wrecking ball in the same location.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare,* p. 131

CHAINSAW

Introduced: Pre-spaceflight

The chainsaw used by today's ForestryMechs and Support Vehicles like the GM Pathmaker series is a powerful upgrade to the same kind many woodsmen keep in their backyard sheds. This larger version, reinforced and upgraded in order to take on a broad mix of exotic flora—including the infamous Kaumberg oaks, said to be nearly rock-hard after a solid decade or two of growth—is tough enough to maul battlefield armor. Despite this fact, and the niche popularity of armor-rending chainsaws on the Solaris game vids, this device makes for a clumsy, desperate weapon at best. Chainsaws are thus a rare sight on the battlefield, never appearing among 'Mechs or Combat Vehicles belonging to regular armies. Like their Clan counterparts, Inner Sphere military commanders prefer to use the right tools for the right jobs.

CHAINSAW

Tech Base: Inner Sphere and Clan

Unit Restrictions: Only BattleMechs, IndustrialMechs and ground-based Combat and Support Vehicles (those with Wheeled, Tracked, Hover or WiGE motive types) may install a chainsaw.

Game Rules: Note that Hover and WiGE units may not use a Chainsaw unless they have first landed (stopped in the previous turn and spent 0 MP in that turn) and are adjacent to the target.

Construction Rules: Combat and Support Vehicles may mount only one chainsaw each in the Front, Back or Turret locations, but only if the location(s) selected does not also include a backhoe, bulldozer, combine, dual saw, heavy-duty pile driver, mining drill, rock cutter or wrecking ball.

Humanoid BattleMechs and IndustrialMechs may mount chainsaws in the arms only, but are limited to one chainsaw per arm and must remove the hand actuator on the chosen arm to do so. Quad BattleMechs and IndustrialMechs may only mount chainsaws in their Side Torso locations, with a maximum of one chainsaw per location. As with vehicles, 'Mechs of any type may not place a chainsaw in any location that also includes a backhoe, combine, dual saw, heavy-duty pile driver, mining drill, rock cutter or wrecking ball.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare,* p. 134

COMBINE

Introduced: Pre-spaceflight

Combines are another piece of commercial gear focused on the agricultural industry. This equipment generally consists of a series of rotating blades used to thresh and harvest tall grain crops. Though not intended for combat, the construction materials used in the manufacture of combine blades are generally quite sturdy, to facilitate faster action and less wear. If seen in combat—usually on the arm of a dedicated AgroMech or the front of a farming vehicle—it is likely that sheer desperation brought such a device into play as a weapon, especially as it can only inflict negligible damage against armored units. Against conventional infantry or other unarmored personnel, however, the use of a combine shows not desperation, but cruelty, as this device can shred such soft targets in seconds.

COMBINE

Tech Base: Clan and Inner Sphere

Unit Restrictions: Only BattleMechs, IndustrialMechs and Combat and Support Vehicles with a Wheeled or Tracked motive systems may use a combine.

Construction Rules: Combat and Support Vehicles may mount only one combine each in the Front, Back, or Turret locations, but only if the location(s) selected does not also include a backhoe, bulldozer, chainsaw, dual saw, heavy-duty pile driver, mining drill, rock cutter or wrecking ball.

Humanoid BattleMechs and IndustrialMechs may mount combines in the arms only, but are limited to only one combine per arm and must remove the hand actuator on the chosen arm to do so. Quad BattleMechs and IndustrialMechs may mount combines in the side torsos only, and are limited to one combine per location. As with vehicles, 'Mechs of any type may not place a combine in any location that also includes a backhoe, chainsaw, dual saw, heavy-duty pile driver, mining drill, rock cutter or wrecking ball.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare*, p. 134

DUAL SAW

Introduced: Pre-spaceflight

Another common tool in the arsenal of urban construction and industrial demolitions, the dual saw is a more powerful variation on the chainsaw that typically uses twin high-speed ferro-carbide circular blades or a scissoring set of oblong vibro-blades instead of a monoblade, chain-fed cutter. Designed with hard objects in mind, such as industrial steels and pavement, the dual saw—by its very design—happens to be fairly effective against armored units as well.

Fortunately, like many industrial tools, the dual saw was never intended as a melee weapon, and using it as such is considered wasteful by the regular armies of the Inner Sphere and the Clans. This, however, has not prevented it from appearing on the Solaris circuit as a favored dueling weapon. Far more rare is the odd, down-on-his-luck mercenary or Periphery pirate armed with such tools, or a truly desperate fool in an urban IndustrialMech.

DUAL SAW

Tech Base: Inner Sphere and Clan

Unit Restrictions: Only BattleMechs, IndustrialMechs and ground-based Combat and Support Vehicles (those with Wheeled, Tracked, Hover and WiGE motive systems) may use a dual saw.

Game Rules: Note that Hover and WiGE units may not use a Dual Saw unless they have first landed (stopped in the previous turn and spent 0 MP in that turn) and are adjacent to the target.

Construction Rules: Combat and Support Vehicles may mount only one dual saw each in the Front, Back or Turret locations, but only if the location(s) selected does not also include a backhoe, bulldozer, chainsaw, combine, heavy-duty pile driver, mining drill, rock cutter or wrecking ball.

Humanoid BattleMechs and IndustrialMechs may mount dual saws in the arms only, but are limited to one dual saw per arm and must remove the hand actuator on the chosen arm to do so. Quad BattleMechs and IndustrialMechs may mount dual saws in the side torsos only, and are limited to one dual saw per location. As with vehicles, 'Mechs of any type may not place a dual saw in any location that also includes a backhoe, chainsaw, combine, heavy-duty pile driver, mining drill, rock cutter or wrecking ball.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare*, p. 134

DUMPER

Introduced: Pre-spaceflight

Cargo-hauling vehicles—most commonly Support Vehicles and IndustrialMechs—occasionally make use of a cargo bed tilting mechanism known more commonly as a dumper. Little more than a hydraulic mechanism, this piece of equipment typically allows for the off-loading of open beds toward the rear or to one side of the unit, albeit in a manner often less than graceful for the carried cargo or units.

To date, no Combat Vehicles feature dumper mechanisms, nor do any BattleMechs make use of them—the latter primarily because BattleMechs carry no cargo.

DUMPER

Tech Base: Inner Sphere and Clan

Unit Restrictions: Only IndustrialMechs, Combat Vehicles and Support Vehicles may install a dumper mechanism.

Construction Rules: A dumper mechanism must be assigned to all or some of a cargo-carrying unit's cargo weight, and must indicate the direction in which it dumps its contents when emptied (Front, Left/Right Side or Rear). The weight of the dumping mechanism is equal to 5 percent of the cargo being dumped (rounded up in accordance with the weight standard for the unit in question), and the dumping mechanism's critical/equipment slot must be allocated to the same location where the cargo to be dumped is located.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare*, p. 134

EXTENDED FUEL TANKS

Introduced: Circa 2300 (Terran Alliance)

The concept of the extended fuel tank is hardly new, but entered widespread use in the days of pre-myomer, ICE-driven IndustrialMechs, when those walking monstrosities chugged away entire liters of fossil fuels every minute. Today's far more efficient engines have made great strides—no pun intended—since those days, but even so, fuel remains the limiting factor for all non-fusion/non-fission units.

Using the same basic technology as the external hardpoints described later for aircraft units—but mounted internally to protect the reserves of volatile chemicals or fuels—extended fuel tanks (available for ICEs and fuel cell engines) vastly improve a unit's basic operating range, depending on how many are installed. In the case of most internal combustion engines, a single tank weighing one tenth as much as the engine itself can add about 600 kilometers' worth of mobility, doubling its effective range. Matching such capabilities point by point, fuel cell-powered units gain about 450 extra kilometers for the equivalent ratio of added tanks, which also effectively doubles their stamina in the field.

EXTENDED FUEL TANKS

Tech Base: Inner Sphere and Clan

Unit Restrictions: Only IndustrialMechs and Combat Vehicles with ICEs or Fuel Cell engines may install extended fuel tanks.

Game Rules: Each filled or partially filled extended fuel tank is treated as an ammo bin in combat, and will explode for 40 points per ton of tank if it suffers a critical hit (regardless of whether or not the unit is shut down or the pilot is conscious). Fuel consumption is not measured in *Total Warfare* game play; this aspect of play is covered in *Strategic Operations* (p. 35).

Construction Rules: Each extended fuel tank adds up to 600 kilometers of operating range for ICEs, or up to 450 kilometers of range for Fuel Cell engines, and weighs 10 percent of the unit's engine weight (rounded up to the nearest half ton). There is no special limit to the number of tanks that may be added.

For 'Mechs, the number of critical spaces occupied by an extended fuel tank is equal to the tank's tonnage (rounded up); these critical spaces can only be located in the Torso locations. For Combat Vehicles, an extended fuel tank occupies one slot (regardless of its weight), which must be placed in the Body.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345)

HEAVY-DUTY PILE DRIVER

Introduced: Pre-spaceflight

Common on construction vehicles, dense urban ConstructionMechs and mining machinery, the heavy-duty pile driver is essentially a long, heavy impact ramrod. In construction applications, this equipment is designed to pound piles into the earth and prepare it for the foundation of skyscrapers and other particularly tall structures. In mining applications, it is used to break up particularly obstinate rock. The pile driver packs sufficient force to damage BattleMech armor in a pinch, but as a combat weapon it is wholly inefficient and quite rare, even for the arenas of Solaris VII.

HEAVY-DUTY PILE DRIVER

Tech Base: Inner Sphere and Clan

Prohibited Units: Only BattleMechs, IndustrialMechs and Combat and Support Vehicles with a Wheeled, Tracked, or Naval motive system may install pile drivers.

Game Rules: Naval units equipped with pile drivers may only use them while stationary (spending 0 MP in that turn) and directly adjacent to a target.

Construction Rules: Combat and Support Vehicles may mount only one heavy-duty pile driver each in the Front or Back locations, but only if the location(s) selected does not also include a backhoe, bulldozer, chainsaw, combine, dual saw, mining drill, rock cutter or wrecking ball.

Humanoid BattleMechs and IndustrialMechs may mount heavy-duty pile drivers in the arms only, but are limited to one pile driver per arm and must remove the lower arm and hand actuators on the chosen arm to do so. Quad BattleMechs and IndustrialMechs may only mount pile drivers in their Side Torso locations, with a maximum of one pile driver per location. As with vehicles, 'Mechs of any type may not place a pile driver in any location that also includes a backhoe, bulldozer, chainsaw, combine, dual saw, mining drill, rock cutter or wrecking ball.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare*, p. 136

LADDER

Introduced: Pre-spaceflight

Extending ladders are typical of rescue or utility Support Vehicles, where they are often turret mounted for maximum flexibility. Most are composed of lightweight but sturdy materials such as graphite, high-strength plastics, aluminum or even wood, and tend to reach lengths of 20 to 100 meters. It's quite rare to see large ladder mechanisms like these deployed on combat vehicles or 'Mechs. Indeed, the closest common item is the roll-out rope or chain ladders MechWarriors and IndustrialMech drivers use to climb into and out of their machines, which make for poor rescue options in a pinch.

LADDER

Tech Base: Inner Sphere and Clan

Unit Restrictions: Ladders may not be installed on ProtoMechs, fighters, Fixed-Wing Support Vehicles, Small Craft or DropShips.

Game Rules: Ladders permit a single friendly foot infantry unit to climb up or down elevation levels to any terrain adjacent to a ladder-equipped unit (such as a building or hill) at a rate of 1 MP per level, up to the maximum number of levels accommodated by the ladder (equal to the ladder's length in meters, divided by 6, rounding up), to the level of the underlying terrain of the ladder-equipped unit. Infantry may not climb a ladder on a unit that spends any MP in the same turn.

Construction Rules: BattleMechs and IndustrialMechs may only mount ladders in torso locations. Combat and Support Vehicles using ladders may mount them on any Side location or the turret. Ladders weigh 100 kg (0.1 ton) per 20-meter length (or fraction thereof, to a maximum length of 100 meters). Regardless of the ladder's length, it only occupies one slot in a vehicle or 'Mech design.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345)

LIFT HOIST/ARRESTING HOIST

Introduced: Pre-spaceflight

IndustrialMechs and Support Vehicles designed for hauling (or merely moving) cargo often mount lift hoists as a means of expediting the process. Though the look and methods of these items vary—from pull chains and high-tension cables to hydraulics and even myomer-enhanced claw-like specialty lifters—the basic lift hoist system essentially takes advantage of the unit's own mass as a counterbalance against the weight being lifted.

Airships employ a specialized variant of the lift hoist on rare occasions. Dubbed arresting hoists, these specially actuated mechanisms are used to snag VTOLs, aircraft and aerospace fighters while in flight, recovering said craft the way a DropShip with suitable fighter bays can recover smaller aerospace craft. Though such operation is fraught with danger, it has granted airships the ability to operate as light carriers after a fashion, augmenting the small air-defense forces of troubled skies.

LIFT HOIST/ARRESTING HOIST

Tech Base: Clan and Inner Sphere

Unit Restrictions: Only Airship Support Vehicles may install arresting lift hoists; standard lift hoists may be used by any unit type except ProtoMechs, fighters (conventional and aerospace), Small Craft and DropShips.

Game Rules: Arresting hoists enable an Airship Support Vehicle so equipped to retrieve airborne fighters, Fixed-Wing Support Vehicles and VTOLs (Combat and Support VTOLs) like a DropShip. Lift hoists may not be used if the unit is shut down or its pilot/crew is unable to act.

Construction Rules: BattleMechs and IndustrialMechs may mount up to 2 lift hoists per unit (limited to Arm and Torso locations only).

Combat and Support Vehicles may mount up to 4 (standard) lift hoists per unit. Airship and Fixed-Wing Support Vehicles mount these in the body; VTOL Combat and Support Vehicles may mount lift hoists in any location except the rotor. All other Combat and Support Vehicle types may mount lift hoists in any location except the body.

Airships can only mount arresting lift hoists in the Body location and only in conjunction with a minimum of one vehicle cubicle (of any size), representing the docking stations for any airborne unit intended to dock with the Airship.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345). **Game Rules:** *Total Warfare*, p. 136

MANIPULATOR

Introduced: Circa 2000

The modern manipulator is effectively a fully (or semi-) articulated armature and gripping claw a bit more elaborate and multifunctional than a basic robotic assembler arm, but significantly smaller and less sophisticated than a 'Mech's hand actuator. Mounted on the exterior of a vehicle—'Mechs don't use these devices, as any intended for manipulating objects can easily be built with hand and arm actuators for the job—most basic manipulators typically have a lifting and carrying capacity of about 100 kilograms, and a reach of maybe five meters away from the vehicle's hull. The typical use of these devices covers the handling of dangerous chemicals and waste without exposing the operator to harm, and so they are most commonly seen on specialized vehicles for the disposal of bombs and hazardous materials.

MANIPULATOR

Tech Base: Inner Sphere and Clan

Unit Restrictions: BattleMechs, IndustrialMechs, ProtoMechs, fighters, Small Craft and DropShips may not mount manipulators.

Game Rules: The limited range and capacity of the manipulator means it has no impact in *Total Warfare* game play. Its full functionality will be covered in *A Time of War*. The manipulator may not be used if its controlling unit is shut down or if its pilot/crew is otherwise prevented from acting.

Construction Rules: Qualifying units may mount a maximum of 2 manipulators per location (not including Rotor locations).

Table Reference: Weapons and Equipment (Industrial, pp. 344–345)

MINING DRILL

Introduced: Pre-spaceflight

Another piece of industrial equipment that occasionally gets dragooned into combat use (with mediocre results), the fast-spinning mining drill uses a drill head composed of a super-hard alloy (typically steel- or nickel-based) or a ceramic. Capable of boring through the hardest ores, ferrocrete walls or even BattleMech armor, the mining drill is capable of much finer control than the rock cutter, which is also used in mining or construction work. This device, however, makes for an ineffective weapon not because it is generally inaccurate, but because it cuts a typically small surface area relative to other powered cutting implements available at vehicular scale. Over the centuries, some specialized models—particularly the Airship version boasted by the Free Worlds League's Poseidon engineering vehicle—even incorporate an extendable armature that allows this item to work in hard-to-reach areas.

MINING DRILL

Tech Base: Clan and Inner Sphere

Unit Restrictions: Only BattleMechs, IndustrialMechs, ground-based Combat and Support Vehicles (those with Wheeled, Tracked, Hover and WiGE motive systems), Airship Support Vehicles and Naval Combat and Support Vehicles may use a mining drill.

Game Rules: Note that Hover and WiGE units may not use a Mining Drill unless they have first landed (stopped in the previous turn and spent 0 MP in that turn) and are adjacent to the target. Naval units equipped with Mining Drills may only use them while stationary (spending 0 MP in that turn) and directly adjacent to a target. Airships must land or hover directly adjacent to the target to use their drills.

Construction Rules: Combat and Support Vehicles (Wheeled, Tracked, Hover, WiGE, Airship or Naval) may mount only one mining drill each in the Front, Back or Turret locations, but only if the location(s) selected does not also include a backhoe, bulldozer, chainsaw, combine, dual saw, heavy-duty pile driver, rock cutter or wrecking ball.

Humanoid BattleMechs and IndustrialMechs may mount mining drills in the arms, but are limited to one drill per arm and must remove the hand actuator on the chosen arm to do so. Quad BattleMechs and IndustrialMechs may mount mining drills in the Side Torso locations only, and are limited to one drill per location. As with vehicles, 'Mechs of any type may not place a mining drill in any location that also includes a backhoe, bulldozer, chainsaw, combine, dual saw, heavy-duty pile driver, rock cutter or wrecking ball.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare,* p. 138

NAIL/RIVET GUN

Introduced: Circa 2310 (Free Worlds League)

Though typically employed by hand, nail guns or rivet guns have become a long-standing favorite for the rapid construction of lightweight wood- or steel-frame structures (respectively). Naturally, the development of the IndustrialMech eventually led to the larger adaptation of these popular tools, with the Free Worlds-based Sheridan Constructs company debuting the SC-M "Powerjoin" series of guns in the early 24th century. Upon seeing the large-scale version's success even in the crude hands of a IndustrialMech, various manufacturers soon adapted these vehicle-scale guns for use on other, more conventional construction vehicles as a variation on the basic manipulator.

Though designed similarly and referred to as a single piece of equipment, the nail/rivet gun is a catch-all term for the common joiners used in such roles; both of which work the same in principle, by driving nails (or white-hot rivets) through two pieces of construction material at tremendous speed. Nail guns cannot fire rivets and rivet guns cannot fire nails, in other words.

This device may not truly serve as a weapon of note against armored units—even at point-blank range, a nail gun won't pierce the hide of a BattleMech—but the speed and force achieved by these construction wonders *is* potent enough to rip through personal body armor, especially at close range. BattleMechs with stripped armor sections may even fear the sheer level of foreign-object damage this "weapon" can deliver. Desperate pilots have even been known to employ nail/rivet guns in crowd control situations, where their deadly projectiles can horribly maim or kill unprotected personnel by the dozens.

NAIL/RIVET GUN

Tech Base: Inner Sphere and Clan

Unit Restrictions: ProtoMechs, Airship Support Vehicles, VTOL Combat and Support Vehicles, and aerospace units of all kinds may not mount nail or rivet guns.

Game Rules: Nail and rivet guns may not be fired if the unit is shut down or if its pilot/crew is otherwise prevented from acting.

Construction Rules: Nail or rivet guns may be mounted on any applicable unit in accordance with the unit's standard core construction rules. When mounted, the gun must be identified as either a nail or rivet gun.

Nail/rivet gun ammunition may be mounted on the unit in accordance with the rules under the *Add Weapons and Equipment* step of each unit type's core construction rules.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare,* p. 98

REFUELING DROGUE/FLUID SUCTION SYSTEM

Introduced: Pre-spaceflight

Mid-air refueling may be an unconventional method for supplying the needs of airborne units such as aerospace fighters and airships, but it is a common enough procedure in today's universe. The standard refueling drogue, which makes this possible, is a long pump that can mate with the integral fueling port of another airborne unit in mid-air. So long as both craft are capable of maintaining steady and level flight, at matched speeds and vectors, this pump system can transfer up to 100 kilograms of fuel per second. Though fully refilling the tanks of typical aerospace fighter running on fumes can take an airborne tanker close to a minute, this ability has helped maintain the readiness of many aerospace forces—commercial and military—for centuries.

The fluid suction system (FSS) works on the same principles as the drogue, only in reverse (and with a much safer margin of operation, as it is typically reserved for ground-based operations). Designed instead to draw fuels, coolants or other fluids from another unit, the standard suction system can drain roughly 100 kilograms per second. Though impossible to use as a weapon system—it generally requires a crew or a real steady hand to make the necessary connections—the FSS enables a typical SalvageMech so equipped to drain off any vital liquid chemicals from a downed BattleMech or crippled tank in less than a minute. Heavy firefighting vehicles use similar equipment to rapidly fill their on-board water tanks from open bodies of water like rivers and lakes as well.

REFUELING DROGUE/FLUID SUCTION SYSTEM

Tech Base: Inner Sphere and Clan

Unit Restrictions: Only fighters, Airship and Fixed-Wing Support Vehicles, VTOL Combat and Support Vehicles, and Small Craft may install a refueling drogue. BattleMechs, ProtoMechs and DropShips may not mount a fluid suction system.

Game Rules: Refueling drogues and fluid suction systems have no impact in *Total Warfare*; their use is covered in on pages 35 and 42 of *Strategic Operations*, respectively. Fluid suction systems aren't necessary for refueling operations; only units designated as tankers for mid-air refueling require a refueling drogue.

Construction Rules: Fuel-using ground-based vehicles, 'Mechs and DropShips must dock to take on fuel. Drogues may be mounted in multiples, but each counts as a separate item.

Fluid suction systems may be mounted in any location on an applicable unit (except for VTOL rotors). Suctions may be mounted in multiples, but each counts as a separate item.

Units mounting a refueling drogue must also possess a liquid or refrigerated cargo storage bay from which the fuel is to be transferred. Units mounting a fluid suction system must also possess a liquid or refrigerated cargo storage bay into which the fluids are drawn. See *Transport Bays*, p. 239, for details on these bays.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345)

ROCK CUTTER

Introduced: Pre-spaceflight

The typical rock-cutter—used in mining and dense urban area construction/demolitions—consists of a chain of tempered alloy links studded with diamond-hard cutting heads. Looking for all the worlds like a nasty older brother to the typical ForestryMech's chainsaw, this clumsy device is meant to cut through solid rock and ferrocrete. It is also one of the few items of heavy industrial equipment that actually builds up heat thanks to its high-speed motors and cutting mechanisms. Unsurprisingly, the rock cutter can definitely harm armored units like BattleMechs, but its sheer size makes it supremely difficult to wield as a weapon, even by an IndustrialMech. This tool rarely appears in combat outside the Solaris circuits.

ROCK CUTTER

Tech Base: Inner Sphere and Clan

Unit Restrictions: Only BattleMechs, IndustrialMechs and ground or naval Combat and Support Vehicles (those with a Wheeled, Tracked, Hover, WiGE or Naval motive system) may carry a rock cutter.

Game Rules: Note that Hover and WiGE units may not use a Rock-Cutter unless they have first landed (stopped in the previous turn and spent 0 MP in that turn) and are adjacent to the target. Naval units equipped with Rock-Cutters must be adjacent to a target and stationary (spending 0 MP in that turn) to use one.

Construction Rules: Combat and Support Vehicles may mount only one rock cutter each in the Front, Back or Turret locations, but only if the location(s) selected does not also include a bulldozer, backhoe, chainsaw, combine, dual saw, heavy-duty pile driver, mining drill or wrecking ball.

Humanoid BattleMechs and IndustrialMechs may mount rock cutters in the arms, but are limited to one cutter per arm and must remove the hand actuator on the chosen arm to do so. Quad BattleMechs and IndustrialMechs may mount rock cutters in the Side Torso locations only, and are limited to one cutter per location. As with vehicles, 'Mechs of any type may not place a rock cutter in any location that also includes a bulldozer, backhoe, chainsaw, combine, dual saw, heavy-duty pile driver, mining drill or wrecking ball.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare*, p. 140

SALVAGE ARM

Introduced: 2415 (Terran Hegemony)

A salvage arm is actually a specialized IndustrialMech replacement for the hand actuator, combining a highly dexterous light manipulator with a variety of powered tools intended to aid in salvage and repair operations. Far too weak to be of much use in combat, or to carry cargoes greater than a few hundred kilograms at best, the manipulators are deliberately incompatible with hand-held weapons, stressing their use as a sophisticated multi-functional tool rather than a weapon of war.

SALVAGE ARM

Tech Base: Inner Sphere and Clan

Unit Restrictions: Only humanoid BattleMechs and IndustrialMechs may mount a salvage arm.

Game Rules: The salvage arm has no effect in Total Warfare game play. Its uses are described more fully in *Tactical Operations* (p. 213) and *Strategic Operations* (pp. 171, 191). If an arm equipped with a salvage arm is used in a physical attack, it counts as a missing hand actuator for to-hit and damage modifiers.

Construction Rules: Humanoid BattleMechs and IndustrialMechs may mount one salvage arm per arm, but must remove the hand actuator on the chosen arm to do so. Because the salvage arm replaces the hand actuator, a 'Mech may not also mount any of the following in the same arm: backhoe, chainsaw, combine, dual saw, heavy-duty pile driver, mining drill, rock cutter or wrecking ball.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare,* p. 143

SPOT WELDER

Introduced: Circa 2320 (Lyran Commonwealth)

Industrial-scale welders have been in use since the latter half of the twentieth century, but much like the nail and rivet guns discussed earlier, their utility on a vehicular scale was considered largely questionable until the advent of effective IndustrialMech technology. Since then, a vehicular adaptation that melds this item with a purpose-built manipulator arm allows for its installation on other units.

It should be noted, however, that today's industrial-grade spot welder is an advanced technology adaptation of its ancient progenitors. Rather than relying on its own fuel cells, it draws on the carrying unit's power supply to achieve the heat needed to melt industrial-grade alloys. These energy needs—and waste heat generated—are on par with that of a military grade small laser, and so units that mount this equipment must install power amplifiers and heat sinks as necessary to deal with these issues.

According to some reports, the spot welder's high-heat arc can also be a potent physical attack weapon in a pinch, but rather than pounding away armor with a simple punch, the welder's arc instead inflicts its damage more like a contact laser.

SPOT WELDER

Tech Base: Inner Sphere and Clan

Unit Restrictions: Only BattleMechs, IndustrialMechs and ground or naval Combat and Support Vehicles (those with a Wheeled, Tracked, Hover, WiGE or Naval motive system) may mount a spot welder.

Game Rules: Spot welders mounted in any location other than the arms of a humanoid 'Mech may not be used to make physical attacks. Spot welders do not remain active if the unit's engine shuts down or its pilot/crew is incapable of taking action. Note that Hover and WiGE units may not use a spot welder unless they have first landed (stopped in the previous turn and spent 0 MP in that turn) and are adjacent to the target. Naval units must be stationary (spending 0 MP in that turn) to use a spot welder.

Construction Rules: Combat or Support Vehicles (Wheeled, Tracked, Hover, WiGE or Naval only) may mount spot welders in any desired location (including the turret).

Humanoid BattleMechs and IndustrialMechs may mount spot welders in the arms only, but are limited to one welder per arm and must remove the hand actuator on the chosen arm to do so. Quad BattleMechs and IndustrialMechs may mount spot welders in the Side Torso locations only, and are limited to one welder per location.

For units running on non-fusion/non-fission engines, spot welders are considered to a heavy energy weapon and so require heat sinks and power amplifiers to operate.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare,* p. 142

SPRAYER/LIGHT FLUID SUCTION SYSTEM

Introduced: Pre-spaceflight

A fairly common item on police riot-control units, fire engines, coolant trucks and the like, the so-called sprayer is simply a high-pressure pump-and-hose system used to dispense directed bursts of internally stored fluids at a given target. Most commonly seen on IndustrialMechs or vehicles equipped with fluid reserves, the limited effective range and damage yield for most fluids makes the sprayer an ineffective combat weapon. Indeed, with a typical pumping rate of some 10 kilograms of liquids per second, and a physical accuracy of only thirty meters or so—beyond which it becomes a crap shoot—the sprayer hardly counts as a weapon at all. Nevertheless, their ability to dispense any desired fluids with ease—water, insecticides, paints or coolants—makes the sprayer a favored tool for many civil service and commercial agencies.

As with the refueling drogue, a reversed version of the standard lightweight sprayer is the aptly named light fluid suction system (LFSS). Used generally by smaller firefighting vehicles and battlefield tenders (though a slightly larger, 'Mech-based version also exists for RescueMechs), the LFSS can draw fuels, coolant or other liquid cargo into on-board storage tanks at a rate of about 10 kilograms per second.

SPRAYER/LIGHT FLUID SUCTION SYSTEM

Tech Base: Inner Sphere and Clan
Unit Restrictions: As they may not mount internal cargo, ProtoMechs may not mount sprayers or light fluid suction systems. Aerospace units are also prohibited from mounting Sprayer/Light Fluid Suction Systems.
Game Rules: Sprayers, while they do "fire" as weapons, may not benefit from targeting computers or fire control systems in vehicles, and so all "attacks" made using such equipment are performed as if the unit in which they are mounted has no fire control (+2 to-hit). Sprayers inflict damage to conventional infantry units only, equivalent to a battle-armor flamer with an attack range of 1 hex (see *Total Warfare*, p. 217).
Fluid suction systems have no effect in *Total Warfare* standard rules play. Their use will be covered more fully in future products.
Neither the sprayer nor the light fluid suction system will function if the unit's engine is shut down or its pilot/crew is incapable of acting.
Construction Rules: Sprayers and suction systems may be mounted on any applicable unit, but each piece of equipment so mounted should have a location and firing arc assigned, like any weapon system. Multiple sprayers or suction systems may be mounted, if desired, but each counts as a separate item. To be able to use a sprayer or suction system, the carrying unit must also have cargo space specifically set aside for liquid storage (see *Transport Bays*, p. 239).
Due to additional pumping mechanisms and mounts, the sprayers and light fluid suction systems used by IndustrialMechs weigh 0.5 tons each rather than 15 kg.
Sprayers and suction systems do not count as weapons, and so do not require gunners.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345)

TRACKS

Introduced: 2440 (Draconis Combine)
Tracks are an oddball piece of equipment only found on specialized IndustrialMechs such as MiningMechs and TunnelMechs. Essentially a set of powered, foot-mounted tread-skates, this equipment was developed to enable such units to move better in the tight confines of narrow tunnels, where a typical IndustrialMech's legs often cannot manage the full range of motion necessary for safe walking. Though their utility is limited, in some select instances—such as extreme actuator or gyro damage—tracks can get an otherwise crippled 'Mech back to safety in good time. Still, these systems are maintenance-intensive, and limited in speed by their small size. Too fragile for combat, they are almost never seen on BattleMechs. Even among their intended users, tracks are often shunned, with owners often stripping them (or their mechanisms) out in favor of other equipment.

TRACKS

Tech Base: Inner Sphere and Clan
Unit Restrictions: Only BattleMechs and IndustrialMechs may mount tracks.
Construction Rules: 'Mech-based tracks weigh 10 percent as much as the unit on which they are mounted (rounded up to the nearest half-ton). Tracks take up 1 critical slot in each of the 'Mech's legs, so a humanoid 'Mech equipped with tracks requires 2 slots in total, while a quadruped requires 4.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare*, p. 143

WRECKING BALL

Introduced: Pre-spaceflight
Whether you see them being slung about on Solaris holovids, or by honest working men smashing down old and condemned buildings in an inner city, the wrecking ball is effectively the same tool that humans have used for centuries in much the same basic capacity. Even though nowadays the ball is ferrocrete, the sheathing is hard steel alloy and the chain comes with a myomer lacing for quick retraction if over-extended, the wrecking ball is at heart little more than a large, heavy rock on a chain. Its whole purpose is to swing and smash, and even the Solaran variations on this device as a weapon accomplish little more than dressing up this simple function with more flair. While tough enough to batter even armored units into a mangled pulp, the wrecking ball makes for an inelegant weapon on the battlefield, and so its use there is quite rare.

WRECKING BALL

Tech Base: Inner Sphere and Clan
Unit Restrictions: Only humanoid BattleMechs and IndustrialMechs, and ground- and naval-based Combat and Support Vehicles (those with Wheeled, Tracked, Hover, WiGE, or Naval motive types—including submersibles and hydrofoils), may install a wrecking ball.
Game Rules: Note that Hover and WiGE units may not use a wrecking ball unless they have first landed (stopped in the previous turn and spent 0 MP in that turn) and are adjacent to the target. Naval units equipped with wrecking balls may only use them while stationary (spending 0 MP in that turn) and surfaced (at Depth 0) directly adjacent to a target.
Construction Rules: Combat and Support Vehicles may only mount a wrecking ball in a Turret location, but only if the location(s) selected does not also include a backhoe, chainsaw, combine, dual saw, heavy-duty pile driver, mining drill or rock cutter.
Humanoid BattleMechs and IndustrialMechs may mount wrecking balls in the arms only, but are limited to one wrecking ball per arm and must remove the hand actuator on the chosen arm to do so. Quad BattleMechs and IndustrialMechs may not mount wrecking balls. As with vehicles, 'Mechs may not place a wrecking ball in any location that also includes a backhoe, chainsaw, combine, dual saw, heavy-duty pile driver, mining drill or rock cutter.

Table Reference: Weapons and Equipment (Industrial, pp. 344–345) **Game Rules:** *Total Warfare*, p. 143

BATTLE ARMOR EQUIPMENT

The Clans—particularly Clan Wolf—claim credit for developing battle armor as we know it today, but military historians would likely find me remiss if I did not point out that before its fall, the original Star League had just begun researching the viability of powered, full-body armor systems. Though these early suit designs—often referred to as Power Armor (Light) suits, or PA(L)s—could never hope to repel small arms fire or accomplish the tasks a Clan Elemental can, these suits share more similarities in architecture than not with their present-day brethren.

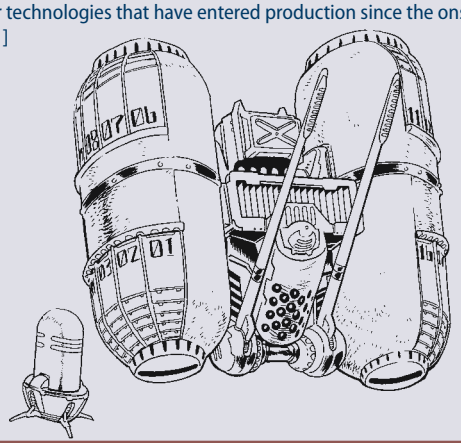
Likening battle armor or exoskeletons to a miniaturization of BattleMech technology may be a gross over-simplification of the facts, but it will suffice for the purpose of exploring the technologies one might find in today's battlesuit designs.

Likewise, it's important to remember the scale of weapons and such mounted on battlesuits, versus their heavier equivalents on vehicles, BattleMechs and the like. Though they share the same names, many items—like virtually all of the weapons mounted on battle armor—are not so much a miniaturization of vehicular weapon systems as they are a heavier, significantly upgraded variation of an analogous infantry-portable weapon. Enhanced for the more effective targeting systems, myomer musculature and power supply capabilities of battle armor, these weapons gain weight and size from their conventional progenitors, and attain capabilities roughly analogous to those seen in vehicular-scale guns. Because of these capabilities, weapons mounted on battle armor are more commonly classified by their vehicular-scale nomenclature, rather than that of their baseline infantry-scale support weapons.

—Preface to *Modern Infantry Systems 321*, Prof. Arastide Habeas, NAMA Publications, 3067

[Once again, the late Professor Habeas' primer on battle armor and infantry weapons systems is thorough, but somewhat dated. As with the previous document, I have amended this one with information on the newer technologies that have entered production since the onset of the Jihad.

—Major Elisa Brubaker, WolfNet, 15 December 3071]



• MINE DISPENSER •
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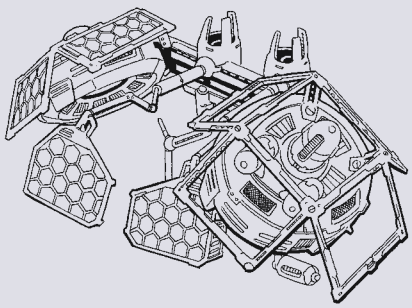

• ECM SUITE •
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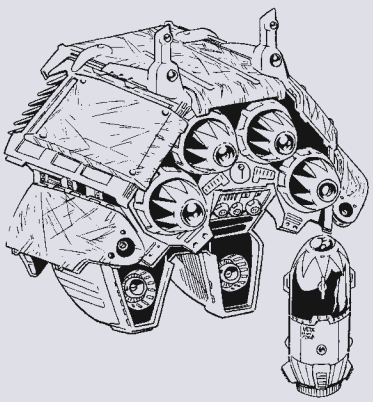

• ADVANCED SRM LAUNCHER •
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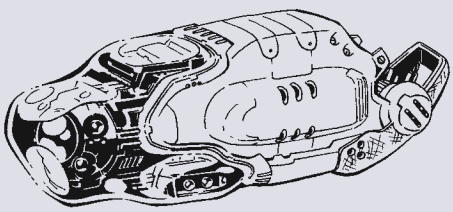

• TAG (LIGHT) •
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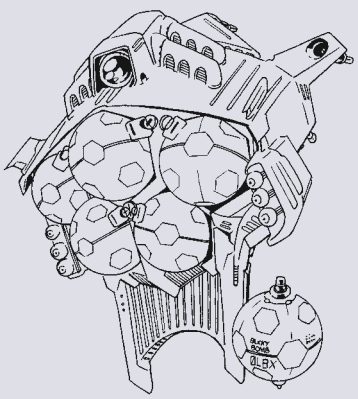

• BOMB RACK •
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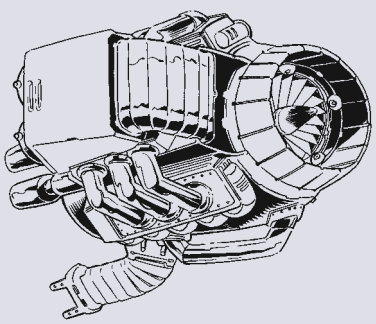
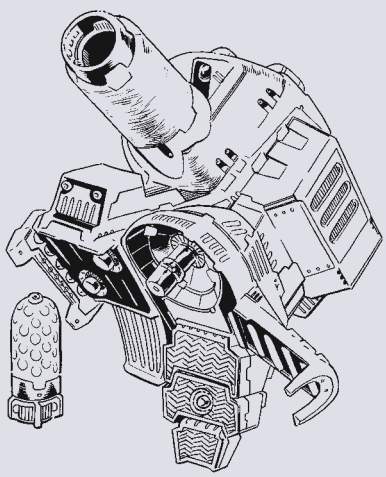


• JUMP BOOSTER •
[PAGE 257]



• HEAVY MORTAR •
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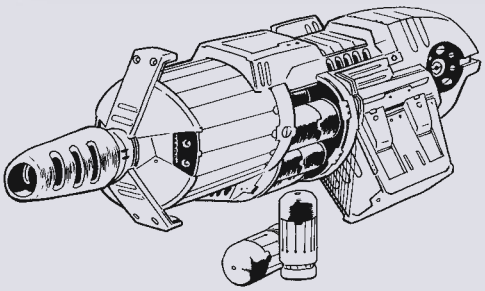

• MICRO GRENADE LAUNCHER •
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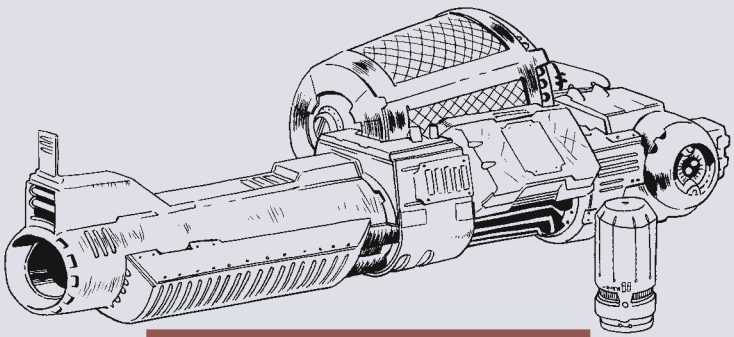
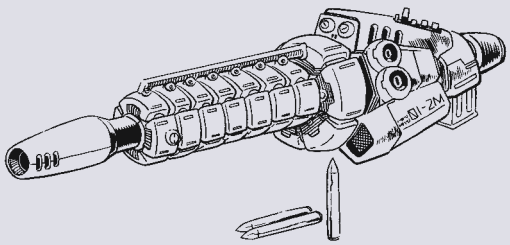


• GRENADE LAUNCHER •
[PAGE 256]



• MAGSHOT GAUSS RIFLE •
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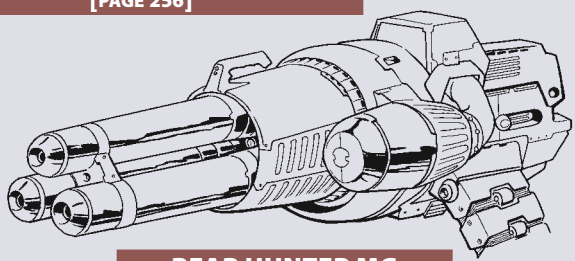

• BEAR HUNTER MG •
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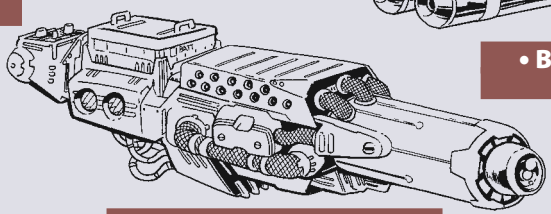

• MEDIUM LASER •
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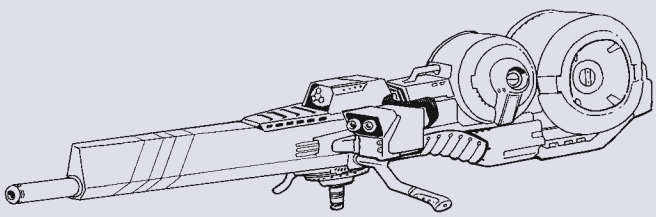

• KING DAVID GAUSS RIFLE •
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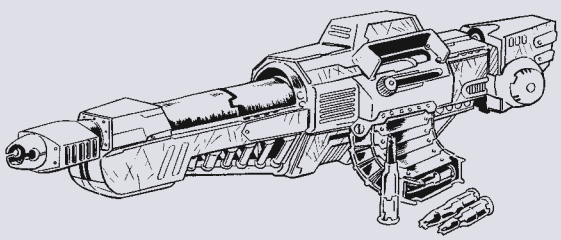
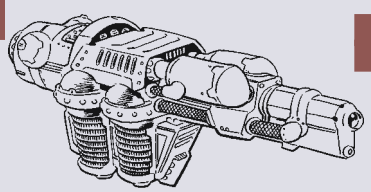
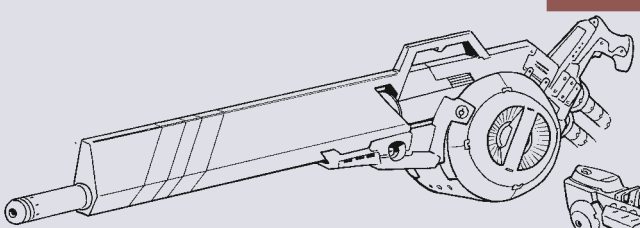


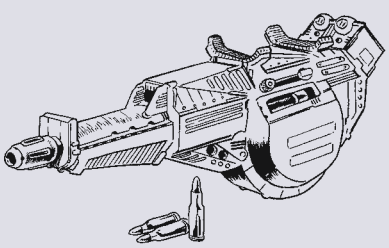
• HEAVY MACHINE GUN •
[PAGE 258]



• SMALL PULSE LASER •
[PAGE 258]



• DAVID GAUSS RIFLE •
[PAGE 255]



• LIGHT MACHINE GUN •
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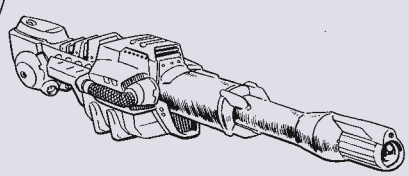

• ER SMALL LASER •
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ACTIVE PROBE

Introduced: 2900 (Clan Smoke Jaguar), 3050 (Federated Commonwealth)

Like the vehicular-scale version, the battlesuit-scale active probe is a complex sensor array far more sophisticated and powerful than the sensors normally used by the battlesuit. Incorporating strong yet portable thermal and radar sensors, both the Inner Sphere and Clan models can accurately spot hidden units out to 90 meters.

ACTIVE PROBE, LIGHT

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: No restrictions
Game Rules: Units with multiple active probes may use only one at a time in game play.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount more than one active probe, if desired.

Table Reference: Battle Armor (Inner Sphere and Clan, pp. 346–348) **Game Rules:** *Total Warfare*, p. 129

ARMOR

Battlesuit armor is more varied than that seen on BattleMechs thanks to the utility of various techniques in manufacture and function. Stealth technology, for instance, is much more feasibly deployed on a one-ton, 2.5-meter suit of battle armor than on a 50-plus ton BattleMech that stands ten to twelve meters tall. The relative newness of this technology has also bred a number of varied "prototypical" armor styles, many of which remain in use even as battlesuit styles themselves grow more numerous.

Here, of course, we'll see that Clan technology is more refined in battle armor design, especially as it incorporates the Harjel self-sealing system, but rest assured that Inner Sphere engineers have done much to close this gap in the seventeen years since venturing into this new area of military technology.

STANDARD (PROTOTYPE)

Introduced: 3050 (Federated Commonwealth/Draconis Combine)

Prototype armor—the battlesuit armor first developed by the various Inner Sphere nations at the start of their respective development programs in the early 3050s—is significantly bulkier and heavier than the standard armor used today. While not generally in production, a number of first-generation battlesuits—sold off with the advent of more capable designs—have led to a wider dispersal of this armor type and a "cottage industry" devoted to maintaining the few suits that still depend on the design.

The Clans, who have long since perfected this technology, have no equivalent of this bulkier armor type.

STANDARD (BASIC)

Introduced: 2868 (Clan Wolf), 3052 (Inner Sphere)

The standard battlesuit armor produced throughout the Inner Sphere after the initial battle armor design projects of 3050 to 3051 is a triumph of materials technology, overshadowed only by the more refined version the Clans have used for almost two centuries now. Common to most suit designs intended for offensive roles, standard armor is the cheapest to produce and the least bulky type available, and features no enhanced stealth capabilities.

STANDARD (ADVANCED)

Introduced: 3057 (Free Worlds League)

Developed by Free Worlds League engineers in an effort to match the capabilities of Clan battlesuit armor, Inner Sphere advanced armor first appeared on the Longinus suit in 3057. This armor is still heavier and bulkier than the Clan system, but represents a significant improvement in battle armor weight-to-protection ratios, enabling suit designs to attain up to twenty percent greater protection for the same weight investment.

STEALTH (PROTOTYPE)

Introduced: 3050 (Federated Commonwealth)

Like the prototype version of basic armor, prototype stealth armor was conceived in the early 3050s by FedCom engineers. Adapting the capabilities of existing thermal and electronic sneak suits and embedding these features in the battlefield armor, engineers managed to mimic the lost technologies of Star League-era power armor almost exactly. Though this armor is no longer in wide-scale production, examples of it may still be seen today, in surplus first-generation suits sold off or gifted to various mercenary concerns. As with prototype standard armor, prototype stealth battlesuit armor has no Clan analogue, due to the presence of cached Star League-era suits in Clan arsenals.

STEALTH (BASIC)

Introduced: 2710 (Terran Hegemony)
Extinct: 2770 (Inner Sphere)
Recovered: 3052 (Draconis Combine)

While the Clans have a general aversion to guerrilla tactics and "deceptive" forms of combat, even they recognize the tactical benefits of providing the basic protection of stealth armor to their infantry, so that such forces can have a better chance at closing with their chosen targets. Battlesuit-grade stealth armor is based on the Star League-era power armor suits that Kerensky took with him in his Exodus. The fact that the Inner Sphere fielded the first stealth battlesuits in combat, however, likely spurred Clan efforts to dust off the technology for the battlefields of today. On the Inner Sphere's part, Combine engineers working on samples of the FedCom-produced prototype stealth system managed to reintroduce basic stealth armor for their Kage battlesuits.

Incorporating micro-ECM emitters and special insulation for better infrared suppression, basic stealth battlesuit armor is heavier and more bulky than standard version.

STEALTH (STANDARD)

Introduced: 2720 (Terran Hegemony)
Extinct: 2770 (Inner Sphere)
Recovered: 3053 (Draconis Combine)

Not long after developing the basic stealth armor system, Combine engineers recovered the Star League-era enhanced version that made Nighthawk power armor so effective in the original Star League. Since then, this armor has become the Sphere-wide standard in battlesuit stealth technology (hence the name "standard stealth armor"). Featuring a greater amount of integral ECM, infrared and electronic camouflage techniques, standard stealth is slightly more effective than basic stealth, but is also somewhat bulkier and heavier.

STEALTH (IMPROVED)

Introduced: 3057 (Free Worlds League/Word of Blake), circa 3058 (Clans)

A joint Free Worlds League-Word of Blake development team fielded the first Achileus stealth battlesuit prototypes in 3055, but when the suit went into production two years later, it sported a much more effective form of stealth armor that would be surpassed only by the advent of mimetic armor some years later.

Bulkier than most other battlesuit armor types, improved stealth integrated electronic camouflage with the heat baffles and integral micro-ECM that makes standard and basic stealth armors so effective. This also makes improved stealth armor much more expensive, so it tends to see the most use in battle armor types intended more for infiltration and surveillance than front-line battle. Reportedly, the Clans have developed an equivalent of this armor design, but apparently have not yet deployed it in anything more than occasional one-off suit variants.

FIRE RESISTANT

Introduced: 3058 (Clan Fire Mandrill)

Despite its resilience and self-contained nature, battle armor—like most conventional vehicles—remains particularly susceptible to the lethal effects of fire and incendiary weapons. Recognizing this, Clan Fire Mandrill recently developed an enhanced fire-resistant battlesuit armor—their Salamander design. Inner Sphere scientists have yet to crack the secrets of this technology, but many suspect it combines advanced iridium cermets, highly efficient insulation and a powerful refrigeration system.

MIMETIC

Introduced: 3061 (Word of Blake)

The mimetic battlesuit armor that debuted on the Word of Blake's Purifier designs was, according to all accounts, under development by ComStar on Terra when the Blakists captured that world in 3058. The Word was quick to follow the program through to its conclusion, creating an armor that uses integral sensors and cameras to sample the external surroundings and—through a sophisticated computer in the suit's chest plate—control an array of pigments imbedded in the armor's composites. This feature enables the color and pattern on the armor to shift, even as it moves, to match the surrounding environment. Most effective when the suit is motionless, mimetic armor also features limited ECM and IR baffling capabilities that enhances the armor's visual camouflage, making targeting a squad of troopers so equipped nearly impossible, especially if they move slowly.

The Clans have yet to field an equivalent of mimetic armor. Indeed, beyond the Word of Blake—and likely their Free Worlds allies—only the Capellan Confederation has demonstrated a capability to produce mimetic armor, given last year's debut of their Trinity battlesuit design. Though some among the Word have accused the Capellans of stealing this technology, the fact that Sian has yet to see a Blakist interdiction speaks to less outrage than one might expect from an act of bold-faced espionage.

ARMOR

Tech Base: Inner Sphere (Standard [Prototype, Basic and Advanced], Stealth [Prototype, Basic, Standard and Improved], Mimetic); Clan (Standard [Basic only], Stealth [Basic, Standard and Improved], Fire Resistant)
Battle Armor Unit Restrictions: No restrictions
Game Rules: Armor is considered structural and any modifiers applied (for stealth capabilities) are considered active until the trooper is destroyed.
Construction Rules: The weight, space and construction limitations of all armor types for battle armor are covered in Step 4 of the Battle Armor core construction rules.

Table Reference: Battle Armor (p. 347) **Game Rules:** *Total Warfare*, p. 228

BOMB RACK

Introduced: 3060 (Clan Cloud Cobra)

As battle armor weapons go, the bomb rack used by the Clans is an odd duck. Usable only by VTOL-capable battlesuits—which only the Clans have developed to date; Inner Sphere engineers have yet to overcome many of the quirks of such motive designs—these on-shot racks allow a battlesuit in flight to drop explosive cluster munitions on ground targets. Though not particularly potent against armored targets individually, a Point of bomb-equipped units can deliver an attack even a BattleMech might notice.

BOMB RACK

Tech Base: Clan only
Battle Armor Unit Restrictions: No restrictions
Game Rules: Bomb racks may not be used if the unit's troopers are rendered incapable of acting in combat.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount multiple bomb racks. Each rack is a one-shot item and may purchase no additional ammo.

Table Reference: Battle Armor Weapons and Equipment (Clan, pp. 347–348) **Game Rules:** *Total Warfare*, p. 228

CAMO SYSTEM

Introduced: Circa 2800 (ComStar)

According to reports, ComStar developed the visual camouflage system used by their power armor suits from Star League-era research recovered on Terra after the Order's successful conquest of the planet in 2788. This camo system, developed more as a module than an armor type, essentially uses mimetic technology to produce a visual effect similar to a sneak suit—where a central computer and sensors sample the surrounding terrain visually and change the armor's colors to match. Incorporated into ComStar's Tornado Power Armor (Light) suit, this system is the basis for the Word of Blake's mimetic armor technology.

CAMO SYSTEM

Tech Base: Inner Sphere only
Battle Armor Unit Restrictions: No restrictions
Game Rules: Like armor, a trooper's camo system is considered active until the trooper is destroyed, even if the trooper is otherwise rendered incapable of acting in combat.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount only one camo system.

Table Reference: Battle Armor (p. 347) **Game Rules:** *Total Warfare*, p. 228

CUTTING TORCH

Introduced: Early spaceflight

The cutting torch mounted on a typical exoskeleton is an enhanced version of the same technology used by technicians and engineers for more than a millennium. Simply described, the torch is a highly adaptable energy-based cutting tool, which can also be used to weld metal parts together or cut through even the advanced aerospace and battlefield materials used today. However, the time this item requires to do its work properly, coupled with its extremely short range, makes the cutting torch an ineffective combat weapon.

CUTTING TORCH

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: No restrictions
Game Rules: Cutting torches have no impact in *Total Warfare* game play. Their use will be covered in later publications.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount multiple cutting torches, if desired.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348)

DETACHABLE MISSILE PACK MODIFICATION

Introduced: Circa 2870 (Clans), 3051 (Inner Sphere)

The battle armor detachable missile pack (DMP) system enables any suit-mounted missile launcher (including SRMs, advanced SRMs, MRMs, LRMs or rocket launchers) to be jettisoned in battle (voluntarily or automatically upon depletion of the launcher in question). Essentially an adaptor that adds a little extra weight to the launcher itself, the Clan Elemental suit already featured this technology when it first appeared in the Inner Sphere. Unfortunately, balancing issues have prevented Spheroid manufacturers from matching their techniques one-for-one.

DETACHABLE MISSILE PACK (DMP)

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: No restrictions
Game Rules: Suits using Inner Sphere DMP missile launchers cannot jump or execute anti-'Mech attacks until their launchers are detached.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may modify none, any or all of its missile launchers (including those of modular design) with a detachable missile pack (DMP) adaptation. Doing so adds to the launcher weight, but not its equipment space.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348) **Game Rules:** *Total Warfare,* p. 225

ECM SUITE

Introduced: 2720 (Terran Hegemony)

The micro-scale version of the vehicular Guardian ECM suite, the battlesuit ECM suite module provides stealth technology that is not so much built into the suit's armored "skin" as it is an area-effect jamming field. Active rather than passive, the battle armor ECM suite can disrupt sensors and communications to a range of fifteen meters. The first to field this technology beyond the Star League-era Nighthawk suits were Word of Blake Militia forces, in a modified form of the Free Worlds League's Achileus suit.

ECM SUITE

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: No restrictions
Game Rules: Suits equipped with an ECM suite may continue to operate them until destroyed. Only one ECM suite per suit may be engaged at one time.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may carry any number of ECM suites desired.

Table Reference: Weapons and Equipment (Inner Sphere and Clan, pp. 346–348) **Game Rules:** *Total Warfare,* p. 228

EXTENDED LIFE SUPPORT

Introduced: Circa 2715 (Star League)

Under normal operations, all battle armor and many exoskeleton designs are completely sealed, intended to operate in hostile environments under great strain. Normally, their life support endurance in such environments is about twelve hours, but extended life support (ELS) equipment can increase this operational time by adding supplemental compressed-oxygen reserves and air-recycling/purification systems. This equipment is fairly lightweight compared to most battlesuit gear, but because of its bulk a battle armor suit or exoskeleton can carry only enough ELS gear to double the normal life support time.

Of interesting historical note, ELS gear actually predates the development of battle armor. The progenitors to this technology—the Star League's Mark XXI Nighthawk power armor—employed such gear to extend their usage.

EXTENDED LIFE SUPPORT

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: No restrictions
Game Rules: Extended life support has no effect in *Total Warfare* game play. Its impact in campaign and role-playing settings will be covered in future sources.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may carry only one extended life support system. Suits using an Inner Sphere exoskeleton chassis that are intended for work in hazardous environments require extended life support and a minimum of 1 armor point (of any type) to do so.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348)

FLAMER

Introduced: 2868 (Clan Wolf), 3050 (Federated Commonwealth)

Though smaller in design, the battle armor flamer is in function the same deadly incendiary weapon typically used by non-fusion vehicles. Drawing on a reservoir of combustible fuel, the flamer used by battlesuits is capable of dishing out roughly the same raw damage as its bigger cousins.

FLAMER

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: No restrictions
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount more than one flamer, if desired.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348) **Game Rules:** *Total Warfare*, p. 214

FUEL TANK

Introduced: 2744 (Terran Hegemony)
Extinct: 2781
Recovered: 3051 (Federated Commonwealth)

Any battlesuit capable of jumping or VTOL flight does so by drawing on an integral supply of fuel. To expand this capacity, some suits incorporate additional fuel tanks.

FUEL TANK

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: Fuel tanks may be mounted only on battlesuits with Jump or VTOL MP greater than 0.
Game Rules: Fuel consumption has no effect in Total Warfare game play. When converting battle armor for use in zero-g operations (see *Strategic Operations* pp. 24-25), each fuel tank adds 40 points to the unit's fuel amount.
Construction Rules: Only a battle armor suit (including exoskeleton and power armor designs) with Jumping or VTOL MP may add fuel tanks. Such units may mount multiple fuel tanks, if desired.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348)

GAUSS RIFLE

Introduced: Various

A fairly new class of weapon system for us, having been largely a lost technology since the collapse of the Star League, the gauss rifle took its time to enter infantry-scale development, but it was a definite favorite when battlesuits began to emerge in the 3050s, both as a favored battle armor weapon mount and as a weapon regular foot troops could use to put a dent in armored troopers.

Interestingly enough, however, while gauss weaponry has proven popular in the Inner Sphere—three main models now exist for battlesuit use, with our own Magshot as the front-runner in terms of power and range—the Clans have not demonstrated much interest in expanding this weapon type to the battle armor venue. The fact that numerous samples of Clan-made gauss weapons do appear among their conventional infantry forces, however, may see the advent of such weapons once the Clans become convinced enough by samples like the Magshot.

ANTI-PERSONNEL GAUSS RIFLE

[Introduced: 3069 (Clan Jade Falcon)

Once more, Habeas might have been surprised if he'd survived a few more years to see the next wave of weapons design. As mentioned under the heavy equipment section, Clan Jade Falcon first fielded their anti-personnel gauss rifle (AP gauss) as a battle armor-mounted weapon system in 3069, upgrading it quickly for 'Mech-scale usage. Like the heavier version, the battlesuit model fires a hail of metal flechettes that can shred conventional infantry and even damage heavier armor. –EB]

GAUSS RIFLE

Tech Base: Inner Sphere (Grand Mauler, Tsunami, Magshot, David and King David) and Clan (AP gauss only)
Battle Armor Unit Restrictions: No restrictions
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount multiple gauss rifles of varying types, if desired.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348) **Game Rules:** *Total Warfare*, p. 214

GRENADE LAUNCHER

Introduced: Early Spaceflight [Micro Grenade Launcher], 2900 (Clan Diamond Shark [Heavy Grenade Launcher]), 3050 (Federated Commonwealth [Heavy Grenade Launcher])

Though grenade launchers were among the Inner Sphere's first weapons mounted on battle armor—the original Infiltrator design used one in 3050—these weapons are not a common sight on battlesuits today. Often used as a light support weapon by conventional infantry, the typical grenade launcher lobs conventional hand grenades to greater distances (and with more accuracy) than the manual approach. Their use against armored targets is unreliable (which may be why the Clans rarely use them), but against swarms of conventional infantry the typical auto-loading micro- or heavy grenade launcher can be a devastating weapon.

GRENADE LAUNCHER

Tech Base: Inner Sphere (Micro and Heavy); Clan (Heavy only)
Battle Armor Unit Restrictions: No restrictions
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount multiple grenade launchers of varying types, if desired.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348) **Game Rules:** *Total Warfare,* p. 214

HARJEL

Introduced: Circa 2840 (Clan Diamond Shark)

One of the most critical differences in Clan battle armor (and WarShip) design over their Inner Sphere counterparts is the miracle substance called HarJel. Essentially a semi-organic compound that hardens to a surprisingly strong and rigid state—capable even of withstanding vacuum—upon the introduction of a simple starch catalyst, HarJel is exceedingly rare. Indeed, this substance is perhaps the single most important commodity Clan Diamond Shark has to offer, and they presently hold the only two worlds where the raw materials vital to this compound can be found (Twycross in the Inner Sphere and Strato Domingo in the Clan Homeworlds). Though rumors persist of a variant synthetic HarJel, developed by Clans Hell's Horses and Ice Hellion, as far as we know in the Inner Sphere there is no true way to synthesize this substance without the original raw materials, and so no Spheroid analog to HarJel yet exists. [Professor Habeas is correct; the Horses' development merely introduces an additive that enables them to double their current HarJel supplies, not replace the compound altogether, leaving their Elemental-heavy Clan just as bound to the Sharks as any other. –EB]

HARJEL

Tech Base: Clan only
Battle Armor Unit Restrictions: Not compatible with Inner Sphere battlesuit chassis
Game Rules: This equipment has no impact on *Total Warfare* standard rules play. Its effect in campaign or role-playing settings will be covered in future rulebooks.
Construction Rules: Clan exoskeletons using a Clan chassis, as well as all Clan-made power armor and battle armor weighing 401 kilograms or more, incorporate HarJel automatically.

Table Reference: Battle Armor Weapons and Equipment (Clan, pp. 346–348)

HEAT SENSOR

Introduced: Circa 2880 (Clans), 3050 (Federated Commonwealth)

The portable heat sensor is a common enough device, but its adaptation to battlesuit use amounted to an early effort to enhance the standard sensor packages on said armor designs. The Inner Sphere first used these on Infiltrator battle armor in 3050. Though their use would eventually be phased out by more sophisticated and enhanced sensor suites, some of these thermal packages remain, even finding their way into the industrial sector to enhance the capabilities of some exoskeleton designs.

HEAT SENSOR

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: No restrictions
Game Rules: This equipment has no impact on *Total Warfare* standard rules play. Its effect in campaign or role-playing settings will be covered in future rulebooks. Units with multiple heat sensors may use only one at a time in game play.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount more than one heat sensor, if desired.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348)

IMPROVED SENSORS

Introduced: Circa 2890 (Clans), 3051 (Gray Death Legion [Mercenary])

Clan battlesuit design largely evolved beyond the use of heat sensors and other "halfway" measures for improving sensor accuracy when they developed their improved battle armor sensor suite in the 2890s. In the Inner Sphere, it was the Gray Death Legion, tinkering with FedCom-supplied variations on the Infiltrator suit, that pioneered the use of improved battle armor sensors on their GDL Scout suit models. These broad-spectrum sensors boast capabilities similar to the miniaturized active probe, and can root out hidden units that lack sufficient ECM cover, but are roughly effective only within a 60-meter radius. The lighter Clan sensors are effective up to 90 meters.

IMPROVED SENSORS

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: No restrictions
Game Rules: Improved sensors may remain active in game play until the suit carrying them is destroyed.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount only one improved sensor suite per suit.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348) **Game Rules:** *Total Warfare*, p. 228

JUMP JETS/JUMP PACK

Introduced: Circa 2050 (Western Alliance, Terra)

One of the most basic motive systems for battle armor and some exoskeletons is the jump jet or jump pack system. Though similar to the BattleMech jump system, battlesuit jump packs and jets predate such technologies, when the Western Alliance on Terra unveiled the first widely deployed jump infantry. Unlike the 'Mech-based system, infantry and battle armor jump jets and packs rely on conventional fuels for reaction mass, rather than a fusion-based thruster system. Today's battlesuit jump jets and packs incorporate the fuels and thrust mechanisms necessary to propel a battlesuit along. Jump jets are the smaller system, which may be mounted singly, while packs are available only by weight classes, and are essentially clustered jets designed to give the suit its maximum possible jump distance in a single burst. The two systems may not be combined on one chassis.

JUMP JETS/JUMP PACK

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: Quadruped exoskeleton and battle armor suits may not install jump jets or jump packs.
Game Rules: Note that Inner Sphere battle armor suits with detachable missile packs may not jump until the missile pack is jettisoned.
Construction Rules: The rules for installing jump jets or packs on battlesuits may be found under Determine Non-Ground Movement in Step 2 of the Battle Armor core construction rules (starting on p. 164). Note that Jumping MP may be combined with either the partial wing or the jump booster for added Jumping MP.

Table Reference: Battle Armor Non-Ground Motive Systems, p. 165 **Game Rules:** *Total Warfare*, p. 53

JUMP BOOSTER

Introduced: Circa 3062 (Clans), 3051 (Gray Death Legion [Mercenary])

Today's battlesuit design establishes a general cap on movement based on weight and bulk, in much the same way BattleMech design standards do. This also applies to jumping capability. However, incorporating a high-power adaptation of the jet packs used by conventional infantry jump troops, combined with the relatively lighter weight of battle armor (compared to other battlefield units), both the Clans and the Inner Sphere have pushed the design envelope for battlesuit jump capability. By installing special packs on jump-capable suits, a given model can gain as much as 30 meters of jump distance beyond the suit's normal design specs. This bulky jump "super-charger," however, is incompatible with other flight aids, such as the Combine's partial wing or Clan VTOL jets.

Though evidence suggests the Clans have had the ability to deploy booster-equipped suits all along, the late Gray Death Legion mercenary command first fielded booster-equipped battle armor, to enhance the speed profile of their GDL Scout suits. Reports are only now coming in that the Combine-Nova Cat joint suit design, dubbed the Void, also incorporates this technology, while the Ice Hellion Clan is allegedly beginning to field their own booster-equipped models as well back in the Homeworlds.

JUMP BOOSTER

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: Battlesuits must have Jumping MP in order to install jump boosters.
Game Rules: Note that Inner Sphere battle armor suits with detachable missile packs may not jump until the missile pack is jettisoned.
Construction Rules: The rules for installing jump boosters on battlesuits may be found under Special Physical Enhancements (Jump Booster/Partial Wing) in Step 2 of the Battle Armor core construction rules (starting on p. 164). Jump jets or packs are necessary before adding a jump booster, and jump boosters may not be combined with a partial wing.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348) **Game Rules:** *Total Warfare*, p. 53

LASER

Introduced: Various

As with flamer and gauss weaponry, the development of laser weapons for battle armor use was simply a matter of upgrading the capabilities of comparable infantry-support versions and meshing them to work with battle armor to attain almost vehicular-scale potential. A plethora of such weapons have long been available to infantry, with at least six standard Spheroid models that qualify today, and nine Clan variants. Between them, these weapons match the equivalent capabilities of ten vehicular-scale laser weapons, ranging from the ultra-light firepower of the Clan ER micro laser to the devastating punch of the medium pulse laser or even the blazing fire of the Clan Heavy medium laser. Accomplishing these conversions from support weapons, as with similar efforts on flamer and gauss-based weapons, has created fundamentally different weapons when meshed with battle armor designs, so the array of firepower can be quite staggering...as long as the weapons carry enough charge packs for continuous fire.

LASER

Tech Base: Inner Sphere (small and medium only in Standard, ER and Pulse) and Clan (small Standard; small and medium Heavy; micro, small and medium in ER and Pulse)
Battle Armor Unit Restrictions: No restrictions
Game Rules: Under *Total Warfare* game play, a battlesuit's lasers remain operational as long as the suit is not destroyed and its trooper is capable of acting.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount multiple lasers of varying types, if desired.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348) **Game Rules:** *Total Warfare,* p. 214

LASER MICROPHONE

Introduced: early-spaceflight

The laser microphone is a piece of surveillance gear that saw widespread use well before the Star League era, when it served as a tool for anti-insurgent work and active surveillance in hostile but well-populated areas. Essentially a focused infrared beam, when angled at a thin, reflective surface—such as typical plate glass windows—this microphone can measure the vibrations from within, analyze them and retranslate them as sound with the aid of a specialized computer. Under ideal conditions, this system can eavesdrop on a conversation occurring within a target structure at ranges of almost 1,000 meters, though the sensitivity is such that a dense fog can force the listener to close in a great deal. This spy gear may not show up very often in the battlefield, and the Clans use it most rarely, relegating it to their so-called Watch intelligence groups. It is included here merely for the sake of completeness.

LASER MICROPHONE

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: No restrictions
Game Rules: This equipment has no impact on *Total Warfare* standard rules play. Its effect in campaign or role-playing settings will be covered in future rulebooks. Units with multiple laser microphones may use only one at a time in game play.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount more than one laser microphone, if desired.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348)

MACHINE GUN

Introduced: Varies

A tried-and-true weapon with origins stretching back to the nineteenth century, machine guns today remain a staple of modern warfare. Effective and inexpensive, they are favored on battlesuits, where their high firing rates and impressive stopping power make them ideal for anti-infantry work. Many of those used on battlesuits are, of course, upgraded infantry-support versions that rival the capabilities of their larger vehicular-scale cousins. Indeed, as of this writing, the Clans field four types of these weapons, ranging from their light machine gun to the recently deployed "Bearhunter" super-heavy machine gun/personal autocannon that the Hell's Horses Clan lost to Clan Ghost Bear during their 3062 war.

Inner Sphere suits have yet to reach the Clans' level of variety in terms of suit-mounted machine guns, but the broad choices of such weapons available assure that equivalents of light and heavy MGs, at least, are likely just around the corner. [Here, Professor Habeas definitely guessed right—a no-brainer, to be sure. Within a year after this publication, Spheroid variations of light and heavy MGs (derived from Inner Sphere models of the semi-portable MG and semi-portable autocannon infantry support weapons) hit the field in 'Mech-mounted and battlesuit varieties. –EB]

MACHINE GUN

Tech Base: Inner Sphere (Light, Standard and Heavy only) and Clan (Light, Standard, Heavy and Bearhunter)
Battle Armor Unit Restrictions: No restrictions
Game Rules: Under *Total Warfare* game play, a battlesuit's machine guns remain operational as long as the suit is not destroyed and its trooper is capable of acting.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount multiple machine guns of varying types, if desired.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348) **Game Rules:** *Total Warfare,* p. 214

MAGNETIC CLAMPS

Introduced: 3062 (Capellan Confederation)

As amusing as it may seem, the concept of battle armor hitching a ride by virtue of integral magnets—remarkably simple and straightforward—did not occur to anyone before House Liao deployed its first home-grown suits, the Fa Shih. Even the Clans have no analogue, as they were never inclined to attach their elite battle armor troops to anything but the elite OmniMechs that were ready-designed for their use. But while the principle was simple, the use of magnetic clamps as a means for deploying battle armor usable even by non-Omni units was not quite so straightforward. The magnetic attraction of a 'Mech's chassis, after all, may hold a grapple rod and allow a fully-kitted anti-'Mech foot trooper to ascend with relative ease, but a one-ton armor suit is considerably harder for mere electromagnets to hold in place, especially given the only semi-magnetic nature of battlefield armor. To counter this, the Capellan magnetic clamps system incorporates not only strong EM capability, but also special mechanical grippers capable of clinging to the armor just enough to avoid being shrugged off. The effect is much like the way a nervous pet latches onto its owner when lifted. This combination of magnetism and physical gripping, rather than magnets alone, allows battlesuits so equipped to hitch a ride on non-Omnis.

MAGNETIC CLAMPS

Tech Base: Inner Sphere only
Battle Armor Unit Restrictions: Quadruped and assault-weight battle armor may not mount magnetic clamps.
Game Rules: Under *Total Warfare* game play, a battlesuit's magnetic clamps remain operational as long as the suit is not destroyed and its trooper is capable of acting.
Construction Rules: Battle armor may mount only one set of magnetic clamps per suit. Suits with UMUs may not mount magnetic clamps.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere, pp. 346–348) **Game Rules:** *Total Warfare*, p. 228

MANIPULATORS

Introduced: Various

Akin to BattleMech hand actuators, manipulators are a surprisingly varied means by which humanoid-style battle armor can interact with its surroundings. Absolutely necessary for any battlesuit intended to be deployed on OmniMechs or OmniVehicles, manipulators are also of paramount importance for troopers attempting to make anti-'Mech attacks such as swarming the legs or torso of a hostile unit. Suits without manipulators—except for quads—are quite rare, typically the result of focusing more on sheer firepower than any other function. Troopers in these suits can only be carried on board cargo haulers and specially built APCs.

Not all possible manipulator styles are well suited for all roles, of course. Indeed, some suits—especially specialized exoskeletons and such—carry alternative manipulators, including mining drills, salvage arms and cargo lifters. Such devices may aid in a specific duty, but make for poor choices on combat suits. Some manipulator types may also add adaptations to further enhance their utility. The styles and types of most manipulators used today are outlined below.

ARMORED GLOVES

Introduced: Pre-spaceflight

The armored glove is a manipulator in the truest sense of the word, and yet it is not truly an enhanced battlesuit manipulator at all, but rather—as its name implies—an armored fitting within which the user's fingers reside. This gives the trooper the dexterity needed for fine operations, including the ability to work a keyboard or handle small arms, and is even strong enough to allow a trooper in light armor to ride on Omnis or engage in anti-'Mech attacks. Because these gauntlets lack strength, however, their use on medium-weight battlesuits and heavier designs is limited solely to the dexterity department.

MANIPULATOR (BASIC)

Introduced: Circa 2110 (Terran Alliance)

Similar to the armored glove but based more on mechanics and myomers, the basic battle armor manipulator is operated by controls in the battlesuit's wrists, rather than as an actual glove. With increased strength sufficient to hold a trooper securely to the hull of a moving OmniMech, even if the battlesuit model is especially heavy, this manipulator is ideal for most suit types and functions. However, the larger digits, loss of fine motor control and lack of sufficient tactile feedback make it impossible to handle conventional infantry weapons or operate most equipment.

BATTLE CLAW

Introduced: 2868 (Clan Wolf)

Specialized for close-quarters anti-BattleMech combat, the battle claw is bigger and more powerful than the standard manipulator, but far less dexterous. Usually configured as a four- or three-fingered appendage, this manipulator is primarily meant to rend armor, cling to OmniMech handholds and perform any other task where brute strength outweighs all other considerations. As a result, these manipulators are useless for operating most equipment, including small arms.

The upgraded, high-power version of the battle claw, the aptly named heavy battle claw, is preferred for larger suits and is even clumsier than the standard claw in terms of fine motor control. Built expressly to rip armor off an opposing 'Mech in the least delicate way possible, the heavy claw is useless for just about everything else save for hanging onto a speeding Omni.

CARGO LIFTER

Introduced: circa 2110 (Terran Alliance)

Cargo lifters are one of the most common non-military manipulators one might expect to see on a powered exoskeleton. Always mounted in pairs, these manipulators are used for lifting and moving especially heavy loads, and come in a variety of sizes and styles. Some of the most powerful even allow a battlesuit to lift masses of up to two tons, though the overall design of a typical suit can allow for even larger capacities, depending on how much mass is devoted to the lifters themselves.

INDUSTRIAL DRILL

Introduced: Pre-spaceflight

The industrial drill is obviously not a true manipulator, but more of a simple tool adapted to use by exoskeletons. Reportedly, Draconis Combine engineers experimented with using this device as a weapon on their Kanazuchi suit, but upon realizing how unwieldy and tacti-

cally limited the drill was in combat, they instead learned to employ their battlesuit drills in the same way as others have: as a tool for constructing fortifications and tunnels.

SALVAGE ARM

Introduced: 2415 (Terran Hegemony)

The salvage arm is a special multi-tool most often seen on industrial exoskeletons and battlefield recovery suits, rather than on true battle armor designs. A special assembly that includes a cluster of clamp-like manipulators and cutting equipment—including laser torches and powered blades—the salvage arm is practically useless in combat, but an invaluable asset in the field during salvage and recovery operations.

MANIPULATOR ADAPTATIONS

A number of special adaptations exist that can be combined with other manipulator types to expand their utility or effectiveness. By far the most common of these are the magnetic-claw, mine-clearance and vibro-claw adaptations, used by the Clans and the Inner Sphere. None of these adaptations can be combined on the same manipulator—so until engineers develop, say, a magnetic vibro-claw, you're unlikely to encounter a battlesuit featuring the capabilities of both.

Magnetic Claws: Not to be confused with the clamps discussed earlier, FedCom engineers developed magnetic claws in the mid-3050s as an enhancement for standard and heavy battle claw manipulators, but these can also be mounted on the feet of battlesuits to aid in their anti-'Mech swarming and leg attack potential. To be effective, the magnetic claws must be installed on matching manipulators as well as on the battle armor's legs. But once so enhanced, a battlesuit can climb a hostile target almost as easily as it can walk over land.

Mine Clearance Equipment: Designed to work with standard manipulators only, mine clearance equipment is mounted in both of a battlesuit's arms. Including sensory systems and special electronic and chemical injectors, these barrel-shaped modifications enhance the trooper's ability to locate and either disable or clear away hostile mines. The sophistication of this system requires, however, that one arm effectively function as the detector, while the other is the disabling/clearing system, and the adaptation requires standard manipulators to handle the inert mines long enough to assure their safe disposal. Not surprisingly, it was the Capellans who first began installing battle armor mine clearance equipment in 3057.

Vibro-Claw: Often retractable, to avoid interference in climbing or handling larger objects, vibro-claws are an adaptation to standard and heavy battle claw manipulators that adds lethality and damage potential to close-quarters combat. Experienced troopers can use these powered vibro-blades to enhance their anti-'Mech damage as well, improving their chances of disabling or at least badly wounding their target. The Draconis Combine introduced the first suit-mounted vibro-claws in 3054.

MODULAR EQUIPMENT ADAPTOR

A manipulator adaptation that deserves its own category, the modular equipment adaptor (MEA) is sort of an Omni-mount that can be used to allow a suit to rapidly switch between multiple manipulator types. The Combine-made Kanazuchi armor introduced this feature in 3058, with a left arm mount that can be quickly adapted as mission needs demand to swap its standard battle claw with an armored glove for extra dexterity, or even an industrial drill for construction work in the field. The MEA equipment weighs only 10 kilograms per modified arm, but can accommodate any manipulator.

MANIPULATOR

Tech Base: Inner Sphere and Clan

Battle Armor Unit Restrictions: Battlesuits constructed as quadrupeds (quads) may not mount manipulators.

Game Rules: Under *Total Warfare* game play, a battlesuit's manipulators remain operational as long as the suit is not destroyed and its trooper is capable of acting.

Construction Rules: The rules for installing manipulators on a battle armor suit (including exoskeleton and power armor designs) are covered under Step 3 of the Battle Armor core construction rules (starting on p. 166).

Table Reference: Battle Armor Manipulator Weight, p. 166

Game Rules: *Total Warfare,* pp. 228–229

The "big gun" of most battle armor designs is beyond doubt the missile launcher. Offering some of the best reach and damage potential for the most economical cost in terms of mass and bulk, the missile launchers used by suits are—like all their primary weapon types—an intermediary between standard infantry-launched tubes and their 'Mech-mounted analogs. Though smaller by tube than the launchers deployed by vehicle-scale units, the missiles fired by battle armor benefit from the advanced targeting systems and enhanced-strength stability integral to battlesuit design. Combined with the fact that their size, fuel-load and warhead yields approximate those used in vehicular launchers, this makes suit-mounted missiles every bit as powerful as those fired by their bigger cousins.

It should be noted, however, that the scale-down of missile launchers to battlesuit sizes has its drawbacks. Battle armor launchers, for instance, must integrate a launcher's ammo feed into the launcher itself, rendering it impossible to "cross-feed" a launcher in the event that some tubes are damaged and others remain operational. They also cannot carry enhanced targeting systems, like Artemis FCS. Their range of alternative munitions is likewise somewhat limited, as most suits don't have the mass to spare for special missile types and alternative loading mechanisms.

LONG RANGE MISSILE (LRM) LAUNCHERS

Introduced: 3057 (Federated Commonwealth)

Corean Enterprises was the first company on the scene to debut an infantry-launched version of the LRM in 3057 with their FarShot LRM launch system. Brooks Incorporated of the Free Worlds League followed suit not long after, flooding the booming military markets of the destabilized Chaos March in the process. It was not long, naturally, before battlesuit versions became feasible. Clan Goliath Scorpion's Undine battle armor, which sports a single-shot five-tube LRM launcher, was the first to widespread production, debuting in 3059.

MEDIUM RANGE MISSILE (MRM) LAUNCHER

Introduced: 3065 (Draconis Combine)

House Kurita's inexpensive (and relatively inaccurate) MRM system finally reached infantry and battle armor scale after the end of their brief war with the Ghost Bear Dominion in the mid-3060s, developed in part from the lessons of that conflict. Though boasting better range than the SRM, the smaller MRM warheads have a punch roughly equivalent to that of a standard LRM. Only the launchers' decreased bulk and size in fact, makes them a worthy trade for an LRM.

ROCKET LAUNCHERS

Introduced: 3050 (Federated Commonwealth)

Hardly the most sophisticated missile launch system in the universe, the simple one-shot light anti-vehicle weapon (LAW) lacks the accuracy of SRMs and LRMs, but is easy to manufacture and cheap to boot. When deployed by battlesuits, these rocket launchers mimic those seen on the newer Periphery 'Mech designs, but as they offer few advantages over the more sophisticated LRM and SRM launcher types (beyond cost-effectiveness), they're rarely seen on production suits. The Clans don't even bother with such "primitive" weaponry.

SHORT RANGE MISSILE (SRM) LAUNCHER

Introduced: 2370 (Terran Hegemony)

One of the most destructive weapons available to conventional infantry, the short-range missile (SRM) balances portability, firepower and range so well that it became the favorite for battle armor design almost as soon as battle armor became a viable technology. The suit models are bulky but reliable, easily making them today's most popular battle armor weapon system.

ADVANCED SHORT RANGE MISSILE LAUNCHER

Introduced: 3056 (Clan Hell's Horses)

A recent advance in battlesuit SRM technology, the so-called advanced SRM debuted in 3056 with Clan Hell's Horses' Gnome-class battle armor. Apparently an effort to match the capabilities of the Clan Streak SRM, these launchers manage to come about halfway, with an excellent range boost and no appreciable loss in warhead yields, but the Horses quickly abandoned the absolutism of the Streak design and settled for a slight increase in target acquisition instead.

SINGLE-SHOT (OS) LAUNCHERS

Excepting rocket launchers—which gain this feature for free—a single-shot variation is available for most battlesuit-mounted missile launcher designs. Unlike the vehicular variety, which presents a slight mass increase due to the specialized small-scale ammo bin, the battlesuit single-shot system removes a typical missile launcher's ammunition feed mechanisms and bins in favor of individual, pre-chambered and launch-prepared warheads. This adaptation slightly increases the weapon's bulk, but presents a tonnage savings that makes up for—in some cases, anyway—the loss of battlefield weapon endurance.

MISSILE MUNITIONS

As with vehicular missile systems, variant ammunition exists for battle armor use, but the small size and relative lack of sophistication inherent to launchers at this scale limits the options available. Only three main "alternative ammo" types are known to exist today in great numbers: the inferno SRM, Clan multi-purpose missiles and the torpedo.

Infernos: Inferno missiles—only available to standard SRM launchers and their single-shot versions—are identical to their vehicle-launched counterparts. Like the vehicular inferno, these warheads explode just short of impact, to shower the target with a flaming gel that can cause immense damage to unprotected personnel or significantly raise the heat level of 'Mechs.

Multi-Purpose Missiles: Clan Goliath Scorpion is credited with the development of the so-called multi-purpose missile munition. Essentially an amphibious propulsion system mated to a standard SRM or LRM warhead, these multi-purpose missiles (sometimes called an SRM/T or LRM/T to emphasize their role) can be used as a torpedo or a normal missile with a standard launcher, and made

MISSILE LAUNCHERS

Tech Base: Inner Sphere (LRM, MRM, rocket launcher and SRM only) and Clan (LRM, SRM and advanced SRM only)

Battle Armor Unit Restrictions: No restrictions

Game Rules: Under *Total Warfare* game play, a battlesuit's missile launcher remains operational until jettisoned (if mounted as detachable) or until its ammunition is depleted. If neither has occurred, the launcher remains operational as long as the suit is not destroyed and its trooper is capable of acting.

Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount multiple missile launchers of varying types, if desired. Note the appropriate rules for carrying missile ammunition in Step 5 of the Battle Armor core construction rules (starting on p. 170).

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348) **Game Rules:** *Total Warfare*, p. 214, 229

it possible for the Scorpions' Undine battlesuits to function equally well underwater and on land.

Torpedoes: Rather than taking the BattleMech and vehicular-scale approach to torpedo technology, torpedoes used by battle armor are more missile-based, requiring simply that the missiles themselves—which use a specialized alternative chemical propellant and aquatic thrust system—be modified, rather than the munitions and their launcher.

MISSION EQUIPMENT

To call a spade a spade, what battle armor designers call "mission equipment" is little more than a small cargo bay built into the suit. This protected storage area can carry items of reasonable size—typically around a cubic meter or so—up to the weight limits set aside by the chassis' design. This space is commonly used to carry such diverse cargo as explosive charges, tools, spare ammo for other units, or even remote sensors and mines, if the unit in question does not already have the proper dispensers.

MISSION EQUIPMENT

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: No restrictions
Game Rules: Mission equipment is the battle armor equivalent of cargo space. The contents of a mission equipment item have no impact in *Total Warfare* standard rules play.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount only one mission equipment item, the contents of which may be any weight desired up to any remaining weight after the installation of all other battlesuit components.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348)

MODULAR/TURRET MOUNTS

The fact of the matter is, battle armor gains one design benefit that BattleMechs didn't have during their early development, and that is hindsight. Where OmniMech technology revolutionized the BattleMech during the height of the Clans' Golden Century, battle armor came onto the scene after the benefits of Omni design were a proven technology. This mindset appears in the development of the modular weapon mount (MWM) technologies available to both Inner Sphere- and Clan-made armor and exoskeleton designs. Five main MWM types can be identified:

MODULAR/TURRET MOUNTS

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: Only quadruped (quad) battlesuits may install turret mounts. Only humanoid battlesuits (including exoskeletons and power armor) may install standard modular weapon mounts. Both body types may install anti-personnel weapon mounts.
Game Rules: Modular weapon mounts (including the configurable turret mount, but not the standard turret mount) enable a battlesuit to mimic the configurable capabilities of Omni units, but have no direct impact on *Total Warfare* game play.
Construction Rules: Humanoid battle armor may place a maximum of 1 standard MWM in each arm and 2 in the body. Quad battlesuits may place a maximum of 1 turret (configurable or standard) in the body only.

For specific rules on the modular equipment adaptor or squad support weapon mounts, see *Manipulators* (p. 259) and *Squad Support Weapon* (p. 270), respectively.

The weights of standard, AP and turret mounts are shown in the table below. Also listed (under the Space column) is the number of weapon slots occupied by the mount, followed by the number of weapon slots available for any equipment to be mounted in it (under Capacity). An entry of "As Location" under Capacity means that all slots remaining in the mount's location (after those occupied by the mount itself or any gear placed there before the mount was installed) are considered part of the mount. (For example, if an arm has three slots open, and then installs a standard MWM for 1 slot, the remaining 2 slots in that arm may be used for a weapon placed in that standard MWM. In another example, an 80 kg configurable turret—with a Capacity of 4—has a set limit of 4 slots in its mount, but only occupies 2 slots in the suit for the mount itself).

Mount Type	Weight	Space (Slots Occupied)	Capacity (Slots Available)
Standard Modular Weapon Mount	10 kg	1	As Location
Anti-Personnel Weapon Mount	5 kg	1	1
Standard Turret Mount	--	--	--
	40 kg*	1	1*
	50 kg	1	2
	60 kg	1	3
	70 kg	1	4
	80 kg	1	5
	90 kg	1	6
	100 kg	1	7
	110 kg	1	8
	120 kg	1	9
	130 kg	1	10
Configurable Turret Mount	+10 kg**	+1**	–1**

*Modular turret mounts in this size cannot be classified as configurable.
**Weight, space and capacity modifiers apply to the desired standard turret mount size.

The weight and weapon slots of any items placed in any modular mount (including ammunition) may be found under their appropriate entries throughout this section. Only standard battle armor weapons may be mounted in standard modular weapon mounts. AP weapon mounts may only accommodate Standard-type conventional infantry weapons (see the Conventional Infantry Weapons and Equipment Table, pp. 349-351). All other mount types described herein can also accommodate non-weapon items: see *Modular Technology* on p. 171 for details).

Table Reference: See Chart

the standard modular weapon mount, the turret weapon mount, the anti-personnel weapon mount, the squad support weapon and the modular equipment adaptor.

In essence, the principle behind all of these modular mounts involves "under-loading" the suit design to leave room for the installation of other weapons and equipment in the field. Some of these mounts—such as the modular equipment adaptor—are fixed to a distinct function, mass and space capacity (see Manipulators above for more on this modular mount). Others—like the squad support weapon, discussed at length later—are more of a simple holster for temporary storage. The remaining three—anti-personnel, standard MWM and turret mount—are modular mounts tied directly into the battlesuit's sensors and targeting system, intended for immediate use at the trooper's command.

The largest and typically most flexible of these is the standard MWM, designed for use on humanoid chassis. Each consists of 10 kilograms' worth of mounting equipment and targeting interfaces suitable to a single primary battlesuit weapon system of any given size desired.

The turret mount, developed for quadruped chassis, allows for the mounting of multiple weapons at once, in a 360-degree swivel assembly. Turret mounts come in a standard hard-mount style and a configurable style. The closest equivalent to the MWM is the configurable turret mount, but the hard-mounted standard turret is slightly lighter and more compact.

The anti-personnel (AP) weapon mount is the last of the major MWMs, and is designed for infantry-scale weapons such as small arms and non-battlesuit support weapon types that lack the punch and refinements of their larger cousins.

MORTAR

Introduced: 3057 (Lyran Alliance)

A common infantry support weapon since as far back as the nineteenth century, mortars are designed to lob explosive ordnance high and far—kind of like a miniaturized, anti-personnel variation on an artillery piece. While quite effective against unarmored personnel, mortars are less common with battle armor than with conventional infantry because they are relatively unreliable compared to missiles and have fairly poor anti-'Mech potential. The Clans show no interest in these weapons.

MORTAR

Tech Base: Inner Sphere only
Battle Armor Unit Restrictions: No restrictions
Game Rules: Under *Total Warfare* game play, a battlesuit's mortar weapons remain operational as long as the suit is not destroyed and its trooper is capable of acting.
Construction Rules: Mortars come in heavy and light sizes. A battle armor suit (including exoskeleton and power armor designs) may mount multiple mortar weapons of varying types, if desired.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere, pp. 346–348) **Game Rules:** *Total Warfare*, p. 214, 217

NARC

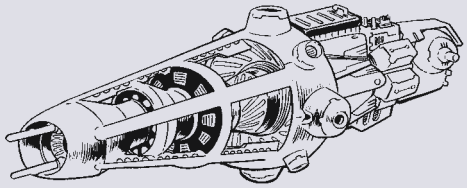
Introduced: 3061 (Word of Blake)

The battle armor-mounted Narc launcher is functionally identical to that deployed on vehicular-scale units. Though the Clans reportedly have this weapon system as well, the Inner Sphere first deployed battle armor Narc launchers with the Word of Blake's 3061 introduction of the Purifier adaptive battle armor. Indeed, the Clans appear to consider the weight and bulk of compact Narc launchers wasteful for battlesuit use, as they effectively prevent otherwise unhindered suits from executing anti-'Mech attacks until the launcher is jettisoned. The Clan system—seen quite rarely on apparent one-off refits—appears no more refined than the Spheroid version.

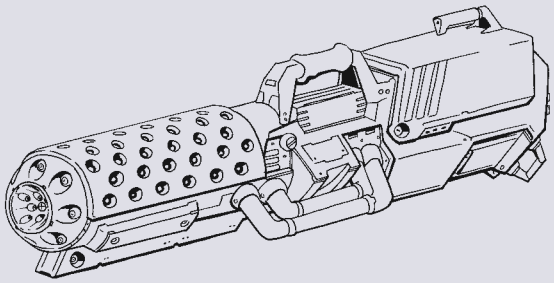
NARC

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: No restrictions
Game Rules: Under *Total Warfare* game play, a battlesuit's Narc launcher remains operational as long as it is not jettisoned (if mounted as a detachable missile), and is not out of ammunition. Otherwise, a suit's launcher will remain operational as long as the suit itself is not destroyed and its trooper is capable of acting. Narc pods fired by a battlesuit remain active even if the launching suit is destroyed later.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount multiple Narc launchers if desired. Narc ammo is treated as missile ammo under Step 5 of the Battle Armor core construction rules (starting on p. 170).

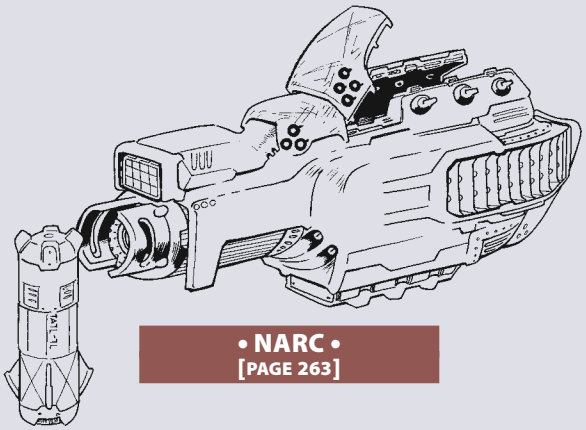
Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348) **Game Rules:** *Total Warfare*, p. 229



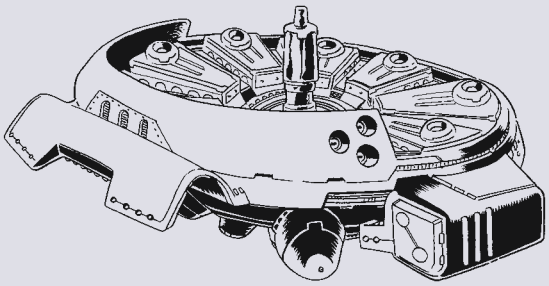
• PARTICLE PROJECTOR CANNON (SUPPORT) •
[PAGE 267]



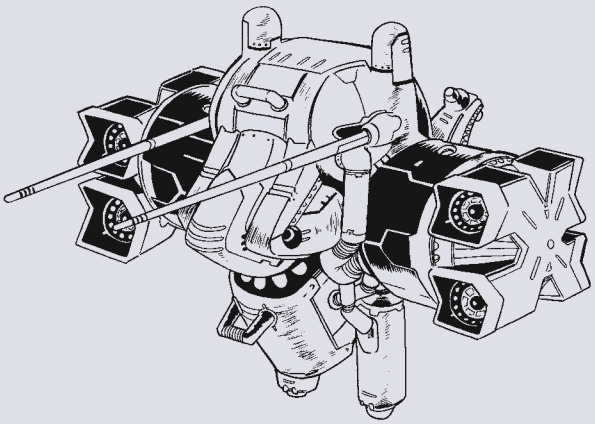
• FIREDRAKE NEEDLER •
[PAGE 266]



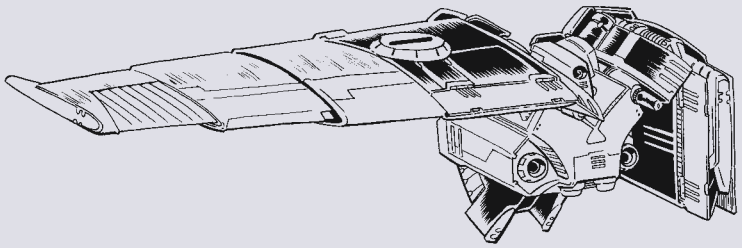
• NARC •
[PAGE 263]



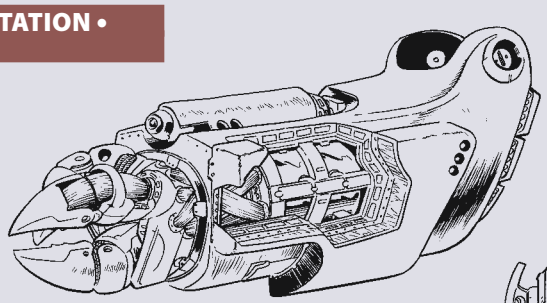
• MODULAR TURRET MOUNT •
[PAGE 263]



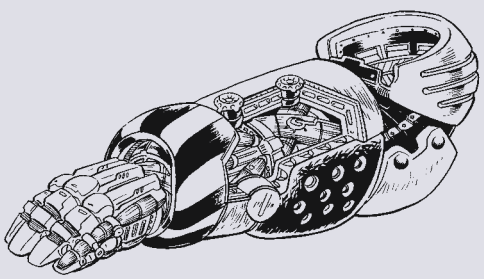
• SPACE OPERATIONS ADAPTATION •
[PAGE 269]



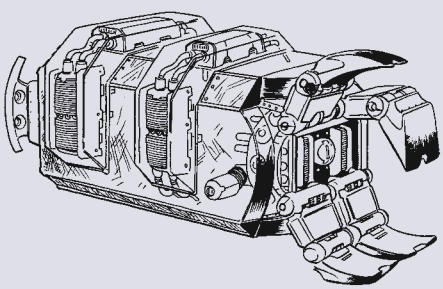
• PARTIAL WING •
[PAGE 266]



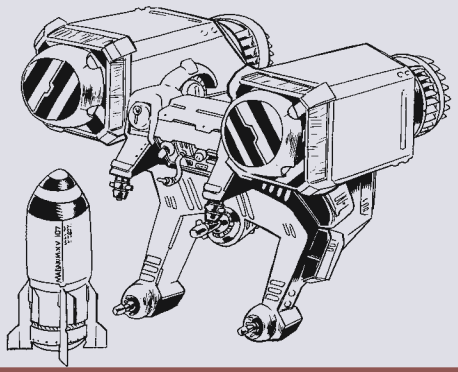
• HEAVY BATTLE CLAW •
[PAGE 260]



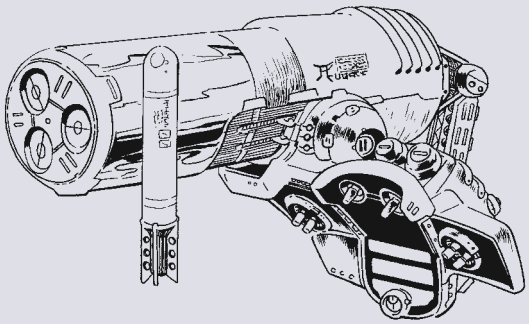
• BASIC MANIPULATOR •
[PAGE 260]



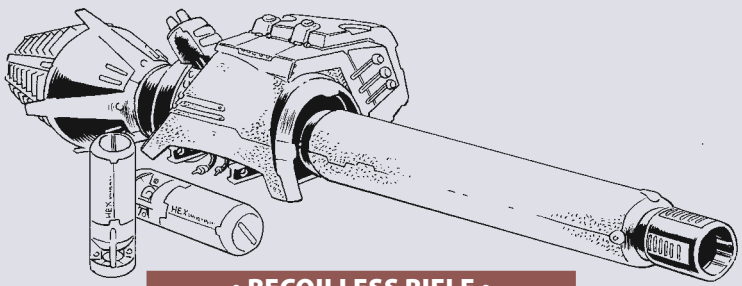
• MAGNETIC CLAW •
[PAGE 260]



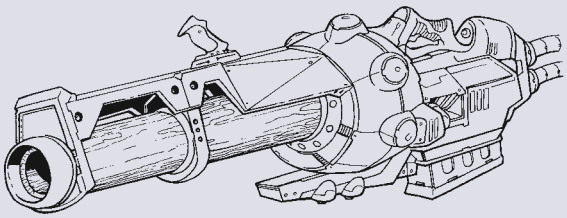
• SINGLE-SHOT SRM LAUNCHER •
[PAGE 261]



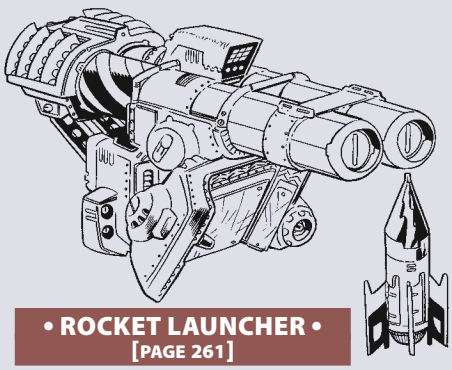
• MEDIUM RANGE MISSILE LAUNCHER •
[PAGE 261]



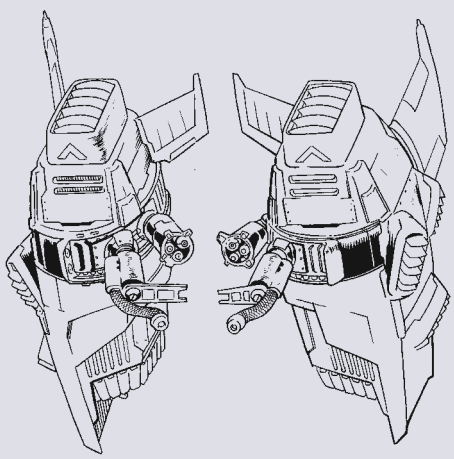
• RECOILLESS RIFLE •
[PAGE 268]



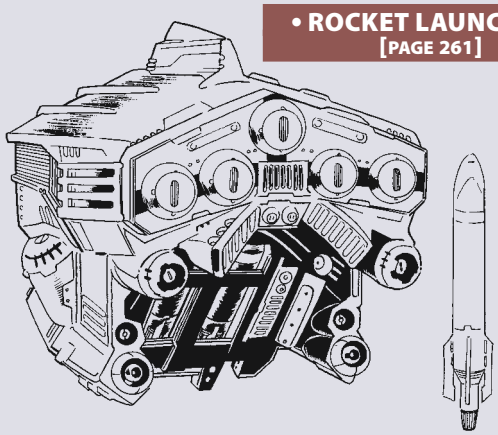
• PLASMA RIFLE (MAN PORTABLE)•
[PAGE 267]



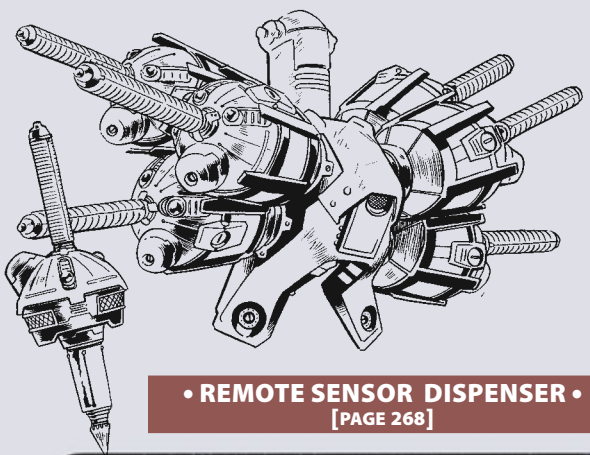
• ROCKET LAUNCHER •
[PAGE 261]



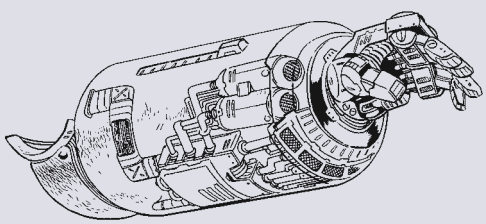
• VTOL EQUIPMENT •
[PAGE 271]



• LONG RANGE MISSILE LAUNCHER •
[PAGE 261]



• REMOTE SENSOR DISPENSER •
[PAGE 268]



• MINE CLEARANCE EQUIPMENT •
[PAGE 260]

NEEDLER (FIREDRAKE)

Introduced: 3061 (Lyran Alliance)

Also known as flechette weapons, needler weapons (or simply needlers) are typically useless on the battlefield, specifically against battlesuits and other armored units. Essentially a projectile weapon that uses a block of treated polymer for ammunition, a needler sprays a shotgun-like cloud of shredded plastic, intended to rip through lighter personal armor and bare flesh. While devastatingly effective in close-quarters, anti-personnel situations, the typical needler lacks the range and the armor penetration to be of much use beyond crowd control or spacecraft boarding missions.

In 3061, however, Mauser and Gray of the Lyran Alliance introduced the Firedrake heavy support needler—a much bigger and nastier flechette weapon than ever before. Built larger, with more power, and even capable of rapid-firing bursts, this support needler also incorporates a specialized polymer ammunition laced with encapsulated hypergolic chemicals. When exposed to air after shredding—specifically, when fired—these needles ignite, adding an incendiary effect that magnifies the weapon's damage potential beyond any other flechette weapon produced today.

While still of questionable value against armored targets, the Firedrake's brutal potential in large-scale anti-infantry work won this weapon a place among battlesuit arsenals after its 3065 debut on the Rottweiler-class battle armor.

NEEDLER (FIREDRAKE)

Tech Base: Inner Sphere only
Battle Armor Unit Restrictions: No restrictions
Game Rules: Under *Total Warfare* game play, a battlesuit's needler weapons remain operational as long as the suit is not destroyed and its trooper is capable of acting.
Construction Rules: A battlesuit may mount multiple Firedrake needlers if desired.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere, pp. 346–348)

PARAFOIL

Introduced: Pre-spaceflight

Because they are relatively lightweight, battlesuits making combat drops on atmospheric planets need not rely solely on jump jets or packs for braking, but can instead deploy a specially designed parafoil. Similar to a parachute, but narrower and designed to be steered through an added interface in the suit's helmet, the parafoil can deploy from a rear mount at any point during a drop and then be detached or reeled in for re-use after landing. Silent and low-tech, parafoils can make troop deployments during a hot drop not only safer, but much more stealthy.

PARAFOIL

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: No restrictions
Game Rules: Battle armor units equipped with parafoils as well as jump jets benefit from greater control in atmospheric drops. These drops are not an option in *Total Warfare* game play, but the combination of parafoils and jump jets gives a -2 bonus to the Landing Roll as described under *Atmospheric Drops*, pp. 22-23 of *Strategic Operations.*
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount only one parafoil. It may only be mounted in the Body location.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clans, pp. 346–348)

PARTIAL WING

Introduced: 3053 (Draconis Combine)

The DCMS introduced the partial wing as a means of stabilizing the flight characteristics of their Kage light battle armor. Designed merely to assist in jumping flight, this collapsible structure automatically extends when the suit engages its jump jets and retracts or folds up when the suit lands. While employed, the extra glide surface can extend a standard jump distance by as much as 30 meters, and it nicely mitigated the stability control issues that cost the lives of several Kage test troopers.

It has its limits, of course. The wing structure cannot be combined with jump boosters, both because of their bulk and because the power of the boosters, when engaged, can cause the relatively fragile wing to warp or even shatter. The partial wing also relies on significant air flow for its lift, and so in environments where atmospheric pressure is half standard or less—such as an airless moon—the gliding benefit is effectively lost.

PARTIAL WING

Tech Base: Inner Sphere only
Battle Armor Unit Restrictions: Battlesuits must have Jumping MP in order to install a partial wing. Partial wings may only be installed on humanoid-style light suits or PA(L)/exoskeletons.
Game Rules: Inner Sphere battle armor suits with detachable missile packs may not jump until the missile pack is jettisoned.
Construction Rules: The rules for installing partial wings on battlesuits appear under Special Physical Enhancements (Jump Booster/Partial Wing) in Step 2 of the Battle Armor core construction rules (starting on p. 164). Jump jets or packs are necessary before adding a partial wing, and partial wings may not be combined with a jump booster.

Table Reference: Battle Armor (Inner Sphere, pp. 346–347) **Game Rules:** *Total Warfare,* p. 53

PARTICLE PROJECTOR CANNON (SUPPORT)

Introduced: 2436 (Draconis Combine)

Originally developed by New Samarkand Small Arms along the same lines as the standard vehicular-scale version, the support particle projector cannon (sometimes shortened to S-PPC) is a bit more exotic than the standard laser weapon and delivers a powerful punch. Though easily adapted for use on battle armor, it was not until the Draconis Combine began development of the Void battlesuit that this weapon saw deployment in such a fashion. The Void entered service earlier this year.

PARTICLE PROJECTOR CANNON (SUPPORT)

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: No restrictions
Game Rules: Under *Total Warfare* game play, a battlesuit's particle projector cannon will remain operational as long as the suit is not destroyed and its trooper is capable of acting.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount multiple particle projector cannons if desired.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348) **Game Rules:** *Total Warfare*, p. 214

PLASMA RIFLE (MAN-PORTABLE)

Introduced: 3065 (Capellan Confederation)

A curious new weapon from our Capellan neighbors, the man-portable plasma rifle (M-PPR) first appeared on the battlefield in late 3065. Analysis of captured samples have revealed this weapon to be a hybrid energy and ballistic rifle system that features a ceramic-lined rifle tube, energy coupler, cooling system and an ammunition supply of plastic foam cartridges. When fired, a lasing process converts the cartridges into a ball of white-hot plasma, which splashes the target and delivers damage more through its incendiary effects than true kinetic impact. Though in principle these methods sound like a high-tech variation on the Firedrake, the plasma bolt's high energy and velocity allows it to burn through even battlefield armor, with almost the same effectiveness as a small laser.

As expected, the M-PPR was quickly deployed for battle armor usage, appearing on the Capellan version of the Trinity battlesuits that debuted last year. Rumors abound that the Confederation is looking into a 'Mech-scale upgrade, but has yet to produce a viable large-scale adaptation of this technology. [As noted earlier, both the Clans and the Inner Sphere eventually accomplished that feat after this publication appeared. –EB]

PLASMA RIFLE (MAN-PORTABLE)

Tech Base: Inner Sphere only
Battle Armor Unit Restrictions: No restrictions
Game Rules: Under *Total Warfare* game play, a battlesuit's plasma weapons remain operational as long as the suit is not destroyed and its trooper is capable of acting.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount multiple plasma rifles if desired.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere, pp. 346–348) **Game Rules:** *Total Warfare*, p. 214

POP-UP MINE

Introduced: 3050 (Federated Commonwealth)

One of the first weapons deployed by Inner Sphere-made battle armor—specifically the FedCom-era Sloth—the one-shot pop-up mine was a clever enough concept, but dangerous to employ because it required the attacker to get within point-blank range of a target. Fired from very close ranges (ideally, in fact, from directly below the target), the pop-up mine is a magnetized limpet mine that uses a shaped charge powerful enough to breach even heavy battlefield armor and cause internal systems damage. As powerful as this system is, however, since the Sloth went out of production very few pop-up mines have seen use on modern battlesuits, largely because the attack procedure literally throws the trooper under the proverbial bus into the bargain.

POP-UP MINE

Tech Base: Inner Sphere only
Battle Armor Unit Restrictions: No restrictions
Game Rules: Under *Total Warfare* game play, a battlesuit's pop-up mine remains operational as long as it is not already fired in combat. Otherwise, the weapon remains operational as long as its carrying suit is not destroyed and its trooper is capable of acting.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount multiple pop-up mines if desired. Pop-up mines are one-shot devices and may not add extra reloads.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere, pp. 346–348) **Game Rules:** *Total Warfare*, p. 229

POWER PACK

Introduced: Pre-spaceflight

Unlike BattleMechs and most vehicles, battle armor and exoskeletons do not run on fusion power supplies, but instead rely on batteries and internalized rechargers to remain viable. Most suit designs have sufficient power stores built in for an operational duration of roughly 24 hours, which is typically sufficient for most operations. Longer campaigns, however, can easily necessitate additional power packs, which are merely suit-based modifications of the extant energy packs used to power most infantry electronics and non-projectile support weapons.

Both the Clans and the Inner Sphere use these power packs on suit models intended for longer battlefield endurance. The more efficient Clan designs can provide enough juice for an extra 12 hours per pack, while their Spheroid counterparts provide an extra 10 hours of useful energy. An automated switching system built into these added power packs maximizes their potential by changing over from one pack to another only after fully depleting each one, rather than draining all on-board packs in unison.

POWER PACK

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: No restrictions
Game Rules: Power supplies have no effect in *Total Warfare* game play. The impact of power packs in campaign and role-playing settings will be covered in future sources.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount multiple power packs, if desired.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348)

RECOILLESS RIFLE

Introduced: Pre-spaceflight

Recoilless rifles have been around since the mid-20th century, but the Capellan Confederation first opted to employ these weapons on battle armor during their invasion of the St. Ives Compact, when the weapon appeared in numerous field refits of the Fa Shih and standard Inner Sphere battle armor suits. Adapted from the infantry-scale version, the recoilless rifle is an anti-vehicle weapon that fires what amounts to a large shell through the use of a high-power explosive charge. These weapons achieving their nearly recoilless nature by ejecting high velocity gasses from the explosion out through the rear when fired, making them less than subtle. However, the damage they inflict on armored units can be considerable.

RECOILLESS RIFLE

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: No restrictions
Game Rules: Under *Total Warfare* game play, a battlesuit's recoilless weapons remain operational as long as the suit is not destroyed and its trooper is capable of acting.
Construction Rules: Recoilless rifles come in light, medium and heavy sizes. A battle armor suit (including exoskeleton and power armor designs) may mount multiple recoilless weapons of varying types, if desired.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348) **Game Rules:** *Total Warfare,* p. 214, 217

REMOTE SENSOR DISPENSER

Introduced: 3050 (Federated Commonwealth)

The battlesuit equivalent of the vehicular sensor dispenser is little more than a backpack-style module from which a trooper can pull out and plant similar remote sensors for use in establishing a security perimeter. Quadruped suits can use this equipment as well, but their lack of hands requires the use of a modified version that ejects the sensors for a slightly less controlled deployment. The humanoid model is detachable, and is typically ejected as soon as the rack is empty.

REMOTE SENSOR DISPENSER

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: No restrictions
Game Rules: This equipment has no impact on *Total Warfare* standard rules play. Its effects are described in detail in *Tactical Operations*, p. 375.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount only one remote sensor dispenser. The battle armor-grade Remote Sensor Dispenser has a fixed payload of 6 sensors, and cannot be equipped with additional remote sensor "ammo".

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere, pp. 346–348)

SEARCHLIGHT

Introduced: Pre-spaceflight

Battle armor and exoskeletons occasionally mount high-powered searchlights, just as 'Mechs and vehicles may. For obvious reasons, however, suits are limited to the smaller variety, rather than the half-ton kilowatt floodlights a 'Mech might lug around. These lights are typically good for about 270 meters or so.

SEARCHLIGHT

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: No restrictions
Game Rules: Searchlights have no effect in *Total Warfare* game play. The effect of these items will be covered in *Tactical Operations*.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount multiple searchlights, if desired.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348) **Game Rules:** *Total Warfare*, p. 228

SHOTGUN MICROPHONE

Introduced: Pre-spaceflight

Similar to the laser microphone but a little less sophisticated, the shotgun microphone is a bit of surveillance technology not typically seen on most suit designs, but known to be available for both Spheroid and Clan suits. Essentially a directional microphone, this device can pick out normal conversation at 100 meters within its angle of focus, and even picks up whispers at 50 meters.

SHOTGUN MICROPHONE

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: No restrictions
Game Rules: Shotgun microphones have no effect in *Total Warfare* game play. The effect of these items will be covered in later rulebooks.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount multiple shotgun microphones, if desired.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348)

SPACE OPERATIONS ADAPTATION

Introduced: Circa 2900 (Clan Snow Raven), 3011 (Taurian Concordat)

While any battlesuit or exoskeleton can be outfitted with electromagnets in the soles of the feet to operate on spacecraft hulls—and indeed, just about all battle armor produced today incorporates such a feature—Clan Snow Raven has developed more advanced adaptations designed to enhance the survivability and effectiveness of battle armor in deep space operations. Employing additional thrusters, arm-mounted electromagnets and so forth improves speed and agility, while an advanced inner lining of HarJel technology—common to all Clan designs—mitigates the normal risks of decompression when a suit is breached in vacuum.

Overlooked all this time is the fact that the Taurian Concordat (of all nations) managed to mimic this technology—without the HarJel—decades ago. Initially devised to enhance the capabilities of labor exoskeletons working the asteroid fields around Taurus, this Inner Sphere version of the space operations adaptation mimics the Clan system in virtually every way except for the use of HarJel, and is gradually becoming available to all Spheroid battlesuit designers.

SPACE OPERATIONS ADAPTATION

Tech Base: Inner Sphere and Clan
Battle Armor Unit Restrictions: No restrictions
Game Rules: Space operations adaptations have no effect in *Total Warfare* game play. Their impact in campaign and role-playing settings will be covered in future sources.
Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may carry only one space operations adaptation system. Suits intended for work in vacuum do not require this equipment, but find operating in such settings easier when so equipped.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348)

SQUAD SUPPORT WEAPON

Introduced: Pre-spaceflight

The squad support weapon (SSW) concept is not so much a piece of technology as a general allowance for communal space and carrying capacities among the members of a given battle armor squad (or Clan Point). A common practice in conventional infantry platoons, the application in battlesuit operations allows designers to "under-load" all like-model suits in the squad with the intention to carry a larger support weapon than any one of the same suits otherwise could. In this effort to circumvent the design ceiling of a given suit's weight and bulk capacities (squad support weapons tend to appear among lighter-model suits), one trooper in a given squad is selected to operate the squad's support weapon and is entrusted with the core components of the weapon itself. Meanwhile, the rest of the squad carries all the removable parts, such as the magazine or power pack, targeting scopes or even the firing muzzles. Once in position, the squad reassembles the weapon quickly and can move for short distances while using the weapon. A typical example of an SSW in action is the use of light TAG by a Kage squad, or the small pulse laser that—according to the latest field trials on Orestes, anyway—may become standard SSW gear for the Rasalhagians' upcoming Kobold battle armor.

SQUAD SUPPORT WEAPON

Tech Base: Inner Sphere and Clan

Battle Armor Unit Restrictions: Quadruped (Quad) suits may not mount a squad support weapon.

Game Rules: In combat, only one trooper in the squad may be designated as the support weapon unit. Under *Total Warfare* game play, the squad support weapon remains operational as long as the designated support weapon suit is not destroyed and its trooper is capable of acting.

Construction Rules: To mount a squad support weapon, each battle armor suit (including exoskeleton and power armor designs) in a given squad must allocate a certain percentage of the largest desired weapon's weight (including the weight of its ammo) to the squad support mount. This amounts to 50 percent of weapon weight for battle armor with an Inner Sphere technology base, 40 for Clan. The final weight allocated to the squad support weapon mount must be rounded up to the nearest kilogram. Also, each suit in the squad must have enough equipment slots in a single location to mount the entire weapon and its ammunition.

A battle armor suit may install only one squad support weapon mount. Though only one suit in a squad actually has the weapon, a squad support weapon mount always counts as one of a suit's allowable anti-'Mech weapons.

This mount can accommodate non-weapon items: see *Modular Technology* on p. 171 for details.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348) **Game Rules:** *Total Warfare*, p. 229

TAG (LIGHT)

Introduced: 3054 (Clan Wolf), 3053 (Draconis Combine)

An even further scaled-down version of the larger battlefield systems, the Light TAG used by battle armor (battlesuit TAG) operates in the same way as the vehicular version of the light TAG system, and may be used to designate targets for Arrow IV homing missiles or semi-guided LRMs. At the battle armor scale, this system is perhaps one of the best candidates for the squad support weapon treatment, because while each member of a given squad may be equipped with this item, the squad cannot designate multiple targets at once without confusing the incoming friendly fire. Strangely enough, the Kurita Kage suit first deployed with a TAG system in just such a capacity in 3053—a year before Clan Wolf debuted its own light TAG system.

TAG (LIGHT)

Tech Base: Inner Sphere and Clan

Battle Armor Unit Restrictions: No restrictions

Game Rules: Under *Total Warfare* game play, a battlesuit's TAG remains operational as long as the suit is not destroyed and its trooper is capable of acting.

Construction Rules: A battle armor suit (including exoskeleton and power armor designs) may mount multiple TAGs if desired, but only 1 (per squad) may be used in combat.

Table Reference: Battle Armor Weapons and Equipment (Inner Sphere and Clan, pp. 346–348) **Game Rules:** *Total Warfare*, p. 229

UNDERWATER MANEUVERING UNITS (UMU)

Introduced: 3059 (Clan Goliath Scorpion)

First seen on Clan Goliath Scorpion's sub-aquatic Undine battle armor design, underwater maneuvering units (UMUs for short) have not yet appeared in the Inner Sphere for battle armor. Though this may seem incongruous—at their core, UMUs simply replace the jet units of standard jump jets with propellers—this technology has yet to be duplicated in the Inner Sphere. Part of the reason, of course, is that it really is not so simple as slapping props on a battlesuit. It also involves adjusting the musculature and pressurization systems of Inner Sphere suits to deal with the increased rigors of submerged combat, while simultaneously miniaturizing aquatic propulsion systems to a point where they are both effective and combat viable. It would, after all, prove pointless to send battle armored troops underwater who could not move as freely as their Clan counterparts due to a bulky prop system and an inability to adjust to shifting depths. In this, the Goliath Scorpions held a distinct advantage in their UMU design; the technologies they needed merely descended from those they pioneered back before the dawn of the Elemental.

UNDERWATER MANEUVERING UNITS (UMU)

Tech Base: Clan only

Battle Armor Unit Restrictions: Exoskeletons using UMUs may not be constructed with an Inner Sphere chassis type. Quadruped (quad) battlesuits may not install UMUs.

Construction Rules: The rules for installing UMUs on battlesuits may be found under Determine Non-Ground Movement in Step 2 of the Battle Armor core construction rules (starting on p. 164). UMU MP may not be combined with any other non-Ground MP types.

Table Reference: Battle Armor Non-Ground Motive Systems, p. 165 **Game Rules:** *Total Warfare*, p. 56

VTOL EQUIPMENT

Introduced: 3060 (Clan Cloud Cobra)

Clan Cloud Cobra's Sylph battlesuit marked the debut of the first practical VTOL propulsion system for lighter-weight battle armor designs. Using larger lift fans, mounted in massive pods that give the suit a distinctive look, VTOL units enable humanoid suits weighing one ton and under to maintain constant and controlled flight in excess of any capability offered by jump jets and packs. As with UMUs, the technology still eludes Inner Sphere designers, particularly due to difficulties in making the system small and tough enough to be viable while addressing the need for flight stability that the Clan system has attained.

It should be noted that even the Clans could not produce the VTOL system without limitations. The system cannot be used by quadruped battle armor, for instance, nor may it be combined with jump jets, jump packs or underwater maneuvering units.

VTOL EQUIPMENT

Tech Base: Clan only

Battle Armor Unit Restrictions: Only humanoid battlesuits weighing 1,000 kilograms or less (including exoskeletons and power armor) may install VTOL equipment.

Construction Rules: The rules for installing VTOL equipment on battlesuits may be found under Determine Non-Ground Movement in Step 2 of the Battle Armor core construction rules (starting on p. 164). VTOL MPs may not be combined with any other non-Ground MP types.

Table Reference: Battle Armor Non-Ground Motive Systems, p. 165 **Game Rules:** *Total Warfare*, p. 54

WEAPONS, ANTI-PERSONNEL

Introduced: Various

In the heavy equipment portion of this chapter, we saw the terms "light- and medium- class weaponry" defined for vehicular design classes, representing the minor adaptations to small arms and infantry support weapons that most vehicular units consider inconsequential to their design. The same still applies even at the battle armor level, though admittedly not by nearly as wide a margin, as an infantryman's support machine gun is merely a close cousin to the one slung under a Cavalier's right arm. Making the most of their kilograms, and recognizing the greater threat conventional infantry troopers offer to battlesuits, however, many more designers make allowances for these smaller weapons, which may lack the punch of their mounted analogs, but can still pose a threat when focused on a single target or cluster of conventional troops.

Light Weapons: As with vehicular classifications, the light weapons used by battle armor include small arms such as pistols and rifles (ballistic and energy-based), as well as shotguns, needler pistols and rifles, submachine guns and the like. These weapons may lack the armor-defeating punch of their counterparts, but their use can handle a crisis without resorting to the overkill of a suit-mounted PPC. These are also the weapons most commonly carried by suits that lack integral weapons and rely instead on whatever can fit into an armored glove manipulator.

Medium Weapons: The medium weapons class for battle armor, like its vehicular equivalent, covers such support-grade, infantry-scale, ranged armaments as support machine guns, support lasers, man-pack PPCs, rocket launchers and the like, which are not converted specifically for use with battle armor. Lighter than the suit-standard weapons, these support weapons lack the punch and efficiency of their upgraded brethren, but their increased mass and bulk over that of light weapons, combined with the existence of their upgraded versions, often makes mounting these weapons on a suit needlessly redundant. Though it is possible to pack an infantry-carried version of the Magshot gauss rifle on the same chassis as a more potent battle armor version of the same gun, most designers would agree that the 45 kilograms spent on the weaker Magshot could have been better used to increase armor or add more rounds to the larger weapon. As such you will only see these unconverted Medium class weapons used by "hand" with suits equipped with armored glove(s) and then only weapons not requiring a crew to operate.

WEAPONS, ANTI-PERSONNEL

Tech Base: Inner Sphere and Clan

Battle Armor Unit Restrictions: No restrictions

Game Rules: Under *Total Warfare* game play, a battlesuit's anti-personnel weapons remain operational as long as the suit is not destroyed and its trooper is capable of acting.

The rules on p. 218 of *Total Warfare* presume the battlesuit is mounting a single Auto-Rifle as an AP weapon. At the players' option, the damage, ranges and to-hits of alternative anti-personnel weapons types may be found in accordance with Step 2 of the Conventional Infantry core construction rules (starting on p. 148).

Construction Rules: The anti-personnel weapon mount (see *Modular/Turret Mounts*, p. 262) carries Standard-type conventional infantry weapons. In addition, a humanoid suit equipped with at one or more armored glove manipulators (see *Manipulators*, pp. 259-260) may carry any non-Melee conventional infantry weapon with a crew requirement of less than 2. In either case, the weight of these weapons and any ammunition required is never counted towards a battlesuit's weight limits.

Table Reference: Weapons and Equipment (Infantry, pp. 349–352) **Game Rules:** *Total Warfare*, p. 218

CONVENTIONAL INFANTRY EQUIPMENT

With the advent of battle armor, the infantry category today has become technically broader than ever. Often, this forces us to apply the term "conventional" when referring to the regular, non-battle armored foot, jump and motorized troops that still form the backbone of modern armies. Despite that status, today's conventional infantry is among the most underestimated and under-appreciated of battlefield units.

Conventional infantry can be highly versatile. The equipment carried by today's infantryman can vary wildly from realm to realm, world to world or even on the same world. Local technology and industry levels, environmental considerations, mission needs and the battlefield philosophies of the commanders who field these troops can prompt a difference in a platoon's weaponry and mobility as much as it can the look of their uniforms or the type of personal armor worn.

Given this wide variance, it would be an exhaustive undertaking to cover absolutely every nuance and every technology a "typical" infantryman might field in combat. However, we can broadly define the main two areas that define an infantry force—mobility and firepower. These two components so quickly define a platoon's overall capabilities that most battlefield parlance today summarizes infantry formations by identifying their motive systems and primary weapons.

MOTIVE SYSTEMS

Motive systems are the first key area in which conventional infantry demonstrates its most obvious diversity. As with weaponry and personal armor, the means by which a platoon might cross open ground or difficult terrain can vary with local conditions, environment, and the resources at hand. The type of motive system affects not only the speed of conventional platoons, but also their size in terms of manpower and transport weight. The choice of motive system can even affect how many support weapons a platoon may effectively carry into battle.

In the broadest sense, conventional infantry use four main motive types: foot, motorized, jump and mechanized.

Foot

The cheapest and most reliable way to move conventional infantry is to have the troops move themselves. As many of you know from hard experience, the human body can march, even heavily laden, for surprisingly long distances when it needs to, and can do so over almost any kind of terrain—all at the relatively insignificant cost of a good set of boots, field rations and a full canteen. Of course, infantry are often called upon to run under battlefield conditions, with that same heavy load and decked out in body armor—often while shooting at opposing forces or dodging incoming fire. For those of you who find basic training a dim memory because you sit in a BattleMech's cockpit, remember that the next time you get shot out of your machines.

Motorized

Motorized infantry emerged on battlefields for the first time soon after the advent of the internal combustion engine. This mode of travel eclipsed horse-mounted infantry—the only other form of infantry travel that did not involve the troops' own sweat—and has become a common form of deployment in most medium-tech regions, especially effective over open ground.

Not to be confused with travel aboard dedicated APCs or even mechanized travel—where infantry are more concentrated aboard fewer vehicles—motorized infantry deployment tends to employ smaller, lighter vehicles, such as jeeps, motorcycles or even lightly armored civilian vehicles. With a maximum of three or four troopers apiece, these vehicles are often driven more recklessly than anything you've seen in a Friday night holovid feature, and often in tight formations to maximize their firepower. Because their vehicles are so lightly armored, motorized infantry remain as prone to damage from heavy weapons as their foot-powered kin and are heavier to transport, but at least they have more speed on the battlefield.

Jump

Taking foot infantry to a third dimension, the adaptation of personal jump packs in the mid-twenty-first century enabled troopers to bound over obstacles and achieve much greater mobility on the battlefield. Today's foot infantry equipped with jump packs can traverse nearly 100 meters in a single hop, and are trained to use their weapons effectively—and with great coordination—even in mid-leap. Many of these troops are also anti-'Mech trained, so those of you who consider yourselves 'Mech jocks should particularly beware this form of conventional infantry. Jump troops tend to operate in three-squad formations, because they need a wider dispersion to avoid mishaps, and because their heavier gear make transporting them more difficult. This tends to make them almost as distinctive on an infantry-rich battlefield as their sudden ability to leap over the treetops.

Mechanized

At the stage when we discuss mechanized conventional infantry, we are looking at a more specialized and concentrated variation on the motorized motive type. Not to be confused with Mechanized Battle Armor, where a squad of battlesuits ride a vehicle or 'Mech like a pack of Avalonian remoras, conventional mechanized platoons are smaller, but wholly contained in fewer, larger and slightly more armored vehicles. These vehicles essentially act as their own intrinsic personnel carriers. This particular form of conventional infantry varies in speed, number of troops and weapon capacity, based on the vehicle types chosen (hovercraft, heavy jeeps and half-tracks are favored). Because their vehicles are significantly larger, these troops are rarely deployed by larger transports—unlike motorized formations, which can fit into sufficiently modified heavy APCs.

CONVENTIONAL INFANTRY MOTIVE SYSTEMS

Tech Base: Inner Sphere and Clan
Conventional Infantry Unit Restrictions: No restrictions
Game Rules: Under *Total Warfare* game rules, conventional infantry retains the same mobility and motive capabilities regardless of the amount of damage sustained.
Construction Rules: The rules for choosing a conventional platoon's motive type, speed and platoon size may be found under Step 1 of the Conventional Infantry core construction rules (starting on p. 145). A single platoon may not mix motive system types.

Table Reference: Conventional Infantry Motive Systems, p. 272 **Game Rules:** *Total Warfare,* p. 213

ARMAMENT

On any given world, one might find a bewildering array of small arms manufacturers capable of producing anything from simple knives, swords and bows to support-grade machine guns, missile launchers and laser weaponry. By and large, if a man (or a small enough squad of men) can carry any of these weapons over a reasonable distance, these weapons will find their way onto a battlefield when that world is threatened byinvaders. Without getting into manufacturer specifics, these weapons—like infantry motive systems—can be broken down into general categories that define their place in combat.

Archaic Weapons

Named so because they require little more advanced technology to operate than human muscles, or because their various developments predate even the simplest of firearms, archaic weapons are nearly useless on the modern battlefield. Their range is typically poor—with many, like swords and bayonets, designed for what amounts to point-blank use. Their damage potential versus today's armor is negligible. These weapons are thus most often used by only the most technologically primitive (or simply technophobic) soldiers or game

hunters, or as a desperate "backup weapon" to a pistol or rifle. While a few more modern variations on these weapons have come into play over the ages—such as vibroswords and stunsticks—archaic weaponry remains an uncommon sight in massed combat.

Despite this, a number of these may appear on today's battlefield. House Kurita's DCMS forces, for instance, maintain an infatuation with the katana sword. The Capellans—especially since Chancellor Liao's Xin Sheng movement—have taken to bringing dao blades into battle. Our own more practical troopers always carry combat knives in the field.

Pistols

Overall, pistols are any non-archaic ranged combat weapon that can be fired one-handed by an average trooper. The earliest form of these weapons dates back to the days when our ancestors on Terra crossed the oceans on rickety wooden sailing ships and still had trouble grasping that the world was not flat. Even today, the simplistic technology of gunpowder- or chemical-based slug throwers dominates the pistols category. Modern technology, however, has introduced additional pistol types, including the self-propelled gyrojets, magnetic-accelerated gauss weapons, energy-based laser pistols and even the shredded-polymer "needler" weapons.

The variety of such weaponry is astounding. Today's AFFS soldier, for instance, prefers the Serrek Arms 7875D auto-pistol as his standard sidearm, while his Lyran counterpart might favor automatic slug throwers or flechette weapons made by Mauser & Gray. In Kurita space, the Nambu auto-pistol or Nakjima hand laser are popular weapons, while some Capellans field a two-shot gauss pistol dubbed the Mandrake.

On the modern battlefield, pistols have largely eclipsed the role of some archaic weaponry thanks to their ease of use, portability and greater damage potential against armor. Still, their use by infantry platoons en masse is exceedingly rare, because pistols still lack the range and damage capabilities of more powerful and effective rifles.

Rifles

The third broad category of small arms, rifles share a common developmental history with pistols, emerging at about the same time and following the same general progression of advancement. Larger than pistols, rifles are designed for two-handed firing. Their ability to deliver greater damage potential with longer range and improved accuracy over pistols has made rifles the quintessential primary weapon of modern infantry. A skilled marksman with a rifle will likely drop an enemy combatant in one shot—even if the target is wearing body armor. There have even been tales of Elementals in their battlesuits being dropped by a well-placed rifle shot—though these tales, if true, are obviously more exception than rule.

Like pistols, rifles are a varied weapon choice—particularly when considering shotgun and SMG varieties. Still, most state armies employ standardized arms to simplify logistics. Federated-Barrett products, for instance, dominate our own AFFS, with examples like the long rifle and the M42B rifle system. The Lyrans, as we all know, prefer the TK assault rifle, the M&G flechette rifle or the Gunther MP-20 submachine gun. Our neighbors in Kurita and Liao space, respectively, prefer the Magna ML8 or Marik-made Intek laser rifles. Free Worlds League troops are more inclined to use the Imperator AX-22 assault rifle.

Submachine Guns and Shotguns: While they technically form a fourth and fifth category of infantry weapons, submachine guns (SMGs) and shotguns are technically an outgrowth of the rifle, though both often lack the range and accuracy that makes the rifle such an effective killer. Instead, submachine guns make up for their relative inaccuracies by spitting out a stream of slugs, while shotguns blast a cloud of pellets for a devastating "splash" effect. Both of these weapons are ideal anti-personnel weapons, mind you, but on the modern battlefield, they remain poorer cousins to the rifle because of their generally reduced range and anti-armor potential.

Support Weapons

At the heaviest tier of modern infantry weapon systems—often so big that it takes more than one trooper to handle them in battle—are support weapons. Designed for far greater range, punch or even volume of fire, support weapons are most typically employed in anti-armor work. In this category, one finds the bigger brothers to almost every type of rifle in existence, with heavy machine guns, lasers and gauss rifles easily outclassing their smaller cousins, grenade and missile launchers putting gyrojet guns to shame, and even heavy flamers for anti-infantry work.

Also thrown into this category (like SMGs and shotguns, they can be classed either by themselves or as support weapons) are hand grenades: high-explosive or fragmentary weapons delivered by little more elaborate means than how far a man can throw them. Unsurprisingly, these weapons are considered ill-suited to the modern battlefield, as their range of effect is often too limited to make the likes of a battlefield vehicle worry.

Typical support weapons one might encounter today include the Grand Mauler or Magshot gauss weapons employed by our own troops. The LAAF and CCAF both favor SRM launchers, such as the Lyran-made DynaCo S2 TwinShot, or the Capellans' Mark-II Harpoon LiteFire. Combine forces have introduced the somewhat dubious Dragonsbane disposable support laser as well as the Tsunami gauss rifle, while ComStar's Hellbore may set the standard in support laser weapons.

Special Purpose Weaponry

In almost every one of the above categories, there exist special variations on the infantry weapon's theme. Stunsticks and neural whips, for instance, are advanced forms of archaic weapons intended to subdue or inflict pain without damage. Dart guns and sonic stunners provide a similar capability for the pistol class. Meanwhile, the Capellan Confederation's Ceres Arms Crowdbuster or the Free Worlds League's Buccaneer gel gun are intriguing adaptations of shotgun-style rifles. The Lyrans' Firedrake support needler, with its hypergolic-laced flechettes, and the Capellan plasma rifle add even more incendiary options to the support weapon category. While many of these weapons are intended for off-battlefield usage (such as riot duty or boarding actions), and special munitions enable many ballistic weapons and ordnance launchers to achieve the same effects, these unique special-purpose weapons can occasionally turn up in an enemy's order of battle.

CONVENTIONAL INFANTRY WEAPONS

Tech Base: Inner Sphere and Clan
Conventional Infantry Unit Restrictions: No restrictions.
Game Rules: Under *Total Warfare* game rules, conventional infantry retains the same weapon to-hit modifiers, attack rules and special weapon effects (if any) regardless of the amount of damage sustained, though overall damage and anti-'Mech capability will be reduced with platoon damage. Special weapons features are defined with the weapons types described under Step 2 of the Conventional Infantry core construction rules, starting on p. 148.
Construction Rules: The rules for choosing a conventional platoon's primary and secondary weapons, and determining their overall damage values and range modifiers, are found under Step 2 of the Conventional Infantry core construction rules (starting on p. 148).
Under these construction rules conventional infantry weapon and ammunition weights need not be tracked. These values appear on the Conventional Infantry Weapons and Equipment table as a means of tracking such weight values for infantry weapons mounted on Small Support Vehicles (see Light Weapons and Heavy Weapons, p. 271).

Table Reference: Conventional Infantry Weapons and Equipment, pp. 349–352 **Game Rules:** *Total Warfare*, p. 214

Early 3052, on the planet Satalice, two venerable enemies face off for what may be the last time.

Comparatively speaking, computing the cost for *BattleTech* units is one of the simplest processes in unit construction. Expressed in C-bills, the cost of a unit represents the manufacturing resources needed to produce it. While these resources are technically a matter that will be handled more completely in future rulebooks (such as *Tactical Operations*), the calculations are provided here for the sake of completeness and as a means of considering the less tangible aspects of "in-character" construction.

This section describes and demonstrates the process of computing a unit's cost in C-bills. In addition, for further aid in developing era-specific units, this section covers the introduction, extinction and reintroduction dates for all items and equipment covered by this book, as well as their overall availability ratings for the major eras of *BattleTech* game play.

BASIC COST CALCULATIONS

In general, computing a unit's C-bill cost is a simple matter of summing up the costs for all of the unit's structural components (such as engines, control and motive systems, structure and armor), plus the cost of all weapons and equipment added. Final cost multipliers are then applied to the result, based on the unit's type, weight and—where applicable—Technology Rating.

Component Formulas

On occasion throughout the cost calculations process, the designer may be asked to find an individual component's cost through a sub-formula, such as determining the cost of a BattleMech's engine by multiplying a base value by the engine's rating and the 'Mech's weight. When encountering such component formulas, care should be taken to ensure that the values used are the exact ones required for the formula. Computing a BattleMech engine's cost using the engine weight instead of the 'Mech's *total* weight, for example, can produce a wildly different result.

Rounding

All costs computed in *TechManual* must not be rounded until the end of the calculations process, after applying any final cost multipliers. At that point, costs should be rounded up to the nearest .01 C-bill.

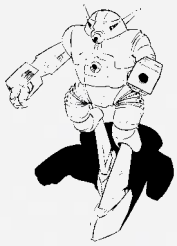
In the earlier stages of calculations, however, designers may either leave all values unrounded, or—for more manageable numbers—rounded normally to three significant digits after the decimal point (thus, a value of 1.4563 could be rounded to 1.456 with minimal impact on computations).

STRUCTURAL COSTS

The Structural Costs tables presented in this section are separated by unit types to provide designers with the clearest approach to finding the C-bill value of a unit's base structure (including framework, controls, engines, heat sinks and armor). To find a unit's structural costs, simply refer to the most appropriate Structural Costs table and sum up the combined values for all appropriate equipment listed there. For instance, designers can find a BattleMech's structural costs by locating the BattleMech and IndustrialMech Structure Table, and then summing up the costs for the 'Mech's cockpit, sensors, life support, musculature, internal structure, actuators, fusion engine, gyro, jump jets (if any), heat sinks and armor.

Conventional Infantry

Conventional Infantry does not receive a structural cost as such. In fact, such units incorporate all of their features into a single set of costs that requires only one reference to the Infantry Weapons and Equipment Tables for the platoon's Primary and Secondary weapons. Once such units are computed at this stage, they are considered to have determined their final platoon value.



Andrew computes the cost of his MON-66 Mongoose. *The* Mongoose *weighs 25 tons and uses a standard cockpit, standard musculature and endo steel internal construction. Its humanoid build includes a full spread of arm and leg actuators (none were removed during the design process). For power, the* Mongoose *uses a standard fusion engine with a rating of 200, and so has a 2-ton gyro. It lacks jump jets, uses 10 standard (single) heat sinks and carries 5 tons of standard ferro-fibrous armor.*

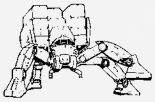
Upon consulting the BattleMech and IndustrialMech Structural Costs Table, Andrew sums up the structural costs of his Mongoose *as follows:*

200,000 (Standard Cockpit) + 50,000 (Life Support) + 50,000 (Sensors for a 25-ton 'Mech [2,000 x 25 tons = 50,000]) = 300,000 C-bills for cockpit, life support and sensors.

50,000 (Standard Musculature on a 25-ton 'Mech [2,000 x 25 tons = 50,000]) + 40,000 (Endo Steel on a 25-ton 'Mech [1,600 x 25 tons = 40,000]) + 11,500 (2 full sets of Arm Actuators for a 25-ton 'Mech [2 arms x ([100 x 25 tons] + [50 x 25 tons] + [80 x 25 tons]) = 11,500) + 17,500 (2 full sets of Leg Actuators for a 25-ton 'Mech [2 legs x ([150 x 25 tons] + [80 x 25 tons] + [120 x 25 tons]) = 17,500) = 119,000 C-bills for musculature, structure and actuators. Coupled with the 300,000 for cockpit systems above, the structural costs so far are 419,000 C-bills.

The 200-rated Standard Fusion engine costs 333,333.333 C-bills (5,000 x [200 Rating x 25 tons] ÷ 75 = 333,333.333), and the 2-ton standard gyro costs 600,000 C-bills (300,000 x 2 tons of Gyro = 600,000). Combined with the earlier costs, this brings the running structural costs total to 1,352,333.333 C-bills (419,000 + 333,333.333 + 600,000 C-bills = 1,352,333.333 C-bills).

The Mongoose *pays no cost for its heat sinks, because it has selected standard (single) heat sinks and has added none beyond the 10 free sinks that came with the engine, and it spends no C-bills on jump jets either, as the unit mounts none. The 5 tons of standard ferro-fibrous armor cost 100,000 C-bills (20,000 x 5 tons of armor = 100,000 C-bills), bringing the* Mongoose*'s structural costs to 1,452,333.333 C-bills (1,352,333.333 + 100,000 = 1,452,333.333).*



Geoffrey's 70-ton Uni *CargoMech is a quadruped IndustrialMech that uses a standard IndustrialMech cockpit (without enhanced fire control) and IndustrialMech internal structure. It features environmental sealing as well as a 210-rated Fuel Cell engine and a 3-ton gyro. The* Uni *uses standard musculature and comes with 1 standard (single) heat sink, as well as 9 tons of commercial armor. Using the BattleMech and IndustrialMech Structural Costs Table, Geoff sums up the structural costs of his* Uni*:*

100,000 (Industrial Cockpit without Advanced Fire Control) + 50,000 (Life Support) + 140,000 (Sensors for a 70-ton 'Mech [2,000 x 70 tons = 140,000]) = 290,000 C-bills for cockpit, life support and sensors.

140,000 (Standard Musculature on a 70-ton 'Mech [2,000 x 70 tons = 140,000]) + 21,000 (Standard Internal Structure for a 70-ton 'Mech [300 x 70 tons = 21,000]) + 15,750 (Environmental Sealing for a 70-ton 'Mech [225 x 70 tons = 15,750) + 98,000 (4 full sets of Leg Actuators for a 70-ton 'Mech [4 legs x ([150 x 70 tons] + [80 x 70 tons] + [120 x 70 tons]) = 98,000) = 274,750 C-bills for musculature, structure and actuators. Coupled with the 290,000 for cockpit systems above, the structural costs so far are 564,750 C-bills.

The 210-rated Fuel Cell engine costs 784,000 C-bills (4,000 x [210 Rating x 70 tons] ÷ 75 = 784,000), and the 3-ton standard gyro costs 900,000 C-bills (300,000 x 3 tons of Gyro = 900,000). Combined with the earlier costs, this brings the running structural costs total to 2,248,750 C-bills (564,750 + 784,000 + 900,000 C-bills = 2,248,750 C-bills).

As the Uni *uses a non-fusion engine, it must pay 2,000 C-bills for its single standard heat sink. It mounts no jump jets and so need not pay for same. The 9 tons of commercial armor cost 27,000 C-bills (3,000 x 9 tons of armor = 27,000 C-bills), bringing the Uni's final structural costs to 2,277,750 C-bills (2,248,750 + 2,000 + 27,000 = 2,277,750).*

Lara's Delphyne-2 *ProtoMech weighs 9 tons and uses all the standard ProtoMech parts (engine, cockpit, musculature, internal structure). It has a 75-rated engine to attain its movement, 5 jump jets for added movement, 2 ProtoMech heat sinks and 40 points of ProtoMech armor. Consulting the ProtoMech Structural Costs Table, Lara finds the basic chassis for her Proto computes as follows:*

500,000 (ProtoMech Cockpit) + 75,000 (Life Support) + 18,000 (Sensors for a 9-ton Proto [2,000 x 9 tons = 18,000]) = 593,000 C-bills for cockpit, life support and sensors.

18,000 (Musculature on a 9-ton Proto [2,000 x 9 tons = 18,000]) + 3,600 (Internal Structure for a 9-ton Proto [400 x 9 tons = 3,600]) + 8,100 (full set of Arm and Leg Actuators for a 9-ton Proto [(2 arms x [180 x 9 tons]) + (1 set of legs x [540 x 9 tons]) = 8,100) = 29,700 C-bills

for musculature, structure and actuators. Coupled with the 593,000 for cockpit systems above, the structural costs so far are 622,700 C-bills.

The 75-rated Fusion engine costs 45,000 C-bills (5,000 x [75 Rating x 9 tons] ÷ 75 = 45,000), and the 5 jump jets installed cost another 45,000 C-bills (200 x [5 Jump Jets]^2 x 9 tons of Proto weight = 45,000). Combined with the earlier costs, this brings the Delphyne-2*'s running structural costs total to 712,700 C-bills (622,700 + 45,000 + 45,000 C-bills = 712,700 C-bills).*

Finally, the Delphyne *must pay 4,000 C-bills for its 2 Proto-Mech heat sinks (2,000 x 2 heat sinks = 4,000), and 25,000 for its 40 points of ProtoMech armor (625 x 40 points = 25,000). This brings the ProtoMech's final structural costs to 741,700 C-bills (712,700 + 4,000 + 25,000 = 741,700).*

In preparing to compute the cost for his Hephaestus OmniVehicle, Michael notes that it is a 30-ton Combat Vehicle with a hover-style motive system. Its internal structure weighs 3 tons. It has 1.5 tons of control components and a 0.5-ton turret. It runs on a standard 110-rated Fusion engine, has 3 tons of lift equipment, 10 heat sinks and 5 tons of Clan ferro-fibrous armor. Mike consults the Combat Vehicle Structural Costs Table to begin computing its costs:

The costs for the Hephaestus' internal structure, controls and lift equipment come to 105,000 C-bills ([10,000 x 3 tons internal structure weight] + [10,000 x 1.5 tons Control weight] + [20,000 x 3 tons Lift Equipment weight] = 105,000).

Its engine costs 220,000 C-bills ([5,000 x 110 Rating x 30 tons] ÷ 75 = 220,000), and its 10 heat sinks are free because the engine type chosen is fusion (which is also why the vehicle need not pay for power amplifiers, as it did not require that any be installed). Coupled with the existing costs and the 2,500 C-bills for turret systems (5,000 x 0.5 tons of Turret weight = 2,500), the Hephaestus' costs are up to 327,500 C-bills (105,000 + 220,000 + 2,500 = 327,500).

The Hephaestus' 5 tons of ferro-fibrous armor add 100,000 C-bills to the total (20,000 x 5 tons of ferro-fibrous armor = 100,000), bringing its final structural costs to 427,500 C-bills (327,500 + 100,000 = 427,500).

Simon's Simca ambulance is a 2.5-ton Wheeled Support Vehicle with an unmodified chassis weighing 300 kilograms (0.3 tons). Its engine—an ICE—weighs 497 kilograms (0.497 tons), and the vehicle uses no power amplifiers, heat sinks or turrets. It carries no armor and has a Structural Tech Rating of D.

Simon computes the Simca's chassis will cost 750 C-bills (2,500 x 0.3 tons of chassis weight [no chassis modifiers applied] = 750), and its engine will cost 2,485 C-bills (5,000 x 0.497 tons of engine weight x 1.0 for ICE = 2,485). As it has no armor, the Simca spends no C-bills on armor costs. Its Structural Tech Rating of D, however, drives the vehicle's structural cost up to 4,043.75 C-bills ([750 + 2,485 + 0] x 1.25 = 4,043.75).

Because the Simca does not include heat sinks, turrets or power amplifiers, such components do not add to the final structural costs.

Christine's Dixon is a 300-ton Airship Support Vehicle with an unmodified chassis weighing 75 tons. Its Fusion engine weighs 19.5 tons. It uses no power amplifiers or turrets, but does carry 6 standard (single) heat sinks. It also carries 104 points of BAR 7 armor—the best it could mount—and has a Structural Tech Rating of D.

Christine computes that the Dixon's chassis will cost 187,500 C-bills (2,500 x 75 tons of chassis weight [no chassis modifiers applied] = 187,500), and its engine will cost 195,000 C-bills (5,000 x 19.5 tons of engine weight x 2.0 for Fusion = 195,000). The Dixon's BAR 7 armor costs 31,200 C-bills (300 x 104 points = 31,200). Combined with the Airship's Structural Tech Rating of D, the vehicle's structural costs are up to 517,125 C-bills ([187,500 + 195,000 + 31,200] x 1.25 = 517,125).

The Dixon's 6 heat sinks add 12,000 C-bills to these structural costs (2,000 x 6 heat sinks = 12,000), for a final structural cost of 529,125 C-bills (517,125 + 12,000 = 529,125).

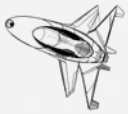
Darrell's conventional infantry platoon is a motorized formation of 28 troopers. These troops possess standard laser rifles as a Primary weapon, and carry no Secondary weapons. After consulting the Conventional Infantry Weapons costs table (pp. 298-301), Darrell looks up the cost of the laser rifle (1,250 C-bills), and finds that the base trooper cost for the platoon will be 70,710.678 C-bills (2,000 x √[1,250] = 70,710.678). As these troops are motorized, this base per-trooper cost becomes 113,137.085 C-bills (70,710.678 x 1.6 for motorized = 113,137.085).

The entire 28-man platoon costs 3,167,838 C-bills (113,137.085 x 28 = 3,167,838.38, rounded down to 3,167,838). This is considered the platoon's final value (unless Darrell chooses to spring for anti-'Mech training).

Max prepares to work up the structural costs for his Purifier battle armor. The Purifier is a medium-class suit, with 1 Ground MP and 3 Jumping MP. It features a single battle claw on one arm and no manipulator on the other. It also features 6 points of mimetic armor.

As it is a medium suit, the Purifier's chassis costs 100,000 C-bills. Its motive systems (ground and jump) add 0 (The suit's minimum 1 Ground MP is cost-free) and 225,000 (75,000 per Jumping MP at medium weight x 3 Jumping MP) C-bills, respectively. The battle claw adds 10,000 C-bills more, while the 6 points of mimetic armor add 90,000 C-bills (6 x 15,000 per point).

The final structural cost for the Purifier suit is 425,000 C-bills (100,000 + 0 + 225,000 + 10,000 + 90,000 = 425,000). Because it is not built using Clan technology, Max does not need to apply the Clan Technology Multiplier. (If he had, the structural costs would have risen to 467,500 C-bills, as the total costs for the Purifier's chassis, motive systems, manipulators, and armor would have been multiplied by 1.1; 1.1 x 425,000 = 467,500.)



Robert wants to find the costs for his 'Mechbuster *(laser variant) conventional fighter. Consulting the Aerospace Units Structural Costs Table, he finds the list of components he needs to know about. As a conventional fighter, the 'Buster uses 5 tons of avionics equipment (rather than an aerospace fighter cockpit and control systems) with no VSTOL gear (though as a fighter it does include landing gear and attitude thrusters). It also has a Structural Integrity of 5, is powered by a 250-rated internal combustion (turbine) engine and carries 4 tons of fuel. In addition, Robert's fighter carries 9 standard (single) heat sinks, 3.5 tons of standard armor and 0.5 tons of power amplifiers for its lasers.*

The 'Mechbuster*'s avionics cost 20,000 C-bills (4,000 x 5 tons of Avionics = 20,000), and its Structural Integrity costs 20,000 (4,000 x 5). In addition, its attitude thrusters cost 25,000 C-bills and its landing gear will cost 500 (10 x 50 tons = 500). So far, the fighter's structural costs are 65,500 C-bills (20,000 + 20,000 + 25,000 + 500 = 65,500).*

The 'Buster*'s 250-rated turbine engine costs 208,333.333 C-bills (1,250 x [250 Rating x 50 tons] ÷ 75 = 208,333.333), while its 4 tons of fuel add 800 C-bills to the costs (200 x 4 tons of fuel = 800). Furthermore, its 3.5 tons of standard armor cost 35,000 (10,000 x 3.5 armor tons = 35,000), and its 9 heat sinks cost a total of 18,000 C-bills (2,000 x 9 sinks = 18,000). Combined with its half-ton of power amplifiers at 10,000 C-bills (20,000 x 0.5 tons of amplifiers), these costs result in a final structural cost of 337,633.333 C-bills (65,500 + 208,333.333 + 800 + 35,000 + 18,000 + 10,000 = 337,633.33).*

Chris' Nekohono'o*-class DropShip weighs 16,000 tons and has a Structural Integrity of 16, a Safe Thrust of 5, an engine weight of 5,200, 408 tons of fuel, 57 tons of ferro-aluminum armor and 295 double heat sinks. It mounts weapons in all six of its firing arcs, and has a total of 42 crew and 219 passengers (counting the bay personnel, whose "quarters" are included with the ship's various battle armor, Small Craft and fighter bays).*

The bridge for this DropShip costs 360,000 C-bills (200,000 + [10 x 16,000 ship tons] = 360,000), while its main computer costs 200,000 and its sensors cost 80,000. Life support for the vessel's passengers and crew costs 1,305,000 C-bills (5,000 x [42 crew + 219 passengers] = 1,305,000). Coupled with 100,000 C-bills for the fire control computers and 60,000 for gunnery control (6 arcs x 10,000 C-bills per arc), the control systems, sensors and life support for the Nekohono'o cost a combined amount of 2,105,000 C-bills (360,000 + 200,000 + 80,000 + 1,305,000 + 100,000 + 60,000 = 2,105,000).

In addition, the Nekohono'o*'s attitude thrusters cost 25,000 C-bills, while its landing gear costs 160,000 C-bills (10 x 16,000 tons = 160,000), and its docking collar costs 10,000. The vessel's Structural Integrity costs 1,600,000 (16 x 100,000 = 1,600,000). Its engine costs are divided among the drive unit at 400,000 (500 x 5 Safe Thrust x [16,000 tons ÷ 100] = 400,000), and the engine itself at 5,200,000 (1,000 x 5,200 engine tons = 5,200,000). In addition, the vessel carries 408 tons of fuel, which costs 81,600 C-bills (408 tons x 200 C-bills per ton = 81,600). These costs, combined with the 2,105,000 above for control systems and such, bring the Nekohono'os costs so far to 9,581,600 C-bills (2,105,000 + 25,000 + 160,000 + 10,000 + 1,600,000 + 400,000 + 5,200,000 + 81,600 = 9,581,600).*

The 57 tons of ferro-aluminum armor the DropShip carries adds another 1,140,000 C-bills to these costs, while the 295 double heat sinks add 1,770,000 more. Combined with the earlier costs, these bring the Nekohono'o's structural value to 12,491,600 C-bills (9,581,600 + 1,140,000 + 1,770,000 = 12,491,600).

BATTLEMECH AND INDUSTRIALMECH STRUCTURAL COSTS AND AVAILABILITY

Component	Cost (in C-bills)	Tech Rating	Availability
Cockpit			
Standard	200,000	D	C-C-C
Small	175,000	E	X-X-E
Industrial (No Fire Control)	100,000	C	B-C-C
Industrial (Advanced Fire Control)	200,000	D	D-E-E
Life Support	50,000	C	C-C-C
Sensors	2,000 x Unit Tonnage	C	C-C-C
Musculature			
Standard	2,000 x Unit Tonnage	D	C-C-C
Triple-Strength Myomer	16,000 x Unit Tonnage	E	X-X-D
Industrial TSM	12,000 x Unit Tonnage	E	X-X-E

BATTLEMECH AND INDUSTRIALMECH STRUCTURAL COSTS AND AVAILABILITY (CONT.)

Component	Cost (in C-bills)	Tech Rating	Availability
Internal Structure			
Standard	400 x Unit Tonnage	D	C-C-C
Endo-Steel	1,600 x Unit Tonnage	E	D-F-E
Industrial	300 x Unit Tonnage	C	C-C-C
Enviro. Sealing (IndustrialMechs only)	225 x Unit Tonnage	C	C-C-C
Actuators (Each)			
Upper Arm	100 x Unit Tonnage	C	C-C-C
Lower Arm	50 x Unit Tonnage	C	C-C-C
Hand	80 x Unit Tonnage	C	C-C-C
Upper Leg	150 x Unit Tonnage	C	C-C-C
Lower Leg	80 x Unit Tonnage	C	C-C-C
Foot	120 x Unit Tonnage	C	C-C-C
Engine			
Standard Fusion	(5,000 x Engine Rating x Unit Tonnage) ÷ 75	D	C-E-D
Light Fusion	(15,000 x Engine Rating x Unit Tonnage) ÷ 75	E	X-X-E
XL Fusion	(20,000 x Engine Rating x Unit Tonnage) ÷ 75	E	D-F-E
Compact Fusion	(10,000 x Engine Rating x Unit Tonnage) ÷ 75	E	X-X-E
Internal Combustion	(1,250 x Engine Rating x Unit Tonnage) ÷ 75	C	A-A-A
Fuel Cell	(3,500 x Engine Rating x Unit Tonnage) ÷ 75	D	C-D-D
Fission	(7,500 x Engine Rating x Unit Tonnage) ÷ 75	D	E-E-D
Gyro			
Standard	300,000 x Gyro Tonnage	D	C-C-C
Compact	400,000 x Gyro Tonnage	E	X-X-E
Heavy Duty	500,000 x Gyro Tonnage	E	X-X-E
XL	750,000 x Gyro Tonnage	E	X-X-E
Jump Jets			
Standard	200 x (Number of Jump Jets)^2 x Unit Tonnage	D	C-C-C
Improved	500 x (Number of Jump Jets)^2 x Unit Tonnage	E	X-X-E
MASC	(1,000 x Engine Rating x MASC Tonnage)	E	D-F-E
Heat Sinks			
Standard (Single) with Fusion Engine	2,000 x (Number of Heat Sinks over 10)	C	B-B-B
Standard with Non-Fusion Engine	2,000 x (Total Number of Heat Sinks)	C	B-B-B
Double	6,000 x (Total Number of Heat Sinks)	E	C-E-D
Power Amplifiers	20,000 x Amplifier Tonnage	D	B-C-B
Tracks	(500 x Engine Rating x Unit Tonnage) ÷ 75	C	D-E-E
Armor			
Standard/Heavy Industrial	10,000 x Armor Tonnage	D	C-C-C
Ferro-Fibrous	20,000 x Armor Tonnage	E	D-F-D
Light Ferro-Fibrous	15,000 x Armor Tonnage	E	X-X-E
Heavy Ferro-Fibrous	25,000 x Armor Tonnage	E	X-X-E
Stealth	50,000 x Armor Tonnage	E	X-X-E
Commercial	3,000 x Armor Tonnage	B	B-B-A
Industrial	5,000 x Armor Tonnage	C	B-C-B

PROTOMECH STRUCTURAL COSTS AND AVAILABILITY

Component	Cost (in C-bills)	Tech Rating	Availability
Cockpit	500,000	F	X-X-E
Life Support	75,000	C	X-X-C
Sensors	2,000 x Unit Tonnage	C	X-X-C
Musculature	2,000 x Unit Tonnage	E	X-X-E
Internal Structure	400 x Unit Tonnage	D	X-X-C
Actuators			
Arm (each, full limb)	180 x Unit Tonnage	D	X-X-D
Legs (both, full limbs)	540 x Unit Tonnage	D	X-X-D
Engine	(5,000 x Engine Rating x Unit Tonnage) ÷ 75	D	X-X-D
Jump Jets	200 x (Number of Jump Jets)^2 x Unit Tonnage	D	X-X-D
ProtoMech Myomer Booster	(1,000 x Engine Rating x Booster Tonnage)	F	X-X-F
Heat Sinks	2,000 x (Total Number of Heat Sinks)	F	X-X-E
Armor	625 x Armor Points	F	X-X-D

COMBAT VEHICLE COSTS AND AVAILABILITY

Component	Cost (in C-bills)	Tech Rating	Availability
Internal Structure	10,000 x Structure Tonnage	B	A-A-A
Control Components	10,000 x Control Tonnage	B	A-A-A
Lift/Dive Equipment	20,000 x Lift/Dive Equipment Tonnage	B	B-B-B
Rotors	40,000 x Rotor Tonnage	B	C-D-C
Engine			
Standard Fusion	(5,000 x Engine Rating x Unit Tonnage) ÷ 75	D	C-E-D
Light Fusion	(15,000 x Engine Rating x Unit Tonnage) ÷ 75	E	X-X-E
XL Fusion	(20,000 x Engine Rating x Unit Tonnage) ÷ 75	E	D-F-E
Compact Fusion	(10,000 x Engine Rating x Unit Tonnage) ÷ 75	E	X-X-E
Internal Combustion	(1,250 x Engine Rating x Unit Tonnage) ÷ 75	C	A-A-A
Heat Sinks			
With Fusion Engine	2,000 x (Number of Sinks over 10)	C	B-B-B
With Non-Fusion Engine	2,000 x (Total Number of Heat Sinks)	C	B-B-B
Armor			
Standard	10,000 x Armor Tonnage	D	C-C-C
Ferro-Fibrous	20,000 x Armor Tonnage	E	D-F-D
Light Ferro-Fibrous	15,000 x Armor Tonnage	E	X-X-E
Heavy Ferro-Fibrous	25,000 x Armor Tonnage	E	X-X-E
Turret	5,000 x Turret Tonnage	B	C-C-C
Power Amplifiers	20,000 x Amplifier Tonnage	D	B-C-B

SUPPORT VEHICLE STRUCTURAL COSTS AND AVAILABILITY

Component	Cost (in C-bills)	Tech Rating*	Availability*
Chassis	2,500 x Chassis Tonnage** x (All Applicable Chassis Modifiers [listed below])		
Amphibious	x 1.25	C	C-D-C
Armored	x 2.0	A	C-E-D
Bicycle	x 0.75	A	A-A-A
Convertible	x 1.1	A	A-A-A
Dune Buggy	x 1.25	B	C-D-C
Environmental Sealing	x 1.75	C	B-D-C
Hydrofoil	x 1.1	B	C-D-C
Monocycle	x 1.3	B	D-D-D
Off-Road	x 1.2	B	B-C-B
Omni	x 1.0	E	X-X-E
Propeller-Driven	x 0.75	B	B-C-B
Snowmobile	x 1.3	B	D-E-D
STOL	x 1.5	C	B-C-B
Submersible	x 3.5	B	C-D-C
Tractor	x 1.1	A	A-A-A
Trailer	x 0.75	A	A-A-A
Ultra-Light	x 1.5	D	C-E-D
VSTOL	x 2.0	C	C-D-C
Engine	5,000 x Engine Tonnage** x (Engine Type Modifier [listed below])		
Steam	x 0.8	A	A-A-A
Internal Combustion	x 1.0	B	A-A-A
Electric (Batteries)	x 1.2	C	A-B-A
Electric (Fuel Cell)	x 1.4	C	B-C-C
Electric (Solar)	x 1.6	C	C-D-C
Fission	x 3.0	C	E-E-D
Fusion	x 2.0	C	C-E-D
Armor	Total Armor Points x (Armor Cost per Point [listed below])		
BAR 2	x 50	A	A-A-A
BAR 3	x 100	A	A-A-A
BAR 4	x 150	B	B-B-A
BAR 5	x 200	B	B-B-B
BAR 6	x 250	C	C-B-B
BAR 7	x 300	C	C-B-B
BAR 8	x 400	D	C-C-B
BAR 9	x 500	D	C-C-C
BAR 10	x 625	D	D-D-D
Final Structural Cost	(Chassis Cost + Engine Cost + Armor Cost) x Tech Rating Multiplier (listed below)		
Tech Rating A	x 0.50	NA	NA
Tech Rating B	x 0.75	NA	NA
Tech Rating C	x 1.00	NA	NA
Tech Rating D	x 1.25	NA	NA
Tech Rating E	x 1.50	NA	NA
Tech Rating F	x 2.00	NA	NA
Heat Sinks	2,000 x Total Number of Heat Sinks	D	B-B-B
Turret	5,000 x Turret Tonnage**	B	A-A-A
Pintle	1,000 x Pintle Tonnage**	B	A-A-A
Power Amplifiers	20,000 x Amplifier Tonnage**	D	B-C-B

*The base Tech Rating and Availability Ratings for Support Vehicle Motive Systems, Chassis, Engines and Armor are determined in the core construction process (starting on p. 116).
**For Small-size Support vehicles, remember to convert kilograms to tonnage (1,000 kg = 1 ton).

BATTLE ARMOR STRUCTURAL COSTS AND AVAILABILITY

Component	Cost (in C-bills)	Tech Rating	Availability
Chassis			
Exoskeleton	50,000	C	D-D-D
PA(L)	50,000	D	E-F-E
Light	50,000	E	X-X-E
Medium	100,000	E	X-X-E
Heavy	200,000	E	X-X-E
Assault	400,000	E	X-X-E
Motive Systems (per MP)			
Ground	25,000	C	D-D-D
Jump	50,000 (PA[L] and Light)	D	E-F-E
	75,000 (Medium)	D	X-X-E
	150,000 (Heavy)	D	X-X-E
	300,000 (Assault)	E	X-X-E
VTOL	50,000 (PA[L] and Light)	F	X-X-F
	100,000 (Medium)	F	X-X-F
UMU	50,000 (PA[L] and Light)	F	X-X-F
	75,000 (Medium)	F	X-X-F
	100,000 (Heavy)	F	X-X-F
	150,000 (Assault)	F	X-X-F
Manipulators (per arm)			
None	0	B	C-C-C
Armored Glove	2,500	C	D-D-D
Basic Manipulator	5,000	C	C-D-C
Basic (Mine-Clearance)	7,500	D	X-X-E
Battle Claw	10,000	E	X-X-E
Battle Claw (Magnets)	12,500	E	X-X-E
Battle Claw (Vibro-Claw)	15,000	E	X-X-E
Heavy Battle Claw	25,000	E	X-X-E
Heavy Battle Claw (Magnets)	31,250	E	X-X-E
Heavy Battle Claw (Vibro-Claw)	30,000	E	X-X-E
Salvage Arm	50,000	D	E-E-E
Cargo Lifter (per 0.5 ton cap.)	500	C	D-D-D
Industrial Drill	2,500	C	D-D-D
Modular Equipment Adaptors	10,000	E	X-X-E
Armor (per Armor Point)			
Standard, Prototype	10,000	E	X-X-F
Standard	10,000	E	F-F-E
Standard, Advanced	12,500	E	X-X-F
Stealth, Prototype	50,000	E	X-X-F
Stealth, Basic	12,000	E	F-F-E
Stealth, Standard	15,000	E	F-X-E
Stealth, Improved	20,000	E	X-X-F
Fire Resistant	10,000	F	X-X-F
Mimetic	15,000	E	X-X-F
Clan Technology Multiplier	1.1 x (Chassis Costs + Motive System Costs + Manipulator Costs + Armor Costs)		

*Do not count free MPs provided by chassis minimums or additional MP generated by Partial Wings or Jump Boosters

BASE CONVENTIONAL INFANTRY COSTS AND AVAILABILITY

Base Trooper Cost = 2,000 x √ (Weapon Cost)

Component	Cost (in C-bills)	Tech Rating	Availability
Motive Type			
Foot	x 1.0	A	A-A-A
Motorized	x 1.6	B	A-A-A
Jump	x 2.6	D	B-B-B
Mechanized (Hover)	x 3.2	C	A-B-A
Mechanized (Wheeled)	x 3.2	A	A-A-A
Mechanized (Tracked)	x 3.2	B	B-C-B
Special			
Anti-'Mech Training and Equipment	x 5.0	D	D-D-D

WEAPONS AND EQUIPMENT

The Weapons and Equipment Cost Tables in this section are used to find the additional cost—beyond that of the aforementioned structural components—for any armaments and other items mounted or carried by a given unit. As a general guide, when using these figures to compute a unit's final cost, it is not necessary to purchase ammunition for ammo-based weaponry. (Combat units, after all, are generally assembled with weapons and fuel tanks empty to avoid mishaps, and ammo purchases are best left up to field commanders.)

The cost of all weapons and equipment are added to the structural costs for the unit.

Special Exemption:
Crew/Passenger Quarters and Infantry Bays/Compartments

Under certain circumstances, crew and passenger quarters on select units—as well as infantry compartments and bays (including Battle Armor bays)—are considered free when computing a unit's C-bill value.

For DropShips and Small Craft, any and all crew/passenger quarters, infantry bays and infantry compartments are considered cost-free, regardless of the quarters or infantry bay type (this cost is considered to be incorporated into the structural and life support costs already incurred by the vessel itself).

For Support Vehicles, only the quarters, seating, and infantry compartments/bays the designer elects to pay for in weight (as opposed to provided free with the chassis design), apply a C-bill cost to the unit's design.

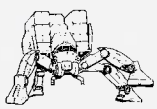
For all other units, C-bill costs for quarters, seating, and infantry bays or compartments apply only if the unit specifically invests weight in such items. Otherwise, it is considered to be a part of the unit's structural and control systems.

Omni Units

Units built with modular technologies (OmniMechs, OmniVehicles, Support OmniVehicles, OmniFighters and battle armor with modular mounts) must compute at least the cost for their base (unloaded) designs. These costs do not include any pod-mounted weapons or items, but must include any weapons and equipment that is "fixed" on the design. Costs for each configuration may be computed when such configurations are finalized, using the cost of the base configuration's structure and weapons as a starting point.

Andrew's MON-66 Mongoose *is equipped with a Beagle active probe, 3 medium lasers and a small laser. The active probe costs 200,000 C-bills, the medium lasers are 40,000 each and the small laser is 11,250. The combined cost for these weapons comes to 331,250 C-bills (200,000 + [3 x 40,000] + 11,250 = 331,250).*

Combined with the structural costs determined earlier, the Mongoose *currently has a price tag of 1,783,583.333 C-bills (1,452,333.333 + 331,250 = 1,783,583.333).*



Geoffrey's 70-ton Uni *CargoMech carries 2 lift hoists and devotes 17 tons to basic cargo. The lift hoists cost 50,000 C-bills each, and the basic cargo space is free. This means the* Uni*'s equipment costs a grand total of 100,000 C-bills.*

Combined with its final structural costs of 2,277,750 C-bills, the Uni *is currently worth 2,377,750 C-bills (2,277,750 + 100,000 = 2,377,750).*

Lara's Delphyne-2 *ProtoMech carries 2 ER micro lasers and 2 SRM-3 launchers. The ER micro lasers are worth 10,000 C-bills each, while the SRM-3s—which ProtoMechs purchase by the tube for "non-standard" rack sizes—cost 30,000 C-bills apiece (3 [ProtoMech] SRM tubes x 10,000 C-bills per tube = 30,000). The SRM ammunition need not be purchased at this time, so the* Delphyne-2*'s weapons load costs a total of 80,000 C-bills ([2 x 10,000] + [2 x 30,000] = 80,000).*

With 741,700 C-bills in structural costs, the Delphyne*'s weapons bring its price tag to 821,700 C-bills thus far (741,700 + 80,000 = 821,700).*

AEROSPACE UNIT STRUCTURAL COSTS AND AVAILABILITY

Component	Cost (in C-bills)	Tech Rating	Availability
Cockpit/Controls (Aerospace Fighter)			
Cockpit	200,000	C	C-C-C
Life Support	50,000	C	C-C-C
Sensors	2,000 x Fighter Tonnage	C	C-C-C
Cockpit/Controls (Conventional Fighter)			
Avionics	4,000 x Control Tonnage	C	C-D-C
VSTOL	5,000 x VSTOL Tonnage	C	C-D-C
Cockpit/Controls (DropShips and Small Craft)			
Bridge	200,000 + (10 x Unit Tonnage)	C	C-C-C
Computer	200,000	B	C-C-C
Life Support	5,000 x (Total Passengers + Crew)	C	C-C-C
Sensors	80,000	C	C-C-C
Fire Control Computer	100,000	C	C-C-C
Gunnery Control Systems	10,000 x (Number of Arcs with Weapons)	C	C-C-C
Structure/Structural Integrity			
Aerospace Fighter	50,000 x Structural Integrity Value	C	C-D-D
Conventional Fighter	4,000 x Structural Integrity Value	C	C-C-C
DropShip/Small Craft	100,000 x Structural Integrity Value	C	D-D-D
Additional Flight Systems			
Attitude Thruster (All craft)	25,000	C	C-C-C
Landing Gear (All craft)	10 x Unit Tonnage	B	C-C-C
Docking Collar (DropShips only)	10,000	C	D-C-C
Engine			
Standard Fusion (All Fighters)	(5,000 x Engine Rating x Unit Tonnage) ÷ 75	D	C-E-D
Light Fusion (Aerospace Fighters)	(15,000 x Engine Rating x Unit Tonnage) ÷ 75	E	X-X-E
XL Fusion (Aerospace Fighters)	(20,000 x Engine Rating x Unit Tonnage) ÷ 75	E	D-F-E
Compact Fusion (Aerospace Fighters)	(10,000 x Engine Rating x Unit Tonnage) ÷ 75	E	X-X-E
Internal Combustion (Conventional Fighters)	(1,250 x Engine Rating x Unit Tonnage) ÷ 75	C	A-A-A
Drive Unit (DropShips/Small Craft)	500 x Safe Thrust x (Unit Tonnage ÷ 100)	D	C-D-C
Engine (DropShips/Small Craft)	1,000 x Engine Tonnage	D	C-E-C
Fuel Tanks	200 x Fuel Tonnage	B	A-A-A
Armor			
Standard	10,000 x Armor Tonnage	D	B-B-B
Ferro-Aluminum	20,000 x Armor Tonnage	E	D-F-D
Light Ferro-Aluminum	15,000 x Armor Tonnage	E	X-X-E
Heavy Ferro-Aluminum	25,000 x Armor Tonnage	E	X-X-E
Heat Sinks			
Standard	2,000 x (Total Number of Heat Sinks)	C	B-B-B
Double	6,000 x (Total Number of Heat Sinks)	E	C-E-D
Power Amplifiers	20,000 x Amplifier Tonnage	D	B-C-B

As an OmniVehicle, Michael's Hephaestus only has two "fixed" items on its base design: a Clan active probe (worth 200,000 C-bills), and 4 tons of standard cargo space (free), which is normally devoted to infantry. Combined with a structural cost of 427,500 C-bills, this means the Hephaestus' base configuration has a current cost of 627,500 C-bills (427,500 + 200,000 = 627,500).

Using that base cost, Michael notes that his Primary configuration for the Hephaestus adds 2 Clan medium pulse lasers (60,000 C-bills each), TAG (50,000 C-bills) and a Clan ECM suite (200,000 C-bills). Together with the 627,500 C-bill cost for the base configuration, the Hephaestus Primary has a current price of 997,500 C-bills (627,500 + [2 x 60,000] + 50,000 + 200,000 = 997,500).

Simon's Simca ambulance carries 4 items of paramedic equipment worth 7,500 C-bills each, plus four extra seats used to represent stretcher and passenger space (each worth 100 C-bills), a 136-kilogram basic cargo space (free), and a rear bay door worth 1,000 C-bills. Together, these items add 31,400 C-bills to the Simca's costs ([4 x 7,500] + [4 x 100] + 0 + 1,000 = 31,400). In addition, the Simca's three crew seats add 300 C-bills more to the equipment costs for 31,700 C-bills in total equipment (31,400 + [3 x 100] = 31,700).

Together with its 4,043.75-C-bill structure costs, the Simca is currently worth 35,743.75 C-bills (4,043.75 + 31,700 = 35,743.75).

Christine's Dixon carries 4 machine guns (5,000 C-bills each) and 2 medium lasers (40,000 C-bills each) for a total of 100,000 C-bills in weapons ([4 x 5,000] + [2 x 40,000] = 100,000), for which she has also installed basic fire control worth 5,000 C-bills (5 percent of 100,000 C-bills = 5,000), giving a weapons and fire control weight of 105,000 C-bills.

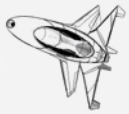
The Airship also carries 4 sprayers (1,000 C-bills each), which require 10 tons of liquid storage and pumps (1,000 C-bills; 100 C-bills x 10 C-bills per ton = 1,000 C-bills), 3 light vehicle bays (10,000 C-bills each), 3 bay doors (1,000 C-bills each) and an arresting lift hoist (50,000 C-bills). In addition, the Dixon boasts 6 tons of communications equipment (at 10,000 C-bills per ton), 2 mounted searchlights (2,000 each) and 6 tons of infantry compartments worth 0 C-bills per ton (as they were added over and above the weight-free crew and passenger facilities, the Dixon would invest in these added facilities; but as because Christine chose the minimalist compartments over dedicated infantry bays, these compartments have a base cost of 0 C-bills per ton). The remaining standard cargo space is free, so the various added equipment comes to a total of 151,100 C-bills ([4 x 1,000] + 1,000 + [3 x 10,000] + [3 x 1,000] + 50,000 + [6 x 10,000] + [2 x 2,000] + [6 x 0] = 152,000). Combined with the 105,000 C-bills for weapons and fire control, the Dixon's total investment in weapons and equipment comes to 257,000 C-bills.

With a structural cost of 529,125, the current total cost for the Dixon comes to 786,125 C-bills (529,125 + 257,000 = 786,125).

Max's Purifier battle armor incorporates a single modular weapon mount rather than a dedicated weapon. This mount costs 1,000 C-bills, which combines with the battlesuit's 425,000 C-bill structure cost for a running total of 426,000 C-bills in its base configuration.

Based on this price, Max also computes that the Primary (ER small laser) configuration of his suit will add 11,250 C-bills to this cost, for a current Primary Purifier cost of 437,250 C-bills (426,000 + 11,250 = 437,250).

*Robert's '*Mechbuster *(laser variant) carries 3 medium lasers for armaments at a cost of 40,000 per weapon. With no other weapons components installed, the fighter's weapons add to its 337,633.333 C-bill structure costs to produce a current total of 457,633.333 C-bills (337,633.333 + [3 x 40,000] = 457,633.333).*



For weapons alone, Chris' Nekohono'o*-class DropShip carries 3 Kraken-T capital missile launchers (500,000 C-bills each), 2 screen launchers (250,000 each), 2 MRM 40s (350,000 each), 5 Streak SRM-6s (120,000 each), 6 MRM-30s (225,000 each), 4 gauss rifles (300,000 each), 4 LRM-20s with Artemis (350,000 each), 10 ER PPCs (300,000 each), 10 LB 10-X ACs (400,000 each), 6 Streak SRM-4s (90,000 each), 6 ER medium lasers (80,000 each) and 7 large pulse lasers (at 175,000 each). The total for these weapons comes to 16,495,000 C-bills ([3 x 500,000] + [2 x 250,000] + [2 x 350,000] + [5 x 120,000] + [6 x 225,000] + [4 x 300,000] + [4 x 350,000] + [10 x 300,000] + [10 x 400,000] + [6 x 90,000] + [6 x 80,000] + [7 x 175,000] = 16,495,000).*

In addition, the DropShip has 6 fighter and 9 Small Craft cubicles (all at 20,000 C-bills each), 27 battle armor squad cubicles (considered free; counted toward quarters/life support costs), 8 bay doors (at 1,000 C-bills each) and 6 escape pods (5,000 each). Quarters for the crew and passengers, again, are not counted toward pricing, as they are considered part of the life support costs and vessel structure. Neither is the 1,548.5-ton capacity standard cargo bay. This means that the various non-weapon items add another 338,000 C-bills to the Nekohono'o*'s cost ([6 x 20,000] + [9 x 20,000] + [27 x 0] + [8 x 1,000] + [6 x 5,000] = 338,000).*

Combined, the 12,491,600 C-bills of structural costs, plus the 16,495,000 C-bills of weapons and the 338,000 of non-weapon items, bring the Nekohono'o *to a current (unloaded) price of 29,324,600 C-bills.*

FINAL UNIT COSTS

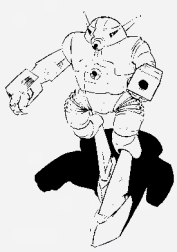
Once a unit's structural costs have been added to its weapons and equipment costs, the unit's final total cost may be computed by factoring in any Omni Conversion costs, unit cost multipliers and such. These final costs account for extra features that affect the design overall, as well as the labor, support, resource processing and other abstract minutiae that can go into unit design.

The Final Unit Cost Formulas Table (see p. 285) shows how each unit sums up its appropriate structural and weapons costs, and applies any Omni Conversion costs, as well as giving final unit computation values. Once applied, the unit's final cost may be rounded as indicated under *Basic Cost Calculations* (see p. 274).

FINAL UNIT COST FORMULAS TABLE

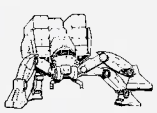
BattleMechs:	(Structural Cost + Weapon/Equipment Costs) x (Omni Conversion Cost*) x (1 + [Total Tonnage ÷ 100])
IndustrialMechs:	(Structural Cost + Weapon/Equipment Costs) x (1 + [Total Tonnage ÷ 400])
ProtoMechs:	(Structural Cost + Weapon/Equipment Costs) x (1 + [Total Tonnage ÷ 100])
Combat Vehicles	
Tracked:	(Structural Cost + Weapon/Equipment Costs) x (Omni Conversion Cost*) x (1 + [Total Tonnage ÷ 100])
Wheeled:	(Structural Cost + Weapon/Equipment Costs) x (Omni Conversion Cost*) x (1 + [Total Tonnage ÷ 200])
Hover:	(Structural Cost + Weapon/Equipment Costs) x (Omni Conversion Cost*) x (1 + [Total Tonnage ÷ 50])
VTOL:	(Structural Cost + Weapon/Equipment Costs) x (Omni Conversion Cost*) x (1 + [Total Tonnage ÷ 30])
Surf. Naval:	(Structural Cost + Weapon/Equipment Costs) x (Omni Conversion Cost*) x (1 + [Total Tonnage ÷ 200])
Hydrofoil:	(Structural Cost + Weapon/Equipment Costs) x (Omni Conversion Cost*) x (1 + [Total Tonnage ÷ 75])
Submarine:	(Structural Cost + Weapon/Equipment Costs) x (Omni Conversion Cost*) x (1 + [Total Tonnage ÷ 50])
WiGE:	(Structural Cost + Weapon/Equipment Costs) x (Omni Conversion Cost*) x (1 + [Total Tonnage ÷ 25])
Support Vehicles	
Tracked:	(Structural Cost + Weapon/Equipment Costs) x (Omni Conversion Cost*) x (1 + [Total Tonnage ÷ 100])
Wheeled:	(Structural Cost + Weapon/Equipment Costs) x (Omni Conversion Cost*) x (1 + [Total Tonnage ÷ 200])
Hover:	(Structural Cost + Weapon/Equipment Costs) x (Omni Conversion Cost*) x (1 + [Total Tonnage ÷ 50])
VTOL:	(Structural Cost + Weapon/Equipment Costs) x (Omni Conversion Cost*) x (1 + [Total Tonnage ÷ 30])
Airship:	(Structural Cost + Weapon/Equipment Costs) x (Omni Conversion Cost*) x (1 + [Total Tonnage ÷ 10,000])
Fixed-Wing:	(Structural Cost + Weapon/Equipment Costs) x (Omni Conversion Cost*) x (1 + [Total Tonnage ÷ 50])
Naval (All):	(Structural Cost + Weapon/Equipment Costs) x (Omni Conversion Cost*) x (1 + [Total Tonnage ÷ 100,000])
WiGE:	(Structural Cost + Weapon/Equipment Costs) x (Omni Conversion Cost*) x (1 [Total Tonnage ÷ 25])
Battle Armor:	(Structural Cost + Weapon/Equipment Costs + Training Cost**) x (Number of Troopers per Squad/Point)
Conv. Fighters:	(Structural Cost + Weapon/Equipment Costs) x (1 + [Total Tonnage ÷ 200])
Aerospace Fighters:	(Structural Cost + Weapon/Equipment Costs) x (Omni Conversion Cost*) x (1 + [Total Tonnage ÷ 200])
Small Craft:	(Structural Cost + Weapon/Equipment Costs) x (1 + [Total Tonnage ÷ 50])
Spheroid DropShips:	(Structural Cost + Weapon/Equipment Costs) x 28
Aerodyne DropShips:	(Structural Cost + Weapon/Equipment Costs) x 36

*Omni Conversion Cost (BattleMechs, Combat Vehicles, Support Vehicles and Aerospace Fighters only) = 1.25; If the unit is not built as an Omni, this value is 1.
**Battle Armor Training Cost = 150,000 for Inner Sphere troopers; 200,000 for Clan troopers



The combined structural and weapons costs for Andrew's MON-66 Mongoose *come to 1,783,583.333 C-bills. As it is not an Omni, it does not apply an Omni Conversion cost, and applies the BattleMech Final Cost Formula as follows:*

(1,783,583.333 [Structure + Weapons/Equipment]) x 1 (Non-Omni) x (1 + [25 tons ÷ 100]) = 2,229,479.166, rounded down to 2,229,479 C-bills.



The combined structural and weapons costs for Geoffrey's Uni *come to 2,377,750 C-bills. Geoff applies the IndustrialMech Final Cost Formula as follows:*

(2,377,750 [Structure + Weapons/Equipment]) x (1 + [70 tons ÷ 400]) = 2,793,856.25 C-bills, rounded down to 2,793,856 C-bills.

The combined structural and weapons costs for Lara's Delphyne-2 *came to 821,700 C-bills. She applies the ProtoMech Final Cost Formula as follows:*

(821,700 [Structure + Weapons/Equipment]) x (1 + [9 tons ÷ 100]) = 895,653 C-bills.

The base cost for Michael's Hephaestus OmniVehicle is a combined structural and equipment cost of 627,500, which works this way (using the Final Cost Formula for a Hover Combat Vehicle):

(627,500 [Structure + Weapons/Equipment]) x 1.25 (Omni) x (1 + [30 tons ÷ 50]) = 1,255,000 C-bills.

The Primary configuration, which boasts more firepower, uses the same method to determine its final cost:

(997,500 [Structure + Weapons/Equipment]) x 1.25 (Omni) x (1 + [30 tons ÷ 50]) = 1,995,000 C-bills.

Simon's Simca ambulance has a combined structural and weapons cost of 35,743.75. As it is not an Omni, it does not apply an Omni Conversion cost, and applies the Final Cost Formula for a Wheeled Support Vehicle as follows:

(35,743.75 [Structure + Weapons/Equipment]) x 1 (Non-Omni) x (1 + [2.5 tons ÷ 200]) = 36,190.547, rounded up to 36,191 C-bills.

The structural and weapons costs for Christine's Dixon Airship came to 786,125. As it is not an Omni, it does not apply an Omni Conversion cost, and applies the Final Cost Formula for an Airship Support Vehicle like so:

(786,125 [Structure + Weapons/Equipment]) x 1 (Non-Omni) x (1 + [300 tons ÷ 10,000]) = 809,708.75, rounded up to 809,709 C-bills.

The base cost for Max's Purifier battlesuit is a combined structural and equipment cost of 451,000 C-bills, is used by Inner Sphere troops (thus incurring Inner Sphere training costs), and is typically employed by ComStar or Word of Blake, who use 6-man squads. Its final costs therefore work out like so (using the Final Cost Formula for battle armor):

(426,000 [Structure + Weapons/Equipment] + 150,000 [Training]) x (6 troops per squad) = 3,456,000 C-bills.

In its ER small laser configuration, the same method is used to determine its final cost:

(437,250 [Structure + Weapons/Equipment] + 150,000 [Training]) x (6 troops per squad) = 3,523,500 C-bills.

The structural and weapons costs for Robert's 'Mechbuster *conventional fighter came to 457,633.333. The Final Cost Formula for this unit is computed as follows:*

(457,633.333 [Structure + Weapons/Equipment]) x (1 + [50 tons ÷ 200]) = 572,041.666, rounded up to 572,042 C-bills.

The structural and weapons costs for Chris' Nekohono'o *DropShip (a Spheroid design) came to 29,234,600. The Final Cost Formula for this unit is computed as follows:*

(29,324,600 [Structure + Weapons/Equipment]) x 28 = 821,088,800 C-bills.

AVAILABILITY

Not used in *Total Warfare* game play, but useful for campaign settings, role-playing or even setting a given design in an historical context, a unit's availability (as it applies to construction) determines the earliest time period at which it can be constructed. This availability is expressed in two main ways: by a standard Availability Rating, and by years of introduction (as well as extinction and reintroduction, when applicable). These methods help designers find the relative accessibility of a unit constructed using certain components throughout the major three eras of *BattleTech* history.

AVAILABILITY RATINGS

Similar to the Technology Rating values used in Support Vehicle construction, Availability Ratings provide a three-letter code that loosely defines a given item or unit's general availability within three major periods of *BattleTech* history.

The letter grades (A through F) reflect the relative commonality of an item or unit in a given age, with A reflecting a very common item, and F indicating an item nearly impossible to find. A letter grade of "X" indicates an item that simply does not exist in a given era. The Availability Codes Table below provides a basic guide to what each code letter means in turn.

For a unit or item's overall Availability Rating, the designer will find three letter grades, separated by hyphens, which correspond to the three main eras of *BattleTech* history. These eras are (respectively): the Age of War through the Star League period (up to 2800), the Succession Wars period (2801 to 3050) and the Clan Invasion era (3051 to the present).

Combined with the letter grades, the standard Availability Rating shows a unit or item's availability throughout history, from the perspective of an Inner Sphere designer. For instance, an Availability Rating of "X-E-D" would describe an item that did not exist in the Age of War and Star League era, was rare in the Succession Wars, and remains somewhat hard to find after the arrival of the Clans. Availability Codes are not always related to an item's Technology Rating; even if an item could be manufactured prior to its availability, mass production of it may simply have been limited or non-existent for economic or philosophical reasons prior to its introduction.

Clan Ratings

The Standard Availability Ratings codes apply primarily to units and items of Inner Sphere design and production. For units constructed with a Clan Tech Base, the following guidelines apply to equipment entries shared with the Inner Sphere:

First, the Clans did not exist in the Age of War or Star League period, and so consider only two periods of availability: the Succession Wars era and the Clan Invasion era.

Second, though the Clans did not exist during the Star League, they benefited from the peak of Star League engineering. Therefore, units with a Clan Technology Base use the first Availability Code (for the Age of War/Star League period) in place of the middle Availability Code (for the Succession Wars period).

Third, if the item is a piece of military technology or is used in the core construction of military units (BattleMechs, ProtoMechs, Combat Vehicles, battle armor or aerospace units), this code is further reduced by one level (to a minimum of A) among the Clans. Items of non-military application or that are used in the core construction of IndustrialMechs and Support Vehicles do not change their letter grade.

AVAILABILITY CODES TABLE

Code	Availability
A	Very Common
B	Common
C	Uncommon
D	Rare

Code	Availability
E	Very Rare
F	Unique
X	Item does not exist in this era

Fourth, if a listed item has a Clan Extinction year that falls within the period referenced (such as standard autocannons, which went extinct for the Clans in the 2850s), the Availability Code instead must be increased by two letter grades (to a maximum of F), *and* any ratings shown for periods after that era (such as the Clan Invasion period, which follows the Succession Wars era) automatically receive a value of F.

Fifth, any items introduced in an era that otherwise do not exist in the Inner Sphere (such as the Ultra AC/2, Ultra AC/10 and Ultra AC/20) receive an Availability Code of D for that era, dropping to C in the following era.

Finally, any items not introduced during the Age of War/Star League era, and that have no introduction date for the Clans, may not receive a Clan Availability Rating, and so have an X for both eras.

INTRODUCTION AND EXTINCTION DATES

In addition to the general Availability Ratings, all items also present up to three dates (years) for the Inner Sphere and the Clans, respectively. These dates note when the items or components were first introduced in a final production-quality form (and which faction introduced them). Also presented is when the item went extinct for the Inner Sphere (and/or the Clans, if applicable), and when it was reintroduced (if it went extinct and was subsequently rediscovered).

When constructing units for a certain time period, a designer must note whether or not the items and components that go into the unit's design are even in production at the desired time. These dates are absolute, and take precedence even if the item is shown as being available by its Availability Rating alone. For instance, a unit being constructed before the Star League's creation (in 2571) cannot mount an ER large laser (even though that weapon has an Age of War/Star League era Availability Rating of E), because the ER large laser wasn't developed until 2620. It should also be noted that units of a given type (such as BattleMechs, ProtoMechs, and so on) may not be introduced before the dates given for them in the Unit Type Introduction Dates Table below.

The same generally applies to items and components that have gone extinct. Though surplus parts may have lingered for decades or even centuries, units defined by a full-scale production year cannot be made using items that have previously gone extinct (and have yet to be reintroduced). Units

UNIT TYPE INTRODUCTION DATES

Unit Type	Year of Introduction (Era)*
BattleMechs	2443 (Age of War)
IndustrialMechs	2300 (Pre-Age of War)
ProtoMechs	3060
Vehicles (Combat and Support)	
Wheeled	Pre-Spaceflight
Tracked	Pre-Spaceflight
Hovercraft	Pre-Spaceflight
Naval (Displacement Hull)	Pre-Spaceflight
Naval (Hydrofoil)	Pre-Spaceflight
Naval (Submarine)	Pre-Spaceflight
VTOL	Pre-Spaceflight
WiGE	Early Spaceflight
Airship	Pre-Spaceflight
Fixed-Wing	Pre-Spaceflight
Battle Armor	
Exoskeletons	Early Spaceflight
Power Armor (Light)	2710 (Star League)
Light Battle Armor	2870 (Succession Wars [Early Clans])
Medium Battle Armor	2868 (Succession Wars [Early Clans])
Heavy Battle Armor	2875 (Succession Wars [Early Clans])
Assault Battle Armor	2877 (Succession Wars [Early Clans])
Conventional Infantry	
Foot	Pre-Spaceflight
Motorized	Pre-Spaceflight
Jump	Early Spaceflight
Mechanized (Wheeled)	Pre-Spaceflight
Mechanized (Tracked)	Pre-Spaceflight
Mechanized (Hover)	Pre-Spaceflight
Conventional Fighter	Pre-Spaceflight
Aerospace Fighter	Early Spaceflight
Small Craft	
Aerodyne	Early Spaceflight
Spheroid	Early Spaceflight
DropShip	
Aerodyne	2480 (Age of War)
Spheroid	2470 (Age of War)

*Entries of "Pre-Spaceflight" reflect units developed in or before 1950; Entries of "Early Spaceflight" reflect units developed between 1950 and 2200

constructed that carry "extinct" technologies may exist, however, as "one-off" units: Custom units built using scavenged parts left over from bygone eras.

A listing of "PS" or "Pre-Spaceflight" for an introduction date indicates an item that existed up to around 1950, before humankind first left Terra in the *BattleTech* universe. Any listing of "ES" or "Early Spaceflight" indicates an item or component with an introduction date between 1950 and 2200, the time between humankind's first tentative steps into space to the eventual colonization of other stars. Any entry with a dash listing ("—") indicates an item that either pre-existed and did not require introduction, or (in the case of extinction dates) which has not gone extinct since its introduction. An entry of "NA" indicates a non-applicable date, and appears for items that were either never introduced to begin with (such as light ACs for the Clans) or never went extinct, and therefore receive no reintroduction dates.

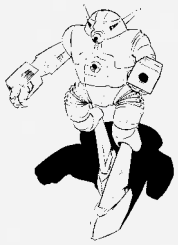
Late-Era Units: A certain amount of common sense should also be applied when defining a unit's overall availability within its era. Designers should also bear in mind how close a unit's chosen introduction date might fall to the beginning or end of an era it falls into. A unit that debuts later in a given era would receive a less common availability rating than it normally would for something created at the peak of that era or close to its start. Designers creating "late-era" units should thus feel free to increase the letter code for any units produced within the final 20 to 50 years of an era, raising the availability by 1 letter (from "D" to "E", for example) if the unit debuted within 50 to 20 years of the end of an era. If the unit debuted within 20 years of the end of a given era, the designer should raise its availability letter code by 2 levels.

Regardless of how close to the end of an era a unit debuts, the maximum availability code it can receive in any era where it has not gone extinct is always "F". Furthermore, it must be noted that Availability codes may only increase within a given era; regardless of how close a unit debuts to the dawn of a given era, it may not be rated as more common than its most uncommon components.

DETERMINING A UNIT'S FINAL AVAILABILITY

To find a unit's final availability, the designer must note its date of introduction and the highest Availability Codes for all of its various component types. The date of the unit's introduction—determined solely by the designer—verifies whether or not it may exist at all in the period in which it was created, and rates any time period before that with an Availability Code of "X". The remaining Availability Codes are found based on the highest code provided for all of the unit's components in each era.

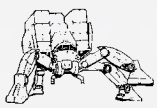
For instance, if the designer creates a BattleMech for the year 3025 (late in the Succession Wars), the unit automatically receives an Availability Code of X for the Age of War/Star League era. If the highest Availability Code among all its component items in the Succession Wars is D (such as for the large laser), it receives a D for its middle code. If its highest-rated Availability Code for the Clan Invasion is C, it receives a C for the Clan Invasion era, and so the unit's entire Availability Rating is considered X-D-C, with an introduction date of 3025.



While determining the availability of his MON-66 Mongoose, *Andrew first decides that it will enter production in 2660—the height of the Star League. Reviewing its components, he makes sure that all of them were in production by that time (including its endo steel internal structure, ferro-fibrous armor and Beagle active probe), meaning that all components have introduction dates before the* Mongoose*'s year of introduction, and no extinction dates until after that same year. The choice of production date ensures that the* Mongoose *will have Availability Codes for each of the three main eras, while its year of introduction will indicate to any players exactly when the machine entered production.*

Combing the eras one at a time, and looking up the Availability Codes of each component used in the Mongoose*'s design, Andrew finds that the Beagle active probe was its most restrictive component during the Age of War/Star League era, with an availability of E. In the Succession Wars era, the endo steel structure, ferro-fibrous armor and the Beagle are all the most restrictive at an "F" rating, while in the Clan Invasion era these same components have the highest ratings at "D"..*

The Mongoose *therefore receives a final Availability Rating of E-F-D.*



Geoffrey decides that his ATAE-70 Uni CargoMech *debuted in 3050. This automatically gives it an availability code of "X" for the Star League era. For the eras that remain, the most difficult to come by component in the* Uni*'s design is its fuel cell engine (which rates a "D" in both the Succession Wars and Clan Invasion eras). Because the* Uni *entered production at the very end of the Succession Wars era (in 3050), Geoff considers it a "late-era" design and so raises its Availability Rating for the Succession Wars era two letter codes (to "F"). In the Clan Invasion era, this Availability Rating returns to its normal level of "D". Thus, the "*Uni*" receives a final Availability Rating of "X-F-D".*

ProtoMechs simply did not exist before 3060, and Lara decides that her Delphyne-2 *debuted around 3067, making it a very new machine indeed. This date also assures that the unit receives an X for the Succession Wars era—the first of the only two Availability Codes available to Clan-made units.*

As a ProtoMech, many of the Delphyne*'s components are already most restrictive, with the ProtoMech heat sinks and cockpit (base Availability X from the Inner Sphere standings) taking the highest place. Because these technologies were introduced by the Clans and do not exist in the Inner Sphere, their code (for Clan forces only) is E. The* Delphyne-2 *thus has a final Availability Rating of X-X-X for the Inner Sphere, but X-E for the Clans.*

Michael determines that his Hephaestus OmniVehicle entered production in the Clan homeworlds in late 3064, which automatically gives it an Availability Code of X for the Star League and Succession War periods as far as both the Clans and the Inner Sphere are concerned. Its development as an Omni, coupled with its active probe, makes it a D unit in its Base and Primary configurations, and so it receives a final Availability Code of X-X-D from the Inner Sphere perspective. Because it is Clan-made, it also receives a Clan Availability Rating, which converts the Inner Sphere codes to X-C, reflecting a unit that does not exist in the Succession Wars time period but is much more accessible to Clan forces in the Invasion era.

Simon decides that his Simca ambulance is essentially the latest name brand for a long line of rescue Support Vehicles that its stats represent, stretching back as far as the 2400s. Its base chassis and engines, as a result, happen to come in at A-A-A. However, the paramedic equipment it carries is hardest to come by, with C codes in all eras. This results in a unit rated C-C-C in all eras of play.

For Christine's Dixon Airship (which she decides to introduce in 2705), the choice of size, chassis type and Fusion engine alone have ensured that its availability from the Star League era through the Succession Wars is set firmly at E. The use of an arresting hoist, however, drives its availability up to E in the Clan Invasion era, producing a unit that has a final Availability Rating of E-E-E.

In determining the availability of his motorized laser platoon, Darrell recognizes that he went for ultra-generic troops, wielding standard laser weapons that have equivalents stretching back at least as far as the 25th century. These weapons have Availability Codes B-C-B, which overshadows the B-B-B codes given to their motorized movement system. Darrell's motorized infantry platoon therefore claims a final Availability Rating of B-C-B.

Max works up the availability for his Purifier battle armor. Battle armor technology as such did not exist in the Inner Sphere prior to the Clan invasion, and the Purifier, he has decided, emerged only as recently as 3062. This gives it an X Availability Code for the Age of War/Star League and Succession Wars eras. In addition, Inner Sphere battle armor (except for exoskeletons) rates an E by default. However, in the case of Max's Purifier, this is superseded by the suit's mimetic armor technology, which has a code of F. The Purifier therefore has a final Availability Rating of X-X-F.

For the availability of his 'Mechbuster *(laser variant) conventional fighter, Robert decides upon an introduction date of 3023, the tail end of the Succession Wars. This automatically gives it an Age of War/Star League Availability Code of X, while its design as a conventional fighter gives it a high code of D in the Succession Wars (where large-scale factory production had been heavily damaged). By the time of the Clan Invasion, the 'Buster's highest Availability Code goes to C, giving the fighter a final Availability Code of X-D-C.*

Chris notes that his Nekohono'o*-class DropShip debuted in 3065, automatically placing it in the Clan Invasion era only (Availability X for Age of War/Star League and the Succession Wars). Of its components, the highest-rated in availability for the Clan Invasion era are—unsurprisingly—the Kraken-T and screen launcher weapon systems, both of which rate F for availability. This means the* Nekohono'o *receives a final Availability Rating of X-X-F.*

Marshal of the Armies Jackson Davion and two lone Legionnaire *pilots are all that stand between the Corean Facility and the forces of the Word of Blake.*

INTRODUCED (AFFILIATION) KEY

Introduction Date Codes:			
PS = Pre-Spaceflight (1950 or sooner)	ES = Early Spaceflight (1951 to 2200)		
Inner Sphere Faction Codes:			
CC = Capellan Confederation	FW = Free Worlds League	RW = Rim Worlds Republic	CS = ComStar
LA = Lyran Alliance	TA = Terran Alliance	DC = Draconis Combine	LC = Lyran Commonwealth
TC = Taurian Concordat	FC = Federated Commonwealth (3030-3057)	MC = Magistracy of Canopus	TH = Terran Hegemony
FR = Free Rasalhague Republic	MH = Marian Hegemony	WA = Western Alliance (Terra)	FS = Federated Suns
OA = Outworlds Alliance	WB = Word of Blake		
Clan Faction Codes:			
CBS = Clan Blood Spirit	CGS = Clan Goliath Scorpion	CSR = Clan Snow Raven	CBR = Clan Burrock
CHH = Clan Hell's Horses	CSA = Clan Star Adder	CCC = Clan Cloud Cobra	CIH = Clan Ice Hellion
CSV = Clan Steel Viper	CCY = Clan Coyote	CJF = Clan Jade Falcon	CWF = Clan Wolf
CDS = Clan Diamond Shark/Sea Fox	CMN = Clan Mongoose	CWM = Clan Widowmaker	CFM = Clan Fire Mandrill
CNC = Clan Nova Cat	CWV = Clan Wolverine	CGB = Clan Ghost Bear	CSJ = Clan Smoke Jaguar
CWX = Clan Wolf (in Exile)			

HEAVY WEAPONS AND EQUIPMENT

Weapon / Item	Cost	Availability (AoW-SW-3050+)	Introduced (Affiliation)	Extinction	Reintroduced (Affiliation)
Autocannons					
Autocannon/2	75,000	(C-D-D)	2300 (TH) / —	— / 2850	NA / NA
Autocannon/5	125,000	(C-C-D)	2250 (TH) / —	— / 2850	NA / NA
Autocannon/10	200,000	(C-D-D)	2460 (TH) / —	— / 2850	NA / NA
Autocannon/20	300,000	(D-E-D)	2500 (LC) / —	— / 2850	NA / NA
LB 2-X AC	150,000	(X-X-E)	3058 (FS) / 2826 (CGS)	— / —	NA / NA
LB 5-X AC	250,000	(X-X-E)	3058 (FS) / 2825 (CCY)	— / —	NA / NA
LB 10-X AC	400,000	(E-F-D)	2595 (TH) / 2824 (CWF)	2840 / —	3035 (FC) / NA
LB 20-X AC	600,000	(X-X-E)	3058 (FS) / 2826 (CHH)	— / —	NA / NA
Light AC/2	100,000	(X-X-F)	3068 (FS) / NA	— / NA	NA / NA
Light AC/5	150,000	(X-X-F)	3068 (FS) / NA	— / NA	NA / NA
Rotary AC/2	175,000	(X-X-E)	3062 (FS) / NA	— / NA	NA / NA
Rotary AC/5	275,000	(X-X-E)	3062 (FS) / NA	— / NA	NA / NA
Ultra AC/2	120,000	(X-X-E)	3057 (FW) / 2827 (CGS)	— / —	NA / NA
Ultra AC/5	200,000	(D-F-D)	2640 (TH) / 2825 (CMN)	2915 / —	3035 (FC) / NA
Ultra AC/10	320,000	(X-X-E)	3057 (FW) / 2825 (CDS)	— / —	NA / NA
Ultra AC/20	480,000	(X-X-E)	3060 (LA) / 2825 (CSV)	— / —	NA / NA
Gauss Rifles					
AP Gauss Rifle	10,000	(X-X-E)	NA / 3069 (CJF)	NA / —	NA / NA
Light Gauss Rifle	275,000	(X-X-E)	3056 (FW) / NA	— / NA	NA / NA
Gauss Rifle	300,000	(D-F-D)	2590 (TH) / 2828 (CBR)	2865 / —	3040 (FW) / NA
Heavy Gauss Rifle	500,000	(X-X-E)	3061 (LA) / NA	— / NA	NA / NA
Hyper Assault Gauss 20	400,000	(X-X-E)	NA / 3068 (CHH)	NA / —	NA / NA
Hyper Assault Gauss 30	500,000	(X-X-E)	NA / 3068 (CHH)	NA / —	NA / NA
Hyper Assault Gauss 40	600,000	(X-X-E)	NA / 3069 (CHH)	NA / —	NA / NA
Machine Guns					
Light Machine Gun	5,000	(X-X-C)	3068 (CC) / 3060 (CSJ)	— / —	NA / NA
Machine Gun	5,000	(A-A-B)	PS / 2825 (CDS)	— / —	NA / NA
Heavy Machine Gun	7,500	(X-X-C)	3068 (TC) / 3059 (CSJ)	— / —	NA / NA
Flamers					
Flamer	7,500	(B-B-B)	2025 (WA) / 2827 (CFM)	— / —	NA / NA
Flamer (Vehicle)	7,500	(A-A-B)	PS / —	— / —	NA / NA
Lasers					
ER Micro Laser	10,000	(X-X-D)	NA / 3060 (CSJ)	NA / —	NA / NA
ER Small Laser	11,250	(X-X-D)	3058 (FW) / 2825 (CJF)	— / —	NA / NA

HEAVY WEAPONS AND EQUIPMENT (CONT)

Weapon / Item	Cost	Availability (AoW-SW-3050+)	Introduced (Affiliation)	Extinction	Reintroduced (Affiliation)
ER Medium Laser	80,000	(X-X-D)	3058 (FW) / 2824 (CJF)	— / —	NA / NA
ER Large Laser	200,000	(E-F-D)	2620 (TH) / 2823 (CNC)	2950 / —	3037 (DC) / NA
Small Laser	11,250	(B-B-B)	2300 (TA) / —	— / —	NA / NA
Medium Laser	40,000	(B-B-B)	2300 (TA) / —	— / 2850	NA / NA
Large Laser	100,000	(C-D-C)	2316 (TH) / —	— / 2850	NA / NA
Micro Pulse Laser	12,500	(X-X-D)	NA / 3060 (CSJ)	NA / —	NA / NA
Small Pulse Laser	16,000	(E-F-D)	2609 (TH) / 2829 (CGB)	2950 / —	3037 (DC) / NA
Medium Pulse Laser	60,000	(E-F-D)	2609 (TH) / 2827 (CJF)	2950 / —	3037 (DC) / NA
Large Pulse Laser	175,000	(E-F-D)	2609 (TH) / 2824 (CCY)	2950 / —	3037 (DC) / NA
Heavy Small Laser	20,000	(X-X-D)	NA / 3059 (CSA)	NA / —	NA / NA
Heavy Medium Laser	100,000	(X-X-D)	NA / 3059 (CSA)	NA / —	NA / NA
Heavy Large Laser	250,000	(X-X-D)	NA / 3059 (CSA)	NA / —	NA / NA
Plasma Weapons					
Plasma Cannon	320,000	(X-X-E)	NA / 3069 (CDS)	NA / —	NA / NA
Plasma Rifle	260,000	(X-X-E)	3068 (CC) / NA	— / NA	NA / NA
PPCs					
Light PPC	150,000	(X-X-E)	3067 (DC) / NA	— / NA	NA / NA
PPC	200,000	(C-C-C)	2460 (TH) / —	— / 2825	NA / NA
Heavy PPC	250,000	(X-X-E)	3067 (DC) / NA	— / NA	NA / NA
ER PPC	300,000	(E-F-D)	2751 (TH) / 2826 (CSR)	2860 / NA	3037 (DC) / NA
Snub-Nose PPC	300,000	(F-X-F)	3067 (DC) / NA	— / NA	NA / NA
Missiles					
ATM 3	50,000	(X-X-D)	NA / 3054 (CCY)	NA / —	NA / NA
ATM 6	125,000	(X-X-D)	NA / 3054 (CCY)	NA / —	NA / NA
ATM 9	225,000	(X-X-D)	NA / 3054 (CCY)	NA / —	NA / NA
ATM 12	350,000	(X-X-D)	NA / 3055 (CCY)	NA / —	NA / NA
LRM (ProtoMech, per tube)*	10,000	(X-X-E)	NA / 3060 (CSJ)	NA / —	NA / NA
LRM 5	30,000	(C-C-C)	2300 (TA) / 2824 (CCY)	— / —	NA / NA
LRM 10	100,000	(C-C-C)	2300 (TA) / 2824 (CCY)	— / —	NA / NA
LRM 15	175,000	(C-C-C)	2315 (TH) / 2824 (CCY)	— / —	NA / NA
LRM 20	250,000	(C-C-C)	2315 (TH) / 2824 (CCY)	— / —	NA / NA
MML 3	45,000	(X-X-E)	3068 (WB) / —	— / NA	NA / NA
MML 5	75,000	(X-X-E)	3068 (WB) / —	— / NA	NA / NA
MML 7	105,000	(X-X-E)	3068 (WB) / —	— / NA	NA / NA
MML 9	125,000	(X-X-E)	3068 (WB) / —	— / NA	NA / NA
SRM (ProtoMech, per tube)*	10,000	(X-X-E)	NA / 3060 (CSJ)	NA / —	NA / NA
SRM 2	10,000	(C-C-C)	2370 (TH) / 2824 (CCC)	— / —	NA / NA
SRM 4	60,000	(C-C-C)	2370 (TH) / 2824 (CCC)	— / —	NA / NA
SRM 6	80,000	(C-C-C)	2370 (TH) / 2824 (CCC)	— / —	NA / NA
MRM 10	50,000	(X-X-E)	3058 (DC) / NA	— / NA	NA / NA
MRM 20	125,000	(X-X-E)	3058 (DC) / NA	— / NA	NA / NA
MRM 30	225,000	(X-X-E)	3058 (DC) / NA	— / NA	NA / NA
MRM 40	350,000	(X-X-E)	3058 (DC) / NA	— / NA	NA / NA
Rocket Launcher 10**	15,000	(X-X-B)	3064 (MH) / NA	— / NA	NA / NA
Rocket Launcher 15**	30,000	(X-X-B)	3064 (MH) / NA	— / NA	NA / NA
Rocket Launcher 20**	45,000	(X-X-B)	3064 (MH) / NA	— / NA	NA / NA
Streak SRM (ProtoMech, per tube)*	15,000	(X-X-F)	NA / 3060 (CSJ)	NA / —	NA / NA
Streak SRM 2	15,000	(E-F-D)	2647 (TH) / 2822 (CSA)	2845 / —	3035 (FW) / NA
Streak SRM 4	90,000	(X-X-E)	3058 (DC) / 2826 (CSA)	— / —	NA / NA
Streak SRM 6	120,000	(X-X-E)	3058 (DC) / 2826 (CSA)	— / —	NA / NA
Artemis IV	100,000	(E-F-D)	2598 (TH) / —	2855 / —	3035 (FW) / NA
Torpedo (LRM, SRM only)	x 1	As Launcher	2380 (TH) / 2824 (CCY)	— / —	NA / NA
One-Shot**†	x 0.5	As Launcher	2676 (TH) / —	2800 / —	3030 (FW) / —
Special Equipment					
A-Pods	1,500	(X-X-D)	3055 (CS) / 2850 (CGB)	— / —	NA / NA
B-Pods	2,500	(X-X-E)	3069 (LA) / 3068 (CWX)	— / —	NA / NA
Anti-Missile System	100,000	(E-F-D)	2617 (TH) / 2831 (CBS)	2796 / —	3040 (FC) / NA
Active Probe (Beagle)	200,000	(E-F-D)	2576 (TH) / 2832 (CGS)	2835 / —	3045 (CC) / NA
Active Probe (Light)	50,000	(X-X-E)	— / 2900 (CSJ)	— / —	NA / NA

HEAVY WEAPONS AND EQUIPMENT (CONT)

Weapon / Item	Cost	Availability (AoW-SW-3050+)	Introduced (Affiliation)	Extinction	Reintroduced (Affiliation)
CASE	50,000	(C-F-D)	2476 (TH) / 2825 (CCY)	2840 / —	3036 (DC) / NA
C3 Computer (Master)	1,500,000	(X-X-E)	3050 (DC) / NA	— / NA	NA / NA
C3 Computer (Slave)	250,000	(X-X-E)	3050 (DC) / NA	— / NA	NA / NA
Improved C3 Computer	750,000	(X-X-E)	3062 (CS) / NA	— / NA	NA / NA
ECM Suite (Guardian)	200,000	(E-F-D)	2597 (TH) / 2832 (CJS)	2845 / —	3045 (CC) / NA
Machine Gun Array	1,250	(X-X-F)	3068 (FS) / 3069 (CDS)	— / —	NA / NA
Omni Technology††	NA	(X/E/E)	3052 (IS) / 2854 (Clan)	— / —	— / —
Narc Missile Beacon	100,000	(E-F-D)	2587 (TH) / 2828 (CHH)	2795 / —	3035 (FW) / NA
Imp. Narc Launcher	250,000	(X-X-E)	3062 (CS) / NA	— / NA	NA / NA
TAG	50,000	(E-F-D)	2600 (TH) / —	2835 / —	3044 (FC) / NA
Light TAG	40,000	(X-X-F)	— / 3054 (CWF)	— / —	NA / NA
Targeting Computer (per ton)†	10,000	(X-X-E)	3062 (FS) / 2860 (CMN)	— / —	NA / NA
Physical Attack Weapons					
Hatchet (per ton)†	5,000	(X-F-D)	3022 (LC) / NA	— / NA	NA / NA
Sword (per ton)†	10,000	(X-X-D)	3058 (DC) / NA	— / NA	NA / NA
Capital Missiles					
Killer Whale	150,000	(D-X-D)	2305 (TA)	2855 / —	3051 (FC) / NA
White Shark	130,000	(D-X-D)	2305 (TA)	2854 / —	3051 (FC) / NA
Barracuda	90,000	(D-X-D)	2305 (TA)	2855 / —	3051 (FC) / NA
AR-10 Launcher	250,000	(E-X-E)	2550 (TH)	2850 / —	3051 (FC) / NA
Kraken-T	500,000	(X-X-F)	3057 (DC) / NA	— / NA	NA / NA
Killer Whale-T	165,000	(X-X-F)	3056 (DC) / NA	— / NA	NA / NA
White Shark-T	145,000	(X-X-F)	3056 (DC) / NA	— / NA	NA / NA
Barracuda-T	100,000	(X-X-F)	3056 (DC) / NA	— / NA	NA / NA
Screen Launcher	250,000	(X-X-F)	3055 (DC) / NA	— / NA	NA / NA

*Per Tube Costs only apply at non-standard rack sizes (LRM 5, SRM 2, SRM 4, SRM 6—including Streak—use standard launcher cost)
**The One-Shot option may be applied to LRM, MRM, SRM, Streak SRM, Narc, and iNarc weapons only. Rocket Launchers are automatically considered One-Shot items (the ammunition cost reflects post-battle reloads only).
†Based on Equipment Weight (not capacity or total unit weight), rounded up to the nearest whole.
†† Note: this is Omni technology, NOT just OmniMechs specifically.

INDUSTRIAL EQUIPMENT

Weapon / Item	Cost	Availability (AoW-SW-3050+)	Introduced (Affiliation)	Extinction	Reintroduced (Affiliation)
Backhoe	50,000	(B-B-B)	PS / —	— / —	NA / NA
Bay Door	1,000	(A-A-A)	PS / —	— / —	NA / NA
Bridgelayer					
Light	40,000	(D-E-D)	PS / —	— / —	NA / NA
Medium	75,000	(D-E-D)	PS / —	— / —	NA / NA
Heavy	100,000	(E-E-E)	PS / —	— / —	NA / NA
Bulldozer	50,000	(C-C-C)	PS / —	— / —	NA / NA
Chainsaw	100,000	(D-D-D)	PS / —	— / —	NA / NA
Combine	75,000	(C-C-C)	PS / —	— / —	NA / NA
Communications Equip. (per ton)*	10,000	(C-D-C)	PS / —	— / —	NA / NA
Concealed Weapon	5% Weapon Cost	(C-C-C)	PS / —	— / —	NA / NA
Dual Saw	100,000	(D-D-D)	PS / —	— / —	NA / NA
Dumper	5,000	(A-A-A)	PS / —	— / —	NA / NA
Ejection Seat					
(Support Vehicle)	25,000	(D-D-D)	ES / —	— / —	NA / NA
(IndustrialMech)	25,000	(D-E-E)	2445 (TH) / —	— / —	NA / NA
Escape Pod					
(Aerospace)	5,000	(C-D-C)	ES / —	— / —	NA / NA
(Maritime)	5,000	(C-D-C)	ES / —	— / —	NA / NA
Extended Fuel Tanks (per ton)*	500	(C-D-D)	ca 2300 (TA) / —	— / —	NA / NA
External Stores Hardpoints	5,000**	(D-E-D)	PS / —	— / —	NA / NA

INDUSTRIAL EQUIPMENT (CONT)

Weapon / Item	Cost	Availability (AoW-SW-3050+)	Introduced (Affiliation)	Extinction	Reintroduced (Affiliation)
Field Kitchen	25,000	(C-C-C)	PS / —	— / —	NA / NA
Fluid Suction System					
Standard	25,000	(B-B-B)	PS / —	— / —	NA / NA
Light ('Mech)	1,000	(B-B-B)	PS / —	— / —	NA / NA
Light (Vehicular)	1,000	(B-B-B)	PS / —	— / —	NA / NA
Fire Control Systems					
Basic (SV)	5% Weapon Cost	(B-C-C)	PS / —	— / —	NA / NA
Advanced (SV)	10% Weapon Cost	(C-D-D)	2300 (TA) / —	— / —	NA / NA
Heavy Duty Pile-Driver	100,000	(D-E-D)	PS / —	— / —	NA / NA
Ladder (per meter)	5	(A-A-A)	PS / —	— / —	NA / NA
Lifeboat					
(Aerospace)	5,000	(C-C-C)	ES / —	— / —	NA / NA
(Atmospheric)	6,000	(C-C-C)	PS / —	— / —	NA / NA
(Maritime)	5,000	(B-C-C)	PS / —	— / —	NA / NA
Lift Hoist					
Lift Hoist	50,000	(A-A-A)	PS / —	— / —	NA / NA
Arresting Hoist	90,000	(C-F-E)	PS / —	— / —	NA / NA
Look-Down Radar	400,000	(D-E-D)	PS / —	— / —	NA / NA
Manipulator	7,500	(C-D-C)	ES / —	— / —	NA / NA
MASH					
(Core Unit)	35,000	(C-E-D)	PS / —	— / —	NA / NA
(Added Theater)	10,000	(C-E-D)	PS / —	— / —	NA / NA
Mining Drill	100,000	(C-D-D)	PS / —	— / —	NA / NA
Nail/Rivet Gun	7,000	(C-C-C)	2310 (FW) / —	— / —	NA / NA
Paramedic Equipment	7,500	(C-C-C)	PS / —	— / —	NA / NA
Quarters/Seating					
Steerage	5,000	(A-A-A)	PS / —	— / —	NA / NA
Crew/2nd Class	15,000	(A-A-A)	PS / —	— / —	NA / NA
Officer/1st Class	30,000	(B-B-B)	PS / —	— / —	NA / NA
Seating (Standard)	100	(A-A-A)	PS / —	— / —	NA / NA
Seating (Pillion)	10	(A-A-A)	PS / —	— / —	NA / NA
Refueling Drogue	25,000	(B-B-B)	PS / —	— / —	NA / NA
Remote Sensor Dispenser	30,000	(D-D-D)	ES / —	— / —	NA / NA
Retractable Blade					
Mechanism	10,000	(F-D-D)	2420 (TH) / —	— / —	NA / NA
Blade (per ton)*	10,000	(F-D-D)	2420 (TH) / —	— / —	NA / NA
Rock-Cutter	100,000	(D-D-D)	PS / —	— / —	NA / NA
Salvage Arm	50,000	(E-F-E)	2415 (TH) / —	— / —	NA / NA
Searchlight					
Handheld	500	(A-A-A)	PS / —	— / —	NA / NA
Mounted	2,000	(A-A-B)	PS / —	— / —	NA / NA
Spot Welder	75,000	(C-D-C)	2320 (LC) / —	— / —	NA / NA
Sprayer					
'Mech	1,000	(B-B-B)	ca 2300 (TA) / —	— / —	NA / NA
Vehicular	1,000	(B-B-B)	PS / —	— / —	NA / NA
Transport Bay					
Cargo, Container (per container)	0	(A-A-A)	PS / —	— / —	NA / NA
Cargo, Other (Basic, per ton)*	0	(A-A-A)	PS / —	— / —	NA / NA
Cargo, Other (Liquid, per ton)*	100	(A-A-A)	PS / —	— / —	NA / NA
Cargo, Other (Insulated, per ton)*	250	(A-A-A)	PS / —	— / —	NA / NA
Cargo, Other (Livestock, per ton)*	2,500	(B-B-B)	PS / —	— / —	NA / NA
Cargo, Other (Refrigerated, per ton)*	200	(A-A-A)	PS / —	— / —	NA / NA
Compartment, Infantry/BA (per ton)*	0	(B-B-B)	PS / —	— / —	NA / NA
Infantry, Bay (per ton)*	15,000	(B-B-B)	PS / —	— / —	NA / NA
Battle Armor Bay (per ton)*	15,000	(X-F-C)	3050 (FC) / 2868 (CWF)	— / —	NA / NA
'Mech (per Cubicle)	20,000	(D-C-C)	2470 (TH) / —	— / —	NA / NA
Fighter (per Cubicle)	20,000	(C-C-C)	2050 (WA) / —	— / —	NA / NA
ProtoMech (per 5 Cubicles)	10,000	(X-X-D)	NA / 3066 (CSR)	NA / —	NA / NA
Small Craft (per Cubicle)	20,000	(B-B-B)	2050 (WA) / —	— / —	NA / NA

INDUSTRIAL EQUIPMENT (CONT)

Weapon / Item	Cost	Availability (AoW-SW-3050+)	Introduced (Affiliation)	Extinction	Reintroduced (Affiliation)
Light Vehicle (per Cubicle)	10,000	(B-B-B)	ES / —	— / —	NA / NA
Heavy Vehicle (per Cubicle)	10,000	(B-B-B)	ES / —	— / —	NA / NA
Super-Heavy Vehicle (per Cubicle)	20,000	(C-C-C)	ES / —	— / —	NA / NA
Non-Heavy Weapons					
Light	As Weapon	As Weapon	As Weapon	As Weapon	As Weapon
Medium	As Weapon	As Weapon	As Weapon	As Weapon	As Weapon
Wrecking Ball	80,000	(C-C-C)	PS / —	— / —	NA / NA

*Based on Equipment Weight (not capacity), rounded up to the nearest whole ton.
**Applied only if the unit is not an aerospace or conventional fighter.

HEAVY WEAPON AMMUNITION

Weapon / Item	Cost	Availability (AoW-SW-3050+)	Introduced (Affiliation)	Extinction	Reintroduced (Affiliation)
Autocannons					
Autocannon/2	1,000 / 22	(C-D-D)	2300 (TH) / —	— / 2850	NA / NA
Autocannon/5	4,500 / 225	(C-C-D)	2250 (TH) / —	— / 2850	NA / NA
Autocannon/10	6,000 / 600	(C-D-D)	2460 (TH) / —	— / 2850	NA / NA
Autocannon/20	10,000 / 2,000	(D-E-D)	2500 (LC) / —	— / 2850	NA / NA
LB 2-X AC (Standard)	2,000 / 45	(X-X-E)	3058 (FS) / 2826 (CGS)	— / —	NA / NA
(Cluster)	3,300 / 75	(X-X-E)	3058 (FS) / 2826 (CGS)	— / —	NA / NA
LB 5-X AC (Standard)	9,000 / 450	(X-X-D)	3058 (FS) / 2825 (CCY)	— / —	NA / NA
(Cluster)	15,000 / 750	(X-X-D)	3058 (FS) / 2825 (CCY)	— / —	NA / NA
LB 10-X AC (Standard)	12,000 / 1,200	(C-E-D)	2595 (TH) / —	2840 / —	3035 (FC) / NA
(Cluster)	20,000 / 2,000	(E-F-D)	2595 (TH) / —	2840 / —	3035 (FC) / NA
LB 20-X AC (Standard)	20,000 / 4,000	(X-X-E)	3058 (FS) / 2826 (CHH)	— / —	NA / NA
(Cluster)	34,000 / 6,800	(X-X-E)	3058 (TH) / 2826 (CHH)	— / —	NA / NA
Light AC/2	1,000 / 25	(X-X-F)	3068 (FS) / NA	— / NA	NA / NA
Light AC/5	4,500 / 225	(X-X-F)	3068 (FS) / NA	— / NA	NA / NA
Rotary AC/2	3,000 / 70	(X-X-E)	3062 (FS) / NA	— / NA	NA / NA
Rotary AC/5	12,000 / 600	(X-X-E)	3062 (FS) / NA	— / NA	NA / NA
Ultra AC/2	1,000 / 25	(X-X-E)	3057 (FW) / 2827 (CGS)	— / —	NA / NA
Ultra AC/5	9,000 / 450	(D-F-D)	2640 (TH) / —	2915 / —	3035 (FC) / NA
Ultra AC/10	12,000 / 1,200	(X-X-E)	3057 (FW) / 2825 (CDS)	— / —	NA / NA
Ultra AC/20	20,000 / 4,000	(X-X-E)	3060 (LA) / 2825 (CSV)	— / —	NA / NA
Armor-Piercing (Standard/Light AC)	x 4 / x 4	(X-X-E)	3059 (FS) / NA	— / NA	NA / NA
Flechette (Standard/Light AC)	x 1.5 / x 1.5	(X-X-E)	3055 (FS) / NA	— / NA	NA / NA
Precision (Standard/Light AC)	x 6 / x 6	(X-X-E)	3062 (FS) / NA	— / NA	NA / NA
Gauss Rifles					
Anti-Personnel Gauss	3,000 / 75	(X-X-E)	NA / 3069 (CJF)	NA / —	NA / NA
Light Gauss Rifle	20,000 / 1,250	(X-X-E)	3056 (FW) / NA	— / NA	NA / NA
Gauss Rifle	20,000 / 2,500	(D-F-D)	2590 (TH) / —	2865 / —	3040 (FW) / NA
Heavy Gauss Rifle	20,000 / 5,000	(X-X-E)	3061 (LA) / NA	— / NA	NA / NA
Hyper Assault Gauss 20	30,000 / 5,000	(X-X-E)	NA / 3068 (CHH)	NA / —	NA / NA
Hyper Assault Gauss 30	30,000 / 7,500	(X-X-E)	NA / 3068 (CHH)	NA / —	NA / NA
Hyper Assault Gauss 40	30,000 / 10,000	(X-X-E)	NA / 3069 (CHH)	NA / —	NA / NA
Machine Guns					
Light Machine Gun	500 / 2.5	(X-X-C)	3068 (CC) / 3060 (CSJ)	— / —	NA / NA
Machine Gun	1,000 / 5	(A-A-B)	PS / —	— / —	NA / NA
Heavy Machine Gun	1,000 / 10	(X-X-C)	3068 (TC) / 3059 (CSJ)	— / —	NA / NA
Flamer					
Flamer (Vehicle)	1,000 / 50	(A-A-B)	PS / —	— / —	NA / NA

HEAVY WEAPON AMMUNITION (CONT)

Weapon / Item	Cost	Availability (AoW-SW-3050+)	Introduced (Affiliation)	Extinction	Reintroduced (Affiliation)
Plasma Weapons					
Plasma Cannon	12,000 / 1,200	(X-X-E)	NA / 3069 (CDS)	NA / —	NA / NA
Plasma Rifle	10,000 / 1,000	(X-X-E)	3068 (CC) / NA	— / NA	NA / NA
Missiles					
ATM 3	75,000 / 3,750	(X-X-D)	NA / 3054 (CCY)	NA / —	NA / NA
ATM 6	75,000 / 7,500	(X-X-D)	NA / 3054 (CCY)	NA / —	NA / NA
ATM 9	75,000 / 10,715	(X-X-D)	NA / 3054 (CCY)	NA / —	NA / NA
ATM 12	75,000 / 15,000	(X-X-D)	NA / 3055 (CCY)	NA / —	NA / NA
LRM (ProtoMech, per tube)*	30,000 / 250	(X-X-E)	NA / 3060 (CSJ)	NA / —	NA / NA
LRM 5	30,000 / 1,250	(C-C-C)	2300 (TA) / —	— / —	NA / NA
LRM 10	30,000 / 2,500	(C-C-C)	2300 (TA) / —	— / —	NA / NA
LRM 15	30,000 / 3,750	(C-C-C)	2300 (TA) / —	— / —	NA / NA
LRM 20	30,000 / 5,000	(C-C-C)	2300 (TA) / —	— / —	NA / NA
MML 3 (LRM Ammo)	30,000 / 750	(C-C-C)	2300 (TA) / —	— / —	NA / NA
(SRM Ammo)	27,000 / 820	(B-B-B)	2370 (TH) / —	— / —	NA / NA
MML 5 (LRM Ammo)	30,000 / 1,250	(C-C-C)	2300 (TA) / —	— / —	NA / NA
(SRM Ammo)	27,000 / 1,350	(B-B-B)	2370 (TH) / —	— / —	NA / NA
MML 7 (LRM Ammo)	30,000 / 1,765	(C-C-C)	2300 (TA) / —	— / —	NA / NA
(SRM Ammo)	27,000 / 1,930	(B-B-B)	2370 (TH) / —	— / —	NA / NA
MML 9 (LRM Ammo)	30,000 / 2,310	(C-C-C)	2300 (TA) / —	— / —	NA / NA
(SRM Ammo)	27,000 / 2,455	(B-B-B)	2370 (TH) / —	— / —	NA / NA
MRM 10	5,000 / 210	(X-X-E)	3058 (DC) / NA	— / NA	NA / NA
MRM 20	5,000 / 420	(X-X-E)	3058 (DC) / NA	— / NA	NA / NA
MRM 30	5,000 / 630	(X-X-E)	3058 (DC) / NA	— / NA	NA / NA
MRM 40	5,000 / 840	(X-X-E)	3058 (DC) / NA	— / NA	NA / NA
SRM (ProtoMech, per tube)*	27,000 / 270	(X-X-E)	NA / 3060 (CSJ)	NA / —	NA / NA
SRM 2	27,000 / 540	(B-B-B)	2370 (TH) / —	— / —	NA / NA
SRM 4	27,000 / 1,080	(B-B-B)	2370 (TH) / —	— / —	NA / NA
SRM 6	27,000 / 1,800	(B-B-B)	2370 (TH) / —	— / —	NA / NA
Rocket Launcher 10**	NA / 1,000	(X-X-B)	3064 (MH) / NA	— / NA	NA / NA
Rocket Launcher 15**	NA / 1,500	(X-X-B)	3064 (MH) / NA	— / NA	NA / NA
Rocket Launcher 20**	NA / 2,000	(X-X-B)	3064 (MH) / NA	— / NA	NA / NA
Streak SRM (ProtoMech, per tube)*	54,000 / 540	(X-X-F)	NA / 3060 (CSJ)	NA / —	NA / NA
Streak SRM 2	54,000 / 1,080	(E-F-D)	2647 (TH) / —	2845 / —	3035 (FW) / NA
Streak SRM 4	54,000 / 2,160	(X-X-E)	3058 (DC) / 2826 (CSA)	— / —	NA / NA
Streak SRM 6	54,000 / 3,240	(X-X-E)	3058 (DC) / 2826 (CSA)	— / —	NA / NA
ER Missiles (ATM)	x 1 / x 1	(X-X-D)	NA / 3054 (CSA)	NA / —	NA / NA
HE Missiles (ATM)	x 1 / x 1	(X-X-D)	NA / 3054 (CCY)	NA / —	NA / NA
Artemis-Capable (LRM/SRM/MML)	x 2 / x 2	(E-F-D)	2598 (TH) / —	2855 / —	3035 (FW) / NA
Fragmentation (LRM/SRM/MML)	x 2 / x 2	(E-F-E)	2385 (TH) / —	2810 / —	3050 (FW) / NA
Harpoon (SRM)	x 0.2 / x 0.2	(C-C-C)	2400 (LC) / —	— / —	NA / NA
Incendiary (LRM)	x 1.5 / x 1.5	(X-X-E)	3053 (FW) / NA	— / NA	NA / NA
Inferno (SRM)	x 0.5 / x 0.5	(D-D-D)	2380 (TC) / —	— / —	NA / NA
Semi-Guided (LRM)	x 3 / x 3	(X-X-D)	3057 (FW) / NA	— / NA	NA / NA
Swarm (LRM)	x 2 / x 2	(E-X-D)	2621 (TH) / —	2840 / —	3053 (FC) / NA
Swarm-I (LRM)	x 3 / x 3	(X-X-D)	3057 (FW) / NA	— / NA	NA / NA
Tear Gas (SRM)	x 1.5 / x 1.5	(B-B-B)	2375 (TH) / —	— / —	NA / NA
Thunder (LRM)	x 2 / x 2	(E-F-D)	2620 (TH) / —	2840 / —	3052 (FC) / NA
Thunder-Augmented (LRM)	x 4 / x 4	(X-X-E)	3057 (CC) / NA	— / NA	NA / NA
Thunder-Inferno (LRM)	x 1 / x 1	(X-X-D)	3056 (CC) / NA	— / NA	NA / NA
Thunder-Vibrabomb (LRM)	x 2.5 / x 2.5	(X-X-E)	3057 (CC) / NA	— / NA	NA / NA
Thunder-Active (LRM)	x 3 / x 3	(X-X-E)	3058 (CC) / NA	— / NA	NA / NA
Narc-Capable (LRM/SRM/MML)	x 2 / x 2	(E-F-D)	2597 (TH) / —	2795 / —	3035 (FW) / NA
Torpedo (LRM/SRM)	x 1 / x 1	(C-C-C)	2380 (TH) / —	— / —	NA / NA
Multi-Purpose Missile (Suit LRM/SRM)	x 2 / x 2	(X-X-E)	NA / 3060 (CGS)	NA / —	NA / NA
One-Shot**†	NA** / x 1**	As Launcher	2676 (TH) / —	2800 / —	NA / NA
Special Equipment					
Anti-Missile System (Clan)	2,000 / 85	(X-D-C)	NA / 2831 (CBS)	— / —	3040 (FC) / NA
Anti-Missile System (Inner Sphere)	2,000 / 170	(E-F-D)	2617 (TH) / —	2796 / —	3040 (FC) / NA

HEAVY WEAPON AMMUNITION (CONT)

Weapon / Item	Cost	Availability (AoW-SW-3050+)	Introduced (Affiliation)	Extinction	Reintroduced (Affiliation)
Narc Missile Beacon (Homing)	6,000 / 1,000	(E-F-D)	2587 (TH) / —	2795 / —	3035 (FW) / NA
(Explosive)	1,500 / 250	(X-X-D)	3060 (DC) / NA	— / NA	— / NA
Improved Narc Launcher (Homing)	7,500 / 1,875	(X-X-E)	3062 (CS) / NA	— / NA	NA / NA
(ECM)	15,000 / 3,750	(X-X-D)	3062 (CS) / NA	— / NA	— / NA
(Explosive)	1,500 / 375	(X-X-D)	3062 (CS) / NA	— / NA	— / NA
(Haywire)	20,000 / 5,000	(X-X-E)	3062 (CS) / NA	— / NA	— / NA
(Nemesis)	10,000 / 2,500	(X-X-E)	3062 (CS) / NA	— / NA	— / NA
Capital Missiles					
Killer Whale	NA / 20,000	(C-X-E)	2305 (TA) / —	2855 / —	3051 (FC) / NA
White Shark	NA / 14,000	(C-X-E)	2305 (TA) / —	2854 / —	3051 (FC) / NA
Barracuda	NA / 8,000	(C-F-D)	2305 (TA) / —	2855 / —	3051 (FC) / NA
AR-10 Launcher	As Missile	As Missile	2550	As Missile	As Missile
Kraken-T	NA / 55,000	(X-X-F)	3057 (DC) / NA	— / NA	NA / NA
Killer Whale-T	NA / 17,000	(X-X-F)	3056 (DC) / NA	— / NA	NA / NA
White Shark-T	NA / 12,000	(X-X-F)	3056 (DC) / NA	— / NA	NA / NA
Barracuda-T	NA / 7,000	(X-X-F)	3056 (DC) / NA	— / NA	NA / NA
Screen Launcher	NA / 10,000	(X-X-F)	3055 (DC) / NA	— / NA	NA / NA
Fighter/Airborne Support Vehicle Hardpoint Weapons					
High-Explosive (Bomb)	NA / 5,000	(C-C-C)	PS / —	— / —	NA / NA
Cluster (Bomb)	NA / 8,000	(D-D-D)	PS / —	— / —	NA / NA
Laser-Guided (Bomb)	NA / 10,000	(E-F-E)	PS / —	2800 / —	3060 (FW) / NA
Inferno (Bomb)	NA / 6,000	(D-D-D)	PS / —	— / —	NA / NA
Mines (Bomb)	NA / 12,000	(E-E-D)	PS / —	— / —	NA / NA
Rocket Launcher (Pod)	15,000 / NA	(X-X-B)	3064 (MH) / NA	— / NA	NA / NA
Rocket Launcher (Ammo)	NA / 1,000	(X-X-B)	3064 (MH) / NA	— / NA	NA / NA
TAG (Pod)	50,000 / NA	(E-F-D)	2605 (TH) / —	2835 / —	3035 (FS) / NA
Industrial Equipment					
Nail/Rivet Gun	300 / 1	(A-A-A)	PS / —	— / —	NA / NA
Remote Sensor Dispenser	21,000 / 700	(F-F-D)	PS / —	— / —	NA / NA

*Per Tube Costs only apply at non-standard rack sizes (LRM 5, SRM 2, SRM 4, SRM 6—including Streak—use standard launcher cost)
**The One-Shot option may be applied to LRM, MRM, SRM, Streak SRM, Narc, and iNarc weapons only. Rocket Launchers are automatically considered One-Shot items (the ammunition cost reflects post-battle reloads only).
† See page 230 'Single-Shot (OS) Missile Launchers' for exact dates/availability of One-Shot systems.
NOTE: Ammunition costs are not added to a unit's total cost. These values are included here for completeness.

ADDITIONAL BATTLE ARMOR WEAPONS AND EQUIPMENT

Weapon / Item	Cost	Availability (AoW-SW-3050+)	Introduced (Affiliation)	Extinction	Reintroduced (Affiliation)
Machine Guns					
Light Machine Gun	5,000 / 500	(X-X-C)	3068 (CC) / 3060 (CSJ)	— / —	NA / NA
Machine Gun	5,000 / 1,000	(X-X-B)	PS / —	— / —	NA / NA
Heavy Machine Gun	7,500 / 1,000	(X-X-C)	3068 (TC) / 3059 (CSJ)	— / —	NA / NA
Bearhunter Superheavy AC	11,250 / 650	(X-X-F)	NA / 3062 (CHH)	NA / —	NA / NA
Gauss Weapons					
Anti-Personnel Gauss Rifle	10,000 / 750	(X-X-E)	NA / 3069 (CJF)	NA / —	NA / NA
David Light Gauss Rifle	22,500 / 250	(X-X-E)	3063 (FW) / NA	— / NA	NA / NA
King David Light Gauss Rifle	30,000 / 250	(X-X-E)	3063 (FW) / NA	— / NA	NA / NA
Magshot Gauss Rifle	10,500 / 400	(X-X-E)	3059 (FS) / NA	— / NA	NA / NA
Grand Mauler Gauss Rifle	8,000 / 20	(X-X-D)	3059 (FS) / NA	— / NA	NA / NA
Tsunami Gauss Rifle	9,500 / 20	(X-X-E)	3056 (DC) / NA	— / NA	NA / NA
Flamers					
Flamer (BA)	7,500 / 200	(X-X-B)	3050 (FC) / 2868 (CWF)	— / —	NA / NA
Lasers					
ER Micro Laser	10,000 / 200	(X-X-D)	NA / 3059 (CSJ)	NA / —	NA / NA
ER Small Laser	11,250 / 200	(X-X-D)	3058 (FW) / 2825 (CJF)	— / —	NA / NA

ADDITIONAL BATTLE ARMOR WEAPONS AND EQUIPMENT (CONT)

Weapon / Item	Cost	Availability (AoW-SW-3050+)	Introduced (Affiliation)	Extinction	Reintroduced (Affiliation)
ER Medium Laser	80,000 / 200	(X-X-D)	3058 (FW) / 2824 (CJF)	— / —	NA / NA
Small Laser	11,250 / 200	(X-X-B)	2300 (TA) / —	— / —	NA / NA
Medium Laser	40,000 / 200	(X-X-B)	2300 (TA) / —	— / —	NA / NA
Micro Pulse Laser	12,500 / 200	(X-X-D)	NA / 3060 (CSJ)	NA / —	NA / NA
Small Pulse Laser	16,000 / 200	(X-X-D)	2609 (TH) / —	2950 / —	3037 (DC) / NA
Medium Pulse Laser	60,000 / 200	(X-X-D)	2609 (TH) / —	2950 / —	3037 (DC) / NA
Heavy Small Laser	20,000 / 200	(X-X-D)	NA / 3059 (CSA)	NA / —	NA / NA
Heavy Medium Laser	100,000 / 200	(X-X-D)	NA / 3059 (CSA)	NA / —	NA / NA
PPCs					
Support PPC	14,000 / 200	(X-X-D)	2436 (DC) / —	— / —	NA / NA
Plasma Weapons					
Man-Portable Plasma Rifle	28,000 / 20	(X-X-D)	3065 (CC) / NA	— / NA	NA / NA
Needlers					
Firedrake Support Needler	1,500 / 100	(X-X-C)	3061 (LA) / NA	— / NA	NA / NA
Recoilless Rifles					
Light Recoilless Rifle	1,000 / 400	(X-X-A)	PS / —	— / —	NA / NA
Medium Recoilless Rifle	3,000 / 600	(X-X-A)	PS / —	— / —	NA / NA
Heavy Recoilless Rifle	5,000 / 800	(X-X-A)	PS / —	— / —	NA / NA
Mortars					
Light Mortar	2,100 / 600	(X-X-C)	3057 (LA)	— / —	NA / NA
Heavy Mortar	7,500 / 800	(X-X-B)	3057 (LA)	— / —	NA / NA
Grenade Launcher					
Grenade Launcher (Heavy)	4,500/500	(X-X-D)	3050 (FC) / 2900 (CDS)	NA / —	NA / NA
Micro Grenade Launcher	1,950 / 400	(B-B-B)	ES / —	— / —	NA / NA
Missile Launchers					
LRM (per tube)	6,000 / 250	(X-X-E)	3057 (FS) / 3060 (CGS)	— / —	NA / NA
SRM (per tube)	5,000 / 270	(X-X-D)	3050 (FC) / 2868 (CWF)	— / —	NA / NA
MRM (per tube)	5,000 / 21	(X-X-D)	3060 (DC) / NA	— / NA	NA / NA
Rocket Launcher (per tube)*	1,500 / 100	(X-X-B)	3050 (FC) / NA	— / NA	NA / NA
Advanced SRM (per tube)	15,000 / 540	(X-X-F)	NA / 3056 (CHH)	NA / —	NA / NA
Detachable Missile Pack Mod.**	+10,000 / NA	(X-X-E)	3060 (LA) / 2870 (CSV)	— / —	NA / NA
One-Shot*	x 0.5 / x 1	As Launcher	2676 (TH) / —	2800 / —	NA / NA
Inferno Ammo (SRM)	NA / x 0.5	(D-D-D)	2380 (TC) / —	— / —	NA / NA
Torpedo Ammo (LRM/SRM)	NA / x 1	(C-C-C)	2380 (TH) / —	— / —	NA / NA
Multi-Purpose Ammo (Suit LRM/SRM)	NA / x 2	(X-X-E)	NA / 3060 (CGS)	NA / —	NA / NA
Special Weapons					
Compact Narc Launcher	50,000 / 200	(X-X-E)	3060 (LA) / 2875 (CSV)	— / —	NA / NA
Bomb Rack	30,000 / 500	(X-X-F)	NA / 3060 (CCC)	NA / —	NA / NA
Pop-Up Mine	2,500 / 15,000	(X-X-E)	3050 (FS) / NA	— / NA	NA / NA
Anti-Personnel Weapons	As Weapon	As Weapon	As Weapon	As Weapon	As Weapon
Other Equipment					
Light Active Probe	50,000 / NA	(X-X-E)	3050 (FC) / 2900 (CSJ)	— / —	NA / NA
Camo System	200,000 / NA	(X-F-F)	2800 (CS) / NA	— / NA	NA / NA
Cutting Torch	1,000 / NA	(B-B-B)	PS / —	— / —	NA / NA
ECM (Battle Armor)	50,000 / NA	(E-F-F)	2720 (TH) / —	2788 / —	3057 (WB) / NA
Extended Life Support	10,000 / NA	(E-F-E)	2715 (TH) / —	— / —	NA / NA
Fuel Tank	500 / 10	(X-X-E)	2744 (TH) / —	— / —	3051 (FC) / NA
Heat Sensor	15,000 / NA	(X-X-F)	3050 (FC) / 2880 (CBS)	— / —	NA / NA
Improved Sensors	35,000 / NA	(X-X-E)	3051 / 2890 (CBS)	— / —	NA / NA
Jump Booster	75,000 / NA	(X-X-E)	3051 / 3062 (CIH)	— / —	NA / NA
Laser Microphone	750 / NA	(E-E-F)	ES / —	— / —	NA / NA
Magnetic Clamps	2,500 / NA	(X-X-E)	3062 (CC) / NA	— / NA	NA / NA
Mission Equipment	0 / 0	(A-A-A)	PS / —	— / —	NA / NA
Modular Mount					
Std. Modular Weapon Mount	1,000 / NA	(X-X-C)	3050 / 2868 (CWF)	— / —	NA / NA
Anti-Personnel Weapon Mount	500 / NA	(X-X-C)	3050 / 2868 (CWF)	— / —	NA / NA
Modular Turret Mount (per Slot)	2,500 / NA	(X-X-D)	3050 / 2868 (CWF)	— / —	NA / NA
Configurable Turret Mount**	+2,500 / NA	(X-X-E)	3050 / 2868 (CWF)	— / —	NA / NA

ADDITIONAL BATTLE ARMOR WEAPONS AND EQUIPMENT (CONT)

Weapon / Item	Cost	Availability (AoW-SW-3050+)	Introduced (Affiliation)	Extinction	Reintroduced (Affiliation)
Parafoil	3,000 / NA	(B-B-C)	PS / —	— / —	NA / NA
Partial Wing	50,000 / NA	(X-X-F)	3053 (DC) / NA	— / NA	NA / NA
Power Pack	1,000 / NA	(B-C-B)	PS / —	— / —	NA / NA
Remote Sensor Dispenser	7,500 / 700	(D-D-D)	PS / —	— / —	NA / NA
Searchlight	500 / NA	(A-A-A)	PS / —	— / —	NA / NA
Shotgun Microphone	750 / NA	(E-E-F)	PS / —	— / —	NA / NA
Space Operations Adaptation	50,000 / NA	(X-X-E)	3011 (TC) / 2895 (CSR)	— / —	NA / NA
Squad Support Weapon Mount	Weapon +5,000 / NA	(X-X-E)	PS / —	— / —	NA / NA
Light TAG	40,000 / 200	(X-X-F)	3053 (DC) / 3054 (CWF)	— / —	NA / NA

*For battlesuits, the One-Shot option may be applied to LRM, MRM, SRM, Advanced SRM, and Narc weapons only; Rocket Launchers and Pop-Up Mines are automatically considered One-Shot items (the ammunition shot cost is for post-battle reload purposes only).

**Detachable Missile Packs and Configurable Weapon Mounts add their price to the cost of the weapon or turret they modify (respectively).

NOTE: Battle Armor Equipment Prices and Availabilities reflect the versions adapted for use on battle armor only; The dates of Introduction, however, may reflect the creation of the originating weapon system instead

CONVENTIONAL INFANTRY WEAPONS

Weapon / Item	Cost	Availability (AoW-SW-3050+)	Introduced (Affiliation)	Extinction	Reintroduced (Affiliation)
Archaic Weapons					
Bow (Compound)	15 / 2	(B-A-A)	PS / —	— / —	NA / NA
Bow (Daikyu)	30 / 2	(C-D-D)	PS / —	— / —	NA / NA
Bow (Long bow)	20 / 2	(B-B-B)	PS / —	— / —	NA / NA
Bow (Shortbow)	10 / 1	(A-A-A)	PS / —	— / —	NA / NA
Bow (Hankyu)	15 / 1	(C-C-C)	PS / —	— / —	NA / NA
Club (Blackjack/Sap)	5 / NA	(A-A-A)	PS / —	— / —	NA / NA
Club (Club/Improvised)	0 / NA	(A-A-A)	PS / —	— / —	NA / NA
Crossbow (Basic)	10 / 1	(A-A-A)	PS / —	— / —	NA / NA
Crossbow (Heavy)	20 / 1	(A-A-A)	PS / —	— / —	NA / NA
Blade (Axe)	25 / NA	(A-A-A)	PS / —	— / —	NA / NA
Blade (Bokken)	15 / NA	(B-B-B)	PS / —	— / —	NA / NA
Blade (Dao)	200 / NA	(C-C-C)	PS / —	— / —	NA / NA
Blade (Carbon-Reinforced Nails)	1,000 / NA	(X-D-D)	2990 (CC) / NA	— / NA	NA / NA
Blade (Hatchet/Tomahawk)	10 / NA	(A-A-A)	PS / —	— / —	NA / NA
Blade (Katana)	250 / NA	(C-C-D)	PS / —	— / —	NA / NA
Blade (Dagger/Knife/Bayonet)	8 / NA	(A-A-A)	PS / —	— / —	NA / NA
Blade (No-Dachi)	300 / NA	(C-C-C)	PS / —	— / —	NA / NA
Blade (Shuriken)	5 / NA	(C-C-C)	PS / —	— / —	NA / NA
Blade (Sword)	30 / NA	(A-A-A)	PS / —	— / —	NA / NA
Blade (Wakizashi)	150 / NA	(C-C-C)	PS / —	— / —	NA / NA
Blade (Vibro-axe)	150 / *	(C-D-D)	2445 (LC) / —	— / —	NA / NA
Blade (Vibro-blade)	100 / *	(B-C-B)	2400 (FW) / —	— / —	NA / NA
Blade (Vibro-katana)	350 / *	(E-E-D)	2450 (DC) / —	— / 2850	NA / NA
Blade (Vibro-sword, I.S.)	300 / *	(D-D-C)	2440 (TH) / —	— / 2850	NA / NA
Blade (Vibro-sword, Clan)	500 / *	(X-F-E)	NA / 2800 (CJF)	NA / —	NA / NA
Nunchaku	10 / NA	(B-B-B)	PS / —	— / —	NA / NA
Staff	5 / NA	(A-A-A)	PS / —	— / —	NA / NA
Staff (Pole Arm)	50 / NA	(B-B-B)	PS / —	— / —	NA / NA
Staff (Stun Staff, Single-End)	300 / *	(A-C-A)	2150 (WA) / —	— / —	NA / NA
Staff (Stun Staff, Double-End)	500 / *	(A-C-A)	2155 (WA) / —	— / —	NA / NA
Stunstick	200 / *	(A-A-A)	ES / —	— / —	NA / NA
Stunstick (Mini)	50 / *	(B-A-A)	ES / —	— / —	NA / NA
Whip	18 / NA	(A-A-A)	PS / —	— / —	NA / NA
Whip (Monowire)	200 / *	(E-F-E)	2200 (TA) / —	— / —	NA / NA

CONVENTIONAL INFANTRY WEAPONS (CONT)

Weapon / Item	Cost	Availability (AoW-SW-3050+)	Introduced (Affiliation)	Extinction	Reintroduced (Affiliation)
Whip (Medusa)	2,200 / *	(X-F-E)	NA / 2820 (CWM)	NA / —	NA / NA
Whip (Neural Lash)	750 / *	(E-E-D)	2200 (DC) / —	— / —	NA / NA
Whip (Neural Whip)	500 / *	(F-F-E)	2215 (DC) / —	— / 2786	NA / NA
Pistols					
Auto-Pistol	50 / 2	(A-A-A)	PS / —	— / —	NA / NA
Auto-Pistol (Magnum)	75 / 4	(A-A-B)	PS / —	— / —	NA / NA
Auto-Pistol (Mydron)	100 / 4	(C-B-B)	2612 (FS) / —	— / —	NA / NA
Auto-Pistol (Nambu)	75 / 2	(B-C-C)	2540 (DC) / —	— / —	NA / NA
Auto-Pistol (Sternsnacht Python)	125 / 4	(X-X-C)	3051 (FC) / NA	— / NA	NA / NA
Auto-Pistol (Stetta)	150 / 10	(X-F-C)	3010 (LC)	— / NA	NA / NA
Auto-Pistol (M&G)	60 / 3	(C-B-C)	2495 (LC) / —	— / —	NA / NA
Auto-Pistol (Hawk Eagle)	100 / 10	(X -F-C)	3035 (FW) / NA	— / —	NA / NA
Auto-Pistol (Serrek 7875D)	185 / 3	(X-C-B)	2810 (FS) / NA	— / —	NA / NA
Dart Gun	40 / 1	(A-A-A)	PS / —	— / —	NA / NA
Flare Pistol	25 / 2	(A-A-A)	PS / —	— / —	NA / NA
Gauss Pistol	1,500 / 1	(X-D-D)	NA / 2850 (CSA)	NA / —	NA / NA
Gauss Pistol (Mandrake)	750 / **	(X-X-E)	3052 (CC) / NA	— / NA	NA / NA
Gyrojet Pistol	450 / 1	(D-D-C)	2625 (TH) / —	— / —	NA / NA
Gyrojet Pistol (Coventry Handrocket)	250 / 3	(X-X-D)	3055 (FC) / NA	— / NA	NA / NA
Gyrojet Pistol (Hold-Out)	30 / 1	(D-D-C)	2630 (TH) / —	— / —	NA / NA
Laser Pistol	750 / *	(B-A-A)	2210 (TA) / —	— / —	NA / NA
Laser Pistol (Blazer)	3,000 / *	(C-C-D)	2295 (FW) / —	— / —	NA / NA
Laser Pistol (ER)	1,000 / *	(X-D-C)	NA / 2835 (CFM)	NA / —	NA / NA
Laser Pistol (Hold-Out)	100 / *	(B-B-B)	2320 (LC) / —	— / —	NA / NA
Laser Pistol (Intek White Dwarf)	250 / **	(X-X-C)	3058 (FW) / NA	— / NA	NA / NA
Laser Pistol (Nakjima)	750 / *	(X-D-C)	2880 (DC) / NA	— / NA	NA / NA
Laser Pistol (Sunbeam)	750 / *	(X-F-D)	3020 (FW) / NA	— / NA	NA / NA
Laser Pistol (Sunbeam Nova)	1,250 / *	(X-X-D)	3053 (FW) / NA	— / NA	NA / NA
Machine Pistol (Martial Eagle)	180 / 20	(X-F-D)	3045 (FW) / NA	— / NA	NA / NA
Needler Pistol	50 / 1	(A-A-A)	PS / —	— / —	NA / NA
Needler Pistol (Hold-Out)	20 / **	(C-B-B)	2515 (TH) / —	— / —	NA / NA
Needler Pistol (M&G Flechette)	100 / 4	(B-B-C)	2360 (LC) / —	— / —	NA / NA
Needler Pistol (Sea Eagle)	110 / 5	(X-F-D)	3035 (FW) / NA	— / NA	NA / NA
Paint Gun (LGB-46R)	50 / 10	(A-A-B)	PS / —	— / —	NA / NA
Pistol (Flamer)	50 / 1	(B-B-B)	ES / —	— / —	NA / NA
Pistol (Hold-Out)	20 / 1	(A-A-B)	PS / —	— / —	NA / NA
Pistol (Makeshift)	15 / 1	(A-A-A)	PS / —	— / 2800	NA / NA
Pistol (TK Enforcer Semi-Auto)	110 / 3	(X-X-B)	3058 (LA) / NA	— / NA	NA / NA
Pistol (Spitball Gas Weapon)	6 / 2	(X-X-C)	3059 (LA) / NA	— / NA	NA / NA
Pistol (Sternsnacht Heavy [Claymore])	200 / 1	(X-E-D)	2885 (LC) / NA	— / NA	NA / NA
Pulse Laser Pistol (Clan)	1,500 / *	(X-C-C)	NA / 2840 (CFM)	NA / —	NA / NA
Pulse Laser Pistol (IS)	1,000 / *	(B-F-C)	2620 (TH) / —	— / 2845	NA / NA
Revolver	60 / 1	(A-A-A)	PS / —	— / —	NA / NA
Revolver (Magnum)	60 / 3	(B-B-B)	PS / —	— / —	NA / NA
Sonic Stunner	100 / *	(B-C-B)	2375 (TH) / —	— / —	NA / NA
Tranq Gun	30 / 1	(A-A-A)	PS / —	— / —	NA / NA
Rifles					
Auto-Rifle	80 / 2	(A-A-A)	PS / —	— / —	NA / NA
Elephant Gun	100 / 2	(B-C-C)	PS / —	— / —	NA / NA
Gauss Rifle (Thunderstroke)	2,500 / 3	(X-X-E)	3058 (FS) / NA	— / NA	NA / NA
Gauss Rifle (Thunderstroke II)	3,500 / 10	(X-X-D)	3062 (FS) / NA	— / NA	NA / NA
Gyroslug Carbine	800 / 5	(C-D-C)	2580 (CC) / —	— / —	NA / NA
Gyroslug Carbine (Star King)	950 / 15	(X-C-D)	2789 (LC) / NA	2925 / NA	NA / NA
Gyroslug Rifle	1,000 / 20	(B-C-C)	2530 (TH) / —	— / —	NA / NA
Gyrojet Gun (Heavy)	2,500 / 250	(C-D-C)	2590 (LC) / —	— / —	NA / NA
Gyrojet Rifle	1,000 / 20	(C-C-B)	2540 (TH) / —	— / —	NA / NA
Laser Rifle	1,250 / *	(C-B-B)	2230 (TA) / —	— / —	NA / NA
Laser Rifle (Blazer)	2,190 / *	(C-C-D)	2290 (FW) / —	— / —	NA / NA

CONVENTIONAL INFANTRY WEAPONS (CONT)

Weapon / Item	Cost	Availability (AoW-SW-3050+)	Introduced (Affiliation)	Extinction	Reintroduced (Affiliation)
Laser Rifle (Ebony Assault)	8,500 / *	(X-X-E)	3063 (MC) / NA	— / NA	NA / NA
Laser Rifle (ER)	2,000 / *	(X-D-D)	NA / 2845 (CSA)	NA / —	NA / NA
Laser Rifle (ER [Sunbeam Starfire])	2,500 / *	(X-X-E)	3052 (FW) / NA	— / NA	NA / NA
Laser Rifle (Federated-Barrett M61A)	2,150 / *	(X-X-D)	3062 (FS) / NA	— / NA	NA / NA
Laser Rifle (Intek)	1,250 / *	(X-D-D)	2880 (FW) / NA	— / NA	NA / NA
Laser Rifle (Magna)	1,500 / *	(C-C-D)	2465 (DC) / —	— / —	NA / NA
Laser Rifle (Marx XX)	1,750 / *	(D-E-D)	2690 (TH) / —	— / —	NA / NA
Laser Rifle (Mauser 960)	8,000 / *	(C-F-D)	2700 (TH) / —	— / 3040	NA / NA
Laser Rifle (Mauser 1200 LSS)	10,000 / *	(X-X-E)	3055 (WB) / NA	— / NA	NA / NA
Laser Rifle (Mauser IIC IAS)	18,000 / *	(X-F-E)	NA / 3015 (CHH)	— / —	NA / NA
Laser Rifle (Maxell PL-10)	2,000 / *	(X-X-C)	3059 (LA) / NA	— / NA	NA / NA
Needler Rifle	75 / 2	(B-B-B)	ES / —	— / —	NA / NA
Needler Rifle (Shredder Heavy)	150 / 3	(X-X-C)	3054 (FC) / NA	— / NA	NA / NA
Needler Rifle (M&G Flechette)	200 / 8	(C-C-C)	2325 (LC) / —	— / —	NA / NA
Pulse Laser Rifle (Clan)	3,000 / *	(X-E-D)	NA / 2835 (CGS)	NA / —	NA / NA
Pulse Laser Rifle (IS)	2,000 / *	(D-E-C)	2680 (TH) / —	— / 2880	NA / NA
Rifle (Bolt-Action)	60 / 1	(A-A-A)	PS / —	— / —	NA / NA
Rifle (Federated-Barrett M42B)	1,385 / 12	(X-X-D)	3064 (FS) / NA	— / NA	NA / NA
Rifle (Federated Long)	120 / 3	(X-C-A)	2870 (FS) / NA	— / NA	NA / NA
Rifle (Imperator AX-22 Assault)	200 / 3	(X-X-B)	3060 (FW) / NA	— / NA	NA / NA
Rifle (M&G G-150)	270 / 5	(X-X-C)	3060 (LA) / NA	— / NA	NA / NA
Rifle (Makeshift)	20 / 1	(A-A-A)	PS / —	— / —	NA / NA
Rifle (Minolta 9000)	1,000 / 5	(X-X-E)	3055 (CC) / NA	— / NA	NA / NA
Rifle (Radium Sniper)	9,500 / 650	(F-X-F)	2583 (TC) / NA	2607 / —	3062 (TC) / NA
Rifle (Sniper)	350 / 4	(C-C-C)	PS / —	— / —	NA / NA
Rifle (TK Assault)	150 / 3	(X-C-A)	2870 (LC) / NA	— / NA	NA / NA
Rifle (Zeus Heavy)	200 / 3	(C-B-B)	2740 (FS) / —	— / —	NA / NA
Shotguns					
Auto-Shotgun	200 / 2	(B-B-C)	ES / —	— / —	NA / NA
Ceres Arms Crowdbuster	150 / *	(X-F-D)	3030 (CC) / NA	— / NA	NA / NA
Gel Gun (Buccaneer)	200 / 20	(X-X-D)	3035 (FW) / NA	— / NA	NA / NA
Shotgun (Avenger CCW)	345 / 4	(X-E-C)	NA / 3020 (CSV)	NA / —	NA / NA
Shotgun (Combat)	175 / 2	(B-B-B)	PS / —	— / —	NA / NA
Shotgun (Double-Barrel)	30 / 1	(A-A-A)	PS / —	— / —	NA / NA
Shotgun (Double-Barrel, Sawed Off)	30 / 1	(A-A-A)	PS / —	— / —	NA / NA
Shotgun (Pump-Action)	40 / 1	(A-A-A)	PS / —	— / —	NA / NA
Shotgun (Pump-Action, Sawed Off)	40 / 1	(A-A-A)	PS / —	— / —	NA / NA
Submachine Guns					
Gauss SMG	2,000 / 10	(X-X-D)	NA / 3055 (CDS)	NA / —	NA / NA
Submachine Gun	80 / 5	(A-A-A)	PS / —	— / —	NA / NA
SMG (Gunther MP-20)	125 / 5	(X-E-C)	3007 (LC) / NA	— / NA	NA / NA
SMG (Imperator 2894A1)	100 / 5	(X-C-B)	2842 (FW) / NA	— / NA	NA / NA
SMG (KA-23 Subgun)	350 / 6	(X-C-D)	2895 (DC) / NA	— / NA	NA / NA
SMG (Rorynex RM-3/XXI)	80 / 10	(C-B-C)	2660 (TH) / —	— / —	NA / NA
SMG (Rugan)	100 / 8	(D-B-C)	2720 (TH) / —	— / —	NA / NA
Grenades (Thrown)					
Grenade	16 / **	(A-A-A)	PS / —	— / —	NA / NA
Grenade (Micro)	2 / **	(B-C-C)	PS / —	— / —	NA / NA
Grenade (Mini)	8 / **	(B-B-B)	PS / —	— / —	NA / NA
Grenade (Rocket-Assisted)	50 / **	(X-X-D)	3065 (FS) / NA	— / NA	NA / NA
Support Weapons					
AA Weapon (Mk. 1, Light)	1,000 / **	(E-F-D)	2500 (TH) / —	2790 / —	3056 (FW) / NA
AA Weapon (Mk. 2, Man-Portable)	3,500 / 1,000	(E-F-D)	2510 (TH) / —	2790 / —	3058 (FW) / NA
Autocannon (Bearhunter)	3,000 / 200	(X-X-D)	NA / 3062 (CHH)	NA / —	NA / NA
Autocannon (Semi-Portable)	2,000 / 150	(C-D-D)	2255 (TA) / —	— / —	NA / NA
Flamer (Heavy)	200 / 200	(B-B-B)	ES / —	— / —	NA / NA
Flamer (Man-Pack)	100 / 2	(A-A-A)	PS / —	— / —	NA / NA
Gauss Cannon (Grand Mauler)	5,000 / 5	(X-X-D)	3059 (FS) / NA	— / NA	NA / NA

CONVENTIONAL INFANTRY WEAPONS (CONT)

Weapon / Item	Cost	Availability (AoW-SW-3050+)	Introduced (Affiliation)	Extinction	Reintroduced (Affiliation)
Gauss Rifle (Magshot)	8,500 / 10	(X-X-E)	3059 (FS) / NA	— / NA	NA / NA
Gauss Rifle (Tsunami Heavy)	5,500 / 5	(X-X-D)	3056 (DC) / NA	— / NA	NA / NA
Gauss Rifle, Light (David)	6,000 / 20	(X-X-E)	3063 (FW) / NA	— / NA	NA / NA
Gauss Rifle, Light (King David)	8,000 / 200	(X-X-E)	3063 (FW) / NA	— / NA	NA / NA
Grenade Launcher	465 / 80	(A-B-B)	PS / —	— / —	NA / NA
Grenade Launcher (Auto)	975 / 160	(B-B-B)	ES / —	— / —	NA / NA
Grenade Launcher (Compact)	290 / 2	(B-C-B)	ES / —	— / —	NA / NA
Grenade Launcher (Heavy)	1,500 / 320	(X-X-D)	3050 (FC) / NA	— / NA	NA / NA
Grenade Launcher (Heavy Auto)	4,500 / 400	(X-X-D)	NA / 2900 (CDS)	NA / —	NA / NA
Laser (Hellbore Assault)	2,500 / *	(X-X-E)	3058 (CS) / —	— / —	NA / NA
LRM Launcher (FarShot)	2,000 / 1,500	(X-X-D)	3057 (FWL) / —	— / —	NA / NA
Machine Gun (Light)	400 / 6	(B-B-B)	PS / —	— / —	NA / NA
Machine Gun (Portable)	1,000 / 10	(B-B-B)	PS / —	— / —	NA / NA
Machine Gun (Semi-Portable)	1,100 / 10	(B-B-B)	PS / —	— / —	NA / NA
Machine Gun (Support)	1,750 / 50	(C-C-C)	PS / —	— / —	NA / NA
Mortar (Light)	1,400 / 24	(C-C-C)	PS / —	— / —	NA / NA
Mortar (Heavy)	5,000 / 32	(B-C-B)	PS / —	— / —	NA / NA
MRM Launcher (One-Shot)	2,500 / 21	(X-X-E)	3065 (DC) / NA	— / NA	NA / NA
Needler, Support (Firedrake)	500 / 10	(X-X-C)	3061 (LA) / NA	— / NA	NA / NA
Particle Cannon (Semi-Portable)	7,000 / *	(D-E-D)	2436 (DC) / —	— / —	NA / NA
Particle Cannon (Support)	45,000 / *	(C-D-C)	2470 (TH) / —	— / —	NA / NA
Plasma Rifle (Man-Portable)	7,500 / 10	(X-X-D)	3065 (CC) / NA	— / NA	NA / NA
Pulse Laser (Dragonsbane)	5,000 / **	(X-X-D)	3058 (DC) / NA	— / NA	NA / NA
Recoilless Rifle (Light)	300 / 20	(A-A-A)	PS / —	— / —	NA / NA
Recoilless Rifle (Medium)	2,000 / 30	(A-A-A)	PS / —	— / —	NA / NA
Recoilless Rifle (Heavy)	3,000 / 40	(A-A-A)	PS / —	— / —	NA / NA
Rocket Launcher (LAW)	350 / **	(A-B-B)	PS / —	— / —	NA / NA
Rocket Launcher (V-LAW)	75 / **	(A-A-A)	PS / —	— / —	NA / NA
SRM Launcher (Std, Two-Shot)	1,500 / 450	(C-C-D)	2370 (TH) / —	— / —	NA / NA
SRM Launcher (Hvy, One-Shot)	3,000 / 500	(C-C-D)	2370 (TH) / —	— / —	NA / NA
SRM Launcher (Light)	1,500 / 300	(C-C-D)	2370 (TH) / —	— / —	NA / NA
Support Laser	10,000 / *	(B-C-D)	2380 (TH) / —	— / —	NA / NA
Support Laser (ER, IS)	11,250 / *	(X-X-E)	3059 (FW) / NA	— / NA	NA / NA
Support Laser (ER, Clan)	11,250 / *	(X-E-D)	NA / 2825 (CHH)	NA / —	NA / NA
Support Laser (ER Heavy, IS)	80,000 / *	(X-X-D)	3060 (FW) / NA	— / NA	NA / NA
Support Laser (ER Heavy, Clan)	80,000 / *	(X-E-D)	NA / 2827 (CHH)	NA / —	NA / NA
Support Laser (ER, Semi-Portable)	10,000 / *	(X-X-C)	NA / 3060 (CSJ)	NA / —	NA / NA
Support Laser (Heavy)	40,000 / *	(E-E-D)	2405 (TH) / —	— / —	NA / NA
Support Laser (Heavy, Semi-Portable)	20,000 / *	(X-X-D)	NA / 3061 (CSA)	NA / —	NA / NA
Support Laser (Semi-Portable)	5,000 / *	(C-D-C)	2400 (TH) / —	— / —	NA / NA
Support Laser (Ultra-Heavy)	100,000 / *	(X-X-D)	NA / 3062 (CSA)	NA / —	NA / NA
Support Pulse Laser	16,000 / *	(D-E-D)	2610 (TH) / —	— / —	NA / NA
Support Pulse Laser (Heavy)	60,000 / *	(E-F-E)	2615 (TH) / —	— / —	NA / NA
Support Pulse Laser (Semi-Portable)	12,500 / *	(X-X-D)	NA / 3059 (CSJ)	NA / —	NA / NA

*These weapons use Energy Cells; a base value of 200 C-bills may be applied to reflect a sufficient supply of power cells for combat.
**These weapons are Single-Use only Items

Clan Jade Falcon's Delta Galaxy conducts a Trial of Possession to take a power station from the Steel Vipers' Rho Galaxy.

The Battle Value (BV) system provides a numerical rating that represents the capabilities and survivability of every *BattleTech* unit: BattleMechs, IndustrialMechs, Combat Vehicles, Support Vehicles, aerospace fighters, conventional fighters, DropShips, Small Craft, ProtoMechs, conventional infantry and battle armor. With the Battle Value system, players can create fairly well matched battles by assembling two opposing forces, each with the same total BV ratings (see *Constructing a Battle Force*, p. 315) and equivalent force sizes. The BV ratings for combat-effective weapons and equipment are listed in the Inner Sphere, Clan and Conventional Infantry Weapons Battle Value tables at the end of this section, beginning on p. 317.

The formulas in this section allow players to calculate the exact BV of any BattleMech, vehicle or other unit. However, the variety of hardware and units encompassed by *BattleTech* precludes an easy-to-use system. Players may find some of the formulas complex, and space prohibits a detailed analysis of the methods by which equipment values and other modifiers are derived.

This revised Battle Value system replaces the system first published in *Maximum Tech* and the *BattleTech Master Rules*. A list of Battle Values for all units with a published Record Sheet can be found on Catalyst Game Labs' Master Unit List website (http://www.masterunitlist.info/).

CALCULATING 'MECH BV

BattleMechs and IndustrialMechs share the same method of calculating their BV ratings, involving three main steps. First, calculate the 'Mech's Defensive Battle Rating (DBR). Second, calculate the Offensive Battle Rating (OBR). Finally, add the Defensive and Offensive Battle Ratings together for a combined BV and then round to the nearest whole number (round .5 up) to obtain the final BV. As you read each step, refer to pp. 304–305 for an example of calculating the BV for a MON-66 *Mongoose*, a TDR-10SE *Thunderbolt* and a WI-DM *DemolitionMech*.

STEP 1: CALCULATE DEFENSIVE BATTLE RATING

First, **ADD** the following figures:

Total Armor Factor x 2.5 x Armor Type Modifier

Consult the 'Mech Armor Type Modifier Table on p. 315.

Total Internal Structure Points x 1.5 x Internal Structure Type Modifier x Engine Type Modifier

Consult the 'Mech Internal Structure Type Modifier Table on p. 315 and the 'Mech Engine Type Modifier Table on p. 315.

Gyro ('Mech Tonnage x 'Mech Gyro Modifier)

Consult the 'Mech Gyro Type Modifier Table on p. 315.

Total BV of all Defensive Equipment

Defensive Equipment includes active probes, anti-missile system (including AMS ammo up to the BV of the systems themselves), antipersonnel pods, anti-battle armor pods, bridgelayers and ECM suites. All TechManual Defensive Equipment is identified on the Weapon and Equipment Battle Value Tables by a dagger footnote (†).

Then **SUBTRACT** the following figures. These subtractions cannot drop the running total below 1.

15 points per critical space of explosive ammo in the center torso, legs or head (Clan 'Mech)

15 points per critical space of explosive ammo in any location (Inner Sphere 'Mech with XL engine)

15 points per critical space of explosive ammo in the center torso, legs or head, or not protected by CASE* in its location (Inner Sphere 'Mech with Standard or Light engines)

15 points per critical space of explosive ammo in arm not protected by CASE* in its location, or in the next location inward on the Damage Transfer Diagram (see p. 123, *TW*) (Inner Sphere 'Mechs with standard or light engines)

1 point per Gauss weapon critical space in the center torso, legs or head (Clan 'Mech)

1 point per Gauss weapon critical space in any location (Inner Sphere 'Mech with XL engine)

1 point per Gauss weapon critical space in the center torso, legs or head, or not protected by CASE* in its location (Inner Sphere 'Mech with Standard or Light engine)

1 point per Gauss weapon critical space in arm not protected by CASE* in its location, or in the next location inward on the Damage Transfer Diagram (see p. 123, *TW*) (Inner Sphere 'Mechs with standard or light engines)

Note: Explosive ammo is any ammunition that may explode inside a 'Mech. Gauss weapons include Gauss rifles, HAGs and AP Gauss.

* – It is assumed Clan 'Mechs have CASE installed. If the design specifically did not pay the C-bill cost to install CASE then treat a Clan-built 'Mech as an Inner Sphere 'Mech for the purpose of these calculations.

Calculate 'Mech's Defensive Battle Rating

MULTIPLY the current total by the 'Mech's Defensive Factor. A 'Mech's Defensive Factor is based on the unit's highest potential target modifier (including bonuses for jump capability, enhanced movement capability from MASC or triple-strength myomer, and the maximum effects of stealth armor, such as the modifier for long range), as shown on the Defensive Factors Table and Defensive Factor Modifier Table (p. 316). The final result is the 'Mech's Defensive Battle Rating (DBR).

STEP 2: CALCULATE OFFENSIVE BATTLE RATING

To calculate the Offensive Battle Rating, first calculate the Modified Battle Value of each weapon on the 'Mech. Then, make any required adjustments for the 'Mech's Heat Efficiency, offensive equipment, and tonnage to get the 'Mech's Weapon Battle Rating. Multiply the Weapon Battle Rating by the 'Mech's Speed Factor: the result is the Offensive Battle Rating.

Calculate Each Weapon's Modified BV

First, determine the Battle Value of each weapon and its ammunition (if applicable) carried by the 'Mech (see pp. 317-318). Then apply the following BV modifiers as necessary. All modifiers are cumulative. The result is the weapon's Modified BV, which is used in the steps that follow.

Excessive Ammunition: To prevent excessive ammo from distorting the Battle Value, the BV added for ammunition cannot exceed the unmodified BV of the weapon itself. If the BV of the ammo exceeds the weapon BV, reduce the ammo BV to equal the unmodified weapon BV. When a 'Mech carries several weapons of the same model, total the unmodified BV for all examples of that model and then the BV for all ammunition carried for that model before comparing the two BVs.

Rear-Firing Weapons: Rear-firing torso-, leg- and head-mounted weapons (but not their ammunition) count as half their normal BV value. If the unmodified BV of forward-firing weapons in those locations is less than the unmodified BV of rear-firing weapons, then halve the value of the forward-firing torso-, leg- and head-mounted weapons instead. When making heat adjustments to a weapon's BV (see below), switch the forward- and rear-firing arcs in an identical manner.

Artemis IV FCS: Increase by 20 percent the BV of any missile launcher equipped with Artemis IV. This increase does not apply to the launcher's ammunition.

Targeting Computer: Each weapon linked to a targeting computer (see p. 238) multiplies its BV by 1.25. Do not include ammunition when adjusting linked weapon BVs.

Determine 'Mech Heat Efficiency and Total Weapon Heat

Determine 'Mech Heat Efficiency: A weapon's Modified BV may need to be reduced to take into consideration the 'Mech's Heat Efficiency. To calculate 'Mech Heat Efficiency, add 6 to the unit's Heat Sink Capacity and subtract the heat generated when the 'Mech moves.

'Mech Heat Efficiency = 6 + Heat Sink Capacity – Movement Heat

Heat Sink Capacity: Heat Sink Capacity denotes the maximum number of Heat Points a 'Mech can dissipate in a single turn. Each single heat sink dissipates 1 point of heat. Double-capacity heat sinks dissipate 2 points of heat.

Movement Heat: Movement Heat is the amount of heat generated when the 'Mech moves in the most heat-intensive manner possible (Running or Jumping at its maximum capacity) during a single turn. If the 'Mech has stealth armor, add 10 to this value. ICE-powered IndustrialMechs do not generate heat when moving and so always have a Movement Heat Value of 0.

Determine Total Weapon Heat: Determine the total heat that the 'Mech would generate if it fired all its offensive weapons, including rear-firing weapons, in a single turn (Defensive Equipment is never figured in this value). Multiply by 2 the heat points generated by Ultra autocannons, multiply by 6 the heat points generated by rotary autocannons, reduce by half the heat points generated by Streak SRMs and reduce to one-quarter the heat points generated by one-shot weapons.

Calculate Weapon Battle Rating

Start a running Weapon Battle Rating total, beginning at 0. When instructed, add the specified amount to this total.

1. Add the Modified BV of any weapon on the 'Mech that does not generate heat when fired to the running Weapon Battle Rating total.
2. Add the BV of any ammunition and non-Defensive Equipment on the 'Mech to the running Weapon Battle Rating total.
3. If the 'Mech's Total Weapon Heat is equal to or less than the 'Mech's Heat Efficiency, add the Modified BV of all the 'Mech's remaining weapons to the running Weapon Battle Rating and proceed to Step 8. If the Total Weapon Heat is greater than the 'Mech's Heat Efficiency, start a running heat total, beginning at 0, and proceed to Step 4.
4. Ignoring weapons that generate no heat when fired, choose the weapon on the 'Mech with the highest Modified BV. If more than one weapon has the same Modified BV, choose the one that generates the least heat when fired. If multiple weapons of the same type are mounted, choose one randomly.

5. Add this weapon's Modified BV to the running Weapon Battle Rating total, and add its Heat Value to the running heat total.
6. If the running heat total is less than the 'Mech Heat Efficiency, repeat Steps 4-5 (ignoring any weapons already chosen). If the running heat total is equal to or has exceeded the Heat Efficiency, proceed to Step 7.
7. The weapon that causes the 'Mech's Heat Efficiency to be equaled or exceeded is still calculated at its full Modified BV. All remaining weapons are then added to the running Weapon Battle Rating total at half their Modified BV.
8. Add the total 'Mech tonnage to the running Weapon Battle Rating total. Note: TSM-equipped 'Mechs multiply their tonnage by 1.5. Industrial TSM-equipped 'Mechs multiply their tonnage by 1.15.

Having followed the steps above, the result is the 'Mech's Weapon Battle Rating. Proceed to the next step, Calculate Offensive Battle Rating.

Calculate Offensive Battle Rating

Determine Speed Factor: A 'Mech's Speed Factor reflects its ability to maneuver on the battlefield. To find the Speed Factor of a 'Mech, add together its Running MP and half its Jumping MP (rounded up). If the 'Mech has equipment that increases its Running and/or Jumping MP, such as MASC or triple-strength myomer (but not industrial triple-strength myomer), use the maximum MP it can legally generate for each movement type. Then consult the Speed Factor Table (p. 316).

Multiply the Weapon Battle Rating by the Speed Factor to give the Offensive Battle Rating. Note: IndustrialMechs, unless equipped with Advanced Fire Control (see p. 69), multiply their Offensive Battle Rating by 0.9.

STEP 3: CALCULATE FINAL BATTLE VALUE

Calculate a 'Mech's final BV by adding its Defensive and Offensive Battle Ratings. If the 'Mech is equipped with a Small cockpit, multiply this total by .95. Round the remaining fraction to the nearest whole number (round .5 up).

This formula yields the Battle Value of a 'Mech piloted by a MechWarrior with the standard Gunnery 4 and Piloting 5 Skill levels. If the MechWarrior has higher or lower skill levels, multiply the BV by the appropriate skill level multiplier (see *Constructing a Battle Force*, p. 315).

CALCULATING THE BV OF: A MON-66 *MONGOOSE*

CALCULATE DEFENSIVE BATTLE RATING

89 points Ferro-Fibrous Armor (1.0 multiplier)
Total Armor Factor x 2.5: **89 x 2.5 x 1.0 = 222.5**
43 Points Endo Steel (1.0 multiplier) with Standard Engine (1.0 multiplier)
Total Internal Structure Points x 1.5 x 1.0 x 1.0: **43 x 1.5 = 64.5**
Gyro: **25 x 0.5 = 12.5**
Total BV of all Defensive Equipment:
1 Beagle Active Probe **10**
309.5

At a run, the *Mongoose* presents a Target Movement Modifier of +4. That gives the 'Mech a Defensive Factor of 1.4.

309.5
x 1.4
Defensive Battle Rating = 433.3

CALCULATE OFFENSIVE BATTLE RATING

1. Calculate Each Weapon's Modified BV

The *Mongoose* is armed with 3 Medium Lasers and 1 Small Laser. It has no special equipment that modifies the BV of its weapons.

3 Medium Lasers: **46 each**
1 Small Laser: **9**

2. Determine 'Mech Heat Efficiency and Total Weapon Heat

The *Mongoose* has 10 single heat sinks. It cannot jump, and so its hottest movement mode is Running (2 points of heat). It is armed with 3 Medium Lasers (3 heat each) and 1 Small Laser (1 heat). Find its 'Mech Heat Efficiency and Total Weapon Heat.

'Mech Heat Efficiency = 6 + 10 - 2 = 14

Total Weapon Heat = 3 + 3 + 3 + 1 = 10

Because the Total Weapon Heat is lower than the 'Mech Heat Efficiency, there is no need to reduce the BV of any of its weapons. The Weapon Battle Rating is therefore the sum of these weapons' BVs, plus the 'Mech's tonnage.

3 Medium Lasers: **3 x 46 = 138**
1 Small Laser: **1 x 9 = 9**
25-ton 'Mech (No TSM): **25**
Weapon Battle Rating = 172

3. Calculate Offensive Battle Rating

Multiply the *Mongoose*'s Weapon Battle Rating by its Speed Factor. With a maximum Running MP of 12, and no Jumping MP, its Speed Factor is 1.89.

172 x 1.89 = 325.08
Offensive Battle Rating = 325.08

CALCULATE FINAL BATTLE VALUE

Defensive Battle Rating + Offensive Battle Rating = BV

433.3 + 325.08 = 758.38

MON-66 *Mongoose* BV = 758

CALCULATING THE BV OF: A WI-DM *DEMOLITIONMECH*

CALCULATE DEFENSIVE BATTLE RATING

85 points Industrial Armor (1.0 multiplier)	
Total Armor Factor x 2.5:	**85 x 2.5 = 212.5**
58 Points Industrial (0.5 multiplier) with Inner Sphere Fuel Cell Engine (1.0 multiplier)	
Total Internal Structure Points x 1.5 x 0.5 x 1.0:	**58 x 1.5 x 0.5 x 1.0 = 43.5**
Gyro:	**35 x 0.5 = 17.5**
Total BV of all Defensive Equipment:	**0**
	273.5

At the run, the *DemolitionMech* presents a Target Movement Modifier of +2. That gives the 'Mech a Defensive Factor of 1.2.

273.5
x 1.2
Defensive Battle Rating = 328.2

CALCULATE OFFENSIVE BATTLE RATING

1. Calculate Each Weapon's Modified BV

The *DemolitionMech* is armed with 1 Small Laser. It has no special equipment that modifies the BV of its weapons.

1 Small Laser:	**9**

2. Determine 'Mech Heat Efficiency and Total Weapon Heat

The *DemolitionMech* has 1 single heat sink. It cannot jump, and so its hottest movement mode is Running (2 points of heat). It is armed with 1 Small Laser (1 heat). Find its 'Mech Heat Efficiency and Total Weapon Heat.

'Mech Heat Efficiency = 6 + 1 - 2 = 5

Total Weapon Heat = 1

Because the Total Weapon Heat is lower than the 'Mech Heat Efficiency, there is no need to reduce the BV of any of its weapons. The Weapon Battle Rating is therefore the sum of its equipment and weapon BVs, plus the 'Mech's tonnage.

Rock Cutter:	**6**
Wrecking Ball:	**8**
1 Small Laser:	**9**
35-ton 'Mech (No Industrial TSM):	**35**
	Weapon Battle Rating = 58

3. Calculate Offensive Battle Rating

Multiply the *DemolitionMech*'s Weapon Battle Rating by its Speed Factor. With a maximum Running MP of 5, and no Jumping MP, its Speed Factor is 1.00.

58 x 1.00 = 58

Because the *DemolitionMech* is an IndustrialMech and does not have an Advanced Fire Control System, the Offensive Battle Rating needs to be multiplied by 0.9.

58 x 0.9 = 52.2
Offensive Battle Rating = 52.2

CALCULATE FINAL BATTLE VALUE

Defensive Battle Rating + Offensive Battle Rating = BV

328.2 + 52.2 = 380.4

WI-DM *DemolitionMech* BV = 380

A Blood Spirit Elemental Point dismounts from a Black Hawk *OmniMech.*

CALCULATING PROTOMECH BV

The procedure for calculating the Battle Value (BV) of a ProtoMech is similar to that for 'Mechs. The player first determines the ProtoMech's Defensive and Offensive Battle Ratings and then combines them to produce the final BV. In all cases, retain fractions until reaching the final BV, then round to the nearest whole number (.5 rounds up). As you read each step, refer to p. 307 for an example of calculating the BV for a *Delphyne-2*.

STEP 1: CALCULATE DEFENSIVE BATTLE RATING

First, **ADD** the following figures:

Total Armor Factor x 2.5
Total Internal Structure Points x 1.5
Total BV of all Defensive Equipment

Defensive Equipment includes active probes, anti-missile systems (including AMS ammo, up to the BV of the systems themselves) and ECM suites. All *TechManual* Defensive Equipment is identified on the Weapon and Equipment Battle Value Tables by a dagger footnote (†).

Calculate ProtoMech's Defensive Battle Rating

MULTIPLY the current total by the ProtoMech's Defensive Factor. The Defensive Factor is based on the unit's highest potential target modifier (including bonuses for jump capability and the use of a ProtoMech myomer booster), as shown on the Defensive Factors Table and Defensive Factor Modifier Table (p. 316). ProtoMechs add 0.1 to the value from the table.

The final result is the ProtoMech's Defensive Battle Rating (DBR).

STEP 2: CALCULATE OFFENSIVE BATTLE RATING

To calculate the Offensive Battle Rating, calculate each weapon's BV in order to determine the Weapon Battle Rating. Then **MULTIPLY** the Weapon Battle Rating by the ProtoMech's Speed Factor.

Calculate Weapon Battle Rating

Determine the Battle Value of each weapon and its ammunition (if applicable) carried, as well as any equipment (see pp. 317-318).

Ammunition: If the ProtoMech carries a quantity of ammo other than a full ton, divide the kilograms of ammo carried by 1,000, then multiply the result by the BV of the ammo per ton. The result is the BV for the amount of ammo carried.

To prevent excessive ammo from distorting the Battle Value, the BV added for ammunition cannot exceed the BV of the weapon itself. If the ammo BV exceeds that of the weapon, reduce the ammo BV to match the weapon BV.

Calculate Offensive Battle Rating

Determine Speed Factor: A ProtoMech's Speed Factor reflects its ability to maneuver on the battlefield. To find the Speed Factor, add together the ProtoMech's Running MP and half its Jumping MP (rounded up). Add 1 to the result if the ProtoMech is equipped with a myomer booster. Then consult the Speed Factor Table (p. 316).

Multiply the Weapon Battle Rating by the listed Speed Factor to give the Offensive Battle Rating.

STEP 3: CALCULATE FINAL BATTLE VALUE

Players calculate the BV of a ProtoMech by adding the ProtoMech's Defensive and Offensive Battle Ratings. Round the remaining fraction to the nearest whole number (.5 rounds up).

This formula yields the Battle Value of a ProtoMech piloted by a warrior with the standard Gunnery Skill level of 4. If the warrior has a higher or lower skill level, multiply the BV by the appropriate skill level multiplier (see *Constructing a Battle Force*, p. 315).

CALCULATING THE BV OF: A *DELPHYNE*-2

CALCULATE DEFENSIVE BATTLE RATING

Total Armor Factor x 2.5:	**40 x 2.5 = 100**
Total Internal Structure Points x 1.5:	**20 x 1.5 = 30**
Total BV of all Defensive Equipment:	**0**
	130

At a run or when jumping, the *Delphyne*-2 presents a Target Movement Modifier of +3. That gives the ProtoMech a Defensive Factor of 1.3 + 0.1 (because it is a ProtoMech) = 1.4.

	130
	x 1.4
	Defensive Battle Rating = 182

CALCULATE OFFENSIVE BATTLE RATING

1. Calculate Weapon Battle Rating

The *Delphyne*-2 is armed with 2 ER Micro Lasers and 2 SRM 3s. The *Delphyne*-2 carries 20 shots for its SRM 3, or 60 missiles, which weigh 10 kg each (see p. 88, *ProtoMech Ammunition Weight Table*).

Ammunition (SRM) 60:	**60 x 10 = 600**

600 kg is less than a full ton of SRM ammunition so it must calculate the modified BV for its ammunition. SRM 3 ammunition has a BV of 4 for each full ton.

600 kg of SRM 3 ammunition:	**(600 ÷ 1,000) x 4 = 2.4**

No weapon has an ammunition BV greater than the BV of the weapon, so no further modifications to BV are needed.

2 ER Micro Lasers:	**2 x 7 = 14**
2 SRM-3s:	**2 x 30 = 60**
Ammunition (SRM) 60 (at full value):	**2.4**
	76.4

2. Calculate Offensive Battle Rating

Multiply the *Delphyne*'s Weapon Battle Rating by its Speed Factor. With a maximum Running MP of 8, and a Jumping MP of 5, its Speed Factor is 1.76.

76.4 x 1.76 = 134.464
Offensive Battle Rating = 134.464

CALCULATE FINAL BATTLE VALUE

Defensive Battle Rating + Offensive Battle Rating = BV

182 + 134.464 = 316.464

***Delphyne-2* BV = 316**

CALCULATING VEHICLE BV

The procedure for calculating the Battle Value (BV) of Combat Vehicles and tracked, wheeled, hover, VTOL, WiGE and naval Support Vehicles is similar to that for 'Mechs. First determine the vehicle's Defensive and Offensive Battle Ratings, and then combine them to produce the final BV. Retain fractions until reaching the final BV, then round to the nearest whole number (.5 rounds up). As you read each step, refer to p. 308 for an example of calculating the BV for a CellCo Ranger APC and a Hephaestus OmniVehicle.

For Airship and Fixed Wing Support Vehicles, compute the unit's BV using the rules for Aerospace Units, starting on p. 312.

STEP 1: CALCULATE DEFENSIVE BATTLE RATING

First, **ADD** the following figures:

Total Armor Factor x 2.5
(Support Vehicles: multiply by BAR ÷ 10)

Total Internal Structure Points x 1.5 (including rotor and turret internal structure)

Total BV of all Defensive Equipment

Defensive Equipment includes active probes, anti-missile systems (including AMS ammo, up to the BV of the systems themselves) and ECM suites. All *TechManual* Defensive Equipment is identified on the Weapon and Equipment Battle Value Tables by a dagger footnote (†).

Calculate the Vehicle's Defensive Battle Rating

MULTIPLY the current value by the appropriate modifier from the Unit Type Modifiers Table (p. 316). The Unit Type Modifier represents a unit's terrain restrictions and vulnerabilities to critical damage. Surface vessels, hydrofoils and submarines are considered naval vessels for this purpose.

Next, **MULTIPLY** the current total by the vehicle's Defensive Factor. The Defensive Factor is based on the unit's highest potential target Modifier, as shown on the Defensive Factors Table and Defensive Factor Modifier Table (p. 316).

The final result is the vehicle's Defensive Battle Rating (DBR).

STEP 2: CALCULATE OFFENSIVE BATTLE RATING

To calculate the Offensive Battle Rating, calculate each weapon's Modified BV in order to determine the Weapon Battle Rating. Then **MULTIPLY** the Weapon Battle Rating by the Vehicle's Speed Factor.

Calculate Each Weapon's Modified BV

First, determine the Battle Value of each weapon and its ammunition (if applicable) carried (see pp. 317-318). Then apply the following BV modifiers as necessary. All modifiers are cumulative. The result is the weapon's Modified BV, which is used in the steps that follow.

Support Vehicles: Adjust the Battle Value of all heavy weapons and their ammunition by the fire control multiplier from the Offensive BV Adjustment Table (see p. 316). Players need not adjust light and medium weapons.

Turret-Mounted Weapons: Turret-mounted weapons are always treated as facing forwards when calculating their Battle Value.

Excessive Ammunition: To prevent excessive ammo from distorting the Battle Value, the BV added for ammunition cannot exceed the unmodified BV of the weapon itself. If the BV of the ammo exceeds the weapon BV, reduce the ammo BV to equal the unmodified weapon BV. If the unit has several weapons of the same model, total the unmodified BV for all examples of that model and then the BV for all ammunition carried for that model before comparing the two BVs.

Rear-Firing Weapons: Rear-firing torso-, leg- and head-mounted weapons (but not their ammunition) count as half their normal BV value. If the unmodified BV of forward-firing weapons in those locations is less than the unmodified BV of rear-firing weapons, then halve the value of the forward-firing torso-, leg- and head-mounted weapons instead. When making heat adjustments to a weapon's BV (see below), switch the forward- and rear-firing arcs in an identical manner.

Artemis IV FCS: Increase by 20 percent the BV of any missile launcher equipped with Artemis IV. This increase does not apply to the launcher's ammunition.

Targeting Computer: Each weapon linked to a targeting computer (see p. 238) multiplies its BV by 1.25. Do not include ammunition when adjusting linked weapon BVs.

Calculate Weapon Battle Rating

Add the Modified BV of all weapons, ammunition and equipment.

Next, **ADD** total Vehicle tonnage ÷ 2

Calculate Offensive Battle Rating

Determine Speed Factor: Use the Vehicle's Flanking MP rating and consult the Speed Factor Table (p. 316).

Multiply the vehicle's Weapon Battle Rating and Speed Factor to determine its Offensive BV.

STEP 3: CALCULATE FINAL BV

Add the Defensive and Offensive Battle Value Ratings and round the resulting sum to the nearest whole number. The result is the vehicle's BV.

This formula yields the BV of a vehicle controlled by a crew with the standard Gunnery 4 and Piloting/Driving Skill 5. If a crew with a different skill level pilots the unit, multiply the BV by the appropriate skill level multiplier (see *Constructing a Battle Force*, p. 315).

CALCULATING THE BV OF: A CELLCO RANGER APC

CALCULATE DEFENSIVE BATTLE RATING

The CellCo Ranger is equipped with 38 points of BAR 7 armor.

Total Armor Factor x (BAR ÷ 10):	**38 x 0.7 = 26.6**
Total Internal Structure Points x 1.5:	**10 x 1.5 = 15**
Total BV of all Defensive Equipment:	**0**
	41.6
	41.6
Multiply by Unit Type Modifier (Wheeled):	**x 0.8**
	33.28

At Flanking speed, the CellCo Ranger presents a Target Movement Modifier of +2. That gives the vehicle a Defensive Factor of 1.2.

33.28
x 1.2
Defensive Battle Rating = 39.94

CALCULATE OFFENSIVE BATTLE RATING

1. Calculate Each Weapon's Modified BV

The CellCo Ranger is armed with 1 Machine Gun with a half-ton of ammunition. It is a Support Vehicle and does not mount a Basic or Advanced Fire Control System, so all its weapons and ammunition BV must be multiplied by 0.8.

1 Machine Gun:	**5 x 0.8 = 4**
Ammunition (MG) 100:	**1 x 0.8 = 0.8**

2. Calculate Weapon Battle Rating

1 Machine Gun (modified for no Fire Control):	**4**
Ammunition (MG) 100 (modified for no Fire Control):	**0.8**
	4.8
Add Total Vehicle Tonnage ÷ 2:	**17 ÷ 2 = 8.5**
	4.8
	8.5
	Weapon Battle Rating = 13.3

3. Calculate Offensive Battle Rating

Use the Flanking MP rating for all vehicles except unmotorized trailers (assume their Flanking MP is 1) and consult the Speed Factor Table.

13.3 x 1.00 = 13.3

Offensive Battle Rating = 13.3

CALCULATE FINAL BATTLE VALUE

Defensive Battle Rating + Offensive Battle Rating = BV

39.94 + 13.3 = 53.24

CellCo Ranger BV = 53

CALCULATING THE BV OF: A HEPHAESTUS OMNIVEHICLE (PRIMARY CONF)

CALCULATE DEFENSIVE BATTLE RATING

Total Armor Factor x 2.5:	**96 x 2.5 = 240**
Total Internal Structure Points x 1.5:	**15 x 1.5 = 22.5**
Total BV of all Defensive Equipment:	
1 Active Probe and 1 ECM Suite	**73**
	335.5
	335.5
Multiply by Unit Type Modifier (Hover):	**x 0.7**
	234.85

At Flanking speed, the Hephaestus presents a Target Movement Modifier of +4. That gives the vehicle a Defensive Factor of 1.4.

234.85
x 1.4
Defensive Battle Rating = 328.79

CALCULATE OFFENSIVE BATTLE RATING

1. Calculate Weapon Battle Rating

2 Medium Pulse Lasers (Clan):	**2 x 111 = 222**
Add Total Vehicle Tonnage ÷ 2:	**30 ÷ 2 = 15**
	Weapon Battle Rating = 237

2. Calculate Offensive Battle Rating

Use the Flanking MP rating for all vehicles except unmotorized trailers (assume their Flanking MP is 1) and consult the Speed Factor Table.

237 x 1.89 = 447.93

Offensive Battle Rating = 447.93

CALCULATE FINAL BATTLE VALUE

Defensive Battle Rating + Offensive Battle Rating = BV

328.79 + 447.93 = 776.72

Hephaestus (Prime) BV = 777

CALCULATING CONVENTIONAL INFANTRY BV

The process for calculating the Battle Value (BV) of a conventional infantry unit is similar to that for 'Mechs and vehicles. First determine the unit's Defensive and Offensive Battle Ratings, and then combine them to produce the final BV. Retain fractions until reaching the final BV, then round to the nearest whole number (.5 rounds up). As you read each step, refer to p. 310 for an example of calculating the BV for an Anti-'Mech Jump Infantry Platoon.

STEP 1: CALCULATE DEFENSIVE BATTLE RATING

MULTIPLY the number of troopers by 1.5 and the unit's Defensive Factor. The Defensive Factor is based on the unit's highest potential target modifier (including bonuses for jump capability), as shown on the Defensive Factors Table (p. 316).

The final result is the conventional infantry unit's Defensive Battle Rating.

STEP 2: CALCULATE OFFENSIVE BATTLE RATING

To calculate the Offensive Battle Rating, determine the Weapon Battle Rating and then **MULTIPLY** the result by the infantry unit's Speed Factor.

Calculate Weapon Battle Rating

Add the BV ratings of all individual and support weapons (see the Conventional Infantry Weapons BV Table, p. 319). If the unit is capable of performing anti-'Mech attacks, add these amounts again (all non-mechanized conventional infantry has this capability).

Multiply Weapon Battle Rating by Speed Factor

Multiply the unit's Weapon Battle Rating and Speed Factor to determine its Offensive BV Rating. Use the infantry unit's fastest movement mode; for example, jump infantry use their Jumping movement.

STEP 3: CALCULATE FINAL BATTLE VALUE

Add the Defensive Battle Rating and the Offensive Battle Rating and round to the nearest whole number (0.5 rounds up).

This formula yields the Battle Value of an infantry unit with the standard Gunnery 4 and Anti-'Mech 5 Skill Ratings. If the unit possesses higher or lower skill ratings, multiply the BV by the appropriate skill rating multiplier (see *Constructing a Battle Force*, p. 315). Remember that, for infantry units with the Mechanized Motive Type, as well as units which lack the Anti-'Mech Infantry kits referred to on p. 155, the unit's Anti-'Mech Skill should be treated as fixed at 8 for this purpose.

CALCULATING THE BV OF: AN ANTI-'MECH JUMP INFANTRY PLATOON

CALCULATE DEFENSIVE BATTLE RATING

(Number of Troopers x 1.5): **(21 x 1.5) = 31.5**

The Anti-'Mech Jump Infantry platoon receives a Target Movement Modifier of +2. That gives it a Defensive Factor of 1.2.

31.5
x 1.2
Defensive Battle Rating = 37.8

CALCULATE OFFENSIVE BATTLE RATING

1. Calculate Weapon Battle Rating

Individual Weapons
18 Blazer Rifles: **18 x 1.79 = 32.22**

Support Weapons
3 Heavy Support Lasers: **3 x 17.34 = 52.02**

Anti-'Mech Attack Capability
Individual Weapons BV + Support Weapons BV:
32.22 + 52.02 = 84.24

32.22
52.02
84.24
Weapon Battle Rating = 168.48

2. Calculate Offensive Battle Rating

Multiply the unit's Weapon Battle Rating by its Speed Factor.

168.48 x 0.77 = 129.73

Offensive Battle Rating = 129.73

CALCULATE FINAL BATTLE VALUE

Defensive Battle Rating + Offensive Battle Rating = Platoon BV

37.8 + 129.73 = 167.53

Anti-'Mech Infantry Platoon BV = 168

CALCULATING BATTLE ARMOR BV

The procedure for calculating the Battle Value (BV) of Battle Armor very similar to that for calculating the BV for 'Mechs and vehicles. The Defensive and Offensive Battle Ratings of the Battle Armor are determined and then combined to produce the final BV. In all cases retain fractions until reaching the final BV, then round to the nearest whole number (.5 rounds up). As you read each step, refer to p. 310 and p. 311 for an example of calculating the BV for a Purifier unit and a Grenadier unit.

STEP 1: CALCULATE DEFENSIVE BATTLE RATING

First, **ADD** the following figures:

Total Armor Points x Armor BV (not including the 1 point for the warrior) + 1

Fire-resistant armor has a BV of 3.5; all other armor has a BV of 2.5.

Add 1 to the total for each of these systems the battle armor mounts (if any): Improved Sensors, Active Probes, or ECM.

Next, **MULTIPLY** the current value by the battle armor unit's Defensive Factor. A battle armor unit's Defensive Factor is based on its highest potential target movement modifier (including bonuses for jump capability and enhanced movement), as shown on the Defensive Factors Table (see p. 316). In addition, add to the Defensive Factor any appropriate modifiers from the Defensive Factor Modifier Table. The final result is the battle armor's Defensive Battle Rating.

STEP 2: CALCULATE OFFENSIVE BATTLE RATING

Calculate Weapon Battle Rating

ADD the following:

Direct Fire Weapons Battle Rating: Add the BV of all direct-fire weapons. Direct-fire weapons are all weapon systems except SRM launchers, advanced SRM launchers, MRM launchers, rocket launchers, LRM launchers, Narc (Compact) and Popup Mine. Do not factor BV for any ammunition used by direct fire weapons.

Missile Weapon Battle Rating: Calculate the Missile Weapon Battle Ratting for SRMs, advanced SRMs, MRMs, rocket launchers and LRMs. Use the BV of the launcher as normal. Calculate the ammunition BV for the kilograms of ammo carried proportionate to the BV for a full ton (1,000 kg) of that type of ammunition. That is, divide the kilograms of ammo carried by 1,000, and multiply the result by the BV of a full ton of the required ammunition type. Keep any fractional results.

Anti-'Mech Attacks: If the unit can perform Swarm Attacks, add the BV of all direct-fire weapons plus the BV of vibroclaws and/or claws and magnets that aid Swarm operations.

Anti-Personnel Weapons: Add the BV of anti-personnel weapons from the Conventional Infantry Weapons BV Table on p. 319.

Squad Support Weapon: The BV of a Squad Support Weapon is equal to the total BV of the weapon divided by the number of troopers in the unit. Squad Support Weapons have their BV divided between all units, and so Inner Sphere units will only use 1/4 of the BV, whereas a Clan unit uses 1/5 of the BV and ComStar/Word of Blake units use 1/6.

Other Equipment: Add BV for other Offensive equipment. The final sum is the total Weapon Battle Rating.

Multiply the Weapon Battle Rating by the Battle Armor's Speed Factor

Multiply the battle armor's Weapon Battle Rating by its Speed Factor as shown on the Speed Factor Table (see p. 316). Use the movement mode that gives the highest movement rate.

This calculation gives the battle armor unit's final Weapon Battle Rating.

STEP 3: CALCULATE FINAL BATTLE VALUE

The BV of a single suit of battle armor is calculated by adding the battle armor's Defensive and Offensive Battle Ratings. To determine the BV for a squad / point / Level I, multiply this value by the Modifier for the appropriate size of battle armor unit from the Battle Armor Unit Size Modifier Table (p. 316). Inner Sphere squads usually contain four troopers, Clan Stars contain five troopers and a ComStar/Word of Blake Level I contains six troopers.

This formula yields the Battle Value of a battle armor unit with the standard Gunnery 4 and Anti-'Mech 5 Skill Ratings. If the unit possesses higher or lower skill ratings, multiply the BV by the appropriate skill rating multiplier (see *Constructing a Battle Force*, p. 315).

CALCULATING THE BV OF A: PURIFIER LEVEL I

CALCULATE DEFENSIVE BATTLE RATING

6 points Mimetic Armor (BV 2.5 per point)
(Total Armor x Armor BV) + 1: **(6 x 2.5) + 1 = 16**

The Purifier has a Jumping MP of 3, and so receives a Target Movement Modifier of +2. That gives it a Defensive Factor of 1.2 + 0.1 (because it is battle armor) + 0.3 (Mimetic Armor) = 1.6.

16
x 1.6
Defensive Battle Rating = 25.6

CALCULATE OFFENSIVE BATTLE RATING

1. Calculate Weapon Battle Rating

Direct-Fire Weapons
1 ER Small Laser: **1 x 17 = 17**
Missile Weapons
None **0**
Anti-'Mech Attacks
Direct-Fire Weapons: **17**
Anti-Personnel Weapons
None **0**
Squad Support Weapons
None **0**
Other Equipment
None **0**
34

2. Calculate Offensive Battle Rating
Multiply the unit's Weapon Battle Rating by its Speed Factor.

34 x 0.77 = 26.18

Offensive Battle Rating = 26.18

CALCULATE FINAL BATTLE VALUE

Defensive Battle Rating + Offensive Battle Rating = BV per suit

25.6 + 26.18 = 51.78
Individual Purifier BV = 52

There are six suits of battle armor in a Level I Purifier unit, yielding a BV Modifier of 9.

51.78 x 9.0 = 466.02

Purifier Level I BV = 466

CALCULATING THE BV OF: A GRENADIER [SRM/SL] SQUAD

CALCULATE DEFENSIVE BATTLE RATING

9 points Stealth Armor (BV 2.5 per point)
(Total Armor x Armor BV) + 1: **(9 x 2.5) + 1 = 23.5**

The Grenadier has a ground MP of 2, and no jumping movement, and so receives a Target Movement Modifier of 0. That gives it a Defensive Factor of 1.0 + 0.1 (because it is battle armor) + 0.2 (Standard Stealth Armor) = 1.3

23.5
x 1.3
Defensive Battle Rating = 30.55

CALCULATE OFFENSIVE BATTLE RATING

1. Calculate Weapon Battle Rating

Direct-Fire Weapons	
1 Small Laser:	**1 x 9 = 9**
Missile Weapons	
1 SRM 4:	**1 x 39 = 39**
Ammo (SRM 4) 7 (280 kg):	**(280/1,000) x 5 = 1.4**
Anti-'Mech Attacks	
Not Applicable	**0**
Anti-Personnel Weapons	
None	**0**
Squad Support Weapons	
None	**0**
Other Equipment	
None	**0**
	49.4

2. Calculate Offensive Battle Rating
Multiply the unit's Weapon Battle Rating by its Speed Factor.

49.4 x 0.65 = 32.11

Offensive Battle Rating = 32.11

CALCULATE FINAL BATTLE VALUE

Defensive Battle Rating + Offensive Battle Rating = BV per suit

30.55 + 32.11 = 62.66
Individual Grenadier BV = 63

There are four suits of battle armor in a Grenadier squad, yielding a BV Modifier of 5.2.

63 x 5.2 = 325.832

Grenadier [SRM/SL] squad BV = 326

CALCULATING AEROSPACE BV

The procedure for calculating the Battle Value (BV) of aerospace units is similar to that for 'Mechs. Determine the Defensive and Offensive Battle Ratings of the aerospace unit and combine them to produce the final BV. Retain fractions until reaching the final BV, then round to the nearest whole number (.5 rounds up). Refer to pp. 313–314 for an example of calculating BV for a TRB-D36 *Thunderbird* and a *Dragau II*.

STEP 1: CALCULATE DEFENSIVE BATTLE RATING

First, **ADD** the following numbers.

Total Armor Factor x 2.5 (Fighters, DropShips, Small Craft)
(Support Vehicles: multiply by BAR ÷ 10)
Structural Integrity x 2.0
Total BV of all Defensive Equipment

Defensive Equipment includes screen launchers anti-missile systems and ECM (including ammo up to the BV of the systems and launchers themselves). All *TechManual* Defensive Equipment is identified on the Weapon and Equipment Battle Value Tables by a dagger footnote (†).

For aerospace fighters, small craft and conventional fighters, then **SUBTRACT** the following figures. (Explosive ammo is any ammunition that may explode inside an aerospace fighter. Gauss weapons include Gauss rifles, HAGs and AP Gauss.) These subtractions cannot drop the running total below 1.

15 points per type of explosive ammo (regardless of tonnage) in an Inner Sphere aerospace or small craft not equipped with CASE*

1 point per Gauss weapon in Inner Sphere aerospace or small craft not equipped with CASE*

* – It is assumed Clan aerospace units have CASE installed. If the design specifically did not pay the C-bill cost to install CASE then treat all Clan-built aerospace units as Inner Sphere aerospace units for the purpose of these calculations.

Calculate Defensive Battle Rating

MULTIPLY the resulting Defensive Battle Rating by the unit type multiplier from the Unit Type Modifiers Table (p. 316) to give the aerospace unit's final Defensive Battle Rating (DBR).

STEP 2: CALCULATE OFFENSIVE BATTLE RATING

To calculate the Offensive Battle Rating, first calculate the Modified Battle Value of each weapon on the unit. Then, make any

required adjustments for the Heat Efficiency and equipment to get the unit's Weapon Battle Rating. Multiply the Weapon Battle Rating by the unit's Speed Factor: the result is the Offensive Battle Rating.

Calculate Each Weapon's Modified BV

First, determine the Battle Value of each weapon and its ammunition (if applicable) carried by the unit (see pp. 317-318). Then apply the following BV modifiers as necessary. All modifiers are cumulative. The result is the weapon's Modified BV, which is used in the steps that follow.

Excessive Ammunition: To prevent excessive ammo from distorting the Battle Value, the BV added for ammunition cannot exceed the unmodified BV of the weapon itself. If the BV of the ammo exceeds the weapon BV, reduce the ammo BV to equal the unmodified weapon BV. When a unit carries several weapons of the same model, total the unmodified BV for all examples of that model and then the BV for all ammunition carried for that model before comparing the two BVs.

Rear-Firing Weapons: Aft-mounted weapons (but not their ammunition) count as half their normal BV value (aft-side arcs are not considered). If the unmodified BV of nose-mounted weapons is less than the unmodified BV of rear-firing weapons, then halve the value of the forward-firing weapons instead. When making heat adjustments to a weapon's BV (see below), switch the nose- and aft-firing arcs in an identical manner. **Note**: DropShips do not use this modifier.

Artemis IV FCS: Increase by 20 percent the BV of any missile launcher equipped with Artemis IV. This increase does not apply to the launcher's ammunition.

Targeting Computer: Each weapon linked to a targeting computer (see p. 238) multiplies its BV by 1.25. Do not include ammunition when adjusting linked weapon BVs.

Determine Unit's Heat Efficiency

For aerospace fighters, Small Craft and DropShips, a weapon's Modified Battle Value may need to be reduced to take into consideration the unit's Heat Efficiency. The Heat Efficiency of a design is equal to its Heat Sink Capacity. Aerospace fighters and Small Craft add 6 to this value.

DropShip Heat Efficiency = Heat Sink Capacity
Aerospace Heat Efficiency = 6 + Heat Sink Capacity

Heat Sink Capacity: Heat Sink Capacity denotes the maximum number of Heat Points the unit can dissipate in a single turn. Each single heat sink dissipates 1 point of heat. Double heat sinks dissipate 2 points of heat.

Determine Total Weapon Heat: Find and write down the total heat that the unit would generate if it fired all its offensive weapons, including rear-firing weapons, in a single turn (Defensive Equipment is never figured in this value). Multiply by 2 the heat points generated by Ultra autocannons, multiply by 6 the heat points generated by rotary autocannons, reduce by half the heat points generated by Streak SRMs and reduce to one-quarter the heat points generated by one-shot weapons.

Calculate Weapon Battle Rating

For aerospace fighters, conventional fighters and Small Craft:

Start a running Weapon Battle Rating total, beginning at 0. When instructed, add the specified amount to this total.

1. Add the Modified BV of any weapon on the unit that does not generate heat when fired to the running Weapon Battle Rating total.
2. Add the BV of any ammunition and non-Defensive Equipment on the unit to the running Weapon Battle Rating total.
3. If the unit's Total Weapon Heat is equal to or less than its Heat Efficiency, add the Modified BV of all the unit's remaining weapons to the running Weapon Battle Rating total and proceed to *Calculate Offensive Battle Rating*. If the Total Weapon Heat is greater than the unit's Heat Efficiency, start a running heat total, beginning at 0, and proceed to Step 4.
4. Ignoring weapons that generate no heat when fired, choose the weapon on the unit that has the highest Modified BV. If more than one weapon has the same Modified BV, choose the one that generates the least heat when fired. If multiple weapons of the same type are mounted, choose one randomly.
5. Add this weapon's Modified BV to the running Weapon Battle Rating total, and add its Heat Value to the running heat total.
6. If the running heat total is less than the unit's Heat Efficiency, repeat Steps 4-5 (ignoring any weapons already chosen). If the running heat total is equal to or has exceeded the Heat Efficiency, proceed to Step 7.
7. The weapon that causes the Heat Efficiency to be equaled or exceeded is still calculated at its full Modified BV. All remaining weapons are then added to the running Weapon Battle Rating total at half their Modified BV.

For DropShips:

DropShips calculate their Weapon Battle Rating by firing arc, instead of by individual weapons, reflecting their firing by weapon bay and generating heat by firing arcs.

1. Calculate individual firing arc BVs: First determine the total Modified BV of each individual firing arc (Nose, Aft, Fore (Wing) Left/Right, Aft (Rear Wing (Left/Right). Do not include ammunition or equipment at this time.
2. Determine the "Front" firing arc: Compare these BV totals. The arc with the highest BV becomes the "Front" arc for calculating BV and Heat Efficiency.
3. Calculate the BV for the "Front" arc: Add the BV of any ammunition located in "Front" arc to the "Front" arc total. "Front" BV is always factored at 100% even if the DropShip will overheat firing the "Front" arc.
4. Determine the "Left Side" firing arc: Look at the Battle Value of the two arcs adjacent to the "Front" arc. The one with the highest BV becomes the "Left Side" firing arc. If both arcs are of equal BV, choose one at random.
5. Calculate the BV for the "Left Side" arc: Add the BV of ammunition in the "Left Side" to the BV total for that side obtained in Step 1. If the DropShip has exceeded its DropShip Heat Efficiency after firing the "Front" arc, multiply the "Left Side" arc BV by 0.5.
6. Determine the "Right Side" firing arc: The remaining arc adjacent to the "Front" arc now becomes the "Right Side" firing arc.
7. Calculate the BV for the "Right Side" arc: Add the BV of ammunition in the "Right Side" to the BV total for that side obtained in Step 1. If the DropShip has not exceeded its DropShip Heat Efficiency after firing the "Left Side" arc, multiply the "Right Side" BV by 0.5. If the DropShip has exceeded its DropShip Heat Efficiency, then the multiply the "Right Side" BV by 0.25.
8. Total remaining firing arcs: The remaining three arcs are now considered the "Rear" firing arc. Add the BV of ammunition in these arcs to the BV total for those arcs obtained in Step 1. Multiply the "Rear" BV by 0.25.
9. Add the BV of any equipment with a BV rating.

Having followed Steps 1-7 (1-9 for DropShips), the result is the unit's Weapon Battle Rating. Proceed to *Calculate Offensive Battle Rating*.

Calculate Offensive Battle Rating

Determine Unit's Speed Factor: A unit's Speed Factor reflects its ability to maneuver on the battlefield. To find the Speed Factor of any aerospace unit, cross-reference its Maximum Thrust Value with the Speed Factor Table (p. 316).

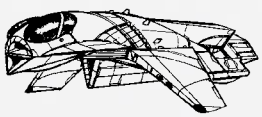
Multiply the Total Battle Rating by the Speed Factor to find the unit's Offensive Battle Rating.

Airships: Use the Maximum Thrust rating for airships, but round up to the next whole number for vehicles with fractional thrust ratings.

STEP 3: CALCULATE FINAL BATTLE VALUE

An aerospace unit's final BV is calculated by adding its Defensive and Offensive Battle Ratings. Round any remaining fractions to the nearest whole number (.5 rounds up).

CALCULATING THE BV OF: A TRB-D36 *THUNDERBIRD* AEROSPACE FIGHTER



CALCULATE DEFENSIVE BATTLE RATING

Total Armor Factor x 2.5:	**224 x 2.5 = 560**
Structural Integrity x 2:	**10 x 2 = 20**
Total BV of all Defensive Equipment:	**0**
	580

SUBTRACT
15 points per type of explosive ammo

LRM Ammunition:	**15**
	580
	- 15
	565
	565
Multiply by the Unit Type Modifier:	**x 1.2**
	678

Defensive Battle Rating = 678

CALCULATE OFFENSIVE BATTLE RATING

1. Calculate Each Weapon's Modified BV

The *Thunderbird* is armed with 3 Large Lasers, 2 LRM 20s and 5 Medium Lasers. It has no special equipment that modifies the BV of its weapons, but two of its Medium Lasers are rear-firing. Its LRM ammo does not exceed the BV of the launchers, and so does not have to be modified.

4 tons LRM 20 ammunition (at full value):	**92**
2 LRM 20s:	**181 each**
3 Large Lasers:	**123 each**
3 Medium Lasers:	**46 each**
2 Medium Lasers (aft-mounted):	**(46 ÷ 2) = 23 each**

2. Determine Heat Efficiency and Total Weapon Heat

The *Thunderbird* has 25 single heat sinks. It is armed with 3 Large Lasers (8 heat each), 2 LRM 20s (6 heat each) and 5 Medium Lasers (3 heat each). Find its Heat Efficiency and Total Weapon Heat.

Unit Heat Efficiency = 6 + 25 = 31
Total Weapon Heat = 8 + 8 + 8 + 6 + 6 + 3 + 3 + 3 + 3 + 3 = 51

Because the Total Weapon Heat is higher than the Heat Efficiency, its weapons must be sorted in order of Modified BV and a running heat total tracked to determine when weapon BVs should be halved. Ammunition is still handled as normal.

4 tons LRM 20 ammunition:	**(4 x 23) = 92**
LRM 20:	**181**
Running Heat Total: 0 + 6 = 6	
LRM 20:	**181**
Running Heat Total: 6 + 6 = 12	
Large Laser:	**123**
Running Heat Total: 12 + 8 = 2**0**	
Large Laser:	**123**
Running Heat Total: 20 + 8 = 28	
Large Laser:	**123**
Running Heat Total: 28 + 8 = 36 (Overheat)	

Because the third Large Laser exceeds the Heat Efficiency of the *Thunderbird* (31), all subsequent heat-generating weapons will halve their Modified BV.

Medium Laser:	**46 ÷ 2 = 23**
Running Heat Total: (Overheat**)**	
Medium Laser:	**46 ÷ 2 = 23**
Running Heat Total: (Overheat)	
Medium Laser:	**46 ÷ 2 = 23**
Running Heat Total: (Overheat)	
Medium Laser (Aft):	**23 ÷ 2 = 11.5**
Running Heat Total: (Overheat**)**	
Medium Laser (Aft):	**23 ÷ 2 = 11.5**
Running Heat Total: (Overheat)	
	Weapon Battle Rating = 915

3. Calculate Offensive Battle Rating

Multiply the *Thunderbird*'s Weapon Battle Rating by its Speed Factor. With a Maximum Thrust of 8, its Speed Factor is 1.37.

915 x 1.37 = 1,253.55

Offensive Battle Rating = 1,253.55

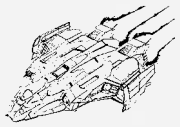
CALCULATE FINAL BATTLE VALUE

Defensive Battle Rating + Offensive Battle Rating = BV

678 + 1,253.55 = 1,931.55

TRB-D36 *Thunderbird* BV = 1,932

CALCULATING THE BV OF: A *DRAGAU II*-CLASS DROPSHIP



CALCULATE DEFENSIVE BATTLE RATING

Total Armor Factor x 2.5:	**1,372 x 2.5 = 3,430**
Structural Integrity x 2:	**15 x 2 = 30**
Total BV of Defensive Equipment	
6 Anti-Missile Systems:	**6 x 32 = 192**
10 tons Ammo (AMS) 120 rounds:	**10 x 11 = 110 (max. 192)**
	302
	3,762
	3,762
Multiply by the Unit Type Modifier:	**x 1.0**
	3,762

Defensive Battle Rating = 3,762

CALCULATE OFFENSIVE BATTLE RATING

Due to space restrictions, the steps below deviate in terms of presentation from the explanation above.

1. Determine Unit Heat Efficiency and Total Weapon Heat

Find the DropShip's Heat Efficiency and the total heat generated by firing all weapons.

DropShip Heat Efficiency = 244

2. Calculate Weapon Battle Rating and Arc Heat for each firing arc

Add up the Modified BV of all weapons in a given firing arc. Do not calculate ammo or equipment at this time.

ARC/WEAPON	Total Heat	BV
Nose:		
2 Heavy Gauss Rifles (2 heat)	2 x 2 = 4	**2 x 346 = 692**
6 Heavy PPCs (15 heat)	6 x 15 = 90	**6 x 317 = 1,902**
	94	**2,594**
Wing:		
2 LRM 15s + Artemis (5 heat)	2 x 5 = 10	**2 x (136 x 1.2) = 326.4**
2 ER PPCs (15 heat)	2 x 15 = 30	**2 x 229 = 458**
2 Large VSP Lasers (10 heat)	2 x 10 = 20	**2 x 123 = 246**
	60	**1,030.4**
Aft Wing:		
2 Large VSP Lasers (10 heat)	2 x 10 = 20	**2 x 123 = 246**
	20	**246**
Aft:		
2 Large VSP Lasers (10 heat)	2 x 10 = 20	**2 x 123 = 246**
2 ER Medium Lasers (5 heat)	2 x 5 = 10	**2 x 62 = 124**
	30	**370**

The *Dragau*'s Nose arc generates the greatest BV. This makes the Nose the "Front" of the DropShip. Now that this has been determined, add the BV of ammunition in that arc and calculate the Nose Weapon Battle Rating. The "Front" is always calculated at 100% BV, even if it exceeds the Heat Efficiency (244) of the DropShip.

Base "Front" Battle Value	**2,594**
8 tons of Heavy Gauss ammo (8 x 43)	**344**
Running Heat Total: 0 + 94 = 94	
	"Nose" BV = 2,938

Because the two adjacent arcs are identical Wing arcs, the left one is chosen as the "Left Side" arc. As the *Dragau*'s "Front Side" does not exceed its Heat Efficiency, this "Side" is calculated at 100% of its total BV. Had the Heat Efficiency been exceeded, the "Left Side" would have been calculated at 50% of its BV.

Base "Left Side" Battle Value	**1,030.4**
6 tons of LRM ammo (6 x 17)	**102**
Running Heat Total: 94 + 60 = 154	
	"Left Side" BV = 1,132.4

The right wing becomes the "Right Side" arc. As the *Dragau* has still not exceeded its Heat Efficiency, the "Right Side" is calculated at 50% of its total BV. Had the Heat Efficiency been exceeded, the "Right Side" would have been calculated at 25% of its BV.

Base "Right Side" Battle Value	**1,030.4**
6 tons of LRM ammo (6 x 17)	**102**
	1,132.4
	"Right Side" BV (1,132.4 ÷ 2) = 566.2

All remaining arcs are now considered the "Rear" and are calculated at 25% of their total BV.

Base Left Aft Wing:	**246 x .25 = 61.5**
No Ammo	**0**
	61.5
Base Right Aft Wing:	**246 x .25 = 61.5**
No ammo	**0**
	61.5
Base Aft:	**370 x .25 = 92.5**
No ammo	**0**
	92.5
	"Rear" BV = 215.5

Add the BV for the "Front", "Right Side", "Left Side" and "Rear" to determine the Weapon Battle Rating.

"Nose" BV	**2,938**
"Left Side" BV	**1,132.4**
"Right Side" BV	**566.2**
"Rear" BV	**215.5**
	Weapon Battle Rating = 4,852.1

3. Calculate Offensive Battle Rating

Multiply the unit's Weapon Battle Rating by its Speed Factor. With a Maximum Thrust of 14, its Speed Factor is 2.16.

4,852.1 x 2.16 = 10,480.54

Offensive Battle Rating = 10,480.54

CALCULATE FINAL BATTLE VALUE

Defensive Battle Rating + Offensive Battle Rating = BV

3,762 + 10,480.54 = 14,242.54

***Dragau II*-class DropShip BV = 14,243**

CONSTRUCTING A BATTLE FORCE

A battle force is a collection of units (including but not limited to BattleMechs, Combat Vehicles, ProtoMechs, infantry, battle armor and aerospace fighters). The methods presented previously can provide the base Battle Value for any unit with a standard skill/experience level.

This BV is adjusted to reflect the effectiveness of the battle force's target acquisition gear; command, control and communications systems; and skill rating. Apply these modifiers in the order listed.

TARGET ACQUISITION GEAR (TAG)

Any unit in the battle force equipped with TAG, Light TAG or a C^3 Master Computer adds BV equal to the BV of each ton of semi-guided LRM ammunition carried in the force (use the ammo BV for the appropriate-size LRM launcher). Units whose only such piece of equipment is rear-mounted add half the BV instead.

COMMAND, CONTROL AND COMMUNICATIONS (C^3)

Two or more units in a battle force equipped with C^3 systems can be designated as part of a C^3 network (see *Total Warfare*, p. 131). Add 5 percent of the total BV of all units in a C^3 network to each of the units linked by each network.

EXTERNAL STORES

Aerospace fighters, conventional aircraft and some Support Vehicles may carry additional weapons and equipment on external hard points (see the Aerospace Weapons and Equipment BV Table, p. 318). The BV of any external stores is added to the base BV of a unit before the base BV is modified for skill rating.

Aerospace fighters can carry a maximum of one bomb per 5 tons of mass. Support Vehicles can carry one bomb per hardpoint added during design.

BV SKILL MULTIPLIER TABLE

Gunnery Skill	Piloting/Driving/Anti-'Mech Skill								
	0	1	2	3	4	5	6	7	8
0	2.42	2.31	2.21	2.1	1.93	1.75	1.68	1.59	1.5
1	2.21	2.11	2.02	1.92	1.76	1.6	1.54	1.46	1.38
2	1.93	1.85	1.76	1.68	1.54	1.4	1.35	1.28	1.21
3	1.66	1.58	1.51	1.44	1.32	1.2	1.16	1.1	1.04
4	1.38	1.32	1.26	1.2	1.1	**1.00**	0.95	0.9	0.85
5	1.31	1.19	1.13	1.08	0.99	0.9	0.86	0.81	0.77
6	1.24	1.12	1.07	1.02	0.94	0.85	0.81	0.77	0.72
7	1.17	1.06	1.01	0.96	0.88	0.8	0.76	0.72	0.68
8	1.1	0.99	0.95	0.9	0.83	0.75	0.71	0.68	0.64

SKILL RATINGS

When assembling a battle force, a player can elect to use different skill ratings for selected units. However, selecting better skill ratings correspondingly increases the BV of that unit. Conversely, selecting worse skill ratings will reduce the units' overall BV.

ProtoMechs: Because ProtoMech pilots have no Piloting Skill, use the 5 column of the BV Skill Multiplier Table when determining skill modifiers for non-standard troops.

Mechanized Infantry: Because they cannot perform anti-'Mech attacks, mechanized infantry can only adjust their Gunnery Skill Rating (use the 5 column of the BV Skill Multiplier Table for this purpose).

Anti-'Mech Default Skill: Unless the unit has an Anti-'Mech Infantry Kit (see p. 155), all non-mechanized conventional infantry have a default Anti-'Mech Skill Rating of 8, which cannot be improved.

BATTLE VALUE CHARTS AND TABLES

'MECH ARMOR TYPE MODIFIER TABLE

Armor Type	Modifier
Standard	1.0
Ferro-Fibrous (All)	1.0
Industrial	1.0
Heavy Industrial	1.0
Commercial	0.5
Stealth	1.0

'MECH INTERNAL STRUCTURE MODIFIER TABLE

Internal Structure Type	Modifier
Standard	1.0
Endo-Steel	1.0
Industrial	0.5

'MECH ENGINE TYPE MODIFIER TABLE

Engine Type	Modifier
Standard*	1.0
Light	0.75
Compact	1.0
Inner Sphere XL	0.5
Clan XL	*0.75*

*Includes ICE, Fuel Cell, and Fission

'MECH GYRO TYPE MODIFIER TABLE

Gyro Type	Modifier
Standard	0.5
Compact	0.5
Extralight (XL)	0.5
Heavy Duty	1.0

*Includes ICE, Fuel Cell, and Fission

BATTLE VALUE CHARTS AND TABLES (CONTINUED)

DEFENSIVE FACTORS TABLE

Target Modifier*	Defensive Factor
+0	1.0
+1	1.1
+2	1.2
+3	1.3
+4	1.4
+5	1.5
+6	1.6
+7	1.7
+8	1.8
+9 and above	1 + (modifier ÷ 10)

* Including bonuses for jump capability, enhanced movement capability from MASC or triple-strength myomer, and any VTOL movement modifier. Do not add the +1 to-hit penalty used in attacks against battle armor units. For units with detachable missile packs, use the best modifier for movement.

DEFENSIVE FACTOR MODIFIER TABLE

Special Case	Defensive Factor Modifier
ProtoMech	+0.1
Battle Armor	+0.1
Battle Armor Armor and Equipment	
Camo	+0.2
Basic Stealth	+0.2
Prototype Stealth	+0.2
Standard Stealth	+0.2
Improved Stealth	+0.3
Mimetic	+0.3

UNIT TYPE MODIFIERS TABLE

Type	Modifier
Tracked	0.9
Wheeled	0.8
Hover	0.7
Naval	0.6
VTOL	0.7
Airship	0.7
Fixed-Wing	1.0
WiGE	0.7
Aerospace Fighter	1.2
Conventional Fighter	1.1
Small Craft	1.0
DropShip	1.0

OFFENSIVE BV ADJUSTMENT TABLE

Fire Control	OBV Adjustment
None	0.8
Basic	0.9
Advanced	1.0

SPEED FACTOR TABLE

Result of Speed Factor Calculation	Speed Factor
0	0.44
1	0.54
2	0.65
3	0.77
4	0.88
5	1.00
6	1.12
7	1.24
8	1.37
9	1.50
10	1.63
11	1.76
12	1.89
13	2.02
14	2.16
15	2.30
16	2.44
17	2.58
18	2.72
19	2.86
20	3.00
21	3.15
22	3.29
23	3.44
24	3.59
25	3.74

To calculate the Speed Factors for movement not shown on the table, use the following formula:
Speed Factor = $(1 + ((\text{Running MP} + (\text{Jump MP} \div 2) - 5) \div 10))^{1.2}$

If the unit has MASC or triple-strength myomer (but not industrial triple-strength myomer), use the maximum MP it can generate utilizing that equipment. Round off the result to two decimal places.

BATTLE ARMOR UNIT SIZE MODIFIER TABLE

Troopers in Unit	BV Modifier
1	1.0
2	2.2
3	3.6
4	5.2
5	7.0
6	9.0

WEAPONS AND EQUIPMENT BATTLE VALUE

The following tables list the BV for Inner Sphere and Clan standard rules equipment. The BV for single-shot (OS) versions of missile launchers is listed as the second BV figure for the launcher, after the slash mark (/).

INNER SPHERE WEAPONS AND EQUIPMENT BV TABLE

Item	Item BV	Ammo BV*
Energy Weapons		
ER Laser (Large)	163	—
ER Laser (Medium)	62	—
ER Laser (Small)	17	—
Flamer ('Mech)	6	—
Laser (Large)	123	—
Laser (Medium)	46	—
Laser (Small)	9	—
PPC (Heavy)	317	—
PPC	176	—
PPC (Light)	88	—
PPC (Snub-Nose)	165	—
PPC (Support)	14	—
ER PPC	229	—
Plasma Rifle	210	26§
Plasma Rifle (Man-Portable)	12	0
Pulse Laser (Large)	119	—
Pulse Laser (Medium)	48	—
Pulse Laser (Small)	12	—
Ballistic Weapons		
AC/2	37	5
AC/5	70	9
AC/10	123	15
AC/20	178	22
"Firedrake" Support Needler	2	0
Flamer (Vehicle)	5	1
Gauss Rifle (Heavy)	346	43§
Gauss Rifle	320	40§
Gauss Rifle (Light)	159	20§
Gauss Rifle (David)	7	0
Gauss Rifle ("King David")	7	0
Gauss (Magshot)	15	0
LB 2-X AC	42	5
LB 5-X AC	83	10
LB 10-X AC	148	19
LB 20-X AC	237	30
Light AC/2	30	4
Light AC/5	62	8
Machine Gun (Heavy)	6	1
Machine Gun	5	1
Machine Gun (Light)	5	1
Mortar (Light)	9	0
Mortar (Heavy)	17	0
Nail/Rivet Gun	1	0§
Rotary AC/2	118	15
Rotary AC/5	247	31
Ultra AC/2	56	7
Ultra AC/5	112	14
Ultra AC/10	210	26
Ultra AC/20	281	35
Missile Weapons		
LRM-5	45/9	6
LRM-10	90/18	11
LRM-15	136/27	17
LRM-20	181/36	23
MML-3	29/—	4
MML-5	45/—	6
MML-7	67/—	8
MML-9	86/—	11
MRM-10	56/11	7
MRM-20	112/22	14
MRM-30	168/34	21
MRM-40	224/45	28
Rocket Launcher 10	18	—
Rocket Launcher 15	23	—
Rocket Launcher 20	24	—
SRM-2	21/4	3
SRM-4	39/8	5
SRM-5	47/9	6
SRM-6	59/12	7
Streak SRM-2	30/6	4
Streak SRM-4	59/12	7
Streak SRM-6	89/18	11
Other Equipment		
Anti-Missile System	32†	11†
Anti-Personnel Pod (A-Pod)	1†	—
Anti-Battle Armor Pod (B-Pod)	2†	—
Artemis IV FCS	B	—
Backhoe	8	—
Bridge-Layer (Light)	5†	—
Bridge-Layer (Medium)	10†	—
Bridge-Layer (Heavy)	20†	—
Beagle Active Probe	10†	—
Bulldozer	10†	—
CASE	C	—
C^3 Computer (Master)	D	—
C^3 Slave	D	—
Chainsaw	7	—
Combine	5	—
Dual Saw	9	—
Guardian ECM Suite	61†	—
Hatchet	(Damage x 1.5)**	—
Heavy-Duty Pile Driver	5	—
Improved C^3 Computer	D	—
Improved Narc Launcher	75/15	0
Machine Gun Array	F	—
MASC	C	—
Mining Drill	6	—
Narc Missile Beacon	30/6	0
Retractable Blade	(Damage x 1.725)**	—
Rock Cutter	6	—
Spot Welder	5	—
Sword	(Damage x 1.725)**	—
TAG	A	—
Targeting Computer	E	—
Triple-Strength Myomer	C	—
Industrial Triple-Strength Myomer	C	—
Wrecking Ball	8	—
Battle Armor Equipment		
Flamer (BA)	5	—
Gauss (Grand Mauler)	6	0
Gauss (Tsunami)	6	0
Grenade Launcher (Heavy)	2	0
Grenade Launcher (Micro)	1	0
Recoilless Rifle (Light)	12	0
Recoilless Rifle (Medium)	19	0
Recoilless Rifle (Heavy)	22	0
LRM-1	14/3	2
LRM-2	20/4	3
LRM-3	29/6	4
LRM-4	38/8	5
MRM-1	9/2	1
MRM-2	13/3	2
MRM-3	18/4	2
MRM-4	23/5	3
MRM-5	28/6	4
Rocket Launcher 1	2	—
Rocket Launcher 2	3	—
Rocket Launcher 3	4	—
Rocket Launcher 4	5	—
Rocket Launcher 5	6	—
SRM-1	15/3	2
SRM-3	30/6	4
Battle Claw (w/Magnets)	3/pair	—
Battle Claw (w/Vibro-Claws)	1 each	—
Heavy Battle Claw (w/Magnets)	3/pair	—
Heavy Battle Claw (w/Vibro-Claws)	1 each	—
Magnetic Clamps	1	—
Narc (Compact)	16/4	0
Popup Mine	6	—

* Per ton

**The damage used to calculate the item's BV is based on the final damage the item can deal after all possible modifications (such as TSM) are applied.

† Defensive Battle Rating

§ Ammunition for these weapons is not counted as explosive.

NOTES

A **TAG:** Only affects a unit's BV if it or other friendly units carry equipment that can be used in conjunction with it. See *Constructing a Battle Force*, p. 315.

B **Artemis IV FCS:** Increase by 20 percent the BV of any missile launcher equipped with Artemis IV. This increase does not apply to the launcher's ammunition.

C **CASE/MASC/Triple-Strength Myomer, Industrial Triple-Strength Myomer:** Though these items are used when calculating Battle Ratings, they have no individual BV.

D **C^3 Computers/Slaves and Improved C^3 Computers:** C^3 Computers and Slaves (or Improved (C^3Computers) only affect a unit's BV if the unit is designated as part of a complete C^3 network (at least one C^3 Master and one Slave, or two Improved C^3 Computers). See *Constructing a Battle Force*, p. 315.

E **Targeting Computer:** The BV of a targeting computer equals 25 percent of the total BV of all weapons linked to the computer. Do not include the BV of ammo when calculating this sum, and use half the BV ratings of rear-mounted weapons.

F BV is the total BV of all weapons in a machine gun array multiplied by 0.67.

CLAN WEAPONS AND EQUIPMENT BV TABLE

Item	Item BV	Ammo BV*
Energy Weapons		
ER Laser (Large)	248	—
ER Laser (Medium)	108	—
ER Laser (Small)	31	—
ER Laser (Micro)	7	—
Flamer ('Mech)	6	—
Heavy Laser (Large)	244	—
Heavy Laser (Medium)	76	—
Heavy Laser (Small)	15	—
ER PPC	412	—
Plasma Cannon	170	21§
Pulse Laser (Large)	265	—
Pulse Laser (Medium)	111	—
Pulse Laser (Small)	24	—
Pulse Laser (Micro)	12	—
Ballistic Weapons		
Flamer (Vehicle)	5	1
Gauss (AP)	21	3§
Gauss Rifle	320	40§
HAG 20	267	33§
HAG 30	401	50§
HAG 40	535	67§
LB 2-X AC	47	6
LB 5-X AC	93	12
LB 10-X AC	148	19
LB 20-X AC	237	30
Machine Gun (Heavy)	6	1
Machine Gun	5	1
Machine Gun (Light)	5	1
Nail/Rivet Gun	1	0§
Ultra AC/2	62	8
Ultra AC/5	122	15
Ultra AC/10	210	26
Ultra AC/20	335	42
Missile Weapons		
ATM-3	53/—	14
ATM-6	105/—	26
ATM-9	147/—	36
ATM-12	212/—	52
LRM-1	17/3	2
LRM-2	24/5	3
LRM-3	34/7	4
LRM-4	46/9	6
LRM-5	55/11	7
LRM-6	69/14	9
LRM-7	76/15	10
LRM-8	88/18	11
LRM-9	94/19	12
LRM-10	109/22	14
LRM-11	126/25	16
LRM-12	141/28	18
LRM-13	145/29	19
LRM-14	159/32	20
LRM-15	164/33	21
LRM-16	180/36	23
LRM-17	185/37	24
LRM-18	199/40	25
LRM-19	203/41	26
LRM-20	220/44	27
SRM-1	15/3	2
SRM-2	21/4	3
SRM-3	30/6	4
SRM-4	39/8	5
SRM-5	47/9	6
SRM-6	59/12	7
Streak SRM-1	20/4	3
Streak SRM-2	40/8	5
Streak SRM-3	59/12	7
Streak SRM-4	79/16	10
Streak SRM-5	99/20	13
Streak SRM-6	118/24	15
Other Equipment		
Active Probe	12†	—
Active Probe (Light)	7†	—
Anti-Missile System	32†	22†
Anti-Personnel Pod (A-Pod)	1†	—
Anti-Battle Armor Pod (B-Pod)	2†	—
Artemis IV FCS	B	—
Backhoe	8	—
Bridge-Layer (Light)	5†	—
Bridge-Layer (Medium)	10†	—
Bridge-Layer (Heavy)	20†	—
Bomb Rack	11	—
Bulldozer	10†	—
CASE	C	—
Chainsaw	7	—
Combine	5	—
Dual Saw	9	—
ECM Suite	61†	—
Heavy-Duty Pile Driver	5	—
Machine Gun Array	F	—
MASC	C	—
Mining Drill	6	—
Narc Missile Beacon	30/6	0
Rock Cutter	6	—
Spot Welder	5	—
TAG	A	—
Light TAG	A	—
Targeting Computer	D	—
Wrecking Ball	8	—
Battle Armor Equipment		
Flamer (BA)	5	—
Laser (Small)	9	—
PPC (Support)	14	—
"Bearhunter" Superheavy AC	4	0
Grenade Launcher (Heavy)	2	0
Recoilless Rifle (Light)	12	0
Recoilless Rifle (Medium)	19	0
Recoilless Rifle (Heavy)	22	0
Advanced SRM-1	15/3	2
Advanced SRM-2	30/6	4
Advanced SRM-3	45/9	6
Advanced SRM-4	60/12	8
Advanced SRM-5	75/15	10
Advanced SRM-6	90/18	12
Battle Claw (w/Vibro-Claws)	1 each	—
Narc (Compact)	16/4	0

* Per ton
† Defensive Battle Rating
§ Ammunition for these weapons is not counted as explosive.

NOTES

A **TAG:** Only affects a unit's BV if it or other friendly units carry equipment that can be used in conjunction with it. See *Constructing a Battle Force*, p. 315.

B **Artemis IV:** Increase by 20 percent the BV of any missile launcher equipped with Artemis IV. This increase does not apply to the launcher's ammunition.

C **CASE/MASC:** Though these items are used when calculating the Defensive Battle Rating, they have no individual BV.

D **Targeting Computer:** The BV of a targeting computer equals 25 percent of the total BV of all weapons linked to the computer. Do not include the BV of ammo when calculating this sum, and use half the BV ratings of rear-mounted weapons.

AEROSPACE WEAPONS AND EQUIPMENT BV TABLE

Item	Item BV	Ammo BV*
Capital Missile Weapons		
Killer Whale	769	96 each
White Shark	577	72 each
Barracuda	522	65 each
AR-10	961	—
Kraken-T	2,306	288 each
Killer Whale-T	923	115 each
White Shark-T	692	86 each
Barracuda-T	461	58 each

* The Ammo Battle Values for capital missiles and equipment are per missile, not per ton of ammo.
† Defensive Battle Rating

Item	Item BV	Ammo BV*
External Stores		
High Explosive (HE)	—	12 each
Cluster	—	13 each
Laser Guided (LG)	—	20 each
Inferno	—	16 each
Rocket Launcher	18	—
TAG	A	—
Equipment		
Screen Launcher	160†	20† each

NOTES

A **TAG:** Only affects a unit's BV if it or other friendly units carry equipment that can be used in conjunction with it. See *Constructing a Battle Force*, p. 315.

CONVENTIONAL INFANTRY WEAPONS BV TABLE

Weapon	BV
Archaic Weapons	
Bow (Compound)	0.01
Bow (Daikyu)	0.01
Bow (Longbow)	0.01
Bow (Shortbow)	0
Bow (Hankyu)	0
Club (Blackjack/Sap)	0.05
Club (Club/Improvised)	0.02
Club (Vibro-Mace)	0.24
Crossbow (Basic)	0.01
Crossbow (Heavy)	0.02
Blade (Axe)	0.10
Blade (Bokken)	0.04
Blade (Dao)	0.04
Blade (Carbon-Reinforced Nails)	0.02
Blade (Hatchet/Tomahawk)	0.04
Blade (Katana/Scimitar)	0.06
Blade (Knife/Dagger/Bayonet)	0.02
Blade (No-Dachi)	0.05
Blade (Sword)	0.06
Blade (Wakizashi)	0.02
Blade (Vibro-axe)	0.39
Blade (Vibro-blade)	0.19
Blade (Vibro-katana)	0.29
Blade (Vibro-sword, IS)	0.29
Blade (Vibro-sword, Clan)	0.34
Nunchaku	0.02
Staff	0.04
Staff (Pole Arm)	0.04
Staff (Stun Staff, Single-End)	0.06
Staff (Stun Staff, Double-End)	0.06
Stunstick	0.06
Stunstick (Mini)	0.05
Thrown (Dart)	0
Thrown (Hatchet/Tomahawk)	0.01
Thrown (Knife)	0
Thrown (Spear)	0.01
Thrown (Shuriken)	0
Whip	0.05
Whip (Monowire)	0.32
Whip (Medusa)	0.15
Whip (Neural Lash)	0.08
Whip (Neural Whip)	0.08
Pistols	
Auto-Pistol	0.19
Auto-Pistol (Hawk Eagle)	0.25
Auto-Pistol (Magnum)	0.19
Auto-Pistol (M&G)	0.16
Auto-Pistol (Nambu)	0.19
Auto-Pistol (Serrek 7875D)	0.15
Auto-Pistol (Sternsnacht Python)	0.26
Dart Gun	0.01
Flare Pistol	0.08
Gauss Pistol	0.13
Gauss Pistol (Hold-Out [Mandrake])	0.02
Gyrojet Pistol	0.04
Gyrojet Pistol (Coventry Handrocket)	0.43
Gyrojet Pistol (Hold-Out)	0.04
Harpoon Gun (Pequod Mk. I)	0.02
Laser Pistol	0.64
Laser Pistol (Blazer)	0.79
Laser Pistol (ER)	0.61
Laser Pistol (Hold-Out)	0.13
Laser Pistol (Hold-Out [White Dwarf])	0.02
Laser Pistol (Nakjima)	0.55
Laser Pistol (Sunbeam)	0.86
Laser Pistol (Sunbeam Nova)	0.24

Weapon	BV
Needler Pistol	0.21
Needler Pistol (Hold-Out)	0.10
Needler Pistol (M&G Flechette)	0.10
Needler Pistol (Sea Eagle)	0.10
Paint Gun (LGB-46R)	0
Pistol (Flamer)	0.31
Pistol (Hold-Out)	0.03
Pistol (Makeshift)	0.02
Pistol (TK Enforcer Semi-Automatic)	0.18
Pistol (Spitball Gas Weapon)	0
Pistol (Sternsnacht Heavy [Claymore])	0.08
Pulse Laser Pistol (Clan)	0.61
Pulse Laser Pistol (IS)	0.13
Revolver	0.16
Revolver (Magnum)	0.17
Sonic Stunner	0.06
Tranq Gun	0.13
Rifles	
Auto-Rifle	1.59
Elephant Gun	0.34
Gauss Rifle (Thunderstroke)	0.79
Gauss Rifle (Thunderstroke II)	2.71
Gyroslug Carbine	0.86
Gyroslug Carbine (Star King)	1.07
Gyroslug Rifle	1.07
Gyrojet Gun (Heavy)	1.07
Gyrojet Rifle	1.07
Harpoon (Pequod Mk. 2)	0.18
Laser Rifle	1.43
Laser Rifle (Blazer)	1.79
Laser Rifle (Ebony Assault)	1.07
Laser Rifle (ER)	2.01
Laser Rifle (ER, Starfire)	2.01
Laser Rifle (Federated-Barrett M61A)	3.83
Laser Rifle (Intek)	1.51
Laser Rifle (Magna)	1.33
Laser Rifle (Marx XX)	1.86
Laser Rifle (Mauser 960 Assault Sys.)	4.75
Laser Rifle (Mauser 1200 LSS)	5.32
Laser Rifle (Mauser IIC)	
(Non-Inferno)	9.82
(Inferno)	6.45
Laser Rifle (Maxell PL-10)	1.33
Needler Rifle	0.21
Needler Rifle (Shredder Heavy)	0.31
Needler Rifle (M&G Flechette)	0.10
Pulse Laser Rifle (Clan)	1.69
Pulse Laser Rifle (IS)	0.76
Rifle (Bolt-Action)	0.43
Rifle (Federated-Barrett M42B)	3.12
Rifle (Federated Long)	1.07
Rifle (Imperator AX-22 Assault)	1.59
Rifle (M&G G-150)	1.64
Rifle (Makeshift)	0.09
Rifle (Minolta 9000 Adv. Sniper Sys.)	1.79
Rifle (Radium Sniper)	2.58
Rifle (Sniper)	0.92
Rifle (TK Assault)	1.34
Rifle (Zeus Heavy)	0.67
Shotguns	
Auto-Shotgun	0.21
Ceres Arms Crowdbuster	0.10
Gel Gun (Buccaneer)	0.06
Shotgun (Avenger CCW)	0.30
Shotgun (Combat)	0.25
Shotgun (Double-Barrel)	0.03

Weapon	BV
Shotgun (Double-Barrel, Sawed-Off)	0.03
Shotgun (Pump-Action)	0.07
Shotgun (Pump-Action, Sawed-Off)	0.07
Submachine Guns	
Auto-Pistol (Mydron)	0.13
Auto-Pistol (Stetta)	0.16
Gauss Submachine Gun	1.38
Machine Pistol (Martial Eagle)	0.23
Submachine Gun	0.23
SMG (Gunther MP-20)	0.30
SMG (Imperator 2894A1)	0.20
SMG (KA-23 Subgun)	0.20
SMG (Rorynex RM-3/XXI)	0.18
SMG (Rugan)	0.18
Grenades (Thrown)	
Grenade	
(Non-Inferno)	0.44
(Inferno)	0.17
Grenade (Micro)	0.15
Grenade (Mini)	
(Non-Inferno)	0.25
(Inferno)	0.10
Grenade (Rocket-Assisted)	0.92
Support Weapons	
AA Weapon (Mk. 1 Light AA)	0.70
AA Weapon (Mk. 2 Man-Portable AA)	4.14
Autocannon (Bearhunter Super-Heavy)	2.13
Autocannon (Semi-Portable)	2.35
Flamer (Heavy)	0.72
Flamer (Man-Portable)	0.50
Gauss Cannon (Grand Mauler)	3.22
Gauss Rifle (Magshot)	3.78
Gauss Rifle (Tsunami Heavy)	3.22
Gauss Rifle, Light (David)	4.01
Gauss Rifle, Light (King David)	4.87
Grenade Launcher	
(Non-Inferno Ammo)	2.48
(Inferno Ammo)	1.04
Grenade Launcher (Automatic)	
(Non-Inferno Ammo)	4.55
(Inferno Ammo)	1.25
Grenade Launcher (Compact)	0.49
Grenade Launcher (Heavy)	
(Non-Inferno Ammo)	5.38
(Inferno Ammo)	2.11
Grenade Launcher (Heavy Auto)	
(Non-Inferno Ammo)	5.90
(Inferno Ammo)	2.93
Laser (Hellbore Assault)	3.22
LRM Launcher (Corean FarShot)	
(Non-Inferno Ammo)	3.44
(Inferno Ammo)	1.36
Machine Gun (Light)	1.50
Machine Gun (Portable)	1.99
Machine Gun (Semi-Portable)	2.29
Machine Gun (Support)	4.80
Mortar (Heavy)	
(Non-Inferno Ammo)	4.09
(Inferno Ammo)	2.44
Mortar (Light)	
(Non-Inferno Ammo)	1.62
(Inferno Ammo)	0.79
MRM Launcher	
(Non-Inferno Ammo)	2.71
(Inferno Ammo)	1.33

Weapon	BV
Needler, Support (Firedrake)	6.13
Particle Cannon (Semi-Portable)	3.68
Particle Cannon (Support)*	11.32
Plasma Rifle, Man-Portable	8.08
Pulse Laser (Dragonsbane Disp.)	0.82
Recoilless Rifle (Heavy)	
(Non-Inferno Ammo)	2.91
(Inferno Ammo)	1.74
Recoilless Rifle (Light)	
(Non-Inferno Ammo)	2.45
(Inferno Ammo)	0.97
Recoilless Rifle (Medium)	
(Non-Inferno Ammo)	2.71
(Inferno Ammo)	1.33
Rocket Launcher (LAW)	2.71
Rocket Launcher (V-LAW)	1.47
SRM Launcher (Standard, Two-Shot)	
(Non-Inferno Ammo)	5.83
(Inferno Ammo)	3.48
SRM Launcher (Heavy)	
(Non-Inferno Ammo)	2.91
(Inferno Ammo)	1.74
SRM Launcher (Light)	
(Non-Inferno Ammo)	2.91
(Inferno Ammo)	1.74
Support Laser	6.02
Support Laser (ER, IS)	8.21
Support Laser (ER, Clan)	10.27
Support Laser (ER Heavy, IS)	13.88
Support Laser (ER Heavy, Clan)	18.52
Support Laser (ER, Semi-Portable)	5.02
Support Laser (Heavy)	17.35
Support Laser (Heavy, Semi-Portable)	7.53
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BATTLETECH™

'MECH RECORD SHEET

'MECH DATA

Type: _____

Movement Points:
Walking: _____
Running: _____
Jumping: _____

Tonnage: _____

Tech Base:
Clan ☐
Inner Sphere ☐

Weapons & Equipment Inventory (hexes)

Qty	Type	Loc	Ht	Dmg	Min	Sht	Med	Lng

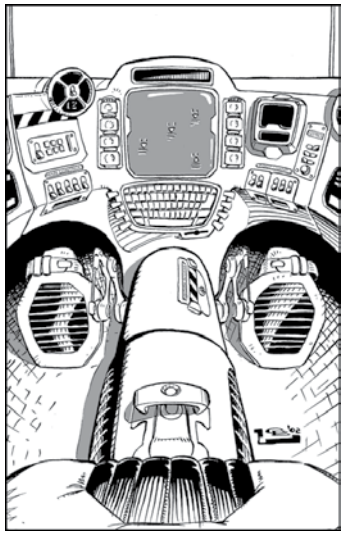
Cost: _____ BV: _____

WARRIOR DATA

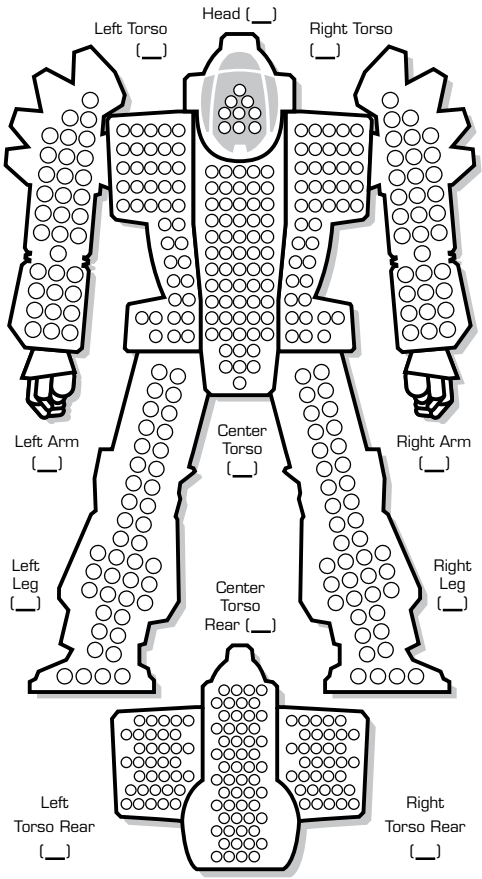
Name: _____

Gunnery Skill: ___ Piloting Skill: ___

Hits Taken	1	2	3	4	5	6
Consciousness#	3	5	7	10	11	Dead



ARMOR DIAGRAM



CRITICAL HIT TABLE

Left Arm

1-3	1.	Shoulder
	2.	Upper Arm Actuator
	3.	Lower Arm Actuator
	4.	Hand Actuator
	5.	_____
	6.	_____
4-6	1.	_____
	2.	_____
	3.	_____
	4.	_____
	5.	_____
	6.	_____

Head

1. Life Support
2. Sensors
3. Cockpit
4. _____
5. Sensors
6. Life Support

Right Arm

1-3	1.	Shoulder
	2.	Upper Arm Actuator
	3.	Lower Arm Actuator
	4.	Hand Actuator
	5.	_____
	6.	_____
4-6	1.	_____
	2.	_____
	3.	_____
	4.	_____
	5.	_____
	6.	_____

Center Torso

1-3	1.	Engine
	2.	Engine
	3.	Engine
	4.	Gyro
	5.	Gyro
	6.	Gyro
4-6	1.	Gyro
	2.	Engine
	3.	Engine
	4.	Engine
	5.	_____
	6.	_____

Left Torso

1-3	1.	_____
	2.	_____
	3.	_____
	4.	_____
	5.	_____
	6.	_____
4-6	1.	_____
	2.	_____
	3.	_____
	4.	_____
	5.	_____
	6.	_____

Right Torso

1-3	1.	_____
	2.	_____
	3.	_____
	4.	_____
	5.	_____
	6.	_____
4-6	1.	_____
	2.	_____
	3.	_____
	4.	_____
	5.	_____
	6.	_____

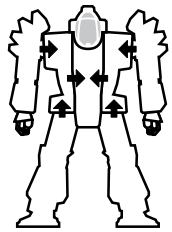
Engine Hits ○○○
Gyro Hits ○○
Sensor Hits ○○
Life Support ○

Left Leg

1. Hip
2. Upper Leg Actuator
3. Lower Leg Actuator
4. Foot Actuator
5. _____
6. _____

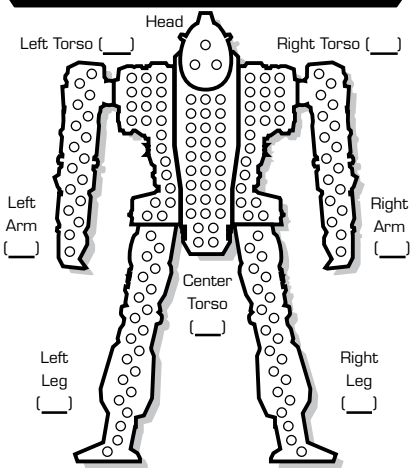
Right Leg

1. Hip
2. Upper Leg Actuator
3. Lower Leg Actuator
4. Foot Actuator
5. _____
6. _____



Damage Transfer Diagram

INTERNAL STRUCTURE DIAGRAM



Heat Scale

Overflow

30* 29 28* 27 26* 25* 24* 23* 22* 21 20* 19* 18* 17* 16 15* 14* 13* 12 11 10* 9 8* 7 6 5* 4 3 2 1 0

HEAT DATA

Heat Level*	Effects
30	Shutdown
28	Ammo Exp. avoid on 8+
26	Shutdown, avoid on 10+
25	–5 Movement Points
24	+4 Modifier to Fire
23	Ammo Exp. avoid on 6+
22	Shutdown, avoid on 8+
20	–4 Movement Points
19	Ammo Exp. avoid on 4+
18	Shutdown, avoid on 6+
17	+3 Modifier to Fire
15	–3 Movement Points
14	Shutdown, avoid on 4+
13	+2 Modifier to Fire
10	–2 Movement Points
8	+1 Modifier to Fire
5	–1 Movement Points

Heat Sinks:
___ (___)

○○○ ○○○ ○○○ ○○○ ○○○ ○○○ ○○○ ○○○ ○○○ ○○○

Single ☐
Double ☐

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BATTLETECH™

FOUR-LEGGED 'MECH RECORD SHEET

'MECH DATA

Type: _____

Movement Points:
Walking: _____
Running: _____
Jumping: _____

Tonnage: _____

Tech Base:
Clan ☐
Inner Sphere ☐

Weapons & Equipment Inventory (hexes)

Qty	Type	Loc	Ht	Dmg	Min	Sht	Med	Lng

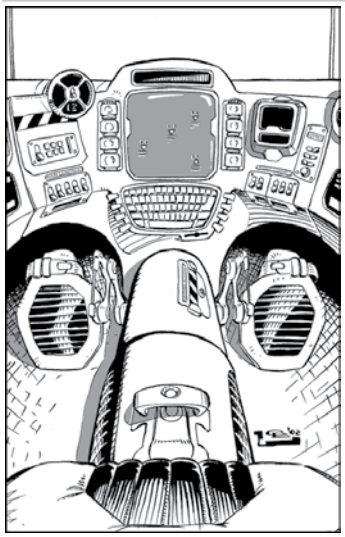
Cost: _____ BV: _____

WARRIOR DATA

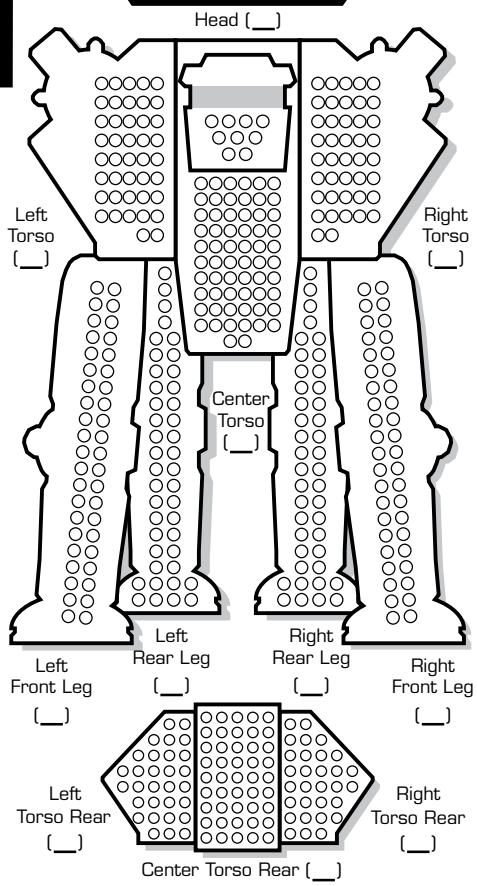
Name: _____

Gunnery Skill: ___ Piloting Skill: ___

Hits Taken	1	2	3	4	5	6
Consciousness#	3	5	7	10	11	Dead



ARMOR DIAGRAM



CRITICAL HIT TABLE

Head
1. Life Support
2. Sensors
3. Cockpit
4. _____
5. Sensors
6. Life Support

Left Front Leg
1. Hip
2. Upper Leg Actuator
3. Lower Leg Actuator
4. Foot Actuator
5. _____
6. _____

Right Front Leg
1. Hip
2. Upper Leg Actuator
3. Lower Leg Actuator
4. Foot Actuator
5. _____
6. _____

Center Torso

1-3
1. Engine
2. Engine
3. Engine
4. Gyro
5. Gyro
6. Gyro

4-6
1. Gyro
2. Engine
3. Engine
4. Engine
5. _____
6. _____

Left Torso

1-3
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

4-6
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Right Torso

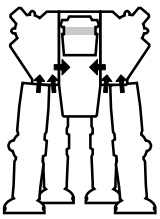
1-3
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

4-6
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Engine Hits ○ ○ ○
Gyro Hits ○ ○
Sensor Hits ○ ○
Life Support ○

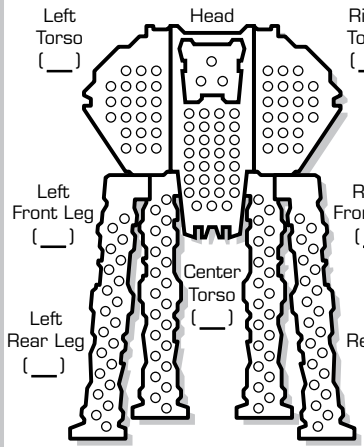
Left Rear Leg
1. Hip
2. Upper Leg Actuator
3. Lower Leg Actuator
4. Foot Actuator
5. _____
6. _____

Right Rear Leg
1. Hip
2. Upper Leg Actuator
3. Lower Leg Actuator
4. Foot Actuator
5. _____
6. _____



Damage Transfer Diagram

INTERNAL STRUCTURE DIAGRAM



Heat Scale

Overflow
30*
29
28*
27
26*
25*
24*
23*
22*
21
20*
19*
18*
17*
16
15*
14*
13*
12
11
10*
9
8*
7
6
5*
4
3
2
1
0

HEAT DATA

Heat Sinks: ___ (___)

Heat Level*	Effects	
30	Shutdown	
28	Ammo Exp. avoid on 8+	○○○
26	Shutdown, avoid on 10+	○○○
25	–5 Movement Points	○○○
24	+4 Modifier to Fire	○○○
23	Ammo Exp. avoid on 6+	○○○
22	Shutdown, avoid on 8+	○○○
20	–4 Movement Points	○○○
19	Ammo Exp. avoid on 4+	○○○
18	Shutdown, avoid on 6+	○○○
17	+3 Modifier to Fire	○○○
15	–3 Movement Points	○○○
14	Shutdown, avoid on 4+	○○○
13	+2 Modifier to Fire	
10	–2 Movement Points	Single ☐
8	+1 Modifier to Fire	Double ☐
5	–1 Movement Points	

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BATTLETECH™

PROTOMECH RECORD SHEET

PROTOMECH 1

Type: _____
Tons: ____
Movement Points:
Walk/Run/Jump
___/___/___

WEAPONS INVENTORY

LOC.	TYPE	Dmg	Min	Sht	Med	Lng
Main Gun:						
Right Arm:						
Left Arm:						
Torso A:						
Torso B:						
Ammo:						

PILOT DATA

Name: _____
Gunnery Skill: ____

Hits Taken	1	2	3	4	5	6
Consciousness #	3	5	7	10	11	Dead

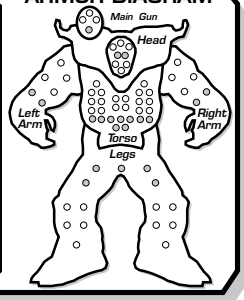
Cost: _____ BV: ____

HIT LOCATIONS AND CRITICAL HITS

2D6	LOCATION	1st HIT	2nd HIT	3rd HIT
2	Main Gun	☐ Main Gun Destroyed		
4	Right Arm	☐ +1 to Hit	☐ Right Arm Destroyed	
5,9	Legs	☐ –1 Walk MP	☐ 1/2 Walk MP	☐ No Move
6,7,8	Torso	☐ –1 Jump*	☐ 1/2 Jump*	■ Proto Destroyed
10	Left Arm	☐ +1 to Hit	☐ Left Arm Destroyed	
12	Head	☐ +1 to Hit	☐ +2 to Hit, no Long range shots	

*Roll 1D6:
1–2, Torso Weapon A Destroyed; 3–4, Torso Weapon B Destroyed

ARMOR DIAGRAM



PROTOMECH 2

Type: _____
Tons: ____
Movement Points:
Walk/Run/Jump
___/___/___

WEAPONS INVENTORY

LOC.	TYPE	Dmg	Min	Sht	Med	Lng
Main Gun:						
Right Arm:						
Left Arm:						
Torso A:						
Torso B:						
Ammo:						

PILOT DATA

Name: _____
Gunnery Skill: ____

Hits Taken	1	2	3	4	5	6
Consciousness #	3	5	7	10	11	Dead

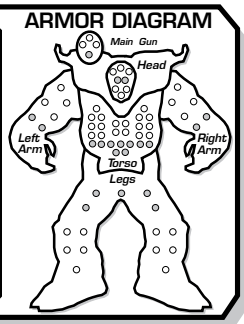
Cost: _____ BV: ____

HIT LOCATIONS AND CRITICAL HITS

2D6	LOCATION	1st HIT	2nd HIT	3rd HIT
2	Main Gun	☐ Main Gun Destroyed		
4	Right Arm	☐ +1 to Hit	☐ Right Arm Destroyed	
5,9	Legs	☐ –1 Walk MP	☐ 1/2 Walk MP	☐ No Move
6,7,8	Torso	☐ –1 Jump*	☐ 1/2 Jump*	■ Proto Destroyed
10	Left Arm	☐ +1 to Hit	☐ Left Arm Destroyed	
12	Head	☐ +1 to Hit	☐ +2 to Hit, no Long range shots	

*Roll 1D6:
1–2, Torso Weapon A Destroyed; 3–4, Torso Weapon B Destroyed

ARMOR DIAGRAM



PROTOMECH 3

Type: _____
Tons: ____
Movement Points:
Walk/Run/Jump
___/___/___

WEAPONS INVENTORY

LOC.	TYPE	Dmg	Min	Sht	Med	Lng
Main Gun:						
Right Arm:						
Left Arm:						
Torso A:						
Torso B:						
Ammo:						

PILOT DATA

Name: _____
Gunnery Skill: ____

Hits Taken	1	2	3	4	5	6
Consciousness #	3	5	7	10	11	Dead

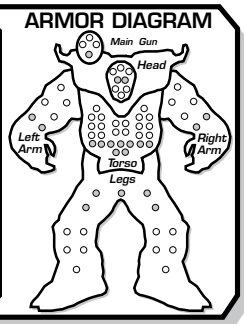
Cost: _____ BV: ____

HIT LOCATIONS AND CRITICAL HITS

2D6	LOCATION	1st HIT	2nd HIT	3rd HIT
2	Main Gun	☐ Main Gun Destroyed		
4	Right Arm	☐ +1 to Hit	☐ Right Arm Destroyed	
5,9	Legs	☐ –1 Walk MP	☐ 1/2 Walk MP	☐ No Move
6,7,8	Torso	☐ –1 Jump*	☐ 1/2 Jump*	■ Proto Destroyed
10	Left Arm	☐ +1 to Hit	☐ Left Arm Destroyed	
12	Head	☐ +1 to Hit	☐ +2 to Hit, no Long range shots	

*Roll 1D6:
1–2, Torso Weapon A Destroyed; 3–4, Torso Weapon B Destroyed

ARMOR DIAGRAM



PROTOMECH 4

Type: _____
Tons: ____
Movement Points:
Walk/Run/Jump
___/___/___

WEAPONS INVENTORY

LOC.	TYPE	Dmg	Min	Sht	Med	Lng
Main Gun:						
Right Arm:						
Left Arm:						
Torso A:						
Torso B:						
Ammo:						

PILOT DATA

Name: _____
Gunnery Skill: ____

Hits Taken	1	2	3	4	5	6
Consciousness #	3	5	7	10	11	Dead

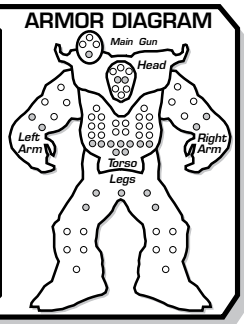
Cost: _____ BV: ____

HIT LOCATIONS AND CRITICAL HITS

2D6	LOCATION	1st HIT	2nd HIT	3rd HIT
2	Main Gun	☐ Main Gun Destroyed		
4	Right Arm	☐ +1 to Hit	☐ Right Arm Destroyed	
5,9	Legs	☐ –1 Walk MP	☐ 1/2 Walk MP	☐ No Move
6,7,8	Torso	☐ –1 Jump*	☐ 1/2 Jump*	■ Proto Destroyed
10	Left Arm	☐ +1 to Hit	☐ Left Arm Destroyed	
12	Head	☐ +1 to Hit	☐ +2 to Hit, no Long range shots	

*Roll 1D6:
1–2, Torso Weapon A Destroyed; 3–4, Torso Weapon B Destroyed

ARMOR DIAGRAM



PROTOMECH 5

Type: _____
Tons: ____
Movement Points:
Walk/Run/Jump
___/___/___

WEAPONS INVENTORY

LOC.	TYPE	Dmg	Min	Sht	Med	Lng
Main Gun:						
Right Arm:						
Left Arm:						
Torso A:						
Torso B:						
Ammo:						

PILOT DATA

Name: _____
Gunnery Skill: ____

Hits Taken	1	2	3	4	5	6
Consciousness #	3	5	7	10	11	Dead

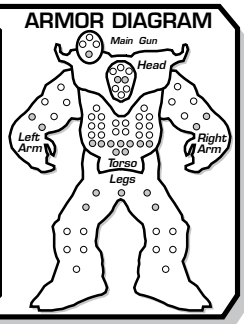
Cost: _____ BV: ____

HIT LOCATIONS AND CRITICAL HITS

2D6	LOCATION	1st HIT	2nd HIT	3rd HIT
2	Main Gun	☐ Main Gun Destroyed		
4	Right Arm	☐ +1 to Hit	☐ Right Arm Destroyed	
5,9	Legs	☐ –1 Walk MP	☐ 1/2 Walk MP	☐ No Move
6,7,8	Torso	☐ –1 Jump*	☐ 1/2 Jump*	■ Proto Destroyed
10	Left Arm	☐ +1 to Hit	☐ Left Arm Destroyed	
12	Head	☐ +1 to Hit	☐ +2 to Hit, no Long range shots	

*Roll 1D6:
1–2, Torso Weapon A Destroyed; 3–4, Torso Weapon B Destroyed

ARMOR DIAGRAM



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BATTLETECH™

GROUND VEHICLE RECORD SHEET

VEHICLE DATA

Type: _____

Movement Points:
Cruising: _____
Flank: _____
Movement Type: _____
Engine Type: _____

Tonnage: _____
Tech Base:
Clan ☐
Inner Sphere ☐

Weapons & Equipment Inventory (hexes)

Qty	Type	Loc	Dmg	Min	Sht	Med	Lng

Cost: _____ **BV:** _____

CREW DATA

Crew: _____
Gunnery Skill: ___ **Driving Skill:** ___
Commander Hit +1 — Modifier to all Skill rolls
Driver Hit +2 — Modifier to Driving Skill rolls

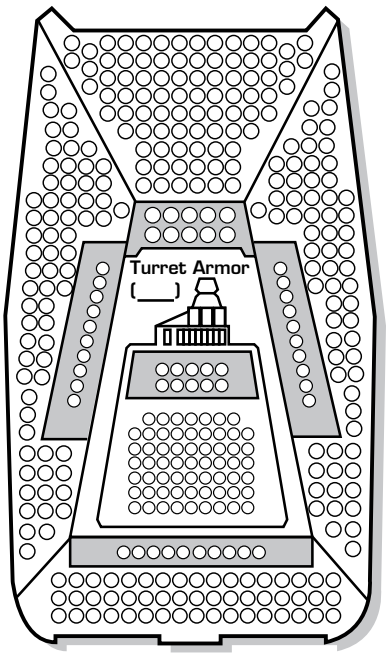
CRITICAL DAMAGE

Turret Locked ☐ Engine Hit ☐
Sensor Hits +1 +2 +3 D
Motive System Hits +1 +2 +3
Stabilizers
Front ☐ Left ☐ Right ☐
Rear ☐ Turret ☐

NOTES

ARMOR DIAGRAM

BAR: _____ Front Armor (___)



Left Side Armor (___)
Right Side Armor (___)
Rear Armor (___)

GROUND COMBAT VEHICLE HIT LOCATION TABLE

	ATTACK DIRECTION		
2D6 Roll	FRONT	REAR	SIDE§
2*	Front (critical)	Rear (critical)	Side (critical)
3	Front†	Rear†	Side†
4	Front†	Rear†	Side†
5	Right Side†	Left Side†	Front†
6	Front	Rear	Side
7	Front	Rear	Side
8	Front	Rear	Side (critical)*
9	Left Side†	Right Side†	Rear†
10	Turret	Turret	Turret
11	Turret	Turret	Turret
12*	Turret (critical)	Turret (critical)	Turret (critical)

*A result of 2 or 12 (or an 8 if the attack strikes the side) may inflict a critical hit on the vehicle. For each result of 2 or 12 (or 8 for side attacks), apply damage normally to the armor in that section. The attacking player then automatically rolls once on the Ground Combat Vehicle Critical Hits Table below (see *Combat*, p. 192 in *Total Warfare* for more information). A result of 12 on the Ground Combat Vehicles Hit Location Table may inflict critical hit against the turret; if the vehicle has no turret, a 12 indicates the chance of a critical hit on the side corresponding to the attack direction.
†The vehicle may suffer motive system damage even if its armor remains intact. Apply damage normally to the armor in that section, but the attacking player also rolls once on the Motive System Damage Table at right (see *Combat*, p. 192 in *Total Warfare* for more information). Apply damage at the end of the phase in which the damage takes effect.
§Side hits strike the side as indicated by the attack direction. For example, if an attack hits the right side, all Side results strike the right side armor. If the vehicle has no turret, a turret hit strikes the armor on the side attacked.

MOTIVE SYSTEM DAMAGE TABLE

2D6 Roll	EFFECT*
2–5	No effect
6–7	Minor damage; +1 modifier to all Driving Skill Rolls
8–9	Moderate damage; –1 Cruising MP, +2 modifier to all Driving Skill Rolls
10–11	Heavy damage; only half Cruising MP (round fractions up), +3 modifier to all Driving Skill Rolls
12+	Major damage; no movement for the rest of the game. Vehicle is immobile.

Attack Direction Modifier:

Hit from rear	+1
Hit from the sides	+2

Vehicle Type Modifiers:

Tracked, Naval	+0
Wheeled	+2
Hovercraft, Hydrofoil	+3
WiGE	+4

*All movement and Driving Skill Roll penalties are cumulative. However, each Driving Skill Roll modifier can only be applied once. For example, if a roll of 6-7 is made for a vehicle, inflicting a +1 modifier, that is the only time that particular +1 can be applied; a subsequent roll of 6-7 has no additional effect. This means the maximum Driving Skill Roll modifier that can be inflicted from the Motive System Damage Table is +6. If a unit's Cruising MP is reduced to 0, it cannot move for the rest of the game, but is not considered an immobile target. In addition, all motive system damage takes effect at the end of the phase in which the damage occurred. For example, if two units are attacking the same Combat Vehicle during the Weapon Attack Phase and the first unit inflicts motive system damage and rolls a 12, the –4 immobile target modifier would not apply for the second unit. However, the –4 modifier would take effect during the Physical Attack Phase. If a hover vehicle is rendered immobile while over a Depth 1 or deeper water hex, it sinks and is destroyed.

GROUND COMBAT VEHICLE CRITICAL HITS TABLE

	LOCATION HIT			
2D6 Roll	FRONT	SIDE	REAR	TURRET
2–5	No Critical Hit	No Critical Hit	No Critical Hit	No Critical Hit
6	Driver Hit	Cargo/Infantry Hit	Weapon Malfunction	Stabilizer
7	Weapon Malfunction	Weapon Malfunction	Cargo/Infantry Hit	Turret Jam
8	Stabilizer	Crew Stunned	Stabilizer	Weapon Malfunction
9	Sensors	Stabilizer	Weapon Destroyed	Turret Locks
10	Commander Hit	Weapon Destroyed	Engine Hit	Weapon Destroyed
11	Weapon Destroyed	Engine Hit	Ammunition**	Ammunition**
12	Crew Killed	Fuel Tank*	Fuel Tank*	Turret Blown Off

*If Combat Vehicle has ICE engine only. If Combat Vehicle has a fusion engine, treat this result as Engine Hit.
**If Combat Vehicle carries no ammunition, treat this result as Weapon Destroyed.

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BATTLETECH™

V.T.O.L. VEHICLE RECORD SHEET

VEHICLE DATA

Type: _____

Movement Points:
Cruising: _____
Flank: _____
Engine Type: _____

Tonnage: _____
Tech Base:
Clan ☐
Inner Sphere ☐

Weapons & Equipment Inventory (hexes)

Qty	Type	Loc	Dmg	Min	Sht	Med	Lng
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—

Cost: _____ BV: _____

CREW DATA

Crew:
Gunnery Skill: ___ Driving Skill: ___
Co-Pilot Hit +1 (Modifier to all Skill rolls)
Pilot Hit +2 (Modifier to Driving Skill rolls)

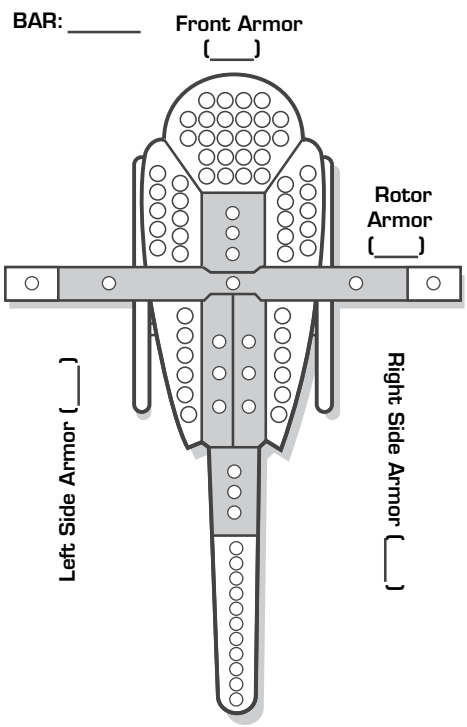
CRITICAL DAMAGE

Flight Stabilizer* +3 Engine Hit ☐
Sensor Hits +1 +2 +3 D
Stabilizers
Front ☐ Left ☐ Right ☐ Rear ☐
*Move at Cruising speed only

NOTES

ARMOR DIAGRAM

BAR: _____



VTOL COMBAT VEHICLE HIT LOCATION TABLE

	ATTACK DIRECTION FRONT	REAR	SIDE
2*	Front (critical)	Rear (critical)	Side (critical)
3	Rotors†	Rotors†	Rotors†
4	Turret‡	Turret‡	Turret‡
5	Right Side	Left Side	Front
6	Front	Rear	Side
7	Front	Rear	Side
8	Front	Rear	Side (critical)*
9	Left Side	Right Side	Rear
10	Rotors†	Rotors†	Rotors†
11	Rotors†	Rotors†	Rotors†
12*	Rotors (critical)†	Rotors (critical)†	Rotors (critical)†

*A result of 2 or 12 (or an 8 if the attack strikes the side) may inflict a critical hit on the VTOL. For each such attack, appl damage normally to the armor in that section. The attacking player then immediately rolls once on the VTOL Combat Vehicle Critical Hits Table, below.

†Damage Value / 10 (round up); see *Rotor Hits*, p. 197, *Total Warfare*. Additionally, damage to rotors slows down the VTOL. Each hit reduces the VTOL's Cruising MP by 1, meaning that the controlling player must also recalculate Flank MP; multiply the new Cruising MP by 1.5 and round up. As with all damage, such movement penalties do not apply until the end of the phase in which the damage occurred.

‡ If the VTOL has no turret, a turret strike hits Rotors†

VTOL ELEVATION TRACK

Turn	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Elevation															

Turn	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Elevation															

PHYSICAL ATTACKS AGAINST VTOL VEHICLES TABLE

DIFFERENCE IN LEVELS	TYPES OF PHYSICAL ATTACK ALLOWED
–1 or lower	None
0	All except Punch
1–2	All except Kick
3	Club and Physical Weapons only
4+	None

VTOL COMBAT VEHICLE CRITICAL HITS TABLE

	LOCATION HIT SIDE	REAR	ROTORS	TURRET
2–5	No Critical Hit	No Critical Hit	No Critical Hit	No Critical Hit
6	Co-Pilot Hit	Weapon Malfunction	Cargo/Infantry Hit	Rotor Damage	Stabilizer
7	Weapon Malfunction	Cargo/Infantry Hit	Weapon Malfunction	Rotor Damage	Turret Jam
8	Stabilizer	Stabilizer	Stabilizer	Rotor Damage	Weapon Malfunction
9	Sensors	Weapon Destroyed	Weapon Destroyed	Flight Stabilizer Hit	Turret Lock
10	Pilot Hit	Engine Hit	Sensors	Flight Stabilizer Hit	Weapon Destroyed
11	Weapon Destroyed	Ammunition**	Engine Hit	Rotors Destroyed	Ammunition**
12	Crew Killed	Fuel Tank*	Fuel Tank*	Rotors Destroyed	Turret Blown Off

*Only if the VTOL has an ICE engine. For VTOLs with fusion engines, treat this result as Engine Hit.
**If the VTOL carries no ammunition, treat this result as Weapon Destroyed.

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BATTLETECH™

NAVAL VESSEL RECORD SHEET

VEHICLE DATA

Type: _____

Movement Points:
Cruising: _____
Flank: _____
Movement Type: _____
Engine Type: _____

Tonnage: _____
Tech Base:
Clan ☐
Inner Sphere ☐

Weapons & Equipment Inventory (hexes)

Qty	Type	Loc	Dmg	Min	Sht	Med	Lng

Cost: _____ **BV:** _____

CREW DATA

Crew: _____
Gunnery Skill: ___ **Driving Skill:** ___

Commander Hit +1 ☐
Modifier to all Skill rolls

Driver Hit +2 ☐
Modifier to Driving Skill rolls

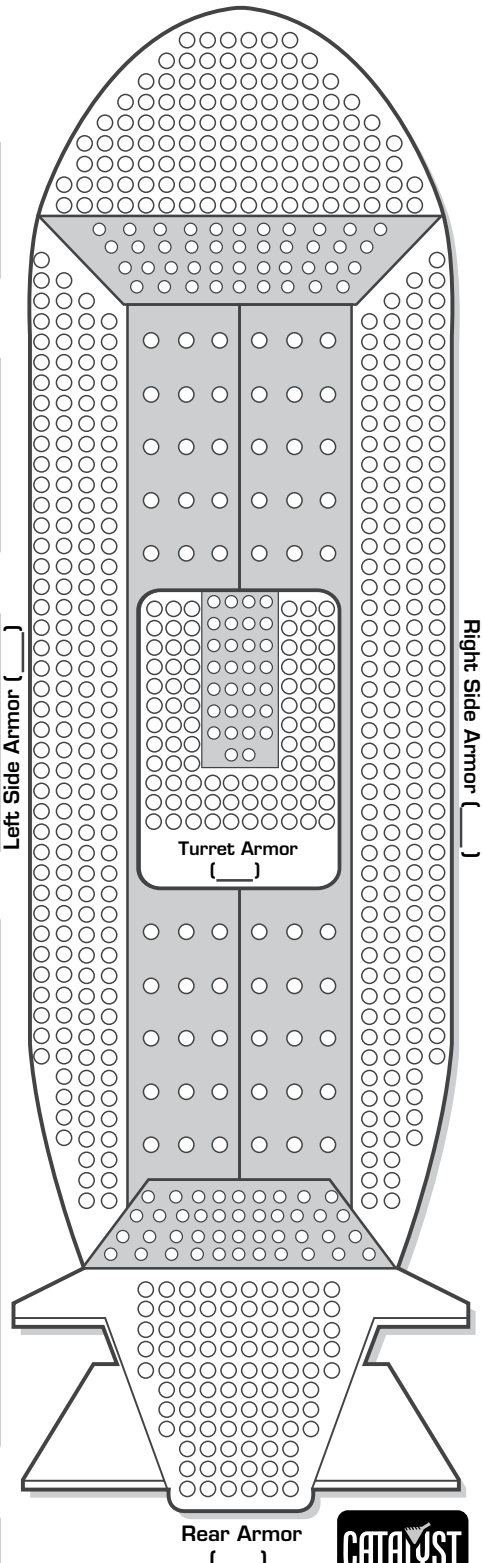
CRITICAL DAMAGE

Turret Locked ☐ Engine Hit ☐
Sensor Hits +1 ☐ +2 ☐ +3 ☐ D ☐
Motive System Hits +1 ☐ +2 ☐ +3 ☐
Stabilizers
Front ☐ Left ☐ Right ☐
Rear ☐ Turret ☐

NOTES

ARMOR DIAGRAM

BAR: _____ Front Armor (___)



NAVAL COMBAT VEHICLE HIT LOCATION TABLE

2D6 Roll	ATTACK DIRECTION FRONT	REAR	SIDE§
2*	Front (critical)	Rear (critical)	Side (critical)
3	Front†	Rear†	Side†
4	Front†	Rear†	Side†
5	Right Side†	Left Side†	Front†
6	Front	Rear	Side
7	Front	Rear	Side
8	Front	Rear	Side (critical)*
9	Left Side†	Right Side†	Rear†
10	Turret	Turret	Turret
11	Turret	Turret	Turret
12*	Turret (critical)	Turret (critical)	Turret (critical)

*A result of 2 or 12 (or an 8 if the attack strikes the side) may inflict a critical hit on the vehicle.For each result of 2 or 12 (or 8 for side attacks), apply damage normally to the armor in that section. The attacking player then automatically rolls once on the Naval Combat Vehicle Critical Hits Table below (see *Combat*, p. 192 in *Total Warfare* for moreinformation). A result of 12 on the Naval Combat Vehicles Hit Location Table may inflict critical hit against the turret; if the vehicle has no turret, a 12 indicates the chance of a critical hit on the side corresponding to the attack direction.
†The vehicle may suffer motive system damage even if its armor remains intact. Apply damage normally to the armor in that section, but the attacking player also rolls once on the Motive SystemDamage Table at right (see *Combat*, p. 192 in *Total Warfare* for more information). Apply damage at the end of the phase in which the damage takes effect.
§Side hits strike the side as indicated by the attack direction. For example, if an attack hits the right side, all Side results strike the right side armor. If the vehicle has no turret, a turret hit strikes the armor on the side attacked.

MOTIVE SYSTEM DMG. TABLE

2D6 Roll	EFFECT*
2–5	No effect
6–7	Minor damage; +1 modifie to all Driving Skill Rolls
8–9	Moderate damage; –1 Cruising MP, +2 modifier to all Driving Skill Rolls
10–11	Heavy damage; only half Cruising MP (round fractions up), +3 modifier to all Driving Skill Rolls
12+	Major damage; no movement for the rest of the game. Vehicle is immobile.

Attack Direction Modifier:

Hit from rear	+1
Hit from the sides	+2

Vehicle Type Modifiers:

Naval	+0
Hydrofoil	+3

*All movement and Driving Skill Roll penalties are cumulative. However, each Driving Skill Roll modifier can only be applied once. For example, if a roll of 6-7 is made for a vehicle, inflicting a +1 modifier, that is the only time that particular +1 can be applied; a subsequent roll of 6-7 has no additional effect. This means the maximum Driving Skill Roll modifier that can be inflicted from the Motive System Damage Table is +6. If a unit's Cruising MP is reduced to 0, it cannot move for the rest of the game, but is not considered an immobile target. In addition, all motive system damage takes effect at the end of the phase in which the damage occurred.

NAVAL COMBAT VEHICLE CRITICAL HITS TABLE

LOCATION HIT 2D6 Roll	FRONT	SIDE	REAR	TURRET
2–5	No Critical Hit	No Critical Hit	No Critical Hit	No Critical Hit
6	Driver Hit	Cargo/Infantry Hit	Weapon Malfunction	Stabilizer
7	Weapon Malfunction	Weapon Malfunction	Cargo/Infantry Hit	Turret Jam
8	Stabilizer	Crew Stunned	Stabilizer	Weapon Malfunction
9	Sensors	Stabilizer	Weapon Destroyed	Turret Locks
10	Commander Hit	Weapon Destroyed	Engine Hit	Weapon Destroyed
11	Weapon Destroyed	Engine Hit	Ammunition**	Ammunition**
12	Crew Killed	Fuel Tank*	Fuel Tank*	Turret Blown Off

*If Combat Vehicle has ICE engine only. If Combat Vehicle has a fusion engine, treat this result as Engine Hit.
**If Combat Vehicle carries no ammunition, treat this result as Weapon Destroyed.

DEPTH TRACK

Turn	1	2	3	4	5	6	7	8	9	10
Depth										
Turn	11	12	13	14	15	16	17	18	19	20
Depth										

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BATTLETECH™

ARMOR DIAGRAM

BAR:_____

AIRSHIP RECORD SHEET

AIRSHIP DATA

Type: _____

Name: _____ Tonnage: _____

Thrust: Tech Base:

Safe Thrust: _____ Clan ☐

Maximum Thrust: _____ Inner Sphere ☐

Weapons & Equipment Inventory

Qty	Type	Loc.	Ht	SRV (0–6)	MRV (6–12)	LRV (13–20)	ERV (21–25)
Standard Scale							
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
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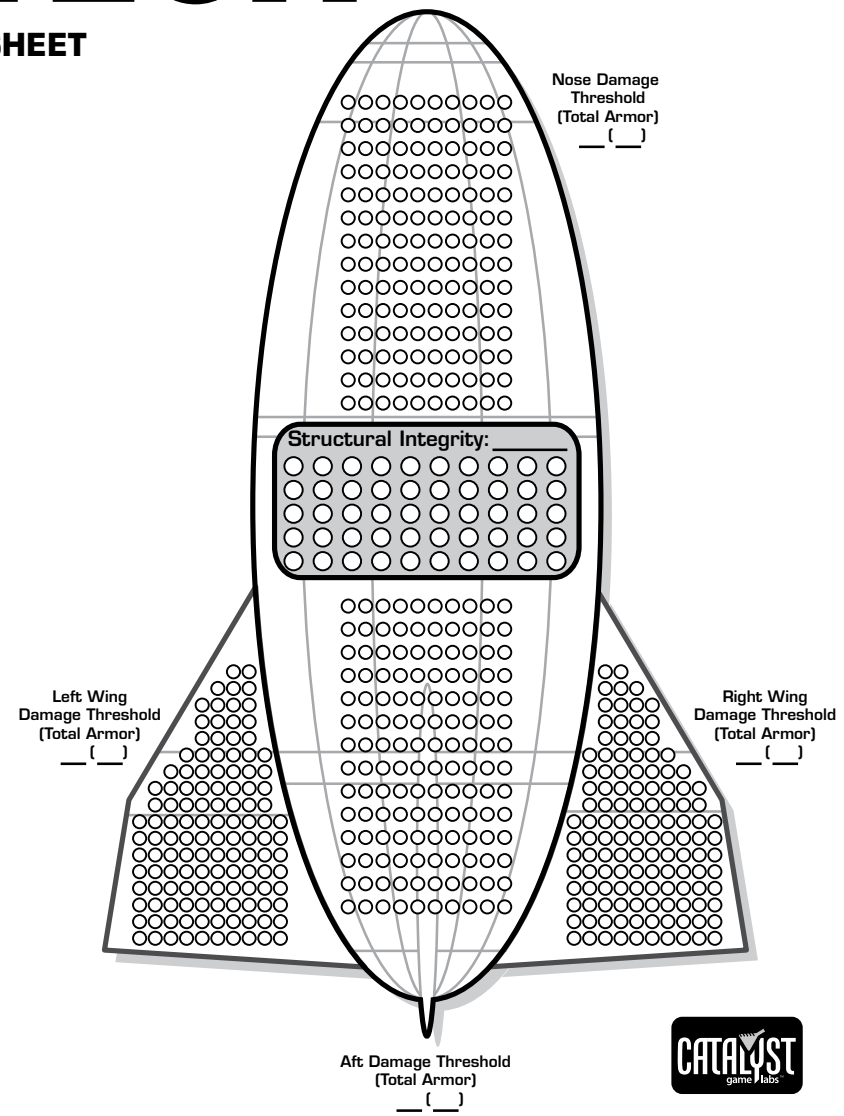
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—
—	_____	—	—	—	—	—	—

Ammo: _____

_____

Cost: _____ BV: _____



NOTES

CREW DATA

Gunnery Skill: ___ Piloting Skill: ___

Hits Taken	1	2	3	4	5	6
Modifier	+1	+2	+3	+4	+5	Incp.

Crew: _____ Marines: _____

Passengers: _____ Elementals: _____

Other: _____ Battle Armor: _____

Life Boats/Escape Pods: ___/___

CRITICAL DAMAGE

Avionics	+1	+2	+5	Gear	+5	
FCS	+2	+4	D	Life Support	+2	
Sensors	+1	+2	+5			
Thrusters						
Left	+1	+2	+3	D		
Right	+1	+2	+3	D		
Engine	−1	−2	−3	−4	−5	D

VELOCITY RECORD

Turn #	1	2	3	4	5	6	7	8	9	10
Thrust										
Velocity										
Effective Velocity										
Altitude										

Turn #	11	12	13	14	15	16	17	18	19	20
Thrust										
Velocity										
Effective Velocity										
Altitude										

AIRSHIP VELOCITY TABLE

Current Velocity	Thrust Points per Cycle Turn 1	2	3	4
0.25	1	—	—	—
0.5	1	—	1	—
0.75	1	—	1	1
1	1	1	1	1
1.25	2	1	1	1
1.5	2	1	2	1
1.75	2	1	2	2
2	2	2	2	2
2.25	3	2	2	2
2.5	3	2	3	2
2.75	3	2	3	3
3	3	3	3	3

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BATTLETECH™

LARGE GROUND SUPPORT VEHICLE RECORD SHEET

VEHICLE DATA

Type: _____

Movement Points:
Cruising: _____
Flank: _____
Movement Type: _____
Engine Type: _____

Tonnage: _____
Tech Base:
Clan ☐
Inner Sphere ☐

Weapons & Equipment Inventory (hexes)

Qty	Type	Loc	Dmg	Min	Sht	Med	Lng

Cost: _____ **BV:** _____

CREW DATA

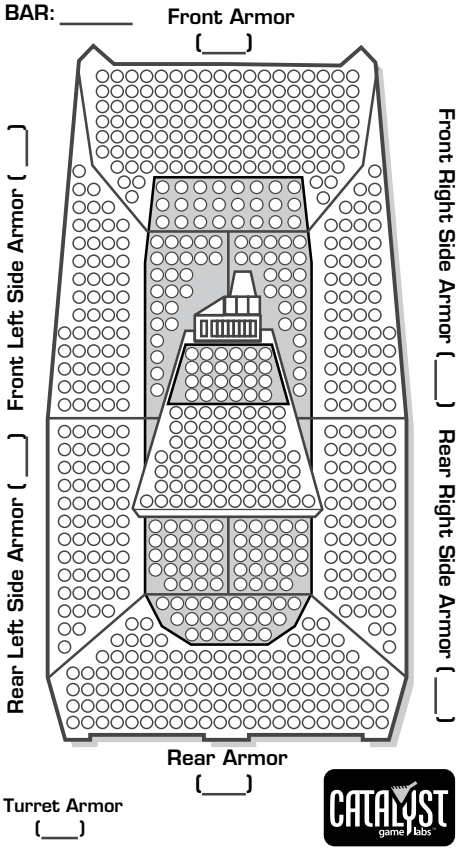
Crew: _____
Gunnery Skill: ___ **Driving Skill:** ___
Commander Hit +1 — Modifier to all Skill rolls
Driver Hit +2 — Modifier to Driving Skill rolls

CRITICAL DAMAGE

Turret Locked ☐ Engine Hit ☐
Sensor Hits +1 +2 +3 D
Motive System Hits +1 +2 +3
Stabilizers
Front ☐ Left ☐ Right ☐
Rear ☐ Turret ☐

NOTES

ARMOR DIAGRAM



LARGE GROUND SUPPORT VEHICLE HIT LOCATION TABLE

	ATTACK DIRECTION			
2D6 Roll	FRONT	REAR	FRONT SIDE	REAR SIDE
2*	Front (critical)	Rear (critical)	Side (critical)§	Side (critical)§
3	Right Side†	Left Side†	Front†	Rear†
4	Front†	Rear†	Side†	Side†
5	Front†	Rear†	Side	Side
6	Front	Rear	Side	Side
7	Front	Rear	Side	Side
8	Front	Rear	Side (critical)*	Side (critical)*
9	Front†	Rear†	Side†	Side†
10	Turret	Turret	Turret	Turret
11	Turret	Turret	Turret	Turret
12*	Turret (critical)	Turret (critical)	Turret (critical)	Turret (critical)

*A result of 2 or 12 (or an 8 if the attack strikes the side) may inflict a critical hit on the vehicle. For each result of 2 or 12 (or 8 for side attacks), apply damage normally to the armor in that section. The attacking player then automatically rolls once on the Ground Combat Vehicle Critical Hits Table below (see *Combat*, p. 194 in *Total Warfare* for more information). A result of 12 on the Ground Combat Vehicles Hit Location Table may inflict critical hit against the turret; if the vehicle has no turret, a 12 indicates the chance of a critical hit on the side corresponding to the attack direction.
†The vehicle may suffer motive system damage even if its armor remains intact. Apply damage normally to the armor in that section, but the attacking player also rolls once on the Motive System Damage Table at right (see *Combat*, p. 192 in *Total Warfare* for more information). Apply damage at the end of the phase in which the damage takes effect.
§If the attack hits the front right or left side, all Front side results strike the front armor, while Rear Side results strike the rear right or rear left side armor. If the vehicle has no turret, a turret hit strikes the armor on the side attacked.

MOTIVE SYSTEM DAMAGE TABLE

2D6 Roll	EFFECT*
2–5	No effect
6–7	Minor damage; +1 modifier to all Driving Skill Rolls
8–9	Moderate damage; –1 Cruising MP, +2 modifier to all Driving Skill Rolls
10–11	Heavy damage; only half Cruising MP (round fractions up), +3 modifier to all Driving Skill Rolls
12+	Major damage; no movement for the rest of the game. Vehicle is immobile.

Attack Direction Modifier:		Vehicle Type Modifiers:	
Hit from rear	+1	Tracked, Naval	+0
Hit from the sides	+2	Wheeled	+2
		Hovercraft, Hydrofoil	+3
		WiGE	+4

*All movement and Driving Skill Roll penalties are cumulative. However, each Driving Skill Roll modifier can only be applied once. For example, if a roll of 6-7 is made for a vehicle, inflicting a +1 modifier, that is the only time that particular +1 can be applied; a subsequent roll of 6-7 has no additional effect. This means the maximum Driving Skill Roll modifier that can be inflicted from the Motive System Damage Table is +6. If a unit's Cruising MP is reduced to 0, it cannot move for the rest of the game, but is not considered an immobile target. In addition, all motive system damage takes effect at the end of the phase in which the damage occurred. For example, if two units are attacking the same Combat Vehicle during the Weapon Attack Phase and the first unit inflicts motive system damage and rolls a 12, the –4 immobile target modifier would not apply for the second unit. However, the –4 modifier would take effect during the Physical Attack Phase. If a hover vehicle is rendered immobile while over a Depth 1 or deeper water hex, it sinks and is destroyed.

LARGE GROUND SUPPORT VEHICLE CRITICAL HITS TABLE

	LOCATION HIT			
2D6 Roll	FRONT	SIDE	REAR	TURRET
2–5	No Critical Hit	No Critical Hit	No Critical Hit	No Critical Hit
6	Driver Hit	Cargo/Infantry Hit	Weapon Malfunction	Stabilizer
7	Weapon Malfunction	Weapon Malfunction	Cargo/Infantry Hit	Turret Jam
8	Stabilizer	Crew Stunned	Stabilizer	Weapon Malfunction
9	Sensors	Stabilizer	Weapon Destroyed	Turret Locks
10	Commander Hit	Weapon Destroyed	Engine Hit	Weapon Destroyed
11	Weapon Destroyed	Engine Hit	Ammunition**	Ammunition**
12	Crew Killed	Fuel Tank*	Fuel Tank*	Turret Blown Off

*If Combat Vehicle has ICE engine only. If Combat Vehicle has a fusion engine, treat this result as Engine Hit.
**If Combat Vehicle carries no ammunition, treat this result as Weapon Destroyed.

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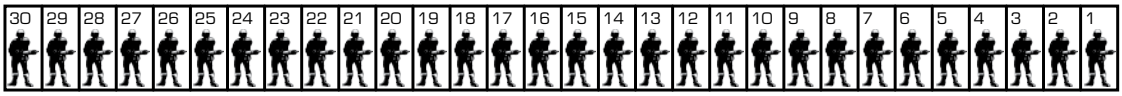
BATTLETECH™

GENERIC CONVENTIONAL INFANTRY RECORD SHEET

CONVENTIONAL INFANTRY: PLATOON/POINT 1

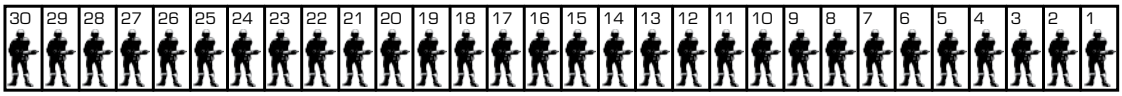
Gunnery Skill: ____
Anti-'Mech Skill: ____



Movement MP: ____ Type: _____

CONVENTIONAL INFANTRY: PLATOON/POINT 2

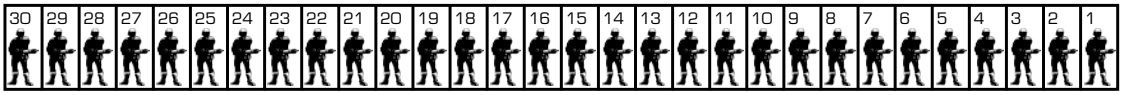
Gunnery Skill: ____
Anti-'Mech Skill: ____



Movement MP: ____ Type: _____

CONVENTIONAL INFANTRY: PLATOON/POINT 3

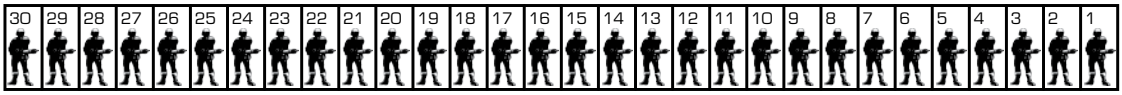
Gunnery Skill: ____
Anti-'Mech Skill: ____



Movement MP: ____ Type: _____

CONVENTIONAL INFANTRY: PLATOON/POINT 4

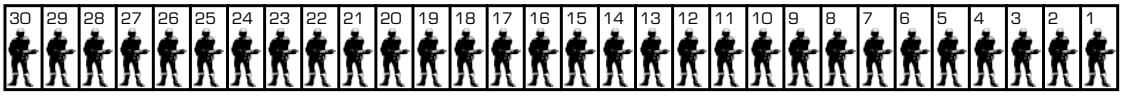
Gunnery Skill: ____
Anti-'Mech Skill: ____



Movement MP: ____ Type: _____

CONVENTIONAL INFANTRY: PLATOON/POINT 5

Gunnery Skill: ____
Anti-'Mech Skill: ____



Movement MP: ____ Type: _____

CONVENTIONAL INFANTRY DAMAGE TABLE

MAX WEAPON DAMAGE PER PLATOON/POINT TYPE*	NUMBER OF TROOPERS																												
	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Rifle, Ballistic	16	15	15	14	14	13	12	12	11	11	10	10	9	9	8	8	7	7	6	6	5	5	4	4	3	3	2	2	1	1
Rifle, Energy	8	8	8	8	7	7	7	6	6	6	6	5	5	5	4	4	4	4	3	3	3	3	2	2	2	1	1	1	1	0
Machine Gun	17	16	16	15	15	14	13	13	12	12	11	11	10	10	9	8	8	7	7	6	6	5	4	4	3	3	2	2	1	1
SRM	15	14	14	13	13	12	12	11	11	10	10	9	9	8	8	7	7	6	6	5	5	4	4	3	3	2	2	1	1	0
LRM	13	12	12	11	11	11	10	10	9	9	9	8	8	7	7	6	6	6	5	5	4	4	3	3	3	2	2	1	1	0
Flamer	14	14	14	13	12	12	12	11	11	10	10	9	9	8	8	7	7	6	6	5	5	4	4	3	3	2	2	1	1	0

*Damage is always applied in 2-point Damage Value groupings

CONVENTIONAL INFANTRY RANGE MODIFIER TABLE

WEAPON TYPE	RANGE IN HEXES (TO-HIT MODIFIER)									
	0	1	2	3	4	5	6	7	8	9
Rifle, Ballistic	–2	0	+2	+4	—	—	—	—	—	—
Rifle, Energy	–2	0	0	+2	+2	+4	+4	—	—	—
Machine Guns	–2	0	+2	+4	—	—	—	—	—	—
SRM	–1	0	0	+2	+2	+4	+4	—	—	—
LRM	–1	0	0	0	+2	+2	+2	+4	+4	+4
Flamer	–1	0	+2	+4	—	—	—	—	—	—

NON-INFANTRY WEAPON DAMAGE AGAINST INFANTRY TABLE

WEAPON TYPE*	NUMBER OF CONVENTIONAL TROOPERS HIT†
Direct Fire (Ballistic or Energy)	Damage Value / 10
Cluster (Ballistic)	Damage Value / 10 + 1
Pulse* *	Damage Value / 10 + 2
Cluster (Missile)	Damage Value / 5
Area-Effect (AE)	Damage Value / .5
Burst-Fire	See Burst-Fire Weapons Table
Heat-Effect Weapons	See Heat-Effect Weapons‡

*See *Combat*, p. 113 in *Total Warfare*, for weapon terminology.
**Except for Small and Micro Pulse Lasers, which are treated as Burst-Fire Weapons.
†This equals the number of conventional infantry troopers hit and eliminated, regardless of armor protection. Attacks by non-infantry weapons against mechanized infantry double the number of troopers eliminated; round all fractions up.
‡Each Heat-Effect Weapon has specific damage against conventional infantry, as noted on either the appropriate Weapon and Equipment Tables or in *Other Combat Weapons and Equipment* (see p. 129 in *Total Warfare*).

BURST-FIRE WEAPON DAMAGE VS. CONVENTIONAL INFANTRY TABLE

'MECHS, PROTOMECHS AND *VEHICLES*

WEAPON	DAMAGE vs. CONVENTIONAL INFANTRY
AP Gauss Rifle	2D6
Light Machine Gun	1D6
Machine Gun	2D6
Heavy Machine Gun	3D6
Small/Micro Pulse Laser	2D6
Flamer	4D6

BATTLE ARMOR

WEAPON	DAMAGE vs. CONVENTIONAL INFANTRY
Light Machine Gun	1D6/2 (round up)
Machine Gun	1D6
Heavy Machine Gun	2D6
Flamer	3D6
Light Recoilless Rifle	1D6
Medium Recoilless Rifle	2D6
Heavy Recoilless Rifle	2D6
Light Mortar	1D6
Heavy Mortar	1D6
Automatic Grenade Launcher	1D6/2 (round up)
Heavy Grenade Launcher	1D6

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BATTLETECH™

CONVENTIONAL INFANTRY RECORD SHEET

CONVENTIONAL INFANTRY: PLATOON/POINT 1

Gunnery Skill: ____
Anti-'Mech Skill: ____
Max Weapon Damage*

*Damage is always applied in 2-point Damage Value groupings

	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

RANGE IN HEXES (TO-HIT MODIFIER)

Range	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Range Modifier	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___

Movement MP: ____ **Type:** _____

CONVENTIONAL INFANTRY: PLATOON/POINT 2

Gunnery Skill: ____
Anti-'Mech Skill: ____
Max Weapon Damage*

*Damage is always applied in 2-point Damage Value groupings

	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

RANGE IN HEXES (TO-HIT MODIFIER)

Range	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Range Modifier	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___

Movement MP: ____ **Type:** _____

CONVENTIONAL INFANTRY: PLATOON/POINT 3

Gunnery Skill: ____
Anti-'Mech Skill: ____
Max Weapon Damage*

*Damage is always applied in 2-point Damage Value groupings

	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

RANGE IN HEXES (TO-HIT MODIFIER)

Range	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Range Modifier	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___

Movement MP: ____ **Type:** _____

CONVENTIONAL INFANTRY: PLATOON/POINT 4

Gunnery Skill: ____
Anti-'Mech Skill: ____
Max Weapon Damage*

*Damage is always applied in 2-point Damage Value groupings

	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

RANGE IN HEXES (TO-HIT MODIFIER)

Range	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Range Modifier	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___

Movement MP: ____ **Type:** _____

BURST-FIRE WEAPON DAMAGE VS. CONVENTIONAL INFANTRY TABLE

'MECHS, PROTOMECHS AND *VEHICLES*

WEAPON	DAMAGE vs. CONVENTIONAL INFANTRY
AP Gauss Rifle	2D6
Light Machine Gun	1D6
Machine Gun	2D6
Heavy Machine Gun	3D6
Small/Micro Pulse Laser	2D6
Flamer	4D6

BATTLE ARMOR

WEAPON	DAMAGE vs. CONVENTIONAL INFANTRY
Light Machine Gun	1D6/2 (round up)
Machine Gun	1D6
Heavy Machine Gun	2D6
Flamer	3D6
Light Recoilless Rifle	1D6
Medium Recoilless Rifle	2D6
Heavy Recoilless Rifle	2D6
Light Mortar	1D6
Heavy Mortar	1D6
Automatic Grenade Launcher	1D6/2 (round up)
Heavy Grenade Launcher	1D6

NON-INFANTRY WEAPON DAMAGE AGAINST INFANTRY TABLE

WEAPON TYPE*	NUMBER OF CONVENTIONAL TROOPERS HIT†
Direct Fire (Ballistic or Energy)	Damage Value / 10
Cluster (Ballistic)	Damage Value / 10 + 1
Pulse**	Damage Value / 10 + 2
Cluster (Missile)	Damage Value / 5
Area-Effect (AE)	Damage Value / .5
Burst-Fire	See Burst-Fire Weapons Table
Heat-Effect Weapons	See Heat-Effect Weapons‡

*See *Combat*, p. 113 in *Total Warfare*, for weapon terminology.
**Except for Small and Micro Pulse Lasers, which are treated as Burst-Fire Weapons.
†This equals the number of conventional infantry troopers hit and eliminated, regardless of armor protection. Attacks by non-infantry weapons against mechanized infantry double the number of troopers eliminated; round all fractions up.
‡Each Heat-Effect Weapon has specific damage against conventional infantry, as noted on either the appropriate Weapon and Equipment Tables or in *Other Combat Weapons and Equipment* (see p. 129 in *Total Warfare*).

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BATTLETECH™

BATTLE ARMOR RECORD SHEET

BATTLE ARMOR: SQUAD/POINT 1

Type: _____

Gunnery Skill: ____ Anti-'Mech Skill: ____

Ground MP: ____ Other MP (_____): ____

Weapons & Equip.	Dmg	Min	Sht	Med	Lng
_____	____	—	—	—	—
_____	____	—	—	—	—
_____	____	—	—	—	—
_____	____	—	—	—	—

Mechanized: ☐ Swarm: ☐ Leg: ☐ AP: ☐

1 ○○○○○○○○○○○○○○○○○○○○
2 ○○○○○○○○○○○○○○○○○○○○
3 ○○○○○○○○○○○○○○○○○○○○
4 ○○○○○○○○○○○○○○○○○○○○
5 ○○○○○○○○○○○○○○○○○○○○
6 ○○○○○○○○○○○○○○○○○○○○

Armor: _____ (___/___/___)

BATTLE ARMOR: SQUAD/POINT 2

Type: _____

Gunnery Skill: ____ Anti-'Mech Skill: ____

Ground MP: ____ Other MP (_____): ____

Weapons & Equip.	Dmg	Min	Sht	Med	Lng
_____	____	—	—	—	—
_____	____	—	—	—	—
_____	____	—	—	—	—
_____	____	—	—	—	—

Mechanized: ☐ Swarm: ☐ Leg: ☐ AP: ☐

1 ○○○○○○○○○○○○○○○○○○○○
2 ○○○○○○○○○○○○○○○○○○○○
3 ○○○○○○○○○○○○○○○○○○○○
4 ○○○○○○○○○○○○○○○○○○○○
5 ○○○○○○○○○○○○○○○○○○○○
6 ○○○○○○○○○○○○○○○○○○○○

Armor: _____ (___/___/___)

BATTLE ARMOR: SQUAD/POINT 3

Type: _____

Gunnery Skill: ____ Anti-'Mech Skill: ____

Ground MP: ____ Other MP (_____): ____

Weapons & Equip.	Dmg	Min	Sht	Med	Lng
_____	____	—	—	—	—
_____	____	—	—	—	—
_____	____	—	—	—	—
_____	____	—	—	—	—

Mechanized: ☐ Swarm: ☐ Leg: ☐ AP: ☐

1 ○○○○○○○○○○○○○○○○○○○○
2 ○○○○○○○○○○○○○○○○○○○○
3 ○○○○○○○○○○○○○○○○○○○○
4 ○○○○○○○○○○○○○○○○○○○○
5 ○○○○○○○○○○○○○○○○○○○○
6 ○○○○○○○○○○○○○○○○○○○○

Armor: _____ (___/___/___)

BATTLE ARMOR: SQUAD/POINT 4

Type: _____

Gunnery Skill: ____ Anti-'Mech Skill: ____

Ground MP: ____ Other MP (_____): ____

Weapons & Equip.	Dmg	Min	Sht	Med	Lng
_____	____	—	—	—	—
_____	____	—	—	—	—
_____	____	—	—	—	—
_____	____	—	—	—	—

Mechanized: ☐ Swarm: ☐ Leg: ☐ AP: ☐

1 ○○○○○○○○○○○○○○○○○○○○
2 ○○○○○○○○○○○○○○○○○○○○
3 ○○○○○○○○○○○○○○○○○○○○
4 ○○○○○○○○○○○○○○○○○○○○
5 ○○○○○○○○○○○○○○○○○○○○
6 ○○○○○○○○○○○○○○○○○○○○

Armor: _____ (___/___/___)

BATTLE ARMOR: SQUAD/POINT 5

Type: _____

Gunnery Skill: ____ Anti-'Mech Skill: ____

Ground MP: ____ Other MP (_____): ____

Weapons & Equip.	Dmg	Min	Sht	Med	Lng
_____	____	—	—	—	—
_____	____	—	—	—	—
_____	____	—	—	—	—
_____	____	—	—	—	—

Mechanized: ☐ Swarm: ☐ Leg: ☐ AP: ☐

1 ○○○○○○○○○○○○○○○○○○○○
2 ○○○○○○○○○○○○○○○○○○○○
3 ○○○○○○○○○○○○○○○○○○○○
4 ○○○○○○○○○○○○○○○○○○○○
5 ○○○○○○○○○○○○○○○○○○○○
6 ○○○○○○○○○○○○○○○○○○○○

Armor: _____ (___/___/___)

LEG ATTACKS TABLE

BATTLE ARMOR TROOPERS ACTIVE	BASE TO-HIT MODIFIER
4–6	0
3	+2
2	+5
1	+7

SWARM ATTACKS TABLE

BATTLE ARMOR TROOPERS ACTIVE	BASE TO-HIT MODIFIER
4–6	+2
1–3	+5

SWARM ATTACK MODIFIERS TABLE

ATTACKING ENEMY BATTLE ARMOR TROOPERS ACTIVE	FRIENDLY MECHANIZED BATTLE ARMOR TROOPERS ACTIVE					
	1	2	3	4	5	6
6	+0	+0	+0	+0	+1	+2
5	+0	+0	+0	+1	+2	+3
4	+0	+0	+1	+2	+3	+4
3	+0	+1	+2	+3	+4	+5
2	+1	+2	+3	+4	+5	+6
1	+2	+3	+4	+5	+6	+7

BATTLE ARMOR EQUIPMENT

Claws with magnets	–1

SITUATION*

'Mech prone	–2
'Mech or vehicle immobile	–4
Vehicle	–2

*Modifiers are cumulative

SWARM ATTACKS HIT LOCATION TABLE

2D6 ROLL	BIPEDAL LOCATION	FOUR-LEGGED LOCATION
2	Head	Head
3	Rear Center Torso	Front Right Torso
4	Rear Right Torso	Rear Center Torso
5	Front Right Torso	Rear Right Torso
6	Right Arm	Front Right Torso
7	Front Center Torso	Front Center Torso
8	Left Arm	Front Left Torso
9	Front Left Torso	Rear Left Torso
10	Rear Left Torso	Rear Center Torso
11	Rear Center Torso	Front Left Torso
12	Head	Head

TRANSPORT POSITIONS TABLE

TROOPER NUMBER	'MECH LOCATION	VEHICLE LOCATION
1	Right Torso	Right Side
2	Left Torso	Right Side
3	Right Torso (rear)	Left Side
4	Left Torso (rear)	Left Side
5	Center Torso (rear)	Rear
6	Center Torso	Rear

TROOPER NUMBER	LARGE SUPPORT VEHICLE LOCATION*
1	Right Side (Unit 1/Unit 2)
2	Right Side (Unit 1/Unit 2)
3	Left Side (Unit 1/Unit 2)
4	Left Side (Unit 1/Unit 2)
5	Rear (Unit 1/Unit 2)
6	Rear (Unit 1/Unit 2)

*Unit 1 and Unit 2 represent two battle armor units

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BATTLETECH™

CONVENTIONAL FIGHTER RECORD SHEET

FIGHTER DATA

Type: _____

Thrust: _____ Tonnage: _____

Safe Thrust: _____ Tech Base:

Maximum Thrust: _____ Clan ☐

VSTOL ☐ STOL ☐ Inner Sphere ☐

Weapons & Equipment Inventory

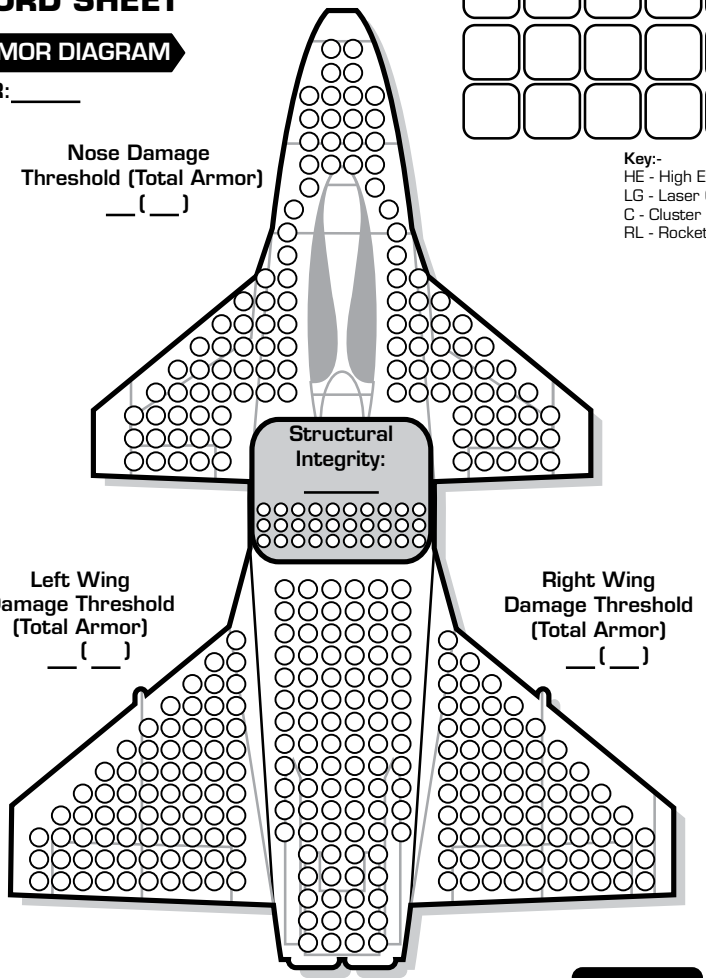
Standard Scale

Qty	Type	Loc.	Ht	SRV (0–6)	MRV (6–12)	LRV (13–20)	ERV (21–25)

Cost: _____ BV: _____

ARMOR DIAGRAM

BAR: _____



EXTERNAL STORES/BOMBS

Key:-
HE - High Explosive
LG - Laser Guided
C - Cluster
RL - Rocket Launcher

NOTES

CRITICAL DAMAGE

Avionics	+1	+2	+5	Engine	2	4	D
FCS	+2	+4	D	Gear	+5		
Sensors	+1	+2	+5	Life Support	+2		

PILOT DATA

Name: _____

Gunnery Skill: ___ Piloting Skill: ___

Hits Taken	1	2	3	4	5	6
Consciousness #	3	5	7	10	11	Dead
Modifier	+1	+2	+3	+4	+5	

GROUND MAP STRAIGHT MOVEMENT

MINIMUM STRAIGHT MOVEMENT (IN HEXES)

VELOCITY	FIGHTER	SMALL CRAFT AND FIXED WING SUPPORT VEHICLES
1	8	8
2	12	14
3	16	20
4	20	26
5	24	32
6	28	38
7	32	44
8	36	50
9	40	56
10	44	62
11	48	68
12	52	74

Velocity above 12 is not possible on ground maps.

VELOCITY RECORD

Turn #	1	2	3	4	5	6	7	8	9	10
Thrust										
Velocity										
Effective Velocity										
Altitude										

Turn #	11	12	13	14	15	16	17	18	19	20
Thrust										
Velocity										
Effective Velocity										
Altitude										

FIGHTER RETURN TABLE

SAFE THRUST	TURNS BEFORE RETURN
1–4	3
5–8	2
9–12	1
13+	0

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BATTLETECH™

AEROSPACE FIGHTER RECORD SHEET

FIGHTER DATA

Type: _____

Thrust:
Safe Thrust: ____
Maximum Thrust: ____

Tonnage: _____

Tech Base:
Clan ☐
Inner Sphere ☐

Weapons & Equipment Inventory

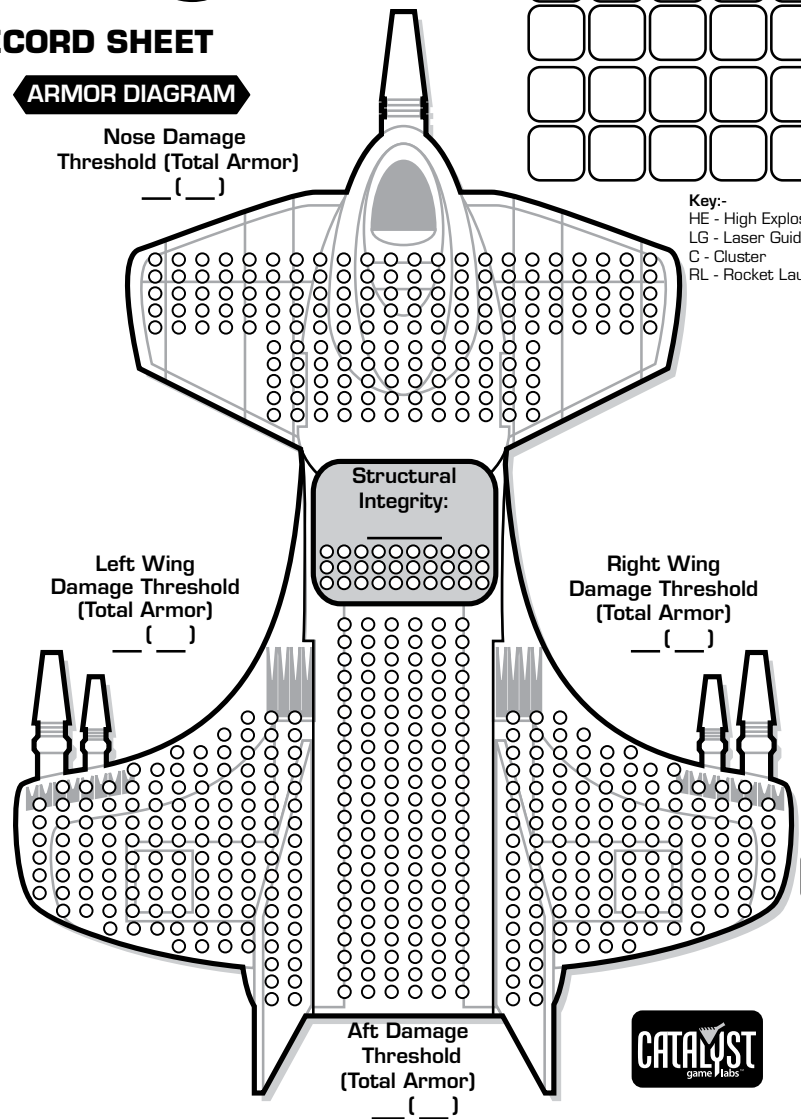
Standard Scale

Qty	Type	Loc.	Ht	SRV (0–6)	MRV (6–12)	LRV (13–20)	ERV (21–25)

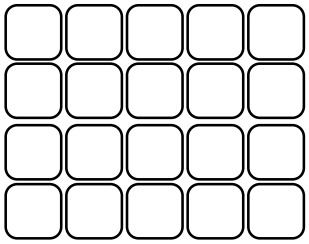
Cost: _____ BV: _____

NOTES

ARMOR DIAGRAM



EXTERNAL STORES/BOMBS



Key:-
HE - High Explosive
LG - Laser Guided
C - Cluster
RL - Rocket Launcher

CRITICAL DAMAGE

Avionics	+1	+2	+5	Engine	2	4	D
FCS	+2	+4	D	Gear	+5		
Sensors	+1	+2	+5	Life Support	+2		

PILOT DATA

Name: _____

Gunnery Skill: ___ Piloting Skill: ___

Hits Taken	1	2	3	4	5	6
Consciousness #	3	5	7	10	11	Dead
Modifier	+1	+2	+3	+4	+5	

HEAT DATA

Heat Level*	Effects
30	Shutdown
28	Ammo Exp. avoid on 8+
27	Pilot Damage, avoid on 9+
26	Shutdown, avoid on 10+
25	Random Movement, avoid on 10+
24	+4 Modifier to Fire
23	Ammo Exp. avoid on 6+
22	Shutdown, avoid on 8+
21	Pilot Damage, avoid on 6+
20	Random Movement, avoid on 8+
19	Ammo, Exp. avoid on 4+
18	Shutdown, avoid on 6+
17	+3 Modifier to Fire
15	Random Movement, avoid on 7+
14	Shutdown, avoid on 4+
13	+2 Modifier to Fire
10	Random Movement, avoid on 6+
8	+1 Modifier to Fire
5	Random Movement, avoid on 5+

Heat Sinks: ____ (___)

Single ☐
Double ☐

Heat Scale

Overflow

30* 29 28* 27* 26* 25* 24* 23* 22* 21* 20* 19* 18* 17* 16 15* 14* 13* 12 11 10* 9 8* 7 6 5* 4 3 2 1 0

VELOCITY RECORD

Turn #	1	2	3	4	5	6	7	8	9	10
Thrust										
Velocity										
Effective Velocity										
Altitude										

Turn #	11	12	13	14	15	16	17	18	19	20
Thrust										
Velocity										
Effective Velocity										
Altitude										

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BATTLETECH™

AERODYNE SMALL CRAFT RECORD SHEET

CRAFT DATA

Type: _____

Thrust:
Safe Thrust: _____
Maximum Thrust: _____

Tonnage: _____

Tech Base:
Clan ☐
Inner Sphere ☐

Weapons & Equipment Inventory

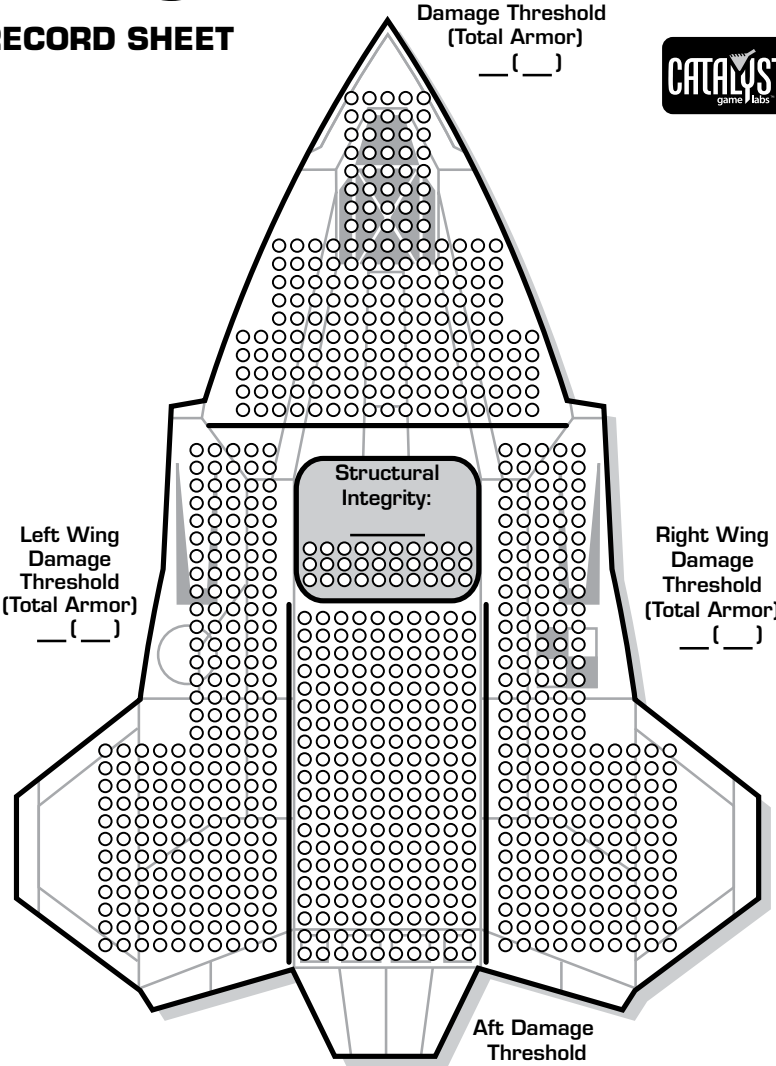
Standard Scale

Qty	Type	Loc.	Ht	SRV (0–6)	MRV (6–12)	LRV (13–20)	ERV (21–25)

Cost: _____ **BV:** _____

ARMOR DIAGRAM

Standard Scale



CATALYST game labs

NOTES

CRITICAL DAMAGE

Avionics	+1	+2	+5	Engine	2	4	D
FCS	+2	+4	D	Gear	+5		
Sensors	+1	+2	+5	Life Support	+2		

PILOT DATA

Name: _____

Gunnery Skill: ___ **Piloting Skill:** ___

Hits Taken	1	2	3	4	5	6
Consciousness #	3	5	7	10	11	Dead
Modifier	+1	+2	+3	+4	+5	

HEAT DATA

Heat Level*	Effects
30	Shutdown
28	Ammo Exp. avoid on 8+
27	Pilot Damage, avoid on 9+
26	Shutdown, avoid on 10+
25	Random Movement, avoid on 10+
24	+4 Modifier to Fire
23	Ammo Exp. avoid on 6+
22	Shutdown, avoid on 8+
21	Pilot Damage, avoid on 6+
20	Random Movement, avoid on 8+
19	Ammo, Exp. avoid on 4+
18	Shutdown, avoid on 6+
17	+3 Modifier to Fire
15	Random Movement, avoid on 7+
14	Shutdown, avoid on 4+
13	+2 Modifier to Fire
10	Random Movement, avoid on 6+
8	+1 Modifier to Fire
5	Random Movement, avoid on 5+

Heat Sinks: ____ (___)

Single ☐
Double ☐

Heat Scale

Overflow

30* 29 28* 27* 26* 25* 24* 23* 22* 21* 20* 19* 18* 17* 16 15* 14* 13* 12 11 10* 9 8* 7 6 5* 4 3 2 1 0

VELOCITY RECORD

Turn #	1	2	3	4	5	6	7	8	9	10
Thrust										
Velocity										
Effective Velocity										
Altitude										

Turn #	11	12	13	14	15	16	17	18	19	20
Thrust										
Velocity										
Effective Velocity										
Altitude										

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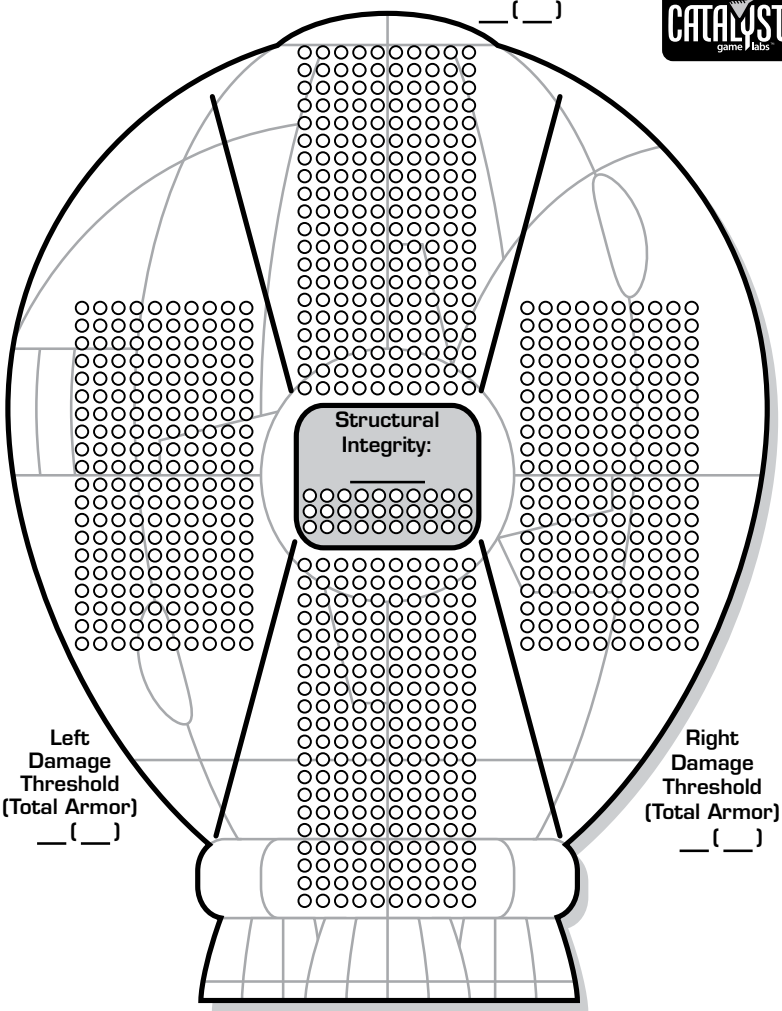
BATTLETECH™

SPHEROID SMALL CRAFT RECORD SHEET

ARMOR DIAGRAM

Standard Scale

Nose
Damage Threshold
(Total Armor)
___(___)



Left
Damage
Threshold
(Total Armor)
___(___)

Right
Damage
Threshold
(Total Armor)
___(___)

Aft Damage Threshold
(Total Armor)
___(___)

CRAFT DATA

Type: _____

Thrust:
Safe Thrust: _____
Maximum Thrust: _____

Tonnage: _____
Tech Base:
Clan ☐
Inner Sphere ☐

Weapons & Equipment Inventory

Standard Scale

Qty	Type	Loc.	Ht	SRV (0–6)	MRV (6–12)	LRV (13–20)	ERV (21–25)

Cost: _____ BV: _____

NOTES

CRITICAL DAMAGE

Avionics	+1	+2	+5	Engine	2	4	D
FCS	+2	+4	D	Gear	+5		
Sensors	+1	+2	+5	Life Support	+2		

PILOT DATA

Name: _____

Gunnery Skill: ___ Piloting Skill: ___

Hits Taken	1	2	3	4	5	6
Consciousness #	3	5	7	10	11	Dead
Modifier	+1	+2	+3	+4	+5	

HEAT DATA

Heat Level*	Effects
30	Shutdown
28	Ammo Exp. avoid on 8+
27	Pilot Damage, avoid on 9+
26	Shutdown, avoid on 10+
25	Random Movement, avoid on 10+
24	+4 Modifier to Fire
23	Ammo Exp. avoid on 6+
22	Shutdown, avoid on 8+
21	Pilot Damage, avoid on 6+
20	Random Movement, avoid on 8+
19	Ammo, Exp. avoid on 4+
18	Shutdown, avoid on 6+
17	+3 Modifier to Fire
15	Random Movement, avoid on 7+
14	Shutdown, avoid on 4+
13	+2 Modifier to Fire
10	Random Movement, avoid on 6+
8	+1 Modifier to Fire
5	Random Movement, avoid on 5+

Heat Sinks:
___ (___)

Single ☐
Double ☐

Heat Scale

Overflow
30*
29
28*
27*
26*
25*
24*
23*
22*
21*
20*
19*
18*
17*
16
15*
14*
13*
12
11
10*
9
8*
7
6
5*
4
3
2
1
0

VELOCITY RECORD

Turn #	1	2	3	4	5	6	7	8	9	10
Thrust										
Velocity										
Effective Velocity										
Altitude										

Turn #	11	12	13	14	15	16	17	18	19	20
Thrust										
Velocity										
Effective Velocity										
Altitude										

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BATTLETECH™

Nose Damage Threshold (Total Armor) ___(___)

AERODYNE DROPSHIP RECORD SHEET

DROPSHIP DATA

Type: _____

Name: _____ Tonnage: _____

Thrust: Tech Base:

Safe Thrust: _____ Clan ☐

Maximum Thrust: _____ Inner Sphere ☐

Fighters/Small Craft: ___/___ Launch Rate: _____

Weapons & Equipment Inventory

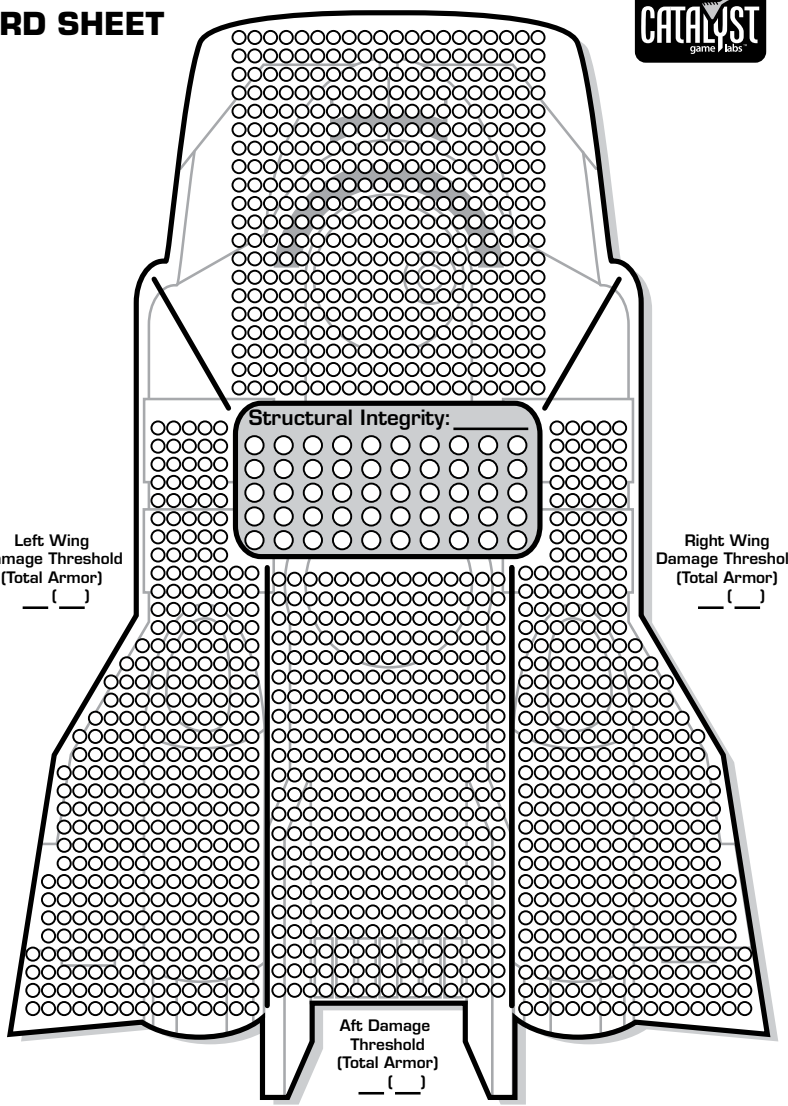
Capital Scale		(1–12)	(13–24)	(25–40)	(41–50)
Standard Scale		(1–6)	(6–12)	(13–20)	(21–25)
Bay	Loc	SRV	MRV	LRV	ERV

Ammo: _____

Cost: _____ BV: _____

ARMOR DIAGRAM

Standard Scale



NOTES

CREW DATA

Gunnery Skill: ___ Piloting Skill: ___

Hits Taken	1	2	3	4	5	6
Modifier	+1	+2	+3	+4	+5	Incp.

Crew: _____ Marines: _____

Passengers: _____ Elementals: _____

Other: _____ Battle Armor: _____

Life Boats/Escape Pods: ___/___

CRITICAL DAMAGE

Avionics	+1	+2	+5	Gear	+5	
FCS	+2	+4	D	Life Support	+2	
Sensors	+1	+2	+5	K-F Boom	D	
Thrusters				Docking Collar	D	
Left	+1	+2	+3	D		
Right	+1	+2	+3	D		
Engine	–1	–2	–3	–4	–5	D

VELOCITY RECORD

Turn #	1	2	3	4	5	6	7	8	9	10
Thrust										
Velocity										
Effective Velocity										
Altitude										

Turn #	11	12	13	14	15	16	17	18	19	20
Thrust										
Velocity										
Effective Velocity										
Altitude										

HEAT DATA

Heat Sinks: ____(____)

Single ☐

Double ☐

Heat Generation Per Arc

Nose: _____ Aft: _____

Left Wing: Right Wing:

Fwd: _____ Fwd: _____

Aft: _____ Aft: _____

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BATTLETECH™

SPHEROID DROPSHIP RECORD SHEET

DROPSHIP DATA

Type: _____

Name: _____ Tonnage: _____

Thrust: Tech Base:

Safe Thrust: ____ Clan ☐

Maximum Thrust: ____ Inner Sphere ☐

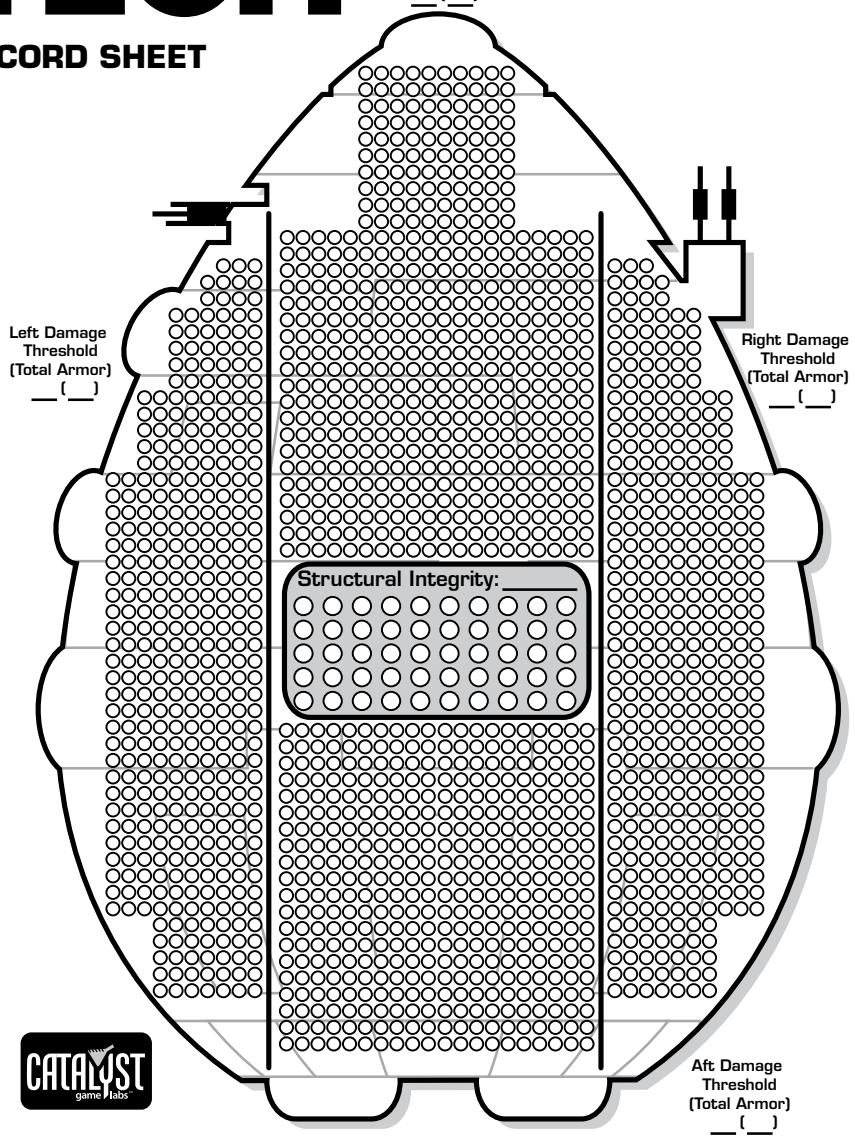
Fighters/Small Craft: ___/___ Launch Rate: ____

Weapons & Equipment Inventory

Capital Scale / Standard Scale / Bay	Loc	SRV (1–12) (1–6)	MRV (13–24) (6–12)	LRV (25–40) (13–20)	ERV (41–50) (21–25)

Ammo: _____

Cost: _____ BV: _____



ARMOR DIAGRAM

Standard Scale

NOTES

CREW DATA

Gunnery Skill: ___ Piloting Skill: ___

Hits Taken	1	2	3	4	5	6
Modifier	+1	+2	+3	+4	+5	Incp.

Crew: ____ Marines: ____

Passengers: ____ Elementals: ____

Other: ____ Battle Armor: ____

Life Boats/Escape Pods: ___/___

CRITICAL DAMAGE

Avionics	+1	+2	+5	Gear	+5	
FCS	+2	+4	D	Life Support	+2	
Sensors	+1	+2	+5	K-F Boom	D	
Thrusters				Docking Collar	D	
Left	+1	+2	+3	D		
Right	+1	+2	+3	D		
Engine	–1	–2	–3	–4	–5	D

VELOCITY RECORD

Turn #	1	2	3	4	5	6	7	8	9	10
Thrust										
Velocity										
Effective Velocity										
Altitude										

Turn #	11	12	13	14	15	16	17	18	19	20
Thrust										
Velocity										
Effective Velocity										
Altitude										

HEAT DATA

Heat Sinks: ____(____)

Single ☐

Double ☐

Heat Generation Per Arc

Nose: ____ Aft: ____

Fore-Left: ____ Aft-Left: ____

Fore-Right: ____ Aft-Right: ____

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HEAVY WEAPONS AND EQUIPMENT KEY

Space Column	Unit Type
M	BattleMechs and IndustrialMechs (Critical Slots)
P	ProtoMechs (Weapon Slots)
CV	Combat Vehicles (Weapon Slots)
SV	Support Vehicles (Equipment Slots)
F	Aerospace Fighters and Conventional Fighters (Weapon Slots)
SC	Aerodyne and Spheroid Small Craft (Weapon Slots)
DS	Aerodyne and Spheroid DropShips (Weapon Slots)

Space Entry Code	Construction Notes
NA	Item may not be mounted on these units
0	Item may be mounted on these units, but does not occupy space/slots
1+	Item occupies indicated number of continuous critical/item slots on the unit

Additional Codes	Construction Notes
OS (Ammo)	Item is one-shot only, and may not carry additional ammunition.
PHYS (Range)	Item may only be employed against targets in the item's "firing arc" that are within the same or adjacent hexes

INNER SPHERE HEAVY WEAPONS AND EQUIPMENT TABLE

Weapon / Item	Heat Std (Aero)	Damage Std (Aero)	Range Min/Sht/Med/Lng (Aero)	Ammo (per Ton)	WT (Tons)	Space M	Space P	Space CV	Space SV	Space F	Space SC	Space DS	Tech Rating	Page Ref
Autocannons														
Autocannon/2	1 (1)	2 (2)	4/8/16/24 (Long)	45	6	1	NA	1	1	1	1	1	C	208
Autocannon/5	1 (1)	5 (5)	3/6/12/18 (Medium)	20	8	4	NA	1	4	1	1	1	C	208
Autocannon/10	3 (3)	10 (10)	0/5/10/15 (Medium)	10	12	7	NA	1	7	1	1	1	C	208
Autocannon/20	7 (7)	20 (20)	0/3/6/9 (Short)	5	14	10	NA	1	10	1	1	1	C	208
LB 2-X AC	1 (1)	2 (2)	4/9/18/27 (Extreme)	45	6	4	NA	1	4	1	1	1	E	207
LB 5-X AC	1 (1)	5 (3)	3/7/14/21 (Long)	20	8	5	NA	1	5	1	1	1	E	207
LB 10-X AC	2 (2)	10 (6)	0/6/12/18 (Medium)	10	11	6	NA	1	6	1	1	1	E	207
LB 20-X AC	6 (6)	20 (12)	0/4/8/12 (Medium)	5	14	11	NA	1	11	1	1	1	E	207
Light AC/2	1 (1)	2 (2)	0/6/12/18 (Medium)	45	4	1	NA	1	1	1	1	1	D	207
Light AC/5	1 (1)	5 (5)	0/5/10/15 (Medium)	20	5	2	NA	1	2	1	1	1	D	207
Rotary AC/2	1/Shot (6)	2/Shot (8)	0/6/12/18 (Medium)	45	8	3	NA	1	3	1	1	1	E	207
Rotary AC/5	1/Shot (6)	5/Shot (20)	0/5/10/15 (Medium)	20	10	6	NA	1	6	1	1	1	E	207
Ultra AC/2	1/Shot (2)	2/Shot (3)	3/8/17/25 (Extreme)	45	7	3	NA	1	3	1	1	1	E	208
Ultra AC/5	1/Shot (2)	5/Shot (7)	2/6/13/20 (Long)	20	9	5	NA	1	5	1	1	1	E	208
Ultra AC/10	4/Shot (8)	10/Shot (15)	0/6/12/18 (Medium)	10	13	7	NA	1	7	1	1	1	E	208
Ultra AC/20	8/Shot (16)	20/Shot (30)	0/3/7/10 (Medium)	5	15	10	NA	1	10	1	1	1	E	208
Gauss Rifles														
Light Gauss Rifle	1 (1)	8 (8)	3/8/17/25 (Extreme)	16	12	5	NA	1	5	1	1	1	E	219
Gauss Rifle	1 (1)	15 (15)	2/7/15/22 (Long)	8	15	7	NA	1	7	1	1	1	E	219
Heavy Gauss Rifle	2 (2)	25/20/10 (25/20/10)	4/6/13/20 (Long)	4	18	11	NA	1	11	1	1	1	E	218
Machine Guns														
Light Machine Gun	0 (0)	1 (1)	0/2/4/6 (Short)	200	0.5	1	NA	1	1	1	1	1	B	228
Machine Gun	0 (0)	2 (2)	0/1/2/3 (Short)	200	0.5	1	NA	1	1	1	1	1	B	228
Heavy Machine Gun	0 (0)	3 (3)	0/1/2/— (Short)	100	1.0	1	NA	1	1	1	1	1	B	228
Flamers														
Flamer	3 (3)	2 (2)	0/1/2/3 (Short)	NA	1	1	NA	1	1	1	1	1	C	218
Flamer (Vehicle)	3 (3)	2 (2)	0/1/2/3 (Short)	20	0.5	1	NA	1	1	1	1	1	B	218
Lasers														
ER Small Laser	2 (2)	3 (3)	0/2/4/5 (Short)	NA	0.5	1	NA	1	1	1	1	1	E	226
ER Medium Laser	5 (5)	5 (5)	0/4/8/12 (Medium)	NA	1	1	NA	1	1	1	1	1	E	226
ER Large Laser	12 (12)	8 (8)	0/7/14/19 (Long)	NA	5	2	NA	1	2	1	1	1	E	226
Small Laser	1 (1)	3 (3)	0/1/2/3 (Short)	NA	0.5	1	NA	1	1	1	1	1	C	227
Medium Laser	3 (3)	5 (5)	0/3/6/9 (Short)	NA	1	1	NA	1	1	1	1	1	C	227
Large Laser	8 (8)	8 (8)	0/5/10/15 (Medium)	NA	5	2	NA	1	2	1	1	1	C	227
Small Pulse Laser	2 (2)	3 (3)	0/1/2/3 (Short)	NA	1	1	NA	1	1	1	1	1	E	226
Medium Pulse Laser	4 (4)	6 (6)	0/2/4/6 (Short)	NA	2	1	NA	1	1	1	1	1	E	226
Large Pulse Laser	10 (10)	9 (9)	0/3/7/10 (Medium)	NA	7	2	NA	1	2	1	1	1	E	226
Plasma Weapons														
Plasma Rifle	10 (10)	10 (10)	0/5/10/15 (Medium)	10	6	2	NA	1	2	1	1	1	E	234
PPCs														
Light PPC	5 (5)	5 (5)	3/6/12/18 (Medium)	NA	3	2	NA	1	2	1	1	1	E	234
PPC	10 (10)	10 (10)	3/6/12/18 (Medium)	NA	7	3	NA	1	3	1	1	1	D	234
Heavy PPC	15 (15)	15 (15)	3/6/12/18 (Medium)	NA	10	4	NA	1	4	1	1	1	E	234
ER PPC	15 (15)	10 (10)	0/7/14/23 (Long)	NA	7	3	NA	1	3	1	1	1	E	233
Snub-Nose PPC	10 (10)	10/8/5 (10/8)	0/9/13/15 (Medium)	NA	6	2	NA	1	2	1	1	1	E	234
Missiles														
LRM 5	2 (2)	1/Msl (3)	6/7/14/21 (Long)	24	2	1	NA	1	1	1	1	1	C	229
LRM 10	4 (4)	1/Msl (6)	6/7/14/21 (Long)	12	5	2	NA	1	2	1	1	1	C	229
LRM 15	5 (5)	1/Msl (9)	6/7/14/21 (Long)	8	7	3	NA	1	3	1	1	1	C	229
LRM 20	6 (6)	1/Msl (12)	6/7/14/21 (Long)	6	10	5	NA	1	5	1	1	1	C	229
LRM 5 + Artemis IV	2 (2)	1/Msl (4)	6/7/14/21 (Long)	24	3	2	NA	1	2	1	1	1	E	206/229
LRM 10 + Artemis IV	4 (4)	1/Msl (8)	6/7/14/21 (Long)	12	6	3	NA	1	3	1	1	1	E	206/229

INNER SPHERE HEAVY WEAPONS AND EQUIPMENT TABLE (CONT)

Weapon / Item	Heat Std (Aero)	Damage Std (Aero)	Range Min/Sht/Med/Lng (Aero)	Ammo (per Ton)	WT (Tons)	Space M	Space P	Space CV	Space SV	Space F	Space SC	Space DS	Tech Rating	Page Ref
LRM 15 + Artemis IV	5 (5)	1/Msl (12)	6/7/14/21 (Long)	8	8	4	NA	1	4	1	1	1	E	206/229
LRM 20 + Artemis IV	6 (6)	1/Msl (16)	6/7/14/21 (Long)	6	11	6	NA	1	6	1	1	1	E	206/229
MML 3 (LRM)	2 (2)	1/Msl (2)	6/7/14/21 (Long)	40	1.5	2	NA	1	2	1	1	1	E	229
MML 3 (SRM)	2 (2)	2/Msl (4)	0/3/6/9 (Short)	33	1.5	2	NA	1	2	1	1	1	E	229
MML 5 (LRM)	3 (3)	1/Msl (3)	6/7/14/21 (Long)	24	3	3	NA	1	3	1	1	1	E	229
MML 5 (SRM)	3 (3)	2/Msl (6)	0/3/6/9 (Short)	20	3	3	NA	1	3	1	1	1	E	229
MML 7 (LRM)	4 (4)	1/Msl (4)	6/7/14/21 (Long)	17	4.5	4	NA	1	4	1	1	1	E	229
MML 7 (SRM)	4 (4)	2/Msl (8)	0/3/6/9 (Short)	14	4.5	4	NA	1	4	1	1	1	E	229
MML 9 (LRM)	5 (5)	1/Msl (5)	6/7/14/21 (Long)	13	6	5	NA	1	5	1	1	1	E	229
MML 9 (SRM)	5 (5)	2/Msl (10)	0/3/6/9 (Short)	11	6	5	NA	1	5	1	1	1	E	229
MML 3 (LRM)+Art. IV	2 (2)	1/Msl (2)	6/7/14/21 (Long)	40	2.5	3	NA	1	3	1	1	1	E	206/229
MML 3 (SRM)+Art. IV	2 (2)	2/Msl (4)	0/3/6/9 (Short)	33	2.5	3	NA	1	3	1	1	1	E	206/229
MML 5 (LRM)+Art. IV	3 (3)	1/Msl (4)	6/7/14/21 (Long)	24	4	4	NA	1	4	1	1	1	E	206/229
MML 5 (SRM)+Art. IV	3 (3)	2/Msl (8)	0/3/6/9 (Short)	20	4	4	NA	1	4	1	1	1	E	206/229
MML 7 (LRM)+Art. IV	4 (4)	1/Msl (6)	6/7/14/21 (Long)	17	5.5	5	NA	1	5	1	1	1	E	206/229
MML 7 (SRM)+Art. IV	4 (4)	2/Msl (12)	0/3/6/9 (Short)	14	5.5	5	NA	1	5	1	1	1	E	206/229
MML 9 (LRM)+Art. IV	5 (5)	1/Msl (7)	6/7/14/21 (Long)	13	7	6	NA	1	6	1	1	1	E	206/229
MML 9 (SRM)+Art. IV	5 (5)	2/Msl (14)	0/3/6/9 (Short)	11	7	6	NA	1	6	1	1	1	E	206/229
SRM 2	2 (2)	2/Msl (2)	0/3/6/9 (Short)	50	1	1	NA	1	1	1	1	1	C	229
SRM 4	3 (3)	2/Msl (4)	0/3/6/9 (Short)	25	2	1	NA	1	1	1	1	1	C	229
SRM 6	4 (4)	2/Msl (8)	0/3/6/9 (Short)	15	3	2	NA	1	2	1	1	1	C	229
SRM 2 + Artemis IV	2 (2)	2/Msl (4)	0/3/6/9 (Short)	50	2	2	NA	1	2	1	1	1	E	206/229
SRM 4 + Artemis IV	3 (3)	2/Msl (6)	0/3/6/9 (Short)	25	3	2	NA	1	2	1	1	1	E	206/229
SRM 6 + Artemis IV	4 (4)	2/Msl (10)	0/3/6/9 (Short)	15	4	3	NA	1	3	1	1	1	E	206/229
MRM 10	4 (4)	1/Msl (6)	0/3/8/15 (Medium)	24	3	2	NA	1	2	1	1	1	C	229
MRM 20	6 (6)	1/Msl (12)	0/3/8/15 (Medium)	12	7	3	NA	1	3	1	1	1	C	229
MRM 30	10 (10)	1/Msl (18)	0/3/8/15 (Medium)	8	10	5	NA	1	5	1	1	1	C	229
MRM 40	12 (12)	1/Msl (24)	0/3/8/15 (Medium)	6	12	7	NA	1	7	1	1	1	C	229
Rocket Launcher 10	3 (3)	1/Msl (6)	0/5/11/18 (Medium)	OS	0.5	1	NA	1	1	1	1	1	B	229
Rocket Launcher 15	4 (4)	1/Msl (9)	0/4/9/15 (Medium)	OS	1	2	NA	1	2	1	1	1	B	229
Rocket Launcher 20	5 (5)	1/Msl (12)	0/3/7/12 (Medium)	OS	1.5	3	NA	1	3	1	1	1	B	229
Streak SRM 2	2 (2)	2/Msl (4)	0/3/6/9 (Short)	50	1.5	1	NA	1	1	1	1	1	E	230
Streak SRM 4	3 (3)	2/Msl (8)	0/3/6/9 (Short)	25	3	1	NA	1	1	1	1	1	E	230
Streak SRM 6	4 (4)	2/Msl (12)	0/3/6/9 (Short)	15	4.5	2	NA	1	2	1	1	1	E	230
Special Equipment														
A-Pods	0 (NA)	**	** (NA)	OS	0.5	1	NA	1	1	NA	NA	NA	B	204
B-Pods	0 (NA)	**	** (NA)	OS	1	1	NA	1	1	NA	NA	NA	E	204
Anti-Missile System	1 (1)	**	** (Point Defense)	12	0.5	1	NA	1	1	1	1	1	E	204
Beagle Active Probe	0 (0)	NA	0/0/0/4 (**)	NA	1.5	2	NA	1	2	1	1	NA	E	204
CASE	0 (0)	NA (NA)	NA (NA)	NA	0.5	1	NA	1	1	0	NA	NA	D	210
C^3 Computer (Master)	0 (NA)	NA (NA)	NA (NA)	NA	5	5*	NA	1	1*	NA	NA	NA	E	209
C^3 Computer (Slave)	0 (NA)	NA (NA)	NA (NA)	NA	1	1*	NA	1	1*	NA	NA	NA	E	209
Improved C^3 Computer	0 (NA)	NA (NA)	NA (NA)	NA	2.5	2*	NA	1	1*	NA	NA	NA	E	209
Guardian ECM Suite	0 (0)	NA	0/0/0/6 (**)	NA	1.5	2	NA	1	2	1	1	NA	E	213
Machine Gun Array	NA	**	** (**)	**	+0.5	1	NA	1	1	1	1	0	E	228
MASC	NA	NA (NA)	NA (NA)	NA	Var*	Var*	NA	NA	NA	NA	NA	NA	E	232
One-Shot†	NA	NA	NA	OS	+0.5	NA	NA	NA	NA	NA	NA	NA	**	229
Narc Missile Beacon	0 (**)	**	0/3/6/9 (**)	6	3	2	NA	1	2	1	1	1	E	232
Imp. Narc Launcher	0 (**)	**	0/4/9/15 (**)	4	5	3	NA	1	3	1	1	1	E	232
TAG	0 (0)	**	0/5/9/15 (**)	NA	1	1	NA	1	1	1	1	1	E	238
Targeting Computer	0 (0)	**	NA (NA)	NA	Var*	Var*	NA	1	1	0	NA	NA	E	238
Physical Attack Weapons														
Hatchet	0 (NA)	** (NA)	PHYS (NA)	NA	Var*	Var*	NA	NA	NA	NA	NA	NA	B	220
Sword	0 (NA)	** (NA)	PHYS (NA)	NA	Var*	Var*	NA	NA	NA	NA	NA	NA	B	237
Capital Missiles														
Killer Whale	NA (20)	NA (40)	NA (Extreme)	50 t/Msl	150	NA	NA	NA	NA	NA	NA	1	D	210
White Shark	NA (15)	NA (30)	NA (Extreme)	40 t/Msl	120	NA	NA	NA	NA	NA	NA	1	D	210
Barracuda	NA (10)	NA (20)	NA (Extreme)	30 t/Msl	90	NA	NA	NA	NA	NA	NA	1	D	210
AR-10 Launcher	NA (††)	NA (††)	NA (††)	††	250	NA	NA	NA	NA	NA	NA	1	D	210
Kraken-T	NA (50)	NA (100)	NA (Extreme)	100 t/Msl	220	NA	NA	NA	NA	NA	NA	1	D	210
Killer Whale-T	NA (20)	NA (40)	NA (Extreme)	50 t/Msl	160	NA	NA	NA	NA	NA	NA	1	D	210
White Shark-T	NA (15)	NA (30)	NA (Extreme)	40 t/Msl	140	NA	NA	NA	NA	NA	NA	1	D	210
Barracuda-T	NA (10)	NA (20)	NA (Extreme)	30 t/Msl	100	NA	NA	NA	NA	NA	NA	1	D	210
Screen Launcher	NA (10)	NA (**)	NA (Short)	10 t/Msl	40	NA	NA	NA	NA	NA	1	1	E	237

WEIGHT/SPACE: All weights are listed in tonnage (1 ton = 1,000 kg). Items with variable (Var) weight/space values must consult the item's listing in on the appropriate page (Ref) to determine the final weight and internal space for the specific item.

*Special Construction Rules (see Item Description)

**Special Weapon Rules (Consult Total Warfare)

†May apply to LRM, MRM, SRM, Streak SRM, Narc and iNarc. Adds 0.5 ton to weapon weight and is considered part of the weapon.

††Weapon heat, damage, range, and ammo weight is based on missile type fired (May fire only standard Killer Whale, White Shark, or Barracuda missiles).

CLAN HEAVY WEAPONS AND EQUIPMENT TABLE

Weapon / Item	Heat Std (Aero)	Damage Std (Aero)	Range Min/Sht/Med/Lng (Aero)	Ammo (per Ton)	WT (Tons)	Space M	Space P	Space CV	Space SV	Space F	Space SC	Space DS	Tech Rating	Ref
Autocannons														
LB 2-X AC	1 (1)	2 (2)	4/10/20/30 (Extreme)	45	5	3	1	1	3	1	1	1	F	207
LB 5-X AC	1 (1)	5 (3)	3/8/15/24 (Long)	20	7	4	1	1	4	1	1	1	F	207
LB 10-X AC	2 (2)	10 (6)	0/6/12/18 (Medium)	10	10	5	1	1	5	1	1	1	F	207
LB 20-X AC	6 (6)	20 (12)	0/4/8/12 (Medium)	5	12	9	NA	1	9	1	1	1	F	207
Ultra AC/2	1/Shot (2)	2/Shot (3)	2/9/18/27 (Extreme)	45	5	2	1	1	2	1	1	1	F	208
Ultra AC/5	1/Shot (2)	5/Shot (7)	0/7/14/21 (Long)	20	7	3	1	1	3	1	1	1	F	208
Ultra AC/10	3/Shot (6)	10/Shot (15)	0/6/12/18 (Medium)	10	10	4	1	1	4	1	1	1	F	208
Ultra AC/20	7/Shot (14)	20/Shot (30)	0/4/8/12 (Medium)	5	12	8	NA	1	8	1	1	1	F	208
Gauss Rifles														
AP Gauss Rifle	1 (1)	3 (3)	0/3/6/9 (Short-PD)	40	0.5	1	1	1	1	1	1	1	F	218
Gauss Rifle	1 (1)	15 (15)	2/7/15/22 (Long)	8	12	6	1	1	6	1	1	1	F	219
Hyper-Assault Gauss 20	4 (4)	20** (16/12/12)	2/8/16/24 (Long)	6	10	6	1	1	6	1	1	1	F	219
Hyper-Assault Gauss 30	6 (6)	30** (24/18/18)	2/8/16/24 (Long)	4	13	8	NA	1	8	1	1	1	F	219
Hyper-Assault Gauss 40	8 (8)	40** (32/24/24)	2/8/16/24 (Long)	3	16	10	NA	1	10	1	1	1	F	219
Machine Guns														
Light Machine Gun	0 (0)	1 (1)	0/2/4/6 (Short)	200	0.25	1	1	1	1	1	1	1	F	228
Machine Gun	0 (0)	2 (2)	0/1/2/3 (Short)	200	0.25	1	1	1	1	1	1	1	C	228
Heavy Machine Gun	0 (0)	3 (3)	0/1/2/— (Short)	100	0.5	1	1	1	1	1	1	1	C	228
Flamers														
Flamer	3 (3)	2 (2)	0/1/2/3 (Short)	NA	0.5	1	1	1	1	1	1	1	C	218
Flamer (Vehicle)	3 (3)	2 (2)	0/1/2/3 (Short)	20	0.5	1	1	1	1	1	1	1	B	218
Lasers														
ER Micro Laser	1 (1)	2 (2)	0/1/2/4 (Short)	NA	0.25	1	1	1	1	1	1	1	F	226
ER Small Laser	2 (2)	5 (5)	0/2/4/6 (Short)	NA	0.5	1	1	1	1	1	1	1	F	226
ER Medium Laser	5 (5)	7 (7)	0/5/10/15 (Medium)	NA	1	1	1	1	1	1	1	1	F	226
ER Large Laser	12 (12)	10 (10)	0/8/15/25 (Extreme)	NA	4	1	1	1	1	1	1	1	F	226
Micro Pulse Laser	1 (1)	3 (3)	0/1/2/3 (Short)	NA	0.5	1	1	1	1	1	1	1	F	226
Small Pulse Laser	2 (2)	3 (3)	0/2/4/6 (Short)	NA	1	1	1	1	1	1	1	1	F	226
Medium Pulse Laser	4 (4)	7 (7)	0/4/8/12 (Medium)	NA	2	1	1	1	1	1	1	1	F	226
Large Pulse Laser	10 (10)	10 (10)	0/6/14/20 (Long)	NA	6	2	1	1	2	1	1	1	F	226
Heavy Small Laser	3 (3)	6 (6)	0/1/2/3 (Short)	NA	0.5	1	1	1	1	1	1	1	F	226
Heavy Medium Laser	7 (7)	10 (10)	0/3/6/9 (Short)	NA	1	2	1	1	2	1	1	1	F	226
Heavy Large Laser	18 (18)	16 (16)	0/5/10/15 (Medium)	NA	4	3	1	1	3	1	1	1	F	226
Plasma Weapons														
Plasma Cannon	7 (7)	0** (**)	0/6/12/18 (Medium)	10	3	1	NA	1	1	1	1	1	F	235
PPCs														
ER PPC	15 (15)	15 (15)	0/7/14/23 (Long)	NA	6	2	1	1	2	1	1	1	F	233
Missiles														
ATM 3	2 (2)	2/Msl (4)	4/5/10/15 (Medium)	20	1.5	2	NA	1	2	1	1	1	F	229
ATM 6	4 (4)	2/Msl (10)	4/5/10/15 (Medium)	10	3.5	3	NA	1	3	1	1	1	F	229
ATM 9	6 (6)	2/Msl (14)	4/5/10/15 (Medium)	7	5	4	NA	1	4	1	1	1	F	229
ATM 12	8 (8)	2/Msl (20)	4/5/10/15 (Medium)	5	7	5	NA	1	5	1	1	1	F	229
LRM 5	2 (2)	1/Msl (3)	0/7/14/21 (Long)	24	1	1	1	1	1	1	1	1	F	229
LRM 10	4 (4)	1/Msl (6)	0/7/14/21 (Long)	12	2.5	1	1	1	1	1	1	1	F	229
LRM 15	5 (5)	1/Msl (9)	0/7/14/21 (Long)	8	3.5	2	1	1	2	1	1	1	F	229
LRM 20	6 (6)	1/Msl (12)	0/7/14/21 (Long)	6	5	4	1	1	4	1	1	1	F	229
LRM 5 + Artemis IV	2 (2)	1/Msl (4)	0/7/14/21 (Long)	24	2	2	NA	1	2	1	1	1	F	206/229
LRM 10 + Artemis IV	4 (4)	1/Msl (8)	0/7/14/21 (Long)	12	3.5	2	NA	1	2	1	1	1	F	206/229
LRM 15 + Artemis IV	5 (5)	1/Msl (12)	0/7/14/21 (Long)	8	4.5	3	NA	1	3	1	1	1	F	206/229
LRM 20 + Artemis IV	6 (6)	1/Msl (16)	0/7/14/21 (Long)	6	6	5	NA	1	5	1	1	1	F	206/229
SRM 2	2 (2)	2/Msl (2)	0/3/6/9 (Short)	50	0.5	1	1	1	1	1	1	1	F	229
SRM 4	3 (3)	2/Msl (4)	0/3/6/9 (Short)	25	1	1	1	1	1	1	1	1	F	229
SRM 6	4 (4)	2/Msl (8)	0/3/6/9 (Short)	15	1.5	1	1	1	1	1	1	1	F	229
SRM 2 + Artemis IV	2 (2)	2/Msl (4)	0/3/6/9 (Short)	50	1.5	2	NA	1	2	1	1	1	F	206/229
SRM 4 + Artemis IV	3 (3)	2/Msl (6)	0/3/6/9 (Short)	25	2	2	NA	1	2	1	1	1	F	206/229
SRM 6 + Artemis IV	4 (4)	2/Msl (10)	0/3/6/9 (Short)	15	2.5	2	NA	1	2	1	1	1	F	206/229
Streak SRM 2	2 (2)	2/Msl (4)	0/4/8/12 (Medium)	50	1	1	1	1	1	1	1	1	F	230
Streak SRM 4	3 (3)	2/Msl (8)	0/4/8/12 (Medium)	25	2	1	1	1	1	1	1	1	F	230
Streak SRM 6	4 (4)	2/Msl (12)	0/4/8/12 (Medium)	15	3	2	1	1	2	1	1	1	F	230
Special Equipment														
A-Pods	0 (NA)	**	** (NA)	OS	0.5	1	NA	NA	NA	NA	NA	NA	B	204
B-Pods	0 (NA)	**	** (NA)	OS	1	1	NA	1	1	NA	NA	NA	E	204
Anti-Missile System	1 (1)	**	** (Point Defense)	24	0.5	1	1	1	1	1	1	1	F	204
Active Probe	0 (0)	NA	0/0/0/5 (**)	NA	1	1	1	1	1	1	1	NA	E	204
Light Active Probe	0 (0)	NA	0/0/0/3 (**)	NA	0.5	1	1	1	1	1	1	0	F	204
ECM Suite	0 (0)	NA	0/0/0/6 (**)	NA	1	1	1	1	1	1	1	NA	F	213
Machine Gun Array	NA	**	** (**)	**	+0.25	1	1	1	1	1	1	0	E	228
MASC	NA	NA (NA)	NA (NA)	NA	Var*	Var*	NA	NA	NA	NA	NA	NA	F	232
One-Shot†	NA	NA	NA	OS	+0.5	NA	NA	NA	NA	NA	NA	NA	**	229
Narc Missile Beacon	0 (**)	**	0/4/8/12 (**)	6	2	1	1	1	1	1	1	1	F	232
TAG	0 (0)	**	0/5/9/15 (**)	NA	1	1	1	1	1	1	1	1	E	238
Light TAG	0 (0)	**	0/3/6/9 (**)	NA	0.5	1	1	1	1	1	1	1	F	238
Targeting Computer	0 (0)	**	NA (NA)	NA	Var*	Var*	NA	1	Var*	0	NA	NA	F	238
Capital Missiles														
Killer Whale	NA (20)	NA (40)	NA (Extreme)	50 t/Msl	150	NA	NA	NA	NA	NA	NA	1	D	210
White Shark	NA (15)	NA (30)	NA (Extreme)	40 t/Msl	120	NA	NA	NA	NA	NA	NA	1	D	210
Barracuda	NA (10)	NA (20)	NA (Extreme)	30 t/Msl	90	NA	NA	NA	NA	NA	NA	1	D	210
AR-10 Launcher	NA (††)	NA (††)	NA (††)	††	250	NA	NA	NA	NA	NA	NA	1	D	210

WEIGHT/SPACE: All weights are listed in tonnage (1 ton = 1,000 kg). Items with variable (Var) weight/space values must consult the item's listing in on the appropriate page (Ref) to determine the final weight and internal space for the specific item.
*Special Construction Rules (see Item Description)
**Special Weapon Rules (Consult *Total Warfare*)
† May apply to LRM, SRM, Streak SRM, and Narc. Adds 0.5 ton to weapon weight and is considered part of the weapon.
††Weapon heat, damage, range, and ammo weight is based on missile type fired (May fire only standard Killer Whale, White Shark, or Barracuda missiles).

INDUSTRIAL EQUIPMENT TABLE

Weapon / Item	Heat Std (Aero)	Damage Std (Aero)	Range Min/Sht/Med/Lng (Aero)	Ammo (per Ton)	WT (Tons)	Space M	Space P	Space CV	Space SV	Space F	Space SC	Space DS	Tech Rating	Ref
Backhoe	0 (NA)	6 (NA)	PHYS (NA)	NA	5	6*	NA	1*	1*	NA	NA	NA	B	241
Bay Door	0 (0)	NA (NA)	NA (NA)	NA	0	NA	NA	0*	0*	NA	0*	0*	A	209
Bridgelayer														
Light	0 (NA)	NA (NA)	NA (NA)	NA	1	2*	NA	1*	1*	NA	NA	NA	B	242
Medium	0 (NA)	NA (NA)	NA (NA)	NA	2	4*	NA	1*	1*	NA	NA	NA	C	242
Heavy	0 (NA)	NA (NA)	NA (NA)	NA	6	12*	NA	1*	1*	NA	NA	NA	D	242
Bulldozer	0 (NA)	NA (NA)	NA (NA)	NA	2	NA	NA	1*	1*	NA	NA	NA	B	243
Chainsaw	0 (NA)	5 (NA)	PHYS (NA)	NA	5	5*	NA	1*	1*	NA	NA	NA	B	242
Combine	0 (NA)	3** (NA)	PHYS (NA)	NA	2.5	4*	NA	1*	1*	NA	NA	NA	B	243
Comm. Equipment	0 (0)	NA (NA)	NA (NA)	NA	Var*	1*	NA	1*	1*	0	0	0	D	212
Concealed Weapon	NA	NA	NA	NA	Var*	NA	NA	NA	0*	NA	NA	NA	A	213
Dual Saw	0 (NA)	7 (NA)	PHYS (NA)	NA	7	7*	NA	1*	1*	NA	NA	NA	C	243
Dumper	0 (NA)	NA (NA)	NA (NA)	NA	Var*	1	NA	1	1	NA	NA	NA	A	243
Ejection Seat														
(Support Vehicle)	0 (NA)	NA (NA)	NA (NA)	NA	0.1	NA	NA	NA	0*	NA	NA	NA	B	213
(IndustrialMech)	0 (NA)	NA (NA)	NA (NA)	NA	0.5	1*	NA	NA	NA	NA	NA	NA	B	213
Environmental Sealing														
(IndustrialMech)	0 (NA)	NA (NA)	NA (NA)	NA	Var*	8*	NA	NA	NA	NA	NA	NA	C	216
(Support Vehicle)	0 (NA)	NA (NA)	NA (NA)	NA	*	NA	NA	NA	0	NA	NA	NA	C	216
Escape Pod														
(Aerospace)	NA (0)	NA (NA)	NA (NA)	OS	7	NA	NA	NA	0*	NA	0	0	D	216
(Maritime)	0 (NA)	NA (NA)	NA (NA)	OS	7	NA	NA	NA	0*	NA	NA	NA	C	216
Extended Fuel Tanks	0 (NA)	NA (NA)	NA (NA)	NA	Var*	Var*	NA	1	NA	NA	NA	NA	C	244
Ext. Stores Hardpoint	0 (NA)	NA (NA)	NA (NA)	NA	0.2	NA	NA	NA	1*	NA	NA	NA	B	216
Field Kitchen	0 (NA)	NA (NA)	NA (NA)	NA	3	NA	NA	1	1*	NA	NA	NA	A	217
Fluid Suction System														
Standard	0 (0)	NA (NA)	PHYS (NA)	10*	1	1*	NA	1*	1*	1*	1*	NA	C	247
Light ('Mech)	0 (NA)	NA (NA)	PHYS (NA)	10*	0.5	1	NA	NA	NA	NA	NA	NA	B	248-9
Light (Vehicular)	0 (0)	NA (NA)	PHYS (NA)	10*	0.015	NA	NA	1*	1*	1*	1*	NA	B	248-9
Fire Control														
Basic (SV)	0 (NA)	NA (NA)	NA (NA)	NA	Var*	NA	NA	NA	0*	NA	NA	NA	C	217
Advanced ('Mech)	0 (NA)	NA (NA)	NA (NA)	NA	0	0*	NA	NA	NA	NA	NA	NA	D	217
Advanced (SV)	0 (NA)	NA (NA)	NA (NA)	NA	Var*	NA	NA	NA	0*	NA	NA	NA	D	217
Heavy Duty Pile-Driver	0 (NA)	9 (NA)	PHYS (NA)	NA	10	8	NA	1	1*	NA	NA	NA	C	244
Ladder	0 (NA)	NA (NA)	NA (NA)	NA	Var*	1*	NA	1*	1*	NA	NA	NA	A	245
Lifeboat														
(Aerospace)	(NA) 0	NA (NA)	NA (NA)	NA	7	NA	NA	NA	NA	NA	0	0	C	227
(Atmospheric)	(NA) 0	NA (NA)	NA (NA)	NA	1	NA	NA	NA	0*	NA	NA	NA	A	227
(Maritime)	(NA) 0	NA (NA)	NA (NA)	NA	1	NA	NA	0*	0*	NA	NA	NA	A	227
Lift/Arresting Hoists														
Arresting Hoist	0 (0)	NA (NA)	PHYS (NA)	NA	3	NA	NA	NA	1*	NA	NA	NA	C	245
Lift Hoist	0 (0)	NA (NA)	PHYS (NA)	NA	3	3*	NA	1*	1*	NA	NA	NA	A	245
Look-Down Radar	NA (0)	NA (NA)	NA (NA)	NA	5	NA	NA	NA	1*	0*	0*	0*	B	227
Manipulator	0 (NA)	0 (NA)	PHYS (NA)	NA	0.01	NA	NA	1*	1*	NA	NA	NA	C	245
MASH														
(Core Unit)	0 (NA)	NA (NA)	NA (NA)	NA	3.5	NA	NA	1*	1*	NA	NA	NA	B	228
(Added Theater)	0 (NA)	NA (NA)	NA (NA)	NA	1	NA	NA	0*	0*	NA	NA	NA	B	228
Mining Drill	0 (NA)	4 (NA)	PHYS (NA)	NA	3	4*	NA	1	1	NA	NA	NA	B	246
Nail/Rivet Gun	0 (0)	0 (NA)	0/1/—/— (NA)	300	0.5	1	NA	1	1**	NA	NA	NA	C	246
Paramedic Equipment	0 (NA)	NA (NA)	NA (NA)	NA	0.25	1*	NA	1	1*	NA	NA	NA	C	233
Pintle Mount	0 (NA)	NA (NA)	NA (NA)	NA	Var*	NA	NA	NA	0*	NA	NA	NA	A	234
Power Amplifier	0 (0)	NA (NA)	NA (NA)	NA	Var*	0	NA	0	0	0	NA	NA	D	235
Quarters/Seating														
Steerage	0 (0)	NA (NA)	NA (NA)	NA	5	NA	NA	NA	1*	NA	0*	0*	A	236
Crew/2nd Class	0 (0)	NA (NA)	NA (NA)	NA	7	NA	NA	NA	1*	NA	0*	0*	A	236
Officer/1st Class	0 (0)	NA (NA)	NA (NA)	NA	10	NA	NA	NA	1*	NA	0*	0*	A	236
Seating (Combat Crew)	0 (0)	NA (NA)	NA (NA)	NA	0.5	NA	NA	1*	NA	NA	NA	NA	A	236
Seating (Standard)	0 (NA)	NA (NA)	NA (NA)	NA	0.075	NA	NA	NA	0*	NA	NA	NA	A	236
Seating (Pillion)	0 (NA)	NA (NA)	NA (NA)	NA	0.025	NA	NA	NA	0*	NA	NA	NA	A	236
Refueling Drogue	0 (0)	NA (NA)	PHYS (Same)	Var*	1	NA	NA	1*	1*	1*	1*	NA	C	247
Remote Sensor Dispenser	0 (0)	NA (NA)	0/0/0/0 (Same)	30*	0.5	1	NA	1	1	1	1	0	C	236
Retractable Blade	0 (NA)	** (NA)	PHYS (NA)	NA	Var*	Var*	NA	NA	NA	NA	NA	NA	B	236
Rock-Cutter	0 (NA)	5 (NA)	PHYS (NA)	NA	5	5	NA	1*	1*	NA	NA	NA	C	247
Salvage Arm	0 (NA)	NA (NA)	PHYS (NA)	NA	3	2*	NA	NA	NA	NA	NA	NA	D	248
Searchlight														
Handheld	0 (0)	NA (NA)	0/0/0/9 (Short)	NA	0.005*	0	0	0*	0*	0	0	0	A	237
Mounted	0 (0)	NA (NA)	0/0/0/170 (Extreme)	NA	0.5	1*	NA	1	1	0	0	0	A	237
Spot Welder	2 (NA)	5 (NA)	PHYS (NA)	NA	2	1*	NA	1	1	NA	NA	NA	C	248
Sprayer														
'Mech	0 (NA)	NA (NA)	0/0/0/1 (NA)	10*	0.5	1	NA	NA	NA	NA	NA	NA	B	249
Vehicular	0 (NA)	NA (NA)	0/0/0/1 (NA)	10*	0.015	NA	NA	1	1	1	1	NA	B	249
Track	0 (NA)	NA (NA)	NA (NA)	NA	Var*	2*	NA	NA	NA	NA	NA	NA	C	249
Transport Bay														
Cargo, Container	0 (0)	NA (NA)	NA (NA)	NA	10	1*	NA	1	1	0	0	0	A	239
Cargo, Other	0 (0)	NA (NA)	NA (NA)	NA	Var*	Var*	NA	1*	1*	0	0	0	A	239
Infantry, Compart.	0 (0)	NA (NA)	NA (NA)	NA	Var*	Var*	NA	1*	1*	0	0	0	A	239
Infantry, Bay	0 (0)	NA (NA)	NA (NA)	NA	Var*	Var*	NA	1*	1*	0	0	0	A	239

INDUSTRIAL EQUIPMENT TABLE (CONT)

Weapon / Item	Heat Std (Aero)	Damage Std (Aero)	Range Min/Sht/Med/Lng (Aero)	Ammo (per Ton)	WT (Tons)	Space M	P	CV	SV	F	SC	DS	Tech Rating	Ref
Battle Armor, Comp.	0 (0)	NA (NA)	NA (NA)	NA	Var*	Var*	NA	1*	1*	0	0	0	D	239
Battle Armor, Bay	0 (0)	NA (NA)	NA (NA)	NA	Var*	Var*	NA	1*	1*	0	0	0	D	239
'Mech (Cubicle)	0 (0)	NA (NA)	NA (NA)	NA	150	NA	NA	1**	1**	NA	0	0	C	239
Fighter (Cubicle)	0 (0)	NA (NA)	NA (NA)	NA	150	NA	NA	1**	1**	NA	0	0	C	239
ProtoMech (5 Cub.)	0 (0)	NA (NA)	NA (NA)	NA	50	NA	NA	1**	1**	NA	0	0	C	239
Small Craft (Cub.)	0 (0)	NA (NA)	NA (NA)	NA	200	NA	NA	1**	1**	NA	0	0	C	239
Lt. Vehicle (Cub.)	0 (0)	NA (NA)	NA (NA)	NA	50	NA	NA	1**	1**	NA	0	0	C	239
Hvy. Vehicle (Cub.)	0 (0)	NA (NA)	NA (NA)	NA	100	NA	NA	1**	1**	NA	0	0	C	239
Super-Hvy. Vehicle	0 (0)	NA (NA)	NA (NA)	NA	200	NA	NA	1**	1**	NA	0	0	C	239
Turret	0 (NA)	NA (NA)	NA (NA)	NA	Var*	NA	NA	0	0	NA	NA	NA	B	239
Weapons, Anti-Personnel														
Light	0 (NA)	** (NA)	** (NA)	**	**	NA	NA	NA	1*	NA	NA	NA	Var*	271
Medium	0 (NA)	** (NA)	** (NA)	**	**	NA	NA	NA	1*	NA	NA	NA	Var*	271
Wrecking Ball	0 (NA)	8 (NA)	PHYS (NA)	NA	4	5*	NA	1*	1*	NA	NA	NA	A	249

WEIGHT/SPACE: All weights are listed in tonnage (1 ton = 1,000 kg). Items with variable (Var) weight/space values must consult the item's listing in on the appropriate page (Ref) to determine the final weight and internal space for the specific item.
*Special Construction Rules (see Item Description)
**Special Weapon Rules (Consult *Total Warfare*)

HEAVY WEAPONS AMMUNITION

Ammo Type	Heat Std (Aero)	Damage Std (Aero)	Range Min/Sht/ Med/Lng (Aero)	Ammo (per Ton)	WT (Tons)	Tech Base	Tech Rating	Ref
Autocannons								
Standard Autocannons	*	*	*	x 1	x 1	IS	C	208
LB-X Autocannons (Standard)	*	As Standard AC	*	x 1	x 1	IS / Clan	E	207
(Cluster)	*	*	*	x 1	x 1	IS / Clan	E	208
Light Autocannons (Standard)	*	*	*	x 1	x 1	IS	D	207
Rotary Autocannons (Standard)	*	*	*	x 1	x 1	IS	E	207
Ultra Autocannons (Standard)	*	*	*	x 1	x 1	IS / Clan	E	208
Armor-Piercing (Standard/Light ACs)	*	*	*	x 0.5**	x 1	IS	E	208
Flechette (Standard/Light ACs)	*	Var†	*	x 1	x 1	IS	E	208
Precision (Standard/Light ACs)	*	*	*	x 0.5**	x 1	IS	E	208
Gauss Rifles								
AP Gauss Ammo	*	*	*	x 1	x 1	Clan	F	218
Light Gauss Rifle	*	*	*	x 1	x 1	IS	E	219
Gauss Rifles	*	*	*	x 1	x 1	IS / Clan	E	219
Heavy Gauss Rifle	*	*	*	x 1	x 1	IS	E	218
Hyper-Assault Gauss Rifle	*	*	*	x 1	x 1	Clan	F	219
Machine Guns								
Machine Guns (Lt, Std, Heavy)	*	*	*	x 1	x 1	IS / Clan	A	228
Flamer								
Flamer (Vehicle)	*	*	*	x 1	x 1	IS / Clan	A	218
Plasma Weapons								
Plasma Cannon	*	*	*	x 1	x 1	Clan	F	234
Plasma Rifle	*	*	*	x 1	x 1	IS	E	234
Missiles								
ATMs (Standard Ammo)	*	*	*	x 1	x 1	Clan	F	229
LRMs (Standard Ammo)	*	*	*	x 1	x 1	IS / Clan	C	229
MMLs (Standard LRM Ammo)	*	*	*	x 1	x 1	IS	E	229
MMLs (Standard SRM Ammo)	*	*	*	x 1	x 1	IS	E	229
MRMs (Standard Ammo)	*	*	*	x 1	x 1	IS	C	229
Rocket Launchers (Standard Ammo)	*	*	*	x 1	x 1	IS	B	229
SRMs (Standard Ammo)	*	*	*	x 1	x 1	IS / Clan	C	229
Streak SRMs (Standard Ammo)	*	*	*	x 1	x 1	IS / Clan	E	230
ER Ammo (ATMs)	*	1/Msl (x 0.5**)	9/18/27 (Extreme)	x 1	x 1	Clan	F	229
HE Ammo (ATMs)	*	3/Msl (x 1.5**)	0/3/6/9 (Short)	x 1	x 1	Clan	F	229
Artemis-Capable (LRM/SRM/MML)	*	As "+Art" Weapon	*	x 1	x 1	IS / Clan	E	206/230
Fragmentation (LRM/SRM/MML)	*	Var†	*	x 1	x 1	IS / Clan	D	230
Harpoon (SRM)	*	1/Msl (x 0.5**)	0/2/4/6 (Short)	x 1	x 1	IS / Clan	D	230
Inferno (SRM)	*	*†	*	x 1	x 1	IS / Clan	B	231
Semi-Guided (LRM)	*	*†	*	x 1	x 1	IS	E	231
Swarm (LRM)	*	*†	*	x 1	x 1	IS / Clan	E	231
Swarm-I (LRM)	*	*†	*	x 1	x 1	IS	E	231
Tear Gas (SRM)	*	Var†	*	x 1	x 1	IS / Clan	B	231
Thunder (LRM)	*	0†	*	x 1	x 1	IS / Clan	E	231
Thunder-Augmented (LRM)	*	0†	*	x 0.5**	x 1	IS	E	231
Thunder-Inferno (LRM)	*	0†	*	x 0.5**	x 1	IS	E	231

HEAVY WEAPON AMMUNITION (CONT)

Ammo Type	Heat Std (Aero)	Damage Std (Aero)	Range Min/Sht/ Med/Lng (Aero)	Ammo (per Ton)	WT (Tons)	Tech Base	Tech Rating	Ref
Thunder-Vibrobomb (LRM)	*	0†	*	x 0.5**	x 1	IS	E	231
Thunder-Active (LRM)	*	0†	*	x 0.5**	x 1	IS	E	231
Narc-Capable (LRM/SRM/MML)	*	*†	*	x 1	x 1	IS / Clan	E	232
Torpedo (LRM/SRM)	*	*†	*	x 1	x 1	IS / Clan	C	230
Multi-Purpose (LRM/SRM)	*	*†	*	x 1	x 1	Clan	F	261
Single-Shot (OS)§	*	*	*	NA	NA	IS / Clan	C	230
Special Equipment								
Anti-Missile System (Standard Ammo)	*	*	*	x 1	x 1	IS / Clan	E / F	204
Narc Missile Beacon (Homing)	*	*	*	x 1	x 1	IS	E	233
(Explosive)	*	4†	*	x 1	x 1	IS	E	233
Improved Narc Launcher (Homing)	*	*	*	x 1	x 1	IS	E	232
(ECM)	*	†	*	x 1	x 1	IS	E	232
(Explosive)	*	6†	*	x 1	x 1	IS	E	232
(Haywire)	*	†	*	x 1	x 1	IS	E	232
(Nemesis)	*	†	*	x 1	x 1	IS	E	233
Capital Missiles								
Killer Whale	*	*	*	x 1	x 1	IS / Clan	D	210
White Shark	*	*	*	x 1	x 1	IS / Clan	D	210
Barracuda	*	*	*	x 1	x 1	IS / Clan	D	210
AR-10 Launcher	As Missile	As Missile	As Missile	x 1	x 1	IS / Clan	D	210
Kraken-T	*	*	*	x 1	x 1	IS	D	210
Killer Whale-T	*	*	*	x 1	x 1	IS	D	210
White Shark-T	*	*	*	x 1	x 1	IS	D	210
Barracuda-T	*	*	*	x 1	x 1	IS	D	210
Screen Launcher	*	*	*	x 1	x 1	IS	E	237
External Stores Hardpoint Weapons								
High-Explosive (Bomb)	0	10†	NA	1	1	IS / Clan	B	216
Cluster (Bomb)	0	5†	NA	1	1	IS / Clan	B	216
Laser-Guided (Bomb)	0	10†	NA	1	1	IS / Clan	C	216
Inferno (Bomb)	0	0†	NA	1	1	IS / Clan	C	216
Mines (Bomb)	0	20†	NA	1	1	IS / Clan	C	216
Rocket Launcher (Pod)	0	As Rocket Launcher-10	As Rocket Launcher-10	1	1	IS	B	216
TAG (Pod)	0	0†	As TAG	1	1	IS / Clan	E	216
Industrial Equipment								
Nail/Rivet Gun	*	*	*	x 1	x 1	IS / Clan	A	246

*As Weapon's listed statistics.
**Round Damage values up; Round all other factors down (to the nearest whole number)
†See item's combat rules in *Total Warfare* or *Tactical Operations* for more information.
Thunder); in such cases the heat, damage, range, and ammo capacity/weight statistics of the other missile type apply, but rack size is treated as 5 tubes smaller.
§The One-Shot option may be applied to LRM, MRM, SRM, Streak SRM, Narc, and iNarc weapons only. Rocket Launchers are automatically considered One-Shot items (the ammunition cost reflects post-battle reloads only).

INNER SPHERE BATTLE ARMOR EQUIPMENT TABLE

Weapon / Item	Damage	Range Min/sht/med/lng	Weight (Item)	Weight Per Shot (Ammo)	Space Slots	Tech Rating	Ref
Gauss Weapons							
David Light Gauss Rifle	1	—/3/5/8	100 kg	0.75 kg (20)	1	E	255
King David Light Gauss Rifle	1	—/3/6/9	275 kg	0.75 kg (20)	2	E	255
Magshot Gauss Rifle	2	—/3/6/9	175 kg	0.5 kg (10)	3	E	255
Grand Mauler Gauss Rifle	*1*	—/2/4/5	125 kg	1.0 kg (5)	2	E	255
Tsunami Gauss Rifle	1	—/2/4/5	125 kg	1.0 kg (5)	2	E	255
Grenade Launchers							
Micro Grenade Launcher	1**	—/1/2/—	75 kg	0.25 kg (20)	1	B	256
Heavy Grenade Launcher	1**	—/1/2/3	100 kg	0.25 kg (20)	1	C	256
Machine Guns							
Light Machine Gun	*1***	—/2/4/6	75 kg	0.1 kg (50)	1	C	258
Machine Gun	2**	—/1/2/3	100 kg	0.1 kg (50)	1	C	258
Heavy Machine Gun	*3***	—/1/2/—	150 kg	0.1 kg (50)	1	C	258
Mortars							
Light Mortar	3**	1/1/2/3	300 kg	2 kg (20)	2	B	262
Heavy Mortar	3**	2/2/4/6	400 kg	4 kg (20)	2	B	262
Recoilless Rifles							
Light Recoilless Rifle	2**	—/2/4/6	175 kg	1 kg (20)	2	C	268
Medium Recoilless Rifle	3**	—/2/4/6	250 kg	2 kg (20)	2	C	268
Heavy Recoilless Rifle	*3***	—/3/5/7	325 kg	4 kg (20)	3	C	268
Flamers							
Flamer (BA)	*2***	—/1/2/3	150 kg	0.5 kg (10)	1	C	255
Lasers							
ER Small Laser	*3*	—/2/4/5	350 kg	0.25 kg (20)	2	E	258
ER Medium Laser	5	—/4/8/12	800 kg	0.25 kg (20)	3	E	258
Small Laser	*3*	—/1/2/3	200 kg	0.16 kg (30)	1	E	258
Medium Laser	5	—/3/6/9	500 kg	0.5 kg (30)	3	E	258
Small Pulse Laser	3	—/1/2/3	400 kg	0.35 kg (14)	1	E	258

INNER SPHERE BATTLE ARMOR EQUIPMENT TABLE (CONT)

Weapon / Item	Damage	Range Min/sht/med/lng	Weight (Item)	Weight Per Shot (Ammo)	Space Slots	Tech Rating	Ref
Medium Pulse Laser	6	—/2/4/6	800 kg	0.41 kg (12)	3	E	258
PPCs							
Support PPC	2	—/2/5/7	250 kg	0.33 kg (15)	2	D	267
Plasma Weapons							
Plasma Rifle (Man-Portable)	*2*	*—/2/4/6*	*300 kg*	*1.5 kg (20)*	*2*	*E*	*267*
Needlers							
Firedrake Support Needler	1**	—/1/2/3	50 kg	0.16 kg (30)	1	D	266
Missile Launchers†							
LRM 1	1/msl	6/7/14/21	60 kg [40 kg]	8.3 kg (1) [NA]	2 [3]	E	261
LRM 2	1/msl	6/7/14/21	120 kg [80 kg]	16.6 kg (1) [NA]	2 [3]	E	261
LRM 3	1/msl	6/7/14/21	180 kg [120 kg]	25 kg (1) [NA]	3 [4]	E	261
LRM 4	1/msl	6/7/14/21	240 kg [160 kg]	33.3 kg (1) [NA]	3 [5]	E	261
LRM 5	1/msl	6/7/14/21	300 kg [200 kg]	41.5 kg (1) [NA]	4 [5]	E	261
SRM 1	2/msl	—/3/6/9	60 kg [50 kg]	10 kg (1) [NA]	1 [2]	E	261
SRM 2	2/msl	—/3/6/9	120 kg [75 kg]	20 kg (1) [NA]	2 [2]	E	261
SRM 3	2/msl	—/3/6/9	180 kg [125 kg]	30 kg (1) [NA]	2 [2]	E	261
SRM 4	2/msl	—/3/6/9	240 kg [150 kg]	40 kg (1) [NA]	2 [3]	E	261
SRM 5	2/msl	—/3/6/9	300 kg [175 kg]	50 kg (1) [NA]	3 [3]	E	261
SRM 6	2/msl	—/3/6/9	360 kg [200 kg]	60 kg (1) [NA]	3 [4]	E	261
MRM 1	1/msl	—/3/8/15	60 kg [50 kg]	5 kg (1) [NA]	1 [2]	D	261
MRM 2	1/msl	—/3/8/15	120 kg [100 kg]	10 kg (1) [NA]	2 [2]	D	261
MRM 3	1/msl	—/3/8/15	180 kg [150 kg]	15 kg (1) [NA]	2 [3]	D	261
MRM 4	1/msl	—/3/8/15	240 kg [200 kg]	20 kg (1) [NA]	3 [3]	D	261
MRM 5	1/msl	—/3/8/15	300 kg [250 kg]	25 kg (1) [NA]	3 [4]	D	261
Rocket Launcher 1	1/msl	—/3/7/12	25 kg	OS (1)	2	E	261
Rocket Launcher 2	1/msl	—/3/7/12	50 kg	OS (1)	2	E	261
Rocket Launcher 3	1/msl	—/3/7/12	75 kg	OS (1)	3	E	261
Rocket Launcher 4	1/msl	—/3/7/12	100 kg	OS (1)	3	E	261
Rocket Launcher 5	1/msl	—/3/7/12	125 kg	OS (1)	4	E	261
Detachable Missile Pack	NA	NA	10 kg	NA	0	E	254
Special Weapons							
Compact Narc	0	—/2/4/5	150 kg	10 kg (1)	1	E	263
Pop-Up Mine	4**	—/—/—/0	200 kg	OS (1)	1	E	267
Other Equipment							
Active Probe	NA	—/—/—/4	250 kg	NA	2	E	252
Camo System	NA	NA	200 kg	NA	2	E	253
Cutting Torch	NA	PHYS	5 kg	NA	1	C	254
ECM Suite	NA	—/—/—/0	100 kg	NA	1	E	254
Extended Life Support	NA	NA	25 kg	NA	1	E	254
Fuel Tank	NA	NA	50 kg	NA	1	C	256
Heat Sensor	NA	—/9/18/27	20 kg	NA	1	D	255
Improved Sensors	NA	—/—/—/2	65 kg	NA	1	E	257
Jump Booster	NA	NA	125 kg	NA	2	E	257
Laser Microphone	NA	—/—/—/34	5 kg	NA	1	C	258
Magnetic Clamps	NA	NA	30 kg	NA	2	C	259
Mission Equipment	NA	NA	Var*	NA	1	A	262
Modular Weapon Mount							
(Anti-Personnel)	NA	NA	5 kg	NA	1*	B	262
(Standard)	NA	NA	10 kg	NA	1*	B	262
(Turret, Standard)	NA	NA	Var*	NA	1*	B	262
(Turret, Configurable)	NA	NA	Var*	NA	2*	B	262
Parafoil	NA	NA	35 kg	NA	1*	A	266
Partial Wing	NA	NA	200 kg	NA	1	D	266
Power Pack	NA	NA	25 kg	NA	1	C	268
Remote Sensor Dispenser	NA	NA	40 kg	NA (6*)	1	E	268
Searchlight	NA	—/—/—/9	5 kg	NA	1	A	269
Shotgun Microphone	NA	—/—/—/3	5 kg	NA	1	C	269
Space Operations Adapt.	NA	NA	100 kg	NA	1	E	269
Squad Support Weapon Mt.	NA	NA	Var**	Var**	Var**	Var**	270
Light TAG	NA	—/3/6/9	35 kg	0.08 kg (60)	1	E	270

WEIGHT/SPACE: All weights are listed in kilograms (1 ton = 1,000 kg). Items with variable (Var) weight/space values must consult the item's listing in on the appropriate page (Ref) to determine the final weight and internal space for the specific item.

*Special Construction Rules (see Item Description)

**Special Weapon Rules (Consult *Total Warfare*)

†One-Shot (OS) capability may be assigned to any desired LRM, SRM or MRM launcher type. When mounting a One-Shot launcher, use the weight and slot space values in [brackets] instead of the standard launcher weight and slots. Note that Rocket launchers and Pop-Up Mines are One-Shot weapons by default and have no alternative weight/space values.

CLAN BATTLE ARMOR EQUIPMENT TABLE

Weapon / Item	Damage	Range Min/sht/med/lng	Weight (Item)	Weight Per Shot (Ammo)	Space Slots	Tech Rating	Ref
Gauss Weapons							
AP Gauss Rifle	3**	—/3/6/9	200 kg	1.25 kg (20)	2	F	255
Grenade Launchers							
Heavy Grenade Launcher	1**	—/1/2/3	100 kg	0.25 kg (20)	1	C	256
Machine Guns							
Light Machine Gun	1**	—/2/4/6	75 kg	0.1 kg (50)	1	C	258
Machine Gun	2**	—/1/2/3	100 kg	0.1 kg (50)	1	C	258
Heavy Machine Gun	3**	—/1/2/—	150 kg	0.1 kg (50)	1	C	258
Bearhunter Superheavy AC	3**	—0/1/2	150 kg	1.5 kg (20)	2	D	258
Recoilless Rifles							
Light Recoilless Rifle	2**	—/2/4/6	175 kg	1 kg (20)	2	C	268
Medium Recoilless Rifle	3**	—/2/4/6	250 kg	2 kg (20)	2	C	268
Heavy Recoilless Rifle	3**	—/3/5/7	325 kg	4 kg (20)	3	C	268
Flamers							
Flamer (BA)	2**	—/1/2/3	150 kg	0.5 kg (10)	1	C	255
Lasers							
ER Micro Laser	2	—/1/2/4	150 kg	0.16 kg (30)	1	F	258
ER Small Laser	5	—/2/4/6	350 kg	0.25 kg (20)	2	F	258
ER Medium Laser	7	—/5/10/15	800 kg	0.25 kg (20)	3	F	258
Small Laser	3	—/1/2/3	200 kg	0.16 kg (30)	1	E	258
Micro Pulse Laser	3	—/1/2/3	160 kg	0.29 kg (17)	1	F	258
Small Pulse Laser	3	—/2/4/6	400 kg	0.35 kg (14)	1	F	258
Medium Pulse Laser	7	—/4/8/12	800 kg	0.41 kg (12)	3	F	258
Heavy Small Laser	6	—/1/2/3	500 kg	0.25 kg (20)	3	F	258
Heavy Medium Laser	10	—/3/6/9	1,000 kg	0.25 kg (20)	4	F	258
PPCs							
Support PPC	2	—/2/5/7	240 kg	0.35 kg (14)	2	D	267
Missile Launchers							
LRM 1	1/msl	—/7/14/21	35 kg [25 kg]	8.3 kg (1) [NA]	2 [2]	F	261
LRM 2	1/msl	—/7/14/21	70 kg [50 kg]	16.6 kg (1) [NA]	2 [2]	F	261
LRM 3	1/msl	—/7/14/21	105 kg [75 kg]	25 kg (1) [NA]	3 [3]	F	261
LRM 4	1/msl	—/7/14/21	140 kg [100 kg]	33.3 kg (1) [NA]	3 [3]	F	261
LRM 5	1/msl	—/7/14/21	175 kg [125 kg]	41.5 kg (1) [NA]	3 [4]	F	261
SRM 1	2/msl	—/3/6/9	35 kg [20 kg]	10 kg (1) [NA]	1 [2]	F	261
SRM 2	2/msl	—/3/6/9	70 kg [40 kg]	20 kg (1) [NA]	2 [2]	F	261
SRM 3	2/msl	—/3/6/9	105 kg [60 kg]	30 kg (1) [NA]	2 [2]	F	261
SRM 4	2/msl	—/3/6/9	140 kg [80 kg]	40 kg (1) [NA]	2 [3]	F	261
SRM 5	2/msl	—/3/6/9	175 kg [100 kg]	50 kg (1) [NA]	3 [3]	F	261
SRM 6	2/msl	—/3/6/9	210 kg [120 kg]	60 kg (1) [NA]	3 [4]	F	261
Advanced SRM 1	2/msl	—/4/8/12	60 kg [35 kg]	10 kg (1) [NA]	2 [3]	F	261
Advanced SRM 2	2/msl	—/4/8/12	90 kg [70 kg]	20 kg (1) [NA]	2 [3]	F	261
Advanced SRM 3	2/msl	—/4/8/12	120 kg [105 kg]	30 kg (1) [NA]	3 [4]	F	261
Advanced SRM 4	2/msl	—/4/8/12	150 kg [135 kg]	40 kg (1) [NA]	3 [4]	F	261
Advanced SRM 5	2/msl	—/4/8/12	180 kg [165 kg]	50 kg (1) [NA]	4 [5]	F	261
Advanced SRM 6	2/msl	—/4/8/12	210 kg [195 kg]	60 kg (1) [NA]	4 [5]	F	261
Detachable Missile Pack	NA	NA	10 kg	NA	0	F	254
Special Weapons							
Compact Narc	0	—/2/4/5	150 kg	10 kg (1)	1	E	263
Bomb Rack	2	—/—/—/—	100 kg	NA	2	F	253
Other Equipment							
Active Probe	NA	—/—/—/5	150 kg	NA	2	F	252
Cutting Torch	NA	PHYS	5 kg	NA	1	C	254
ECM Suite	NA	—/—/—/0	75 kg	NA	1	F	254
Extended Life Support	NA	NA	25 kg	NA	1	C	254
Fuel Tank	NA	NA	50 kg	NA	1	C	255
HarJel	NA	NA	0 kg	NA	0	F	256
Heat Sensor	NA	—/—/—/34	20 kg	NA	1	D	256
Improved Sensors	NA	—/—/—/3	45 kg	NA	1	F	257
Jump Booster	NA	NA	125 kg	NA	2	E	257
Laser Microphone	NA	—/—/—/34	5 kg	NA	1	C	258
Mission Equipment	NA	NA	Var*	NA	1	A	262
Modular Weapon Mount							
(Anti-Personnel)	NA	NA	5 kg	NA	1*	B	262
(Standard)	NA	NA	10 kg	NA	1*	B	262
(Turret, Standard)	NA	NA	Var*	NA	1*	B	262
(Turret, Configurable)	NA	NA	Var*	NA	2*	B	262
Parafoil	NA	NA	35 kg	NA	1*	A	266
Power Pack	NA	NA	25 kg	NA	1	C	268
Remote Sensor Dispenser	NA	NA	40 kg	NA (6*)	1	E	268
Searchlight	NA	—/—/—/9	5 kg	NA	1	A	269
Shotgun Microphone	NA	—/—/—/3	5 kg	NA	1	C	269
Space Operations Adapt.	NA	NA	100 kg	NA	1	F	269
Squad Support Weapon Mt.	NA	NA	Var**	Var**	Var**	Var**	270
Light TAG	NA	—/3/6/9	35 kg	0.08 kg (60)	1	E	270

WEIGHT/SPACE: All weights are listed in kilograms (1 ton = 1,000 kg). Items with variable (Var) weight/space values must consult the item's listing in on the appropriate page (Ref) to determine the final weight and internal space for the specific item.

*Special Construction Rules (see Item Description)

**Special Weapon Rules (Consult *Total Warfare*)

†One-Shot (OS) capability may be assigned to any desired LRM or SRM launcher type. When mounting a One-Shot launcher, use the weight and slot space values in [brackets] instead of the standard launcher weight and slots. Note that Rocket launchers and Pop-Up Mines are One-Shot weapons by default and have no alternative weight/space values.

CONVENTIONAL INFANTRY WEAPONS

Weapon	Tech (Rating)	Class/ Type (Damage Type)	Base Range	Damage (each)	Weight of Weapon / Ammo (Shots)	Crew
Archaic Weapons						
Bow (Compound)	IS / Clan (C)	Small / Melee (B)	0	0.01	1.0 kg / 0.07 kg (1)	1
Bow (Daikyu)	IS / Clan (A)	Small / Melee (B)	0	0.01	1.0 kg / 0.07 kg (1)	1
Bow (Longbow)	IS / Clan (A)	Small / Melee (B)	0	0.01	1.5 kg / 0.07 kg (1)	1
Bow (Shortbow)	IS / Clan (A)	Small / Melee (B)	0	0	0.8 kg / 0.06 kg (1)	1
Bow (Hankyu)	IS / Clan (A)	Small / Melee (B)	0	0	0.8 kg / 0.06 kg (1)	1
Club (Blackjack/Sap)	IS / Clan (A)	Small / Melee (P)N	0	0.05	1.0 kg / NA (NA)	1
Club (Club/Improvised)	IS / Clan (A)	Small / Melee (P)	0	0.02	2.0 kg / NA (NA)	1
Club (Vibro-Mace)	IS (D)	Small / Melee (P)	0	0.26	6.0 kg / 0.3 kg (7)	1
Crossbow (Basic)	IS / Clan (A)	Small / Melee (B)	0	0.01	2.0 kg / 0.05 kg (1)	1
Crossbow (Heavy)	IS / Clan (A)	Small / Melee (B)	0	0.02	4.0 kg / 0.06 kg (1)	1
Blade (Axe)	IS / Clan (A)	Small / Melee (P)	0	0.11	4.0 kg / NA (NA)	1
Blade (Bokken)	IS / Clan (A)	Small / Melee (P)N	0	0.04	2.0 kg / NA (NA)	1
Blade (Dao)	IS / Clan (A)	Small / Melee (P)	0	0.04	3.0 kg / NA (NA)	1
Blade (Carbon-Reinforced Nails)	IS (D)	Small / Melee (P)	0	0.02	0 kg / NA (NA)	1
Blade (Hatchet/Tomahawk)	IS / Clan (A)	Small / Melee (P)	0	0.04	1.0 kg / NA (NA)	1
Blade (Katana/Scimitar)	IS / Clan (A)	Small / Melee (P)	0	0.07	2.5 kg / NA (NA)	1
Blade (Knife/Dagger/Bayonet)	IS / Clan (A)	Small / Melee (P)	0	0.02	0.25 kg / NA (NA)	1
Blade (No-Dachi)	IS / Clan (A)	Small / Melee (P)	0	0.05	4.5 kg / NA (NA)	1
Blade (Sword)	IS / Clan (A)	Small / Melee (P)	0	0.07	3.0 kg / NA (NA)	1
Blade (Wakizashi)	IS / Clan (A)	Small / Melee (P)	0	0.02	0.2 kg / NA (NA)	1
Blade (Vibro-axe)	IS / Clan (E)	Small / Melee (P)	0	0.42	5.0 kg / 0.3 kg (15)	1
Blade (Vibro-blade)	IS / Clan (D)	Small / Melee (P)	0	0.21	0.35 kg / 0.3 kg (30)	1
Blade (Vibro-katana)	IS (E)	Small / Melee (P)	0	0.32	3.0 kg / 0.3 kg (30)	1
Blade (Vibro-sword, IS)	IS (E)	Small / Melee (P)	0	0.32	4.0 kg / 0.3 kg (30)	1
Blade (Vibro-sword, Clan)	Clan (F)	Small / Melee (P)	0	0.37	4.0 kg / 0.28 kg (15)	1
Nunchaku	IS / Clan (A)	Small / Melee (P)	0	0.02	1.5 kg / NA (NA)	1
Staff	IS / Clan (A)	Small / Melee (P)N	0	0.04	2.5 kg / NA (NA)	1
Staff (Pole Arm)	IS / Clan (A)	Small / Melee (P)	0	0.04	6.0 kg / NA (NA)	1
Staff (Stun Staff, Single-End)	IS / Clan (C)	Small / Melee (P)N	0	0.07	3.0 kg / 0.3 kg (30)	1
Staff (Stun Staff, Double-End)	IS / Clan (C)	Small / Melee (P)N	0	0.07	3.0 kg / 0.3 kg (15)	1
Stunstick	IS / Clan (C)	Small / Melee (P)N	0	0.07	0.2 kg / 0.25 kg (20)	1
Stunstick (Mini)	IS / Clan (C)	Small / Melee (P)N	0	0.05	0.15 kg / 0.15 kg (15)	1
Thrown (Dart)	IS / Clan (A)	Small / Melee (P)	0	0	0.01 kg / NA (1)	1
Thrown (Hatchet/Tomahawk)	IS / Clan (A)	Small / Melee (P)	0	0.01	1.0 kg / NA (1)	1
Thrown (Knife)	IS / Clan (A)	Small / Melee (P)	0	0	0.25 kg / NA (1)	1
Thrown (Spear)	IS / Clan (A)	Small / Melee (P)	0	0.01	5.0 kg / NA (1)	1
Thrown (Shuriken)	IS / Clan (A)	Small / Melee (P)	0	0	0.1 kg / NA (1)	1
Whip	IS / Clan (A)	Small / Melee (P)N	0	0.05	0.35 kg / NA (NA)	1
Whip (Monowire)	IS / Clan (E)	Small / Melee (P)	0	0.35	0.25 kg / 0.15 kg (15)	1
Whip (Medusa)	Clan (E)	Small / Melee (P)N	0	0.16	0.45 kg / 0.15 kg (20)	1
Whip (Neural Lash)	IS / Clan (D)	Small / Melee (P)N	0	0.09	0.1 kg / 0.15 kg (15)	1
Whip (Neural Whip)	IS (D)	Small / Melee (P)N	0	0.09	0.3 kg / 0.25 kg (20)	1
Pistols						
Auto-Pistol	IS / Clan (C)	Small / Standard (B)	0	0.21	0.5 kg / 0.14 kg (10)	1
Auto-Pistol (Hawk Eagle)	IS (C)	Small / Standard (B)	0	0.27	0.5 kg / 0.11 kg (15/5)	1
Auto-Pistol (Magnum)	IS / Clan (C)	Small / Standard (B)	0	0.21	0.5 kg / 0.14 kg (8)	1
Auto-Pistol (M&G)	IS / Clan (C)	Small / Standard (B)	0	0.17	0.65 kg / 0.11 kg (8)	1
Auto-Pistol (Nambu)	IS / Clan (C)	Small / Standard (B)	0	0.21	0.45 kg / 0.16 kg (12)	1
Auto-Pistol (Serrek 7875D)	IS (C)	Small / Standard (B)	0	0.16	0.4 kg / 0.16 kg (16)	1
Auto-Pistol (Sternsnacht Python)	IS (C)	Small / Standard (B)	0	0.28	0.75 kg / 0.16 kg (12)	1
Dart Gun	IS / Clan (C)	Small / Standard (B)N	0	0.01	0.65 kg / 0.01 kg (1)	1
Flare Pistol	IS / Clan (C)	Small / Support (E)	0	0.09	0.4 kg / 0.02 kg (5)	1
Gauss Pistol	Clan (F)	Small / Standard (B)	0	0.14	1.0 kg / 0.01 kg (4)	1
Gauss Pistol (Hold-Out [Mandrake])	IS (E)	Small / Standard (B)	0	0.02	0.1 kg / 0.01 kg (1)	1
Gyrojet Pistol	IS / Clan (D)	Small / Standard (B)	0	0.04	2.5 kg / 0.18 kg (2)	1
Gyrojet Pistol (Coventry Handrocket)	IS (D)	Small / Standard (B)	1	0.14	3.1 kg / 0.24 kg (5)	1
Gyrojet Pistol (Hold-Out)	IS / Clan (D)	Small / Standard (B)	0	0.04	0.05 kg / 0.02 kg (2)	1
Harpoon Gun (Pequod Mk. I)	IS / Clan (B)	Small / Standard (B)	0	0.02	2.3 kg / 0.14 kg (1)	1
Laser Pistol	IS / Clan (D)	Small / Standard (E)	1	0.21	1.0 kg / 0.3 kg (16)	1
Laser Pistol (Blazer)	IS / Clan (D)	Small / Standard (E)	1	0.26	2.0 kg / 0.3 kg (8)	1
Laser Pistol (ER)	Clan (F)	Small / Standard (E)	1	0.21	1.0 kg / 0.3 kg (10)	1
Laser Pistol (Hold-Out)	IS / Clan (D)	Small / Standard (E)	0	0.14	0.05 kg / 0.02 kg (6)	1
Laser Pistol (Hold-Out [White Dwarf])	IS (D)	Small / Standard (E)	0	0.02	0.25 kg / NA (1-D)	1
Laser Pistol (Nakjima)	IS (D)	Small / Standard (E)	1	0.18	1.0 kg / 0.3 kg (30)	1
Laser Pistol (Sunbeam)	IS (D)	Small / Standard (E)	1	0.28	1.0 kg / 0.3 kg (7)	1
Laser Pistol (Sunbeam Nova)	IS (E)	Small / Standard (E)	0	0.26	1.5 kg / 0.3 kg (3)	1
Needler Pistol	IS / Clan (D)	Small / Standard (B)N	0	0.23	0.3 kg / 0.07 kg (10)	1
Needler Pistol (Hold-Out)	IS / Clan (D)	Small / Standard (B)N	0	0.11	0.05 kg / 0.03 kg (5)	1
Needler Pistol (M&G Flechette)	IS / Clan (D)	Small / Standard (B)N	0	0.11	0.5 kg / 0.17 kg (15/3)	1
Needler Pistol (Sea Eagle)	IS (D)	Small / Standard (B)N	0	0.11	0.35 kg / 0.1 kg (10/2)	1

CONVENTIONAL INFANTRY WEAPONS (CONT)

Weapon	Tech (Rating)	Class/ Type (Damage Type)	Base Range	Damage (each)	Weight of Weapon / Ammo (Shots)	Crew
Paint Gun (LGB-46R)	IS / Clan (C)	Small / Standard (E)	0	0	1.8 kg / 0.64 kg (15)	1
Pistol (Flamer)	IS / Clan (C)	Small / Standard (E)	0	0.34	1.2 kg / 0.8 kg (10)	1
Pistol (Hold-Out)	IS / Clan (D)	Small / Standard (B)	0	0.03	0.2 kg / 0.02 kg (2)	1
Pistol (Makeshift)	IS (B)	Small / Standard (B)	0	0.02	1.0 kg / 0.01 kg (1)	1
Pistol (TK Enforcer Semi-Automatic)	IS (C)	Small / Standard (B)	0	0.20	1.6 kg / 0.20 kg (20/5)	1
Pistol (Spitball Gas Weapon)	IS (C)	Small / Standard (B)	0	0	1.0 kg / 0.04 kg (25)	1
Pistol (Sternsnacht Heavy [Claymore])	IS (C)	Small / Standard (B)	0	0.09	2.5 kg / 0.09 kg (3)	1
Pulse Laser Pistol (Clan)	Clan (F)	Small / Standard (E)	1	0.20	1.0 kg / 0.3 kg (10/2)	1
Pulse Laser Pistol (IS)	IS (D)	Small / Standard (E)	0	0.14	1.0 kg / 0.3 kg (15/3)	1
Revolver	IS / Clan (B)	Small / Standard (B)	0	0.17	0.5 kg / 0.06 kg (6)	1
Revolver (Magnum)	IS / Clan (C)	Small / Standard (B)	0	0.18	0.5 kg / 0.06 kg (5)	1
Sonic Stunner	IS / Clan (D)	Small / Standard (E)N	0	0.07	0.6 kg / 0.3 kg (30)	1
Tranq Gun	IS / Clan (C)	Small / Standard (B)N	0	0.14	1.5 kg / 0.04 kg (10)	1
Rifles						
Auto-Rifle	IS / Clan (C)	Small / Standard (B)	1	0.52	4.0 kg / 0.48 kg (30/2)	1
Elephant Gun	IS / Clan (B)	Small / Standard (B)	1	0.11	5.0 kg / 0.04 kg (2)	1
Gauss Rifle (Thunderstroke)	IS (E)	Small / Standard (B)	1	0.26	7.0 kg / 0.33 kg (5)	1E
Gauss Rifle (Thunderstroke II)	IS (E)	Small / Standard (B)	2	0.53	6.5 kg / 0.42 kg (20)	1
Gyroslug Carbine	IS / Clan (D)	Small / Standard (B)	1	0.28	4.0 kg / 1.84 kg (20)	1
Gyroslug Carbine (Star King)	IS (D)	Small / Standard (B)	1	0.35	5.2 kg / 2.3 kg (20)	1
Gyroslug Rifle	IS / Clan (D)	Small / Standard (B)	1	0.35	8.0 kg / 5.8 kg (50)	1
Gyrojet Gun (Heavy)	IS / Clan (D)	Small / Standard (B)	2	0.21	10.0 kg / 1.0 kg (5)	1
Gyrojet Rifle	IS / Clan (D)	Small / Standard (B)	1	0.35	7.0 kg / 1.3 kg (10)	1
Harpoon (Pequod Mk. 2)	IS / Clan (C)	Small / Standard (B)	1	0.06	4.1 kg / 0.36 kg (2)	1
Laser Rifle	IS / Clan (D)	Small / Standard (E)	2	0.28	5.0 kg / 0.3 kg (6)	1
Laser Rifle (Blazer)	IS / Clan (D)	Small / Standard (E)	2	0.35	7.0 kg / 0.3 kg (3)	1
Laser Rifle (Ebony Assault)	IS (F)	Small / Standard (E)	2	0.21	10.0 kg / 0.3 kg (3)	1
Laser Rifle (ER)	Clan (F)	Small / Standard (E)	3	0.28	5.0 kg / 0.3 kg (6)	1
Laser Rifle (ER, Starfire)	IS (E)	Small / Standard (E)	3	0.28	5.0 kg / 0.3 kg (5)	1
Laser Rifle (Federated-Barrett M61A)	IS (D)	Small / Standard (E)	2	0.75	6.0 kg / 0.3 kg (6)	1
Laser Rifle (Intek)	IS (D)	Small / Standard (E)	3	0.21	5.0 kg / 0.3 kg (15)	1
Laser Rifle (Magna)	IS / Clan (D)	Small / Standard (E)	2	0.26	6.0 kg / 0.3 kg (6)	1
Laser Rifle (Marx XX)	IS / Clan (D)	Small / Standard (E)	3	0.26	6.0 kg / 0.3 kg (5)	1
Laser Rifle (Mauser 960 Assault Sys.)	IS (E)	Small / Standard (E)	2	0.93	10.8 kg / 0.3 kg (15/2)	1
Laser Rifle (Mauser 1200 LSS)	IS (E)	Small / Standard (E)	2	1.04	11.0 kg / 0.3 kg (6/1)	1
Laser Rifle (Mauser IIC)						
(Non-Inferno Ammo)	Clan (F)	Small / Standard (E)	3	1.37	12.0 kg / 0.3 kg (6)	1E
(Inferno Ammo)	Clan (F)	Small / Standard (E)F	3	0.90	12.0 kg / 0.3 kg (6)	1E
Laser Rifle (Maxell PL-10)	IS (D)	Small / Standard (E)	2	0.26	6.5 kg / 0.3 kg (3)	1
Needler Rifle	IS / Clan (D)	Small / Standard (B)N	0	0.23	1.0 kg / 0.2 kg (20)	1
Needler Rifle (Shredder Heavy)	IS (D)	Small / Standard (B)N	0	0.34	1.0 kg / 0.24 kg (10)	1
Needler Rifle (M&G Flechette)	IS / Clan (D)	Small / Standard (B)N	0	0.11	1.5 kg / 0.24 kg (30)	1
Pulse Laser Rifle (Clan)	Clan (F)	Small / Standard (E)	2	0.33	5.0 kg / 0.3 kg (8/1)	1
Pulse Laser Rifle (IS)	IS (D)	Small / Standard (E)	1	0.25	5.0 kg / 0.3 kg (6/1)	1
Rifle (Bolt-Action)	IS / Clan (B)	Small / Standard (B)	1	0.14	3.0 kg / 0.06 kg (5)	1
Rifle (Federated-Barrett M42B)	IS (C)	Small / Standard (B)B	1	1.02	6.0 kg / 0.24 kg (50/5)	1
Rifle (Federated Long)	IS (C)	Small / Standard (B)	1	0.35	5.0 kg / 0.15 kg (10)	1
Rifle (Imperator AX-22 Assault)	IS (C)	Small / Standard (B)	1	0.52	3.5 kg / 0.24 kg (15/1)	1
Rifle (M&G G-150)	IS (C)	Small / Standard (B)	2	0.32	3.5 kg / 0.15 kg (9/3)	1
Rifle (Makeshift)	IS (B)	Small / Standard (B)	1	0.03	6.0 kg / 0.02 kg (1)	1
Rifle (Minolta 9000 Adv. Sniper Sys.)	IS (D)	Small / Standard (B)	2	0.35	6.0 kg / 0.12 kg (10)	1
Rifle (Radium Sniper)	IS (E)	Small / Standard (E)	3	0.36	12 kg / 0.33 kg (5)	1
Rifle (Sniper)	IS / Clan (B)	Small / Standard (B)	2	0.18	10.0 kg / 0.06 kg (5)	1
Rifle (TK Assault)	IS (C)	Small / Standard (B)	1	0.44	5.5 kg / 0.32 kg (20/2)	1
Rifle (Zeus Heavy)	IS / Clan (C)	Small / Standard (B)	1	0.22	8.0 kg / 0.08 kg (5)	1
Shotguns						
Auto-Shotgun	IS / Clan (C)	Small / Standard (B)	0	0.23	5.0 kg / 0.27 kg (12/3)	1
Ceres Arms Crowdbuster	IS (D)	Small / Standard (E)N	0	0.11	1.0 kg / 0.3 kg (15)	1
Gel Gun (Buccaneer)	IS (C)	Small / Standard (B)	0	0.07	2.5 kg / 0.85 kg (5)	1
Shotgun (Avenger CCW)	Clan (C)	Small / Standard (B)	0	0.33	5.5 kg / 0.4 kg (15/5)	1
Shotgun (Combat)	IS / Clan (C)	Small / Standard (B)	0	0.27	4.5 kg / 0.14 kg (8)	1
Shotgun (Double-Barrel)	IS / Clan (B)	Small / Standard (B)	0	0.03	4.0 kg / 0.04 kg (2)	1
Shotgun (Double-Barrel, Sawed-Off)	IS / Clan (B)	Small / Standard (B)	0	0.03	3.0 kg / 0.04 kg (2)	1
Shotgun (Pump-Action)	IS / Clan (B)	Small / Standard (B)	0	0.08	4.0 kg / 0.12 kg (6)	1
Shotgun (Pump-Action, Sawed-Off)	IS / Clan (B)	Small / Standard (B)	0	0.08	3.0 kg / 0.12 kg (6)	1
Submachine Guns						
Auto-Pistol (Mydron)	IS / Clan (C)	Small / Standard (B)	0	0.14	1.5 kg / 0.14 kg (20/4)	1

CONVENTIONAL INFANTRY WEAPONS (CONT)

Weapon	Tech (Rating)	Class/ Type (Damage Type)	Base Range	Damage (each)	Weight of Weapon / Ammo (Shots)	Crew
Auto-Pistol (Stetta)	IS (D)	Small / Standard (B)	0	0.17	2.0 kg / 0.68 kg (100/10)	1
Gauss Submachine Gun	Clan (E)	Small / Standard (B)	1	0.45	4.5 kg / 0.52 kg (30/10)	1
Machine Pistol (Martial Eagle)	IS (D)	Small / Standard (B)	0	0.25	1.8 kg / 0.25 kg (30/3)	1
Submachine Gun	IS / Clan (C)	Small / Standard (B)	0	0.25	3.0 kg / 0.57 kg (50/5)	1
SMG (Gunther MP-20)	IS (C)	Small / Standard (B)	0	0.33	2.5 kg / 0.34 kg (30/6)	1
SMG (Imperator 2894A1)	IS (C)	Small / Standard (B)	0	0.22	4.0 kg / 0.38 kg (50/5)	1
SMG (KA-23 Subgun)	IS (D)	Small / Standard (B)	0	0.22	2.5 kg / 0.3 kg (40/4)	1
SMG (Rorynex RM-3/XXI)	IS / Clan (D)	Small / Standard (B)	0	0.20	3.0 kg / 0.76 kg (100/6)	1
SMG (Rugan)	IS / Clan (C)	Small / Standard (B)	0	0.20	3.5 kg / 0.61 kg (100/7)	1
Grenades (Thrown)						
Grenade						
(Non-Inferno)	IS / Clan (C)	Small / Support (B)	0	0.48	0.6 kg / NA (1-D)	1
(Inferno)	IS / Clan (C)	Small / Support (B)F	0	0.19	0.6 kg / NA (1-D)	1
Grenade (Micro)	IS / Clan (C)	Small / Support (B)	0	0.16	0.2 kg / NA (1-D)	1
Grenade (Mini)						
(Non-Inferno)	IS / Clan (C)	Small / Support (B)	0	0.27	0.45 kg / NA (1-D)	1
(Inferno)	IS / Clan (C)	Small / Support (B)F	0	0.11	0.45 kg / NA (1-D)	1
Grenade (Rocket-Assisted)	IS (C)	Small / Support (B)	1	0.30	0.6 kg / NA (1-D)	1
Support Weapons						
AA Weapon (Mk. 1 Light AA)	IS / Clan (D)	Small / Support (B)A	1	0.23	5.0 kg / NA (1-D)	1
AA Weapon (Mk. 2 Man-Portable AA)	IS / Clan (D)	Medium / Support (B)A	2	0.81	35.0 kg / 14 kg (4)	2
Autocannon (Bearhunter Super-Heavy)	Clan (D)	Medium / Support (B)B	0	2.33	40.0 kg / 9 kg (180/6)	2
Autocannon (Semi-Portable)	IS / Clan (C)	Medium / Support (B)	1	0.77	25.0 kg / 8 kg (200/8)	2
Flamer (Heavy)	IS / Clan (C)	Medium / Support (E)F	0	0.79	25.0 kg / 2.9 kg (3)	2
Flamer (Man-Portable)	IS / Clan (C)	Medium / Support (E)F	0	0.55	15.0 kg / 8.4 kg (12)	1E
Gauss Cannon (Grand Mauler)	IS (E)	Medium / Support (B)	2	0.63	14.0 kg / 4.5 kg (5)	1E
Gauss Rifle (Magshot)	IS (E)	Medium / Support (B)	2	0.74	45.0 kg / 16.5 kg (20)	2
Gauss Rifle (Tsunami Heavy)	IS (E)	Medium / Support (B)	2	0.63	12.5 kg / 4.5 kg (5)	1E
Gauss Rifle, Light (David)	IS (E)	Medium / Support (B)	3	0.56	18 kg / 2.0 kg (8/2)	1E
Gauss Rifle, Light (King David)	IS (E)	Medium / Support (B)	3	0.68	30 kg / 16.0 kg (80/16)	2
Grenade Launcher						
(Non-Inferno Ammo)	IS / Clan (C)	Small / Support (B)	1	0.81	5.0 kg / 4.5 kg (10)	1
(Inferno Ammo)	IS / Clan (C)	Small / Support (B)F	1	0.34	5.0 kg / 4.5 kg (10)	1
Grenade Launcher (Automatic)						
(Non-Inferno Ammo)	IS / Clan (C)	Medium / Support (B)	1	1.49	12.0 kg / 9 kg (20/4)	1
(Inferno Ammo)	IS / Clan (C)	Medium / Support (B)F	1	0.41	12.0 kg / 9 kg (20/4)	1
Grenade Launcher (Compact)	IS / Clan (C)	Small / Support (B)	1	0.16	3.0 kg / 0.2 kg (1)	1
Grenade Launcher (Heavy)						
(Non-Inferno Ammo)	IS (C)	Medium / Support (B)	1	1.76	18.0 kg / 12.0 kg (20/4)	1E
(Inferno Ammo)	IS (C)	Medium / Support (B)F	1	0.69	18.0 kg / 12.0 kg (20/4)	1E
Grenade Launcher (Heavy Auto)						
(Non-Inferno Ammo)	Clan (D)	Medium / Support (B)	1	1.93	20.0 kg / 12.0 kg (20/3)	1E
(Inferno Ammo)	Clan (D)	Medium / Support (B)F	1	0.96	20.0 kg / 12.0 kg (20/3)	1E
Laser (Hellbore Assault)	IS (E)	Medium / Support (E)	2	0.63	10.0 kg / 3 kg (15)	1E
LRM Launcher (Corean FarShot)						
(Non-Inferno Ammo)	IS (D)	Medium / Support (M)	3	0.48	30.0 kg / 8.3 kg (1)	1E
(Inferno Ammo)	IS (D)	Medium / Support (M)F	3	0.19	30.0 kg / 8.3 kg (1)	1E
Machine Gun (Light)	IS / Clan (C)	Medium / Support (B)	1	0.49	7.0 kg / 2 kg (45/3)	1
Machine Gun (Portable)	IS / Clan (C)	Medium / Support (B)B	1	0.65	11.5 kg / 3 kg (75/5)	1E
Machine Gun (Semi-Portable)	IS / Clan (C)	Medium / Support (B)B	1	0.75	20.0 kg / 4 kg (80/4)	2
Machine Gun (Support)	IS / Clan (C)	Medium / Support (B)B	2	0.94	44.0 kg / 5 kg (100/5)	2
Mortar (Heavy)						
(Non-Inferno Ammo)	IS / Clan (B)	Medium / Support (B)	3	0.57	220.0 kg / 4 kg (1)	3
(Inferno Ammo)	IS / Clan (B)	Medium / Support (B)F	3	0.34	220.0 kg / 4 kg (1)	3
Mortar (Light)						
(Non-Inferno Ammo)	IS / Clan (B)	Medium / Support (B)	1	0.53	50.0 kg / 2 kg (1)	2
(Inferno Ammo)	IS / Clan (B)	Medium / Support (B)F	1	0.26	50.0 kg / 2 kg (1)	2
MRM Launcher						
(Non-Inferno Ammo)	IS (D)	Medium / Support (M)	2	0.53	30.0 kg / 5 kg (1)	1
(Inferno Ammo)	IS (D)	Medium / Support (M)F	2	0.26	30.0 kg / 5 kg (1)	1
Needler, Support (Firedrake)	IS (D)	Medium / Support (B)F	1	1.20	25 kg / 3 kg (30/3)	2
Particle Cannon (Semi-Portable)	IS / Clan (D)	Medium / Support (E)	2	0.72	40.0 kg / 3 kg (25)	2
Particle Cannon (Support)*	IS / Clan (D)	Medium / Support (E)	3	1.58	1,800.0 kg / 25 kg (150)	5
Plasma Rifle, Man-Portable	IS (E)	Medium / Support (E)F	2	1.58	30 kg / 18 kg (10)	1E
Pulse Laser (Dragonsbane Disp.)	IS (E)	Medium / Support (E)	3	0.16	7.0 kg / NA (1-D)	1E
Recoilless Rifle (Heavy)						
(Non-Inferno Ammo)	IS / Clan (C)	Medium / Support (B)	2	0.57	60.0 kg / 4 kg (1)	3
(Inferno Ammo)	IS / Clan (C)	Medium / Support (B)F	2	0.34	60.0 kg / 4 kg (1)	3

CONVENTIONAL INFANTRY WEAPONS (CONT)

Weapon	Tech (Rating)	Class/ Type (Damage Type)	Base Range	Damage (each)	Weight of Weapon / Ammo (Shots)	Crew
Recoilless Rifle (Light)						
(Non-Inferno Ammo)	IS / Clan (C)	Small / Support (B)	2	0.48	8.0 kg / 0.6 kg (1)	1E
(Inferno Ammo)	IS / Clan (C)	Small / Support (B)F	2	0.19	8.0 kg / 0.6 kg (1)	1E
Recoilless Rifle (Medium)						
(Non-Inferno Ammo)	IS / Clan (C)	Medium / Support (B)	2	0.53	32.0 kg / 2 kg (1)	2
(Inferno Ammo)	IS / Clan (C)	Medium / Support (B)F	2	0.26	32.0 kg / 2 kg (1)	2
Rocket Launcher (LAW)	IS / Clan (C)	Small / Support (M)	2	0.53	4.0 kg / NA (1-D)	1
Rocket Launcher (V-LAW)	IS / Clan (C)	Small / Support (M)	1	0.48	2.2 kg / NA (1-D)	1
SRM Launcher (Standard, Two-Shot)						
(Non-Inferno Ammo)	IS / Clan (C)	Medium / Support (M)	2	1.14	30.0 kg / 20 kg (2)	1E
(Inferno Ammo)	IS / Clan (C)	Medium / Support (M)F	2	0.68	30.0 k / 20 kg (2)	1E
SRM Launcher (Heavy)						
(Non-Inferno Ammo)	IS / Clan (C)	Medium / Support (M)	2	0.57	20.0 kg / 18 kg (1)	1E
(Inferno Ammo)	IS / Clan (C)	Medium / Support (M)F	2	0.34	20.0 kg / 18 kg (1)	1E
SRM Launcher (Light)						
(Non-Inferno Ammo)	IS / Clan (C)	Medium / Support (M)	2	0.57	10.0 kg / 9 kg (2)	1
(Inferno Ammo)	IS / Clan (C)	Medium / Support (M)F	2	0.34	10.0 kg / 9 kg (2)	1
Support Laser	IS / Clan (D)	Medium / Support (E)	3	0.84	72.0 kg / 3 kg (15)	2
Support Laser (ER, IS)	IS (E)	Medium / Support (E)	4	0.84	110.0 kg / 3 kg (10)	2
Support Laser (ER, Clan)	Clan (F)	Medium / Support (E)	4	1.05	100.0 kg / 3 kg (10)	2
Support Laser (ER Heavy, IS)	IS (E)	Medium / Support (E)	6	1.05	250.0 kg / 3 kg (7)	4
Support Laser (ER Heavy, Clan)	Clan (F)	Medium / Support (E)	7	1.26	240.0 kg / 3 kg (7)	3
Support Laser (ER, Semi-Portable)	Clan (F)	Medium / Support (E)	3	0.70	25.0 kg / 3 kg (15)	2
Support Laser (Heavy)	IS / Clan (D)	Medium / Support (E)	5	1.47	300.0 kg / 3 kg (7)	3
Support Laser (Heavy, Semi-Portable)	Clan (F)	Medium / Support (E)	3	1.05	150.0 kg / 3 kg (10)	3
Support Laser (Semi-Portable)	IS / Clan (D)	Medium / Support (E)	3	0.61	40.0 kg / 3 kg (21)	2
Support Laser (Ultra-Heavy)	Clan (F)	Medium / Support (E)	5	1.72	250.0 kg / 3 kg (5)	4
Support Pulse Laser	IS / Clan (E)	Medium / Support (E)B	3	0.81	150.0 kg / 3 kg (21/4)	2
Support Pulse Laser (Heavy)	IS / Clan (E)	Medium / Support (E)B	4	0.98	300.0 kg / 3 kg (18/3)	4
Support Pulse Laser (Semi-Portable)	Clan (F)	Medium / Support (E)	2	0.55	40.0 kg / 3 kg (25/2)	2

* The Support Particle Cannon is considered to be a vehicle in itself, with an effective MP of 2 (Tracked); it may thus only be employed by Motorized/Mechanized (Tracked) infantry platoons.
A = Anti-Air capable; B = Burst-Fire Capable; F = Flame-based weapon; N = Non-Penetrating Weapon

AEROSPACE WEAPON CLASSES

Autocannons

Inner Sphere	*Clan*
Standard ACs (All); Light ACs (All); Rotary ACs (All); Ultra ACs (All); Gauss Rifles (All); Light Machine Gun	Ultra ACs (All), Gauss Rifles (Standard and HAG only); Light Machine Gun

Lasers

Inner Sphere	*Clan*
ER Lasers (Small, Medium, Large); Standard Lasers (Medium and Large); TAG	ER Lasers (Micro, Small, Medium, Large); Heavy Lasers (Small, Medium, and Large)*; TAG

LB-X Autocannons

Inner Sphere	*Clan*
LB-X ACs (All)	LB-X ACs (All)

Pulse Lasers

Inner Sphere	*Clan*
Pulse Lasers (Medium and Large)	Pulse Lasers (Small, Medium, and Large)

Point Defense Weapons

Inner Sphere	*Clan*
Anti-Missile System; Standard Laser (Small); Pulse Laser (Small); Flamers (All); Machine Guns (Standard and Heavy)	Anti-Missile System; Pulse Laser (Micro); Flamers (All); Machine Guns (Standard and Heavy); Gauss (AP)

PPCs

Inner Sphere	*Clan*
PPC, ER PPC, Light PPC, Heavy PPC, Snub-Nose PPC	ER PPC

Plasma Weapons

Inner Sphere	*Clan*
Plasma Rifle	Plasma Cannon

ATMs

Inner Sphere	*Clan*
None	(all)

LRMs

Inner Sphere	*Clan*
LRMs (All); LRMs + Artemis (All)	LRMs (All); LRMs + Artemis (All)

MMLs

Inner Sphere	*Clan*
MMLs (All); MMLs + Artemis (All)	None

MRMs

Inner Sphere	*Clan*
MRMs (All)	None

Rocket Launchers

Inner Sphere	*Clan*
Rocket Launchers (All)	None

SRMs

Inner Sphere	*Clan*
SRMs (All); SRMs + Artemis (All); Streak SRMs (All)	SRMs (All); SRMs + Artemis (All); Streak SRMs (All)
Narc Launcher; iNarc Launcher	Narc Launcher

Capital Missiles

Inner Sphere	*Clan*
Killer Whales (All); White Sharks (All); Barracudas (All); AR-10s (All); Kraken-T; Screen Launcher	Killer Whales (Standard only); White Sharks (Standard only); Barracudas (Standard only); AR-10s (Standard only)

*Laser Weapon Bays that include Heavy Lasers suffer a +1 to-hit modifier to all attacks.