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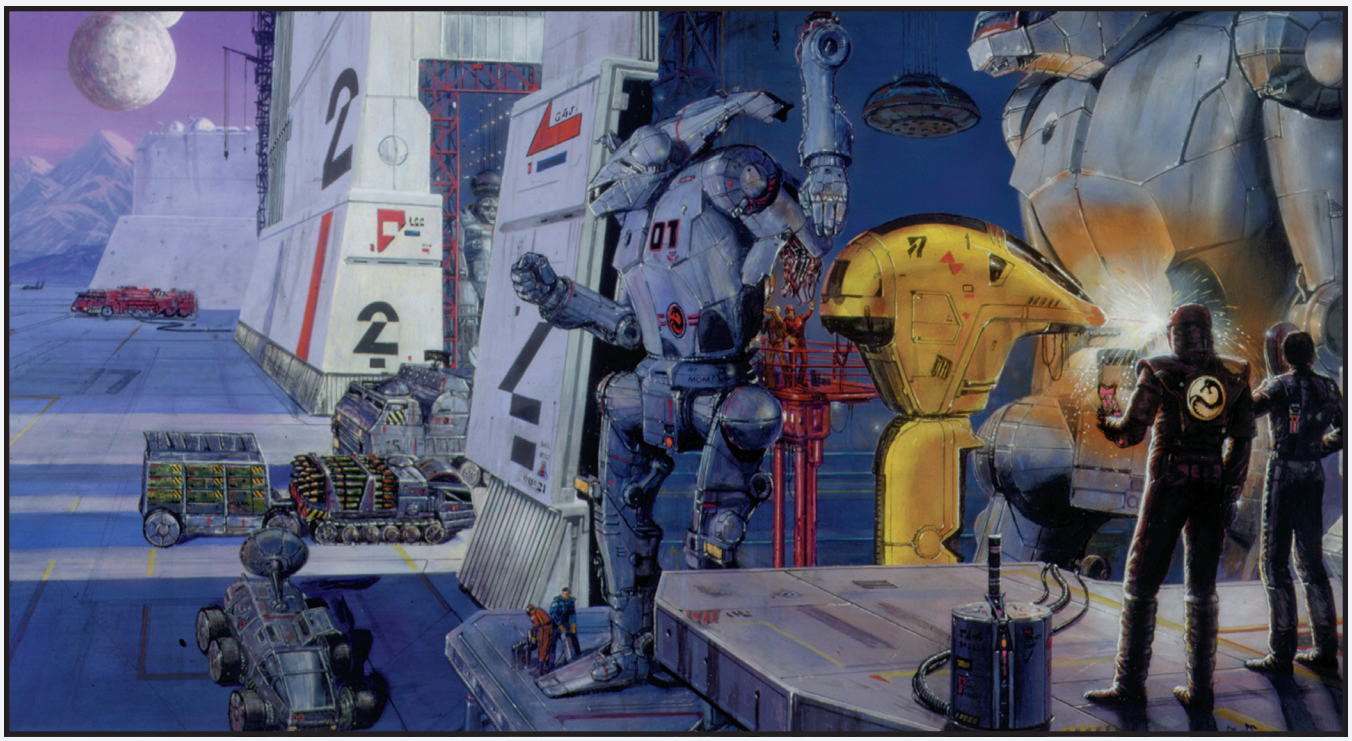

Draconis Combine technicians work to retrofit captured HCT-3F Hatchetman *'Mechs at a mobile firebase.*

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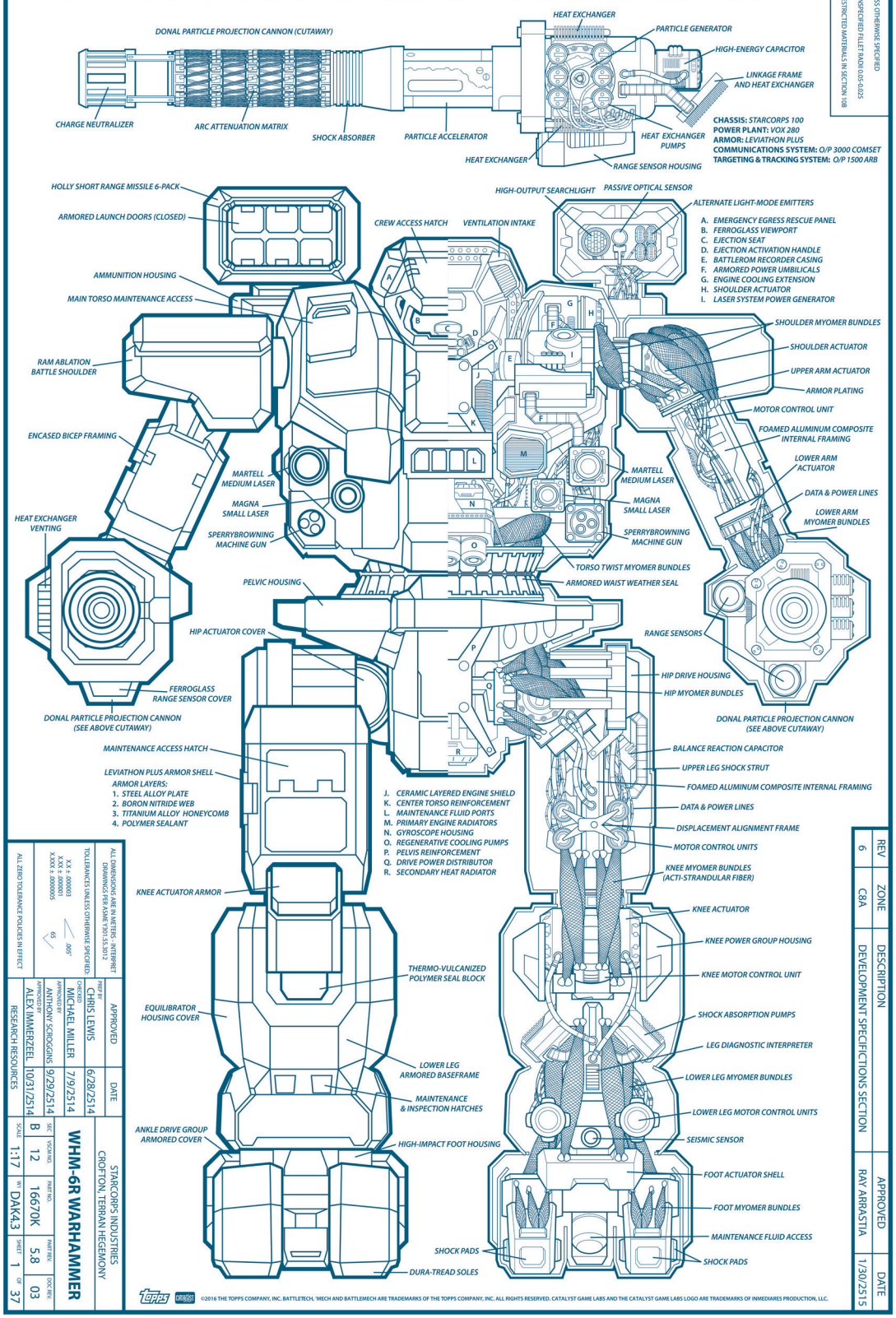

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Dedication

To Tara Suzanne Bills for allowing me to continue playing in the sand box that I love even as I'm supposed to be "moving on." If you love this book, give her a giant thanks the next time you see her.

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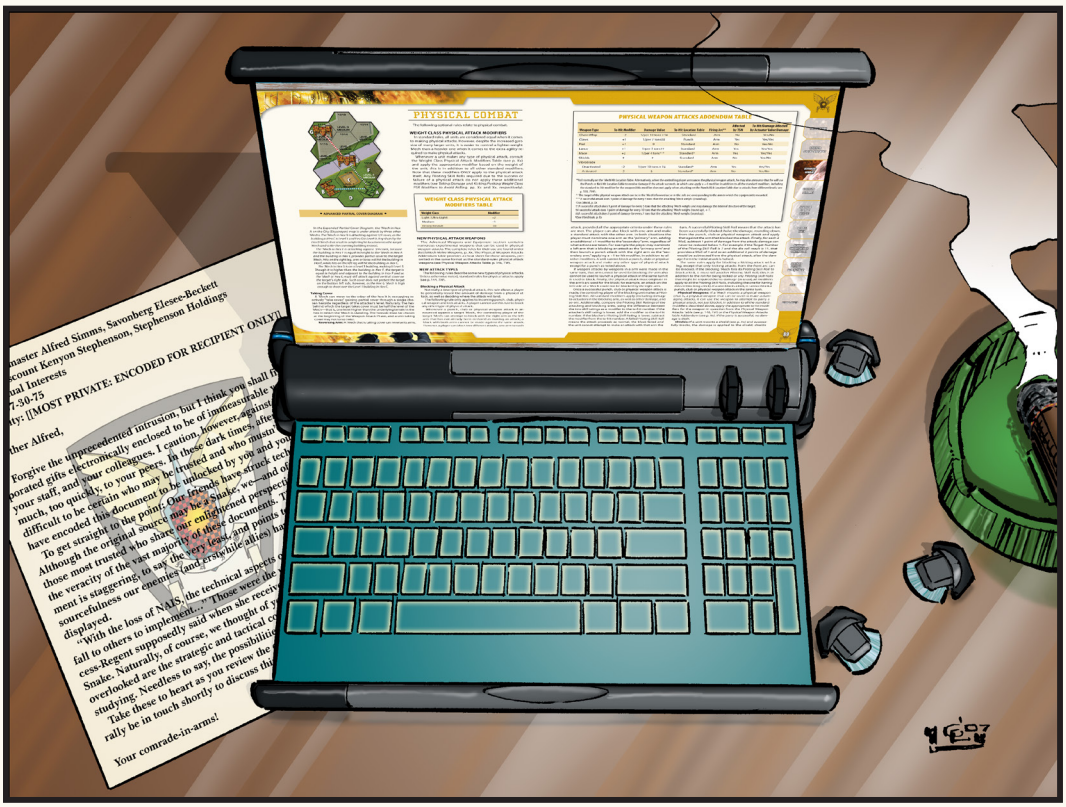


The *Total Warfare* (*TW*) and *TechManual* (*TM*) rulebooks present the core game and construction rules for *BattleTech* (*BT*), otherwise referred to as the standard rules. These two volumes encompass eight core unit types—several of which contain numerous sub-unit types—and a host of weapons and rules, as well as covering many different game situations. However, despite the breadth of play covered, many game situations still fall outside those rules, not to mention a plethora of more advanced equipment, as well as a few advanced units.

ADVANCED RULES

Beyond the standard rules, a legion of advanced rules exists, allowing players to expand their games in any direction they desire. In an effort to bring these rules to players in the most logical form possible, the advanced rules are contained in five core rulebooks, each one staging up and building off of the previous rules set. Additionally, each one focuses on a particular "in-universe time frame" that will allow players to easily grasp where a given rulebook will "plug into" their existing game play.

TACTICAL OPERATIONS (2 VOLUMES)

SitRep:
Forces on-world.
Conflict expected to last mere hours to achieve object.

ADVANCED RULES

Tactical Operations: Advanced Rules (*TO: AR*) is the first in the "staging" Advanced Rulebooks. Its focus is during game play, and applies directly to a game as it unfolds on a world in the *BattleTech* universe; its rules represent hours in-universe, the time frame it takes for a single, moderate-sized battle to play out on a gaming table.

Building on *Total Warfare*, *TO: AR* conveys numerous advanced rules for movement and combat across various units, while expanding core rules such as those for buildings, and implementing a host of advanced terrain and weather rules.

ADVANCED UNITS AND EQUIPMENT

Tactical Operations: Advanced Units and Equipment (*TO: AUE*) is the rulebook you are holding in your hands. Building on *TechManual*, *TO: AUE* presents rules for the construction and use of advanced Support Vehicles, as well as advanced and prototype construction options and weapons for use by almost every unit. To use the construction rules, designers will need paper and pencils, as well as copies of the Blank Record Sheets found at the back of this book. Due to the complexities involved with the construction of the Advanced Support Vehicles, a calculator will be handy as well.

These books contain a number of rules changes from previous editions. We feel confident that these are the most complete, clear and concise advanced rules for *BattleTech* ever presented.

These rules supersede all previously published rules, including the *BattleTech Manual*, *BattleTech Compendium*, *BattleTech Compendium: The Rules of Warfare*, *BattleTech Master Rules* (standard and revised editions), *Combat Equipment*, *Tactical Handbook*, *Maximum Tech* (standard and revised editions) and *Unbound*.

STRATEGIC OPERATIONS

SitRep:
Forces in solar system.
Beginning burn to planet.
Conflict expected to last weeks to achieve object.

Strategic Operations (*SO*) is the second "staging" Advanced Rulebook. It contains advanced movement and combat operations emphasizing the importance of aerospace units, while extensive rules cover combat drops of numerous troop types into any situation. Complete game play and construction rules for advanced aerospace units are also included.

INTERSTELLAR OPERATIONS (2 VOLUMES)

SitRep:
Forces marshaled.
Flotillas assigned to target solar systems.
Conflict expected to last months to achieve objects.

ALTERNATE ERAS

Interstellar Operations: Alternate Eras (*IO:AE*) contains a huge swath of units and rules that can be plugged into any Era, as well as any level of play, from a simple scenario up to the largest scale battles.

BATTLEFORCE

Interstellar Operations: BattleForce (*IO:BF*) is the third "staging" Advanced Rulebook. Players are staged up to the final level of play, where they can assume the roles of a House Lord or Clan Khan and dominate the galaxy; *IO:BF* rules can represent months in the *BattleTech* universe, the time frame for conquering numerous star systems.

IO:BF contains complete rules for generating and running any type or size of force. Additionally, a comprehensive rules set governs the running of an entire faction's military as a player tries to conquer (or defend) numerous solar systems. More importantly, the system contains rules that allow players to stage any portion of a given conflict back through the various rule sets, as they desire–from the simple, easy-to-use rules of conflict at the largest scale, or all the way back down to a standard *BattleTech* game as presented in *Total Warfare* and *Tactical Operations*. Players have complete flexibility for any type of conflict in which they wish to engage.

CAMPAIGN OPERATIONS

SitRep:
Prepare forces.
Assign objectives, targets, and plans of attack across a world or a swath of interstellar space.
Wage war to achieve your final objective.

Campaign Operations (CO) is the foundational book to prepare players for campaigns that can encompass all of the previous Advanced Rulebooks. Incorporating elements from all of the previous rulebooks, as well as *Alpha Strike Commander's Edition*, *CO* represents an entire campaign, scenario, or story arc within the BattleTech universe. Players can assume the roles of any unit within the universe or create their own iconic force.

Campaign Operations contains rules for the construction and detailing of solar systems, building an opposing force to put in conflict with the players, crafting specialized scenario and campaign arcs, and constructing a stylized *Chaos Campaign* that fits a group's play style. Players and gamemasters can use these rules with *Total Warfare* (and subsequent Advanced Rulebooks), *A Time of War RPG*, and the *Alpha Strike* system.

CHOOSE YOUR RULES

Tactical Operations encapsulates a myriad of advanced rules. In effect, all the weapons/equipment in this volume are optional. This means you can use as many or as few of the equipment in this book as you want. (In fact, this book contains so much new equipment that we recommend you try them out a few at a time, rather than attempting to use them all at once.) You can add pieces of equipment to your game one at a time. This allows you to tailor your *BattleTech* game to your taste by including only those pieces of equipment that you find make the game more interesting or fun. Use whatever new equipment you want and disregard the rest. Given the scope of the rules and the fact that they are optional, all players in a group should read through and agree to the use of any of these weapons/equipment.

PLAYER ADJUDICATION

An advanced-rules book for any game is, almost by definition, more complex. In a game system with such a long and rich heritage as *BattleTech*—this rulebook alone draws from dozens of different sources across a large number of years—that complexity is even greater. Developers and writers have gone to great effort to make these rules as comprehensive as possible—not only from one section to the next in this book, but in how such advanced weapons interact with the core game and construction rules as presented in *Total Warfare* and *TechManual*. However, the sheer scope of *Tactical Operations* and the plethora of options provided (in the more than 100 pages of advanced weapons and equipment) means that it is not possible to cover all potential situations. Once this product reaches the players' hands, they'll envision scenarios and create situations on a game board that never crossed the minds of the developers or the legion of authors and playtesters that thoroughly worked over this product.

With that in mind, when players encounter situations not covered in the rules as they integrate the contents of *Tactical Operations* into their playing group, they are encouraged to adjudicate each situation appropriately; make up the rules that work for you. If in the process a playing group runs into an argument, feel free to let a die roll resolve any disputes so you can return to playing the game and having fun.

Finally, the forums on bg.battletech.com are an excellent resource. Players can join a strong and vibrant online community, tapping a wide selection of players for different ideas on how best to adjudicate a particular situation.

FICTION

As described in *Total Warfare* and *TechManual*, 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, while *TechManual* concentrated on sourcebook fiction. *Tactical Operations* covers something of a middle ground, with various story and sourcebook fiction sections found throughout the book.

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* and *TechManual*, 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. All fiction sections are italicized in the table of contents.

As with *TechManual*, the 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

Tactical Operations follows the graphic design format established by *Total Warfare* and *TechManual*, wedding art to the book's visual presentation in order to enhance the players' experience. In this case, the graphic presentation represents a computer from House Davion's New Avalon Institute of Science, one of the Inner Sphere's largest and most advanced universities for the study and development of new technologies (see *A Time of War*, p. 17, *TW*).

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

COMPONENTS

Page 26 of *Total Warfare* (as well as p. 13 of *TM*) discusses several Support Vehicles that exist in the *BattleTech* universe, but fall outside the purview of the standard-rules game and construction rulebooks. Those units are discussed here.

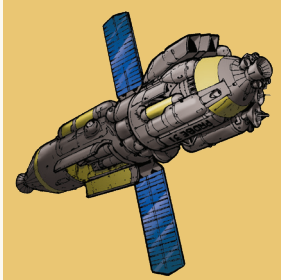
SUPPORT VEHICLES

In addition to the Support Vehicles described on page 25 of *Total Warfare*, the *BattleTech* universe also includes Satellites and Rail systems.

Note: Game and construction rules for Large Airships and Large Naval Support Vehicles are not covered in *Total Warfare* or *TechManual*—though the Small- and Medium-sized classes of both unit types are covered in those volumes—but instead appear in this rulebook.

Satellites

Used for communications, surveying and information-gathering—and often for spying during battles—Satellites rely on station-keeping drives and lack the powerful propulsion systems that would make them true spacecraft.



Satellite

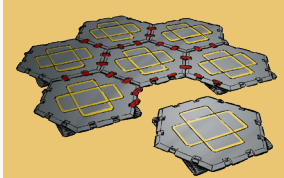
Rail Systems

Rail systems transport cargo and passengers over land. Standard Rail requires little technology to produce or maintain, but advanced maglev systems (which require a much higher level of technology) achieve far greater speed by suspending the train above the track and propelling it with powerful magnetic fields.

Rail System

MOBILE STRUCTURES

An exceptionally rare sight in the *BattleTech* universe, Mobile Structures represent super-large units and mobile buildings. Such unique constructs are usually reserved for wealthy planets that can afford such extravagance (such as super-large wet-navy container ships, or DropShip transports), or specialized planetary environments, where the costs of construction and maintenance are outweighed by the needs of survival, or the desire to plumb harsh environmental locations for rare minerals and so on.



Mobile Structure

RECORD SHEETS

Players use the following record sheets to track various types of information while playing *BattleTech*. Each type of unit (Satellites, Mobile Structures and Large Naval Support Vessels) uses a unique record sheet, while Rail and Large Airship Support Vehicles use Combat Vehicle Record Sheets appropriate to the unit type. 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.

Construction

As noted in *TechManual*, at the end of the design process for any construction rules presented in this volume, 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*.

LARGE NAVAL VEHICLE RECORD SHEET

The Large Naval Vehicle Record Sheet has much in common with the Naval Vehicle Record Sheet. Therefore, only those sections unique to the Large Naval Vehicle Record Sheet are discussed below.

Critical Damage

In addition to the standard critical damage tracked by Small- and Medium size-class Naval Vessels, the Large Naval Vessel includes the various turrets that can be mounted on such a unit.

Armor Diagram

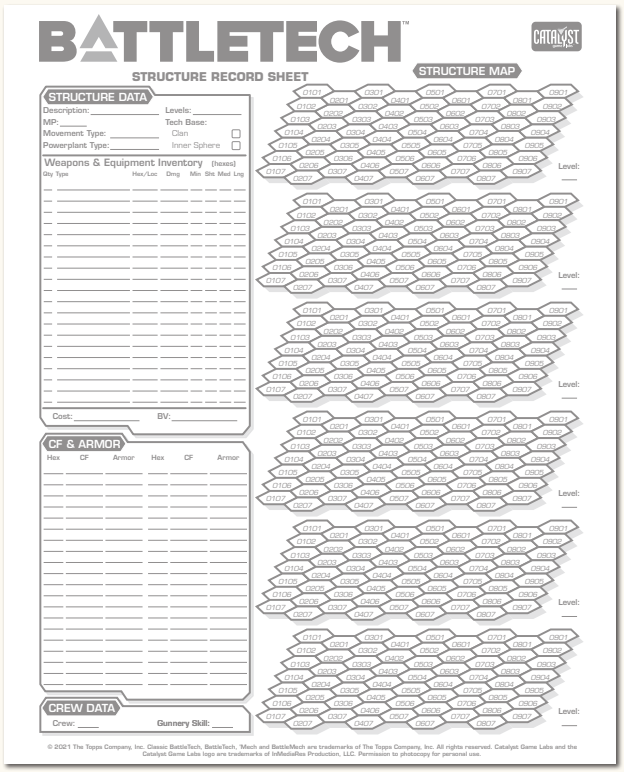
While a standard Naval Vehicle divides its Armor Diagram into five sections (Front, Right, Left, Rear and Turret), a Large Naval Vehicle has six locations (Front, Left Front, Right Front, Left Rear, Right Rear and Rear) as well as the potential for eight turrets (see *Tables*, below).

Tables

In place of the standard tables displayed on all vehicle record sheets, the bottom left of the record sheet includes the armor and internal structure for the eight turrets that a Large Naval Vessel can mount.

SATELLITE RECORD SHEET

The Satellite Record Sheet has much in common with the Aerodyne DropShip Record Sheet. Therefore, only those sections unique to the Satellite Record Sheet are discussed below.


BATTLETECH
CATALYST GAME LABS
STRUCTURE RECORD SHEET
STRUCTURE MAP
STRUCTURE DATA
Description: _____ Levels: _____
MP: _____ Tech Base:
Movement Type: _____ Clan
Powerplant Type: _____ Inner Sphere
Weapons & Equipment Inventory (hexes)
Qty Type Hex/Loc Dmg Min Shs Med Lng
Cost: _____ BV: _____
CF & ARMOR
Hex CF Armor Hex CF Armor
CREW DATA
Crew: _____ Gunnery Skill: ____
Level:
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Unit Data

A satellite does not have a Safe or Maximum Thrust, but only a Station-Keeping Thrust, which is why no Velocity Track appears on the record sheet.

Critical Damage

Only critical damage that applies to a Satellite is included here.

STRUCTURE RECORD SHEET

The Structure Record Sheet is for use when constructing a Mobile Structure (see p. 33).

Structure Map

In advanced-rules play, several rules options require tracing specific building hexes vertically and horizontally. Additionally, the Structure Map is designed to help players create truly large structures using multiple record sheets. For example, Record Sheet A could track Levels 1 to 6, while Record Sheet B could track the same horizontal area from Levels 7 to 12. On Record Sheet C, the players may add a "right side" to the sheet to show that the horizontal locations of these building hexes are conjoined exactly to the right of Record Sheet A, and so on.

Structure Data

The Structure Data block is located in the upper left corner of the record sheet and includes the total levels of the structure, what technology base was used when constructing the structure, and the Weapons Inventory for tracking what weapons a Mobile Structure may mount; weapons of identical types and location may be combined on a single line to conserve space (ammunition is noted on a separate line). The Cost and Battle Value of the Mobile Structure can also be noted in this location. This section also tracks the MP, Movement Type and Powerplant Type.

CF and Armor

The CF & Armor block is located in the bottom left of the record sheet and includes a double column for tracking the Construction Factor and Armor of various hexes. Note that this section is not designed to track all hexes (the Structure Map accomplishes that task), but to track those specific hexes that have been damaged during play.

Crew Data

This block lists the number of crew and their Gunnery Skill.

ADDITIONAL RECORD SHEETS AND TEMPLATES

The following additional record sheets are also found at the end of this rulebook, but are described elsewhere in this volume.

Large Naval Template

This is not a record sheet in the normal sense of the word, as it is not used to track unit information during game play. Instead, it is a template used in conjunction with Large Naval Vessel Support Vehicles (see p. 22) and grounded Large Airship Support Vehicles (see p. 32) during game play.

Mobile Structure Template

This is not a record sheet in the standard use of that word in the *BattleTech* game system. Instead, this record sheet is provided as a way to easily photocopy and cut out whatever sized Mobile Structure template a player desires for use on the playing area (see *Mobile Structures*, p. 33).

TACTICAL ANALYSIS

It would be a waste of valuable time and resources to recap the history of military tactical and industrial development, especially in light of the current conflict. Suffice to say, in the centuries since the rise and fall of the first and only true Star League, humankind has been battered back to the brink of technological collapse, only to see the dawn of a tainted renaissance. The recovery of the Gray Death Memory Core unlocked the technologies lost centuries before—and almost too late to level the playing field between the Inner Sphere and the coming Clan threat. Militarily, this accomplishment brought with it more than a mere hope for survival, however. It also unleashed new ambitions that verged on drying out from the exhaustion of the Succession Wars: the hunger for universal conquest, the rebirth of humankind's Golden Age under the banner of a single House.

Only the Clans' arrival would forestall a Fifth Succession War—and would even, briefly, unite the Great Houses against a common foe long enough to give birth to a new Star League. But in the end, the inevitable bickering and distrust resurfaced, and the armies of the Inner Sphere once more marched against each other, even with the Clan threat looming ominously above. And so, less than fifty years after the close of the last Succession War, amid the smoke of a dozen and more new wars—great and small—the armies of the Inner Sphere and the forces of the Clan juggernaut once more stood on the brink of an all-engulfing conflict, fueled by an arms race not seen since the days of the Terran Hegemony. The promise of a new age under a new Star League—an age where the rediscovery of the glorious knowledge of our civilization's peak promised an end to human suffering—was dashed anew by the petty rivalries of an old order.

And in a fit of blinding rage came the Word of Blake Jihad, a war against everyone, everywhere.

Amid the turmoil of this conflict, it is still difficult to gauge its full effects. Even now, nearly eight years later, the overall strength of the Inner Sphere and Clan militaries can only be guessed at, while the devastating effects on major military industries across human-occupied space can only be suggested. For some powers, even the identity of their military leaders remains unclear. And all the while the tech race resumes, as desperate armies clamor for any weapon they can find to stem the tides of chaos.

This is the Inner Sphere of today—a universe once again at war, locked in the throes of chaos and despair.

—Logan DeMarco,
INN Military Industrial Analyst, Arc-Royal,
14 November 3075

HOUSE STEINER (LYRAN ALLIANCE)

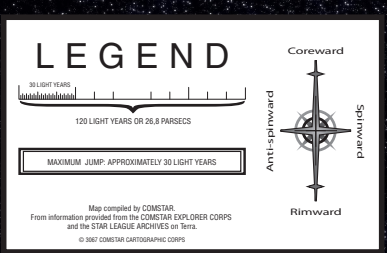
GREAT HOUSE

MOST PROMINENT CENTER OF INNOVATION (3067)	New Cambridge University of Wessex
MAJOR DEFENSE INDUSTRIES (3067)	Arc-Royal MechWorks, Blackstone BattleMechs, Ltd., Bowie Industries, Brigadier Corporation, Coventry Metal Works, Cyclops Incorporated, Defiance Industries, Gienah Combat Vehicles, Lockheed/CBM Corporation, New Earth Trading Company, Quikscell Company, Semier Data Tron, Shipil Company, StarCorps Industries, TharHes Industries, Tharkad Aerospace Group, Yankee Weapons Systems
MOST RECENT INNOVATIONS	Ultra AC/20 (3060), Heavy Gauss Rifle (3061), Bombast Laser (3064*), M-Pod (3064*), Improved Heavy Gauss (3065*), Chaff Pod (3069*), Thunderbolt Launcher (3072)
Tech Rating: E	First Rediscovered: XL Engine (3035)
	Latest Innovation: Thunderbolt Launcher

HOUSE MARIK (FREE WORLDS LEAGUE)

GREAT HOUSE

MOST PROMINENT CENTER OF INNOVATION (3067)	Free Worlds Technical Institute
MAJOR DEFENSE INDUSTRIES (3067)	Andurien Aerotech, Brigadier Corporation, Brooks Incorporated, Corean Enterprises, Deller, Bingham and Fouts, Earthwerks Incorporated, Exeter Organization, Gibson Federated BattleMechs, Grumman Amalgamated, Imstar AeroSpace, Irian BattleMechs Unlimited, Kali Yama / Alphard Trading Corp., Kali Yama Weapons Industries Inc., Kallon Industries, Ronin Inc., Nimakachi Fusion Products Ltd., Quikscell Company
MOST RECENT INNOVATIONS	Light Gauss Rifle (3056), Ultra AC/2 (3057), Ultra AC/10 (3057), Variable Speed Pulse Lasers (3070)
Tech Rating: E	First Rediscovered: Artemis IV FCS (3035)
	Latest Innovation: Variable Speed Pulse Lasers



CLAN JADE FALCON

MOST PROMINENT CENTER OF INNOVATION (3067)	Scientist Caste (Scientist-General Renata [Salk])
MAJOR DEFENSE INDUSTRIES (3067)	Olivetti Weaponry, Red Devil Industries, Trellshire Heavy Industries
MOST RECENT INNOVATIONS	Laser Heat Sinks (3055), Laser Reflective Armor (3061*), BattleMech Partial Wing (3067*), ER Flamer (3067), Heavy Flamer (3067), AP Gauss Rifle (3069), BattleMech Talons (3072)
Tech Rating: F	First Rediscovered: None; Latest Innovation: BattleMech Talons

CLAN

GHOST BEAR DOMINION

MOST PROMINENT CENTER OF INNOVATION (3067)	Scientist Caste (Scientist-General Jorge [Agassiz])
MAJOR DEFENSE INDUSTRIES (3067)	Alshain Weapons, Benson and Bjorn, Bergan Industries, Joint Equipment Systems
MOST RECENT INNOVATIONS	Hardened Armor (3061*), Reactive Armor (3065*)
Tech Rating: F	First Rediscovered: None; Latest Innovation: Reactive Armor

CLAN

HOUSE KURITA (DRACONIS COMBINE)

MOST PROMINENT CENTER OF INNOVATION (3067)	The Imperial Institute of Technology
MAJOR DEFENSE INDUSTRIES (3067)	BBP Industries, Buda Imperial Vehicles, Bulldog Enterprises, Galileo Instruments, Independence Weaponry, Luthien Armor Works, New Samarkand Metals, Scarborough Manufacturers, Wakazashi Enterprises, Yori 'Mech Works
MOST RECENT INNOVATIONS	C3 Computer (3050), Medium Range Missiles (3058), Light PPC (3067), Heavy PPC (3067), Snub-Nose PPC (3067), MRM Fire Control system (3071)
Tech Rating: E	First Rediscovered: Endo Steel Internal Structure (3035); Latest Innovation: MRM Fire Control system

GREAT HOUSE

HOUSE LIAO (CAPELLAN CONFEDERATION)

MOST PROMINENT CENTER OF INNOVATION (3067)	Victoria Academy of Arms and Technology
MAJOR DEFENSE INDUSTRIES (3067)	Aldis Industries, Bergan Industries, Ceres Metals Industries, Earthwerks Inc., Hellespont Industrials, Hellespont 'Mech Works, HildCo Interplanetary, Mujika Aerospace Technologies, Quikscell Company, Saroyan Special Production, Shengli Arms, StarCorps Industries, Tengo Aerospace
MOST RECENT INNOVATIONS	Hyper-Velocity Autocannon (3059*), Stealth Armor (3063), Vehicular Stealth Armor (3067*), Air-Defense Arrow Missiles (3068), Light Machine Gun (3068), Plasma Rifle (3068)
Tech Rating: D	First Rediscovered: MASC (3035); Latest Innovation: Plasma Rifle

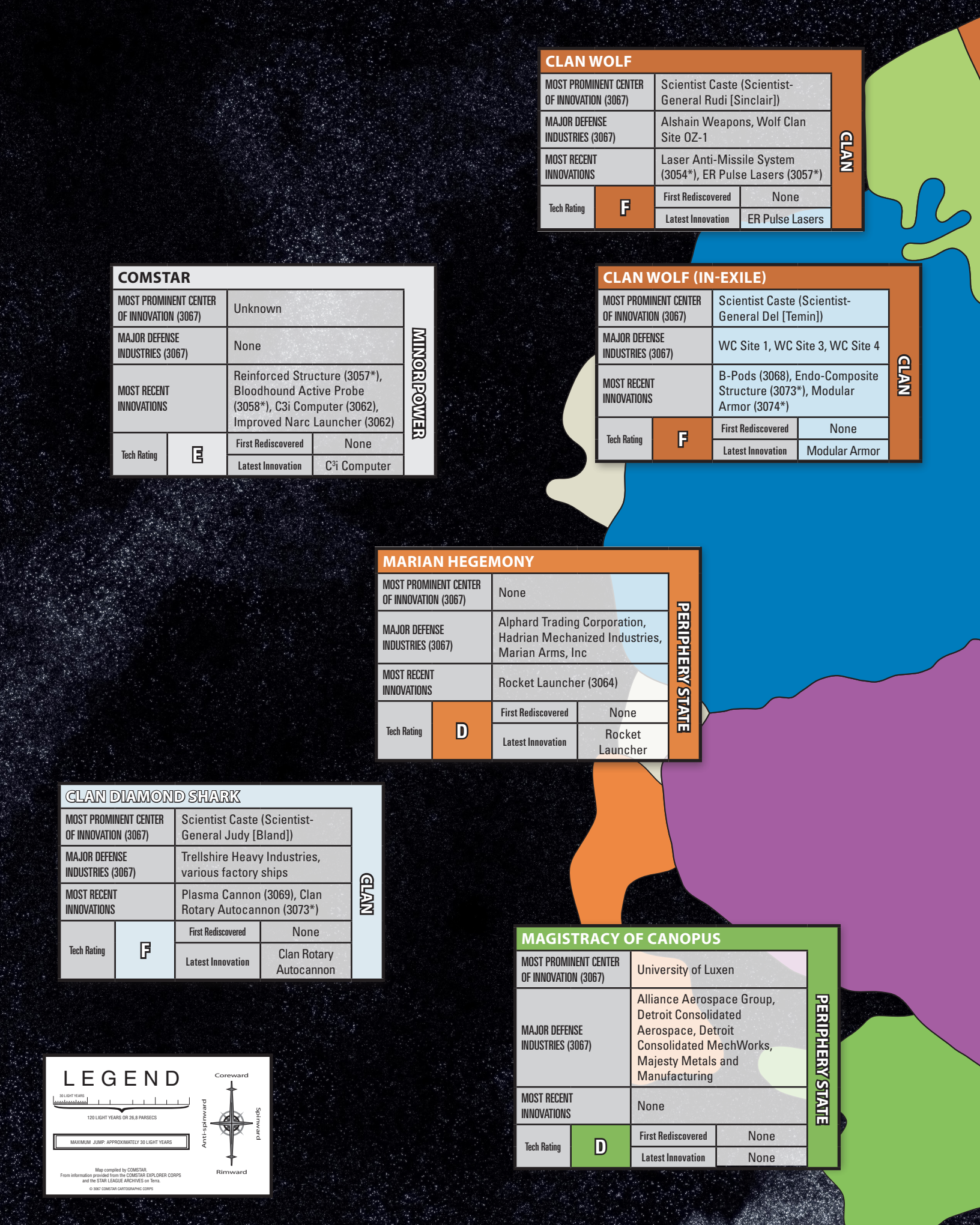
GREAT HOUSE

HOUSE DAVION (FEDERATED SUNS)

MOST PROMINENT CENTER OF INNOVATION (3067)	New Avalon Institute of Science
MAJOR DEFENSE INDUSTRIES (3067)	Achernar BattleMechs, Cal-Boeing of Dorwinion, Corean Enterprises, Dynamico Ltd., Federated-Boeing Interstellar, General Motors, Jalastar Aerospace, Johnston Industries, Kallon Industries, Lycomb-Davion IntroTech, Quikscell Company, Salvatore Inc., Valiant Systems, Wangker Aerospace
MOST RECENT INNOVATIONS	Rotary AC (3062), Targeting Computer (3062), Cruise Missile Artillery (3065*), Light AC (3068), Machine Gun Array (3068), MagShot (3072)
Tech Rating: E	First Rediscovered: Double Heat Sink (3022); Latest Innovation: MagShot

GREAT HOUSE

*These innovations are still classified as prototypical and have yet to reach full production.



CLAN WOLF

MOST PROMINENT CENTER OF INNOVATION (3067)	Scientist Caste (Scientist-General Rudi [Sinclair])		
MAJOR DEFENSE INDUSTRIES (3067)	Alshain Weapons, Wolf Clan Site OZ-1		
MOST RECENT INNOVATIONS	Laser Anti-Missile System (3054*), ER Pulse Lasers (3057*)		
Tech Rating	F	First Rediscovered	None
		Latest Innovation	ER Pulse Lasers

CLAN

COMSTAR

MOST PROMINENT CENTER OF INNOVATION (3067)	Unknown		
MAJOR DEFENSE INDUSTRIES (3067)	None		
MOST RECENT INNOVATIONS	Reinforced Structure (3057*), Bloodhound Active Probe (3058*), C3i Computer (3062), Improved Narc Launcher (3062)		
Tech Rating	E	First Rediscovered	None
		Latest Innovation	C^3i Computer

MINOR POWER

CLAN WOLF (IN-EXILE)

MOST PROMINENT CENTER OF INNOVATION (3067)	Scientist Caste (Scientist-General Del [Temin])		
MAJOR DEFENSE INDUSTRIES (3067)	WC Site 1, WC Site 3, WC Site 4		
MOST RECENT INNOVATIONS	B-Pods (3068), Endo-Composite Structure (3073*), Modular Armor (3074*)		
Tech Rating	F	First Rediscovered	None
		Latest Innovation	Modular Armor

CLAN

MARIAN HEGEMONY

MOST PROMINENT CENTER OF INNOVATION (3067)	None		
MAJOR DEFENSE INDUSTRIES (3067)	Alphard Trading Corporation, Hadrian Mechanized Industries, Marian Arms, Inc		
MOST RECENT INNOVATIONS	Rocket Launcher (3064)		
Tech Rating	D	First Rediscovered	None
		Latest Innovation	Rocket Launcher

PERIPHERY STATE

CLAN DIAMOND SHARK

MOST PROMINENT CENTER OF INNOVATION (3067)	Scientist Caste (Scientist-General Judy [Bland])		
MAJOR DEFENSE INDUSTRIES (3067)	Trellshire Heavy Industries, various factory ships		
MOST RECENT INNOVATIONS	Plasma Cannon (3069), Clan Rotary Autocannon (3073*)		
Tech Rating	F	First Rediscovered	None
		Latest Innovation	Clan Rotary Autocannon

CLAN

MAGISTRACY OF CANOPUS

MOST PROMINENT CENTER OF INNOVATION (3067)	University of Luxen		
MAJOR DEFENSE INDUSTRIES (3067)	Alliance Aerospace Group, Detroit Consolidated Aerospace, Detroit Consolidated MechWorks, Majesty Metals and Manufacturing		
MOST RECENT INNOVATIONS	None		
Tech Rating	D	First Rediscovered	None
		Latest Innovation	None

PERIPHERY STATE

LEGEND

30 LIGHT YEARS

120 LIGHT YEARS OR 26.8 PARSECS

MAXIMUM JUMP: APPROXIMATELY 30 LIGHT YEARS

Coreward

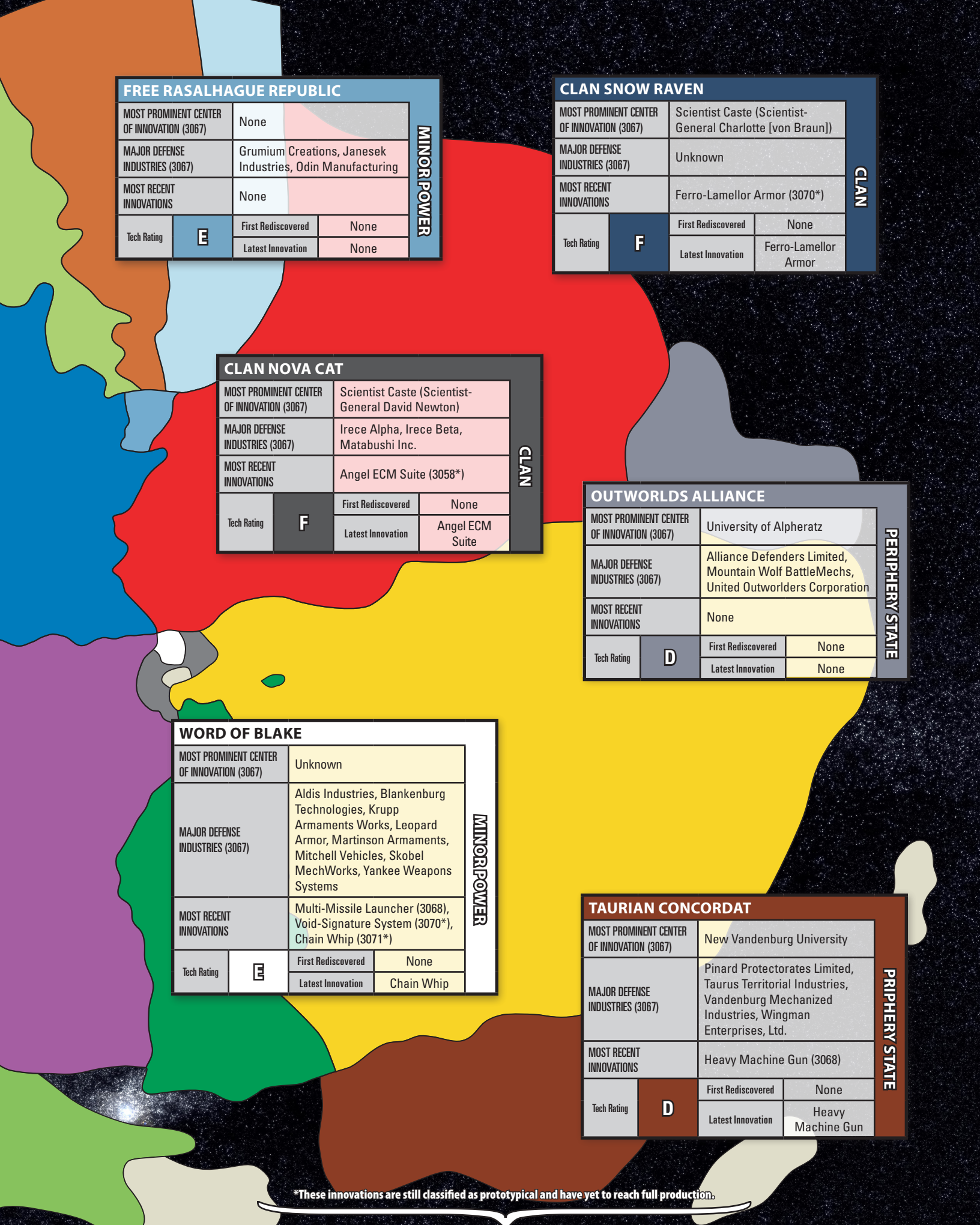
Anti-spinward

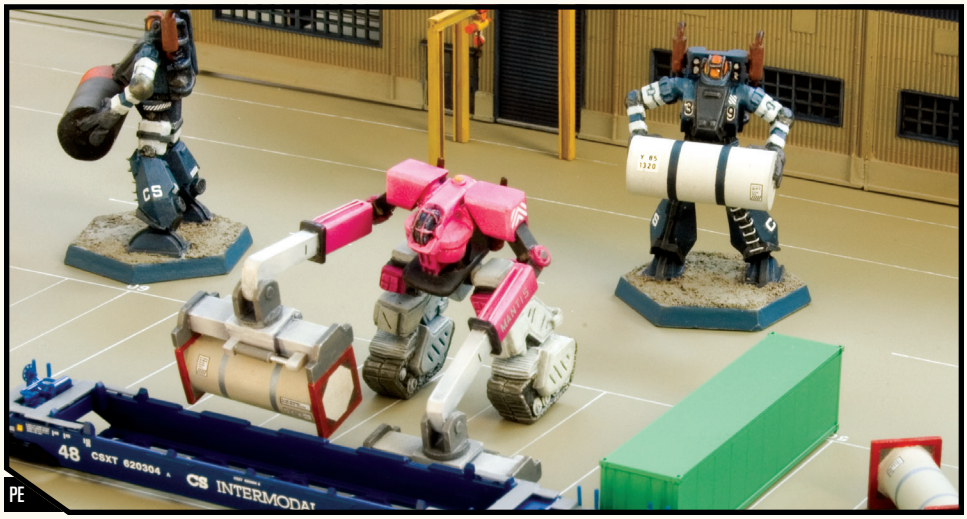
Spinward

Rimward

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

© 3067 COMSTAR CARTOGRAPHIC CORPS


FREE RASALHAGUE REPUBLIC
MOST PROMINENT CENTER OF INNOVATION (3067)
None
MAJOR DEFENSE INDUSTRIES (3067)
Grumium Creations, Janesek Industries, Odin Manufacturing
MOST RECENT INNOVATIONS
None
Tech Rating
E
First Rediscovered
None
Latest Innovation
None
MINOR POWER
CLAN SNOW RAVEN
MOST PROMINENT CENTER OF INNOVATION (3067)
Scientist Caste (Scientist-General Charlotte [von Braun])
MAJOR DEFENSE INDUSTRIES (3067)
Unknown
MOST RECENT INNOVATIONS
Ferro-Lamellor Armor (3070*)
Tech Rating
F
First Rediscovered
None
Latest Innovation
Ferro-Lamellor Armor
CLAN
CLAN NOVA CAT
MOST PROMINENT CENTER OF INNOVATION (3067)
Scientist Caste (Scientist-General David Newton)
MAJOR DEFENSE INDUSTRIES (3067)
Irece Alpha, Irece Beta, Matabushi Inc.
MOST RECENT INNOVATIONS
Angel ECM Suite (3058*)
Tech Rating
F
First Rediscovered
None
Latest Innovation
Angel ECM Suite
CLAN
OUTWORLDS ALLIANCE
MOST PROMINENT CENTER OF INNOVATION (3067)
University of Alpheratz
MAJOR DEFENSE INDUSTRIES (3067)
Alliance Defenders Limited, Mountain Wolf BattleMechs, United Outworlders Corporation
MOST RECENT INNOVATIONS
None
Tech Rating
D
First Rediscovered
None
Latest Innovation
None
PERIPHERY STATE
WORD OF BLAKE
MOST PROMINENT CENTER OF INNOVATION (3067)
Unknown
MAJOR DEFENSE INDUSTRIES (3067)
Aldis Industries, Blankenburg Technologies, Krupp Armaments Works, Leopard Armor, Martinson Armaments, Mitchell Vehicles, Skobel MechWorks, Yankee Weapons Systems
MOST RECENT INNOVATIONS
Multi-Missile Launcher (3068), Void-Signature System (3070*), Chain Whip (3071*)
Tech Rating
E
First Rediscovered
None
Latest Innovation
Chain Whip
MINOR POWER
TAURIAN CONCORDAT
MOST PROMINENT CENTER OF INNOVATION (3067)
New Vandenburg University
MAJOR DEFENSE INDUSTRIES (3067)
Pinard Protectorates Limited, Taurus Territorial Industries, Vandenburg Mechanized Industries, Wingman Enterprises, Ltd.
MOST RECENT INNOVATIONS
Heavy Machine Gun (3068)
Tech Rating
D
First Rediscovered
None
Latest Innovation
Heavy Machine Gun
PERIPHERY STATE
*These innovations are still classified as prototypical and have yet to reach full production.



IndustrialMechs hurry to unload war supplies brought in by rail.

The following rules cover the specifics of movement and combat for the advanced-rules Support Vehicles, as well as Mobile Structures, in this rulebook. Unless stated otherwise, these units follow all the standard/advanced rules for movement and combat discussed in *Total Warfare* (or in this volume, as appropriate).

Rules for construction of these units appear in the *Advanced Support Vehicle Construction Rules* section (see p. 52).

SATELLITES

Satellites are Space Stations' smaller (and often unmanned) kin. Unlike Space Stations, which can be located anywhere in a system, Satellites are exclusively placed in orbit around other planetary bodies (usually a planet or a moon, though potentially a large asteroid or a star) and are extremely reliant on accurately plotted orbits and computer controls.

The following rules apply to Satellites.

MOVEMENT (OUTSIDE OF GAME PLAY)

The following movement rules generally fall outside of the scope of a standard scenario.

A Satellite can be placed in a low-altitude or geo-synchronous orbit (more exotic orbits, like Molniya orbits, are beyond the scope of these rules and are left as an exercise in orbital mechanics between the players). A low altitude orbit (polar or standard) takes 1.5 to 2.5 hours depending on the planet, during which a Satellite located a few hundred kilometers from the surface constantly travels over either the same band of terrain or, if in a polar low altitude orbit, slowly encompasses the entire planet but only occasionally passes over the same point on the ground. A geo-synchronous orbit keeps a Satellite over the same equatorial location continuously but at much higher altitude—the precise distance depends on the world, but on Terra it is just under 36,000 km.

Satellites require no Control Rolls to maintain their orbit. However, when initially placed in orbit, or when its orbit is changed, the player controlling a Satellite must make a 2D6 roll against a Target Number 8. Failure by an MoF of 1 or 2 doubles the time required to change orbits. An MoF of 3 to 5 causes the Satellite's orbit to decay in 2D10 weeks. An MoF of 6 or more immediately sends the Satellite spiraling into the body it orbits. Note that fission- and solar-powered satellites may not change orbits sufficiently to move between the different types of orbits (low altitude (polar) or low altitude (standard), geosynchronous, Molniya, and so on), as these require far more fuel than the satellites carry.

A decaying orbit destroys the Satellite, either through impact with the surface or burning up as it reenters the atmosphere. If the error is caught in time, the situation can be rectified via a Control Roll by a remote operator (though the orbit correction process takes a day), but the difficulty depends on the level of failure of the previous 2D6 roll; apply the previous MoF as a penalty. Multiple attempts can be made until the Satellite falls out of orbit.

MOVEMENT (DURING GAME PLAY)

The following movement rules provide for limited movement of a Satellite within a standard scenario.

Satellites are essentially static in aerospace combat. Their station-keeping drives lack the power to provide even rudimentary changes in velocity within the context of a game; any repositioning of a Satellite requires hours if not days to achieve, the drive generating only around 1/40 of a G (1/20 of a thrust point).

While Satellites mount attitude jets, they are very weak. A Satellite's attitude jets provide .2 thrust. A Satellite can accumulate thrust across several turns to make a facing change. Once a Satellite has accumulated 1 Thrust Point using its attitude jets, it must make a facing change.

Military Satellites mount more robust attitude jets and can change 1 hexside per turn.

Thrusters: Thruster critical hits (see p. 240, *TW*) on a Satellite are treated as a standard critical hit; i.e. the cost to turn in that direction is increased by 1. As such, a civilian satellite that has taken a single left thruster critical hit would require ten turns to build up enough thrust (.2 x 10 = 2) to make a left facing change.

RAIL

The following rules apply to Rail Support Vehicles. All the same rules that apply to Large Support Vehicles as described in the *Combat* section of *Total Warfare* (starting on p. 98, *TW*), as well as Tractors and Trailers as described in *Support Vehicles* (see p. 205, *TW*) also apply to Large Rail Support Vehicles.

MOVEMENT

For Rail Support Vehicles to move on a mapsheet, they must move through a continuous, unbroken line of rail hexes (see *Rails*, p. 49, *TO: AR*). Before play begins, players should determine which hexes on the playing area contain rails.

Tractors may pull one or more Trailers whose combined weight is less than or equal to five times its own weight: there is no MP reduction if weight is equal to or less than half of the Tractor; –3 MP or –1/3 Cruising Speed (round down), whichever is lower, for more than half the weight up to 2x the weight; –1/2 Cruising Speed (round down) for more than 2x the weight up to 4x the weight; –2/3 Cruising Speed (round down) for more than 4x the weight up to a maximum of 5x the weight, to a minimum of 2 MP. Multiple Tractors can be combined within a single "train" to pull even greater weights. When performing in unison, Rail Tractors are assigned a part of the weight in proportion to their relative weights—with the final speed of the whole "train" dictated by the slowest tractor. Rail Tractors operating in this capacity may be positioned anywhere in the "train".

Unlike most vehicles, Rail Support Vehicles take time to reach speed or slow down. Each turn, a train can increase or reduce its speed (up to the unit's maximum current MP limit). Small and Medium Rail Support Vehicles can increase or decrease speed by 2 MP per turn, while Large Rail Support Vehicles can only alter speed by 1 MP per turn. If a Rail Support Vehicle is rendered immobile by damage, it does not come to a sudden halt (though automatic brakes fall into place), but rather it decelerates by 2 MP per turn (Small and Medium) or 1 MP per turn (Large) until its speed drops to zero.

If a Rail Support Vehicle consists of a mix of different size classes, then the speed change for the largest-class Tractor and/or Trailer in the Rail Support Vehicle is used (for example, a Medium Tractor hauling a Large Trailer can only change speed by 1 MP per turn).

Detaching Tractor/Trailers

If the Trailer(s) that a player has announced he is detaching are part of a rail "train," and the detached section does not include a functioning Tractor of its own, the Trailer(s) slow to a stop as indicated above.

Immobile Targets: Once the Tractor/Trailers have come to a complete stop, they are considered immobile targets.

Collisions

A unit that has not yet moved during the current Movement Phase can attempt to dodge a train passing through the hex occupied by the unit. In order to get out of the way, the player controlling the target unit must make a successful Piloting/Driving Skill Roll (or Gunnery Skill, if no Piloting Skill exists) just before the train enters the target's hex. A successful roll means the target unit may make its entire movement immediately, before the rail unit continues its movement. Failure means the target remains in its hex (though a failed roll does not cause the target unit to fall). Units moved in this way have expended their movement (by walking/cruising) and may not move again later in the Movement Phase. A failed roll means the unit gets rammed by the train.

A Rail Support Vehicle entering the hex of a Large Ground Vehicle, an immobile unit, or any grounded aerospace units or grounded VTOL/WiGEs, automatically rams such units.

Unlike other ground vehicles, Rail Support Vehicles cannot intentionally make a ramming attack. If a unit is rammed by a Rail Support Vehicle, damage is applied as for a successful Charge Attack (see p. 148, *TW*), with the following modifications: damage is equal to the current armor of the location which struck the target, plus that location's current internal structure, divided by 10, multiplied by the number of unspent MP in a turn, rounding down (the MP to enter the hex where the ram occurs is considered spent in this calculation). Damage to the Tractor/Trailer is applied normally, per the standard Charge Attack rules; if it strikes an unusual target (see *Unusual Targets*, p. 148, *TW*) the damage to the Tractor/Trailer is based on the weight of the vehicle only and not the entire train.

If ramming occurs, and the weight of the rammed unit is equal to or greater than the weight of the Tractor only, the controlling player of the train makes an immediate Piloting Skill Roll; a failure means the train has derailed, as though the rails in that hex were destroyed (see *Derailed Vehicles*, below). If the weight of the first three Tractors/Trailers is greater than the weight of the target unit, the target unit is randomly displaced to the right or left of the hex it occupied (unlike standard displacement, it is not displaced in the direction of the ram). If the unit cannot legally enter any hex to the right or left of the hex it occupied, it is considered destroyed.

If the weight of the target unit is greater than the weight of the first three Tractors/Trailers, the target unit is not displaced. Instead, the train derails in the last hex it occupied before it would have entered the hex occupied by the unit that was not displaced; the exception to this rule is Large Tractor/Trailers (see *Derailed Vehicles Due to Movement* below).

Large Craft: A Large Craft, regardless of the weight of a train, will never be displaced.

Infantry: Infantry, even if they occupy a hex entered by a moving train, can never be rammed by it; if a stacking violation occurs, simply move the infantry to the most appropriate adjacent hex. If an infantry unit must be moved to an adjacent hex and no legal adjacent hex is available, the infantry unit is destroyed.

Derailed Vehicles Due to Movement

A Rail Support Vehicle entering a hex where the rails have been destroyed derails and skids; except as noted below, follow all the standard rules for a skidding 'Mech (trains are not treated as a vehicle when skidding; see p. 62, *TW*).

A Tractor/Trailer skids a number of hexes equal to its unspent MP at the start of the skid, divided by 2 (round up). For example, a Tractor starts the turn with a speed of 6 MP, and the controlling player does not accelerate or decelerate, meaning it must enter 6 hexes during its movement. If the unit enters 3 hexes, thus having spent 3 MP) and on the third hex it derails, it will skid for 2 hexes [3 hexes (MP remaining) / 2 =

1.5, rounding up to 2].

If a Tractor/Trailer derails, all the Tractors/Trailers behind the derailing one will automatically start to brake, decelerating by 2 MP per hex (this is in addition to the 1 MP cost for entering a hex) until their speed drops to zero and/or the next Tractor/Trailer enters the hex that will cause it to derail. Any Tractor/Trailers that cannot slow quickly enough and enter the hex where the rails are destroyed automatically derail and skid also, as described above.

A skidding Tractor/Trailer may accidentally collide with any unit and/or obstacle in a hex it enters while skidding, per the standard skidding rules (see *Collisions*, p. 62, *TW*). While the skidding of each Tractor/Trailer in a train is resolved separately, if a unit and/or obstacle is struck, the damage is applied as noted under *Collisions*, as noted above

Additionally, because of its massive size and momentum, a Large Tractor/Trailer that derails and skids does not automatically stop if it successfully hits a target unit and that unit is not destroyed, or if the weight of the target unit is more than the weight of the entire train (see above), or if it strikes an obstacle. Small- and Medium-sized Tractors/Trailers do, however, follow the standard skidding rules and their movement would end under those conditions. If a Large Tractor/Trailer skids and encounters any of the three previously described situations as it enters a hex, then the controlling player should look at the hex to the right and to the left of the hex the unit cannot enter to see if the Tractor/Trailer can legally skid into those hexes. If both are available, randomly determine which hex it skids into; if only one is available, the Tractor/Trailer automatically skids into the available hex. In both instances, the Tractor/Trailer continues to skid in the direction of the original skid; this means a Tractor/Trailer could potentially charge multiple units and/or the same unit multiple times (in the case of a multi-hex unit). If both of the hexes to the right and left of the hex the unit cannot enter are illegal to enter, then the Large Tractor/Trailer remains in its current hex and the skid is finished.

A derailed train automatically destroys the rails in any rail hex it enters, and the hex is reduced to a rough hex (unless there are derailed Tractors/Trailers present after the derailing is resolved, in which case it is considered ultra-rough; see below). Additionally, if a derailed and skidding train must remain in its current hex, any rails in that hex are destroyed as well.

Finally, for the ease of game play, stacking limits for derailed trains do not apply. Instead, any number of Tractors/Trailers may end their movement in whatever hexes they skid into. Any hex that contains a derailed Tractor/Trailer is considered an ultra-rough hex, automatically reducing any trees and/or jungle (see p. 29, *TO: AR*); even if all Tractors/Trailers are destroyed during a derailing, the hex is still considered an ultra-rough hex. Once skidding has been resolved, the hex can also be damaged and reduced just like any other ultra-rough hex (the damage is no longer done to the train, but instead to the ultra-rough hex as a whole).

CARRYING UNITS

If a Rail Tractor and/or Trailer is built with cubicles allowing it to carry other units (such as aerospace fighters, Small Craft, 'Mechs, vehicles and so on), the mounting and dismounting of such units from a stationary train follows the same rules as for a grounded DropShip (see *Carrying Units*, p. 89, *TW*).

If a Rail Support Vehicle expends MP in the same turn that units are dismounting, only units with Jumping/VTOL MP may disembark; if a unit mounts a Flight Deck, fighters can take off normally (or using VTOL movement), without regard to whether the carrying unit expended MP or not. Additionally, any such unit (except a fighter taking off from a Flight Deck) expending Jumping MP to dismount must make an immediate Piloting/Driving Skill Roll (Anti-'Mech Skill Roll, in the case of infantry) to avoid falling in the target hex.

If an infantry unit fails this roll, apply a single point of damage to all battle armored troopers, or in the case of conventional infantry, apply a single 5-point Damage Value grouping as though another infantry unit had made a successful attack.

A VTOL Vehicle that fails the Driving Skill Roll automatically crashes in the hex from which it was attempting to take off (see *VTOL and WiGE Vehicle Crashes*, p. 68, *TW*); for the purposes of damage, the VTOL Vehicle is considered to have moved 1 hex and randomly determine the damage location. Infantry expending VTOL MP also crash in the hex from which they were attempting to take off, applying damage as described above for infantry using jumping MP.

In all instances, whether a jumping unit failing a PSR and falling in the target hex or a unit expending VTOL MP failing the PSR and crashing in the hex they were attempting to take off from, the unit's movement is over.

Units Carried Externally: Units carried by a Tractor/Trailer are in transport bays; even on a flatbed car, the unit is considered completely enclosed by the transport bay. Infantry units are the exception to this rule.

When an infantry unit mounts a Tractor/Trailer, the controlling player can choose to have the unit enter the Tractor/Trailer (that is, become cargo) or move to the top of the Tractor/Trailer (meaning they are on the roof); if the Trailer is a flat car, the infantry is "in the open," riding on top of the rail vehicle. Additionally, during any subsequent Movement Phase the controlling player can move the infantry unit from the roof of one Tractor/Trailer to the roof of another (regardless of the size of the Tractors/Trailers involved, the infantry can only move one unit), or to the transport bay (to become cargo) of the unit they currently occupy, or from the transport bay to the roof of the Tractor/Trailer. Regardless of MP available, the infantry unit is considered to have used all its MP when it makes any such transition. If an infantry unit is moved off of the Tractor/Trailer, use the rules above, directly under *Carrying Units*.

Roof stacking limits per side are as follows: 1 infantry unit on a Small Tractor/Trailer, 2 infantry units on a Medium and 3 infantry units on a Large Tractor/Trailer.

In addition, any infantry units carried externally are counted as an individual unit(s) for Initiative purposes (unlike standard rules concerning carried units, which are not counted until the turn following the one in which they dismount). However, they are not counted toward standard stacking limits within a hex.

The only exception to this infantry rule applies to motorized and mechanized conventional infantry, which cannot be on the roof of a Tractor/Trailer, but can be outside a transport bay on a flat car (see p. 63). Motorized or mechanized infantry "in the open" on a flat car cannot be moved to another Tractor/Trailer like other infantry; they must dismount the train and then mount again to move to another Tractor/Trailer. The stacking limits for all types of infantry on a flat car are identical to the roof stacking limits noted above.

Derail: If a Tractor/Trailer derails and is not destroyed, apply two 5-point Damage Value groupings to randomly determined locations (for conventional infantry, the damage is applied as though another infantry unit had made a successful attack). The units may dismount (provided they can do so legally) at the end of the Movement Phase

following the turn in which the derailing occurred.

Destruction: If a Tractor/Trailer is destroyed, use the rules for destruction of a DropShip carrying units (see *Destruction*, p. 90, *TW*) to determine if any units survive.

All cargo on a destroyed Tractor/Trailer is automatically considered destroyed.

If a Rail Tractor and/or Trailer is displaced into a hex that is 2 or more levels lower than the adjacent hex, resulting in an accidental fall, all carried units are automatically destroyed.

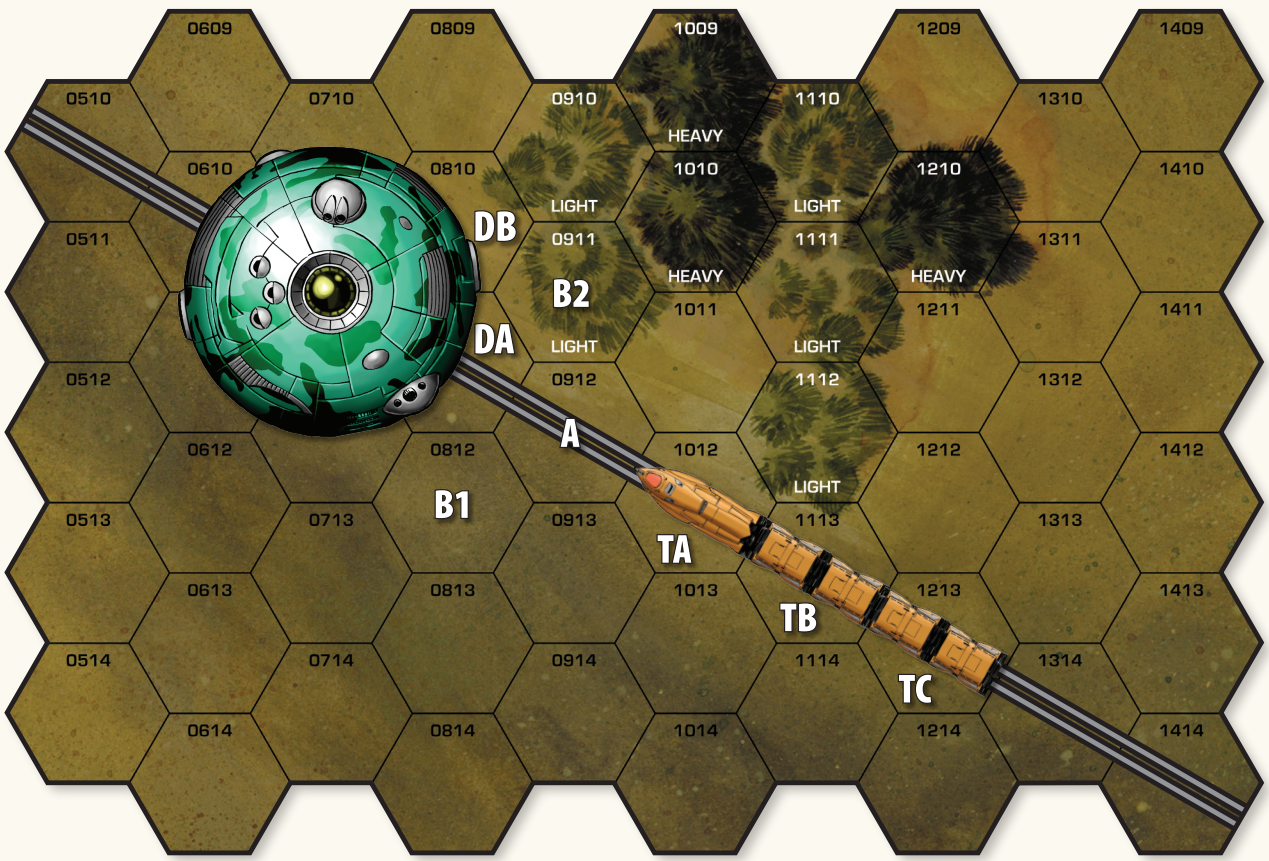
In the Derailing Diagram below, an Adelante Passenger/Cargo Train consisting of a Tractor and four Trailers (2 Configuration Bs, a C and a D; for this example we'll simply call them trailers A, B, C and D) is moving with a current speed of 9 on the Open Terrain #1 map. The players determined before the start of the game which hexes contain rails. The standard movement of the Adelante Tractor is 12/18, but the Trailers it is hauling reduce its current movement to 6/9. At the start of the turn, the Adelante Tractor occupies Hex TA, while Trailers A and B, as Medium-sized Trailers, occupy Hex TB. Trailers C and D (also Medium-sized) occupy Hex TC.

During the Movement Phase (Aerospace) of the previous turn, the opponent successfully landed a Manatee*-class DropShip in Hex DA (the controlling player of the DropShip determines that the ship's right side is lined up with the oncoming train; see p. 250, TW). At the start of the Movement Phase (Ground) of the next turn, the Adelante will be unable to slow quickly enough and so will automatically collide with the DropShip. If using the* Terrain Factor Rules *(see p.* 63, TO: AR*), the landing DropShip would have destroyed the rails, so even if it landed and managed to take off before a train arrived, the destroyed rails would cause the Adelante to derail.*

Even though the Adelante is going to collide with the ship, the train's controlling player does what he can. Because the Adelante Tractor is a Large-sized vehicle, he can only decrease its speed by 1 MP per turn (see p. 17), which he does at the start of the turn, and then he moves it forward 1 hex. The train then spends another MP to attempt to enter the DropShip hex, which means that as the train rams the DropShip its current MP left unspent is 6.

Regardless of the combined weight of the Tractor and the first and second Trailers, the train cannot displace the DropShip as it is a Large Craft. Ramming for each Tractor/Trailer is determined separately, and so the controlling player starts with the Tractor.

The player determines the damage caused by the Tractor ramming the DropShip and arrives at 60 points of damage [60 (current front location internal structure) + 40 (current front location armor) = 100 / 10 = 10 x 6 (MP unspent in the turn) = 60]. Normally this damage would be divided into 5-point Damage Value groupings, but against the DropShip it is simply applied as a single block of damage to the right side, leaving the DropShip with 10 points of armor. As the Damage Value of the attack exceeds the Damage Threshold of the armor in that location, the controlling player of the



● DERAILING DIAGRAM ●

DropShip will need to make a Determining Critical Hits roll.

Because the target is a DropShip, damage to the Tractor is applied based on the Tractor's weight, which equals 60 points of damage [600 (Tractor tonnage) / 10 = 60]. The player rolls 2D6 on the front column of the Large Ground Support Vehicle Hit Location Table (see p. 206, TW), with a result of 6; all the damage is applied to the front, which strips it bare of armor and inflicts 20 points of damage to the internal structure. The internal structure at the front of the Tractor has 40 points remaining. In addition to the standard Determining Critical Hits roll that must be made for damaging the internal structure, a penetrating critical hit must also be rolled because the Damage Value of the collision exceeded the Tractor's BAR of 7.

Next, the Tractor automatically derails and will skid. Upon the attempt to enter Hex DA occupied by the DropShip, the Tractor had 6 unspent MP, meaning it will skid for 3 hexes [6 (MP remaining) / 2]. As the Manatee *ship will not be displaced, the derail actually occurs in Hex A, meaning the rails in Hex A are destroyed. Normally a skidding unit, if it charges an obstacle, would end its movement in Hex A. However, the Adelante Tractor is a Large-sized unit, and so the controlling player looks at Hexes B1 and B2 and determines that both of them are legal to enter. He randomly determines that a roll of 1-3 will be a skid into B1, while a roll of 4-6 will be a skid into B2; the 1D6 die roll result is a 5, and so the first hex of the three-hex skid will be into B2. However, as that hex is light woods, 1 hex is removed from the total number of hexes in the skid (see Terrain, p. 63, TW). The damage applied to the skidding Tractor is just like a 'Mech skidding: the unit's weight, divided by 10 and then halved, resulting in 30 points of damage [600 (weight of Adelante Tractor) / 10 = 60 / 2 = 30]. The controlling player once again rolls for the damage location; a result of a 3 means the 30 points of damage is applied to the right side. Though armor still remains, once again the Damage Value is higher than the BAR, and so another penetrating critical hit must be rolled.*

With only one more hex to skid into, the controlling player of the Tractor must continue the skid in its original direction, meaning that the Tractor will once again ram the DropShip as it attempts to enter Hex DB. The total damage is 24 [40 (current front location internal structure) + 0 (current front location armor) = 40 / 10 = 4 x 6 (MP unspent in the turn) = 24]. This strips the last 10 points of armor away, leaving 14 points to deal with. As per standard rules, the damage is divided in half and applied to the structural integrity, leaving 3 SI. Because the hit exceeds the vessel's Damage Threshold and SI damage was taken, the controlling player of the DropShip must make two Determining Critical Hits rolls. Furthermore, 60 points of damage is also applied to the Tractor [600 (Tractor tonnage) / 10 = 60]; the resulting hit location roll of 8 means the damage is applied to the front. As there are only 40 points of internal structure available, this hit depletes that section's internal structure, which destroys the Tractor. This means the player does not need to skid the Tractor into Hex DB. Even though the Tractor was destroyed, B2 is now considered an ultra-rough hex; the light woods are gone.

Next, the player resolves the movement of Trailer A. The Trailer's 6 MP is reduced to 3 as it enters Hex A [1 MP (entering the hex) + 2 MP (automatic braking) = 3 MP remaining]. Because the rails in Hex A were destroyed when the Tractor derailed there (being unable to legally enter Hex DA), Trailer A automatically derails and will skid for 2 hexes [3 (MP remaining) / 2 = 1.5, rounding up to 2]. First, however, the controlling player must resolve the damage caused by the ramming attack of Trailer A into the DropShip as it attempts to enter Hex DA. He determines that the ram causes 9 points of damage [12 (current front location internal structure) + 20 (current front location armor) = 32 / 10 = 3.2 x 3 (MP unspent in the turn) = 9.6, rounding to 9]. As only structural integrity remains, that damage is halved, rounded down, which means that only 4 points of damage are applied. However, since there is only 3 points remaining, the DropShip is destroyed! Even a DropShip can't play chicken with a train…or if the player is going to play that game, he should put down a DropShip with a whole lot more armor.

The player still must determine damage to Trailer A, which is 12 points [120 (Trailer weight) / 10 = 12]. The player rolls a 7 on the hit location table and applies the 12 points of damage to the front, leaving him with 8 points of armor; the BAR of 9 on the Trailer means a penetrating critical hit must be rolled. With the DropShip destroyed, the player now must continue the skid of Trailer A. Trailer A will skid into Hex DA, inflicting 6 points of damage [120 (weight of Trailer) / 10 = 12 / 2 = 6]; with a hit location roll of 7, that damage is applied to the front, reducing the front armor to 2 (no penetrating critical hit is required). The players are using the Battlefield Wreckage *rules (see p. 155,* TO: AR*), and the DropShip hexes are now considered ultra-rough, so that terrain subtracts the number of hexes Trailer A needs to skid down to 0.*

Now the player turns to Trailer B. As it is the same size and occupies the same original hex when the derailing occurred as Trailer A, it undergoes all the skidding determined above. However, in addition to the 6 points of skidding damage that must be applied to Trailer B for skidding into Hex DA, Trailer B will automatically charge Trailer A, inflicting 36 points of damage on Trailer A [120 tons (each Trailer) x 3 (number of Trailers) = 360 tons / 10 = 36]. The controlling player rolls 2D6 for the hit location, and with a result of 7, applies the damage to the rear. That location has only 19 points of armor and 12 internal structure points, and so can only take 31 points of damage; 36 points means that Trailer A is destroyed. Finally, 12 points of damage (from the ramming attack) is also applied to Trailer B, which will require a penetrating critical hit roll.

Fortunately, the controlling player of the train is luckier with Trailers C and D. As they moved from Hex TC to Hex TB, they expended 3 MP [1 MP (entering the hex) + 2 MP (automatic braking) = 3 MP remaining]. Then, as they moved from Hex TB to Hex TA, they expended the final 3 MP, leaving Trailers C and D as immobile targets in Hex TA.

Finally, the player needs to determine what happened to the units carried by the train. Trailer A was destroyed (a Configuration B Trailer), and so the controlling player must roll 1D6 for each of the light vehicle and three battle armor units carried by the Trailer to see if they survived (provided they survived any penetrating critical hits). For each unit, on a roll of 1-2, the unit survives; on a roll of 3-6, the unit is destroyed. If any units survived, the controlling player must determine stacking and make sure that no violations occur (see Destruction *p. 90,* TW*).*

For Trailer B, the player does not need to determine if the unit was destroyed, but does need to apply two 5-point Damage Value groupings to the light vehicle and three battle armor units in Trailer B (provided they survived any penetrating critical hits). At the end of the Movement Phase in the following turn, the controlling player can dismount the units carried by the derailed Trailer

B (provided a hex exists nearby into which they can legally dismount).

COMBAT

The following additional rules apply to combat for Rail Vehicles.

Attacks from Infantry Carried Externally

Infantry units carried externally (unlike any other units carried by a Tractor/Trailer) can make all standard weapon attacks. This includes attacks using field guns and field artillery (see p. 123) for motorized and mechanized infantry. All standard rules are used for making any type of weapon attacks, with the following exceptions:

Apply a +1 to-hit modifier to all such attacks.

An infantry unit on a flat car cannot make an attack if the LOS falls across the hexside through which a Tractor/Trailer is connected to another Tractor/Trailer.

Attacks Against Infantry Carried Externally

Just like mechanized battle armor (see p. 227, *TW*), attacks against infantry carried externally on a Tractor/Trailer cannot be made. Instead, whenever an attack is made against a Tractor/Trailer carrying infantry externally, roll 1D6. On a result of 1–4, the infantry takes no damage; the total Damage Value of the attack is applied to the Tractor/Trailer. On a result of 5–6, the attack strikes the infantry unit; for battle armor, randomly determine which trooper is hit. Any damage remaining (meaning the conventional infantry is destroyed, or the trooper in a battle armor unit is destroyed) is applied to the Tractor/Trailer.

A pirate Scarabus *attacks a train in the hopes of securing a prize: Long Tom mobile artillery.*

Derailed Vehicles Due to Damage

If a Tractor/Trailer location is completely destroyed, per standard rules for vehicles, the unit is destroyed. The train behind the destroyed unit is automatically detached from the train in front of the destroyed unit; if any portion of the split train does not contain a Tractor, it will slow to a stop (see *Movement*, p. 17). However, there is a chance the destroyed unit will cause the train behind to derail. The controlling player automatically rolls 2D6. On a result of 8 or better, the Tractor/Trailer immediately following the destroyed unit derails, either in the hex it currently occupies or as it enters a new hex, depending on the size of the Tractors/Trailers involved (see *Derailed Vehicles Due to Movement*, p. 17).

Area Effect Weapons

Damage from weapons with an area of effect, such as artillery, may affect multiple Tractors/Trailers in a train, depending on the area affected by the artillery as well as whether a Small, Medium or Large Tractor/Trailer is in a hex. For example, a Large Tractor in Hex A has two Small Trailers following directly behind in Hex B. A Long Tom artillery shell lands in Hex B. Twenty points of damage would be applied to both Small Trailers in Hex B, while 10 points of damage would be applied to the Large Tractor in Hex A.

Infantry Carried Externally: Area-effect weapons apply their full damage to any Tractor/Trailers involved, as well as to any infantry units carried externally (see p. 18).

Swarming Attacks

Enemy infantry units can swarm a Tractor/Trailer using the standard rules for swarming a vehicle. Apply a +1 modifier for every 2 hexes the train entered during the Movement Phase of the current turn; infantry units with VTOL or Jumping MP do not apply this modifier.

A failed swarming attempt automatically inflicts a single 5-point Damage Value grouping; against conventional infantry this is treated as an attack from another infantry unit.

Only externally carried infantry (see p. 18) located on the Tractor/Trailer currently being swarmed by an infantry unit can be used to fight off the swarming attack. If an infantry unit friendly to the Tractor/Trailer is on another Tractor/Trailer, or is inside the Tractor/Trailer that has been successfully swarmed, the controlling player of that friendly infantry unit must make a standard swarming attack for the friendly infantry unit to move onto the swarmed Tractor/Trailer and engage the enemy infantry (see *Mechanized Battle Armor*, p. 222, *TW*).

Note that a Tractor/Trailer cannot make a Driving Skill Roll to attempt to dislodge swarming infantry (see *Vehicles*, p. 222, *TW*).

The stacking limits of a Tractor/Trailer "roof" apply for enemy infantry the same as for friendly: 1 infantry unit on a Small Tractor/Trailer, 2 infantry units on a Medium and 3 infantry units on a Large Tractor/Trailer. This means a total of 2 infantry (one friendly, one enemy) can occupy the roof of a Small Tractor/Trailer, 4 total infantry (two friendly, two enemy) a Medium and 6 total infantry (three friendly, three enemy) a Large Tractor/Trailer.

CHARGING RAIL VEHICLES

Charges against Rail Vehicles are resolved normally, with the following modifications and additions.

If a unit charges a Tractor or Trailer on the side (that is, the charging unit enters on one of the four hexsides that are not the two hexsides via which the train is traveling through the hex), apply a –2 to-hit number. Additionally, after resolving damage, the players should determine if the rail unit derails. If the weight of the charging unit is greater than the combined weight of the target Tractor/Trailer, as well as the weight of the Tractor/Trailer immediately in front of and behind the target (if any), the unit is considered detached at the point where it connects to the rail unit in front and it immediately derails (see *Derailed Vehicles Due to Movement*, p. 17). If the weight of the combined Tractors/Trailers is equal to or greater than the charging unit, the train is not derailed. In all instances, however, the charging unit does not enter the target hex if doing so would violate the stacking limits (see p. 205, *TW*).

If a unit charges the rear of a Tractor or Trailer that moved this turn, the standard charging rules apply, except half the damage (rounded down) is applied to both units. No roll is made to determine if the Tractor/Trailer is derailed, and the charging unit does not enter the target hex if doing so would violate the stacking limits (as noted above).

If a unit charges the front of a Tractor or Trailer that moved this turn, the standard charging rules apply, except double the standard damage is applied to both units. The standard rules for determining if a Tractor/Trailer is derailed are used (*Collisions*, p. 17), though the charging unit does not enter the target hex if doing so would violate the stacking limits (as noted above); though if the train derails, there is a chance the charging unit could be rammed. In the next Movement Phase, if the train did not derail and moves first, there is a chance the train will ram that unit (see *Collisions*, p. 17).

In all instances, if a unit fails a charge and cannot displace into the hex at the right or left of the target hex, then the charging unit does not enter any hexes; its movement ends in the last hex prior to the target hex.

Mobile Structures: A train is always derailed and displaced if a Mobile Structure enters its hex(s); see page 35.

ACCIDENTAL FALLS FROM ABOVE

If a skid leads to a situation where more than a single rail car (Tractors and/or Trailers) enters a hex 2 levels or more lower than its previous hex, use the *Unit Displacement* and *Accidental Falls From Above* rules (see pp. 151 and 152 respectively, *TW*). In all situations, resolve all effects (potentially striking another unit in the target hex, damage, displacement and so on) for each Rail Support Vehicle (each Tractor and/or Trailer) before moving on to the next vehicle.

Once the situation has been resolved, treat the hex occupied by the derailed train as an ultra-rough hex (see p. 37, *TO: AR*), as described under *Derailed Vehicles Due to Movement* (see p. 17).

LARGE NAVAL VESSEL SUPPORT VEHICLES

The following rules apply to Large Naval Vessel Support Vehicles.

MOVEMENT

Large Naval Vessels can be very large—longer than a 30-meter hex on a BT mapsheet. This means a player must first determine the size of template used for the vessel, based on its tonnage (the size of the template will usually be noted on the Record Sheet or in the Technical Readout write-up). If the template is unknown, compare the tonnage of the vessel to the appropriate column of the Airship and Large Naval Vessel Size Table (see p. 57). Once the size of the template is known, players can use the appropriate template from the Large Naval Templates (see record sheets at the back of this book) during game play.

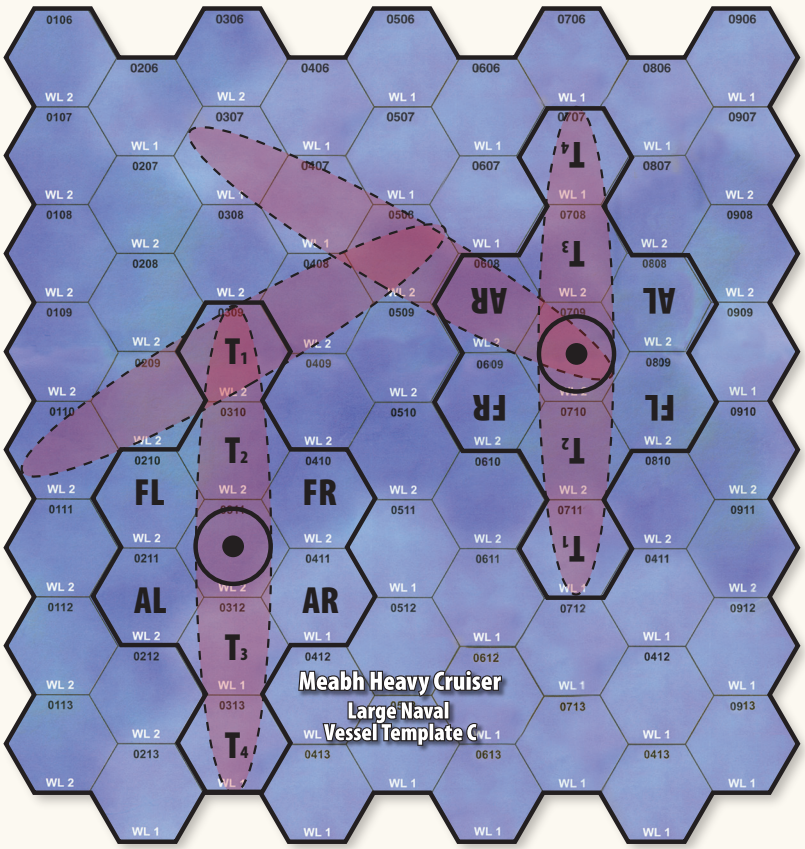
Large Naval Vessels may only change facing by one hexside per hex, and then only once the vessel has moved forward until the center hex of the unit enters the position where the front hex of the unit was after the last facing change. When the unit is moving slowly, this can take more than one game turn to occur. Note that a Template A Large Naval Vessel is only 1 hex in size, so while it can still only change 1 hexside per hex, it does not need to take into consideration the "pivot point" hex when determining how far it must move before it can change its facing again.

The unit pivots around the center point marked as the "Pivot" on the Naval Vessel Template. The cost to change facing is still 1 MP.

Unlike most units, Large Naval Vessels take time to both speed up and slow down. Each turn, a Large Naval Vessel can increase its speed (up to the unit's Flanking MP limit) or slow down by 1 MP. If a Large Naval Vessel is rendered immobile by damage, it does not come to a sudden halt, but rather decelerates by 1 MP (applied during the Movement Phase whenever the player nominates the unit for movement) every other turn until its speed drops to zero.

Submarines: Unlike standard submarines, Large Naval Vessel Submarines are limited in the depths they can change per turn. The maximum number of depths that a Large Naval Vessel Submarine can change up or down is equal to their Template Size as shown on the Large Naval Vessel Sinking Table (see p. 27) +1. For example a Template A could potentially change 6 depths in a turn, while a Template E can only potentially change 2 depths in a turn.

Running Aground: Large Naval Vessels may only operate in water hexes and risk running aground when operating in shallower depths. Consult the Large Naval Heights Table (see p. 24) to find the safe water depth in which these units can operate. A unit entering a water hex that is too shallow immediately runs aground and suffers damage. If the unit was moving at 1 to 3 MP, the damage is equal to its tonnage divided by 100 (rounded up); if moving at 4 to 9 MP, multiply that value by 2; if moving at 10 MP or greater, multiply that value by 3. In all cases, the damage is applied as a single grouping against the location that ran aground (in most instances, the front) The unit, now beached, becomes an immobile target for the remainder of the scenario unless another Naval Vessel with the Tractor modification is present and able to extract the beached vessel (see *Naval Tractors*, p. 24).



● LARGE NAVAL VESSEL MOVEMENT DIAGRAM ●

Surfacing Large Naval Vessel Support Vehicles: If a Large Naval Vessel Support Vehicle with the Submersible chassis modification rises to a depth occupied by another unit, use the Submerged/Surfacing rules for Mobile Structures to resolve the situation; for example, if such a unit rises underneath a Combat Naval Vessel, the Combat Naval Vessel would be "stranded" in the appropriate hex (see p. 41).

In the diagram above, a Large Naval Vessel using a Type C Template is traveling at a speed of 4 MP. It moves forward 2 hexes (bringing the center Pivot point to the hex where the bow started) and then spends 1 MP to turn 1 hexside to the right before moving the final MP (bringing total MP expenditure for the turn to 4). Next turn, the unit increases its speed to 5 MP, but as it has not traveled the required distance to bring the Pivot point to where the bow was after the last facing change, it must move forward one more hex before spending 1 MP to turn to the right once more.

The next 2 MP move the unit forward enough to once more bring the Pivot point to where the bow started after the last facing change, and thus the unit can make one final facing change at a cost of 1 MP.

Collisions

A Large Naval Vessel entering a hex occupied by another unit, automatically rams such units. If a unit is rammed by a Large Naval Vessel Support Vehicle, damage is applied as for a successful Charge Attack (see p. 148, *TW*), with the following modifications: damage is equal to the current armor of the location which struck the target, plus that location's current internal structure, divided by 10, multiplied by the number of hexes moved in the turn, rounding down. Damage to the Large Naval Vessel is applied normally, per the standard Charge Attack rules; if it strikes an unusual target (see *Unusual Targets*, p. 148, *TW*) or another Large Naval Vessel, the damage to the Large Naval Vessel is the same as the damage applied to the target.

If the collision occurs on the "deck" or "bottom" of the vessel (due to a unit changing depths up and down), use the location with the highest current internal structure and armor for determining damage to the target (if the target is receiving damage on the "deck" or "bottom" as well, randomly determine a location to apply all damage); the location on the Large Naval Vessel used to determine target damage is also where damage is applied to the vessel from the target.

If the weight of the target unit is greater than the weight of the ramming Large Naval Vessel, the target unit is not displaced; the Large Naval Vessel does not enter the hex. If the target unit cannot displace appropriately (due to having run aground, for example), no displacement occurs.

STACKING

Standard stacking limits do not apply to Large Naval Vessels. No other unit may occupy a hex currently occupied by a Large Naval Vessel unless the other unit is under, above or standing on the Support Vehicle itself.

CARRYING UNITS

If a Large Naval Vessel Support Vehicle is built with transport bays (see p. 239, *TM*) allowing it to carry other units (such as aerospace fighters, Small Craft, 'Mechs, vehicles and so on), the mounting and dismounting of such units from a stationary Large Navel Vessel follow the same rules as for a grounded DropShip (see *Carrying Units*, p. 89, *TW*).

If a Large Naval Vessel expends MP in the same turn that units are dismounting, only units with Jumping/VTOL MP (including fighters using VTOL movement to take off) may disembark; if a unit mounts a Flight Deck, fighters can take off normally (not using VTOL movement). Additionally, any such unit (except a fighter taking off from a Flight Deck) expending Jumping MP to dismount must make an immediate Piloting/Driving Skill Roll (Anti-'Mech Skill Roll, in the case of infantry) to avoid falling in the target hex.

If an infantry unit fails this roll, apply a single point of damage to all battle armored troopers, or in the case of conventional infantry, apply a single 5-point Damage Value grouping as though another infantry unit had made a successful attack.

A VTOL Vehicle that fails the Driving Skill Roll automatically crashes in the hex from which it was attempting to take off (see *VTOL and WiGE Vehicle Crashes*, p. 68, *TW*); for the purposes of damage, the VTOL Vehicle is considered to have moved 1 hex and randomly determine the damage location. Infantry expending VTOL MP also crash in the hex from which they were attempting to take off, applying damage as described above for infantry using jumping MP.

In all instances, whether a jumping unit failing a PSR and falling in the target hex or a unit expending VTOL MP failing the PSR and crashing in the hex they were attempting to take off from, the units' movement is over.

If the target hex for the dismounting unit is illegal (such as infantry without UMU MP), the unit is automatically destroyed.

Players should also use the rules for dismounting and mounting infantry from naval carriers (see *Dismounting From Naval Carriers*, p. 225, *TW*, and *Naval Carriers*, p. 224, *TW*) as guidelines for how to dismount all units from a Large Naval Support Vessel when it is not adjacent to a land hex, when it is submerged and so on.

FLIGHT DECKS

Depending on the size of the Flight Deck, friendly fighters, Combat and Support VTOLs and Fixed-Wing Support Vehicles may land on a Large Support Vehicle with a Flight Deck. See *Flight Deck*, page 124 in the *Advanced Weapons and Equipment* section, for complete details on how to use a Flight Deck.

Enemy units attempting to land on a Flight Deck must apply an additional +2 modifier to the Landing Target Number (this is in addition to the +1 for a unit landing at an unfriendly airfield; see p. 87, *TW*).

NAVAL TRACTORS

If a Naval Vessel mounts the Tractor chassis modification, it may push or pull any one vessel up to five times its own weight. Multiple tractors may add their tractor capacities together, so (for example) two identical naval tractors combined can push or pull any one vessel up to ten times their own weight.

The unit must end the Movement Phase with either its Front or Rear facing oriented toward the rear or front of the unit that has run aground, whichever is more appropriate for moving it directly away from the beaching hex(s). The entire next turn is spent hooking the two vessels together (the Tractor cannot expend any MP, except to stay in the same hex with the same orientation). During the Movement Phase of the following turn, the Naval Tractor may expend MP normally to extract the grounded unit. However, standard rules for the weight of the target unit (considered Trailers) must be taken into account for the MP available to the Naval Tractor (see *Tractors*, p. 205, *TW*).

COMBAT

Large Naval Vessel Support Vehicles follow all the standard rules for Naval Combat Vehicles (see p. 198, *TW*), except as noted below.

Line of Sight

Large Naval Vessels block line of sight through their hexes like terrain (hill) obstruction of the same height. Additionally, depending on the size of the template used, they rise (and fall) a number of levels above and below the surface of the water, as shown on the Large Naval Vessel Heights Table.

LARGE NAVAL VESSEL HEIGHTS TABLE

Template	Heights (Levels) Above/Below Surface*
A	0/1
B	1/1
C	1/2
D	2/2
E	3/3

*Submersible Large Naval Vessels may not dive in water that is less than the total sum of the above- and below-surface level values. If they attempt to do so, the vessel will run aground (see p. 22).

Specialized Attacks

The following specialized attacks apply against Large Naval Vessel Support Vehicles.

'Mech Mounting (on deck): A 'Mech with Jumping, UMU or VTOL MP may attempt to board a target vessel. The attacker chooses a specific hex as the target location for landing, using the Large Naval Template (see the record sheets at the back of this book). All the rules for infantry mounting a Large Naval Vessel Support Vehicle as noted above also apply. Additionally, the 'Mech in question must make a standard Piloting Skill Roll to stay standing, with a +1 modifier (apply an additional +4 modifier if the target unit is submerged); a failure means the 'Mech falls in the target hex (though it is still on the target vessel). All appropriate modifiers apply; this includes any weather modifiers if Planetary Conditions are in use (see p. 55, *TO: AR*), and so on.

In all cases, the 'Mech is located on the "deck" of the target vessel hex; if it fell, it can attempt to stand during the Movement Phase of the following turn. All standard stacking limits apply to the deck of each hex of a Large Naval Vessel Support Vehicle.

Unlike infantry, a 'Mech "mounted" on a submerged unit must make a Piloting Skill Roll during the End Phase of any turn in which the target unit expended MP. A failure means the 'Mech has fallen off; randomly determine an adjacent hex into which

the 'Mech would most appropriately fall. It immediately sinks to the bottom of that hex (see *Extreme Depths*, p. 40, *TO: AR*). Assign damage normally (see *Falling Damage*, p. 68, *TW*). If the 'Mech has UMU MP, however, it does not take automatically falling damage but is simply placed in the water hex at a depth equal to the deck of the unit off of which it fell, without a Piloting Skill Roll being required for entering water. If the water is insufficiently deep, place the 'Mech at the bottom of the hex and assign falling damage for striking the bottom of a water hex as normal. If the 'Mech falls off but there is no legal hex for the 'Mech to enter, it is considered destroyed.

Weapon Attacks by Boarded Units (on deck): Once a 'Mech or infantry unit has landed on the enemy Large Naval Vessel Support Vehicle (as opposed to infantry used in a boarding action, which "stay on deck"), the attacking unit may not be attacked in turn by the target unit's weapons.

For targeting and damage purposes, the landed unit is assumed to be on the target vessel in the target hex where it landed. During a Movement Phase (Ground), a landed unit may move to an adjacent hex, and may continue to make attacks that turn as well.

Weapon attacks are automatically successful (no to-hit roll required; all Cluster Weapons automatically deal their full Damage Value). However, to-hit rolls should still be made to determine jam rolls, possible critical hits against the target and so on. Physical attacks may also be made, with the following stipulations: only punch, kick and physical weapon attacks may be made, and must still adhere to their standard rules (for example, an arm carrying a physical attack weapon cannot deal damage if a weapon from that arm is fired in the same turn).

Weapon Attacks

A Large Naval Vessel is far easier to hit than something as small as a 12-meter tall BattleMech. Any attack against a Large Naval Vessel receives an additional to-hit modifier from the Airship and Large Vessel Template Table (see p. 57).

Large Support Naval Vessels function in the same way as other Support Naval Vessels, with the following exceptions:

- Large Support Naval Vessels use the Large Naval Vessel Hit Location Table to determine where damage is applied. Attackers target specific hexes of the vessel, consulting the Large Naval Vessel Template (see p. 215) to determine which armor facing is struck. If a turret location is rolled on a hex that does not contain a turret, apply damage to a turret in an adjacent hex (if multiple turrets are available the Initiative winner chooses). If there is no turret in the affected hex or any adjacent hexes, apply the damage to the appropriate side instead.
- If the attacker targets an interior hex with no obvious armor facing (to damage a turret, for example) and rolls a location other than Turret, draw a Line of Sight from the attacker to the targeted hex, and instead apply the damage to the first exterior hex the line crosses. If the line crosses exactly between two hexes, the player that won the Initiative that turn decides the affected hex. A roll of 5 or 9 indicates that the attack strikes a different hex than the one targeted. Apply the damage to the armor facing of an adjacent exterior hex, moving in the direction indicated by the Large Naval Vessel Hit Location Table. Damage that strikes the vessel from underwater cannot strike a turret (unless the vessel is fully submerged). Apply damage to the appropriate armor facing instead, even if an interior hex was targeted.

Critical Hits (Crew Stunned): On Large Support Naval Vessels, treat a Crew Stunned hit in the same manner as a Crew Killed hit, except that the effect wears off in the End Phase of the following turn.

Water: Treat a flooded location as a 'Mech location (see p. 121, *TW*); all equipment mounted in that location no longer functions, but can still receive critical hits and so on.

Attacks Against a Boarded Unit: Attacks against a boarded Large Naval Vessel Support Vehicle may strike the 'Mech or infantry units on deck. When a boarded unit takes a hit on any hex whose deck is occupied by any enemy (or friendly) units, roll 1D6. For 'Mechs, on a result of 1–4, the 'Mech does not take damage, and the total value of the weapon damage is applied directly to the Naval Vessel; a result of 5–6 means the boarding 'Mech is hit. For infantry, a result of 1–5 means the infantry does not take damage; on a result of 6, the boarding infantry unit is hit. If infantry and a 'Mech are in the same hex, randomly determine the order in which to make the 1D6 rolls and then roll for each unit until the damage is assigned to either a boarding unit or the Naval Vessel.

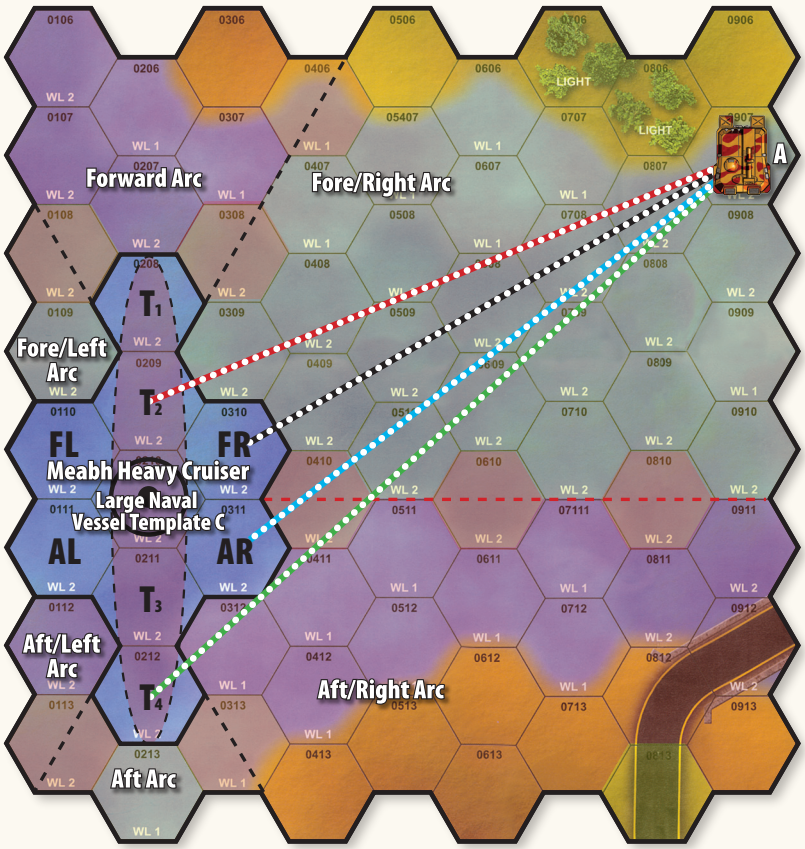
For battle armor, a randomly chosen trooper takes maximum damage. Any damage left after the trooper is destroyed is applied to the Naval Vessel. For conventional infantry, mark off damage as though the attack came from another infantry unit (see *Damage From Infantry Units*, p. 216, *TW*).

In all cases, if the unit is destroyed and any damage remains, it is passed on to the target Naval Vessel.

Attacks Against Boarding Units: Attacks against any units that have boarded a Large Naval Vessel Support Vehicle (either from other units on the vessel's deck or units not on the Large Naval Vessel) may strike the Large Naval Vessel if they miss. If an attack against such a target is unsuccessful, roll 1D6. On a result of 1–5, nothing happens; on a result of 6, the weapon strikes the Large Naval Vessel in the hex where the target boarding unit is located.

On the Archipelago #2 map, a lone Pegasus Scout Hover Tank (Gunnery Skill 4) in Hex A, using flanking speed (8 hexes entered), attacks a Meabh-class Heavy Cruiser Large Naval Support Vehicle that entered 5 hexes this turn on the Large Naval Vessel Combat Diagram on page 26. The players determined before play began that any water hex not adjacent to a clear (land) hex was Depth 6.

The minimum distance to the Meabh is 6 hexes, but in an attempt to knock out some of the unit's turret-mounted weapons, the Pegasus launches an attack against the hex where the first turret position (T2) is located, giving a range to target of 7 hexes. The medium laser in the front cannot be fired, but the Pegasus can fire both SRM-6 launchers mounted in the turret. Fortunately, the Meabh is a big (Template C) target, and so the Pegasus receives a –2 to-hit modifier, for a final modified To-Hit Number of 10 [4 (Gunnery Skill] + 2 (attacker movement modifier) + 4 (long range) +2 (target movement modifier) – 2 (Template C Large Naval Vessel) = 10]. The Pegasus' controlling player rolls a 7 and 10, meaning 1 missile launcher hit. A result of 8 on the Cluster Hits Table means that 4 missiles struck the target; 8 points of damage are assigned to the turret in the T2 location.



● LARGE NAVAL VESSEL COMBAT DIAGRAM ●

LARGE NAVAL VESSEL HIT LOCATION TABLE

2D6 Roll	Front	Rear	Front Side	Rear Side
2	Front (Critical)	Rear (Critical)	Side (Critical)	Side (Critical)
3	Front	Rear†	Front Side	Rear Side†
4	Front	Rear†	Front Side	Rear Side†
5	Right*‡	Left*†‡	Front*‡	Rear*†‡
6	Front	Rear	Front Side	Rear Side
7	Front	Rear	Front Side	Rear Side
8	Front	Rear	Front Side	Rear Side
9	Left*‡	Right*†‡	Rear*‡	Front*†‡
10	Turret	Turret	Turret	Turret
11	Turret	Turret	Turret	Turret
12	Turret (Critical)	Turret (Critical)	Turret (Critical)	Turret (Critical)

*The attack strikes the armor of the hex immediately adjacent to the targeted hex in the direction indicated.

†Roll once on the Motive System Damage Table. Attacks from above the waterline apply a –2 modifier.

‡A roll of 5 or 9 indicates that the attack strikes a different hex than the one targeted (see rules).

The Meabh (Gunnery Skill 3), which expended cruising MP this turn, returns fire.

The weapons mounted in the Aft-Right location count the range to target from the template hex indicated (AR), which gives a range of 7 hexes to the Pegasus. However, as shown on the Large Naval Vessel Combat Diagram, the Pegasus is outside of the Aft/Right Arc and so neither the 2 AC/5s or 2 medium lasers in that arc can fire on the Pegasus.

The weapons in the Fore-Right location count the range to target from the template hex indicated (FR), which gives a range of 6 hexes to the Pegasus. The 2 AC/5s in the Fore-Right have a modified To-Hit Number of 7 [3 (Gunnery Skill) + 1 (attacker movement modifier) + 0 (short range) + 3 (target movement modifier) = 7]. The 2 medium lasers in the Fore-Right have a modified To-Hit Number of 9 [3 (Gunnery Skill) + 1 (attacker movement modifier) + 2 (medium range) + 3 (target movement modifier) = 9].

The weapons in the T2 turret location count the range to target from the template hex indicated (T2), which gives a range of 7 hexes. The 3 PPCs and 1 large laser in the T2 location all have a modified To-Hit Number of 9 [3 (Gunnery Skill) + 1 (attacker movement modifier) + 2 (medium range) + 3 (target movement modifier) = 9].

The weapons in the T4 turret location count the range to target from the template hex indicated (T4), which gives a range of 9 hexes. The 3 PPCs and 1 large laser in the T4 location all have a modified To-Hit Number of 9 [3 (Gunnery Skill)

+ 1 (attacker movement modifier) + 2 (medium range) + 3 (target movement modifier) = 9].

Per standard rules, all attacks that strike the Pegasus will use the Left Side of the Hit Location Table.

Area Effect Weapons

Damage from weapons with an area of effect, such as artillery, is only applied to a single hex of a multi-hex unit. The hex affected receives the highest level of damage, or—if several would receive the same damage—the hex to be damaged is selected by the attacker.

A Meabh-class Naval Vessel is attacked by two Sniper artillery units firing standard HE rounds. The first strike directly hits one of the hexes occupied by the vessel, inflicting the full 20 points of damage, split into four 5-point Damage Value groupings as normal. The adjacent hexes occupied by the vessel ignore the 10 points of damage that would normally be applied to units in adjacent hexes, but any other units in those hexes are damaged as normal.

The second Sniper misses the targeted hex and scatters. However, the new impact hex catches two of the Large Naval Vessel hexes in the outer 10-point blast area. Only one of the two hex strikes (chosen by the attacking player) is counted when determining the damage the vessel receives (two 5-point Damage Value groupings assigned in one of those two hexes only).

Turret Destruction

Unlike Small and Medium Naval Vessels, Large Naval Vessel Support Vehicles can survive the destruction of a turret. Additional damage to a destroyed turret transfers to the side armor facing the attacker. Naval Vessels built with the Submersible chassis modification (see p. 59) cannot dive once a turret is destroyed. Attempting to do so (or having a turret destroyed while submerged) results in the unit's destruction.

CRITICAL DAMAGE

The following modifications are made to ground Combat Vehicle critical hit effects (see p. 193, *TW*), as they apply to Large Naval Vessel Support Vehicles.

Ammunition: A Large Naval Vessel Support Vehicle follows the same rules for an ammunition explosion as other vehicles (see p. 194, *TW*), with the following exceptions.

Only the ammo in the hex where the damage occurred explodes. If there is no ammo in the location hit, the critical hit is ignored.

If the unit mounts CASE, per standard vehicle rules, the ammunition explosion does not damage the internal structure of the location corresponding to the location of the hex hit. Instead damage is applied to the armor of the location corresponding to the damaged hex.

As usual, if a unit is submerged and the armor in a location is destroyed due to an ammunition explosion, that section is flooded and all equipment becomes non-functional (see *Underwater Units*, p. 121, *TW*).

Each ammo critical hit reduces the unit's Cruising MP by 1.

Cargo: Use the rules for Cargo on DropShips (see p. 239, *TW*) when determining critical hits against cargo on Large Naval Vessels.

Crew Killed: The crew of a Large Naval Support Vehicle is treated like a DropShip crew (see p. 240, *TW*). For each crew critical hit suffered, one crew box is marked off and a cumulative +1 modifier (for each such hit) is applied to any Gunnery or Piloting Skill Rolls required by the unit. When all six crew boxes have been marked off, the crewmen are dead.

Engine Hit: Because of the size and redundancies of an engine on a Large Navel Vessel Support Vehicle, an engine critical hit may often be ignored, while a critical hit to the engine that actually does damage does not immediately disable the Large Naval Vessel.

Whenever an engine critical hit is noted, the controlling player of the targeted vessel immediately rolls 2D6. On a result of 8 or better, the engine hit is ignored. If the result is 7 or less, the engine critical hit is applied. However, such a critical hit does not disable the vehicle. Instead, each engine critical hit reduces the unit's Cruising MP by 1. In both instances, Flanking MP should be recalculated (multiply the Cruising MP by 1.5, rounding up).

ELECTRONIC EQUIPMENT

Any multi-hex Large Naval Vessel Support Vehicle that carries electronic equipment with an area of effect (such as ECM) treats the source as located in the Pivot point hex on the appropriate Large Naval Vessel Template.

LARGE NAVAL VESSEL SINKING RATE TABLE

Template Size	Number of Depths per Turn
Size A	5
Size B	4
Size C	3
Size D	2
Size E	1

UNIT DESTRUCTION

Unlike other units, which are automatically removed from the game when they are destroyed, the size of a Large Naval Vessel—and the fact that other units can be mounted on top of it—means that special rules are used to resolve its destruction (this is done to avoid a magic disappearing ship, leaving 'Mechs several levels above the surface of a water hex, their legs windmilling in the air).

Note: These rules do not take into consideration that in a real-world sinking situation, vessels almost always capsize and will tear themselves apart as they gyrate toward the bottom, or the fact that a large vessel will usually have huge sections that remain intact. In an effort to make these rules easy to implement, such realism is ignored. In *BattleTech*, a unit sinks flat; once a hex touches bottom, the unit is immediately removed from the game or reduced to its new terrain (depending on the rules in use).

Although they remain susceptible to hull breaches as a normal naval vessel, Large Naval vessels will not begin to sink unless they suffer a hull breach in half or more of their number of hexes in length (rounded up). If a location is breached, all items in that location are considered destroyed for the remainder of the scenario and must be repaired as per normal rules for breached locations.

Resolving Sinking

A Large Naval Vessel will sink a number of depths per turn equal to its Template Size. This can affect the ability of units on the deck to save themselves before it sinks, and of the crew to abandon ship (see *Ejection And Abandoning Units,* p. 164, *TO: AR*), as well as how long it takes the "battlefield wreckage" to sink to the bottom (see *Battlefield Wreckage*, p. 155, *TO: AR*).

A Large Naval Vessel will sink a number of depths equal to its Template Size as shown on the Large Naval Vessel Sinking Rate Table; note that this depth is measured from the bottom of the unit. For example, a Template E unit is 6 levels high, 3 of which sit below the water line, 3 above the water line. As it sinks 1 depth per turn, it will require 4 turns before it completely submerges.

All such sinking movement is made automatically (and simultaneously in the case of multiple sinking ships) at the end of the Movement Phase (Ground), after all other movement has been made.

As soon as any hex of a sinking Large Naval Support Vessel strikes the bottom of a water hex, that hex of the ship is immediately removed from play, or converted into its appropriate terrain type if using *Battlefield Wreckage* rules (see p. 155, *TO: AR*). This could result in various hexes of the ship "breaking off" and being removed from play or reduced to a terrain type across many turns as a large ship sinks through terrain of different levels/depths.

While the unit is sinking, it still occupies the same number of depths as its Template Size (minus any hexes that might have broken off by already hitting the bottom of their respective hexes). If the sinking unit enters the hex(s) of another unit (or another unit enters a hex of the sinking unit that has yet to hit bottom), use the Submerged/Surfacing rules for Mobile Structures to resolve the situation (see p. 41).

Note that once a Large Naval Vessel has become submerged, if there is no underwater combat occurring and no other units on board (either on deck, or in the cargo bay) that need to be dealt with, if all player agree, the vessel can simply be removed from the playing area (if Battlefield Wreckage is being used, the players can simply assign the appropriate new terrain to the relevant hexes). In other words, due to the length of time and complexity involved of the sinking of a Large Naval Vessel, the players should only go through all the steps of a sinking vessel if they wish.

Running Aground: If a unit has run aground when it is destroyed, any hex(s) that already touch the bottom of a hex are instantly removed from play or reduced to their appropriate terrain type, as discussed above.

Water Flow: If using the *Water Flow* rules (see p. 50, *TO: AR*), the flow of water will move a sinking ship; players should first sink the ship and then apply any movement based on water flow. If this results in a hex of the sinking unit striking the underlying terrain of a new hex (that is, the bottom of the ship entering the hex at the level of the underlying terrain in that hex), the ship is first moved and then the hex(s) that struck bottom are immediately removed from play or reduced to the same terrain type, as describe above. If water flow will move a sinking unit into a hex it cannot enter (such as the side of a submerged hill), then the unit remains in the hexes before the water flow movement was applied; no displacement occurs.

Units Mounted on a Sinking Vessel (On Deck)

For units mounted on the deck of a sinking Large Naval Vessel, use the following rules.

'Mechs: A standing 'Mech must make a Piloting Skill Roll at the end of any turn after a ship has been moved for sinking purposes. The results of a failed roll depend on whether or not the deck of the Large Naval Vessel hex that the 'Mech is standing on is submerged.

If the hex is not submerged, the 'Mech falls in the hex and takes standard falling damage, but remains in the hex.

If the hex is submerged, a failure means the 'Mech has fallen off; randomly determine an adjacent hex into which the 'Mech would most appropriately fall. It immediately sinks to the bottom of that hex (see *Extreme Depths*, p. 40, *TO: AR*). Assign damage normally (see *Falling Damage*, p. 68, *TW*). If the 'Mech has UMU MP, it does not take falling damage, but is simply placed in the adjacent hex at a depth equal to the deck of the unit from which it fell. In the case of 'Mechs with UMU MP, this only applies if the controlling player continues to keep the 'Mech on the sinking vessel. As soon as the deck of the hex the unit occupies has reached Depth 2, the controlling player can disembark the vessel automatically, using UMU MP with no further rolls required.

If the 'Mech falls off but there is no legal hex for it to enter, it is considered destroyed.

Infantry With UMU MP: As soon as the deck of the hex occupied by an infantry unit with UMU MP has reached Depth 1, the controlling player can disembark the vessel automatically, using UMU MP with no further rolls required.

All Units: Only units with Jumping/VTOL MP (including fighters using VTOL movement to take off) may disembark a sinking ship; if a unit mounts a Flight Deck, fighters can take off normally (not using VTOL movement). Additionally, any such unit (excluding a fighter taking off from a Flight Deck) expending Jumping MP must make an immediate Piloting/Driving Skill Roll (Anti-'Mech Skill Roll, in the case of infantry) to avoid falling in the target hex.

If an infantry unit fails this roll, apply a single point of damage to all battle armored troopers, or in the case of conventional infantry, apply a single 5-point Damage Value grouping as though another infantry unit had made a successful attack.

A VTOL Vehicle that fails the Driving Skill Roll automatically crashes in the hex from which it was attempting to take off (see *VTOL and WiGE Vehicle Crashes*, p. 68, *TW*); for the purposes of damage, the VTOL Vehicle is considered to have moved 1 hex and randomly determine the damage location. Infantry expending VTOL MP also crash in the hex from which they were attempting to take off, applying damage as described above for infantry using jumping MP.

In all instances, whether a jumping unit failing a PSR and falling in the target hex or a unit expending VTOL MP failing the PSR and crashing in the hex they were attempting to take off from, the unit's movement is over.

If the target hex for the dismounting unit is illegal (such as infantry without UMU MP entering a water hex), the unit is automatically destroyed.

Players should also use the rules for dismounting and mounting infantry from naval carriers (see *Dismounting From Naval Carriers*, p. 225, *TW*, and *Naval Carriers*, p. 224, *TW*) as guidelines for how to dismount all units from a sinking Large Naval Vessel Support Vehicle when it is not adjacent to a land hex, when it is submerged and so on.

Units Mounted On A Sinking Vessel (In Cargo Bay)

If any units are mounted in the cargo bay of a sinking Large Naval Vessel, use the following rules.

All the standard rules for a friendly unit dismounting a DropShip apply (see p. 89, *TW*), with the following additions:

Any friendly active unit may dismount into a legal non-water hex, if such an adjacent hex exists.

If there are no non-water hexes adjacent, active friendly units (see *Transport Bays (Expanded)*, p. 185, *TO: AR*) can attempt to dismount the Large Naval Vessel using the rules for dismounting and mounting infantry from naval carriers (see *Dismounting From Naval Carriers*, p. 225, *TW*, and *Naval Carriers*, p. 224, *TW*) as guidelines for how to dismount all units from a sinking Large Naval Vessel Support Vehicle.

In situations where there are no non-water hexes adjacent, before the Large Naval Vessel is submerged, 'Mechs and ProtoMechs, or infantry with UMU MP, as well as hover vehicles, may dismount into an adjacent water hex. After the Large Naval Vessel is submerged, only 'Mechs or ProtoMechs or infantry with UMU MP may dismount. If a unit with UMU MP dismounts in this fashion, it is placed in the most appropriate adjacent hex, at a depth equal to the "deck" of the Large Naval Vessel. Units without UMU MP that dismount in this fashion automatically fall as though they were on the deck of the Large Naval Vessel and failed a Piloting Skill Roll (see *Units Mounted on a Sinking Vessel (On Deck)*, p. 28).

In all instances, if all bay doors have been damaged (by units mounting through the doors or due to critical damage), no units mounted in the cargo bay can dismount.

Non-Active Units: Any non-active units (see *Transport Bays (Expanded)*, p. 185, *TO: AR*) must be activated prior to dismounting using the rules above.

Enemy Units: Any enemy unit that has mounted through a bay door (see *Mounting Through a Bay Door (Into a Cargo Bay)*, p. 156, *TO: AR*) may follow the exact rules as noted above for dismounting, except apply a –3 modifier to the Piloting Skill Roll.

When a Hex of a Sinking Unit Is Destroyed

When a hex of a Large Naval Vessel Support Vehicle strikes the bottom and is removed from play or reduced to its battlefield wreckage terrain type (see the rules directly under *Unit Destruction*, p. 27), and that hex has units mounted on it, those units automatically fall into the hex they occupy. Use the following rules to resolve these situations.

'Mechs: If the deck of the Large Naval Vessel hex the unit occupies is above water, the 'Mech takes falling damage to the surface of the water, then falling damage to the bottom, which are both resolved immediately (see *Falling Damage*, p. 68, TW). If the Large Naval Vessel hex the unit occupies is underwater, the 'Mech takes standard underwater falling damage (see *Falling Damage*, p. 68, *TW*). In both instances, the unit immediately sinks to the bottom of the water hex to take that falling damage.

If the 'Mech has UMU MP and it falls from above the water's surface, it takes standard falling damage as above and then remains at Depth 1 in the hex. If the 'Mech has UMU MP and it falls while underwater, it is instead placed at its current depth with no additional effects.

If the hex is not a water hex (the Large Naval Vessel Support Vehicle has run aground; see *Running Aground*, p. 22), then the 'Mech takes standard falling damage (see *Falling Damage to a 'Mech*, p. 68, *TW*).

Infantry: If an infantry unit does not have UMU MP and it falls into a water hex, it is automatically destroyed.

If an infantry unit has UMU MP and the deck of the Large Naval Vessel hex the unit occupies is above water, the unit takes infantry falling damage (see Infantry Falling Damage Table, p. 151, *TW*), divided by 2 (round down). After the damage is assigned, the infantry unit is placed at Depth 1 in the hex.

If the infantry unit has UMU MP and it falls while underwater, it is instead placed at its current depth with no additional effects.

If the hex is not a water hex (the Large Naval Vessel Support Vehicle has run aground; see *Running Aground*, p. 22), then the infantry unit takes standard falling damage (see Infantry Falling Damage Table, p. 151, *TW*).

Naval Units: If a Naval Vessel (for whatever reason) is on a Large Naval Vessel and the deck of that hex(s) is above water, the unit takes standard falling damage when it hits the water's surface (see *Falling Damage*, p. 68, *TW*); if the unit is not destroyed, it is then placed on the surface of the water in that hex. If the hex is not a water hex (the Large Naval Vessel Support Vehicle has run aground; see *Running Aground*, p. 22), the unit is automatically destroyed.

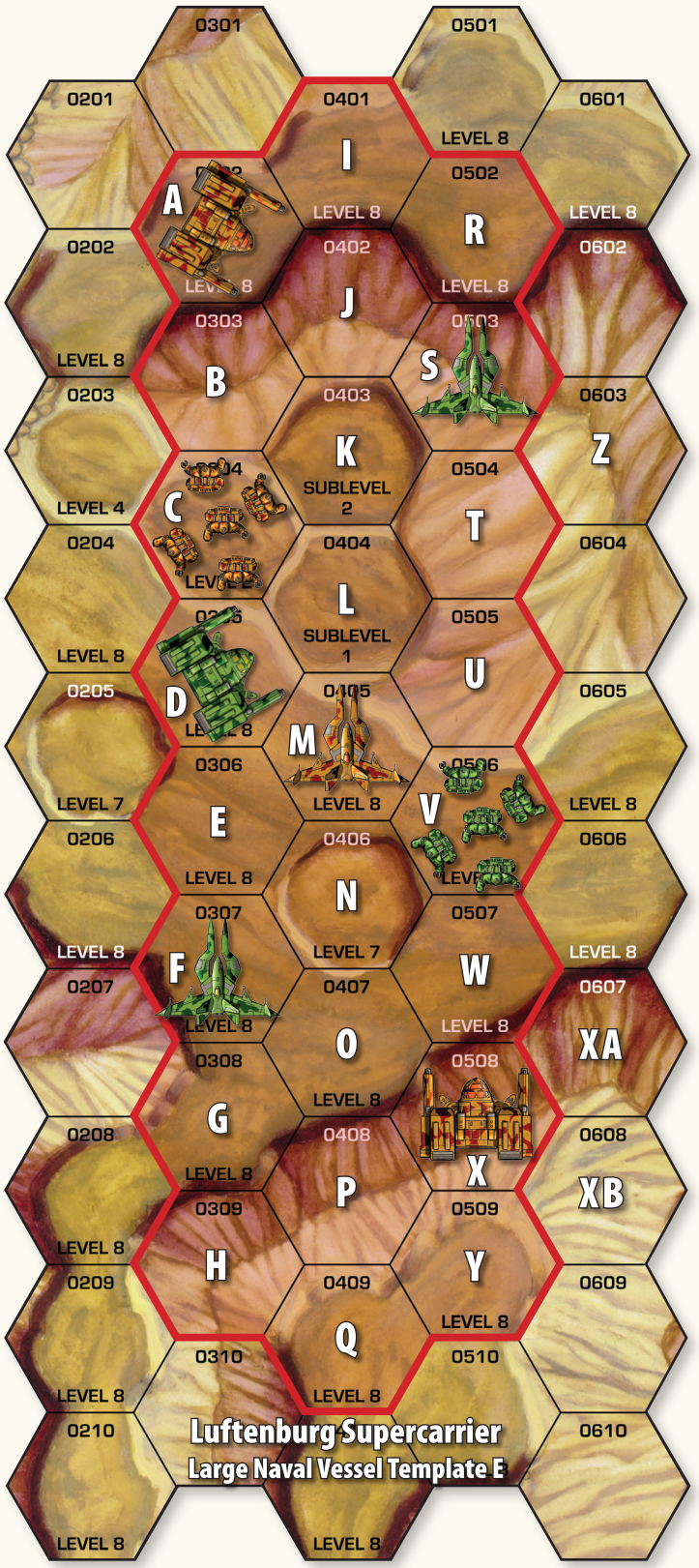
All Units: All other units that fall into a water hex are automatically destroyed. If the hex is not a water hex (the Large Naval Vessel Support Vehicle has run aground; see *Running Aground*, p. 22), then the units take standard falling damage (see *Unit Displacement* and *Accidental Falls From Above*, p. 151, *TW*).

In all cases, if multiple units occupy a hex, randomly determine the order in which the falls are resolved. Resolve stacking limits if necessary, using the standard stacking rules.

Destruction of a Sinking Vessel and Mounted Units (in Cargo Bays)

Use the DropShip destruction rules (see p. 90, *TW*) to determine if any units survive the destruction of a Large Naval Vessel. Resolve completely the sinking and final destruction of all hexes of a Large Naval Vessel before determining if any units mounted inside the vessel survived.

An ancient Sovereign Class cruiser on patrol.



• SINKING SHIP DIAGRAM •

In the Sinking Ship Diagram at left, a group of players are playing a large wet-naval battle, including Large Naval Vessels, submarines, 'Mechs, battle armor, fighters and more. To create a cooler and more tactical-oriented environment for the surface battle as well as the underwater battle, the players are using standard mapsheets completely submerged in water. It is Turn 6 of the game and the players are using the Battlefield Wreckage rules (see p. 155, TO: AR*).*

A Luftenburg Supercarrier is on the Box Canyon (now ocean) mapsheet. The water's surface is 12 Depths above the Level 0 Clear terrain depicted by the mapsheet. As the Luftenburg is a Template E Large Naval Vessel Support Vehicle, it has 6 levels of height, 3 levels above the water and 3 levels below. This puts the Luftenburg's bottom at Depth 9…only one depth separating it from the bottom of Hexes A, D, E, F, G, I, M, O, Q, R, V, W and Y.

All three of the Luftenburg's Flight Decks are occupied by fighters; the fighters are located in Hexes F, M and S (the fighters in Hexes F and S landed on Turn 1, while the fighter in Hex M only landed 2 turns ago). In addition, thanks to some combat drops, there's a battle raging on the deck: a Mad Cat *in Hex A, an Undine battle armor in Hex C, a* Spider *in Hex D, a Sylph battle armor in Hex V and another* Mad Cat *in Hex X.*

During the Weapon Attack Phase of Turn 6, the internal structure of a location is destroyed, destroying the Luftenburg. It will begin to sink during the following turn, 1 Depth each turn per the Large Naval Vessel Sinking Rate Table.

During the Movement Phase of Turn 7, the 'Mechs in Hexes A and X do not have Jumping or VTOL MP and so can do nothing to save themselves. The controlling player leaves them in place. The Undines won't have any issue, so the controlling player also leaves them in place.

For the Sylph battle armor, the controlling player expends 3 VTOL MP to turn its Level 3 into Elevation 6 and then leaves it in the hex to watch the fun.

The Spider *has jump jets, but unfortunately there is no non-water hex within range of its 8 Jumping MP. However, its pilot knows the unit is about to be in a world of hurt as the ship breaks up and various hexes of the Large Naval Vessel are destroyed, so the controlling player decides to jump to Hex Z. Though he'll need to make a Piloting Skill Roll at a +1 modifier to successfully stand in Hex Z at Depth 12, that is by far preferable to falling such a distance. Because it's not lower than Depth 15, he won't have to deal with crush depth check, so he'll just have to walk the* Spider *out…it'll take a while, but the 'Mech should come out with relatively little damage.*

The fighters in Hexes F and S have been on deck long enough since they landed, and so the controlling player immediately makes a Control Roll for both fighters; they both successfully take off. Unfortunately, the fighter in Hex M has not been landed long enough and so cannot move.

Finally, the controlling player of the Luftenburg starts to launch lifeboats. Looking up Ejection and Abandoning Units rules under General Rules (see p. 164, TO: AR*), the players finds the Naval Vessel rules. The Piloting Skill of the Crew is 5, so the controlling player makes a Piloting Skill Roll and gets a result of 10—a MoS of 5. That means 6 lifeboats successfully launched and are placed in adjacent hexes (at the discretion of the controlling player).*

At the end of the Movement Phase of Turn 7, the Luftenburg sinks 1 Depth. Hex A, D, E, F, G, I, M, O, Q, R, V, W, and Y are immediately reduced to ultra-rubble; each of those hexes is now a Depth 4 ultra-rough hex.

The fighter in Hex M falls into the water and is immediately destroyed.

The 'Mech in Hex A falls 2 levels to the water's surface (it was at Level 3 on the deck of the ship, but the ship sank 1 Depth before it was reduced) and takes 12 points of falling damage [75 (tonnage of Mad Cat*) ÷ 10 = 7.5 (rounding up to 8) x (2 (levels fallen) + 1) = 24 ÷ 2 = 12]; note that since the unit is not yet underwater, no rolls for a hull breach are made when applying this damage (see Underwater Units, p. 121,* TW*). The* Mad Cat *will then sink 4 more Depths and take 20 points of falling damage [75 (tonnage of* Mad Cat*) ÷ 10 = 7.5 (rounding up to 8) x (4 (depths fallen) + 1) = 40 ÷ 2 = 20]; unlike when striking the surface of the water, a hull breach avoidance roll must be made for each Damage Value grouping applied to the now-submerged 'Mech. Under standard rules, the* Mad Cat *would be stuck, as all hexes lower than the Depth 4 "shelf" it is on represent more than a Depth 3 change. However, as the players are using the Leaping advanced rule (see p. 20,* TO: AR*), the controlling player in a future turn will make the move and hope that the* Mad Cat *can walk out of the water.*

The infantry in Hex C don't need to do anything yet, but the 'Mech in Hex X must making a Piloting Skill Roll to avoid falling off; the player succeeds and the 'Mech continues on the boat.

Finally, the controlling player once again launches lifeboats. A Piloting Skill Roll result of 8 only gives a MoS of 3. That means only 4 lifeboats successfully launched this turn.

At the end of the Movement Phase of Turn 8, the Luftenburg sinks 1 Depth. Hex N of the ship is immediately reduced to an ultra-rough hex. Once again, the Mad Cat *in Hex X must make a Piloting Skill Roll, which succeeds.*

The result of this turn's Piloting Skill Roll to launch lifeboats is a 5; no MoS, so only 1 lifeboat successfully launches.

At the end of the Movement Phase of Turn 9, the Luftenburg sinks 1 Depth and the Mad Cat *must once again make a Piloting Skill Roll; once again, the controlling player rolls successfully.*

The controlling player of the Luftenburg makes one last desperate attempt to launch lifeboats during the Movement Phase of Turn 10. At the end of the Movement Phase, the deck will be submerged and it will be impossible to launch lifeboats. A final Piloting Skill Roll results in a 12! That gives a MoS of 7, so 8 lifeboats successfully launch. Unfortunately, only 19 lifeboats have been launched so far, which equals 190 crew. As the Luftenburg has a crew of 987 (minus any pilots that dismounted with their units—the vehicles that were dismounted, or the fighters that launched), the controlling player is left with two options: make a Piloting Skill Roll at +2 for each lifeboat launched this last turn, with 1 point of damage inflicted against each boat for each 1 of the MoF, or he can simply have all crewmen abandon ship and float in life vests in the water. While his Luftenburg is a goner, he's still got plenty of other naval and airborne units in the area and so is confident of his search and rescue operations. He chooses the latter option (rather than risk killing much of the crew through questionable lifeboat-launching operations).

At the end of the Movement Phase of Turn 10, the Luftenburg sinks 1 Depth. The bottom of the Luftenburg hexes that have not yet been reduced to battlefield wreckage are at Depth 7. As the Luftenburg has a height of 6 hexes, that means any units still on the deck are encountering the water for the first time. The Undine in Hex C, since it has UMU MP, is immediately placed at Depth 1 in Hex C. The Mad Cat *in Hex X is now at partial cover and once again must make a Piloting Skill Roll to avoid falling. This time the controlling player finally fails. In this situation, a failure doesn't mean the 'Mech falls in Hex X, however, as the Luftenburg's Hex X is now underwater. The most appropriate hex adjacent to the Luftenburg is chosen. In this case, Hexes XA and XB are equally appropriate, so the controlling player randomly determines the location where the 'Mech ends up: Hex XA. The 'Mech takes 48 points of falling damage [75 (tonnage of* Mad Cat*) ÷ 10 = 7.5 (rounding up to 8) x (11 (depths fallen) + 1) = 96 ÷ 2 = 48]; note that it fell 11 depths, since the surface of Hex X was at Depth 1 when the* Mad Cat *fell off. As with the other* Mad Cat*, hull breach avoidance rolls must be made for every Damage Value grouping applied to the 'Mech (see* Underwater Units*, p. 121,* TW*).*

At the end of the Movement Phase of Turn 11, the Luftenburg sinks 1 Depth.

At the end of the Movement Phase of Turn 12, the Luftenburg sinks 1 Depth.

During the Movement Phase of Turn 13, a Verne Cargo Sub attempts to pass underneath the sinking ship, but doesn't quite make it and is at Depth 10 in Hex P. At the end of the Movement Phase of Turn 13, the Luftenburg sinks 1 Depth. As the Verne Cargo Sub occupies the same depth in a hex now occupied by the Luftenburg, a standard charging attack occurs, inflicting 46 points of damage on the Verne [80 (current front location internal structure) + 850 (current front location armor) = 930 ÷ 10 = 93 x 1 (hexes moved) = 93 ÷ 2 (occurred in a water hex) = 46.5, rounding down to 46]. Randomly determining the location, the damage is applied to the front armor, leaving it with 54 points of armor. As the Damage Value of the ram exceeded the Verne's BAR, the controlling player of the Verne must roll once on the Ground Vehicle Critical Hits Table. If it mattered, the Verne would have inflicted 46 points of damage on the Luftenburg's front armor. Finally, the Verne is displaced to Depth 11. Additionally, Hex B is immediately reduced to ultra-rough at Depth 10.

During the Movement Phase of Turn 14, the controlling player of the Verne (who was lucky enough not to roll a critical hit that would've reduced its movement) quickly moves the Verne out of the way of the sinking ship. At the end of the Movement Phase of Turn 15, the Luftenburg sinks 1 Depth. Hexes B, H, J, Q, R, S, T and Y are immediately reduced to ultra-rough at Depth 12.

At the end of the Movement Phase of Turn 16, the Luftenburg sinks 1 Depth and its Hex L is immediately reduced to ultra-rough at Depth 13.

Finally, at the end of the Movement Phase of Turn 17, the Luftenburg sinks 1 Depth and the final Hex K is immediately reduced to ultra-rough at Depth 14.

Now that the final destruction of all hexes has been determined, the controlling player of the Luftenburg uses the DropShip destruction rules (see p. 90, TW*) to determine if any of the units mounted on the Large Naval Vessel survived; if any of the units cannot enter a water hex, they are automatically destroyed.*

LARGE AIRSHIP SUPPORT VEHICLES

Large Airship Support Vehicles follow all the same rules for movement and combat while airborne as Small- and Medium-sized Airships (see p. 204, *TW*).

MOVEMENT

The following additional rules apply to Large Airship movement.

Landing and Liftoff

As described in detail on page 204 of *Total Warfare*, Airships use the Spheroid Small Craft rules for landing and take-off. However, some additional rules apply for Large Airships.

A Large Airship attempting to land has a "footprint" equal to the size of the appropriate template from the Large Naval Templates, as described above. Every hex within that footprint, along with the terrain in the footprint, must be one level higher or less than the height of the grounded Airship along the landing strip, as determined by the Pivot point hex. In other words, while the Pivot point (the gondola) is touching the ground, the entire rest of the footprint (the gas-filled structure above it) is considered one level higher. If any hex within the footprint contains terrain or levels that are two levels higher or more than the Pivot point hex, consult the Landing Modifiers Table (see p. 86, *TW*), and apply all modifiers and/or crash results as normal.

Water: Airships with the Amphibious chassis modification may land in water hexes, though the same general restrictions above apply.

STACKING

Standard stacking limits do not apply for Large Airships. No other unit may occupy the Pivot point hex of a grounded Large Airship. Any unit of Level 1 height or less can enter any other hex of the grounded Large Airship's footprint, per standard movement. However, the height of the underlying terrain plus the height of the unit cannot be higher than the level of the footprint in that hex. Infantry can always pass through any hex occupied by a grounded Large Airship footprint, but they cannot enter the Pivot point hex.

For example, a Large Airship with a Pivot point on a Level 0 hex could have Level 1 hexes anywhere within its footprint. However, any unit with a Level 1 height (a ProtoMech, vehicle and so on) could not enter such a hex, as the unit's total height would then be 2 [1 (level of the hex) + 1 (height of the unit) = 2], which is higher than the level of the Airship's footprint in that hex.

CARRYING UNITS

If a Large Airship is built with cubicles allowing it to carry other units (such as aerospace fighters, Small Craft, 'Mechs, vehicles and so on), the mounting and dismounting of such units from a grounded Airship follow the same rules as for a grounded DropShip (see *Carrying Units*, p. 89, *TW*). The units are placed in adjacent hexes to the Pivot point hex. The exception occurs if a mounting or dismounting unit has a height greater than its level plus the level of the underlying terrain in the adjacent hex to the Pivot point (for example, a Level 2 'Mech). In such a case, apply the following rules: a dismounting or mounting unit is placed in the most appropriate hex adjacent to the template of the Airship, nearest the Pivot point hex.

For an airborne Large Airship, a variety of different rules cover various unit types: for launching/recovering fighters, use the *Launching/Recovering Fighters/Small Craft* rules (see p. 86, *TW*); for mounting infantry with Jumping/VTOL MP, use the *Aerospace Carriers* rules (see p. 224, *TW*); for dismounting infantry with Jumping/VTOL MP, use the *Dismounting From Aerospace Carriers* rules (see p. 225, *TW*).

FLIGHT DECKS

Depending on the size of the Flight Deck, friendly fighters, Combat and Support VTOLs and Fixed-Wing Support Vehicles may land on an Airship Support Vehicle with a Flight Deck. See *Flight Deck*, p. 124 in the *Advanced Weapons and Equipment* section, for complete details on how to use a Flight Deck.

Enemy units attempting to land on a Flight Deck must apply an additional +2 modifier to the Landing Target Number (this is in addition to the +1 for a unit landing at unfriendly airfield; see p. 87, *TW*).

COMBAT

Large Airship Support Vehicles follow all the standard rules for Airship Support Vehicles in combat (see p. 206, *TW*), except as noted below.

Line of Sight

Large Airships block line of sight when grounded. However, players must take into account that any non-Pivot point footprint hex is one level higher than the underlying terrain of the Pivot point hex. In addition, the total height of the footprint that blocks LOS is dependent on the template used for the grounded Airship, as shown on the Large Naval Vessel Heights Table (see p. 24).

Finally, a grounded Large Airship may be easier to hit. Any attack against a grounded Large Airship receives an additional to-hit modifier from the Airship and Large Vessel Template Table (see p. 57).

ELECTRONIC EQUIPMENT

Any multi-hex Airship Support Vehicle that carries electronic equipment with an area of effect (such as ECM) treats the source as located in the Pivot point hex on the appropriate Large Naval Vessel Template.

ACCIDENTAL FALLS FROM ABOVE

If a unit accidentally falls onto a footprint hex, assign damage normally (see p. 152, *TW*). However, no unit can maintain purchase on the rigid, air-filled structure that the footprint template represents, and is automatically displaced to the closest, most appropriate and legal hex; if more than one hex fits that description, randomly determine the hex into which the unit is displaced.

MOBILE STRUCTURES

The following rules apply to Mobile Structures.

Player Adjudication: As noted in the *Introduction* (see p. 9), despite best efforts to the contrary, player adjudication will likely be required as players incorporate more and more of the various advanced rules from *Tactical Operations* into their games. Mobile Structures, by their very nature, significantly raise the likelihood of player adjudication. While we've tried to be as comprehensive as possible, players should be aware before starting a game that they may need to make rulings as a Mobile Structure moves and fires across complex terrain.

Mobile Structure Template

As described in the Mobile Structure construction rules, these units can be a variety of shapes and sizes. While the Structure Record Sheets allow for the tracking of equipment, damage and so on for a Mobile Structure, the record sheet can't really be used to show a Mobile Structure on the map. The Mobile Structure Template (see the record sheets at the back of this book) is a sheet of blank hexes—the same size as the hexes found on *BattleTech* mapsheets—that players can photocopy and then cut out to make the desired "footprint" shape of their Mobile Structure, plainly marking the "centermost" hex. Then, particularly when dealing with Ground Mobile Structures, the player can put the template directly on the mapsheet to designate its location, or can simply use it as a guide for determining where the Mobile Structure can and cannot move.

MOVEMENT

Mobile Structures do not have Cruising/Flanking Movement Points, but instead have a Maximum MP value. The Movement Point cost for Mobile Structures to enter a given hex is noted on the Mobile Structure Movement Costs Table (see p. 34). A Mobile Structure does not pay these movement costs for every hex in the new hex row it enters. Instead, the player determines the move he wishes to accomplish with his Mobile Structure, and then finds the single hex in the new hex row with the most expensive MP requirement. If the Mobile Structure meets that MP requirement, then the Mobile Structure may enter the new row of hexes (see *Sublevels*, at right, for the exception).

In all instances, whenever a Mobile Structure expends any MP, it is considered to have chosen a Flanking Movement Mode.

MP Reduction: Regardless of damage taken by the Mobile Structure (through movement or combat), its Maximum MP and quarter-MP expenditure capability is never reduced (the motive system is distributed throughout every hex of the unit).

Air Mobile Structures: Beyond the difference of MP tracking and expenditure noted for Mobile Structures, Air Mobile Structures follow all the same rules for movement restrictions as Large Airships (see p. 32). They also follow Large Airship rules for landing and take-off, except that the "footprint" of the Air Mobile Structure (as determined by the size of unit in question) is all the same height across the bottom (as opposed to one level above the height of the Pivot point hex on an Airship).

Water Mobile Structures: Water Mobile Structures may only operate in water hexes and can run aground when operating in shallower depths. Consult the Mobile Structure Types Table (see p. 76) to find the safe water depth in which these units can operate. A unit entering a water hex that is too shallow immediately runs aground and suffers 50 points of damage to all hexes involved. The unit, now beached, becomes an immobile target for the remainder of the scenario, unless another Naval Vessel/Water Mobile Structure with the Tractor modification, and with a number of hexes equal to or larger than the beached Mobile Structure, is present and able to extract the unit (see *Naval Tractors*, p. 24).

Additionally, like Large Naval Vessels, Water Mobile Structures take time to speed up and slow down. Each turn, a Mobile Structure can increase its speed (up to the unit's Maximum MP limit) or slow down by 1 MP. If a Water Mobile Structure is rendered immobile by damage, it does not come to a sudden halt, but rather decelerates by 1 MP (applied during the Movement Phase whenever the player nominates the unit for movement) every other turn until its speed drops to zero.

Finally, regardless of the size of a Water (Submersible) Mobile Structure, it may only change 1 depth, up or down, in a turn.

Planetary Conditions: Mobile Structures deal with any additional Planetary Conditions (see p. 26, *TO: AR*) not already covered on the Mobile Structure Movement Costs Table above, in the following manner: all terrain modifications are ignored; all weather conditions except lighting (dawn, dusk and so on) are downgraded two levels to affect a Mobile Structure (for example, Heavy Rainfall would affect a Mobile Structure as though it were Light Rainfall, while Light Hail would not affect a Mobile Structure at all). The full effects of Terrain Conditions are applied as appropriate to Mobile Structures.

Level Change (Ground)

A Ground Mobile Structure cannot change levels if half or less of the hexes on the side of the unit entering the new hex row are not at the same change in level. For example, a Mobile Structure currently occupies all Level 0 hexes. The 5-hex long side that is attempting to enter a new row of hexes encounters some hexes that are Level 1. In order for the Mobile Structure to be able to move forward, at least 3 of the 5 hexes must be Level 1 hexes.

Sublevels: A Mobile Structure can move across hexes that are considered a sublevel to its own base height (such as a canyon or crevasse), provided the distance spanned is always 1/3 or less the width in hexes of the unit itself. For example a 3- or 4-hex wide Mobile Structure would only be able to straddle a 1-hex wide sublevel "canyon," while a 6-hex wide Mobile Structure could straddle a 2-hex wide sublevel "canyon."

LOS Height: A large Ground Mobile Structure will take several turns to move across large hills of multiple levels. As such, the "roof" of a Ground Mobile Structure may have different LOS Heights in different hexes of the unit, depending upon the level of the underlying terrain of a given hex. Make sure to take this into consideration during the Weapon Attack Phase.

Terrain Reduction (Air, Ground)

Whenever a Mobile Structure enters a hex, including a clear hex, it automatically reduces (changes) that hex to a rough hex (see *Buildings*, p. 36, for the exception).

MOBILE STRUCTURE MOVEMENT COSTS TABLE

Movement Action /Terrain Type	MP Cost Per Hex/Terrain Cost	Prohibited Terrain
Cost to Enter Any Hex	1	
Terrain Cost When Entering Any New Hex		
Clear	+0	Water
Paved/Bridge	+0	Water
Road/Rough/Gravel Piles/Sand/		
Tundra/Planted Fields	+0	Water
Ultra Rough	+1	Air, Water
Light/Heavy Woods/Jungles	+0	Air, Water
Ultra-Heavy Woods/Jungles	+1	Air, Water
Water		
Depth 0	+0	Air
Depth 1/Depth 2	+1 (Level change MP cost not included)	Air
Depth 3-15	+2† (Level change MP cost not included)	Air, Ground*
Depth 16+	—‡	Air, Ground
Level change (up or down)		
Level 1/Sheer Cliffs	+0	Water
Level 2	+1	Water
Level 3+	—	Ground, Water, Air
Rubble	+0	Water
Ultra Rubble	+2	Air, Water
Buildings**		
Standard		
Light/Medium/Heavy	+0	Water
Hangar		
Light/Medium/Heavy/Hardened	+0	Water
Fence	+0	Water
Wall		
Light/Medium/Heavy	+0	Water
Hardened	+1	Water
Gun Emplacement		
Light/Medium/Heavy	+0	Water
Hardened	+1	Water
Fortress		
Medium	+1	Water
Heavy	+2	Water
Hardened	—	Air, Ground, Water
Castles Brian		
Heavy	—	Air, Ground, Water
Hardened	—	Air, Ground, Water
Heavy Industrial Zone	+1	Water

*To enter a water hex of Depth 3 or greater, a Ground Mobile Structure must mount the Environmental Sealing chassis modification.
**A Mobile Structure that enters a building hex never moves inside the building (see *Buildings*, p. 36).
†Only applies to Ground Mobile Structure; Water Ground Mobile Structures pay the standard 1 for entering a water hex.
‡ Water Ground Mobile Structure may enter such depths, paying the standard 1 for entering a water hex.

Terrain Factor: If using the *Terrain Factor Rules* (see p. 63, *TO: AR*), a Mobile Structure automatically inflicts 150 points of damage to all terrain and terrain modifications within a hex it enters (see *Buildings*, p. 36, for the exception). As this occurs after the Mobile Structure has entered the hex, it cannot stop the unit from entering the hex as described under *Level Change (Ground)*, page 33.

Off-Map Movement

Unlike any other unit type, Mobile Structures can be partially off the playing area. All hexes off the playing area are considered to be clear, at the Level of the hexes on the mapsheet, for movement purposes. For example, if the last hex before exiting a map is a Level 4, then the hexes off the map corresponding to that hex would be a Clear Level 4.

Combat: Any hexes of a Mobile Structure not directly on the playing area cannot be used in combat; they cannot make attacks or be the target of an attack. Whether a Mobile Structure is destroyed (see *Destroying a Mobile Structure*, p. 40) is based on the Mobile Structure hexes located on the playing area. If the Mobile Structure is considered destroyed, the entire Mobile Structure (including hexes off the map) are considered destroyed also; they cannot enter the playing area later in the scenario.

FACING

Mobile Structures have no facing and can move in any direction unless blocked by impassable terrain, as shown on the Mobile Structures Movement Costs Table. However, at the end of a movement, all the hexes of the Mobile Structure must match up with the hex grid on the playing area.

In place of moving forward into a new hex row, a Mobile Structure may choose to spend all its movement to make a facing change. Mobile Structures may only change facing by one hexside per hex. The unit pivots around the centermost hex of the unit's template. The player simply finds the centermost hex of the unit (if more than one hex qualifies equally as the "centermost hex," the controlling player can choose which hex to use each time he makes a facing change), and keeping that hex centered, rotates the Mobile Structure in the desired direction until the hexsides of the unit once again line up with the hexsides of the mapsheet.

All restrictions on movement still apply for this facing change; if a unit cannot legally make the facing change, it cannot be done. This is tracked as the pivot move is made, so that if any portion of a Mobile Structure hex enters another hex as the player pivots the Mobile Structure template on the playing area, the terrain in that hex must be taken into consideration, even if the Mobile Structure hex will not occupy it once the pivot move is finished. Furthermore, if units occupying such hexes are "brushed" by a pivoting Mobile Structure, collisions may occur and must be resolved in the order that they happen (below). If multiple potential collisions appear to occur simultaneously, randomly determine the order of resolution.

COLLISIONS

The following rules apply to collisions and Mobile Structures.

Ground Mobile Structures

If a Mobile Structure attempts to enter a hex occupied by another unit whose total height (including underlying terrain) is at least three levels, a collision occurs (resolved as a charging attack; see p. 148, *TW*). Some examples are a 'Mech in a Level 1 hex, a grounded DropShip, a vehicle or infantry with VTOL MP airborne in the hex with an elevation corresponding to the Mobile Structure, another Mobile Structure and so on.

In all instances, the number of current hexes of a unit never takes into consideration the number of levels that unit may occupy.

See *Unit Displacement*, page 40, for how to resolve displacements due to charging attacks.

Air Mobile Structures

Collisions against an Air Mobile Structure can only occur when another unit attempts to enter a hex occupied by a landed Air Mobile Structure. In this case, such a move is treated as a charge against a building (see p. 148, *TW*).

Water Mobile Structures

If a Water Mobile Structure attempts to enter a hex occupied by another unit, a ram automatically occurs.

Avoiding a Collision (Ground and Water Mobile Structures)

A unit that has not yet moved during the current Movement Phase can attempt to get out of the way of a Mobile Structure moving into the hex occupied by the unit. In order to get out of the way, the player controlling the target unit must make a successful Piloting/Driving Skill Roll (or Gunnery Skill, if no Piloting Skill exists; for infantry, use the Anti-'Mech Skill) just before the Mobile Structure enters the target's hex. A successful roll means the target unit may make its entire movement immediately, before the Mobile Structure continues its movement. Failure means the target remains in its hex (though a failed roll does not cause the target unit to fall). Units moved in this way have expended their movement by walking/cruising and may not move again later in the Movement Phase. A failed roll means the unit is rammed by the Mobile Structure.

Damage to Targets (Ground and Water Mobile Structures)

The Mobile Structure automatically inflicts 100 points of damage, assigned in 10-point Damage Value groupings, against the appropriate column of the appropriate hit location table; this damage is reduced to 50 points if the charging unit is a Water Mobile Structure. For conventional infantry, this damage is assigned as though it originated from another infantry unit (see p. 216, *TW*); for battle armor, the damage is assigned as though it came from an area-effect weapon (see p. 219, *TW*).

DropShips: If more than one hex of a DropShip is involved in the charge, the 100 points of damage is applied for every hex involved.

Mobile Structures: The damage assigned to another Mobile Structure depends on the size of both structures. A Mobile Structure consisting of a greater number of current hexes charging a smaller Mobile Structure inflicts the standard 100 points of damage to every hex of the target structure it hits.

If both structures consist of the same number of hexes, both players roll 2D6, re-rolling any ties. The winner is considered the charging unit, and takes 50 points of damage to every hex involved, while the loser is the target and receives the standard 100 points of damage to every Mobile Structure hex involved.

If the charging structure consists of a smaller number of hexes than the target, the target receives 50 points of damage to every Mobile Structure hex involved.

In all instances, damage is scaled for the type of Mobile Structure used as applied to buildings (see *Scaled Damage*, p. 124, *TO: AR*); this only applies to Fortress-type Mobile Structures. Also, damage is divided in half, rounded down (after scaling) if the Mobile Structure in question is a Water Mobile Structure.

Damage to a Mobile Structure (Ground and Water Mobile Structures)

The damage applied to a charging Mobile Structure is based on the type of unit involved, as shown under *Damage* in *Charge Attacks* (see p. 148, *TW*), and is applied as a single hit.

DropShips: Damage from a DropShip is based on the size of the DropShip (see *Components*, p. 24, *TW*). A Small DropShip inflicts 25 points of damage, a Medium DropShip inflicts 50 points of damage and a Large DropShip inflicts 75 points of damage. If more than one hex of a DropShip is involved, that damage is applied to all hexes involved.

Mobile Structures: If the charging Mobile Structure consists of a greater number of hexes than the target Mobile Structure, 50 points of damage are assigned to every Mobile Structure hex involved.

If the charging unit consists of the same number of hexes as the target, determine who is the attacker and who is the target, as shown above.

If the charging unit consists of fewer hexes than the target Mobile Structure, 100 points of damage are assigned to every hex involved. In all instances, damage is scaled for the type of Mobile Structure used as applied to buildings (see *Scaled Damage*, p. 124, *TO: AR*); this only applies to Fortress-type Mobile Structures. Also, damage is divided in half, rounded down (after scaling) if the Mobile Structure in question is a Water Mobile Structure.

BUILDINGS

Mobile Structures entering a building hex (along the ground for a Ground Mobile Structure, or while landing for an Air Mobile Structure) never enter the building itself. Instead, the MP cost (if any) represents the difficulty of demolishing the building in the hex; ; the sheer size and inexorable force of movement of even the smallest Mobile Structure reduces any non-armored building hex it enters to rubble (see *Armored Buildings*, p. 119, *TO: AR*). Treat movement into armored buildings as a collision with a DropShip (see *Damage to a Mobile Structure*, p. 36). The height of a building has no impact on whether it can survive being turned into rubble by the movement of a Mobile Structure.

Collapse: If any units occupy a building hex that is turned to rubble in this fashion, resolve any falling, damage and unit displacement using the standard rules (see *Collapse*, p. 176, *TW*). A Mobile Structure always occupies a hex completely for stacking purposes, except as noted under *Stacking* (at right). For example, provided the underlying terrain level of the now-rubble hex allows it, a 'Mech could fall in a collapsed building, but still occupy the hex after the Mobile Structure has entered.

Damage to Mobile Structures: The damage applied to the Mobile Structure hex that entered a building hex is equal to that building hex's CF at the beginning of the current phase, divided by 10, multiplied by the number of levels of the hex. Once the damage from the type of building has been determined, first apply the scaling damage for the type of Mobile Structure used (see *Scaled Damage*, p. 124, *TO: AR*); this only applies to Fortress-type Mobile Structures. If the damage from a destroyed building hex destroys the entering Mobile Structure hex, damage is transferred (see *Hex Destruction*, p. 39).

Prohibited Movement: If a Mobile Structure is prohibited from entering a building hex due to the specific building type and/or classification located within that hex, the Mobile Structure can still expend the MP to attempt the move; in this case it automatically inflicts 150 points of damage against any such building hex it is attempting to enter (even if using the Expanded Construction Factor rules, all levels within the structure receive the 150 points of damage). Regardless of whether this damage destroys the building, reducing it to a rubble or ultra-rubble hex, the Mobile Structure does not actually enter the hex. If the building hex in question was reduced to a rubble or ultra-rubble hex, once the Mobile Structure has accumulated enough MP once more, it may move into the hex.

Castles Brian Complex: The only exception to the movement prohibition noted above involves a Castles Brian complex (see p. 139, *TO: AR*). If the following conditions are met, a Mobile Structure can enter a Castles Brian's hexes without causing the damage noted above:

- A Large Portal (see p. 76) Mobile Structure must be part of the Castles Brian complex.
- The height and width of the Large Portal must be equal to or greater than the Mobile Structure.
- The Large Portal must be open (i.e. it fully moved into an open position in previous turns).
- Any hex of the Castles Brian complex connected to the Large Portal that the Mobile Structure might enter must be designed with Open-Space Construction rules (see p. 136, *TO: AR*).
- The height and width in hexes of the Castles Brian complex must be equal to or greater than the Mobile Structure.
- If the Mobile Structure has a depth greater than 1 hex, the depth of the Castles Brian complex must be equal to or greater than the depth of the mobile Structure; if the Mobile Structure moves deeper into the Castles Brian complex, all the above conditions must be met to avoid causing damage as noted above.

STACKING (GROUND MOBILE STRUCTURES)

While many motive system linkages and tracked "feet" cover the entire base of a Ground Mobile Structure, the solid "bottom" of each unit does not begin until Level 3 above the level that interacts with the base terrain it crosses.

The hexes underneath a Ground Mobile Structure are treated as Light Woods for movement restrictions and LOS (see Movement Costs Table, p. 52, and Attack Modifiers Table, p. 117, respectively, *TW*). Any unit with a height equal to or less than Level 2 that can enter Light Woods can enter a hex underneath a Mobile Structure.

Beyond those restrictions, all stacking rules apply to the hexes underneath, as well as the hexes on top of the Mobile Structure.

Prohibited Units: If a vehicle is prohibited from entering a Light Woods hex and a Ground Mobile Structure moves into a hex occupied by such a unit, apply a 5-point Damage Value grouping hit to every location (only a single point of damage is applied to a rotor on a grounded VTOL) and automatically roll once on the appropriate Motive System Damage Table, as though the damage were coming in on the front arc.

This damage is applied every time a hex of a Ground Mobile Structure enters a hex occupied by such a unit, even in the case of multi-hex Ground Mobile Structures; as a large Ground Mobile Structure slowly moves over such a unit, damage is dealt by each Mobile Structure hex.

● GROUND MOBILE STRUCTURE MOVEMENT DIAGRAM 1 ●

In the case of a Facing change (see p. 35), if more than one hex of a Mobile Structure appears to be passing over a hex occupied by such a unit, then double the damage noted above.

Such "trapped" units can use the Minimum Movement rule (see p. 49, *TW*) to exit from the bottom of a Ground Mobile Structure hex. If they are unable to use the rule to get out from underneath the Mobile Structure and/or enter a new hex underneath the Ground Mobile Structure in an effort to move toward a hex that will be out from under, the unit is trapped until the Ground Mobile Structure is finished passing over.

In the Ground Mobile Structure Movement Diagram 1 (see next page), Dawson is controlling a Ground Mobile Structure with a Maximum MP of 3 on the BattleForce map. It has 4 hexes of depth, 5 hexes of width and is 6 Levels high (making it a total of 8 Levels, as the "bottom" of the Mobile Structure doesn't start until Level 3); the controlling player photocopied the Mobile Structure Template Sheet from the back of this rulebook, then cut out the size template needed to track movement on the playing area.

In place of moving the Mobile Structure onto the playing area, the players decided to simply place the Mobile Structure. Even though a path of 4 hexes of depth 1 river cuts underneath the Ground Mobile Structure, as this represents less than one-third of the Mobile Structure's width, this move is legal.

Before beginning the move, Dawson notes that the opposing player has a Yellow Jacket Gunship VTOL in Hex A at Elevation 8, which has moved, a Regulator Hovertank in Hex B, which has also moved, and a Thunder *BattleMech in Hex C that has not yet moved. Dawson can either move by entering a new hexside, or he can expend all his movement to change his facing by a hexside. He decides he wants to change his facing so that he can line himself up for a move in the following turn. He also notes that since both hexes MA and MB on the Ground Mobile Structure are "equally centered," he can use either to pivot, changing from one turn to the next as he desires. After testing it for a moment, he decides that pivoting around Hex MB will line him up for what he wants to do. With all of that determined, he places the tip of a finger in the middle of Hex MB, then grasps the edge of the template with his other hand and starts to rotate it clockwise; the direction he's decided to change his facing.*

Immediately Hex MC enters Hex A, and Hex MD and Hex ME enters Hex B. As there are units in both hexes, the player must resolve that situation right away; he randomly determines which to resolve first, coming up with VTOL. As the elevation of the Yellow Jacket is equal to the height of the Mobile Structure (the top level), a charge immediately occurs. 100 points of damage, in 10-point Damage Value groupings, is assigned. Despite the relatively robust armor of the Yellow Jacket, the controlling player of the VTOL knows that 100 points will completely destroy all the unit's armor and internal structure with damage left over; he realizes he needed to be 1 elevation higher to avoid that grizzly fate. In return, the Yellow Jacket inflicts only 3 points of damage against the Construction Factor of Hex MC.

Next, they deal with the Regulator Hovertank in hex B. The vehicle is only 1 Level high and since the "bottom" of the Mobile Structure begins at Level 3, there is no charge. However, each hex of the bottom of a Ground Mobile Structure is considered light woods. Since a hover vehicle is prohibited from entering light woods, it immediately takes 5 points of damage to every location. However, the players note that hex MD and ME (as well as MF when Dawson continue to rotate the template) will all enter Hex B. As such, regardless of how many of the Mobile Structure's hexes enter Hex B, the damage is simply 15 points of damage to every location.

The 'Mech in Hex C, for this turn, is fine as even during the facing change, no Ground Mobile Structure hex even "brushes" the corner of Hex C. The players do note that the Ground Mobile Structure enters Hexes F and G, reduces those trees to rough (per the Mobile Structure Movement Costs

● GROUND MOBILE STRUCTURE MOVEMENT DIAGRAM 2 ●

Table, the trees do not cost any extra MP to enter); they also make note of any other clear hexes entered that are now rough as well.

In the Ground Mobile Structure Movement Diagram 2 (above), during the Movement Phase of the following turn, the controlling player of the Regulator wins initiative and moves the Regulator first. Since it is "trapped" underneath the Mobile Structure all he can do is use the minimum movement rule to move the vehicle into Hex 2.

Once that movement is done, it is now Dawson's turn to move the Ground Mobile Structure again. Instead of a facing change this time, however, he decides to spend his 3 MP to enter a new hex row. As the Mobile Structure has no facing, it can move in any direction. As such, he expends 1 MP and moves into Hexes 1, 2, 3 and 4. As soon as Hex ME enters Hex 1, another 5 points of damage are applied to every location on the Regulator as it "sweeps past." Next, Dawson wants to move into hexes C, D and E. Per the Mobile Structure Movement Costs Table, a Level 1 doesn't cost any additional MP to enter. However, more than half of the hexes on a side attempting to change a level up must all be the same level. Since this is the case, Dawson can expend another 1 MP to enter the hill hex row; the far right hex of the Mobile Structure along the ME/MF side will be 'hanging' in the air, and so the bottom of that Mobile Structure hex is now at Level 4.

However, there is the 'Mech in Hex C to deal with. Its height is Level 3, and since that is the "bottom" height of the Mobile Structure "before" it enters the hex (i.e. before it changes a level up), a charge will occur. Yet the Thunder *BattleMech has yet to move and so the controlling player immediately makes a Piloting Skill Roll. A successful roll! The controlling player heaves a sigh of relief at avoiding 100 points of damage and immediately takes his full turn of movement to avoid the Mobile Structure. Once the 'Mech has finished moving, Dawson then moves onto the hill. However, he cannot enter another hex row further onto the hill as there are only two Level 2 hexes and there must be three (more than half) for him to move up another level. He decides to leave off spending the last 1 MP and the turn is over.*

CARRYING UNITS

If a Mobile Structure is built with cubicles allowing it to carry other units (such as aerospace fighters, Small Craft, 'Mechs, vehicles and so on), the mounting and dismounting of such units follow the same rules as for a grounded DropShip (see *Carrying Units*, p. 89, *TW*); even if a Mobile Structure expends MP in a turn that a unit(s) dismounts, it still dismounts using the grounded DropShip rules. Provided the unit is not prohibited from entering a Light Woods hex, mounting and dismounting can occur from hexes underneath the Mobile Structure.

Air Mobile Structures: If airborne, use the launching/recovering rules for fighters (see *Launching/Recovering Fighters/Small Craft*, p. 86, *TW*).

Water Mobile Structures: Use the rules for mounting and dismounting infantry from naval carriers (see *Naval Carriers*, p. 224, and *Dismounting From Naval Carriers*, p. 225, *TW*) as guidelines for how to dismount all units from a Large Naval Support Vessel when it is not adjacent to a land hex, when it is submerged and so on.

FLIGHT DECKS

Depending on the size of the Flight Deck, friendly fighters, Combat and Support VTOLs and Fixed-Wing Support Vehicles may land on a Mobile Structure with a Flight Deck. See *Flight Deck*, page 124, in the *Advanced Weapons and Equipment* section for complete details on how to use a Flight Deck.

Enemy units attempting to land on a Flight Deck must apply an additional +2 modifier to the Landing Target Number (this is in addition to the +1 for a unit landing at unfriendly airfield; see p. 87, *TW*).

COMBAT

The following rules cover the unique aspects of combat surrounding Mobile Structures.

Line of Sight

Ground Mobile Structures rise a number of levels above the underlying terrain equal to their height in levels, plus 2, plus the underlying terrain of the hex in question. Given the nature

of multi-hex units and the fact that a Mobile Structure can occupy different levels at the same time, two different hexes of a Mobile Structure may have different heights for LOS purposes.

Air Mobile Structures: Such units are treated as aerospace units for LOS purposes (see p. 99, *TW*).

Water Mobile Structures: Water Mobile Structures rise for half their height (round down) above the underlying water terrain they occupy (see Mobile Structure Types Table, p. 76).

Specialized Attacks

Use all the rules for all the specialized attacks as described for Large Naval Vessel Support Vehicles, with the following modifications:

- When grappling a Ground Mobile Structure, any Ground Vehicle that follows all the other prescribed rules may attempt to grapple the unit.
- Instead of using the Boarding Action (Non-Infantry) rules, combat inside a Mobile Structure is resolved using the *Combat Within Buildings* rules (see p. 175, *TW*); all damage should be appropriately scaled, depending upon the type of Mobile Structure (see *Scaled Damage*, p. 124, *TO: AR*). Players can decide whether to use *Combat Within Buildings* rules or *Infantry Vs. Infantry Actions* rules (see p. 167, *TO: AR*) when resolving combat between infantry inside a Mobile Structure.

Attacks by Mobile Structures

Per the Mobile Structures Construction Rules (see *Step 4: Install Weapons, Heat Sinks and Equipment*, p. 82), different weapons may be mounted at different levels in any given hex. To determine the height of a given weapon system, and thereby determine its LOS height, first determine the overall height of the hex and then subtract the number of levels down from the top. For example, a weapon is mounted in Level 7 of a 10-level Mobile Structure. With the hex in question on Level 1, the weapon would have a total LOS Height of 10 [10 (height of Mobile Structure) + 2 (undercarriage) + 1 (height of underlying terrain in that hex) – 3 (level of weapon below roof) = 10].

If a weapon is not mounted in a turret, then it has a firing arc corresponding to its designated hexsides (as determined during construction, or noted on the record sheet); see the Mobile Structure Hexside Arcs Diagram for an example of non-turret mounted weapon arcs on a Mobile Structure.

Turrets: Weapons in a Mobile Structure's turret have a 360-degree arc of fire and are always presumed to be on the Mobile Structure's uppermost level.

Underneath a Mobile Structure: A Mobile Structure cannot attack units located underneath it.

Attacks Against Mobile Structures

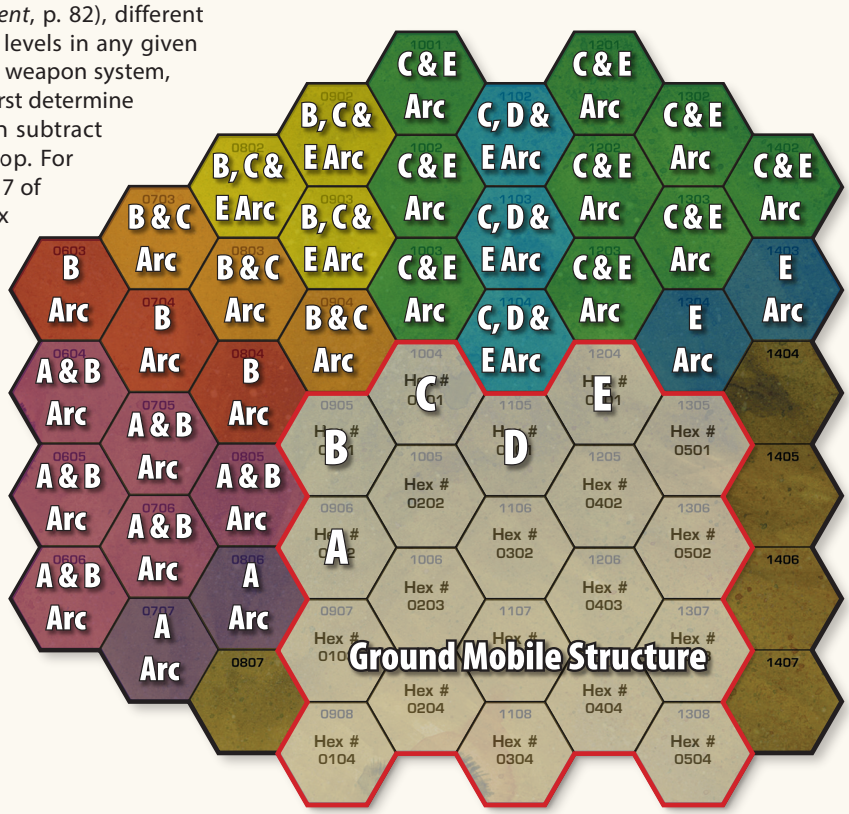
Attacks and damage against Mobile Structures are dealt with exactly like attacks against buildings (see *Attacking Buildings*, p. 171, *TW*), save that Mobile Structures follow all rules for Advanced Buildings (see p. 116, *TO: AR*), including Construction Factor (Expanded) (see p. 119, *TO: AR*); see *Aimed Shots* (p. 118, *TO:AR*) for attacks against turrets on a Mobile Structure. Units outside a Mobile Structure cannot attack units inside a Mobile Structure, and vice versa.

If a hex takes damage equal to its current CF, the hex is destroyed, as are all weapons and equipment within that hex.

Damage Threshold: Every Mobile Structure hex has a Damage Threshold equal to the hex's current CF (at the start of that turn), divided by 10 (round up). If the Damage Value of any single Damage Value grouping exceeds the hex's Damage Threshold, a possible critical hit has occurred (see *Critical Hits*, p. 40).

Armor: If a Mobile Structure hex is armored, apply all damage received by the hex to the armor first, before applying damage to the Construction Factor of the hex in question (critical hits against a Mobile Structure hex cannot occur until all its armor is destroyed). Note that the Damage Thresholds do not apply to armor and only come into play once the armor has been removed.

Hex Destruction: If a Mobile Structure hex is destroyed, it collapses and will automatically damage all adjacent Mobile Structure hexes. Divide the current CF of every Mobile Structure hex adjacent to the collapsing hex by 2 (round down); divide the current armor of those hexes by 2 (round



GROUND MOBILE STRUCTURE FIRING ARCS

down) as well. The resulting number becomes the current CF of those hexes. This damage is modified for *Scaled Damage* rules; that is, it only applies to Fortress-type structures, where any such damage is halved (see p. 124, *TO: AR*).

In addition, every time a Mobile Structure hex is destroyed, roll 2D6 and add 1 for every hex of the unit destroyed during the scenario. On a result of 10 or more, a crew hit results. The crew of a Mobile Structure (as opposed to individual hex gunners, as discussed under *Critical Hits*; below) is treated like a DropShip crew (see p. 240, *TW*). For each such critical hit suffered, one crew box is marked off and a cumulative +1 modifier (for each such hit) is applied to all Gunnery Skill Rolls made by any hex of the Mobile Structure firing weapons. When all six crew boxes have been marked, the crew are dead; the Mobile Structure can no longer move, but all weapons that still have gunners can still fire (though with all the applicable modifiers for dead crew as noted above).

Optional Damage Tracking: If players wish to increase the lethality of a Mobile Structure, they can track damage using the Construction Factor (Expanded) rules (see p. 119, *TO: AR*), in which every level of every hex has a CF equal to the CF of the entire hex and damage is tracked per level. As this will radically increase how long it takes to destroy a Mobile Structure, all players must agree to this alternate rule before play begins.

CRITICAL HITS

When a critical hit occurs, roll on the Mobile Structure Critical Hits Table to determine the exact effects, as described below. If a hex does not contain a specific type of item (even if it was destroyed in the same phase), then re-roll. If a hex does not contain any of the items listed on the Critical Hits Table, then the critical hit has no effect.

Ammunition: This result means the hex's ammunition explodes. Unlike a 'Mech, where only a single slot explodes, the hex loses all its ammunition. Count the total damage for all ammunition carried and apply the damage directly to the hex's Construction Factor. If CASE is mounted in a hex with an ammunition critical hit, divide the total damage by 10 (round down) and apply that value to the hex's Construction Factor. As usual, ammo that cannot explode (such as Gauss and Plasma) doesn't explode, but is still destroyed and cannot be used for the rest of the scenario.

Gunners Killed: A critical hit kills or severely injures the gunners for this hex. No weapons can be fired from this hex for the rest of the scenario.

Gunners Stunned: Damage from the critical hit disorients the gunners. During the following turn, the hex may take no actions (firing weapons and so on). After that, the hex may act normally. Multiple Gunners Stunned results in the same turn extend the number of turns for which these effects last.

Turret Jam: The turret rotation mechanism temporarily freezes, leaving the turret stuck in its current facing until the gunners spend a Weapon Attack Phase fixing the jam. The hex may not fire any weapons from that turret (though other weapons in that hex may still fire) while the jam is being fixed. Treat a second or subsequent Turret Jam critical hit—regardless of whether the gunner cleared the first jam—like a Turret Locks critical hit.

Turret Locks: The turret rotation mechanism is severely damaged, locking the turret in its current facing for the remainder of the game. Additional critical hits of this type—or Turret Jam critical hits—have no further effect.

Weapon Destroyed: One weapon mounted in the damaged hex suffers major damage and ceases to function. The attacking player then rolls 1D6. On a result of 1–3, the player controlling the target unit chooses which weapon stops working. On a 4–6, the attacking player chooses which weapon stops working. If there are weapons in and outside of a turret in a hex, randomly determine which location the player will choose from. The hex cannot fire that weapon for the remainder of the game. If a weapon is destroyed that can explode (such as a Gauss rifle), it is treated as an ammunition explosion for the location where the weapon is mounted (see *Ammunition*, p. 125, *TW*).

Weapon Malfunction: This critical hit causes a weapon mounted in the hex to malfunction. If a hex has multiple weapons in that location, randomly determine which one takes the hit using the Weapon Destroyed rule above. The hex cannot fire that weapon until the malfunction is fixed. The gunners must spend one Weapon Attack Phase clearing the malfunction, during which the hex may make no weapon attacks. The gunners may only fix one weapon malfunction per Weapon Attack Phase.

MOBILE STRUCTURE CRITICAL HITS TABLE

2D6 Roll	Effect
2–5	No Critical Hit
6	Weapon Malfunction/Turret Jammed*
7	Gunners Stunned
8	Weapon Destroyed/Turret Locked*
9	Gunners Killed
10	Turret Jammed/Turret Locked*
11	Ammunition
12	Other**

*When rolling these Critical Hit results, roll 1D6. On a result of 1-3, the effect left of the slash occurs; on a 4-6 result, the effect right of the slash occurs.

**Various other equipment can be mounted in a Mobile Structure hex. On a roll of 12, the player should randomly determine what other equipment is available and destroy an item (provided other equipment exists in that hex to destroy).

DESTROYING A MOBILE STRUCTURE

If all the hexes of an "interior" row of a Mobile Structure are destroyed (in effect splitting the Mobile Structure in half), the Mobile Structure is destroyed. The variable nature of Mobile Structure sizes may require the players to come to a consensus about when the unit is destroyed.

Resolving Unit Destruction

Like Large Naval Vessel Support Vehicles, Mobile Structures are too large to instantly remove from play, depending on whether they are in a water hex(s) and/or units are on the roof. Use the *Unit Destruction* rules for Large Naval Vessel Support Vehicles (see p. 27) when resolving the destruction of a Mobile Structure under these circumstances.

UNIT DISPLACEMENT

Mobile Structures modify the standard Unit Displacement rules in the following manner: The number of current hexes of a unit never takes into consideration the number of levels that unit may occupy.

Displacement

A Mobile Structure is never displaced unless the unit entering a hex of a Mobile Structure is another Mobile Structure; this can occur due to a charging move, another displacement and so on.

In a situation where the Mobile Structure occupies only water hexes, if a Large Naval Vessel Support Vehicle enters a Mobile Structure hex, after resolving the charge effects the Mobile Structure is displaced normally.

Unit Destruction: If a unit other than a Mobile Structure or Large Naval Vessel Support Vehicle is displaced into a hex with a Mobile Structure (not the "roof" hex or underneath), and that hex is the only one it can legally enter, it is destroyed.

Submerged/Surfacing Units

The following rules apply to the interaction of Mobile Structures and various submerging/surfacing situations.

Surfacing Mobile Structure: If any hexes of a Mobile Structure enter a water depth that another unit on the surface occupies, the results depend on the type of units involved.

Standard Combat Naval Vessels, Small and Medium Naval Vessel Support Vehicles and any Large Naval Vessel Support Vehicle of Template A size are stranded on the roof of the Mobile Structure hex, after resolving all charging damage (treat the vertical charge as a standard charge attack; see p. 148, *TW*; see *Collisions*, p. 35, for modifications to the charging damage applied to Large Naval Vessels); if the Mobile Structure hex contains a turret, it is automatically destroyed. The stranded unit can still fire its weapons, but cannot fire them at the Mobile Structure (though it can fire them at any units on the Mobile Structure, meaning it might accidentally hit the structure). If the stranded unit is carrying any other units, they can dismount using the appropriate rules. The unit remains stranded until the roof of the Mobile Structure submerges to Depth 1 and remains at that depth at the end of that Movement Phase, or until the hex occupied by the Mobile Structure is destroyed (no additional damage is applied to the stranded unit; it is simply back in the water and can move normally in the next turn). If the hex of the Mobile Structure occupied by the stranded unit moves into a non-water hex and then the hex is destroyed, the stranded unit is automatically destroyed as well.

Large Naval Vessel Support Vehicles of Template B to E size, after resolving charging damage, must make a Piloting Skill Roll with a +4 modifier (along with all other standard modifiers). A successful roll means no additional damage is applied. A failure means the unit partially capsized; apply a Crew hit and roll twice on the Motive System Damage Table (see p. 193, *TW*), and also three times on the Ground Combat Vehicle Critical Hits Table (see p. 194, *TW*). If the unit involved has the Submersible chassis modification, then its controlling player only rolls once on the Motive System Damage Table and once on the Ground Combat Vehicle Critical Hits Table, though it still takes a Crew hit. After all damage is resolved, displace the unit as appropriately as possible (the displaced unit cannot occupy a hex occupied by the Mobile Structure; the players will need to adjudicate this situation, using common sense, and may roll the dice to help determine the location if there are any issues). A displaced Large Naval Vessel can enter a non-water hex (in which case it has run aground; see p. 22), but cannot be displaced more than 1 non-water hex away from the water; in this instance, the Mobile Structure is displaced as appropriately as possible (it may run aground as well, in which case apply appropriate damage; see *Water Mobile Structures,* p. 33). Even if the displaced unit is a Ground Mobile Structure, running aground damage should be applied, but it is not stuck or immobile.

If a Mobile Structure surfaces below another Mobile Structure, apply standard charging damage (see p. 35). The unit displaced is the Mobile Structure consisting of the smaller number of current hexes. If both units consist of the same number of current hexes, both controlling players roll 2D6 (re-rolling ties). The loser is displaced. If any structure runs aground due to the displacement, use the rules described above. In all instances of displacement, neither unit can occupy the same hex afterward.

Surfacing Large Naval Vessel Support Vehicle: If any hexes of a Template B- to E-size Large Naval Vessel Support Vehicle rise to a depth that a Mobile Structure on the surface occupies, the results depend on the size of the two units involved. After determining damage, resolve the displacement as described above, treating the Large Naval Vessel as a Mobile Structure for purposes of which unit consists of more current hexes.

Surfacing Non-Mobile Structure or Large Naval Vessel: If a unit other than a Mobile Structure or Large Naval Vessel (such as a unit with UMU MP, a Combat Naval Vessel, a submarine and so on) surfaces into a hex occupied by a Mobile Structure, resolve charging damage as normal, but the unit remains at the same depth as before it entered the Mobile Structure depth; neither unit moved.

Completely Underwater: If any of the situations described above arise, but both units are completely underwater, halve (round down) all charging damage; all displacement rules still apply.

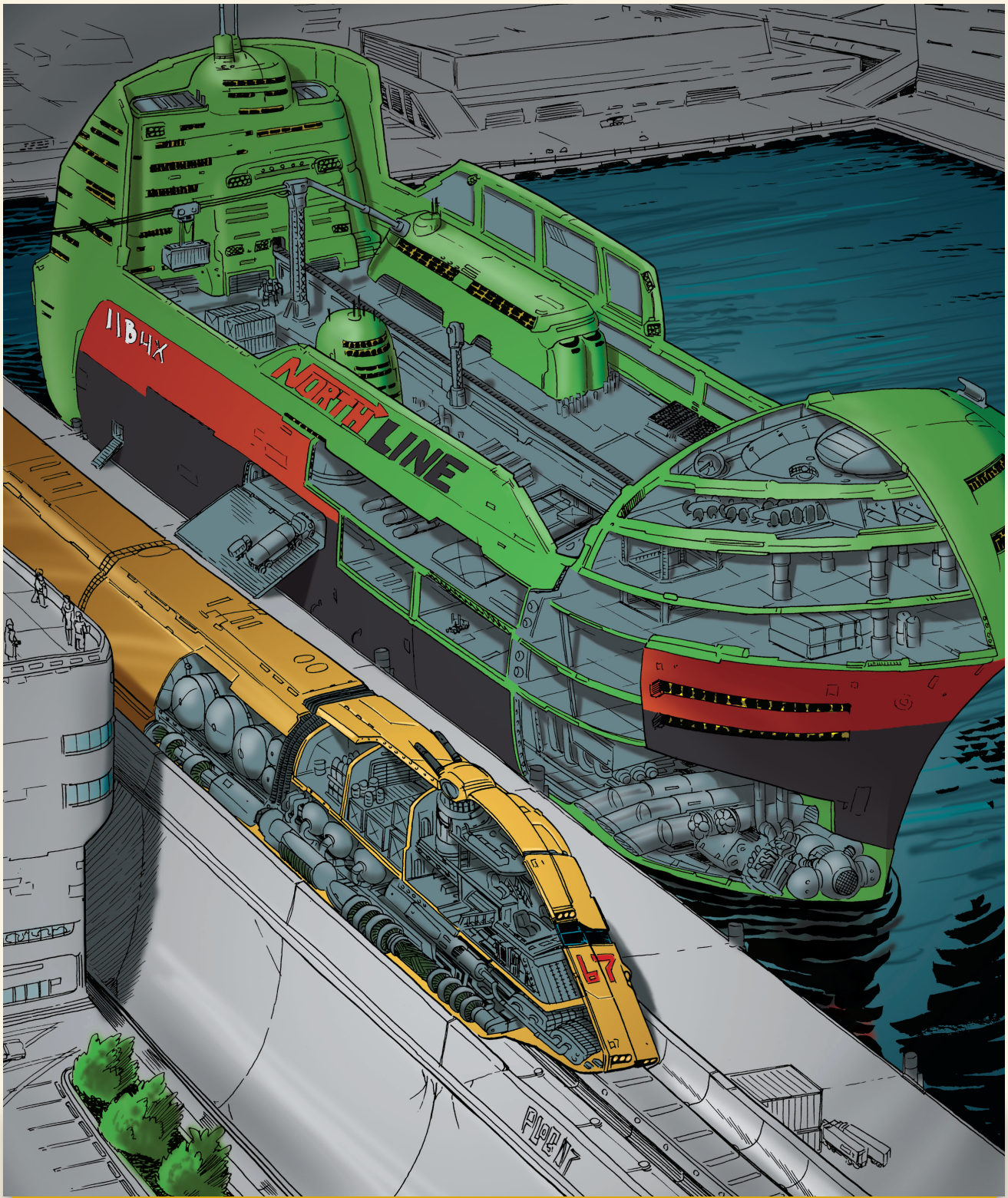
Hover and WiGE Vehicles: If either vehicle type is over a water hex occupied by a Mobile Structure (or Large Naval Vessel Support Vehicle), the hover or WiGE units can still move and fire normally. However, if they move off the edge of the Mobile Structure or Large Naval Vessel, they must take the difference in height into account for MP expenditures. If a Hover Vehicle changes more than 2 hex levels when moving from a hex occupied by the Mobile Structure or Large Naval Vessel to a water (or land) hex, the vehicle falls (see *VTOL Rotor Destruction*, p. 197, *TW*). If it hits a water hex, the falling Hover Vehicle is automatically destroyed.

Accidental Falls From Above

If a unit accidentally falls onto a Mobile Structure hex (or hexes), assign damage normally (see p. 152, *TW*).

In the case of a Mobile Structure falling onto another Mobile Structure, use the size difference as shown in the Submerging/Surfacing rules, at left, to determine which unit will be displaced after all damage is assigned; a Mobile Structure can never be stranded on another Mobile Structure, regardless of differences in size.

A Mobile Structure takes damage equal to 10 points times the levels fallen to all its hexes.



"Human beings have used powered railways for almost thirteen centuries, a reality that is unlikely to change. Where humankind's waterborne vessels cannot deliver goods, railways are most often assigned that task."

UNSUNG TECHNOLOGIES

Hello, I'm Professor…*Assistant* Professor Dietrich Mathers and I'm here to give you an overview on some of the less common vehicles in humankind's service. You should know most of this, but I'm supposed to give you an overview anyway while Professor Readly is away. Well, maybe the stuff about the ships and trains and airships might be new to you, since they don't get in the news as often as BattleMechs and JumpShips. Let's start with surface vehicles.

SURFACE VEHICLES

You've probably seen or heard of most of these, but they're in Dr. Readly's syllabus, so…

RAIL

The earliest native-built ground transportation systems on humanity's far-flung colonies are often railroads. They are less expensive to build than roads for conventional wheeled vehicles, support considerably more cargo, and need less infrastructure to establish. Also, as it is not unusual to find super-continents on the water-poor worlds that humanity often settles, railroads can deliver goods nonstop to most colony sites on a planet.

With little variation, trains are made of chains of dedicated engine cars and cargo cars, called the tractor and trailers, respectively. In large trains, or those that regularly deal with steep slopes, it is not unusual to find extra engine cars. Such trains can be the largest land vehicles in operation: groups of engines and trailers can stretch several kilometers long and haul tens of thousands of tons in cargo. In practice, ten thousand tons is regarded as a practical, manageable maximum.

Trains are a mature technology, to the extent that there exist among them two major variations in propulsion: traditional wheeled railroads and maglev. Maglev offers advantages in speed and maintenance—less rail and train wear—but the expense of maglev lines compared to steel rail often makes the savings difficult to recoup even over years of operation. Wheeled propulsion, on the other hand, is a technology well within the grasp of even the most backward worlds, and advanced worlds find that with centuries of experience and application of advanced technology, wheeled trains remain highly competitive. It is therefore not unusual to see lightning-swift maglev passenger trains paralleling wheeled freight rail lines on advanced worlds like Atreus, Tharkad and New Avalon.

Hidden beneath the shells of the engine cars is another demonstration of the maturity of train technology: the power plant. Though you can find a lot of variation in the fine details and even some very exotic engines in trains across humanity's worlds, trains usually exhibit a lot of similarity in their engines.

Maglev trains, for example, all work in virtually the same way, harnessing magnetic fields to levitate trains by magnetic repulsion (or attraction, when "lift arms" of the train wrap around to the underside of the maglev rails and are drawn upward). Propulsion is also almost universally the same: the train and rails work like two parts of a linear motor, a traditional circular electric motor unwound and stretched the length of the track. Braking is achieved by applying power in reverse or turning the linear motor system into a generator and dumping the electricity generated through a resistor grid. That's called dynamic braking. Power is typically drawn inductively from the maglev line.

Conventional trains are also fairly standardized. Except for the odd steam train or experiment with hydraulic transmission, most trains use electric motors to drive the wheels of their engine cars. The only big difference is the source of electricity. In the Inner Sphere, the two most popular power plants are fuel cells and combustion engines, typically diesel-cycle piston engines or multi-fuel turbines. Batteries are not unknown for light passenger rail or switchyard engines, but they are generally less popular than externally supplied electricity…that's electrified rail lines, the rails you should never, ever pee on, no matter how drunk you are.

The last major power source for trains is fusion, which is generally restricted to advanced worlds. Most planets that can power trains with fusion engines prefer to build large, stationary power plants and electrify the rail lines. The upfront cost of electrified lines is higher, but fusion engines require specialized technicians and maintenance facilities. Also, a crashed fusion-powered train can scatter radioactive engine shielding. Like maglev trains, the electric motors of wheeled trains usually feature dynamic braking, where the motors reverse their function to become generators. This electrical generation robs the train of momentum, reducing wear on conventional friction brakes.

The area where trains vary the most is their trailers, not the underlying technology, and even then freight containers are largely standardized across the Inner Sphere. Container trailers are typically either flatbeds with room for a single, standard 12m x 2.5m x 2.5m shipping container or two in-line 6m containers, or they are "well cars" that suspend one 12m container just centimeters above the rails between the trailer's wheels (in a "well") so another full-sized container can be stacked atop, thus doubling the container capacity per car. That arrangement cuts costs—fewer cars for the amount of cargo.

After container cars, the two next most common are tank cars—large tanks that carry liquids ranging from milk to molten sulfur—and then gondolas and hopper cars for unpackaged dry cargo like ores, coal and grains. Passenger cars appear in myriad forms depending on the needs of the rail line; for example, urban mass transit "cattle cars" are quit a bit different from cabin-filled long haul "sleeper" cars.

Countless specialized cars also exist: stock cars for animals, boxcars for general non-container freight, auto racks for shipping automobiles, refrigerator cars ("reefer cars" to English speakers) for shipping perishable goods (though these are often replaced by refrigerated containers), flat cars and many others.

Human beings have used powered railways for almost thirteen centuries, a reality that is unlikely to change. Where humankind's waterborne vessels cannot deliver goods, railways are most often assigned that task.

NAVAL VESSELS

Of course, while the worlds on which humanity settles are often said to be water-poor and therefore encourage land-based transportation, the large majority of settled planets are habitable without substantial terraforming, and such habitability only exists where there is sufficient water. Mother Terra set a high standard for what constitutes large oceans, but even planets with water covering a mere ten percent of their surface may have bodies of water the size of small continents. Navigable rivers are even more useful to young colonies than railroads. And where do you find populations clustering on water-poor worlds? Near the life-giving water, of course.

Though many worlds are termed "water-poor," it is more correct to call them poor in potable water. Many of the worlds that could only be colonized economically with the advent of the Ryan Cartel ice ships or the technological advances of the Star League are covered in vast, if polluted, oceans. The inhabitants of such worlds might not drink that water, but they certainly do not ignore its potential.

What does all this mean?

It means that naval vessels are a big deal on most worlds even if you don't see them every day. You would be hard pressed to find a cheaper means of shipping goods to market than by water, and the technological requirements are laudably low. Wooden sailing ships were delivering a kiloton of grain across open seas two thousand years before the steam-powered train was a twinkle in an engineer's eye, and twenty-five hundred years before DropShips managed to lift the same payload. With basic steelmaking and steam engine technology—well within the capabilities of almost every planet in the Inner Sphere and hundreds more in the Periphery—it is possible to send a hundred thousand tons (or more!) of freight across an ocean with less infrastructure than a comparable transcontinental rail system, and with far less expense and technology than would be required of a DropShip fleet of the same capacity. Even the most advanced worlds of the Inner Sphere, like New Avalon and Terra, have more freight capacity on their seas than in any other form.

It is difficult to characterize watercraft in one lecture, even when restricted to the class of large naval vessels, which leaves out boats below 300 tons and the workhorse giants above 100,000 tons. But I'll take a stab at it.

Military Vessels

The smallest class of large naval vessels is military vessels. Naval military vessels, not to be confused with spacegoing WarShips, are a rare breed in the Inner Sphere due to the repeated lessons of the Age of War, the Amaris Coup and the early Succession Wars. Simply put, naval military vessels make dandy targets during a real war. In addition to fighters, which have been killing military naval vessels for more than eleven hundred years, many modern weapons work exceedingly well against surface military vessels. From the early 23rd century onward, capital weapons on spacecraft rendered surviving surface naval vessels obsolete. Naval warships could not carry weaponry able to respond to the capital weapons of WarShips, and they could not readily run and hide from the much swifter space-based hunters. WarShips are rare in this day and age, but DropShips armed with capital weapons can perform much the same tasks.

With big budgets and bureaucratic inertia, Terran Alliance and Hegemony wet naval forces managed to build fleets of submersible vessels that could elude most capital weapons. Not only are hundreds of cubic meters of water great for stealth, but that much water also makes effective armor. Of course, the Terran Hegemony found imitators, and the Age of War offered the chance to test the value of such submersible military vessels. The result? The modern multi-environment sensor suites that made underwater combat so effortless for BattleMechs also rendered the stealth of submersibles an illusion. A combination of sensor buoys and capital missiles with

WHAT ARE THEY GOOD FOR?

There are a handful of useful niches for military wet-navy vessels. Open ocean patrols for domestic issues, like search and rescue and piracy suppression, are well-served by small surface ships (500 to maybe 5,000 tons) that should never see combat against front-line military threats. The Davions' *Rapier*-class patrol destroyer is actually a fine vessel for such duties thanks to its speed, endurance, medical facilities, marine complement and VTOL capacity.

Another role for military vessels, preferably submersibles, is the mobile military base, a ship that acts like a military base for other units. This sort of ship frees land, air or sea units aboard it from the vulnerability of a fixed land base. Not only are such vessels useful in defense during raids and invasions, they are also an excellent means of making a planetary occupation difficult or untenable. The classic example is the submersible aircraft carrier, but as the fate of the Regulan *Argos* demonstrates, it may be difficult to properly employ such carriers. In addition to aircraft carriers, land troops and special forces can benefit from mobile basing on large military vessels.

A problem that has stymied carriers' proliferation is shortages of supporting units. Everyone would love their homeworld to have a dozen submersible carriers each with a regiment of aerospace fighters or BattleMechs or both, but in practice it's an uncommon world that can muster a regiment of even conventional fighters for anything, let alone carriers.

Even gunboats have their place on the seas of the Inner Sphere. Military vessels meant for direct combat, from missile submarines to blue-water cruisers, are limited to fighting asymmetric opponents, the (usually) backward foes who lack the fighters or WarShips to deal with such aquatic giants. For example, a handful of *Jormungand*s would do a fine job defending the islands and coastal cities of a world raided by pirates–the interstellar kind, I mean. In general, though, direct-combat vessels are not the sort of ship you want trading shells with a major military; the advantage of surprise offered by such ships rarely works more than once against such foes.

anti-submarine warheads, often with nuclear and/or torpedo submunitions, or aerospace fighters armed with torpedoes, made short work of submarines. New generations of admirals had these lessons beaten into them again during the Amaris Coup and early Succession Wars.

Today, naval military vessels are undergoing a small resurgence due to the depletion of specialized anti-naval weaponry from military inventories. The early Succession Wars killed the large naval vessel, so Houses stopped stocking anti-shipping weapons, and so now many militaries are building them again because most opponents are ill-equipped to fight them. This foolish cycle of thinking is already costing lives, however, as anti-shipping weapons return to service. Tharkad's three Jormungand-class cruisers were all sunk within a week of the start of the Word of Blake blockade, at the hands of our own *Invincible*, no less. And at least a dozen Rapier-class destroyers throughout the Federated Suns have been casually sunk since 3068 during raids, primarily by DropShips armed with capital missiles. We know a couple of Regulan Argo submersible carriers were lost to fighter strikes; they were unable to launch their conventional fighters in self-defense because the looming threat of Word of Blake orbital bombardment kept them submerged. I've heard we've kept a Luftenburg surface carrier functional on Tharkad, which has got to be quite a trick.

Large military vessels may capture the limelight on occasion, but they're a tiny fraction of large naval vessels in service, found on only a few worlds. The dull commercial vessels make up the vast majority of this ship population.

Freighters

The majority of ships on the Inner Sphere's seas are freighters: bulk carriers, liquid carriers or general freighters.

Bulk carriers typically represent around a third to two-fifths of large naval vessels in operation. They haul unpackaged cargo, such as ore, coal, wood chips, cement powder and other materials readily handled by conveyor belts, scoop cranes or pumps.

Liquid carriers represent another sizable portion of shipping. Fuel tankers are perhaps the most famous for their concentrated wealth and importance to modern society. The bulging lines of liquid hydrogen tankers and the blocky shapes of petrochemical and freshwater tankers are well known to most people. Small ships, those under 50,000 tons, find use in making deliveries to small customers shipping less common liquids, like acid, wine, ammonia and so on.

The last major category of freighter is the general freighter, though in most cases this could be called the "container ship" category. Only a few worlds use a much less efficient system of loose cargo on pallets in their freighters, the "break bulk" system. The blocky container ships are filled with stacks and blocks of standard shipping containers that can usually transfer easily to other forms of transport, like trains and trucks. Containers standardized since the Terran Alliance era are 12m long, 2.5m high and 2.5m wide, with variations being fractions of those dimensions. Containers come in an endless variety—some are refrigerated, some hold liquid tanks, some are collapsible, and there is always the eponymous dry goods shipping container. Container ships have remained a dominant force in shipping for more than a millennium because of their efficiency: even without automated systems, the manpower requirement for loading, shipping and unloading tens of kilotons of freight in a few days is barely three score workers.

Freighters in any form offer incredibly efficient transportation, particularly the multi-hundred kiloton behemoths beyond the scope of this lecture, to the extent that mills can find cheaper grains or foundries cheaper ores an ocean away rather than from sources just 50 kilometers distant overland.

Specialist Vessels

Beyond these three broad freighter categories are the specialists: automobile carriers, passenger liners, cable layers, icebreakers, ferries, heavy lift ships, drillships, dredgers and many others. The fine details of those also are beyond the scope of this lecture and, in comparison to freighters, are almost secondary anyway

Common Features of Ships

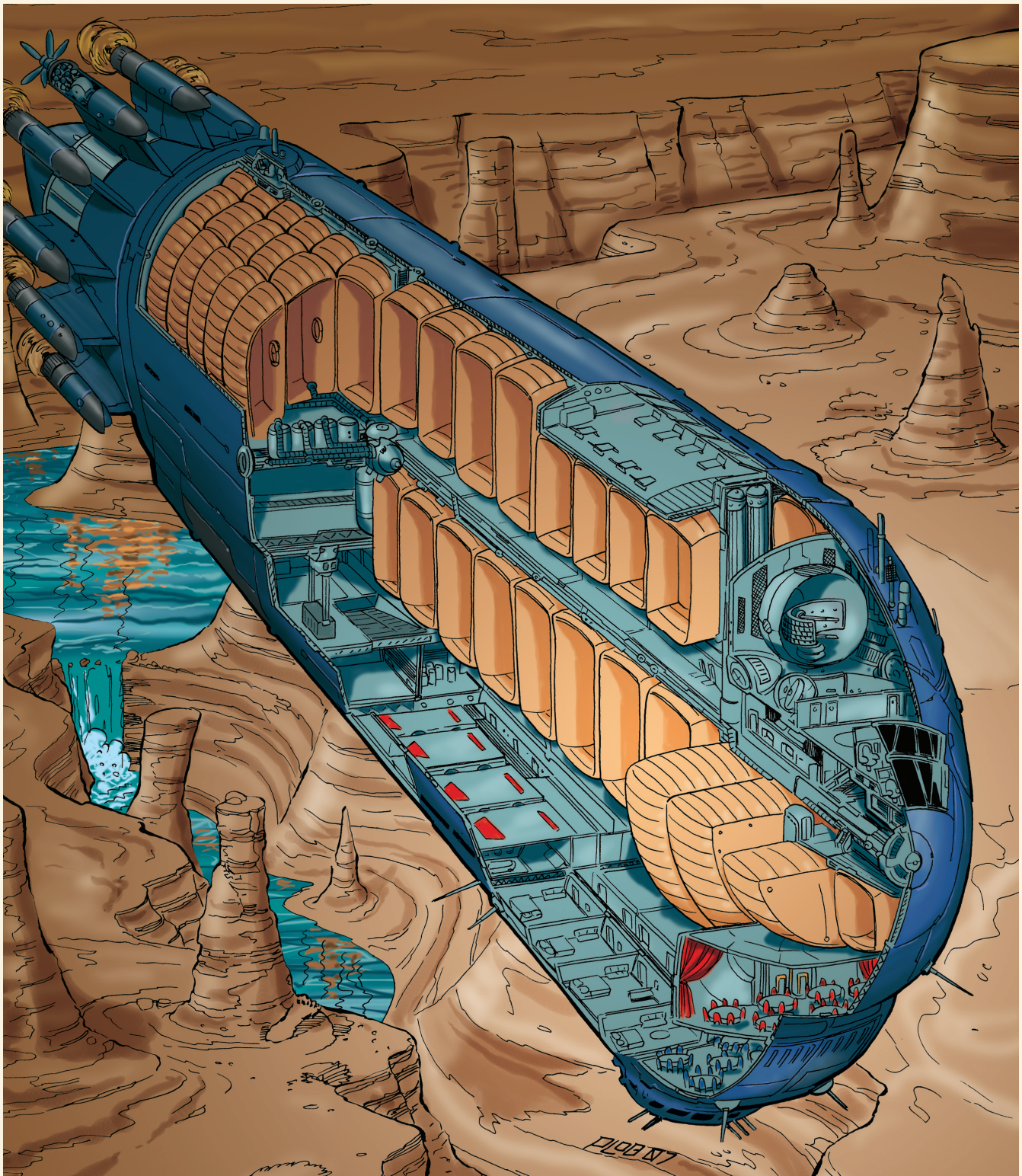
Most ships, particularly the various freighters and tankers, have many basic similarities in design. These ships are large, rectangular displacement hulls that concentrate their engines, controls and crew in one section, typically the stern or the center. They dedicate the remainder of the hull to cargo space, and pay lip service toward reducing hydrodynamic drag with some hull shaping that does not affect the shape of the cargo bays. Monolithic cargo holds or tanks are rare to minimize flooding dangers. Instead, most ships subdivide their interiors; for example, a typical bulk freighter of 100,000 tons will have five to ten cargo bays. Most specialist ships share these features.

Only in the more unique specialists ships do variations appear. Passenger liners, for example, often stretch a large superstructure across the top to provide as many balcony cabins as possible. Automobile carriers are similar to passenger liners in concept though not appearance, using very large superstructures to hold as many vehicles as possible and arranging their interiors for "roll on, roll off" cargo operations. Some engineering craft such as ocean dredgers vary almost from owner to owner.

The common displacement hull is not alone on the seas. Modern hydrodynamics combined with modern power plants offer ships far higher speeds than can be obtained from simple displacement hulls. Semi-planing hulls, planing hulls, hydrofoils, sidewall surface effect hulls, catamarans, trimarans and more exotic styling allow ships on advanced worlds to push beyond 100kph. The Lyran *Jormungand* cruiser is one such swift vessel, and its fusion power plant allows it to sustain its sprint speed for months on end. Unlike smaller watercraft, where features like hydrofoils are noteworthy, hulls sculpted for speed in large naval vessels are simply a matter of course and subsumed in the weight of the propulsion system.

AIRSHIPS

Airships, whether called by that name, blimps or zeppelins, cover a range of flying machines that use lighter-than-air gases for lift. These useful vehicles required several centuries to enter widespread service. The first airships, developed on



"Over the decades and centuries, those colonies established with airships found new uses for the vehicles that Terra overlooked. Not only did smaller airships come to compete with other types of aircraft for existing roles (police airships and scout zeppelins), they opened entirely new industries."

Terra, had a habit of crashing and/or bursting into flames, plus they had competition from fixed wing aircraft and market inertia to contend with. However, the popularization of cruise airships in the Terran Alliance led to a proliferation of airships and creation of new roles for these flying vehicles.

Airships initially made little headway on Terra even during the "aerial cruise" craze, but Terra's offspring had no such compunctions and eagerly took advantage of the growing know-how in these unique vehicles. Colonists needed vehicles that could operate without roads, without large landing strips, and without much fuel. Airships met all those criteria and more. Airships were capable of feats not readily duplicated by any other flying vehicle. For example, their capabilities as sky cranes surpassed even fusion-powered VTOLs. Not only could airships of common sizes lift hundreds more tons than the largest VTOL, they required much less effort and maintenance to remain on station for hours or days at a time. Airships could also operate in trackless wilderness, establishing bases, ferrying supplies and removing valuable products (diamonds, gold, timber and so on) that not even VTOLs could match. Many frontier towns and outback farms on new colonies depended on airships to deliver hundreds of tons of fuel, fresh water, animal feed, fertilizer and countless other supplies.

Over the decades and centuries, those colonies established with airships found new uses for the vehicles that Terra overlooked. Not only did smaller airships come to compete with other types of aircraft for existing roles (police airships and scout zeppelins), they opened entirely new industries. On Skye, for example, builders took centralized factory construction beyond small, trailer-based homes to skyscrapers. Factories would assemble most of a new building in modules, except the foundation, and airships would deliver the module to the distant city and settle the module in position, serving both as ferry and sky crane. The idea was not entirely new, but it was far easier for airships to hoist building components massing several hundred tons into position than for ground-based cranes to do it. The ability to move hundreds of tons of cargo at a time over any terrain has also found airships work in earthmoving and civil engineering projects.

The largest airships, beyond the scope of this discussion, are capable of even greater feats. Kilometer-long airships are not unknown on some worlds and can lift over ten thousand tons of cargo. They are not strictly cost-competitive with trains or naval vessels, but do present some unique abilities, like permanently airborne "aerial cruiseliners."

Airships generally fall into three structural classes: non-rigid airships (blimps), semi-rigid airships and rigid airships (zeppelins). Rigid airships build an enclosing cage and separate skin called collectively, "the envelope," surrounding a multitude of separate gas bags, the balloons that hold the lifting gas. A dozen or more gas bags are common in rigid airships. The envelope may also enclose most of the crew, cargo and engine sections rather than placing them in an exterior gondola. The many separately inflatable gas bags and rigid hull make this style of construction the most popular among freighter aircraft, which deal with shifting loads and therefore need good positional control.

Non-rigid and semi-rigid airships make the envelope and the gas bag one and the same, and obtain most of their shape from internal gas pressure rather than a rigid frame. Because the interior of the envelope is filled with lifting gas, most equipment and cargo volume are located in an external gondola. Semi-rigid airships add a stiff keel or partial internal frame, typically a large triangular truss running through the envelope, to help maintain its shape and distribute point loads, like engines or dense payloads, across the entire envelope.

SATELLITES

Satellites are an overlooked workhorse of modern civilization. From communication relays to weather monitors to navigation—I can't read my own handwriting...ah, beacons!—to navigation beacons, satellites directly touch almost every human being alive today in some way.

The flexibility of modern technology means that a simple summary of a satellite's statistics can make two models of satellites with very different roles look very much alike. IrTech's recent "Vehicle Annex" was a case point; that compilation made it look like a planet-monitoring science satellite and a reconnaissance satellite had very similar equipment aboard. That's almost true. Despite such similarities, however, satellite users tend to request satellites for specific missions, which break down (roughly) into the following common classes of satellites: communications, recon, weather and navigation.

SATELLITE TYPES

Modern communications satellites often handle multiple roles, from relaying media broadcasts, to handling two-way conversations, to monitoring distress beacons, to serving as navigation beacons. Of course, some satellites may be more specialized, but the mass-produced comsats of the Inner Sphere tend to pack software reconfigurable to suit the needs of the owners.

Reconnaissance satellites typically carry a mix of powerful optical, infrared and radar sensors to monitor a planet. Weather satellites monitor a planet's weather with sensors often superficially very like those of reconnaissance satellites, though the large lookdown radar on a weather satellite should not be mistaken for having the same 'Mech-tracking abilities as a spysat's lookdown radar. Despite this, I'm told the "it's a weather satellite" excuse has been used to disguise all sorts of naughty satellites since the dawn of space travel.

Navigation satellites can be considered a specialized communications satellite (those where navigation isn't already a function of a communications satellite). These orbital radio beacons help travelers on a world's surface determine their location.

And then there are the specialists: the unusual (but trendy) orbital cache satellites, solar power satellites, astronomical satellites, private habitats and small science labs, and many others.

ORBITS

Satellites end up in many of the same locations as space stations, as well as several others. However, their distri-

"…And then there are the specialists: the unusual (but trendy) orbital cache satellites, solar power satellites, astronomical satellites, private habitats and small science labs, and many others."

butions are different. Satellites tend to cluster in low orbits (mostly equatorial, some polar) and geosynchronous orbits, with few satellites elsewhere.

Geosynchronous orbit tends to be dominated by communications satellites, which benefit the most from a stable position with respect to planetary customers. You'll find a few other satellites in that band, like weather satellite "floaters" meant to keep the widest possible, continuous view on a hemisphere, but ask politely before putting a satellite here. Communications companies tend to be rabid about protecting their profitable orbital slots, and at least two such companies have WarShips and BattleMechs. The almost unique and anachronistic Taurian solar power satellites also work well in geosynchronous orbits. (You wouldn't want your power plant wandering away from the hamlet it powered, would you?)

Geosynchronous orbits are not perfect for all communications, especially closer to planetary poles where the satellites would appear low to the horizon and thus need to transmit through considerable thickness of atmosphere. For such high-latitude communications, comsats usually end up in "Molniya" orbits. My notes say that's Old Russian for "lightning," because Molniya orbits dip very close, very fast past a planet for part of their path. These orbits are sharply inclined—tilted—compared to the equator of the planet. They're also very eccentric, stretched into comet-like orbital shapes. These orbits are usually selected to be either half of a local day or a full local day in length. (Technically, full-day Molniya orbits are called "Tundra" orbits.) These comet-like orbits put the satellite over the target region of the planet for most of the orbital period, with brief close passes to the planet. The result is that the satellite seems to almost hover over the targeted extreme northern or southern region.

Navigation satellites tend to be in medium and high orbits, but not (by preference) geosynchronous orbits. Navigation satellites providing a global positioning system will not give global coverage from a geosynchronous orbit for the same reason geosynchronous comsats have trouble covering polar regions.

Polar orbits tend to be the domain of planetary science satellites, some weather satellites, and reconnaissance satellites. Polar orbits are generally at low altitudes, too.

Except for L-1 points (which are often close to viable pirate jump points), LaGrange points rarely receive satellites unless there are a lot of space stations present. Generally, you might find a few astronomical satellites parked at L-4 and L-5 points. L-1 points, though, may receive system defense early warning satellites, which are reconnaissance satellites with a fancier name.

Satellites are also distributed into solar orbits—around a system's star, but not around any planet. These satellites are typically part of a system's early warning network, looking to spot any unusual jump signatures in non-standard locations around the system. The short range of typical radar and optical sensors means these satellites have little chance of spotting passing DropShips or WarShips unless the satellites are deployed by the millions, but the signature of an arriving JumpShip can be spotted for many astronomical units (AU). It's therefore feasible to guard the fringes of a star system with just a few satellites.

Locations where it's rare to find satellites are zenith and nadir jump points. I'll talk about this further when I address space stations and JumpShips. While fusion-powered satellites can hold station for a decade on the average fuel load, the station-keeping ion thrusters of fission- and solar-powered satellites are only good for a year before depleting their reaction mass. And their chemical motors can be exhausted much faster. To get around this, some satellites use true light sails large enough to overcome their weight at the jump point, keeping station indefinitely. This usually requires a sail area as large as a JumpShip's solar sail. Despite similarity in size and sometimes shape, a "light sail" is easily distinguished from a JumpShip's solar sail by color. A light sail is silvery because it tries to reflect as much light as possible, while a solar sail is black because it tries to absorb as much light as possible.

MOBILE STRUCTURES

I disagreed with Dr. Readly about this section, as I think it represents an arbitrary class of vehicles that doesn't really exist. But, as he so cleverly reminded me, I'm the one who mouthed off on a live, publicly broadcast lecture about both our esteemed nobles and honorable democratic agitators, and so I'm the assistant professor while he's the full professor. So here we are, talking about mobile structures at the end of the lecture instead of discussing these vehicles as part of the topics I went over earlier.

According to Dr. Readly, the definition of a mobile structure is "a vehicle so large as to hardly be a vehicle in the traditional sense." Dr. Readly's classification of these vehicles is so large that it encompasses everything from submersible, semi-mobile oil rigs to the giant "sky cities" of the Star League.

MOBILE GROUND STRUCTURES

Okay, honestly, the example I have of a mobile ground structure probably typifies a "mobile structure," since I can't think of anything else to call it.

Anyway, a good example of "a large structure that has limited mobility" would be the DropShip transporter. These "crawlers," nicknamed after behemoths that date to the dawn of spaceflight, are tracked vehicles that putter around spaceports at one or two kilometers per hour with spheroid DropShips on their backs. Aerodynes can move themselves around on their wheeled landing gear, but spheroids are stuck where they land unless something carries—Yes? Please speak up.

Okay, yes, spheroid DropShips can take off, hover and scoot over a spaceport to a new location. However, spheroid drive exhaust is extremely hazardous to anyone underneath it. Having a DropShip launch to a safe altitude, like fifty kilometers, and then move sideways in the middle of a busy spaceport's skies, before landing about a kilometer from where it started, is overkill. Hence, the crawlers.

Crawlers are typically shaped like squat, massive squares of metal and ablative armor, sometimes up to two hundred and fifty meters on a side to hold even a *Mammoth*

"Don't fall prey to Succession War-era nostalgia. The Star League did not have anti-gravity. The Skycity-3000s were big balloons and enclosed nineteen separate helium gas bags in a single, rounded hexagonal envelope of a rigid composite, like an oddly shaped zeppelin."

on their back. They have multiple tracks, often on individually steerable legs, which distribute their own massive loads and that of their cargoes across the ground. Despite their scale, they are rarely operated by more than a handful of crew. Of course, dozens of ground crew may be assigned to support the crawler's "DropShip wrangling," but the actual act of driving a crawler only takes a few people.

Picking up a DropShip is an interesting exercise. The usual requirement is for a DropShip to settle on an existing landing pad that is actually propped some distance above the ground. The crawler slides under the pad and picks up both pad and DropShip before trundling them to the hangars. In other cases, the crawler *is* the landing pad. One interesting variation uses a system of floodable landing pads that float a DropShip to a lock that is drained, leaving the DropShip on a mobile landing pad that a crawler can drive under once the water's mostly gone. There are a few side-loading crawlers, though it's pretty difficult to pull a DropShip sideways onto the top of one.

As crawlers are rarely in a great hurry and don't like to have an 11,200-ton *Mule* start wobbling on their backs, they typically trundle along at a kilometer or two per hour. Crawlers may be surprisingly underpowered, with just a few hundred or thousand kilowatts. Because they don't move quickly, they can use relatively small power plants geared down through electric drive systems to produce mammoth amounts of torque. It is also not unusual to see crawlers with load-leveling systems that keep their cargo platforms flat while they climb shallow grades.

MOBILE AERIAL STRUCTURES

Not to be confused with the largest airships, mobile aerial structures are less-streamlined giants exemplified by the General Motors Aerospace Skycity-3000, of which a couple dozen were manufactured in the late 27th and early 28th centuries. These were meant as exotic resorts and high-priced real estate for the ultra-wealthy of the Star League. Today, I think there's one left on Mizar and one on Luthien, though the Lyran "skycity" isn't a GM model. I'll stick to the Skycity-3000 because it was the most common and best known. Can anyone paint a picture of a Star League city without putting a Skycity-3000 overhead?

Don't fall prey to Succession War-era nostalgia. The Star League did not have anti-gravity. The Skycity-3000s were big balloons and enclosed nineteen separate helium gas bags in a single, rounded hexagonal envelope of a rigid composite, like an oddly shaped zeppelin. Underneath this giant balloon was the actual Skycity platform, which was about one hundred meters in diameter.

A hundred meters in diameter is a lot smaller than those sprawling aerial estates look in "Wonders of the Star League," don't they? That's because the Skycity-3000s were modular, mostly as a practical design issue, and designed to dock together to form much larger aerial wonderlands. The Luthien platform has twenty modules about four hundred meters in diameter.

The multi-tiered platforms were where the fun was. Even a single Skycity-3000 module was the size of a large resort hotel. In addition to its basic arresting hoists and aircraft hangars for passengers and crew, the Skycity-3000 had roomy dining and entertaining areas, plenty of balcony rooms with outstanding views, and open sun decks or sports areas on their topsides. Except for large sports areas, like a football field, there was never a shortage of volume for the ultra-wealthy who visited or lived in these aerial cities. The limitation was one of weight. Several thousand tons of capacity might sound like a lot, but it runs out real fast when you're trying to install hundreds of luxury rooms into an aerial hotel. One of the biggest disappointments to the ultra-rich was the lack of open water on the Skycity-3000s—a small backyard pool might contain fifty tons of water, and a decent resort-sized pool could be thousands of tons. Of course, GM was happy to customize the basic frames of its Skycity-3000s to meet the needs of its customers.

The Skycity-3000s were not entirely passive blimps. Their fusion hearts powered some massive, carefully muffled fans that could move them at up to thirty kilometers an hour, give or take. That usually kept them out of the harshest weather. If not, their very low centers of gravity kept them enormously stable in bumpy weather. You didn't shake fifteen thousand tons of airship with a little turbulence.

MOBILE NAVAL STRUCTURES

I hinted about these earlier while discussing naval vessels. Most of what I said there applies to these giants. Sure, mobile naval structures sometimes include the unusual mobile oil rigs or vast vessels designed to look like islands, and I've got some pretty pictures here of the Atlantis Arcology on Atreus, which putters around Atreus' seas at about 10kph.

But, really, most of what Professor Readly wants to call "mobile naval structures" are just big ships. When a planet has waters and ports deep enough to support them, ships over one hundred kilotons are where the money is made. They are hardly more expensive to build than their smaller brethren, operating costs per ton drop, and they deliver more in the same time. If it wasn't for the limits of ports, straits, and artificial canals to handle these giants, most planets would be happy to be populated with megaton container ships that ply some routes on New Avalon and Luthien.

INTERMISSION

Alright, let's break here for five minutes to stretch our legs. This was an introduction to some of the unsung workhorses of the modern universe, the ones that hide on or near planets. Maybe this will give you enough material to look in the right places to get a passing mark when Dr. Readly throws a research paper at you about some obscure light sail zenith point early warning satellite or an Avalonmax containership. After the break, we will address the much flashier vessels that fill our newscreens: spacecraft.

IndustrialMechs perform routine maintenance at a rail yard.

The unit construction rules described in *TechManual* covered the range of *BattleTech*'s most common battlefield and support units, but the list was far from exhaustive. Left out—because they feature more advanced or involved rules and capabilities in game play—were an assortment of other Support Vehicles. Satellites, Rail units, Large-sized Airship and Naval Support Vehicles; these exist in significant numbers in the *BattleTech* universe as well. Far less common are the so-called Mobile Structures: super-massive units that can serve as mobile command centers and industrial support facilities and can even dwarf a DropShip in sheer size.

The following system enables players to construct these so-called "advanced units" for *BattleTech* games that conform to the *Total Warfare* rules (as modified by use of this book). As these rules can be fairly math-intensive, designers are encouraged to do all work on scratch paper before committing the resulting unit's specifications to the appropriate blank Record Sheets.

These rules should be considered the standard rule set for advanced unit design in the same fashion as the *TechManual* rules covered the basic rules for constructing tournament-legal units. These rules do not delve into any experimental options that may be available in the equipment section of this book (see p. 86).

THE BASICS OF ADVANCED UNIT DESIGN

Advanced unit construction relies on three primary factors: unit type, technology base and weight. The notes below explain and expand on these factors.

Throughout these construction rules, the term "unit" refers to a single advanced unit for *Tactical Operations* game play. A unit may be a single Satellite, Rail unit (tractor [engine] or railcar), a single Large-sized Support Vehicle, or a single Mobile Structure.

UNIT TYPE

The advanced units presented here come in a range of unit types that largely determine their core construction rules, maximum weight allowances, structural designs and what equipment they may mount. These features are broadly outlined below. Because so much is influenced by the unit's type—including its core construction rules and Record Sheet—this factor must be decided upon first in the design process.

Advanced Support Vehicles

Advanced Support Vehicles include Satellites, Rail Vehicles and Large-sized Airships and Naval Vessels. Because their construction rules derive from those of Support Vehicles (see pp. 116-139, *TM*), the construction rules for these units are grouped together in their own section.

Satellites: Satellites can weigh up to 300 tons and may only operate in space. These units use the Support Vehicle construction

rules, even though they use the same game play rules as Space Stations and are commonly unmanned.

Rail Vehicles: Rail Vehicles can weigh up to 600 tons each, and come in two broad classes: conventional rail and magnetic levitation (MagLev). These units use the Support Vehicle construction rules.

Large-Sized Airships: Large-sized Airship Support Vehicles range from 300.5 to 1,000 tons in weight. They use the Support Vehicle construction rules and function like their smaller kin in game play, with few exceptions.

Large-Sized Naval Vessels: Large-sized Naval Support Vehicles range from 300.5 tons to 100,000 tons in weight, and may operate only on water of sufficient depths. They use the Support Vehicle construction rules and function similarly to their smaller brethren, but with significant differences due to their greater size.

Mobile Structures

Mobile Structures are more akin to buildings than they are to any other kind of battlefield unit, but unlike buildings, Mobile Structures can move about, either by land, sea or air. These multi-hex units use a unique construction system that relies more on size, shape and mobility type rather than a raw tonnage value.

TECHNOLOGY BASE

In *BattleTech*, all units broadly fall into one of two available technology bases: Inner Sphere or Clan. (Mixed technology bases are possible, per the *Advanced Construction Options* starting on p. 188, but will not be covered here.) Purely Inner Sphere advanced units may only use Inner Sphere equipment, while purely Clan advanced 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 both technology bases.

Technology Rating

In the Weapons and Equipment Tables used for creating units in this book and in *TechManual*, 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. An item's Technology Rating typically has no direct bearing on advanced unit design, though units built using the Support Vehicle construction rules (Rail Vehicles, Satellites, Large Airships and large Naval units) must determine the Technology Ratings of their core structural components before proceeding (see *Tech Base (Ratings)*, p. 87, for a more thorough description).

Omni Units

Some—but not all—of the advanced units presented in these rules may be constructed as modular (Omni) units. Omni units are advanced units designed for rapid reconfigurations between missions, and are available to Clan and Inner Sphere technology bases. Unless otherwise noted, Omni units use the same construction rules as standard advanced units, but when an Omni is made, the designer must first establish its base configuration, which includes its chassis, engine, control systems, armor and—if desired—any additional weapons and heat sinks "hardwired" to the design.

The weight, weapon slots and arrangement for all this equipment is considered "fixed" on all configurations of the Omni unit, leaving any leftover weight and internal space open to pods that can mix and match additional heat sinks, weapons and equipment based on mission needs. A base Omni-unit configuration is never considered a finished unit and is generally not legal for game 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 advanced units) are considered game play-ready.

Mobile Structures use a different type of modular design, where structure segments are chained together in a semi-permanent arrangement, and so these units also may not be built as Omni units.

WEIGHT

Most of the advanced units described in these rules use the tonnage standard, with the weight ranges legal for game play described above under *Unit Type*. Small-sized Satellite and Rail Support Vehicles, however, use the kilogram standard instead.

For purposes of construction, though the term "weight" is typically used, it reflects the mass of items and components rather than a weight based on gravity.

Weight and Unit Classes

The varied nature of these advanced units creates a different range of weight and unit classes than most other unit types covered in *TechManual*. Still, depending on the unit's weight and type, many advanced designs can be classified along similar lines, though unusual specializations and such remain possible within the weight limits of any given design.

Satellite Support Vehicles: Satellite Support Vehicles fall into the Small, Medium and Large size classes common to Support Vehicle units. As the only Support Vehicle type that is routinely fielded unmanned, Small-sized Satellites tend to be civilian models, used for automated communications and weather monitoring. Medium-sized Satellites are usually more militarized or industrial models, some of which may even be crewed, based on their functions—which can range from observational roles to combat defense and even limited production. Large-sized Satellites are uncommon, but are usually manned and can serve as miniature orbiting habitats and production facilities or even spaceports for lighter craft (like fighters).

Rail Support Vehicles: Rail Support Vehicle units run along pre-laid tracks that can be underwater, in vacuum or over land. Small-sized Rail units are typical of commuter trains or mass transit for small-scale bases, while Medium-sized Rail Vehicles may see use as cargo trains, heavy commuter traffic or even military supply units. Large-sized Rail Vehicles are occasionally armed or armored and may be used as part of a local defensive network (though this is fairly uncommon). In addition to classifying a role and size, Rail Vehicles also distinguish between tractors (Rail units that pull or push other Rail units) and trailers (or cars, which lack engines and must be drawn by tractor units).

Large-sized Airship and Naval Support Vehicles: Truly massive (compared to the Small- and Medium-sized versions shown in *TechManual*), Large-sized Airships and Naval Vessels are Support Vehicles most commonly used as super-heavy transports for long-distance duties—often transoceanic or cross-continental work. Large-size Naval Vessels are also favored for military work, though they have long since been sidelined by the much more adaptable DropShips and aerospace forces of the modern age. Armed and armored ships often patrol water-rich worlds to deter local pirates or act as a kind of shore defense/artillery unit, though carriers are equally common and present a unique strategic puzzle for invading forces.

Mobile Structures: Mobile Structures defy classification by weight, but can have a broad range of functions. Some of the more common might include DropShip haulers, used to carry massive DropShips from one landing pad to another, or mobile oil rigs that meander along coastlines for accessible reserves. Land-based Mobile Structures can be moving military bases, mining rigs and factories, while airborne ones may serve as aerial observation platforms, research centers, military headquarters or mobile "cloud cities" (an extravagance of the forgotten Star League era).

SPACE

Under these rules, an advanced unit's size and type determine its equipment capacity and weapon limits. These limits are largely based on the construction rules the unit uses.

DESIGNING ADVANCED SUPPORT VEHICLE UNITS

The following basic rules cover the construction of all advanced Support Vehicle unit types featured here. (Mobile Structures will follow in their own sub-section). Despite their broad range of types, all of these advanced units follow six simple design steps, each of which is described in detail later. In brief, these steps are as follows:

Step 1: Design the Chassis—Determine the advanced Support Vehicle's type, its tech base (including Structural Tech Rating), its weight and (for select units) any internal structure and chassis modifications.

Step 2: Install Engine and Control Systems—Determine the advanced Support Vehicle's motive and engine type, speed (or acceleration), engine weight, control components, fuel (if applicable) and (for some units) its Structural Integrity.

Step 3: Add Armor—Determine type, amount and weight of armor (if any) and allocate armor points.

Step 4: Add Heat Sinks—Determine number and weight of the advanced Support Vehicle's heat sinks.

Step 5: Install Weapons and Equipment—Add weapons and other equipment to the advanced Support Vehicle.

Step 6: Complete the Record Sheet.

These steps are a framework for designing an advanced Support 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 weapon slots. For example, 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 weight on a piece of scratch paper.

Terminology: For the sake of simplicity, any reference under these rules to advanced Support Vehicles refers to all Satellite, Rail, Large Airship and Large Naval Vessel Support Vehicle units. Where a rule applies only to select Support Vehicle types, the specific units are noted.

STEP 1: DESIGN THE CHASSIS

The first step in creating an advanced Support Vehicle is choosing the unit's chassis. This step establishes some of the most basic aspects of its design, determining what type of Support Vehicle it is, its technology base and its weight. These choices will restrict the designer's access to certain equipment and can also influence the weight of the unit's internal structure or structural integrity.

CHOOSE ADVANCED SUPPORT VEHICLE TYPE

Advanced Support Vehicles come in a variety of types that can affect their motive systems, maximum weight, terrain restrictions and engine efficiencies. Because of this, choosing an advanced unit's type is the first key part of the chassis design process. Even the selection of a proper Blank Record Sheet for use in unit design hinges on the choice of unit type before any other component.

The Advanced Support Vehicle Types Table below provides key data that applies to advanced unit design and game play. Each of the unit types covered by these rules is listed in the Unit Type column, along with its upper Size-Class Limit, its Weight Range in tons (beyond which advanced units of that type may not be constructed), Weight Incremental (the increments of tons that the unit may vary in weight within its range), and Restricted Terrain (areas impassable to units of that type in *Total Warfare* game play). The Advanced Support Vehicle Record Sheet Table (see p. 55), meanwhile, determines which Blank Record Sheet must be used to record the construction of a new advanced unit of a given unit type.

Rail Units: While not required for construction purposes, when designing a Rail Support Vehicle, it is advisable to build both an engine or tractor unit (the primary mover for the train) and at least one railcar (of equal or lesser size) at the same time. This way, the completed design can take full advantage of the capabilities of a complete Rail unit.

ADVANCED SUPPORT VEHICLE TYPES TABLE

Unit Type	Size-Class Limit*	Weight Range (Tons)	Weight Incremental (Tons)	Restricted Terrain
Satellite	Large	0.100 to 300	0.001 (Small); 0.5 (Medium/Large)	Any Non-Space
Rail	Large	0.100 to 600	0.001 (Small); 0.5 (Medium/Large)	All Non-Rail terrain**
Large Airship†	Large	300.5 to 1,000	0.5	Any Woods, Hills, or Structures at same altitude†
Large Naval	Large	300.5 to 100,000	0.5	All except Water (Depth 1+)‡

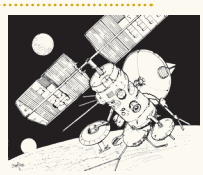
*The Airships and Naval Support Vehicles covered under these rules are only those of the Large size class.
**Rail units must use the appropriate rail type (MagLev rails for MagLev Rail units, Standard Rails for non-MagLevs).
†Airship Support Vehicle types use Aerospace Fighter movement and combat rules, but may not operate on the High-Altitude Map.
‡Higher minimum depth requirements imposed for heavier Naval Support Vehicles.

ADVANCED SUPPORT VEHICLE RECORD SHEET TABLE

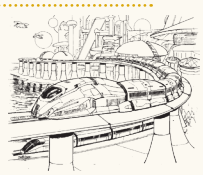
Unit Type	Record Sheet	Weapon Arcs
Satellite (All sizes)	Satellite	Nose, Left, Right, Aft
Rail (Small/Medium)	Ground	Front, Left/Right, Rear*
Rail (Large)	Large Ground	Front, Front-Left/Right, Rear-Left/Right, Rear*
Large Airship	Airship	Front, Front-Left/Right, Rear-Left/Right, Rear
Large Naval	Large Naval	Front, Front-Left/Right, Rear-Left/Right, Rear*

*Plus any Turret(s) installed

Eric wants to design an unmanned unit to aid in planetary communications. He decides on a Satellite Support Vehicle, which he names the SEU-193D Starcomm. In preparation for the design process, he readies a copy of the Satellite Record Sheet.



Frank is designing a new train system for passenger and cargo transport, and has thus chosen a Rail Support Vehicle type for his design. He names his unit the Adelante, and prepares a Rail Record Sheet to aid in his design.



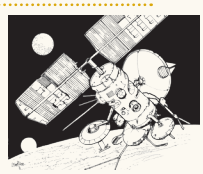
George is building a Large Airship that will serve as an airborne command center and aircraft carrier. Choosing to name it the Cloud Nine Carrier, he readies an Airship Record Sheet to record his work.

Henry wants to create a seagoing cruiser to protect the Tharkan shorelines—not to mention its small carrier fleet—against bandits and invaders (however unlikely they may be). Naming his vessel the Jormungand, he gets a Large Naval Record Sheet prepared.

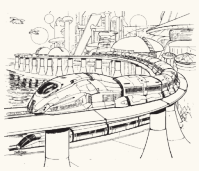
CHOOSE TECHNOLOGY BASE

Advanced Support Vehicles may be constructed using Clan or Inner Sphere technology bases. Units created using either tech base may be built as Advanced Support OmniVehicles, but must incorporate the Omni chassis modification to do so (see *Allocate Weight for Internal Structure*, p. 58).

Eric is building his SEU-193D Starcomm for House Davion's use, and so picks an Inner Sphere technology base.



Frank's passenger train system is meant for commercial use in the Inner Sphere, so he also picks an Inner Sphere tech base for both the engine unit (the primary tractor) and the railcars. To take advantage of modern modular construction, he decides that the Adelante's railcars will be built as Support OmniVehicles, though the primary tractor itself will not be.



George chooses an Inner Sphere tech base for his Cloud Nine Carrier.

Henry decided already that his Jormungand is a Lyran-made design, so it gets an Inner Sphere tech base.

CHOOSE WEIGHT

Depending on the Advanced Support Vehicle's type (see p. 55) and its size class (Small, Medium or Large), its maximum (and minimum) weight varies greatly (as shown on the Advanced Support Vehicle Types Table).

For Small-sized Advanced Support Vehicles, designers may choose any weight under 5 tons, up to a maximum of 4,999 kilograms (in 1-kilogram increments). Construction of such units is handled using a kilogram standard, so when installing any items with weight listings in tonnage, the designer must first convert the weight of such items to kilograms. To do this, multiply the item's tonnage by 1,000.

All other Advanced Support Vehicles described in these rules track their weight using the tonnage standard, and may be constructed as light as their lowest listed weight from the Advanced Support Vehicle Types Table, to their maximum listed weight, increasing from the minimum in multiples of the unit's listed Weight Incremental. Because of the tonnage standard, 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 Advanced Support Vehicle Weight Table below defines the weight ranges of each advanced unit that may be designed under these rules, by unit type and size class. Regardless of the advanced unit's size and type, the total weight for 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 an advanced unit, its weight can also determine the maximum amount of items that may be mounted.

For all advanced Support Vehicles weighing 300 tons or less, the equipment space limit is 5 base item slots, plus 1 additional slot for every 10 tons (10,000 kilograms) of advanced Support Vehicle weight (rounded down). Advanced Support Vehicles weighing over 300 tons receive 35 base item slots, plus 1 additional slot for every 100 tons of unit weight (rounded down). For example, a 48-ton Support Satellite may carry up to 9 slots for items (5 base + [48 tons ÷ 10] = 9.8, round down to 9 item slots), while a 65,000-ton Large Naval Vessel may carry up to 685 slots' worth of items (35 base + [65,000 tons ÷ 100] = 685).

Like other Support Vehicles, advanced 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.

Advanced Support Vehicle Base Chassis/Engine Values

In addition to the weight ranges and Minimum Technology Ratings (see p. 58), each type and size class of advanced Support Vehicle also has a corresponding Base Chassis Value and Base Engine Value. These values—shown in the Advanced Support Vehicle Weight Table below—are required to compute the final chassis and engine weights for these units, and are included here to avoid undue repetition. When choosing a weight for an advanced Support Vehicle, the designer should note these values as well.

Multi-Hex Units

Large Airships, Large Naval Vessels and continuous Rail Support Vehicles (those consisting of an engine (Tractor) unit and more than one railcar (Trailer)) can occupy more than one hex in *BT* game play for purposes of stacking rules and considering weapon mounts. For Large Airships and Naval Vessels, the total weight of such units defines the hexes that they occupy and their levels (expressed as above and below the waterline, for the sake of surfaced Naval Vessels; landed Airships and submerged Naval Vessels use the total of both figures to define their height from the unit's "bottom"). These values are defined in the Airship and Large Vessel Size Template Table (which also includes the number of hexes of length—and therefore the number of CASE units required—for such units). Rail units occupy 1 hex for every 2 Small- or Medium-sized units in the train, or 1 hex for every Large-sized unit in the train. Trains need not be linear, but must follow the contours of the tracks (see *Rail,* p. 17).

Based on the applicable template, a to-hit modifier applies to attacks made against Large Airships and Naval Vessels, reflecting the greater ease with which others units can hit such large targets, even when they are in motion. These modifiers apply in all aspects of game play, including weapon and physical attacks, and attacks against Airships in the air and on the ground. Large Airships in flight are considered to occupy 1 hex, however, for purposes of maneuvering.

Additional movement rules apply to multi-hex units as well. These are discussed under *Advanced Support Vehicles* (see p. 16).

Artillery units are off-loaded from a military train.

ADVANCED SUPPORT VEHICLE WEIGHT TABLE

Vehicle Type (Size)	Weight Range (Tons)	Minimum Tech/Availability Rating	Base Chassis Value	Base Engine Value
Satellite (Small)	0.100 – 4.999	C/C-D-C	0.08	0.10*
Satellite (Medium)	5 – 100	C/C-D-D	0.12	0.10*
Satellite (Large)	100.5 – 300	C/D-E-D	0.16	0.10*
Rail (Small)	0.100 – 4.999	A/C-C-C	0.15	0.003
Rail (Medium)	5 – 300	A/C-C-C	0.20	0.004
Rail (Large)	300.5 – 600	A/C-D-D	0.30	0.005
Airship (Large)	300.5 – 1,000	C/D-E-D	0.30	0.012
Naval (Large)	300.5 – 100,000	B/C-E-D	0.17	0.009

*Fixed Engine Weight; Satellite Support Vehicles have an effective Thrust Point value of 0 in game play.

Advanced Support Vehicle Item Slots*
(Small/Medium): 5 + (Support Vehicle Tons ÷ 10)
(Large): 35 + (Support Vehicle Tons ÷ 100)

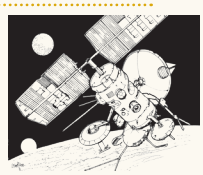
*Round down to the nearest whole number

AIRSHIP AND LARGE VESSEL TEMPLATE TABLE

Support Unit Template (hexes)	Airship Weight(in Tons)*	Naval Weight(in Tons)	Height (Levels) Above / Below Surface	Attacker To-Hit Modifier
A (1)	0.1 – 500	0.1 – 500	0 / 1**	0
B (3)	500.5 – 600	500.5 – 6,000	1 / 1**	–1
C (5)	600.5 – 750	6,000.5 – 12,000	1 / 2**	–2
D (7)	750.5 – 900	12,000.5 – 30,000	2 / 2**	–3
E (9)	900.5 – 1,000	30,000.5 – 100,000	3 / 3**	–4

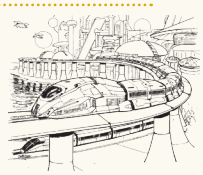
*Airships use templates only when landed; Airship height when landed is computed as the sum of both the above and below levels.
**Submersible Large Naval Vessels may not dive in water that is less than the total sum of both the above- and below-surface Level values. If they attempt to do so, the vessel will run aground (see p. 22).

Eric wants to build his Starcomm as a Medium-sized satellite. He decides on a weight of 20 tons. At this weight, he calculates that his Support Vehicle will have 7 slots of equipment space (5 base slots + [20 tons ÷ 10] = 7 slots).



Eric also notes from the Advanced Support Vehicle Weight Table that the Starcomm will have a Base Chassis Value of 0.12 and a Base Engine Value of 0.10.

Frank goes for the biggest train he can with his Adelante Rail Vehicle—at least for the train engine unit itself. He decides on a weight of 600 tons for the primary mover (the top of the Large size class), and 120 tons (Medium size) for the Omni railcars that will go with it.



At these weights, he calculates that the Adelante's main engine unit will receive 41 slots of equipment space (35 base slots + [600 tons ÷ 100] = 41 slots), while its smaller railcars will receive 17 equipment slots (5 base slots + [120 tons ÷ 10] = 17 slots).

Frank also notes from the Advanced Support Vehicle Weight Table that the Adelante's primary tractor will have a Base Chassis Value of 0.30 and a Base Engine Value of 0.005, while its railcars have a Base Chassis Value of 0.20 and a Base Engine Value of 0.004.

George's Cloud Nine, he decides, will be a Large-sized Airship—the biggest possible, in fact, at 1,000 tons. At this weight, he computes that the unit will have 45 equipment slots (35 base slots + [1,000 tons ÷ 100] = 45 slots).

George also finds that the Large-sized Airship will have a Base Chassis Value of 0.30 and a Base Engine Value of 0.012. Furthermore, as a 1,000-ton Airship, his unit falls into a Template E size, with a length of 9 hexes, and a total height of 6 levels—but only when landed. At this size, the Airship will also be rather easy to hit, with a –4 Attacker To-Hit Modifier applied against it in the air and on the ground.

Henry decides to give his Jormungand battlecruiser a total weight of 60,000 tons, well in the middle of the Large Naval Support Vehicle weight range. At that weight, he finds that the vessel will have an impressive 635 item slots available (35 base slots + [60,000 tons ÷ 100] = 635).

Henry also notes the Jormungand's Base Chassis Value is 0.17 and its Base Engine Value is 0.009, as well as the fact that, as a 60,000-ton vessel, his ship falls into a Template E size, with a length of 9 hexes, and a height of 3 levels above and below the waterline. At this size, the vessel will also be rather easy to hit, with a –4 Attacker to-hit modifier applied against it.

ALLOCATE WEIGHT FOR INTERNAL STRUCTURE/STRUCTURAL INTEGRITY

Like standard Support Vehicles, advanced Support Vehicles have internal structures that represent their framework, and may be determined at the same time as their weight is chosen. The weight of this structure depends on the advanced Support Vehicle's weight, as well as its Structural Tech Rating and any special chassis modifications applied. The formula for computing an advanced Support Vehicle's chassis is identical to that of other Support Vehicles.

Choose Structural Tech Rating

The first step in computing an advanced Support Vehicle's structural weight is the determination of its Structural Technology Rating. This is the 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 advanced 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 have access to the occasional homegrown item that merits a Tech Rating of F.

While choosing an advanced Support Vehicle's Structural Tech Rating will help anchor its core design in 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 advanced Support Vehicle types and size classes covered by these rules, the Minimum Support Vehicle Structural Tech Rating may be found on the Advanced Support Vehicle Weight 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.

Choose Chassis Modifications

For many Advanced Support Vehicles, special modifications may be applied to the chassis at this time that provide added features not built into the unit's basic design. These chassis modifications not only provide a multiplier for chassis weight computations, but also may modify the unit's Structural Tech Rating, and may be restricted to certain motive types or even incompatible with other chassis modifications.

The Advanced 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 unit's Structural Tech Rating to match.

Calculate Chassis Weight

The basic formula for finding the weight of an advanced Support Vehicle's internal structure is to multiply its Base Chassis Value (as found on the Advanced Support Vehicle Weight 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 unit'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. 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. For example, a 50-ton (Medium size) Rail unit with Tech Rating B that sports both the External Power Pickup and the Tractor chassis modifications would compute its chassis weight as follows: 0.20 (Medium, Rail) x 1.3 (Tech Rating B) x 1.1 (External Power) x 1.2 (Tractor) x 50 tons, for a final chassis weight of 17.16 tons (rounded to 17.5 tons).

Internal Structure/Structural Integrity Values

An advanced Support Vehicle's type and total weight also determine the number of internal structure points the unit receives per location. The Advanced Unit Structure Values Table shows what

TECHNOLOGY RATING TABLE

Tech Rating	Technology Level	Sample Advanced Unit Types
A	Primitive (19th to early 20th centuries)	Rail Support Vehicles
B	Low-Tech (late 20th century)	Large Naval Support Vehicles
C	Common Tech (21st to 22nd centuries)	Large Airship and Satellite Support Vehicles
D	High-Tech (Age of War and Succession Wars)	—
E	Advanced (Star League/ Post-3050 Inner Sphere)	—
F	Hyper-Advanced (Clan/ Post-3065 Inner Sphere)	—

ADVANCED SUPPORT VEHICLE STRUCTURE TABLES

ADVANCED SUPPORT VEHICLE STRUCTURE WEIGHT FORMULA
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

ADVANCED SUPPORT VEHICLE CHASSIS MODIFICATIONS TABLE

Chassis Modification	Minimum Tech/ Availability Rating	Multiplier	Modification Restrictions
Amphibious	C/C-D-C	1.75	Not available to Hover or Naval Support Vehicles
Armored*	A/C-E-D	1.5	Not available to Airship Support Vehicles
Environmental Sealing	C/B-D-C	2	No Restrictions
External Power Pickup	B/C-C-C	1.1	Rail Support Vehicles Only (may not be used with MagLev Engines)
Omni	E/X-X-E	1	No Restrictions
Submersible	B/C-D-C	1.8	Naval Support Vehicles Only
Tractor (Ground)	A/A-A-A	1.2	Wheeled, Tracked and Rail Support Vehicles Only
Tractor (Naval)	A/A-A-A	1.2	Naval Support Vehicles Only
Trailer	A/A-A-A	0.8	Wheeled, Tracked and Rail Support Vehicles Only
Ultra-Light*	D/C-E-D	0.5	Small Support Vehicles Only

*Armored and Ultra-Light modifications may not be combined.

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)
Environmental Sealing	Fission-, Fusion- and Electric-engine units may operate normally in vacuum or underwater unless breached
External Power Pickup	Allows non-MagLev Rail vehicles to draw electricity through rails, rather than on-board engines
Omni	May be constructed as an OmniVehicle (but may not use Mechanized Infantry rules)
Submersible	May operate as a submarine (may not use hydrofoil mod, if equipped, when submerged)
Tractor (Ground)	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

formulas apply to which unit type and size class. Remember that Airships and Satellites receive their internal structure values as a single "location" called Structural Integrity, while all other noted unit types receive internal structure values to each hit location, plus any turrets. When using the appropriate Blank Record Sheet, the designer must mark out any excess internal structure or Structural Integrity circles on the unit's Armor Diagram for all applicable locations to indicate the number of structure points in those areas. If no turret is assigned to the vehicle (see *Turrets*, below), then all internal structure *and* armor circles for the turret locations must be blacked out.

Like Internal Structure points on BattleMechs, IndustrialMechs, ProtoMechs and Combat Vehicles, the structure points used by advanced units may not be redistributed to other body locations.

The Advanced Support Vehicle Structure Values Table below lists the locations that apply to the various types and size classes of advanced units constructed using these rules.

Turrets: Like those on Combat Vehicles, turrets on advanced Support Vehicles are optional components. Of the units covered by these rules, they are available to Rail Support Vehicles and Large Naval Vessels only; Airships and Satellites may not mount turrets as such. Large Naval Vessels may mount multiple turrets, if desired, with a maximum limit of 1 turret per hex of vessel length. See *Large Naval Vessels*, below, for further information.

Any turrets installed automatically receive the same number of internal structure points as the unit's other locations, but these extra points do 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-sized 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 turrets. (See the rules regarding OmniVehicles below for an exception.)

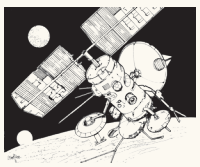
Large Naval Vessels: Large-size Naval Support Vessels may install one turret per hex of vessel length (to a maximum of 9 turrets per vessel). A Large Naval Vessel's hex length is defined by its template size as found in the Airship and Large Vessel Template Table (see p. 57).

Some items mounted on a Large Naval Vessel—such as a Helipad or a Flight Deck—may occupy "turret space" as well as internal equipment space. In such cases, the vessel must reduce the number of actual turrets it can mount accordingly.

Tech Base/Rating: The internal structure and structural integrity types for advanced Support Vehicles in this section are equally available to vehicles of Clan or Inner Sphere tech bases. However, internal structure or Structural Integrity components featured by these advanced units are incompatible with those of any different unit type.

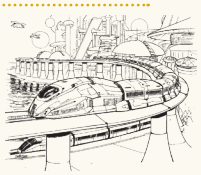
Space: For all of the advanced Support Vehicles discussed here, the various types of structure and chassis modifications have no impact on the unit's equipment slot spaces.

Advanced Support OmniVehicles: As the arrangement of internal structure circles is fixed across all advanced Support Vehicle types and no equipment slots are occupied by structure, advanced OmniVehicle designers need only note whether or not the unit'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.



As he noted earlier, Eric's Starcomm has a Base Chassis Value of 0.12, and he has given it a total weight of 20 tons. He assigns it a Structural Tech Rating of E (multiplier 0.85) and sees no need for any of the various chassis modifications. He computes the Starcomm's chassis weight to be 2.5 tons (0.12 x 0.85 [Tech Rating E] x 20 tons = 2.04, rounded up to 2.5 tons).

As the Starcomm is a Satellite Support Vehicle, he also finds that it has a Structural Integrity Value of 1.



Frank has assigned a weight of 600 tons for the Adelante's primary tractor unit and 120 tons for its railcar. His tractor unit has a Base Chassis Value of 0.30, while the railcar has a Base Chassis Value of 0.20. For the primary tractor, he selects a Structural Tech Rating of D (1.0 multiplier), and a Rating of F for the Omni-railcars (0.66 multiplier).

Because the primary tractor needs to tow other railcars, Frank naturally assigns it the Tractor Chassis Modification, but sees no need for other chassis modifications. He thus computes a chassis weight of 216 tons for the primary tractor unit (0.30 x 1 [Tech D] x 1.2 [Tractor] x 600 tons = 216 tons). According to the Advanced Unit Structure Values Table, he finds that the 600-ton unit will receive 60 internal structure points to each of its 6 locations (Front, Front-Left, Front-Right, Rear-Left, Rear-Right and Rear—Frank has decided not to install a turret; 600 tons ÷ 10 = 60 points per location).

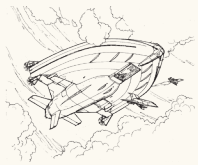
For the more advanced OmniVehicle railcars, Frank assigns the Tractor and Trailer Chassis Modifications (so they can both be pulled and pull additional cars), as well as the Omni chassis modifications. He thus computes a chassis weight of 15.5 tons for the railcars (0.20 x 0.66 [Tech F] x 1.2 [Tractor] x 0.8 [Trailer] x 1.0 [Omni] x 120 tons = 15.206 tons, rounded up to 15.5).

ADVANCED SUPPORT VEHICLE STRUCTURE VALUES TABLE

Advanced Support Vehicle Type (Size)	Structure Values	Internal Structure Locations*
Satellite (All sizes)	1 (SI)	Structural Integrity
Rail (Small/Medium)	Tonnage ÷ 10*	Front, Left/Right, Rear**
Rail (Large)	Tonnage ÷ 10*	Front, Front-Left/Right, Rear-Left/Right, Rear**
Large Airship	†	Structural Integrity
Large Naval	30 + (Tonnage ÷ 2,000)*	Front, Front-Left/Right, Rear-Left/Right, Rear**

*Round up to the nearest whole
**Plus any Turret(s) installed
†Structural Integrity (SI) for these unit types is determined upon installing the unit's engine (See *Install Engine*, p. 61).

According to the Advanced Unit Structure Values Table, he then finds that the Adelante's 120-ton railcars will receive 12 internal structure points to each of their 4 locations (Front, Left, Right and Rear—no turrets installed; 120 tons ÷ 10 = 12 points per location).



George's 1,000-ton Cloud Nine is a Large Airship with a Base Chassis Value of 0.30 and he decides to assign it a Structural Tech Rating of E (multiplier 0.85). With no other chassis modifiers, he computes that its structure will weigh 255 tons (0.30 x 0.85 [Tech E] x 1,000 tons = 255 tons). Because it is a Large Airship, however, George may not yet determine the Structural Integrity value provided for his unit.

Henry's 60,000-ton Jormungand battle cruiser has a Base Chassis Value of 0.17. As it is intended to be an older-style vessel, he selects a Chassis Tech Rating of C (1.15 multiplier), as well as an Armored Chassis modification (1.5 multiplier) because he intends this vessel for combat. This gives the vessel a final chassis weight of 17,595 tons (0.17 x 1.15 [Tech C] x 1.5 [Armored] x 60,000 tons = 17,595 tons).

Henry also notes the Jormungand's weight makes it a Template E vessel, with a 9-hex length, and a height of 3 levels above (and below) the waterline. Though he can mount up to 9 turrets at that size (the maximum allowed for a Large-sized Naval Vessel), Henry opts for a total of 5 turrets instead, and finds that the vessel will receive 60 internal structure points to each of its 11 locations (Front, Fore-Left, Fore-Right, Rear-Left, Rear-Right, Rear and all 5 Turrets; 30 + [60,000 ÷ 2,000] = 60).

Sovereign class cruiser, New Avalon Crucis March Militia (House Davion).

STEP 2: INSTALL ENGINES AND CONTROL SYSTEMS

The second step in Advanced Support Vehicle design is the installation of the unit's engines and control systems. This step establishes the key factors in the advanced unit's mobility, including the size and performance of its engine and the weight of the control systems the crew uses during operations.

INSTALL ENGINE

An advanced Support Vehicle carries one engine to power its movement, equipment and other components. As Advanced Support Vehicles use a wider set of standards than Combat Vehicles, the formula for determining these units' engine weight is slightly more complex than that for a Combat Vehicle, and factors in the advanced Support Vehicle's engine type, Technology Rating and desired speed as well as the unit's overall weight.

The Advanced Support Vehicle Engine Tables on p. 62 give the formulas and compatibilities of the various engine types available to advanced Support Vehicles (by Tech Rating and type). Determining the weight of an advanced Support Vehicle's engine is simply a matter of multiplying the unit's total weight by its relevant factors. These factors are the unit's 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 engine weight (rounded up to the nearest kilogram for Small-sized advanced Support Vehicles, and up 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" (in the Compatibility column on the table) for a given advanced Support Vehicle type, that engine type may not be installed on that advanced Support Vehicle. If a given Engine Weight Multiplier for a Tech Rating is listed as "NA" (in the Multiplier column on the table), that engine type is unavailable at that Tech Rating.

At the designer's option, an advanced 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 unit's overall Tech Rating accordingly.

Minimum Engine Weights: In advanced Support Vehicle design, Fusion engines of Tech Rating C and Fission engines of all Tech Ratings have minimum engine weights that must be satisfied during construction. This minimum engine weight is 5 tons (5,000 kilograms), regardless of the Support Vehicle's size, weight, speed or motive type.

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 satellite may not install a Fusion engine with a Tech Rating of C or any kind of Fission engine, because the satellite itself is smaller than minimum engine size requirement. However, a

ADVANCED SUPPORT VEHICLE ENGINE TABLES

Advanced Support Vehicle Type	Movement Factor
Non-Airship/Non-Rail Support Vehicles	4 + (Desired Cruising MP x Desired Cruising MP)
Rail Support Vehicle	4 + ([Desired Cruising MP –2] x [Desired Cruising MP –2])*
Airship Support Vehicle	4 + (Desired Safe Thrust x Desired Safe Thrust)**
Satellite Support Vehicle	1

Flanking MP Value (Non Airship)	Max Thrust Value (Airships)
Cruising MP x 1.5 (round up)	Safe Thrust x 1.5 (round up)**

*Rail Support Vehicles built to be unpowered railcars need not compute an Engine Weight.

**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); Satellites do not receive a Max Thrust (their engines provide for station-keeping only, at a set 0.1 Thrust).

ADVANCED SUPPORT VEHICLE ENGINE WEIGHT FORMULAE
Engine Weight = Base Engine Value x Movement Factor x Engine Weight Multiplier x Total Advanced Support Vehicle Weight*

*Round up to nearest kilogram for units under 5 tons; for units 5 tons and over, round up to nearest half-ton.

ADVANCED SUPPORT VEHICLE ENGINE COMPATIBILITIES TABLE

	Compatibility by Engine Type								
Advanced Support Vehicle Type	Steam	ICE	External*	Battery*	Fuel Cell*	Solar*	MagLev	Fission	Fusion
Satellite	N	N	N	Y	Y	Y	N	Y	Y
Rail	Y	Y	Y	Y	Y	Y	Y	Y	Y
Airship	Y	Y	N	Y	Y	Y	N	Y	Y
Naval Vessel	Y	Y	N	Y	Y	Y	N	Y	Y

*External, Battery, Fuel Cell and Solar engine types are classified as Electric engines. (Externally powered engines require the External Power Pick-Up Chassis Modification).

ADVANCED SUPPORT VEHICLE ENGINE WEIGHT MULTIPLIERS AND FUEL WEIGHT PERCENTAGE TABLE

	Engine Weight Multiplier (by Tech Rating)							
Advanced Support Vehicle Engine Type	A	B	C	D	E	F	Fuel: % of Engine per 100 km Range*	Tech/Availability Rating
Steam	4.0	3.5	3.0	2.8	2.8	2.5	3	Var./A-A-A
Internal Combustion (ICE)	NA	3.0	2.0	1.5	1.3	1.0	1**	Var./A-A-A
Electric (External)	NA	1.4	1.0	0.8	0.7	0.6	NA	Var./C-C-C
Electric (Battery)	NA	NA	1.5	1.2	1.0	0.8	5	Var./A-B-A
Electric (Fuel Cell)	NA	NA	1.2	1.0	0.9	0.7	1.5	Var./B-C-C
Electric (Solar)†	NA	NA	5.0	4.5	4.0	3.5	NA	Var./C-D-C
MagLev††	NA	NA	0.8	0.7	0.6	0.5	NA	Var./D-F-E
Fission†‡	NA	NA	1.75	1.5	1.4	1.3	NA	Var./E-E-D
Fusion†‡	NA	NA	1.5	1.0	0.75	0.5	NA	Var./C-E-D

*Large Airships use Large Airship Fuel Table below.

**ICEs running on alcohol or natural gas use 1.25 percent.

†Airship Support Vehicles using these engine types do not require fuel.

††MagLev rail trailers must also be constructed as powered railcars (basic Movement Factor of 4).

‡The minimum weight for Fission engines or Tech Rating C Fusion engines is 5 tons; the minimum weight for any other Fusion engine is 0.25 tons.

ADVANCED SUPPORT VEHICLE ENGINE TABLE (CONT.)

LARGE AIRSHIP SUPPORT VEHICLE FUEL TABLE

Fuel Weight (kg) per Thrust Point (by Tech Rating)*					
A	B	C	D	E	F
63	38	27	21	18	15

*Solar-, Fission- and Fusion-Powered Airships require no mass for fuel.

SATELLITE SUPPORT VEHICLE FUEL TABLE

Satellite Engine Type	Fuel Points (per ton)	Strategic Fuel Use (tons/burn day)
Electric and Fission	NA	0.043
Fusion	NA	0.005

15-ton Rail Support Vehicle attempting to use a Fission engine with a calculated weight of 3.9 tons may "inflate" the engine's weight to 5 tons without changing its performance.

Tractor/Trailers: Advanced Support Vehicles built as Trailers (those constructed using the Trailer chassis modification, including railcars), 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 Advanced Support Vehicle combinations is based on 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*), or the appropriate rules for Rail Vehicle movement (see p. 17 of this book).

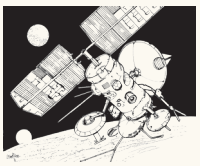
Flat Cars: Rail vehicles without engines or other components may be designated as either "box cars" or "flat cars". Flat cars may not be armored nor may they receive environmental sealing, and carry all cargo externally (but may subtract any of the car's unused weight from that of the cargo or units being transported—to a minimum transported tonnage of 0). (This rule can be used to create "flat bed" Combat and Support Vehicles with Wheeled and Tracked Motive Systems, but must adhere to all the restrictions noted above.)

Tech Base/Rating: The engine types and Tech Ratings presented in this section are available to advanced Support Vehicles made using either the Clan or Inner Sphere tech bases. Advanced Support Vehicles created under either technology base may not make use of the combat engines shown on the Master Engine List in *Total Warfare*, including Compact, Light and XL Fusion engines.

Space: The types of engines used by Advanced Support Vehicles do not affect the unit's equipment slot space.

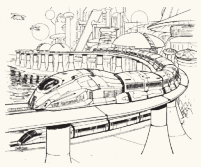
Advanced Support OmniVehicles: Engine type, Tech Rating, movement points and weight must be established when designing an advanced Support OmniVehicle's base configuration, and may not be altered in the completed Primary or Alternate configurations of that advanced Support OmniVehicle.

According to the engine compatibility tables, Eric's Starcomm satellite can only use electric engines of Battery, Fuel Cell or Solar types, a Fission engine or a Fusion engine.



He opts to use an Electric (Solar) Engine system. As a Medium-size Satellite, its Base Engine Value is 0.10. Because it is a Satellite, it receives an automatic Movement Factor value of 1, as its engines are only used for station-keeping. Using the same Tech Rating for the 20-ton Starcomm's engine as for its structure (Tech Rating E), Eric finds that the Satellite's engine weight will be 8 tons in all (0.10 x 1 [Movement Factor] x 4.0 [Tech E Solar Engine Multiplier] x 20 tons = 8 tons).

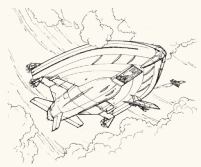
Combined with its 2.5-ton chassis, the Starcomm now has 9.5 unspent tons remaining (20 – 2.5 [Structure] – 8 [Engine] = 9.5 tons).



For the primary tractor of his Adelante train, Frank has already assigned 216 of the vehicle's 600 tons to its chassis, leaving 384 unspent tons to go (600 – 216 = 384). The Adelante's Omni railcar meanwhile has 104.5 unspent tons remaining (120 – 15.5 = 104.5). Because the Adelante's primary tractor unit is the motivator for the entire train, Frank must install an engine there, but decides that the railcars will not require engines themselves.

With a Base Engine Value of 0.005, and any engine type desired available to it, Frank provides the Adelante's primary tractor with a Tech D-rated fusion engine for maximum efficiency. He wants the Adelante to be fast, and assigns it a speedy Cruising Rating of 12, which provides for a Movement Factor of 104 (4 + [(12 Cruising – 2) x (12 Cruising – 2)] = 104) and a Flanking MP of 18 (12 Cruising MP x 1.5 = 18 Flanking MP). This means that the Adelante's primary tractor unit will have a final engine weight of 312 tons (0.005 [Base Engine Value] x 104 [Movement Factor] x 1 [Tech D Fusion engine] x 600 tons = 312 tons). This leaves 72 unspent tons on the Adelante's tractor (384 unspent tons – 312 engine tons = 72).

Because he has chosen not to install engines on the Adelante's Omni railcars, Frank proceeds to the next step.



George's 1,000-ton Cloud Nine has a Base Engine Value of 0.012. He wishes to provide it with a Safe Thrust Rating of 1, which works out to a Movement Factor of 5 (4 + [1 Safe Thrust x 1 Safe Thrust] = 5), and a Max Thrust of 2 (1 Safe Thrust x 1.5 = 1.5 Max Thrust, round up to 2). George decides to employ a Fusion engine with a Tech Rating of E (Engine Multiplier 0.75). He thus computes that the engine will weigh 45 tons (0.012 [Base Engine Value] x 5 [Movement Factor] x 0.75 [Tech E Fusion Engine Multiplier] x 1,000 tons = 45 tons). Combined with the Airship's 255-ton chassis, this leaves 700 unspent tons remaining (1,000 tons – 255 [Chassis] – 45 [Engine] = 700).

For his Jormungand, Henry has a Base Engine Value of 0.009, and wants to provide it a fast Cruising MP of 6 (for a Movement Factor of 40

[4 + (6 Cruising MP x 6 Cruising MP) = 40] and a Flanking speed of 9 MP (6 Cruising MP x 1.5 = 9 Flanking MP). Intending this vessel for long voyages on the open seas, he selects a Fusion engine with a Tech Rating of C (1.5 Engine Multiplier). This gives the Jormungand a final engine weight of 32,400 tons (0.009 [Base Engine] x 40 [Movement Factor] x 1.5 [Tech C Fusion engine] x 60,000 tons = 32,400 tons).

Henry notes that the Jormungand's 17,595-ton structure, combined with its 32,400-ton engine, leaves 10,005 unspent tons remaining (60,000 – 17,595 [Structure] – 32,400 [Engine] = 10,005).

DETERMINE FUEL CAPACITY

Most of the units and engine types featured in these rules have significant fuel requirements. For most advanced Support Vehicles, this fuel capacity is generally expressed as an operating range for the unit, which is computed based on the engine type and the desired operating range (as shown in the Fuel column in the Advanced Support Vehicle Engine Table). Airships, some Satellites and all advanced aerospace units employ Fuel Points instead, as a more abstract means of tracking fuel use. Even though fuel is not typically tracked in *Total Warfare* game play, all advanced units that require fuel must allocate some weight—in addition to their engines—to internal fuel supplies.

Rail and Naval Advanced Support Vehicle Fuel: For the Rail and Large Naval Support Vehicles featured in these rules, fuel weight is computed in the same manner used by most standard Support Vehicles: multiplying the desired range (in hundreds of kilometers) by the listed percentage of the unit's engine weight. This figure is rounded up to the nearest kilogram for Small Support Vehicles, or up to the nearest half-ton for advanced Support Vehicles weighing 5 tons and up. For example, a Medium Rail unit 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 (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 ([300 kg ÷ 12 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).

Large Airship Support Vehicle 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 each Tech Rating of the unit's engine) on the Large Airship Support Vehicle Fuel Table. These points, however, only apply if the Large Airship is powered by Steam, Internal Combustion, Battery or Fuel Cell engine types. Airship Support Vehicles powered by Solar, Fission or Fusion engine types require no Fuel Points at all.

The total weight of all Fuel Points for Airship Support Vehicles must be rounded up to the nearest kilogram for Small units, and up to the nearest half-ton for units 5 tons and up.

Satellite Support Vehicle Fuel: Though all Satellites employ some kind of station-keeping drive units incorporated with their engines, they may or may not require fuel based on their intended area of operation. Satellites meant to be placed in a fixed "natural" orbit around a stellar or planetary body (such as a planet, moon or star) effectively take advantage of natural forces to maintain their orbits, and use low-powered ion thrusters to make miniscule corrections as needed. These satellites require no fuel.

Satellites intended for deeper-space operations (such as the zenith and nadir jump points within a system, which are not orbital, but stationary), require either a reserve of station-keeping fuel or a Light Sail (see p. 135). Station-keeping fuel for all such Satellites 300 tons and under burns at a rate of 43 kilograms (0.043 tons) per day on fission- and solar-powered satellite types (see the Advanced Aerospace Unit/Satellite Fuel Table), while fusion-powered Satellites burn fuel at a rate of 5 kilograms (0.005 tons) per day. Station-keeping fuel may be installed on a Satellite Support Vehicle in increments of "burn days" rather than Fuel Points, but the total fuel reserve must be rounded up to the nearest kilogram for Small-sized Satellites, or up to the nearest half-ton for Satellites 5 tons and up. Satellites—unlike advanced aerospace units—also do not require additional weight for pumps (the weight is considered part of the satellite's engine).

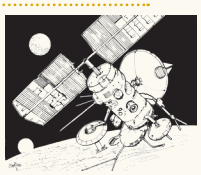
Satellites placed in non-fixed "natural" orbits, which do not carry station-keeping fuel or Light Sails, can only maintain their position for 2 days if powered by an Electric (Solar) or Fission engine, or 10 days if powered by a Fusion engine type. Any other Satellite Support Vehicle without a fuel reserve or Light Sail will immediately begin falling toward the local star.

Tech Base/Rating: Fuel tanks and fuels are standardized, and equally available to advanced Support Vehicles of Clan or Inner Sphere technology bases, but any Fuel Points installed in Airship Support Vehicles must always match the Technology Rating and size class used to compute the unit's engine weight. (For example, a Large Airship's Tech D-Rated IC engine may not use fuel points reserved for a Tech F engine.)

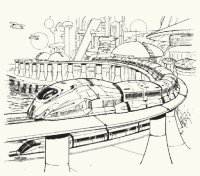
Space: The internal fuel tanks covered by these rules occupy no weapon or equipment slots on any advanced units.

Advanced Support OmniVehicles: The fuel capacity installed with an advanced Support OmniVehicle's engine must be established when designing the advanced Support OmniVehicle's base configuration, and may not be altered in the completed Primary or Alternate configurations of that unit (though some units may have access to pod-mounted external fuel tanks).

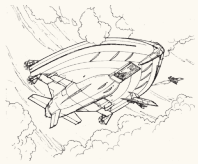
Because he plans to deploy his Starcomm satellites in natural planetary orbits exclusively, Eric chooses not to assign any weight to station-keeping fuels, retaining the unit's 9.5 unspent tons for later use.



Because his Adelante's primary tractor uses a Fusion engine, and the railcars employ no engines, Frank also need not assign fuel to his advanced Support Vehicle.



The Cloud Nine airship would only have needed to install fuel (in Fuel Points) if it had come with a Steam, Internal Combustion, Fuel Cell or Electric-Battery engine. As George chose to employ a Fusion engine, however, the vehicle requires no fuel.



Henry's Jormungand also employs a Fusion engine, and so requires no fuel. Had he chosen a fuel-burning engine, he would have needed to determine the vessel's planned operating range first (either in multiples of 100 kilometers, or by assigning weight equal to some percentage of the Jormungand's engine mass and determining the range such a percentage provides).

DETERMINE STRUCTURAL INTEGRITY (AIRSHIPS ONLY)

Once the weight and Thrust Points of a Large Airship Support Vehicle are determined, designers of this unit type can determine their Structural Integrity (SI) values. This determines the overall strength of the unit's internal structure.

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. This value may not be increased once the Airship's weight and Thrust Points are established; however, regardless of the value, an Airship's SI does not cost any additional weight (as it is considered part of the unit's chassis and armor design).

Space: Airship structural integrity does not affect the amount of internal equipment space available to the advanced Support Vehicle.

Advanced Support OmniVehicles: The Structural Integrity Value of a Large Airship Support Vehicle built as an Omni is fixed once established for the unit's base configuration. These values may not change between the advanced Support OmniVehicle's base, Primary or Alternate configurations.

Because George's Cloud Nine is an Airship, it receives a Structural Integrity (SI) Value at this stage, in place of the internal structure value found on most other vehicle types. Given the unit's Safe Thrust of 1, and its weight at 1,000 tons, George determines that the Cloud Nine will receive an SI of 20 (because 2 percent of 1,000 tons is 20, which is greater than the unit's Safe Thrust value). On the record sheet, George blacks out all but 20 circles in the gray-shaded Structural Integrity area at the center of the airship's Armor Diagram.

ADD LIFT/DIVE EQUIPMENT

Advanced Support Vehicles incorporate any lift or dive equipment into their chassis modification weights, rather than computing them as a separate component. Advanced Support Vehicle designers thus need not assign weight or space to this equipment.

DETERMINE JUMP CAPABILITY

As with Combat Vehicles and standard Support Vehicles, advanced Support Vehicles built under these rules may not possess jump capability and so cannot mount jump jets of any kind.

ADD CONTROL/CREW SYSTEMS

Technically speaking, the chassis of all Advanced Support Vehicles contain basic control systems, but some units must still allocate additional mass to crew accommodations and fire-control systems (if installed).

Crew: With the exception of Satellite Support Vehicles and certain Rail Support Vehicles—which may, at the designer's option, be constructed as unmanned units—all advanced Support Vehicles require a certain amount of crew to operate them. To determine the basic crew needs for each vehicle type, consult the Advanced Support Vehicle Minimum Crew Table below. An advanced 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). The additional crew needs for the specific items listed do not have to be met unless and until the items are mounted (typically after Step 5), and any officer requirements must be computed after all crew is assigned.

Gunners are necessary only for items that require a Gunnery Skill roll to use in combat, and that have a range of more than 1 hex. (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.)

Davion Guards' 'Mechs welcome the arrival of much needed fire-support.

Satellite Support Vehicles and Rail units built as trailers without engine systems are a noteworthy exception because they may be built as unmanned units instead. For such units, a minimum Base Crew of 0 applies (though the units receive no weight credit for this, as any saved weight for life support and control systems would then go into automation). Satellites may be unmanned as long as they employ no weapons, MASH facilities, field kitchen units or any other crew-served equipment aside from communications gear. Railcars (Rail units built as trailers with no engines) may take on crew if they mount any crew-served items.

Crew Accommodations: For Small-sized advanced 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 other advanced Support Vehicles 5 tons and over integrate seating automatically for the minimum required crewmen, but 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. (However, "bay bunks," especially infantry bay accommodations, are even worse than steerage quarters and generally meant for short flights. Designers with a generous weight budget may consider supplying quarters for individual MechWarriors, fighter pilots or even infantry personnel.)

Large-sized Airships and Naval Vessels, which are designed to spend days of operation away from any ports of call, provide quarters—rather than mere crewman seating—as part of their design. These units thus require additional tonnage spent on quarters only for crew and passengers established *beyond* their minimum requirements. Other advanced Support Vehicle types may add quarters, but must pay for *all* of them, as these exceed the minimalist seating provided for by the design.

Satellites with no crew requirement or Rail trailers built without crew requirements do not require quarters (though such should be added if the unit is to carry passengers, or incorporates items that require crewmen, such as weapons, MASH units, field kitchens and non-Satellite communications gear).

Fire Control Systems: Designers of advanced Support Vehicles that are to be armed may wish to allocate additional weight to fire-control systems in order to reduce the crew's need for all mounted

ADVANCED SUPPORT VEHICLE MINIMUM CREW TABLES

Minimum Crew Formula:
Minimum Crew Needs = Base Crew Minimum + Non-Gunner Minimum Crew + Minimum Gunners + Minimum Officers

Advanced Unit Type	Base Crew Minimum
Rail/Satellite Support Vehicles (Small)	1
Rail/Satellite Support Vehicles (Medium)	2
Rail/Satellite Support Vehicles (Large)	3
Airship Support Vehicles (Large)	3 + (1 per 500 tons)*
Naval Support Vehicles (Large)	3 + (1 per 5,000 tons)*
Support Vehicle constructed as a Trailer with no Engine	0**
Support Vehicle constructed as Unmanned Satellite	0**

*Round up

**Trailer and Satellite Base Minimum supersedes any Base Minimum established for other Support Vehicle types

ADDITIONAL CREW

Non-Gunners	Minimum Crew Requirement
Communications Equipment (per ton, see p. 212, *TM*)	1*
Field Kitchen (per item, see p. 217, *TM*)	3
Flight Deck (per item, see p. 124)	20
Helipad (per item, see p. 124)	5
MASH (per theater, see p. 228, *TM*)	5
Mobile Field Base (per item, see p. 142)	5

*Unmanned Satellites need not assign crew to Communications Equipment; All other items listed above always require crew

Officers	Minimum Officer Requirement
1 to 3 Non-Officer Crew	0
4 or more Non-Officer Crew	Total Non-Officer Crew ÷ 6 (round up)

	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/Large	Total Weapon Tonnage ÷ 2†	Total Weapon Tonnage ÷ 3†	Total Weapon Tonnage ÷ 4†/††

*Gunners are required only for items that require a Gunnery Skill roll to use in combat; Unmanned Satellites may not be armed

†Round up

††Tech E Chassis SVs use Tonnage ÷ 5; Tech F Chassis SVs use Tonnage ÷ 6 to determine gunners

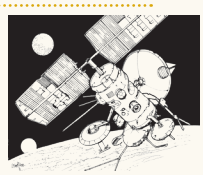
‡Turret and pintle mounts counts as separate facing

‡‡Includes the vehicle's driver

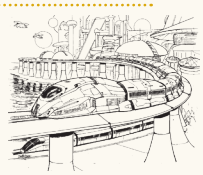
weapons. The impact on crew requirements for installing such fire-control systems will affect the unit's crew requirements and so is shown under the Gunners section of the Advanced Unit Minimum Crew Table, but these values need not apply unless the designer chooses to mount weaponry. Because fire-control system weights are directly related to the weight of the weaponry mounted on an advanced Support Vehicle, the designer may feel free to determine the weight of fire-control systems after installing any mounted weapons and ammunition (in Step 5). However, for the purposes of assigning crews or when designing advanced Support OmniVehicles, it is important to establish whether or not the vehicle will be using such systems at this time.

Tech Base: The control systems and crew accommodations covered by these rules are equally available to advanced Support Vehicles built using a Clan or Inner Sphere technology base.

Advanced Support OmniVehicles: The minimum seating, quarters and fire-control systems, once established for an advanced 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 advanced Support Vehicle, this weight determines how much pod space may be devoted to weaponry. Additional quarters may be installed beyond these requirements, however.



Eric plans for his Starcomm to operate as an unmanned communications satellite, and so establishes a base minimum crew need of 0. Thus, there is no immediate need for crew quarters or seating of any kind on the satellite. However, Eric also may not mount weapons, MASH units, passenger quarters, field kitchens or anything else with a defined crew requirement on this unit except for Satellite-based communications gear. This is just fine by him.



The primary tractor unit for Frank's Adelante is a Large-size Rail unit with an engine, and so has a minimum crew requirement of 3. While Frank could just as easily go with the 3 seats that come free with the Adelante's chassis, he decides to add 5 standard crew quarters to the design as well, to provide comfort for the crew in the event his advanced Support Vehicle is called upon for extended travel. Because quarters are not required for a Rail unit, these quarters occupy 7 tons each—for a total of 35 tons—and take up 1 equipment slot (5 crew quarters ÷ 20 crew quarters per slot = 0.25, round up to 1 slot). This leaves the Adelante's primary tractor unit with 37 tons left over (72 tons – 35 quarters tons = 37 tons).

The railcars, on the other hand, are built as Medium-sized, engine-less trailers, and thus have no crew quarters requirements. For the Adelante's Omni railcars, Frank thus decides to install no quarters at this time. This will leave the current 104.5 unspent tons.

As an Airship weighing 1,000 tons, George's Cloud Nine receives a base minimum crew of 5 (Base Crew = 3 + [1,000 tons ÷ 500] = 5). Because there are already more than 4 crewmen, George must also add an officer (5 crew ÷ 6 = 0.83 officers, round up to 1 officer). Anticipating more crewmen to man on-board systems he has yet to assign, George holds off computing his full crew complement and accommodations at this time. Even so, he bears in mind that quarters for the Airship's minimum crew needs will be provided weight-free as part of the unit's design.

Henry's Jormungand will also receive quarters for its minimal crew needs at no cost in weight or slot space, but—like George—Henry has yet to add equipment, which may increase the cruiser's basic needs. He can, however, establish the Jormungand's base crew needs and officers at this stage. For base crew, the 60,000-ton cruiser has a crew requirement of 15 (3 + [60,000 tons ÷ 5,000] = 15), which requires an additional 3 officers (15 crew ÷ 6 = 2.5, round up to 3).

SPECIAL 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 advanced Support Vehicle's chassis. Advanced Support Vehicles have no add-on equivalents to the MASC or Triple-Strength Myomer systems that BattleMechs may employ.

STEP 3: ADD HEAT SINKS

Advanced Support Vehicles handle heat differently than BattleMechs. Like Combat Vehicles, they only require heat sinks if they mount heavy energy weapons. If such energy weapons are mounted, however, the number of heat sinks required by the unit equals the total amount of heat generated by firing all such energy weapons simultaneously. This applies to all advanced Support Vehicle types, even those that function as aerospace units (such as Airships and Satellites).

Though determining a unit's heat sink needs is dependent on many factors, this stage can help provide advanced Support Vehicle designers with a guide toward determining how many heat sinks the unit initially receives (if any), as well as preparing the unit in advance for a desired selection of weapons. Alternatively, the designer may wish to skip this step until after all weapons and equipment are selected, in order to better allocate the unit's remaining tonnage.

Unlike Combat Vehicles and other units, advanced Support Vehicles receive no "weight-free" heat sinks, regardless of the engine and chassis types chosen. Any shielding

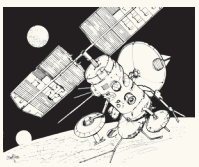
and cooling capability they do have covers only the needs of the engines themselves.

Tech Base: Standard (single) heat sinks are the only type available to advanced Support Vehicles of any tech base.

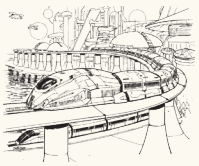
Space: An advanced Support Vehicle's heat sinks do not affect the amount of weapon slots available to the unit.

Advanced Support OmniVehicles: Advanced Support OmniVehicles of Clan or Inner Sphere design may add more heat sinks at this stage, or none. 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.

As Eric already determined that his Starcomm will not carry any heavy energy weapons, and thus will generate no heat from their use, he chooses to install no heat sinks at this time.



The main tractor for Frank's Adelante, he decides, also will not carry heavy energy weapons, and so he elects to install no heat sinks at this time. He also sees no need to install fixed heat sinks on the Adelante's Omni railcars.



George also believes his Cloud Nine Airship will not carry heavy energy weapons, and thus requires no heat sinks at this time.

Because he plans for his Jormungand to serve in combat, Henry decides that at least some of its weaponry will include heavy energy weapons. For now, he decides to install 40 heat sinks (at 1 ton each, for 40 tons in all) on this vessel, leaving a total of 9,965 unspent tons remaining (10,005 – 40 = 9,965 tons). As the Jormungand is a Support Vehicle, it may only employ standard (single) heat sinks.

STEP 4: ADD ARMOR

Most advanced Support Vehicles—whether built as unarmed Rail Vehicles or as massive seagoing battle cruisers—use some kind of armor to protect their internal structures and critical components against the elements, routine wear and tear, and combat. This 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 BAR values reflect the variety of armor types open to advanced Support Vehicles, and is used to determine whether or not heavy weapons fire penetrates the unit's protection despite the points remaining in the location. In *Total Warfare* tournament game play, if a unit has a BAR of less than 10, any damage sustained in a single hit that exceeds the BAR may inflict a Penetrating Critical Hit (see p. 206, *TW*).

The maximum number of armor points an advanced Support Vehicle may receive is shown in the Maximum Armor column of the Advanced Unit Armor Maximums Table. This value is always rounded down to the nearest whole number and applies to Clan and Inner Sphere advanced Support Vehicles, regardless of the Tech Rating used, and is established in points (rather than tons).

Regardless of the BAR, Tech Rating or tech base applicable to the armor used, the unit may not exceed its listed maximum armor capacity. Remember, however, that these values reflect the selected unit's maximum *total* armor capacity; the number of points per location is left up to the designer. Advanced Support Vehicles designed with the Armored, Amphibious, Environmental Sealing or Submersible chassis modifications have a minimum armor requirement of 1 point per location.

Advanced Support Vehicle armor may be mounted in kilogram lots for Small-sized Support Vehicles, but all advanced units weighing 5 tons or more must round all armor weights up to the nearest half-ton. Advanced Support Vehicle armor may be purchased in points or in tons using the Advanced Support Vehicle Armor Weights Table, which provides the weight (in kilograms) for each point of armor at each BAR and Tech Rating. To find the tonnage of a given amount of armor on an advanced Support Vehicle weighing 5 tons or more, simply divide the kilogram weight for the total desired number of armor points by 1,000 and round the result up to the nearest half-ton.

Using the Armor Diagram on the advanced Support Vehicle's appropriate Record Sheet, mark out any excess armor circles to indicate the number of armor points that protect each part of the unit's body. Armor circles for a given location are located in the appropriate unshaded parts of the diagram.

Under these rules, designers may not mix armor types on an advanced Support Vehicle, and may only use armor types listed in the Advanced Support Vehicle Armor Table.

Tech Base/Rating: The Tech Rating of the armor chosen for an advanced Support Vehicle may not exceed that of its chassis. Also, armor at some BAR levels may not be available to an advanced Support Vehicle unless it possesses the Armored chassis modification. (An entry of NA on the Advanced 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 advanced Support Vehicles reduces their equipment slot space.

ADVANCED SUPPORT VEHICLE HEAT SINKS TABLE

Unit Type	Min. Heat Sink Requirement	Weight-Free Heat Sinks
Advanced Support Vehicles (All)	Total of all Heavy Energy Weapon Heat	0

ADVANCED SUPPORT VEHICLE ARMOR TABLES

ADVANCED SUPPORT VEHICLE ARMOR MAXIMUMS

Unit Type	Maximum Armor (Points)*	Armor Facings
Rail (Small/Medium)	4 + (0.5 per ton)	Front, Left, Right, Rear**
Rail (Large)	4 + (0.5 per ton)	Front, Front-Left/Right, Rear-Left/Right, Rear**
Satellite (All sizes)	4 + (0.5 per ton)	Nose, Left, Right, Aft
Large Airship	89 + (0.05 per ton)	Nose, Left Wing, Right Wing, Aft
Large Naval	89 + (0.05 per ton)	Front, Front-Left/Right, Rear-Left/Right, Rear**

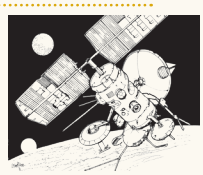
*Round down to nearest whole point or half-ton.
**Rail and Naval units may add Turrets if desired.

ADVANCED SUPPORT VEHICLE ARMOR WEIGHTS

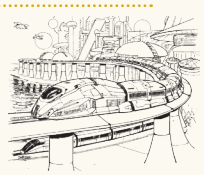
	Weight (in kg) per Armor Point (by Tech Rating)					
Barrier Armor Rating (BAR)	A	B	C	D	E	F
2	40	25	16	13	12	11
3	60	38	24	19	17	16
4	80	50	32	26	23	21
5	100*	63	40	32	28	26
6	130*	75*	48	38	34	32
7	180*	88*	56*	45	40	37
8	230*	120*	64*	51*	45	42
9	NA	180*	100*	57*	51*	47
10	NA	250*	150*	63*	56*	52*

*The Armored chassis modification is required to install this armor on a chassis of this Tech Rating.

Advanced Support OmniVehicles: The type of armor, its weight, number of points and their allocation must be established when designing the base configuration of an advanced Support OmniVehicle. These values may not be altered in the completed Primary or Alternate configurations of that OmniVehicle.



At 20 tons, Eric finds that his Starcomm Satellite can only support 14 points of armor in all (4 + [20 tons x 0.5 points per ton] = 14 points). While he plans to protect the unit nevertheless, Eric has not opted for an Armored chassis modification, and decides upon a modest BAR of 5 for the Starcomm. At a Structural Tech Rating of E, each point of armor will weigh 28 kilograms (0.028 tons). Maximizing the armor, Eric installs 14 points, placing 4 each in the Starcomm's Nose and Aft facings, and 3 each in the Left and Right facings. These 14 points cost 0.5 tons in weight (14 points x 0.028 tons per point = 0.392 tons, round up to 0.5), leaving 9 unspent tons available for his satellite (9.5 – 0.5 = 9).



For the Large-size 600-ton main tractor of Frank's Adelante, the maximum armor factor possible is 304 points (4 + [600 tons x 0.5 points per ton] = 304). Though the unit does not feature the Armored chassis modification, he decides to give it a tough skin to deal with possible collisions (or the odd well-armed raider), and so goes with a BAR of 7 (which also happens to be the toughest armor BAR he can get at his unit's Tech Rating of D without having an armored chassis). This armor will weigh 45 kilograms (0.045 tons) per point, and Frank decides on a nice round 200 points to protect the Adelante's tractor unit. This armor weighs 9 tons in all (200 points x 0.045 tons per point = 9 tons), leaving the train engine with 28 unspent

tons (37 – 9 = 28). Frank allocates 40 points to the tractor unit's Front facing, 35 each to the Front-Side and Rear-Side facings, and the remaining 20 to the Rear facing.

For the smaller, but more advanced 120-ton railcars, Frank notes he has a maximum armor capacity of 64 points (4 + [120 tons x 0.5 points per ton] = 64 points). Once more, the railcars do not feature the Armored chassis modification, but because they were built using a Tech Rating of F, Frank decides to use Tech F armor as well, and finds that the maximum possible BAR for that rating is 9. This armor will weigh 47 kilograms (0.047 tons) per point, and so a maximum armor value will be 3.5 tons (64 points x 0.047 = 3.01 tons, round up to 3.5). Looking to save the half-ton lost to rounding, Frank installs 63 points of armor for 3 tons (63 x 0.047 = 2.96 tons, round up to 3 tons), leaving the Adelante's railcars with 101.5 unspent tons (104.5 – 3 = 101.5). Frank mounts 16 points each in the Medium-sized railcar's Front, Left and Right facings, and 15 in the Rear.

George has decided that his unarmed 1,000-ton Cloud Nine Airship will not require heavy armor as its mission is not one of combat, but merely small aircraft transport and support. He finds, however, that if he wanted to, he could mount up to 139 points of armor on the Large-size Airship (89 + [1,000 tons x 0.05 points per ton] = 139). Looking to save on armor tonnage, George selects the minimum BAR of 2 for his Cloud Nine's protection, which weighs only 12 kilograms (0.012 tons) per point at the unit's Tech Rating of E. He decides to install 83 points of this armor on the Airship, allocating 23 points to the Nose facing and 20 points to the other three locations (Left Wing, Right Wing, and Aft), spending only 1 ton of weight in the effort (83 x 0.012 = 0.996, round up to 1). This leaves the Cloud Nine with 699 unspent tons (700 – 1 = 699).

Henry's 60,000-ton Jormungand is intended for combat, and so features an Armored chassis modification. Thus, at its size, the vessel can mount up to 3,089 points of armor (89 + [60,000 tons x 0.05 points per ton] = 3,089 points), which may be BAR 10—the equivalent strength of BattleMech armor, which he will need to divide up among 11 facings (6 hull facings plus 5 turrets). Henry decides to install the maximum of 3,089 points of BAR 10 armor, which will weigh 463.5 tons at the vessel's Tech Rating of C (3,089 points x [0.150 tons per point for Tech C, BAR 10 armor] = 463.35, round up to 463.5 tons). Henry decides to place 304 armor points in the Jormungand's Front facing, 300 points in all five other hull facings (Front-Left, Front-Right, Rear-Left, Rear-Right and Rear), and 257 points in each of the vessel's five turrets).

After subtracting the armor weight, Henry finds his bluewater cruiser will have a total of 9,501.5 unspent tons remaining (9,965 – 463.5 = 9,501.5 tons).

STEP 5: ADD WEAPONS, AMMUNITION AND OTHER EQUIPMENT

The weapons, ammunition and equipment that may be mounted on advanced Support Vehicles are listed in the Master Weapons and Equipment Tables beginning on page 216. In addition to any heat, damage and range statistics, these tables provide the weight these items take up on an advanced 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 advanced 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 or other equipment (due to item slot constraints or other factors) is considered wasted tonnage.

Weapons and items placed in any non-turret location on any advanced Support Vehicle automatically receive a fixed firing arc in that direction (meaning a vehicle's front-mounted weapon will have a front firing arc, while a Large Naval Vessel's left-forward mounted weapon can only fire into the left-forward arc, and so on). Turret-mounted weapons—available under these rules only to certain advanced units such as Rail and Large Naval vehicles—have a firing arc determined by the turret's facing during game play. Advanced Support Vehicle pintle-mounts—which differ from turrets in that they have no separate locations and are mounted more as items in themselves—provide a 180-degree firing arc based on the side of the unit upon which they are mounted.

For special rules on any item, consult its entry under Heavy Weapons and Equipment (pp. 86-187, plus pp. 201-249, *TM*).

TechManual Items: The Weapons and Equipment items described and listed in the tables in *TechManual* may all be mounted on advanced Support Vehicles in accordance with their standard equipment rules. Advanced Support Vehicles may install any item permitted on tournament-legal Support Vehicles as long as the item has no special rules that preclude its use by such units (such as the use of torpedo LRMs on a Satellite or land-based Rail unit).

Tech Base/Rating: The Weapons and Equipment Tables note which items are available to which technology bases. Clan-made advanced units may use only items available to the Clans, while Inner Sphere-made advanced units must use only those items available to the Inner Sphere. Within these limits, items of any Tech Rating may be chosen, but designers of advanced Support Vehicles should remember that the unit's Final Tech Rating—and with it, its final cost—will be determined by its highest-rated component.

Space: As with their tournament-legal cousins, advanced Support Vehicles spend a variable number of item slots on each weapon or equipment item based on its statistics provided in the item's entry on the Weapon and Equipment Tables in *TechManual* (see pp. 341-345) and in this book (pp. 216-223).

Weapons: Small-sized advanced Support Vehicles may only mount Light- and Medium-weight weapons, which are listed in the Infantry Weapons and Equipment Tables found on pp. 349-352 in *TechManual*. For purposes of arming such 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, but may carry ammunition in multiples of their magazine size. Both of these weapon types may be mounted in fixed locations, or on pintle and turret mounts.

Under these rules, advanced Support Vehicles weighing 5 tons or more may not mount Light- or Medium-weight weapons, but they may instead mount Heavy weapons, which are represented in the Weapons and Equipment Tables starting on page 341 of *TechManual*, as well as any appropriate equipment permitted on such units in the Advanced Weapons and Equipment section in this book (starting on p. 216).

Remember that, depending on the number of weapons and types of fire-control systems used, advanced Support Vehicles may require additional crew (and any applicable accommodations) to handle such firepower (see *Add Control/Crew Systems*, p. 65). For these units, Light- and Medium-weight weapons require gunners based on the weapon's Crew value shown in the Infantry Weapons and Equipment Tables in *TechManual*. For Heavy weapons on advanced Support Vehicles, 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. (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.)

Ammunition: All ammo-dependent Heavy 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.)

Slots for the Light- and Medium-sized weapons on Small-sized advanced Support Vehicles are considered to be included with the slot costs for the weapons themselves. For ammo-based Heavy weapons and the ammunition bins on Medium- and Large-sized advanced Support Vehicles, all ammo is presumed to have a Body location, with each bin of ammo occupying 1 slot regardless of the ammo bin's weight. If the Support Vehicle is a multi-hex design, however (such as a Large-size Naval Vessel), ammo must be stored in the Body hexes corresponding to the location where the weapon is mounted—whether or not the weapon is mounted in a turret. This can require that a multi-hex unit with multiple identical weapons will have to spend more slots overall on ammunition to feed the various weapon mounts.

Ammo bins may be of mixed ammunition types, but only if the ammunition feeds the same weapon (so a single 3-ton ATM ammo bin can carry 1 ton each of ER, High Explosive and Standard ATM rounds, but occupies only 1 advanced Support Vehicle slot).

Heat Sinks: On advanced Support Vehicles, 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 when mounted on advanced Support Vehicles.

Power Amplifiers: An advanced Support Vehicle not powered by a Fission or Fusion engine 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), and take up no equipment 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: Of the advanced Support Vehicles presented here, Small- and Medium-sized Rail Support Vehicles may possess one turret at the designer's option, while Large Naval Vessels may possess one turret per hex of vessel length (to a maximum of 9 turrets per unit). The mass of such turrets 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-sized vehicles, or to the nearest half-ton for advanced Support Vehicles 5 tons and up. Turrets count as an extra section on the advanced Support Vehicle's Record Sheet, each requiring its own internal structure and armor.

Pintles—available under these rules to Small-sized Rail Support Vehicles—may mount only Light and Medium weaponry. The weight of a pintle mount is equal to 5 percent of the weight of all weapons and equipment mounted within it (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).

Satellite and Airship advanced Support Vehicles may not mount turrets or pintles.

Small Items on Medium and Large Advanced Units: Several items that may be installed on advanced units of 5 tons and up in total weight have item weight values 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 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.

If space is available for cargo on an advanced Support Vehicle, 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 an advanced Support OmniVehicle's base configuration just like heat sinks, armor and the like. In such cases, these "fixed" items must be mounted and placed among the unit's weapon slots before completing the base configuration, and they may not be altered in the unit's completed Primary or Alternate configurations.

For turret- or pintle-equipped advanced Support OmniVehicles, the tonnage of the turret or pintle(s) may not be changed across configurations. Developing an advanced Support OmniVehicle therefore requires the designer to consider from the start 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 unit. 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.

Capital Weapons: Advanced Support Vehicles may not carry capital weapons under these rules.

Crew Quarters: The installation of additional items and weapons on an advanced unit can affect the minimum crew required to man any advanced unit, as can the additional space for any passengers for long-distance transportation. The rules determining a unit's minimum crew needs are found under *Add Control/Crew Systems* (see p. 65). For Small-sized advanced Support Vehicle units, 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 automatically integrate seating (or quarters, in the case of Large Naval and Large Airship units) for the minimum required crewmen, but will still require appropriate compartments/bays (or even quarters) to be added for passengers such as infantry, or for any crew added beyond the minimum.

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.

Fire Control Systems: In addition to crew quarters, designers of armed advanced Support Vehicles may wish to allocate weight for fire-control systems to reduce the crew needs for all mounted weapons. The impact on crew requirements for installing such fire-control systems is also shown on the Advanced 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.

Transport Bays and Doors: Bays for cargo and unit transport often make up all remaining tonnage on advanced units of every stripe. 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. At the player's discretion, however, any cargo space not specifically allocated as refrigerated or liquid storage may be declared as "flatbed" cargo space, which can be used to transport cargo or units externally (see p. 261, *TW*).

On Small- and Medium-sized advanced Support Vehicles, bay doors are not a requirement for access and egress to such bays, unless the cargo is considered significantly large (1 ton or more—roughly the size of a battle armored trooper, large pack animal or small vehicle). Large-size Support Vehicles, however, require bay doors for every dedicated transport bay—including those filled with fighter, BattleMech or other unit cubicles.

Designers of Large-sized advanced Support Vehicles must assign a minimum of 1 bay door to any unit with a transport bay, to allow for entry and egress from the unit. To find the maximum total number of bay doors a unit can incorporate, consult the Advanced Support Vehicle Maximum Bay Doors Table below.

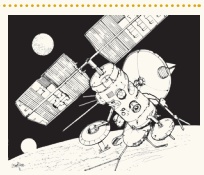
Vehicles using "flatbed" space do not require doors.

ADVANCED SUPPORT VEHICLE MAXIMUM BAY DOORS TABLE

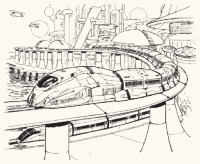
Unit Type (and Size)	Maximum Bay Doors
Any Support Vehicle (Small)	4
Any Support Vehicle (Medium)	4
Satellite Support Vehicle (Large)	6
Rail Support Vehicle (Large)	8
Airship Support Vehicle (Large)	8
Naval Support Vehicle (Large)	7 + [Unit Weight ÷ 50,000]*

*Round fractions up

A transporting unit's launch rate (per turn) for onboard fighters or other launch-capable units with appropriate cubicles (Small Craft, 'Mechs and ProtoMechs) is equal to twice the number of functioning bay doors associated with its launch-capable units. For example, a Naval Support Vehicle with 18 fighters in a single fighter transport 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 cargo train that has 12 BattleMechs across two bays, each of which has 2 doors, would be able to deploy 8 'Mechs per turn (2 doors per bay x 2 bays x 2 BattleMechs per door per turn = 8 BattleMechs per turn).



At 20 tons, Eric's Starcomm Satellite has 7 slots available for items and weapons. With just 9 unspent tons remaining, he decides to spend it all on communications equipment—all of which occupies only 1 slot. Because he specifically chose to make his unit an unmanned satellite, Eric knows that this equipment requires no crew, and thus will function as a kind of relay system. (This means enemy units can potentially make use of the same satellites, of course, but as the Starcomm's primary mission is not military in nature, Eric has no real problem with this.) The communications equipment requires no facing, and its 1 Support Vehicle slot is assigned to the unit's main body.



For the 600-ton main tractor of his Adelante Rail unit, Frank decides that the remaining 28 unspent tons would be best employed for cargo purposes, and so assigns a single,

standard 28-ton cargo bay to the unit's body at a cost of only 1 of the unit's 41 equipment slots. A weight-free (and slot-free) bay door is then added to the Right side for loading and unloading purposes.

For the 120-ton Omni railcars, Frank decides that the remaining 101.5 unspent tons (and all 17 equipment slots) will be sufficient "pod space" for any configuration desired, effectively completing it as a base configuration. As a sample Primary configuration, intended for VIP use, he decides to install 9 first-class passenger quarters for 90 tons (10 tons per quarters x 9 quarters = 90), and 1 second-class quarters for 7 tons, leaving the remaining 4.5 tons for a cargo bay for additional storage, and a weight-free Left-Side bay door. The cargo bay itself takes up 1 item slot, while its bay door is considered free. The single second-class passenger quarters will take up another slot (1 quarters ÷ 20 quarters per slot = 0.05, round up to 1), while the 9 first-class quarters will take up another 2 item slots (9 quarters ÷ 5 quarters per slot = 1.8, round up to 2). The quarters and the cargo bay are given no facing, and are thus assigned to the unit's Body location.

George wants his Cloud Nine Airship to excel as an airborne support unit, capable of transporting and servicing aircraft without having to land. With 699 unspent tons (and 45 item slots) remaining, he decides to invest heavily in support gear for this role. He installs 2 Arresting Hoists at 3 tons (and 1 slot) each, 4 mounted searchlights at 0.5 tons (and 1 slot) each, 1 fully functional Aerospace Fighter bay for 150 tons (and 1 slot), 7 tons of communications equipment (at 1 slot's cost), and a 20-ton (and 1 slot) mobile field base for added maintenance support. He even adds an extra 400 tons' worth of standard cargo space (at 1 slot in equipment space cost) to serve as an extra hangar without the amenities of a fighter bay. This so far costs the Cloud Nine 585 tons ([2 Arresting Hoists x 3 tons] + [4 Searchlights x 0.5 tons] + [1 Fighter Bay x 150 tons] + [7 tons of communications equipment] + [1 Mobile Field Base x 20 tons] + [400 tons of standard cargo] = 585 tons), and 10 item slots. A weight-free/slot-free bay door is assigned to the rear of the craft for launching and recovery purposes (George sees this as an underside door).

The Cloud Nine already has a crew of 5 plus 1 officer at this time, whose accommodations are provided free with the structural design. The mobile field base and the 7 tons of communications equipment, however, added 12 required crewmen to the design's minimum needs, which also ups its officer requirement to 3, as the Cloud Nine will now have a crew of 17 (5 + 12 = 17) and thus needs 3 officers (17 ÷ 6 crewmen per officer = 2.83 officers, round up to 3). Because these crew are required to meet the Cloud Nine's minimum needs, their accommodations are considered free to the unit's design. However, George notes that being a carrier Airship means the Cloud Nine will have some secondary support personnel for the craft it services as well, such as bay personnel for the fighters and so forth. He thus opts to allow for any extra personnel by installing 15 steerage-class passenger quarters to the Airship at 5 tons per quarters (for a total of 75 tons). These quarters will require 1 item slot (15 steerage quarters ÷ 50 quarters per slot = 0.3 slots, round up to 1). For the remaining 39 tons of unspent tonnage, George decides to devote all of it to a secondary cargo storage area, with 2 weight-free/slot-free bay doors (1 to the left and 1 to the right side). The cargo bay takes up one additional item slot.

Henry's Jormungand is a seagoing warship that he sees as primarily focused on shoreline fire support and escort for other large ocean-going vessels. With 9,501.5 unspent tons (and 635 item slots) available for weapons and other equipment, he decides to start with weaponry. For primary ship-to-shore firepower, he chooses 6 Long Tom artillery pieces (see p. 96), at 30 tons (and 30 slots) apiece. He plans to set 3 of these weapons each in two of the ship's five turrets, and chooses Turrets 2 and 6 respectively (representing the second and sixth hexes from the vessel's front, respectively). This means that each Long Tom turret will have a turret mechanism weight of 9 tons (90 tons for 3 Long Toms ÷ 10 = 9 tons). For additional long-range firepower, Henry places 2 LRM 20s (at 10 tons and 5 slots apiece) in a third turret (Turret 3, just behind the first Long Tom turret), which will have a turret mechanism weight of 2 tons (20 tons for 2 LRM-20s ÷ 10 = 2 tons), backed up by 2 LR Torpedo-20s (also at 10 tons and 5 slots each) in a fixed mount at the ship's Front. For close-in work, Henry rounds out this firepower with 4 PPCs (7 tons and 3 slots each) and 2 AC/10s (12 tons, 7 slots each) divided evenly among the two remaining turrets (which he places in hexes 1 and 7), and 6 SR Torpedo-6 launchers (3 tons, 2 slots each); 2 of each are placed in fixed mounts on the Fore-Left side (in hex 3, for range references), Fore-Right side (also in hex 3) and the Rear. The PPCs and autocannon will give both of the turrets in which they are mounted a mechanism weight of 3 tons ([14 tons for 2 PPCs + 12 tons for AC/10] ÷ 10 = 2.6, round up to 3).

For the ammo-based weapons, Henry provides 60 tons (60 x 5 shots per ton = 300 shots) for the Long Toms, 24 tons to the AC/10s (24 x 10 shots per ton = 240 shots), 40 tons to LRM-20s (40 x 6 shots per ton = 240 shots), 40 tons to the LRT-20s (40 x 6 shots per ton = 240 shots) and 24 tons to the SRT-6s (24 x 15 shots per ton = 360 shots). On a smaller, single-hex Support Vehicle, each of these ammo types would occupy only 1 slot in the vehicle's design, assigned automatically to the body location. But because the Jormungand is a multi-hex unit, Henry must spread the ammunition bins out among the various hexes where each weapon is mounted. Thus, he places two slots of Long Tom ammo (each slot carries 30 tons of ammunition) in the ship's second and sixth Body hexes (where the Long Tom turrets are located). Likewise, he assigns all LRM ammo to the second Body hex (where the LRM-20 turret is), and divides the AC/10 ammunition into two slots assigned to the first and seventh Body hexes

(providing 6 tons of ammo to each AC/10 turret). The 40 tons of LRT-20 ammunition occupy a single slot in the vessel's first Body hex. With four out of the Jormungand's six SR-Torpedo launchers located in the ship's third Body hex, Henry places two-thirds of the SRT-6 ammo (16 tons) in an ammo slot in that hex, while the remaining 8 tons of SRT ammo occupies a single slot in the ninth Body hex—the vessel's aftmost location. All told, the ammunition for the Jormungand will occupy 8 slots.

To protect against explosions, Henry also installs CASE, but since his vessel is a multi-hex unit, it must install CASE in every hex, at 0.5 tons (and 1 slot) per hex, for a total of 4.5 tons and 9 slots on the 9-hex-long vessel. Rounding out the firepower, Henry installs Advanced Fire Control as well. With a total weapon weight (discounting turrets, ammunition, and CASE) of 290 tons (180 [6 Long Toms] + 20 [2 LRM-20s] + 20 [2 LRT-20s] + 28 [4 PPCs] + 24 [2 AC/10s] +18 tons [6 SRT-6s] = 290 tons), the Advanced Fire Control will take up another 29 tons of the Jormungand's weight (290 ÷ 10 = 29 tons), but occupies no equipment slots. With weapons, turret mechanisms, ammo, CASE and fire control, the vessel has now spent 537.5 tons (290 [weapons] + 26 [turrets] + 188 [ammo] + 4.5 [CASE] + 29 [Fire Control] = 537.5), and 165 slots (148 [weapons] + 0 [turrets] + 8 [ammo] + 9 [CASE] + 0 [Fire Control] = 165).

Moving on, Henry decides to give his cruiser some air support capacity with a 500-ton (and 5-slot) helipad (which he places in hex 5) and two Light Vehicle Bays at 50 tons (and 1 slot)—each with its own 0-ton/0-slot bay door (facing the fore-left and fore-right arcs, respectively). He also adds 12 tons of communications equipment (which claim 1 slot), a MASH unit with 7 added operating theaters for 10.5 tons (3.5 tons [base] + [7 added theaters x 1 ton each] = 10.5 tons) and 1 slot, and 2 field kitchens at 3 tons (and 1 slot) apiece. He then adds 4 mounted searchlights at 0.5 tons and 1 slot each (1 each mounted to the Fore, Fore-Left, Fore-Right and Rear sides), and 30 lifeboats at 1 ton (and 0 slots) each. This added equipment combines for an additional 660.5 tons and 15 slots spent.

Satisfied with the equipment, Henry reviews his Jormungand's crew needs. At 60,000 tons, the vessel has a base minimum crew of 15 (3 + [60,000 tons ÷ 5,000] = 15), and thus a minimum officer requirement of 3 (15 crew ÷ 6 = 2.5 officers, round up to 3 officers)—which Henry accounted for earlier. In addition, much of its non-weapon equipment adds 63 to the crew minimums (5 [helipad] + 12 [12-ton communications equipment] + 40 [MASH with 8 operating theaters] + 6 [2 field kitchens] = 63), while the vessel's 290 tons of weaponry adds a minimum requirement of 73 gunners (290 weapon tons ÷ 4 = 72.5, round up to 73). Added to the 15 base crew needs, the Jormungand requires a total minimum of 151 crew (15 [base] + 63 [non-gunners] + 73 [gunners] = 151), and a corresponding minimum of 26 officers (151 crew ÷ 6 =25.17, round up to 26 officers). Henry decides to exceed these minimums, however, to provide extra coverage in the event of casualties and the like. As such he decides to add quarters for a further 229 extra crew, allowing the Jormungand to carry triple its minimum complement of non-gunners and double its complement of gunners. In addition, Henry decides he wants to have at least four conventional platoons' worth of marines on his vessel (84 troopers in all). The minimum crew's quarters are provided free with the vessel's chassis, and so Henry doesn't need to assign weight or slots to them, but extra crew, officers and marines all will require quarters. Feeling generous, Henry decides to also provide quarters for the 10 bay personnel that come with the two Light Vehicle Bays he has installed. Using standard 7-ton crew quarters for the 323 extra crew, bay personnel and marines (229 extra crew + 10 bay personnel + 84 marines = 323), he spends a total of 2,261 tons here, at a slot cost of 17 (323 extra crew quarters ÷ 20 quarters per slot = 16.15, round up to 17). The extra officers, whose quarters weigh 10 tons each, add another 380 tons (and 8 slots; 38 officers quarters ÷ 5 = 7.6, round up to 8) to this tally—for a total of 2,641 tons and 25 slots in quarters.

Having now spent a total of 3,839 tons (537.5 [weapons] + 660.5 [non-weapons] + 2,641 [quarters] = 3,839) and 202 slots (162 [weapons] + 15 [non-weapons] + 25 [quarters] = 202), Henry finds he still has 5,662.5 tons (9,501.5 – 3,839 = 5,662.5 tons) and 433 slots (635 – 202 = 433) left to spend. He decides to assign 4,000 tons (and 1 slot) to a standard cargo bay (assigned to the hull, with a bay door assigned to the Rear-Right arc), and the remaining 1,662.5 tons (and 1 slot) to a special refrigerated cargo bay (also assigned to the hull, but with its bay door facing the Rear-Left arc). For the sake of completeness, Henry computes the capacity of this refrigerated bay to be 1,445.5 tons (1,662.5 tons actual size ÷ 1.15 = 1,445.5).

STEP 6: COMPLETE THE RECORD SHEET

By the time the designer has chosen all structure, engine and controls for the advanced 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 competed Record Sheet, the designer must make sure to have selected the appropriate sheet for the unit's type. The sheet must have all data filled in for the Vehicle 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 advanced unit is ready for game play.

SUPPORT OMNIVEHICLES

When completing the Record Sheet for an advanced 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.

DESIGNING MOBILE STRUCTURES

The following basic rules cover the construction of Mobile Structures, particularly large units capable of travel over land, sea and air, but whose designs are often unique and more akin to buildings than their vehicular analogs. Despite their range of types, these advanced units follow five simple steps in design, each of which is described in detail later. In brief, these steps are as follows.

Step 1: Establish Function—Determine the Mobile Structure's class, technology base, structure type, size, Construction Factor (CF).

Step 2: Install Power, Motive and Control Systems—Determine the Mobile Structure's speed, power and motive systems, and determine crew needs.

Step 3: Install Armor—Determine type, amount and weight of armor (if any), and add armor points.

Step 4: Install Weapons, Heat Sinks and Equipment—Add weapons, any required heat sinks and other equipment to the advanced unit.

Step 5: Complete the Record Sheet.

The above steps are a framework for designing a Mobile Structure. The actual process—particularly after the function and motive systems are determined—can involve a bit more flexibility as equipment and armor are balanced for their best fit in terms of tonnage and weapon slots. For example, 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 equipment first, leaving any remaining tonnage to armor.

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 weight on a piece of scratch paper.

Terminology: Mobile Structures are unique among other battlefield units in that they are not constructed so much by a weight standard, though their design uses weight as a regulating factor. Rather than using weight classes, Mobile Structures identify their "class" by their Construction Factor (CF), which may be Light, Medium, Heavy or Hardened. Mobile Structures also come in three main structure types: Hangar, Building and Fortress. The combination of a Mobile Structure's class and type heavily influence its upper size limits (both in hexes and level of height), and its internal weight capacity. Because Mobile Structures are always multi-hex units, the size (in hexes) of a Mobile Structure influences where items may be mounted. Meanwhile, weight (tonnage) becomes a factor when discussing a Mobile Structure's internal weight capacity (the amount of tonnage a given hex may support within its framework), dictating how much equipment may be mounted inside.

STEP 1: ESTABLISH FUNCTION

The first step in creating a Mobile Structure is choosing the unit's primary function and mode of travel. This step determines some of the most basic aspects of its design, including what type of unit it is, its technology base and its structural strength. These choices will restrict the designer's access to certain equipment and can also influence the unit's capabilities in game play.

CHOOSE MOBILE STRUCTURE TYPE

Mobile Structures come in three main structure types that can affect their motive systems, size, maximum Construction Factor and engine options. Because of this, choosing the unit's type is the first key part of the structure's design process.

The Mobile Structure Types Table below provides key data that applies to Mobile Structure design and game play. Each of the structural types covered by these rules is listed in the Mobile Structure Type column, along with its Class (Light, Medium, Heavy or Hardened), Maximum Size (in hexes and levels of height), Construction Factor range (based on class), Motive System types and special notes regarding the nature of its construction (such as whether or not the structure may be armed with heavy weapons, or mount additional armor).

The Mobile Structure types are broadly described by their standard structural equivalents (Building, Hangar and Fortress), which are described more fully below.

Buildings: Building-type structures represent everyday structures such as barracks and on-site housing, administrative centers, infirmaries and such. These structures fall into the Light, Medium and Heavy CF categories.

Buildings may not be armored, nor may they mount heavy weapons (weapons individually weighing more than 0.25 tons). However, these structures may house non-weapon equipment useful for their function—such as crew quarters for barracks and housing, communications equipment for administrative centers, MASH and paramedic gear for infirmaries, and so forth.

Building-type Mobile Structures may be built as ground-based units, flying units or seafaring units (floating and submersible).

Hangars: Hangar-type structures are specialized constructs built with large empty spaces. Typically intended to house vehicles, 'Mechs, fighters and other bulk cargo, these structures come in Light, Medium, Heavy or Hardened CFs and may not be armored. As a consequence of their open internal construction, however, Hangars support only half the CF value of their equivalent Building type. Hangars must stand at least as tall as the units they house (2 levels for 'Mech units, 1 for most others), and should have a Large Door on at least one facing (considered free for purposes of equipment tonnage).

Like Buildings, Hangars may not mount armor or heavy weapons. Their open design enables them to mount more equipment than comparable Buildings and in a similar fashion, but the weight of any such gear mounted in a Hangar tops out at 300 tons per hex for every 4 levels of structure height (or fraction thereof), even if the structure's CF would otherwise support more.

MOBILE STRUCTURE TYPES TABLE

Mobile Structure Type (Class)	Max Size (Hexes/Levels)*	Construction Factor (CF)	Motive Systems	Notes
Buildings	—	—	Ground, Air, Naval	May not be armed or armored
Light	6/5	1-15		
Medium	8/8	16-40		
Heavy	10/10	41-90		
Hangars	—	—	Ground, Air, Naval	May not be armed or armored;
Light	10/7	1-8		Max 300 tons of equipment per hex (per 4 levels)**
Medium	14/10	9-20		
Heavy	18/13	21-45		
Hardened	20/14	46-75		
Fortress	—	—	Ground, Naval	May be armed/armored at extra cost
Medium	12/15	16-40		
Heavy	15/20	41-90		
Hardened	20/30	91-150		

*Naval units stand only half their height (rounded down) when operating on the surface while the remaining levels extend below the surface of the water (submersibles are never fully submerged unless they descend low enough to place their uppermost levels below the surface); Ground units receive an additional 2 levels of height from their motive systems for line of sight purposes, but do not count this height toward the Maximum height in levels and do not add these levels into any calculations based on height.

**Round up

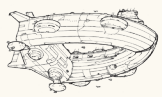
Hangar-type Mobile Structures may be built as ground-based units, flying units or seafaring units (floating and submersible).

Large Portal: A Large Portal is a Mobile Structure designed as part of a Castles Brian complex (see p. 139, *TO: AR*); i.e. they allow the ingress/egress of other Mobile Structures from said complexes (see p. 36). A Large Portal is constructed using the rules for Hangars, with the following additions: Portals must use Open-Space Construction rules (see p. 136, *TO: AR*); the Portal is always placed flat against a hill/mountain of equal or higher height; an underground, open space construction Castles Brian connects to the backside of the Portal, representing the interior tunnel; for every five hexes of 'tunnel' the middle hex is equipped with the identical equipment as Hex 3 of the Portal and the hex directly behind it is identical to Hex 2 of the portal.

Fortresses: Fortress-type structures are available in Medium, Heavy or Hardened CFs. Unlike Hangars and Buildings, they may be armored or even mount heavy weapons. The mass of armor and weapons a Fortress may mount per hex varies with the structure's CF, but is considered additional to any non-combat gear, which may be placed within such structures as noted above under *Buildings*. An armored Fortress must distribute its armor to each hex of the structure.

Fortress-type Mobile Structures may be built as ground-based or water-based units (floating and submersible), but may not be constructed as flying craft.

Nicholai is interested in building a super-sized trans-oceanic vessel capable of hauling massive amounts of bulk cargo to far-flung coastal cities on Fomalhaut. As he doesn't plan this to be a military vessel and intends for it to serve as a cavernous cargo hauler, he decides to construct it with the light and open framework of a Hangar, and so uses a Hangar-type Mobile Structure design.



Paul is interested in building a skybase—an unusual floating city and headquarters platform. Though this skybase may have military applications, Paul notes that he cannot make it as a Fortress-type Mobile Structure (because Fortress-type structures cannot have an Air motive system), and so it cannot be armored or armed with heavy weapons. To maximize his structure's resiliency, he opts for a Building-type Mobile Structure, which offers greater CF capacity.

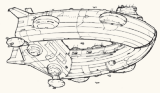
Raymond wants to build a DropShip-mover platform, used to move grounded spheroid DropShips around in crowded spaceports. Even though he does not truly expect such ship movers to come under fire, he nevertheless selects a Fortress-type Mobile Structure for the job, anticipating a need for the maximum possible CF to support his structure's expected cargo capacity.

CHOOSE TECHNOLOGY BASE

Mobile Structures may be constructed using Clan or Inner Sphere technology bases. Mobile Structures may not be constructed as Omnis. However, they may be constructed as special "Modular Structures" that can link up with other Mobile Structures of similar motive type and movement rates.

Nicholai establishes an Inner Sphere tech base for his super cargo vessel. Because he plans to maximize its cargo capacity, he conceives of the vessel as a series of structure modules.

Paul decides that his skybase will have an Inner Sphere tech base.



Raymond chooses an Inner Sphere tech base for his DropShip-mover.

CHOOSE CLASS, SIZE, AND SHAPE

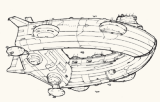
Depending on the Mobile Structure's class, its maximum (and minimum) size and Construction Factor values can vary greatly (as shown on the Mobile Structure Types Table). In this respect, a Mobile Structure's class is equivalent to a combat unit's weight class, and Mobile Structures may be identified—as their structure type permits—as Light, Medium, Heavy or Hardened.

Once a class is decided upon, the designer may set the size and shape of the Mobile Structure (in 30-meter hexes, by 6-meter levels). This shape is recorded by using the layered hexagonal map on the right-hand side of the Mobile Structure's Record Sheet and blacking out all extraneous hexes. For simplicity's sake, a Mobile Structure's shape must be a continuous grouping of hexes no greater than the hexside of the structure class (as defined by the number left of the slash in the Max Size column). These hexes need not be all of the same height, but the highest level chosen for all hexes may not exceed that of the number right of the slash in the Max Size column for the unit's class, and is used as the general height for the Mobile Structure itself for purposes of costs and structural weight capacity.

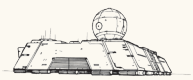
Minimum Size: Mobile Structures are multi-hex units by definition. Thus, the minimum size for any Mobile Structure is 2 hexes.

Nicholai chooses a Hardened class for his super-freighter, to achieve the maximum size for each structure module. He decides to use all 20 hexes worth of Hangar size for his vessel, which he arranges in a chevron-shaped area 4 hexes long and 5 hexes wide. He also decides the Mobile Structure will stand at its maximum height of 14 levels. (As a surface-going naval-type Mobile Structure, this means that the freighter will float with 7 levels above the water surface, and 7 below.)

Paul decides on a Heavy class Building for his skybase. This gives him a maximum Mobile Structure size of 10 hexes in area by 10 levels in height. He takes the maximum hex size and arranges the structure in a wedge shape, 1 hex wide at the tip and 4 hexes wide at the base, with a height of 5 levels.



Raymond decides to make his DropShip-mover a Hardened class, but does not opt for the maximum Fortress-class structure size of 20 hexes by 30 levels. Instead, he sees his unit as a 19-hex structure, arranged on his Record Sheet in a hexagonal "circle" 3 hexes on a side (and 5 hexes at the widest points), with a height of 4 levels. Because it will be ground mobile, this will make the structure's actual height 6 levels tall, but the lower 2 levels will not count for any height-based computations.



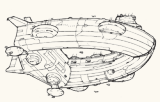
CONSTRUCTION FACTOR AND INTERNAL WEIGHT CAPACITY

The class of the Mobile Structure also helps select its Construction Factor (CF), which determines its damage capacity per hex (regardless of height), as well as its internal weight capacity. The CF is recorded on the Record Sheet in the CF block.

For each hex of Mobile Structure area covered, Building- and Fortress-type structures may internally carry a total tonnage of equipment (including weapons, heat sinks and armor) equal to their Construction Factor times the number of levels of structure height. Because of their open frames, Hangar-type structures may triple this capacity, but that same open frame means they can only support a maximum of 300 tons of equipment per hex for every 4 levels of structural height (or fraction thereof), even if their structural tonnage capacity would support more.

As a Hardened-class Hangar-type structure has a maximum possible CF of 75, Nicholai decides to give his Hangar-type Mobile Structure a CF of 75. This means that each hex of the structure will be able to support 1,200 tons of weight (300 tons x [14 levels high ÷ 4 = 3.5, round up to 4] = 300 x 4 = 1,200 tons).

After assigning a CF of 90—the maximum possible CF under the Heavy-class Building type—to his structure, Paul finds that each hex will support 450 tons of equipment (5 levels x 90 CF = 450 tons).



Raymond decides to give his DropShip-mover (a Hardened-class structure with a maximum CF of 150) its maximum CF, to better bear the strain of its intended load. He finds that such a Mobile Structure would be able to support 600 tons of equipment weight per hex (4 levels [not counting the bonus 2 for being ground-mobile] x 150 CF = 600 tons).

STEP 2: INSTALL POWER, MOTIVE, AND CONTROL SYSTEMS

The second step in Mobile Structure design is the installation of the unit's power and motive systems. This step establishes key factors in the unit's mobility, including the size and performance of its engine and its crew needs for operations.

INSTALL POWER SYSTEM

Thanks to their sheer size, the power systems for a Mobile Structure are more generalized and distributed than on other unit types. The power system runs the unit's drive systems as well as any other onboard components, such as weapons and heavy equipment.

The power systems available to Mobile Structures can vary somewhat, with a range of possible "engines" similar to those found on Support Vehicles (Steam, Internal Combustion, Fuel Cell, Fission and Fusion are all available to Mobile Structures). The weight of these power systems is based on the size of the Mobile Structure, its technology base and motive type, and the desired maximum speed (in Movement Points).

Mobile Structures do not have a Cruising and Flanking rating; just a maximum MP. Mobile Structure Movement Points may be purchased in quarter-points, rather than whole MPs, and depending on the motive type used, all such units receive a set maximum. (See the game play rules for Mobile Structures, p. 33, for information on how these units spend their Movement Points.)

To find the total weight of a Mobile Structure's power system, multiply together the structure's size (in hexes), its height (in levels), its desired movement rate (in MPs) and its Power System Weight Multiplier (shown in the Mobile Structure Power and Motive Systems Table below). Round all weights up to the nearest full ton.

MOBILE STRUCTURE POWER AND MOTIVE SYSTEMS TABLES

MOBILE STRUCTURE POWER SYSTEM, MOTIVE SYSTEM, AND FUEL WEIGHT FORMULAE
Power System Weight = Structure Size (Hexes x Levels) x MP x Power System Weight Multiplier
Motive System Weight = Structure Size (Hexes x Levels) x Motive Type Multiplier x Structure Type Multiplier*
Fuel Weight = Desired Range (in hundreds of kilometers) x Fuel Multiplier x Power System Weight

*Structure Type Multiplier = 0.3 for Hangars, 0.5 for Buildings, and 1.0 for Fortresses

MOBILE STRUCTURE POWER SYSTEM WEIGHT MULTIPLIERS

Mobile Structure Power System Type	Power System Weight Multiplier (by Tech Base and Motive Type)						Fuel Multiplier: (% of Power System Wt. Per 100 km)
	Inner Sphere			Clan			
	Ground	Air	Naval*	Ground	Air	Naval*	
Steam	6.0	6.0	6.0 / 7.0	7.0	7.0	7.0 / 8.0	4.0
Internal Combustion (ICE)	3.0	3.0	3.0 / 3.2	3.0	3.0	3.0 / 3.0	2.0
Fuel Cell	4.0	4.4	4.0 / 5.0	4.0	4.2	4.0 / 4.4	2.0
Fission	3.0	3.0	3.0 / 3.0	4.0	4.0	4.0 / 4.0	NA
Fusion	2.0	2.0	2.0 / 2.2	1.8	1.8	1.8 / 2.0	NA

*Left of Slash = Surface-only movement; Right of slash = Submersible

MOBILE STRUCTURE MOTIVE SYSTEM WEIGHT MULTIPLIERS

Mobile Structure Motive Type	Max MP (Type)*	Motive Type Multiplier (by Tech Base)	
		Inner Sphere	Clan
Ground	2 (Tracked)**	4.0	3.5
Air	4 (VTOL)	5.0	4.0
Water (Surface-only)	3 (Naval)	2.0	1.8
Water (Submersible)	4 (Naval, Submarine)	3.5	3.5

*MPs for Mobile Structures may be purchased in quarter-points; Mobile Structures have no Flank MP rating, nor may they Jump

**Ground-based Mobile Structures increase the Structure's Height by 2 for LOS purposes, but do not affect height-based construction calculations or tonnage capacity; no equipment may be mounted on the lowest 2 Levels

INSTALL MOTIVE SYSTEM

In addition to their power systems, Mobile Structures also must devote tonnage toward the motive systems that enable the unit to move.

As with power systems, Mobile Structures have multiple options in motive system design. Ground-based Mobile Structures use tracks and/or wheels to negotiate terrain. Airborne Mobile Structures use a combination of rotors and lighter-than-air cells that provide sustainable lift (if not high-speed flight). Naval Mobile Structures allow for seafaring units, which can be made as either super-sized surface vessels or—if properly sealed—submersibles.

The amount of tonnage these motive systems require from the Mobile Structure's overall internal weight capacity depends on the unit's size, its exact motive type (ground-based, airborne, surface naval or submersible), its technology base (Clan or Inner Sphere), and its basic structure type (hangar, building, or fortress). To find the total weight of a Mobile Structure's power system, multiply together the structure's size (in hexes), its height (in levels), its Motive Type Multiplier (shown in the Mobile Structure Power and Motive Systems Table below), and its Structure Type Modifier. Round all weights up to the nearest full ton.

Distributed System Weights: Once the total weight of the power and motive systems is known, the tonnage used is dispersed among the Mobile Structure's hexes, effectively limiting the weight capacity of each hex as power conduits and drive systems are spread evenly throughout the design. To find this per-hex weight, divide the total power and motive system weights by the number of hexes the unit occupies, and round up to the nearest half-ton.

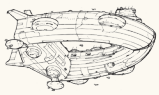
Modular Structures: Mobile Structures built as Modular Structures still require power and motive systems, which must be of the same MP and type as the other Modular Structures with which they are intended to unite.

Tech Base: Under these rules, Clan-made power and motive systems may not be employed on Inner Sphere-made Mobile Structures. Likewise, Clan-made Mobile Structures may not employ power or motive systems with an Inner Sphere technology base.

Nicholai's super-sized Mobile Structure occupies 20 hexes and has a height of 14 levels. He intends it to operate as a surface naval vessel, and chooses an internal combustion engine for its power system, with a desired top speed of 1.25 MP. Based on these choices, he finds that the power systems for this Mobile Structure will weigh 1,050 tons (20 hexes x 14 levels x 1.25 MP x 3.0 Inner Sphere surface naval power system = 1,050). The motive systems, meanwhile, will weigh an additional 168 tons (20 hexes x 14 levels x 2.0 Inner Sphere surface naval motive system x 0.3 for a Hangar-type structure = 168).

Distributing these systems, Nicholai finds that each hex of his Mobile Structure will house 52.5 tons of power systems (1,050 tons ÷ 20 hexes = 52.5 tons per hex) and 8.5 tons of motive system equipment (168 tons ÷ 20 hexes = 8.4 tons per hex, round up to 8.5). Subtracted from the 1,200-ton weight capacity per hex, these systems will leave the unit with 1,139 tons of internal capacity per hex (1,200 tons per hex – [52.5 power system tons + 8.5 motive system tons] = 1,139 tons).

With its 10-hex size, 5 levels of height and CF of 90, Paul has given his airbase an airborne (VTOL) motive system with 4 MP of movement, and chooses a Fusion power system to keep it aloft. He computes the power system will run 400 tons in total (10 hexes x 5 levels x 4 MPs x 2.0 Inner Sphere airborne power system multiplier = 400 tons). The motive system will weigh an additional 125 tons (10 hexes x 5 levels x 5.0 Inner Sphere motive system multiplier x 0.5 for Building-type structure = 125 tons).



Dividing both figures by the airbase's 10-hex size, he finds that each hex will devote 40 tons to power systems and 12.5 to motive systems. Subtracted from the 450-ton weight capacity per hex, these systems will leave the unit with 397.5 tons of internal capacity per hex (450 tons per hex – [40 power system tons + 12.5 motive system tons] = 397.5 tons).

Raymond decides to give his ground-based DropShip-mover (a 19-hex, 4-level high Mobile Structure) a Fusion power system and a maximum MP of 2. He finds that the power system for this unit will weigh 304 tons (19 hexes x 4 levels x 2 MP x 2.0 Inner Sphere Fusion power system multiplier = 304 tons), and the motive system will also weigh 304 tons (19 hexes x 4 levels x 4.0 Inner Sphere Ground motive system multiplier = 304 tons).

Dividing these values by 19 hexes, he finds that the power and motive systems will each take up 16 tons per hex (304 tons ÷ 19 hexes = 16 tons per hex). Subtracted from the 600-ton weight capacity per hex, these systems will leave the unit with 568 tons of internal capacity per hex (600 tons per hex – [16 power system tons + 16 motive system tons] = 568 tons).

DETERMINE FUEL CAPACITY

Mobile Structures have significant fuel requirements, and burn fuel in a similar fashion to Support Vehicles. Like many Support Vehicles, this fuel capacity is expressed as an operating range for the unit, which is computed based on the engine type and the desired operating range (in hundreds of kilometers). Though some Mobile Structure engines may lack fuel requirements (notably Fission- and Fusion-powered types), all others that require fuel must allocate some weight—in addition to their power and motive systems—to internal fuel supplies.

To find the fuel weight for a Mobile Structure, multiply the desired range (in hundreds of kilometers) by the listed percentage of the unit's power system weight shown in the Mobile Structure Power System Multipliers Table. (An entry of NA means that Mobile Structures using those power systems need not purchase fuel reserves.) This figure is rounded up to the nearest ton. For example, a Mobile Structure unit with a 520-ton fuel cell power system and a desired operating range of 1,000 kilometers would add 104 tons of fuel to its design

(520 tons [power system weight] x 0.02 [2.0 percent per 100 km for fuel cells] x 10 [hundreds of kilometers desired; 1,000 ÷ 100 = 10] = 104 tons).

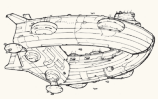
Distributing Fuel Tanks: Unlike power and motive systems, which must be distributed evenly throughout a Mobile Structure's design, fuel storage may be distributed as desired. Mobile Structure units may place as much as 100 percent of their fuel storage (if possible) in a single hex of the unit's design, or divide the supply (as evenly as possible) among multiple structure hexes. The locations of any fuel storage (and quantities thereof in weight) must be noted on the unit's record sheet.

Modular Structures: Mobile Structures built as Modular Structures retain their separate power and motive systems, and thus also retain separated fuel supply systems. The fuel supply of a single module may not be shared with other modules in the linked unit, and so all Mobile Structure modules must invest weight in their own fuel supplies. The operating range of a linked Mobile Structure will be that of its shortest-ranged module.

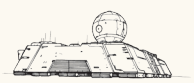
Tech Base: Fuel tanks and fuels are standardized, and equally available to Mobile Structures of Clan or Inner Sphere technology bases.

For its 1,050-ton Internal Combustion power system, Nicholai decides to give his Mobile Structure an operating range of 7,000 kilometers. He finds that this will cost the unit a total of 1,470 tons (1,050 tons [power system weight] x 0.02 [2.0 percent per 100 km for internal combustion] x 70 [hundreds of kilometers desired; 7,000 ÷ 100 = 70] = 1,470). Because this figure exceeds the 1,139-ton internal capacity of a single hex worth of this Mobile Structure, Nicholai decides to divide his fuel tanks up among two of his vessel's centrally-located hexes, with 735 tons applied to each. Those hexes will therefore have an internal weight capacity of 404 tons (1,139 – 735 = 404).

For its 400-ton Fusion power system, Paul finds that no fuel supply is required. His airbase has an effectively unlimited range.



Raymond's DropShip-mover also uses a Fusion power system, and so also requires no fuel storage.



ADD CREW

The control systems that regulate mobility and power on a Mobile Structure are integral to the power and motive systems already established above. However, as these systems still require a crew to operate them, Mobile Structures must allocate additional mass to crew accommodations as needed.

Crew: All Mobile Structures require a certain amount of crew to operate them. To determine the basic crew needs for a Mobile Structure, consult the Mobile Structure Minimum Crew Table below, taking into account the Mobile Structure's size (in hexes) and motive type. A Mobile Structure'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

MOBILE STRUCTURE MINIMUM CREW TABLES

Minimum Crew Formula:
Minimum Crew Needs = (Base Crew Minimum x Structure Size [in hexes]) + Minimum Gunners + Minimum Officers

	Base Crew Minimum (per Hex, by Motive Type)			
Mobile Structure Class	Ground-Based	Airborne	Naval (Surface)	Naval (Submersible)
Hangar	2	3	2	3
Building	3	4	3	4
Fortress	4	NA	5	6

*Round fractions down; apply rounding before applying the Base Crew Minimum to the Minimum Crew Formula

ADDITIONAL CREW

Non-Gunners	Minimum Crew Requirement
Communications Equipment (per ton, see p. 212, *TM*)	1
Field Kitchen (per item, see p. 217, *TM*)	3
Flight Deck (per item, see p. 124)	20
Landing Deck (per hex, see p. 131)	3
Helipad (per item, see p. 124)	5
MASH (per theater, see p. 228, *TM*)	5
Mobile Field Base (per item, see p. 142)	5
Modular Structure Linkage (per item, see p. 81)	4

Gunners	Minimum Gunners*
Per Light Weapon (see p. 82)	1
Per Medium Weapon (see p. 82)	1
Per Heavy Weapon (see p. 82)	Weapon Tons ÷ 5 (round up)
Per Capital Weapon (see p. 83)	7

*Advanced fire control systems are automatically provided for armed Mobile Structures at no cost; gunners are required only for items that require a Gunnery Skill roll to use in combat.

Officers	Minimum Officer Requirement*
9 Non-Officer Crewmen or less	1
10 or more Non-Officer Crewmen	Total Non-Officer Crew ÷ 10 (round up)

Crew Space: Mobile Structures may distribute their crew quarters evenly among the unit's hexes, or concentrate them to a smaller number of hexes.

incorporate a limited amount of bunk space for such personnel). Additional crew needs for the specific items listed do not have to be met unless and until the items are mounted (typically after Step 4), and any officer requirements must be computed after all crew is assigned.

Gunners are necessary only for items that require a Gunnery Skill roll to use in combat, and that have a range of more than 1 hex. (Automatic defensive armaments like Anti-Missile Systems, A-Pods and such require no gunners, nor do non-weapon items listed on the Weapons and Equipment Tables, such as Active Probes and ECM gear.)

Crew Accommodations: Mobile Structures, often designed to spend days or weeks in the field, provide quarters—rather than mere crewman seating—as part of their design. These crew quarters are very basic, however, and make no allowances for luxuries or passengers beyond the minimum crew needs. Such additional facilities may be added later on.

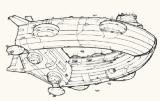
Fire Control Systems: Mobile Structures that are armed automatically incorporate advanced fire control systems into their designs. The massive support of the structure itself makes the weight and cost of any fire control systems negligible.

Tech Base: The control systems and crew accommodations covered by these rules are equally available to Mobile Structures built using a Clan or Inner Sphere technology base.

Crew Space: Mobile Structures may distribute their crew quarters evenly among the unit's hexes, or concentrate them to a smaller number of hexes.

For his 20-hex Hangar-class Mobile Structure (which uses a surface naval motive system), Nicholai finds that he has a minimum crew requirement of 44 ([2 Base Crew Minimum for Surface Naval Hangar x 20 hexes = 40] + 0 gunners [at the moment] + 4 officers [40 crew ÷ 10 = 4 officers] = 44).

For his 10-hex Building-class airborne Mobile Structure, Paul finds that the minimum crew needs are also 44 ([4 Base Crew Minimum for Airborne Building x 10 hexes = 40] + 0 gunners [at the moment] + 4 officers [40 crew ÷ 10 = 4 officers] = 44).



Raymond's DropShip-mover is a 19-hex Fortress-class Mobile Structure with a ground-based motive system, and so currently has a minimum crew need of 84 ([4 Base Crew Minimum for Ground-based Fortress x 19 hexes = 76] + 0 gunners [at present] + 8 officers [76 crew ÷ 10 = 7.6 officers, round up to 8] = 84).

SPECIAL ENHANCEMENTS (ENVIRONMENTAL SEALING, MODULAR STRUCTURE LINKAGE)

Two basic enhancements are available to Mobile Structures of all types and classes: environmental sealing and the linkage systems for modular structure. A Mobile Structure may install either (or both) systems as desired.

MOBILE STRUCTURE SPECIAL ENHANCEMENTS TABLE

Enhancement	Weight (per Hex)*	Required Location
Environmental Sealing	(CF x 0.1) x Height (in levels)	Each Hex
Mobile Structure Linkage	CF x 0.5	Single Hex (Outer)

*Round up to the nearest full ton

Environmental Sealing: The environmental sealing modification reinforces the outer framework of a Mobile Structure and provides secondary hatches throughout to seal off breaches against hazardous environments (including vacuum, toxic atmospheres and water). It is incorporated automatically with the submersible motive system and so need not be added to such units, but may be added to non-submersible Mobile Structures at this stage.

Environmental Sealing systems occupy tonnage equal to one-tenth of the structure's CF times its number of levels in height (rounded up to the nearest full ton), per hex of structure. All hexes of a Mobile Structure must receive this modification.

Modular Structure Linkage: Mobile Structures designed to link up with other Mobile Structures of identical motive types and speeds must incorporate additional equipment to serve as the linkage between themselves and other modular Mobile Structures. A linkage system is required on both sides, so the linkage for one Mobile Structure must mate with the linkage of its companion units. (Once linked in this fashion, the Mobile Structure is treated as a single unit with the same motive type and MP rating, but if the motive system for one of the linked structures is crippled somehow, the entire united structure becomes crippled until it can break the links.)

Modular Structure Linkage occupies tonnage equivalent to half the Mobile Structure's CF (rounded up to the nearest full ton), and must be placed in the desired "linkage" hexes (which may only be chosen from among the structure's outermost hexes). A Modular Structure may incorporate multiple Modular Structure linkage systems to build bigger unified structures. Each system also adds 4 non-officer crewmen to the unit's base crew minimum.

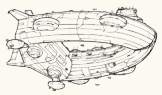
If a Mobile Structure's linkage hex is destroyed in game play, any connection between Modular Structures through that link is broken. Adjacent hexes may thus incorporate linkage systems in order to provide some redundancy in the event of disaster.

Tech Base: Environmental Sealing and Modular Structure Linkage systems are equally available to Mobile Structures built using a Clan or Inner Sphere technology base.

Nicholai sees his superfreighter as a Modular Mobile Structure, and decides to place two linkage systems on the unit, one in the hex he designates as the unit's foremost hex and the other at the opposite end. For his 75 CF structure, these systems will each weigh 38 tons (75 CF x

0.5 = 37.5, round up to 38), and take up that tonnage in the designated hexes. As these hexes are not those reduced by the fuel tank storage, he finds that the remaining internal tonnage capacity of the affected hexes will be 1,101 tons (1,139 tons – 38 tons = 1,101 tons). Nicholai also notes that, per the rules regarding crew, these linkage systems will add 8 more crewmen to his minimum needs, which raises the officer needs to 5 ([40 base non-officer crewmen + 8 linkage crewmen] = 48; 48 ÷ 10 = 4.8 officers, round up to 5).

Paul decides not to incorporate special enhancements into his airbase.



Raymond decides to build his DropShip-mover with Environmental Sealing. With its CF of 150 and its height of 4 levels, he computes that the weight of this equipment will subtract 60 tons from each hex of the Mobile Structure ([150 CF x 0.1] x 4 levels = 60 tons). This will reduce the per-hex internal weight capacity of the mover to 508 tons (568 – 60 = 508 tons).

STEP 3: INSTALL ARMOR

Fortress-type Mobile Structures may add armor to better reinforce them and protect them against heavy weapon fire and other major structural damage. This armor effectively adds a second layer of points that protect the CF in game play, in much the same way as a BattleMech's armor protects its internal structure.

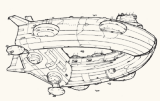
The maximum number of armor points (per hex) that may be placed on a Mobile Structure is equal to the Construction Factor (CF) of the unit itself. When mounted on a Mobile Structure, the same number of armor points applies for all hexes of the unit, so a Mobile Structure that is assigned 112 armor points on one hex must assign 112 armor points to all of its hexes.

On Inner Sphere-made Mobile Structures, every 16 points of armor (or fraction thereof) mounted per hex subtracts 1 ton from the internal weight capacity of that hex. Clan-made Mobile Structures lose 1 ton of internal weight capacity for every 20 points of armor (or fraction thereof) mounted per hex.

Under these rules, only Fortress-type Mobile Structures may install armor of any type. Building- and Hangar-type structures lack the specially reinforced framework and structural design necessary to support military-grade armor.

As a Hangar-type Mobile Structure, Nicholai's super-freighter may not carry armor.

Paul's flying airbase, as a Building-type Mobile Structure, also may not carry armor.



Raymond's DropShip-mover, as a Fortress-type Mobile Structure, may install armor if desired. Though he does not expect the mover to face combat, he decides to install some extra protection anyway, and devotes 2 tons (per hex) to armor. This gives each of the mover's hexes 32 points (16 points per ton x 2 tons = 32 points) of extra armor protection and leaves it with 506 tons of internal capacity per hex (508 – 2 = 506).

STEP 4: INSTALL WEAPONS, HEAT SINKS, AND EQUIPMENT

Once the size, shape and class of the Mobile Structure is established, and its power and motive systems have been installed, any leftover internal tonnage capacity may be used to install weapons, heat sinks and other equipment as desired.

The weapons, ammunition and equipment that may be mounted on Mobile Structures are listed in the Master Weapons and Equipment Tables beginning on page 216. In addition to any heat, damage and range statistics, these tables provide the weight these items take up on such units, what technology base (Clan or Inner Sphere) 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 Mobile Structure's power systems, motive systems, armor, heat sinks, weapons and other components must never exceed the internal weight capacity of the total unit, nor may the total tonnage for all items installed in a given hex of the Mobile Structure exceed the internal weight capacity of that hex. Any leftover weight (per hex) is automatically allocated to cargo space.

For special rules on any item, consult its entry under *Heavy Weapons and Equipment* (see pp. 201-249, *TM*). Rules for the additional advanced items described in this book are found beginning on page 86.

TechManual Items: The Weapons and Equipment items described and listed in the tables in *TechManual* may all be mounted on Mobile Structures in accordance with their standard equipment rules. Mobile Structures may install any item permitted on tournament-legal DropShips or Support Vehicles.

Light and Medium Weapons: Lighter Mobile Structure types, such as Buildings and Hangars, may mount Medium and Small weapons (those usable by conventional infantry units), to a maximum limit of 6 such weapons per level of structure height—as long as they have sufficient tonnage available in the hex to do so.

Heavy Weapons: Only Fortress-type Mobile Structures may mount Heavy weapons (weapons that individually weigh half a ton or more). The maximum tonnage of such weapons that may be mounted per hex—discounting ammunition, turret mechanisms and heat sinks or power amplifiers—is equal to the Fortress CF divided by 10 per level of structure. The weight of these weapons, plus any turrets, power amplifiers, heat sinks or ammunition, counts against the structure's weight capacity as per normal equipment.

Heavy weapons may be mounted on Mobile Structures either in turrets along the roof of the structure (see *Turrets/Pintles*, p. 83) or along the structure's outer walls. If mounted along the walls, the designer must not only note the hex the weapon is placed in, but also its level in height along the wall for line of sight purposes. (Remember

that ground-based Mobile Structures stand 2 levels taller than their base height, but cannot mount weapons and equipment below a height of 3, so a weapon mounted in the lowest level of a ground-based Mobile Structure with a base height of 5 levels would be firing from a height of 3 levels, while one placed on the same Mobile Structure's roof would have an effective height of 8 levels above the ground.) Weapons mounted in a rooftop turret are considered to have a height equal to the Mobile Structure's highest level for line of sight purposes.

Capital Weapons: Capital-class and Sub-capital-class weapons may be mounted on Fortress-type Mobile Structures, but the size of these weapons and the slow-moving nature of these units makes the use of such weapon systems exceedingly rare.

For capital-grade weapons, Mobile Structures that do not employ Fission or Fusion power systems may employ only capital missile launchers. Mobile Structures powered by Fission or Fusion power systems may mount other capital-scale weapon systems, but must add an extra 10 percent to the weapons' weight in order to do so, to reflect increased fire control systems and stabilizers necessary for firing.

A given hex of Mobile Structure may accommodate only 1 non-missile capital weapon, or as many capital missile launchers as the hex's tonnage will allow. Mounting any capital weapon, however, automatically precludes the installation of turrets or pintles in the same hex (or any item that is said to occupy turret space, such as Flight Decks and the like). If a desired hex does not have enough internal weight capacity to support a desired capital weapon, the weapon's tonnage may be divided as evenly as possible between the desired hex and all Mobile Structure hexes immediately adjacent to it (in which case, the same turret and pintle mount limitations apply to the adjacent hexes as well as to the central hex).

Power Amplifiers: As with Combat and Support Vehicles, Mobile Structures not powered by Fission or Fusion engines will require power amplifiers for any heavy energy weapons mounted on them. Such power amplifiers weigh 10 percent of the weight of all applicable weapons (rounded up to the nearest half-ton). Power amplifiers do not count toward the weight of any weapons slaved to a targeting computer, nor do they count toward the weight of any turret or pintle mechanisms mounted on the Mobile Structure, but their weight must be assigned to the hex locations where their related weapons are mounted.

Mobile Structure Firing Arcs: Unless mounted on a Pintle or Turret (see below), all non-capital weapons placed on a Mobile Structure receive a fixed firing arc based on their mounted location. For all non-capital weapons mounted on an outer wall, this arc covers a maximum of 3 adjacent hexsides facing outward from the structure itself (akin to a BattleMech's forward firing arc; the actual hexsides must be chosen and identified by the designer at construction). Any hexside that faces another hex of the same Mobile Structure—adjacent or otherwise—may not be designated as part of a weapon's firing arc (so a Mobile Structure cannot be designed with weapons that turn on itself).

Capital weapons—including capital missile launchers and sub-capital weapons (see p. 155)—receive a special upwards-facing firing arc when assigned to Mobile Structures, and thus do not receive a firing arc that can be projected onto a ground battle. No capital-scale weapon system installed on a Mobile Structure may be placed in a turret or pintle mount.

Turrets/Pintles: All Mobile Structures may install turrets, but are limited to a maximum of 1 turret per hex of unit size. Turrets may carry Light, Medium, or Heavy weapons, and are automatically located on the roof of a Mobile Structure, where they receive a height equal to that of the structure's highest level for line of sight purposes. Mobile Structure turrets have a 360-degree field of fire against any targets at or above the Mobile Structure's uppermost height (including the 2 added levels ground-based Mobile Structures receive from their motive systems), which effectively enable them to cover the structure's entire roof in order to repel any potential boarding parties. Mobile Structure turrets may also engage any targets located below the turret's height, so long as the line of sight between the turret and its target does not pass through another of the Mobile Structure's own hexes.

Some items that may be mounted on a Mobile Structure—such as Helipads, Flight Decks and Landing Decks—may occupy "turret space" as well as internal equipment space. In such cases, the unit must designate the hexes these items occupy. Turrets may not be mounted in these designated hexes.

Pintle mounts are available only for Light and Medium weapons. These mounts may be assigned to any level in a Mobile Structure's height (except for the bonus 2 levels provided by a ground-based Mobile Structure's motive system), and receive a firing arc that runs up to 4 adjacent hexsides facing outward from the structure itself. As with wall-mounted arcs, pintles may not fire into any hex that faces another hex of the same Mobile Structure—adjacent or otherwise.

Turrets and pintles mounted in Mobile Structures receive no additional armor or structure points, and neither weapon mounts are treated as separate hit locations in combat. The weight of a turret mechanism is equal to 10 percent of the weight of all equipment mounted within it (rounded up to the nearest half-ton), discounting any heat sinks, power amplifiers, or ammunition required by any turret-mounted weapons and equipment. Pintles, meanwhile, have a weight equal to 5 percent of the weight of all equipment mounted within (rounded up to the nearest kilogram), excluding ammunition. Turret and pintle weights always count against the internal weight capacity of the hex within which such mounts are located.

Heat Sinks: Regardless of the power system chosen, Mobile Structures receive no free heat sinks. Mobile Structures without a Fission or Fusion power system must incorporate enough heat sinks to cover the heat generated by all energy weapons fired together. These heat sinks may be distributed as desired to the weight capacity of any hex or hexes on the unit—be it in one big lump, or in portions spread across the entire structure.

Fire Control Systems: Mobile Structures need not invest in fire control systems, as they receive such systems automatically when mounting any weapons. The only need for added fire control arises when employing non-missile capital-scale weapons; in which case, see the above rules for mounting capital weapons on Mobile Structures.

Small Items on Mobile Structures: Mobile Structures rarely employ small items, as many of the unit's amenities include such features by default, but if a designer opts to install Small-size items on a Mobile Structure, the same rules for mounting small items on Medium and Large Advanced Units apply (see p. 71).

Tonnage-Based Items: Some items (such as Lift Hoists) derive their strength, capabilities and damage from the

tonnage of the unit that mounts them. In the case of Mobile Structures, the CF of the structure may be used in place of the unit's tonnage to define the upper limits of these capabilities (so a Mobile Structure with 100 CF and a single Lift Hoist in the hex—which can lift half its user's weight—can lift 50 tons; multiple Lift Hoists in the same hex can increase this capacity as multiple Hoists would on a single-hex unit).

Quantity-Limited Items: As multi-hex units, Mobile Structures may exceed the standard per-unit limits of items restricted to a set quantity per unit. In this case, the structure may mount as many such items *per hex* as smaller units may mount per unit. (For example, Lift Hoists, which are limited to 4 per unit under standard construction rules, may be mounted 4 per hex on a Mobile Structure. Turrets, which are limited to 1 per unit under standard construction, may be placed 1 per hex on a Mobile Structure—as noted above.)

Multi-Hex Items: Items that take up multiple hexes (or multiple turret slots on large Support Vehicles) break up their tonnage evenly among the hexes of the Mobile Structure that they occupy (round fractional tonnages up to the nearest .5). These hexes must be consecutive. For example, a Flight Deck (which weighs 2,500 tons and takes up 4 turret spaces on a Support Vehicle) will occupy 4 adjacent hexes on a Mobile Structure and take up 625 tons of internal capacity per hex (2,500 tons ÷ 4 hexes = 625 tons per hex).

Crew Quarters: Mobile Structures of all types and classes receive any needed crew quarters free with their design, and therefore need not allocate tonnage to personnel quarters. Quarters for passengers may be added to reflect an extra level of comfort and support, but these are not required.

Transport Bays and Doors: Bays for cargo and unit transport often take up all remaining tonnage on Mobile Structures of every stripe. 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.

Designers of Mobile Structures must assign a minimum of 1 bay door to any unit with a transport bay, to allow for entry and egress from the unit. A Mobile Structure can designate half of its total number of outward-facing hexsides (rounded down) and place 1 bay door in each (so a Mobile Structure that occupies one central hex and all adjacent hexes in a circular shape has a total of 18 outward-facing hexsides, 9 of which can include bay doors). If the Mobile Structure is built as a Hangar-type structure, the unit may place 2 bay doors per designated hexside, effectively doubling its bay door capacity.

A Mobile Structure's launch rate (per turn) for onboard fighters or other launch-capable units with appropriate cubicles (Small Craft, 'Mechs and ProtoMechs) is equal to twice the number of functioning bay doors associated with said launch-capable units. For example, a Mobile Structure with 18 vehicles in a single fighter transport bay that has 2 doors assigned to it may release 4 of these 18 vehicles per turn (2 doors x 2 vehicles per door per turn = 4 vehicles per turn).

Bay doors in linkage hexes that are joined to another Mobile Structure may not be used.

As a Hangar-type Mobile Structure, Nicholai's super-freighter may not carry heavy weapons. This is fine by him, as he does not plan to arm his super-freighter for combat (escort ships can handle that job, if need be). He also notes that the internal capacity for 2 of the vessel's 20 hexes—where the fuel tanks are—is 404 tons each, while 2 others—designated as linkage hexes—have a capacity of 1,101 tons. The remaining 16 hexes can hold up to 1,139 tons each.

Nicholai decides to spend his tonnage conservatively, to maximize his internal cargo capacity. He opts to place four Lift Hoists per hex (at 3 tons per hoist) along the 4-hex long left and right sides of his unit (the sides not already featuring modular linkage systems, where internal capacity is still at 1,139). In these same hexes, he also opts to place 2 maritime Life Boats (1 ton each), a mounted searchlight (0.5 tons each) and pintle-mounted 2-shot SRM Launchers (the Medium-class infantry weapon) with 50 rounds each (30 kg per weapon + 1,000 kg per 50 shots [20 kg/2 shots] + 1.5 kg per pintle mount [30 kg x 0.05 = 1.5 kg] = 1,031.5 kg, rounded up to 1.5 tons per weapon, ammo, and mount). Leaving the rest of the side hexes for standard cargo, Nicholai finds these hexes can store up to 1,123 tons each (1,139 – 12 [4 Lift Hoists] – 2 [Life Boats] – 0.5 [Searchlight] – 1.5 [SRM Pintles] = 1,123).

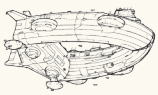
Nicholai also decides to install four helipads on his Mobile Structure, locating 1 each in two of the untouched forward hexes and 2 more in the untouched aft hexes. At 500 tons per helipad, these 1,139-ton hexes are reduced to 639 tons of capacity. In these same hexes, he also establishes two Light vehicle bays to store any visiting helicopters (at 50 tons each, this further reduces the internal capacities of the hexes to 539 tons).

In the internal hexes where the fuel tanks are (and where spare tonnage is lowest at 404 per hex), Nicholai decides to add passenger facilities, communications, kitchens and MASH equipment, for the well-being of his crew and any guests. He decides to install (in each hex): 20 second-class Passenger quarters (7 tons each), 3 tons of Communications Equipment, a Field Kitchen (3 tons) and a MASH unit with 4 operating theaters (6.5 tons). Together, all this equipment reduces the remaining capacity of the hexes to 251.5 tons each (404 – [(20 quarters x 7) + 3 communications + 3 field kitchen + 6.5 MASH] = 251.5).

Nicholai decides to stop adding equipment now and looks into his remaining storage capacity. In the 8 side-most hexes, he determines he has 1,123 tons per hex. In the 2 forward and aft linkage hexes, he finds he has 1,101 tons remaining per hex. In the side-fore and side-aft hexes (the 4 hexes where the helipads went), he finds he has 539 tons remaining per hex. In the 2 innermost hexes (where the fuel tanks and quarters went), he has 251.5 tons per hex. He has not touched the 4 remaining hexes since installing motive and power systems, leaving those with 1,139 tons of capacity each. This gives his super-freighter a grand total of 18,401 tons of internal cargo capacity for this single module of what could be a long linked Mobile Structure vessel ([8 x 1,123] + [2 x 1,101] + [4 x 539] + [2 x 251.5] + [4 x 1,139] = 18,401).

He also notes that the gunners for his Medium weapons raise the number of crewmen he needs by 8 (1 Medium weapon mount per hex, times 4 hexes at a side), while the 4 helipads add 20 crew (5 apiece), the communications gear adds 6 crew (3 per 3-ton systems in each hex), the 2 kitchens add 6 more and the 8 total MASH operating theaters add another 40. Together, this raises the non-officer crew to 128, and the number of officers has thus also risen to 13 (48 crew + 8 gunners + 6 communications crew + 6 kitchen staff + 40 medics = 128; 128 ÷ 10 = 12.8 officers, rounded up to 13). All quarters for these crewmen are free with the Mobile Structure's design.

For cargo egress when docked, Nicholai finds that his Mobile Structure (as a Hangar-type structure) can designate up to 7 hexes for bay doors (half of the 14 outermost hexes it boasts). As a Hangar-type Mobile Structure, these hexsides can accommodate 2 bay doors each, for a total of 14 doors. For symmetry, Nicholai opts to designate 3 hexes on each side of the unit for bay doors, assigning 2 doors to each one. He also selects the forward-most hex as his seventh bay door hex, even though it cannot be used if the vessel is linked to another one at the time. As with the other door hexes, he places 2 bay doors here for a total of 14 bay doors.



Paul's flying airbase currently has an internal weight capacity of 397.5 tons per hex. Though this would preclude the flight decks and helipads Paul might have initially planned on for a flying airbase, he opts to use arresting hooks to retrieve aircraft, launching them via fighter bays in the same fashion as DropShips. He thus chooses the two central hexes along each side facing on his wedge-shaped structure to contain 2 Arresting Hoists (3 tons apiece) in each hex for fighter retrieval, while 2 Aerospace Fighter bays (at 150 tons each) are assigned to the three "point" hexes of the structure (with 2 bay doors placed in 2 of these hexes' 4 outward sides for launching).

To serve as a command and control center for the base and its fighters, Paul places 6 tons of Communications Equipment in the airbase's central hex, as well as 2 20-ton Mobile Field Bases for fighter service and repair, a 4-theater MASH for tending to any wounded pilots and crew (6.5 tons) and a Field Kitchen (3 tons) for airbase personnel and their resident pilots and techs. Finally, he adds a 5-ton Look-Down Radar system, to help the airbase double as a kind of mobile surveillance unit.

The added equipment produces a need for 39 additional crewmen (6 for communications + 10 for 2 mobile field bases + 20 for the 4-theater MASH + 3 for the field kitchen). Combined with the 40 non-officer crewmen established earlier, this also raises the officer requirement to 8 ([40 base crew + 39 additional crew] ÷10 = 7.9 officers, rounded up to 8). Quarters are not needed for these 87 crewmen and officers. However, for the comfort of the fighter pilots, their techs and any other VIP visitors, Paul adds 2 second-class Passenger quarters to the same side hexes in which he placed the arresting hooks. The quarters weigh 7 tons each.

For a final touch, Paul adds three mounted searchlights to his airbase, going so far as to place them in turrets at the structure's three points (for a total of 1 ton each—0.5 tons for the Searchlights and 0.05, rounded up to 0.5, for the turret mechanisms). He also places 2 Aerospace Life Boats in these hexes (at 7 tons each), for emergency egress should the structure be endangered.

Computing the remaining weight (which will all be treated as standard cargo), Paul finds that the three "point" hexes will have 82.5 leftover tons for cargo (397.5 – [(2 Aerospace Fighter bays x 150 tons) + (2 aerospace Life Boats x 7 tons) + (1 Mounted Searchlight with Turret at 1 ton)] = 82.5 tons). Each of the 6 side hexes between these points has 377.5 tons remaining (397.5 – [(2 Arresting Hoists x 3 tons) + (2 second-class Passenger quarters x 7 tons)] = 377.5 tons). The remaining hex, in the unit's center, has a cargo capacity of 337 tons (397.5 – [(6 tons of communications gear) + (2 Mobile Field Bases x 20 tons) + (6.5 tons for 4-theater MASH) + (3 tons for a Field Kitchen) + (5 tons Look-Down Radar)] = 337 tons). Deciding that this central hex will house fuel reserves for the aerospace craft, Paul opts to designate the entire central cargo area as a liquid fuel storage bay. This means the 337-ton storage tonnage will be able to hold up to 306 tons of fuel and other liquids (337 tons ÷ 1.1 [Liquid storage takes up 1.1 times the weight of the liquid being stored] = 306.364 tons, round down).

For his DropShip-mover, Raymond has one and only one primary mission: carrying DropShips. To do this, he needs to make use of the Landing Deck, which takes up 500 tons per hex, and will preclude the use of turrets in all hexes it occupies. Ray decides that the Landing Deck will have a radius of 2 hexes from the center, effectively covering the entirety of his Mobile Structure with it. Thus, all 19 hexes of the Mobile Structure are reduced to an internal tonnage capacity of just 6 tons (506 tons – 500 tons = 6). Along the 6 "point" hexes, he adds 2 Lift Hoists for cargo loading and offloading. At 3 tons each, these hoists reducing the free tonnage of these apex hexes to 0 (6 – [2 hoists x 3 tons] = 0). Along each side hex, Raymond adds a mounted searchlight (for nighttime driving) at 0.5 tons, reducing the cargo capacity of the non-apex outer hexes to 5.5 tons.

The 19-hex platform will also increase his crew needs by 57 (19 Landing Deck hexes x 3 crew per hex = 57), which brings the total non-officer crew count up to 141, with an officer requirement of 15 (84 base crew + 57 = 141; 141 ÷ 10 = 14.1, round up to 15). The basic accommodations for these crewmen are included in the Mobile Structure's design.

With only 6 tons of cargo capacity per interior hex, 0 tons per "point" hex and 5.5 tons per side hex, Raymond decides to call his DropShip mover complete. Even though, as a Fortress-type structure, he could add some anti-'Mech weapons to the outer hexes, he decides that the lack of tonnage and the structure's intended role as a simple DropShip mover make it ill-suited to a combat role.

STEP 5: COMPLETE THE RECORD SHEET

For a competed Record Sheet, the designer must make sure to have selected the Mobile Structure sheet. The sheet must have all data filled in for the Structure Data block (including name, structure type, CF and MP values). All equipment slots must be allocated on the Weapons and Equipment Inventory (including ammunition and number of shots per bin), making certain to note which hexes all items are in as well as their facings (turreted weapons should be noted with a "(T)" and pintle-mounted weapons should receive a "(P)" notation). All extraneous hexes must be blacked out on the Mobile Structure's mapsheet diagram. To calculate the cost for a Mobile Structure, use the formula found on page 230.

Once all of the above is completed, the Mobile Structure is ready for game play.

ADVANCED WEAPONS AND EQUIPMENT

This section provides game play and construction rules for advanced weapons and equipment that may appear in Inner Sphere and Clan battlefield and support units. While they are not suitable for tournament play under the rules of *Total Warfare* (*TW*), they can add more flavor to *BattleTech* games that use *Total Warfare* core rules in conjunction with this rules supplement, and are designed to function in accordance with *Total Warfare* during game play (or *TechManual* during construction) unless otherwise noted.

All equipment appears in alphabetical order within its respective sections. In general, most of these items are used in the design of Battle Armor, Combat Vehicles, Support Vehicles, IndustrialMechs, BattleMechs, ProtoMechs and aerospace units of every kind (though some equipment may be exclusive to a few unit types).

While all items in this section contain both their full construction and game play rules, the expanded rules for the use of some items is not covered under *Tactical Operations;* for example the construction rules for Advanced Rules aerospace units, such as WarShips, JumpShips and Space Stations. Those rules are found in *Strategic Operations*.

To: Headmaster Alfred Simms, Savonberg Elesee-Beckett
From: Viscount Kenyon Stephenson, Stephenson Holdings
Re: Mutual Interests
Date: 07-30-75
Security: [[MOST PRIVATE: ENCODED FOR RECIPIENT ONLY]]

Brother Alfred,

Forgive the unprecedented intrusion, but I think you shall find the incorporated gifts electronically enclosed to be of immeasurable value to you, your staff, and your colleagues. I caution, however, against disclosing too much, too quickly, to your peers. In these dark times, after all, it is most difficult to be certain who may be trusted and who mustn't be. I therefore have encoded this document to be unlocked by you and you alone.

To get straight to the point: Our friends have struck technical paydirt. Although the original source may be a Snake, we—and of course I mean those most trusted who share our enlightened perspective—have verified the veracity of the vast majority of these documents. The level of development is staggering, to say the very least, and points to resources and resourcefulness our enemies (and erstwhile allies) have perhaps never before displayed.

"With the loss of NAIS, the technical aspects of these developments will fall to others to implement…" Those were the words our *illustrious* Princess-Regent supposedly said when she received this information from the Snake. Naturally, of course, we thought of you and yours first. But not to be overlooked are the strategic and tactical concerns, which we are already studying. Needless to say, the possibilities are truly momentous!

Take these to heart as you review the encoded attachments. We will naturally be in touch shortly to discuss things further.

Your comrade-in-arms!
–Kenyon

AVAILABILITY CODES TABLE

Code	Description
AF	Aerospace Fighters
BA	Battle Armor*
BM	BattleMechs
CF	Conventional Fighters
CI	Conventional Infantry
CV	Combat Vehicles
DS	DropShips
IM	IndustrialMechs
JS	JumpShips
PM	ProtoMechs
SC	Aerospace Small Craft
SS	Space Stations
SV	Support Vehicles
WS	WarShips
MS	Mobile Structures

*Including Exoskeletons and PA(L) units

EQUIPMENT NOTES

Each item in this section comes with a basic description of the item and its function, followed by game play data that includes the item's rules level, Availability, Technology Base (and Tech Ratings), game rules and construction rules. This information helps identify how and by what units a given piece of equipment may be employed.

Unless the rules of a weapon or a piece of equipment specifically prohibit its use with a weapon and/or equipment, assume they are compatible.

Rules Level: The rules level of the advanced equipment featured here represents the prevalence of an item outside the tournament-level rules presented in *Total Warfare*, as well as whether the item exists in the mainstream of technology used by units in the *BattleTech* universe. Under these rules, equipment may have either an Advanced or Experimental rules level. Advanced-level equipment represents items appropriate for advanced-level game play, which are considered well in the mainstream of technologies available to *BT* units: for example, artillery, most capital weapons, flight decks and helipads. Experimental-level equipment, meanwhile, has yet to reach mass production in the *BT* universe because it is prohibitively expensive, extraordinarily sophisticated, exceedingly difficult to maintain or simply deemed too unreliable or restrictive for widespread deployment. Such items—including CASE II, independent Handheld Weapons, the Null-Signature System and Sub-Compact K-F Drives—may in fact only exist on drawing boards or in forgotten first Star League caches by the year 3075, and their appearance in game play should be kept rare by players interested in following a "canonical" campaign.

Availability: Availability indicates what unit types may carry a given item (in broad terms) using two-letter codes shown in the Availability Codes Table below. Some items may be used by multiple unit types. For example, an Availability code listing of AF, CF, SC, DS indicates an item that may be carried only by aerospace fighters, conventional fighters, Small Craft and DropShips. However, even if an item is listed for a given unit type, specific units within that type may be unable to carry an item—for example, Docking Units (which may only be used by Naval-type Combat and Support Vehicles). Such exceptions are noted under the item's Construction Rules.

Tech Base (Ratings): Tech Base (Ratings) indicates whether or not a listed item is made using Inner Sphere technology (including the Star League and Periphery), Clan technology, or both. Unless using the *Mixed Technologies* rules (see p. 189), a unit built with a Clan tech base may use only items identified as having a Clan or Both tech base, while Inner Sphere-built units may use only items identified as having an Inner Sphere or Both tech base.

Following the Tech Base Rating, in parentheses, are the Tech Level and Availability Ratings for the item. Used most commonly in Support Vehicle construction, these ratings are given as four-letter codes of A through F plus X. The first letter expresses the item's Tech Rating, followed by a slash; the remaining three letters describe the item's Availability Ratings across three major eras (Star League, Succession Wars and Clan Era). The codes run in ascending order of technology and difficulty to acquire. For example, a Tech Base Rating of A indicates a particularly low-tech item, while an F rating indicates a highly advanced (and often experimental) piece of technology. An Availability Rating of A indicates an easy-to-find item in the selected era, while an Availability Rating of F indicates an item so rare as to be nearly unique. An Availability Rating of X indicates an item that either does not exist in a given era or is so hard to come by that it may as well not exist in that time period.

Game Rules: This entry provides the basic game play rules for a given item, as well as its Advanced Equipment Table reference (starting on p. 216) where players can find the item's raw statistics (such as heat, damage, range and ammunition capacity). Some items can be highly complex to employ, or may negate the effects of other equipment mounted on the same unit, forcing a unit designer to consider the effects of mounting such items.

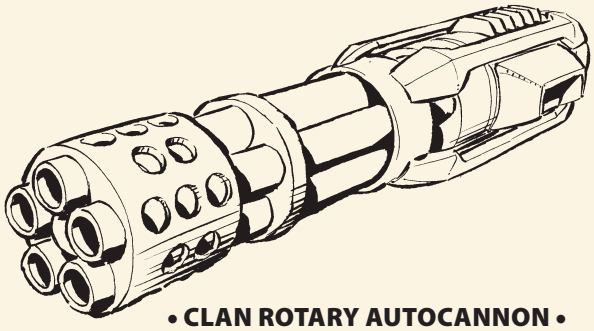
Construction Rules: The Construction Rules entry notes any special construction rules for the item that cannot be described by its raw statistics or Availability codes, such as location restrictions or requirements, unit type exceptions, formulas for finding the weight for variable-weight items and so forth. Raw statistics on equipment (such as weights and critical slot information for fixed-size items) appear in the item's reference line in the Advanced Equipment Table.

Modular (Omni) Technology: The following items may not be pod-mounted: Armor (except Modular Armor), BattleMech Turrets, Cockpits, Engines, Gyros, Musculature, Musculature enhancers (such as AES and MASC), Structure. Otherwise, all of the items presented below may be pod-mounted on appropriate modular or Omni unit types, unless specified otherwise.

A Note on Equipment Introduction and Availability

Unlike the equipment and weapons featured in *TechManual,* the items presented in this section represent less common components and design options in the *BattleTech* universe. Some equipment, for example, is considered to be "Experimental" because it has yet to reach widespread production and distribution in any major or minor faction. These items, as a result, will not even feature an Introduction date in their descriptions. Other items, rendered extinct by the ravages of war or declining use over the centuries, may likewise receive the "Experimental" tag, despite having Introduction (and Extinction) dates.

Players interested in reflecting historically accurate technology use in their games should note the introduction and extinctions dates on any desired item with these explanations in mind to determine whether said item can be employed in their games.



• CLAN ROTARY AUTOCANNON •
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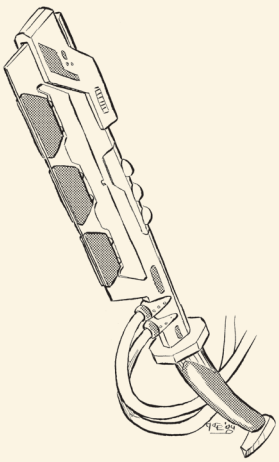
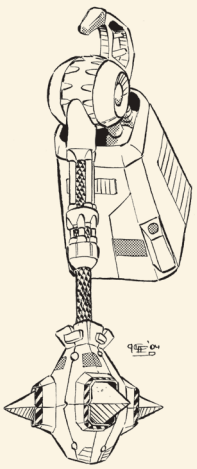
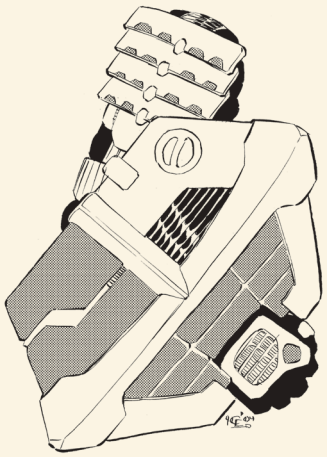
• BATTLEMECH MACE •
[PAGE 102]



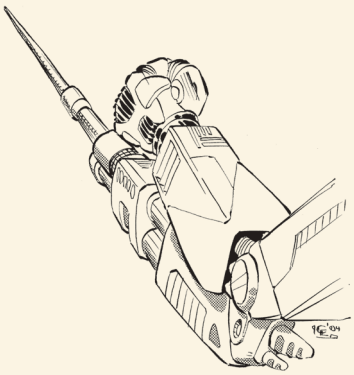
• BATTLEMECH VIBROBLADE •
[PAGE 104]



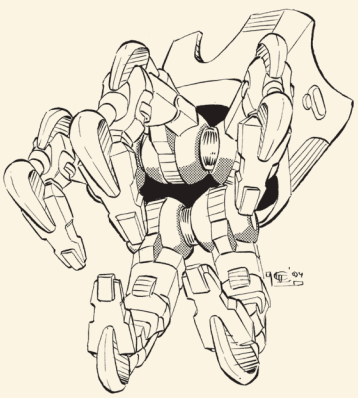
• BATTLEMECH FLAIL •
[PAGE 101]



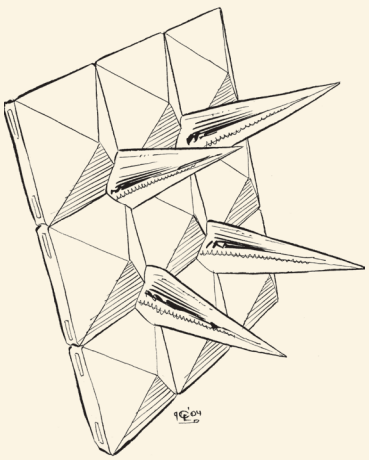
• BATTLEMECH SHIELD •
[PAGE 103]



• BATTLEMECH LANCE •
[PAGE 102]

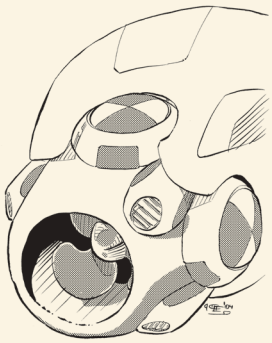


• BATTLEMECH CLAWS •
[PAGE 101]

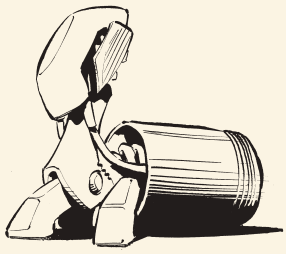


• BATTLEMECH SPIKES •
[PAGE 102]

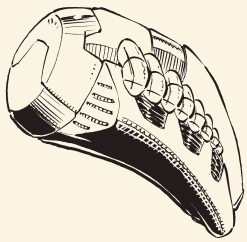
• BATTLEMECH HARJEL SYSTEM •
[PAGE 100]



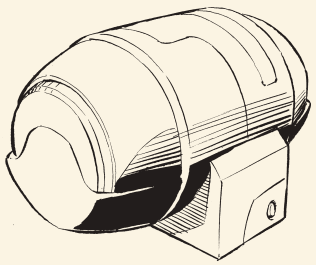
• 'MECH UMU SYSTEM •
[PAGE 107]



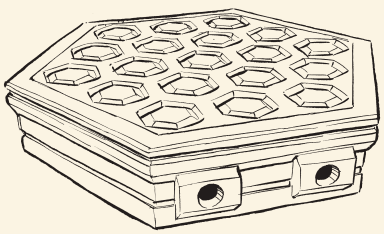
• C³ REMOTE SENSOR •
[PAGE 111]



• COOLANT POD •
[PAGE 115]



• ENERGY STORAGE BATTERY •
[PAGE 118]



• CHAFF POD •
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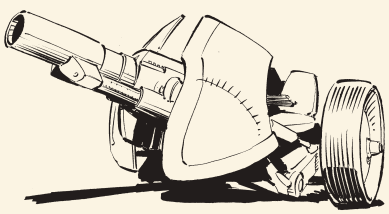
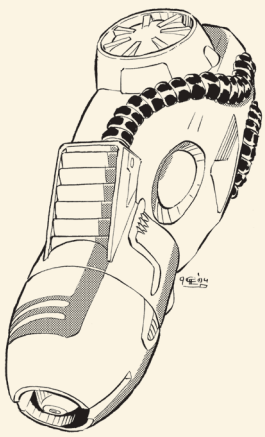
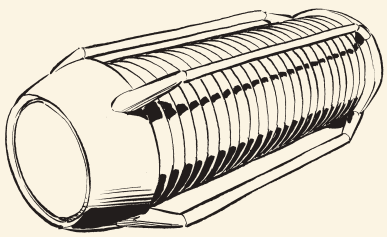


• FIELD GUN •
[PAGE 123]

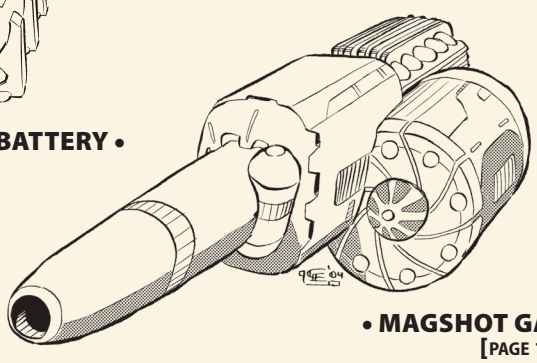


• FLUID GUN •
[PAGE 125]



• BLUE SHIELD PARTICLE FIELD DAMPER (PFD) •
[PAGE 108]

• LITHIUM-FUSION BATTERY •
[PAGE 135]



• MAGSHOT GAUSS RIFLE •
[PAGE 126]

ACTIVE PROBES

In the ongoing race to dominate the increasingly critical battlefield of electronics warfare, both the Clans and the Inner Sphere have experimented with newer and more powerful versions of the Star League-era active probes and ECM suites. Among the most promising and effective devices still in the experimental stages are the Inner Sphere's Bloodhound Active Probe and the Clan Watchdog Composite Electronic Warfare System.

BLOODHOUND ACTIVE PROBE

R&D Start Date: 3056 (ComStar)
Prototype Design and Production: 3058 (ComStar)

Spurred on by the arms race following the initial Clan invasion, ComStar engineers began work on an enhanced form of active probe technology intended to combat modern ECM systems. Unfortunately, numerous setbacks—from the Word of Blake Schism to the current Jihad and ComStar's expulsion from Rasalhague space—have prevented full-scale production of this powerful piece of EW hardware.

BLOODHOUND ACTIVE PROBE

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF, SC, DS, MS
Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: The Bloodhound Probe is an upgraded version of the Inner Sphere's Beagle Active Probe and follows the same rules as that device (see p. 129, *TW*). In addition to boasting increased range, the Bloodhound can detect hidden units with stealth or sneak ability, including Battle Armor units with Stealth Armor, Mimetic Armor and ECM, as well as other units featuring ECM, Null-Signature Systems or Stealth Armor. Unless the unit's ECM rules state otherwise, or the unit is conventional infantry using ECM or stealth systems, the Bloodhound will detect it. Note that a unit with active stealth armor cannot use a Bloodhound Probe.

Units with multiple active probes (of any type) may use only one at a time in game play. (These systems can be activated, deactivated or switched over during the End Phase of any turn.) Fighters, Small Craft, DropShips and other airborne units may only use active probes when interacting with ground units, or in accordance with the advanced rules for aerospace combat covered in *Strategic Operations*.

WATCHDOG COMPOSITE ELECTRONIC WARFARE SYSTEM (CEWS)

R&D Start Date: 3057 (Clan Smoke Jaguar)
Prototype Design and Production: 3059 (Clan Smoke Jaguar)

In their final years, Clan Smoke Jaguar initiated a number of new programs aimed at reinforcing their Touman and negating the Inner Sphere's few tactical edges over Clan technology. Targeting the area of electronic warfare was the so-called Composite Electronic Warfare System (CEWS) that Inner Sphere intelligence dubbed the Watchdog. A combination of the Clan active probe and ECM suite, this device promised the benefits of both in a single compact package, and would allow a given Clan unit to devote the saved weight to additional weapons or armor. The Jaguars' demise saw prototypes of the system eventually scattered among various Clans, but none have yet distributed a production-quality version.

WATCHDOG COMPOSITE ELECTRONIC WARFARE SYSTEM (CEWS)

Rules Level: Experimental
Available To: PM, BM, IM, CV, SV, AF, CF, SC, DS, MS
Tech Base (Ratings): Clan (F/X-X-F)
Game Rules: In an effort to streamline their electronic warfare packages, the Clans developed the Watchdog as a one-piece combination of a light active probe and ECM suite. The system works in the same way as the Clans' standard ECM and Light Active Probes (see pp. 129 and 134, *TW*).

Units with multiple ECM suites (of any type) may use only one at a time in game play. (These systems can be activated, deactivated or switched over during the End Phase of any turn.) Fighters, Small Craft, DropShips and other airborne units may only use ECM suites when interacting with ground units, or in accordance with the advanced rules for aerospace combat covered in *Strategic Operations*.

For units equipped with Stealth Armor systems, the Watchdog can be used in place of the Guardian ECM for the same effect, using the same rules.

CONSTRUCTION RULES

Active Probe: The Bloodhound Active Probe and the Watchdog System may be mounted on any available unit type in accordance with the unit's standard construction rules.

Actuator Enhancement System (AES): May only be installed in a BattleMech or IndustrialMech's arm or leg locations. Only one can be mounted in each limb. Leg-mounted AES components require that all of the unit's legs receive this equipment (so a Humanoid 'Mech must mount two leg AES components, while a Quad 'Mech must mount 4—with each unit placing 1 component in each leg). Arm-mounted AES components need not be mounted in both arms, however (so a 'Mech may install an AES in the left arm, leaving the right arm unmodified). For humanoid 'Mechs, the weight of each AES equals the 'Mech's total weight, divided by 35, rounded up to the nearest half-ton. Four-legged 'Mechs divide the 'Mech's weight by 50 and round up to the nearest half ton to find each AES component's weight.

Regardless of tonnage, each AES component occupies 1 critical slot per weight class (1 slot for light 'Mechs, 2 for medium 'Mechs, 3 for heavy 'Mechs and 4 for assault 'Mechs), which may be placed only in the affected leg or arm locations. Heavy and assault 'Mechs thus cannot mount AES components in the legs (heavy and assault four-legged 'Mechs cannot use AES). AES components may not be pod-mounted and so may only be employed by OmniMechs if installed as part of the design's base configuration. AES components are incompatible with MASC, Triple-Strength Myomer (of any type) and Targeting Computers, and so cannot be mounted on units that employ these systems.

Angel ECM Suite: The Angel ECM Suite may be mounted on any available unit type in accordance with its standard construction rules.

ACTUATOR ENHANCEMENT SYSTEM (AES)

R&D Start Date: 3067 (Blackwell Corporation/Wolf's Dragoons)
Prototype Design and Production: 3070 (Kell Hounds/Wolf Dragoons)

The Actuator Enhancement System (AES) is a combination of finely tuned myomer bundles and an enhanced DI computer interface that can improve the workings of a BattleMech's limbs. In many ways similar to the acuity-enhancing servos and mechanisms tied into enhanced targeting computers, AES components serve to stabilize subtle variances in gross 'Mech movements, which can lead to greater weapon precision or improved balance adjustments. However, the systems are heavy and bulky.

ACTUATOR ENHANCEMENT SYSTEM (AES)

Rules Level: Experimental
Available To: BM, IM
Tech Base (Ratings): Both (E/X-X-F)
Game Rules: An Actuator Enhancement System mounted in the arm provides a –1 to-hit modifier for all weapon attacks mounted in the same arm location, as well as a –1 to-hit modifier for all Physical Attacks (including Physical Weapon attacks) using only that arm. (For Physical Attacks that require both arms, the –1 to-hit modifier only applies if both arms mount a functioning AES.) When mounted in the legs, the AES provides a –2 modifier to all Piloting Skill Rolls, while charges and kicks receive a –1 to-hit modifier. Weapons split between an arm and torso location gain no bonus from an AES.

Actuator Enhancement Systems are considered active at all times during game play until the unit is destroyed or the AES component suffers a critical hit. AES leg units lose all AES-provided modifiers if any of the unit's leg-based AES components suffer critical damage; arms only lose the AES-provided modifiers if the system in the affected arm takes a critical hit.

ANGEL ECM SUITE

R&D Start Date: 3053 (Draconis Combine), 3056 (Clan Nova Cat)
Prototype Design and Production: 3057 (Draconis Combine), 3058 (Clan Nova Cat)

Derived from captured Clan technology, research on the Angel ECM Suite began shortly after the Battle of Luthien as part of an effort to counter the increasingly sophisticated electronic warfare systems of the modern battlefield. Essentially a boosted, broader-spectrum version of the Guardian ECM, the Angel was shelved numerous times due to cost overruns and ultimately saved only with aid from ComStar. Internal problems in the Combine and ComStar derailed development of this device, which has yet to reach full-scale production—but not before Clan scientists, catching wind of this effort, launched a similar project of their own.

ANGEL ECM SUITE

Rules Level: Experimental
Available To: BM, IM, CV, SV, BA, AF, CF, SC, DS, MS
Tech Base (Ratings): Both (F/X-X-F)
Game Rules: The Angel ECM Suite works like standard ECM (see p. 134, *TW*), but can also block Bloodhound Active Probes and C^3 Booster Systems, and even negates the locking systems of Streak missiles. Streak missiles fired into or through a hostile Angel ECM bubble will not fire if the to-hit roll fails, but on a successful Streak launcher attack, the attacker must roll on the Cluster table as though the launcher were a standard (non-Streak) model.

Units with multiple ECM suites (of any type) may use only one at a time in game play. Fighters, Small Craft, DropShips and other airborne units may only use ECM suites when interacting with ground units, or in accordance with the advanced rules for aerospace combat covered in *Strategic Operations*.

Units equipped with Stealth Armor can use the Angel ECM in place of the Guardian ECM for the same effect, using the same rules.

ARMOR

Several new varieties of armor have entered prototype stages over the past several decades, intended to enhance the defensive capabilities of all types of battlefield units. Most, however, lack the comprehensive coverage offered by today's armor.

FERRO-LAMELLOR ARMOR

R&D Start Date: 3066 (Clan Snow Raven)
Prototype Design and Production: 3070 (Clan Snow Raven)

Ferro-Lamellor Armor is an enhanced hybrid of ferro-fibrous armor and WarShip-grade Lamellor armor developed by the Clans for use on smaller battlefield units such as BattleMechs, Combat Vehicles and fighters. Bulkier than standard Clan ferro-fibrous, this armor demonstrates enhanced energy-reflective capability and improved resilience against kinetic damage.

FERRO-LAMELLOR ARMOR

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF
Tech Base (Ratings): Clan (F/X-X-F)
Game Rules: A location protected by Ferro-Lamellor Armor reduces all damage by 1 point for every 5 points (or fraction thereof) delivered per hit (to a minimum of 0 points of damage per hit). If that location has a separate damage reduction method (such as spikes, or being a rotor), the damage reduction from Ferro-Lamellor Armor is applied last. Excess damage will affect internal structure or structural integrity per normal rules for the location's structure type. Weapons reduced to zero damage effects by Ferro-Lamellor Armor (such as LB-X cluster munitions), may not inflict pilot injury in the event of a cockpit-location hit, nor may they deliver a penetrating or "floating" critical from special hit location rolls. However, against Combat and Support Vehicles, such weapons *may* inflict Motive System damage effects normally (because such units feature more exposed movement mechanisms).

In addition, Ferro-Lamellor Armor negates the bonus armor-penetrating effects of Armor-Piercing Ammo (see p. 140, *TW*), Tandem-Charge Missiles (see p. 184) and 'Mech Tasers (see p. 157). If these weapons are fired against a location protected by Ferro-Lamellor, they deliver their standard damage to the armor only (Armor-Piercing Ammo hits as a standard AC round; Tandem-Charge Missiles hit as standard SRMs; 'Mech Tasers inflict only 1 point of armor damage).

HARDENED ARMOR

R&D Start Date: 3045 (Federated Commonwealth), 3057 (Clan Ghost Bear)
Prototype Design and Production: 3047 (Federated Commonwealth), 3061 (Clan Ghost Bear)

Hardened Armor uses thicker, overlapping plates to enhance a unit's protection at the cost of flexibility. Though hardly a novel concept, production-quality Hardened Armor that consistently enhances protection and minimizes its negative effect on unit mobility remains an elusive goal for most Inner Sphere manufacturers.

LASER REFLECTIVE (REFLEC/GLAZED) ARMOR

R&D Start Date: 3055 (Federated Commonwealth), 3059 (Clan Jade Falcon)
Prototype Design and Production: 3058 (Lyran Alliance), 3061 (Clan Jade Falcon)

Workers at Coventry Metal Works accidentally "discovered" a potentially effective form of laser-reflective armor (also known as glazed or "reflec" armor) while working on a batch of ferro-fibrous armor. The resulting high-gloss alloy sharply reduced the effects of laser and flamer fire, but initially proved over-sensitive to the localized subsurface heating effects of particle cannon fire. Later prototypes eventually worked this out, but little headway has been made against the armor's brittleness, which scarcely protects against specialized armor-defeating munitions and shatters easily in the face of collisions, physical attacks, and other broad-surface damage such as artillery blasts.

CONSTRUCTION RULES

Armor: The Armor Table below shows the number of points each Advanced Armor type provides per ton installed on the unit, as well as the required slots of internal space and any relevant construction notes. A listing of NA under a unit type's Space slot indicates that such units may not employ the listed Advanced Armor type. Support Vehicles may mount any of these armor types, but must have the Armored Chassis modification to do so (in which case, compute the armor's per-point weight in kilograms by dividing 1,000 by the number of armor points provided per ton); these advanced armors all have a BAR value of 10.

Unless otherwise noted, the armor types presented here remain active and are not affected by pilot injury or engine shutdown. Critical hits to any armor slots have no effect and must be rerolled unless the armor's rules state otherwise.

Finally, of the Advanced Armor types described here, only Modular Armor may be pod-mounted. No more than one Modular Armor item may be mounted in a given location. For torso locations, it should be specified whether the Modular Armor faces to the front or rear, and it will only protect against attacks striking that armor location. Though Modular Armor is an advanced armor type, the Armor Value provided by Modular Armor is Standard Armor (p. 205, *TM*). It may be mounted over any other armor type. All other armor types (except for Hardened Armor) are available to units using modular (Omni) technologies, but must be incorporated into the unit's base configuration unless the designer is also using the optional Patchwork Armor design option (see p. 189). Hardened Armor is compatible only with standard, non-Omni units.

ADVANCED ARMOR TABLE

Advanced Armor Type	Points per Ton	Space BA	BM	IM	CV	SV*	CF	AF	Construction Notes
BA Laser-Reflective	†	7	NA	NA	NA	NA	NA	NA	Half damage (round down) from energy weapons; †55 / 30 kg (IS / Clan) per point
BA Reactive Armor	†	7	NA	NA	NA	NA	NA	NA	Half damage (round down) from missiles, mortars, and artillery; †60 / 35 kg (IS / Clan) per point
Ferro-Lamellor	14	NA	12	12†	1	1	2	2	Fighter Slots: 1 (per wing)
Hardened	8	NA	0	0†	1	NA	NA	NA	May not be carried by VTOL, WiGE, or Hover Combat Vehicles
Laser-Reflective (IS)	16	NA	10	10†	1	1	2	2	Fighter Slots: 1 (per wing)
Laser-Reflective (Clan)	16	NA	5	5†	1	1	1	1	Fighter Slots: 1 (aft)
Modular	10	NA	1	1†	1	1	1	1	1 slot per ton; May not be mounted on Head or Rotor locations
Reactive (IS)	16	NA	14	14†	2	2	3	3	Fighter Slots: 1 (per wing), 1 (aft)
Reactive (Clan)	16	NA	7	7†	1	1	1	1	Fighter Slots: 1 (aft)
Vehicular Stealth	16	NA	NA	NA	2	2	2	2	ECM Required; Fighter Slots: 1 (per wing); Generates 10 heat**

*Support Vehicles must have the Armored Chassis Mod and a Minimum Chassis Tech rating of D to install Advanced Armor. **Heat sinks required to offset heat for non heat-tracking units (Vehicles and Conventional Fighters). †IndustrialMechs that use any armor type other than Commercial, Industrial, or Heavy Industrial must be classified as Experimental-rules units. In addition, Experimental-rules IndustrialMechs may also make use of all other BattleMech-legal armor types.

HARDENED ARMOR

Rules Level: Experimental
Available To: BM, IM, CV
Tech Base (Ratings): Both (D/X-X-F)
Game Rules: Each point of Hardened Armor can sustain two points of damage. To reflect this, when marking damage off on a location protected by this armor type, draw a single slash through the armor bubble for the first point of damage sustained, and a second slash, making an "X" (or block the armor bubble out entirely) after the second point (at which point any remaining damage affects the internal structure normally, unless any special rules apply). Each full armor bubble lost only counts as one point of damage for Piloting Skill Roll purposes.

Penetrating critical hit checks (including "floating" critical hits) against a unit protected by Hardened Armor (such as those caused by rolling a 2 on the Hit Location Table, or during a successful Swarm Attack) suffer a –2 modifier to all rolls on the Determining Critical Hits Table (including Vehicle Critical Hits Tables). If the attack did not strike a location or facing protected by Hardened Armor, this critical hit modifier does not apply.

In addition, Hardened Armor negates the bonus armor-penetrating effects of Armor-Piercing Ammo (see p. 140, *TW*), Tandem-Charge Missiles (see p. 184) and Tasers (see p. 157). If these weapons are fired against a location protected by Hardened Armor, their damage is not reduced as above, and so they deliver their damage as if they were standard weapons hitting standard armor (Armor-Piercing Ammo hits as a standard AC round; Tandem-Charge Missiles hit as standard SRMs; 'Mech Tasers inflict only 1 point of armor damage).

'Mech with Hardened Armor suffer a +1 Piloting Skill target modifier and –1 Running MP. Combat Vehicles using Hardened Armor suffer a +1 Driving Skill modifier, but no loss in MP. This MP reduction does not affect the number of Improved Jump Jets that can be mounted (see p. 225, *TM*).

LASER REFLECTIVE (REFLEC/GLAZED) ARMOR

Rules Level: Experimental
Available To: BM, IM, CV, SV, BA, AF, CF
Tech Base (Ratings): Inner Sphere (E/X-X-F), Clan (F/X-X-F)
Game Rules: Each point of laser-reflective armor absorbs up to two points of damage from flamers, lasers, PPCs, and plasma rifles before being destroyed. Leftover single points of damage are discarded, but a damage source will always destroy at least one point of this armor. Only full armor circles removed count when determining if the 'Mech has to make the PSR required from suffering 20+ points of damage. Additionally, heat-causing effects are halved (round down to a minimum of 1 heat point).

Because the armor is more brittle than usual, however, damage from falls, physical attacks, and moving through building walls is doubled against locations protected by it. In addition, damage from area effect weapons (such as artillery) is doubled against locations protected by Laser Reflective Armor.

For aerospace units, damage to a location protected by Laser Reflective Armor is also doubled for a failed Control Roll that would normally cause damage to that location involving any of the following events: entering a space/atmosphere interface hex (see p. 78, *TW*); launching and recovering (see p. 86, *TW*); landing and take-off (see pp. 87-88, *TW*) and ramming attacks (see p. 241, *TW*). In addition, damage from area effect weapons (such as artillery) is doubled against locations protected by Laser Reflective Armor.

Also, armor-piercing weapons such as Armor-Piercing Ammo (see p. 140, *TW*), Tandem-Charge Missiles (see p. 184) and Tasers (see p. 157) receive a +2 modifier on their armor-piercing effects rolls (Critical Hit checks for AP Ammo and Tandem-Charge Missiles; Taser Effects for 'Mech and Battle Armor Tasers) for any successful attack against a location protected by Laser Reflective Armor. Against all other weapon types, Laser Reflective Armor behaves normally.

Excess damage beyond the armor's capacity affects internal structure or structural integrity per the normal rules for the location's structure type. However, remaining points of damage that were created as a result of the damage-doubling effect do not transfer. For example, a 5-point hit would be doubled to 10 points of damage. A location with 9 points of armor would lose all 9 points to this hit, but the remaining single point would be lost, with no damage transfer.

Battle armor-grade Laser Reflective Armor conveys all of the bonuses but features none of the drawbacks.

MODULAR ARMOR

R&D Start Date: 3070 (ComStar), 3073 (Clan Wolf-in-Exile)
Prototype Design and Production: 3072 (ComStar), 3074 (Clan Wolf-in-Exile)

An outgrowth of research into hardened armor, modular armor emerged when ComStar scientists reached a compromise plan in which additional armor plates and panels were affixed to a unit's underlying frame, more like a weapon mount than as standard armor. These add-on panels and reinforcements are bulky but effectively create mini-shields that offered enhanced protection, at the expense of flexibility and weapon space. Armed with ComStar's data, the Exiled Wolves quickly mimicked this idea (and the allies even reportedly shared the specs with the Jade Falcons during a recent summit), but neither the Clans nor the Inner Sphere have yet begun full-scale production.

MODULAR ARMOR

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF
Tech Base (Ratings): Both (D/X-X-F)
Game Rules: When a location containing a slot of Modular Armor is damaged, the damage is subtracted from the Modular Armor capacity first. If any damage remains, it is treated as a new attack against the unit's armor using the remaining damage, and then applying the effects of the armor (if any) against that damage. With penetrating critical hits or armor-piercing weaponry, resolve such effects based on the capabilities of the underlying armor.

If a slot of Modular Armor is hit (for example, through a penetrating or floating critical hit, or a Weapon critical on vehicles that randomly rolls up a Modular Armor slot), all remaining points for that slot (if any) are destroyed. Modular Armor slots that are already depleted are considered to be destroyed items.

Units using Modular Armor suffer a +1 modifier to all Piloting Skill target numbers and subtract 1 Walk or Cruise MP, recalculating the unit's Running/Flank MP normally. Fighters apply the +1 modifier to all Control Roll target numbers, as well as subtracting 1 Safe Thrust MP (recalculating Maximum Thrust) when in an atmospheric hex. Jump-capable units also subtract 1 Jumping MP. Modular Armor prevents Stealth Armor from functioning. These penalties do not accumulate if the unit carries more than one slot of Modular Armor, but they all apply as long as even 1 point of Modular Armor remains on the unit. Once *all* points of Modular Armor a unit carries have been destroyed, the negative effects produced are eliminated.

Modular Armor cannot be "ejected" in gameplay.

REACTIVE (BLAZER) ARMOR

R&D Start Date: 3058 (Draconis Combine), 3061 (Clan Ghost Bear)
Prototype Design and Production: 3063 (Draconis Combine), 3065 (Clan Ghost Bear)

An anti-ballistic variant of ferro-fibrous armor, reactive armor (also known as Blazer armor) uses a series of micro-explosive charges to reduce all damage from shaped-charge-type weapons such as missiles, mortars and artillery weapons. The resulting armor also boasted anti-armor-piercing capabilities, negating some of the newer weapons being developed even then. Unfortunately, reactive armor's inability to reduce the effects of other weapons fire or physical damage—coupled with the occasional hazard of runaway explosions caused by seemingly minor hits—has prevented this armor from reaching full-scale production.

REACTIVE (BLAZER) ARMOR

Rules Level: Experimental
Available To: BM, IM, CV, SV, BA, AF, CF
Tech Base (Ratings): Inner Sphere (E/X-X-F), Clan (F/X-X-F)
Game Rules: Reactive Armor reduces all damage from explosive-type weapons such as missiles, mortars and artillery weapons by half (rounded down, to a minimum of 1 point per hit). Physical attacks, as well as attacks using energy weapons, autocannons, Gauss weapons or other weapons deliver their normal damage and effects to the target, but any weapons that rely on an armor-piercing effect, such as Armor-Piercing Ammo (see p. 140, *TW*), Tandem-Charge Missiles (see p. 184) or Tasers (see p. 157) lose any special armor-penetrating abilities if they strike a location protected by Reactive Armor. Excess damage beyond the armor's capacity affects internal structure or structural integrity per the normal rules for the location's structure type. Note that if a 'Mech location contains nothing but Reactive Armor criticals, this second 2D6 roll is only made once; any result other than a 2 in this case means the critical hit transfers to the next location (see p. 125, *TW*).

In addition to the above rules, any penetrating or "floating" critical hits to a Reactive Armor critical slot not only roll the critical hit again as usual, but also require a second 2D6 roll. (Against a non-'Mech unit, this occurs any time the unit suffers a critical hit of any kind to a location still protected by Reactive Armor.) If this roll yields a 2, all remaining armor in the location (including front and back in the event of torso hits) is destroyed and the internal structure in that location suffers an additional 1 point of damage (with additional critical hit effects checked as normal).

Battle armor-grade Reactive Armor conveys all of the bonuses but features none of the drawbacks.

VEHICLE STEALTH ARMOR

R&D Start Date: 3065 (Capellan Confederation)
Prototype Design and Production: 3067 (Capellan Confederation)

Shortly before the start of the Word of Blake Jihad, Capellan engineers began to adapt their groundbreaking stealth armor for use on Combat Vehicles and aerospace forces as well as BattleMechs. The onset of the Jihad and the predations of the Federated Suns and the Word of Blake have disrupted full-scale production of this armor.

VEHICLE STEALTH ARMOR

Rules Level: Experimental
Available To: CV, SV, AF, CF
Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: Finally adapted for use in vehicles and fighters, Vehicle Stealth Armor offers the same capabilities as BattleMech Stealth Armor, with the same requirements and drawbacks (see p. 142, *TW*), including the need for a functioning ECM suite (of any type) and the heat generation for operating the system. Vehicles and conventional fighters do not require fusion engines or power amplifiers to mount Vehicle Stealth Armor, but do require heat sinks to contend with the heat costs of using the system.

Aerospace fighters with Vehicle Stealth Armor do not receive stealth benefits when operating above the space/atmosphere interface on the space map if they expend any Thrust Points during the turn. When landed, operating in atmosphere, or when operating in space without expending Thrust, the range modifiers to hit an aerospace unit equipped with active vehicular stealth armor apply as they do for ground units (adding a +1 modifier at medium range, and +2 at long or extreme range).

Armored Components: Armored components weigh an additional 0.5 tons (to a minimum of 0.5 tons) for every slot they occupy on a standard BattleMech. For example, an Inner Sphere light engine (which occupies 10 critical slots in all) would add 5 tons to its total weight if installed as an armored component (10 slots x 0.5 tons per slot = 5 tons). The only exception is cockpit systems (including Cockpit Command Consoles), which adds 1 ton of armor to the cockpit weight.

Any component on a unit's Critical Hit Table can be armored except for ammunition bins, CASE and other items that have a "roll again" effect (such as Ferro-Fibrous Armor slots). Items designated as Fixed during construction of a base OmniMech chassis, including all basic items such as engines and cockpits, may not have Component Armor added as a Pod item.

Armored Motive Systems: Armored Motive Systems are available only to Combat and Support Vehicles that have a Tracked, Wheeled, Hover, Hydrofoil, Naval (including submarine), or WiGE motive system. VTOLs, Airships, Rail vehicles, Satellites, and other vehicle types may not install Armored Motive Systems. Clan-made Armored Motive Systems take up 10 percent of the vehicle's total weight, while Inner Sphere Armored Motive Systems take up 15 percent of the vehicle's total weight. Neither system occupies weapon space.

Artemis V Fire-Control System: As with the Artemis IV fire control system, the Artemis V must be incorporated on all of an individual unit's standard SRM or LRM launchers (or their Torpedo-based equivalents). Artemis V is incompatible with Artemis IV, so any unit designed to have Artemis V cannot also carry Artemis IV (and vice versa).

ARMORED COMPONENTS

R&D Start Date: 3059 (Free Worlds League), 3060 (Clan Diamond Shark)
Prototype Design and Production: 3061 (Free Worlds League), 3061 (Clan Diamond Shark)

Though battlefield systems are already built ruggedly enough for the stresses of modern combat, extensive testing with alternative compartmentalizing techniques has enabled engineers to further protect most of a 'Mech's internal components against damage. Cost and weight issues, however, have prevented widespread production of this technology, as well as its expansion into non-'Mech fields.

ARMORED COMPONENTS

Rules Level: Experimental
Available To: BM, IM
Tech Base (Ratings): Both (E/X-X-F)
Game Rules: Each critical slot of an armored component can suffer one critical hit with no effect (a second critical hit to the same slot, however, delivers the same effects as a hit against a standard component). Armored components receive this benefit over all of the component's slots.

Except for ammunition bins, explosive components (such as Gauss rifles) may be installed as armored components, and will explode only upon the second critical hit to a given slot. If an armored component explodes in a location protected by CASE, the CASE system will resolve the effects as per its normal rules

To indicate if a component is armored, circle the number before each of the critical slots the component takes up. When a slot suffers its first critical hit, draw a slash through the circle for that slot of the armored component. Upon a second hit to the same critical slot, draw a line through the item itself to indicate that it has been damaged as normal.

Armored shoulder and hip actuators that have not received a first critical hit also protect a 'Mech from a Limb Blown Off result on the Determining Critical Hits Table. In such a case, the appropriate shoulder or hip slot is treated as though it suffers its first critical hit, and will be destroyed on any subsequent critical hits to its location (a subsequent Limb Blown Off result also affects the unit as normal if an armored shoulder or hip has already suffered its first critical hit). No component armor can prevent a Blown Off result from happening to a 'Mech's head. Additionally, component armor has no effect on damage caused by the use of MASC or a Supercharger: such damage resolves as if the components were unarmored. The armor remains in place, however, and so can still absorb damage from other sources.

ARMORED MOTIVE SYSTEM

R&D Start Date: 3054 (Clan Hell's Horses), 3069 (Free Worlds League)
Prototype Design and Production: 3057 (Clan Hell's Horses), 3071 (Free Worlds League)

As part of a far more ambitious plan to enhance the durability and flexibility of their conventional forces (the same plan that attempted to revisit the Kanga jump tank concept which resulted in the Hephaestus hovertank), Clan Hell's Horses' scientists explored new techniques in reinforcing and protecting the vulnerable motive systems for their ground-based combat vehicles. Though weighty, the concept was at least partially successful. A shift in Horses' priorities, however, prevented widespread development. Rumors of this breakthrough, however, intrigued engineers at IrTech, who recently managed to duplicate the Clan's techniques using Spheroid technology.

ARMORED MOTIVE SYSTEM

Rules Level: Experimental
Available To: CV, SV
Tech Base (Ratings): Inner Sphere (E/X-X-F), Clan (F/X-X-F)
Game Rules: Armored Motive Systems apply an additional –2 modifier to any rolls made on the Motive System Damage Table for a vehicle equipped with this system. A result of 2 or less reflects no effect to the vehicle's motive systems.

ARTEMIS V FIRE-CONTROL SYSTEM

R&D Start Date: 3058 (Clan Goliath Scorpion)
Prototype Design and Production: 3061 (Clan Goliath Scorpion)

A Clan-made enhancement to the Artemis IV fire control system, the Artemis V improves the accuracy of standard LRM and SRM launchers better than ever, but at a cost in bulk and weight, and remains susceptible to hostile ECM suites including the Guardian, Angel and Watchdog.

ARTEMIS V FIRE-CONTROL SYSTEM

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Clan (F/X-X-F)
Game Rules: Missile launchers using a functional Artemis V system apply a –1 to-hit modifier to the attack roll, and add +3 to the Cluster Hits Table (to a maximum modified result of 12). Aerospace units using Artemis V-enhanced launchers receive the same to-hit modifier only if all the launchers in a firing bay employ Artemis V, but determine the standard Attack Value as equal to a roll result of 10 on the appropriate-sized launcher on the Cluster Hits Table, delivered per the standard rules (as a standard-scale hit, in strictly aerospace combat, as with other missile systems, or as Clusters appropriate to the launcher type and size, when fired against ground units). Appropriate Point Defense rules may affect this damage value as normal. In all other respects, treat as Artemis IV (see p. 130, *TW* and pp. 206-207, *TM*).

ARTILLERY

Artillery weapons are a common and effective—but not always reliable—source of fire support in the major ground engagements of the BattleTech universe. Unless otherwise noted, the artillery weapons described here follow the same basic gameplay rules as presented on p. 147, *TO: AR*, for Artillery Weapons, and may not be fired by any applicable aerospace units (except Arrow IV; see p. 148, *TO: AR*) unless the unit is first landed or its special munitions (see p. 171) rules permit otherwise.

ARROW IV ARTILLERY MISSILE

Prototype Design and Production: 2593 (Terran Hegemony)
Introduced: 2600 (Terran Hegemony); 2850 (Clans)
Extinct: 2830 (Inner Sphere)
Recovered: 3044 (Capellan Confederation)

Loosely based on short-range ballistic missile technology, the Arrow IV system is a sophisticated, missile-based artillery weapon that debuted during the Age of War. Lost after the last of the Terran Hegemony's major producers were destroyed in the wake of the Star League's collapse, the technology was revived by Capellan engineers—armed with the knowledge of the Helm Memory Core—from the handful of mothballed samples they unearthed in the mid-3040s.

ARROW IV ARTILLERY MISSILE

Rules Level: Advanced
Available To: BM, IM, CV, SV, AF, CF, SC, DS, MS
Tech Base (Ratings): Both (E/E-F-E)
Game Rules: The Arrow IV Artillery Missile launcher uses the standard rules for Indirect Artillery (see p. 147, *TO: AR*) and Direct-Fire Artillery (see p. 153, *TO: AR*), as well as Counter-Battery Fire (see p. 154, *TO: AR*), but can also employ specialized homing rounds that work in conjunction with friendly Target Acquisition Gear (TAG) systems. The rules for Arrow IV Homing Missile attacks are covered on page 166.

CONVENTIONAL ARTILLERY (THUMPER/SNIPER/LONG TOM/BA TUBE)

Introduced: Pre-spaceflight

Often referred to as "tube artillery" (to differentiate them from missile artillery weapons like the Arrow IV), the conventional artillery pieces of the Succession Wars—the Thumper, Sniper and Long Tom—remain the standard by which most similar weapons are measured. Often employing unguided, unpowered rounds, conventional artillery relies on technology that predates humankind's first steps among the stars.

CONVENTIONAL ARTILLERY (THUMPER/SNIPER/LONG TOM/BA TUBE)

Rules Level: Advanced
Available To: BM, IM, CV, SV, BA, SC, DS, MS
Tech Base (Ratings): Both (B/C-C-C)
Game Rules: Thumper, Sniper, Long Tom and BA Tube artillery weapons use the standard rules for Indirect Artillery (see p. 147, *TO: AR*) and Direct-Fire Artillery (see p. 153 *TO: AR*), as well as Counter-Battery Fire (see p. 154, *TO: AR*), and may use a broad range of alternate ammunition loads, including standard, Smoke, Anti-Personnel, Incendiary and Thunder/FASCAM rounds. Note that BA Tube artillery is fired in squads and damage is multiplied by remaining troopers. Ammunition expenditure is tracked during game play. Note that BA Tube artillery is fired in squads and damage is multiplied by remaining troopers: a roll on the Cluster Hit Table is not required. BA Tube artillery may be used against airborne aerospace targets using the flak rules for direct-fire artillery (see *Flak*, p. 153, *TO: AR*). Ammunition expenditure is tracked during game play.

CRUISE MISSILE ARTILLERY

R&D Start Date: 3060 (Federated Commonwealth)
Prototype Design and Production: 3065 (Federated Suns)

Though technically a proven, pre-spaceflight concept, cruise missiles faded from the military stage when spacecraft—and capital-scale missile technologies—became prevalent. The modern tactical cruise missile artillery platforms being developed are effectively heavily modified versions of the Arrow IV launch system, but boast much greater range and damage potential at a significant loss in accuracy.

CONSTRUCTION RULES

Artillery: All of the Artillery Weapons presented here may be installed on their respective Available Unit types in accordance with the unit's standard construction rules. BA Tube artillery may only be mounted in the body location. Ammunition for Artillery Weapons must always be purchased in 1-ton lots. During construction, BA Tube artillery ammunition is treated in the same way as BA missile ammunition. BA Tube artillery ammunition is treated in the same way as battle armor missile ammunition, with one slot required for every four two-round clips.

Artillery Cannons: All of the Artillery Cannons presented here may be installed on their respective Available Unit types in accordance with the unit's standard construction rules (for aerospace units, Artillery Cannons are classified as autocannons and may be mounted as part of an autocannon bay). Ammunition for Artillery Cannons must always be purchased in 1-ton lots. The weight of any Artillery Cannons mounted on a unit does not impact the weight of any Targeting Computer equipment mounted on the same unit.

Autocannon: All versions of the Hyper-Velocity Autocannon, ProtoMech Autocannon and Clan Rotary Autocannon may be installed per the appropriate unit's standard construction rules for mounting weapons. ProtoMechs can only mount the ProtoMech AC in a Main Gun mount.

Ammunition for most of the advanced autocannon types featured here may only be installed in full-ton lots. ProtoMech ACs, which are intended for ProtoMech use, install ammunition on a per-shot basis; each shot of ProtoMech AC ammunition—in kilograms—may be found by dividing the number 1,000 by the weapon's number of shots per ton. Unless stated otherwise in the weapon's individual rules, these weapons may only use their own standard ammunition types.

CRUISE MISSILE ARTILLERY

Rules Level: Experimental
Available To: CV, SV, SC, DS, MS
Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: In game play, Cruise Missile Artillery functions just like artillery systems using standard munitions (see p. 165), with the following exceptions:

- Cruise Missiles may not deliver any Direct-Fire Artillery attacks (see p. 153, *TO: AR*).
- Cruise Missiles use a different Indirect Flight Time than conventional artillery or Arrow missiles, as indicated in the Indirect Artillery Flight Times Table (see p. 149, *TO: AR*).
- Cruise Missile damage radiates more widely from the impact hex, as indicated in the Artillery Ordnance Table (see p. 152, *TO: AR*).

ARTILLERY CANNONS

R&D Start Date: 3000 (Lyran Commonwealth), 3030 (Clan Wolf)
Prototype Design and Production: 3012 (Lyran Commonwealth), 3032 (Clan Wolf)

An alternative approach to artillery weapons, artillery cannons are smaller, snub-nosed versions of the common tube artillery pieces. While useful for area-effect attacks, artillery cannons suffer from a sharp reduction in range compared to their standard cousins. Though well past the prototype stage, artillery cannons have yet to begin consistent, full-scale production.

ARTILLERY CANNONS

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Both (B/X-F-E)
Game Rules: Artillery Cannons are ballistic weapons, rather than artillery weapons, and may not be used to deliver Indirect Artillery attacks. In ground combat, Artillery Cannon attacks may be resolved normally or using the rules for indirect LRM fire (see p. 111, *TW*), but damage both the target's hex and all adjacent hexes in accordance with the standard rules for artillery damage (see p. 150, *TO: AR*). Artillery cannons never apply the –4 immobile target to-hit modifier, regardless of whether the target is a hex, is shut down or immobile, and so on. Missed shots by Artillery Cannons scatter per standard Artillery rules (see p. 150, *TO: AR*), but when rolling for scatter distance (from the intended target), divide the MoF result in half (rounding up) to determine the number of hexes the missed shot scatters, to a maximum of the number of hexes between the attacker and intended target.

Aerospace units employing Artillery Cannons against other aerospace units use them as autocannons, and cannot deliver damage effects into adjacent hexes. However, the damage type is still considered AE.

Artillery Cannons may not use any special munitions present in *Tactical Operations*, but other products may introduce special munitions for these weapons. As area-effect weapons, Artillery Cannons cannot benefit from the use of a Targeting Computer.

AUTOCANNONS

Spurred on by Clan innovations in weapon technology, designers across the Inner Sphere have expanded their efforts to enhance autocannons. Inspired by the rediscovered LB-X and Ultra series, several new autocannon variations have entered production stages over the past twenty years.

HYPER-VELOCITY AUTOCANNON (HVAC)

R&D Start Date: 3055 (Capellan Confederation)
Prototype Design and Production: 3059 (Capellan Confederation)

The Hyper-Velocity Autocannon (HVAC) fires a special gelled shell propellant. This results in a round that travels much faster and produces accurate damage at greater ranges than standard autocannons. The special munitions, however, require hardier components than those in standard ACs, resulting in a larger and heavier autocannon. The lingering danger of catastrophic misfeed has so far prevented this weapon system from entering full-scale production.

HYPER-VELOCITY AUTOCANNON (HVAC)

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Inner Sphere (D/X-X-F)
Game Rules: HVACs function exactly like standard ACs in combat, with the following exceptions:

- On a to-hit roll result of 2, the chambered round's propellant ignites within the barrel, inflicting internal explosion damage equal to that of a single round from the HVAC and destroying all the HVAC's critical slots (in addition to any other critical hits rolled up from the explosion). Treat this explosion as an ammo explosion.
- If a HVAC is fired in any type of atmosphere, the hex behind the firing unit (and opposite the firing direction, if applicable) is filled with heavy smoke (see p. 45, *TO: AR*). This smoke starts at the firing unit's current level, taking into account both its height and the underlying terrain (in the case of buildings and Mobile Structures, the current level is the height of the level where the weapon is mounted). It also fills the 2 elevations above that level. If either elevation is occupied by a hill, building, Large Vehicle, Mobile Structure or DropShip, both elevations of smoke occupies the firing unit's hex. For a DropShip, Mobile Structure, Large Naval Vessel or building, the smoke fills the first hex along the LOS of the attack instead of behind the unit. The smoke dissipates at the start of the End Phase of the turn after the weapon was fired; if using Wind Conditions (see p. 55, *TO: AR*), the smoke will drift during the End Phase in which it was fired, as appropriate.

PROTOMECH AUTOCANNONS (PROTO-AC)

Introduced: 3073 (Clan Blood Spirit)

In an effort to expand on the weapons opportunities for ProtoMechs, Blood Spirit scientists evidently dusted off some obsolete early Clan efforts to miniaturize standard autocannons. Though most such weapons vanished by the time of the Clan invasion, enough mothballed samples and specs evidently existed to spur the development of a new series aimed at ProtoMech use (but usable by other heavy combat units as well), likely inspired by tales of the new Inner Sphere Light autocannon series. As yet, the Spirits have not reportedly placed their so-called ProtoMech ACs into full-scale production, preferring to be sure of the snub-nosed weapons' reliability in live fire tests.

PROTOMECH AUTOCANNONS (PROTO-AC)

Rules Level: Advanced
Available To: BM, IM, PM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Clan (F/X-X-F)
Game Rules: ProtoMech Autocannons use the same rules as standard autocannons, including the ability to use special munitions (when using armor-piercing ammo and checking for armor-piercing critical hits, apply the following modifiers: PAC 2 (–4), PAC 4 (–3), PAC 8 (–2). When mounted on ProtoMechs, ProtoMech ACs are treated in the same manner as ballistic weapons on vehicles, and so do not generate heat.

CLAN ROTARY AUTOCANNON (RAC)

R&D Start Date: 3069 (Clan Diamond Shark)
Prototype Design and Production: 3073 (Clan Diamond Shark)

Clan Diamond Shark scientists began work on their own analog to the rotary autocannon in the late 3060s using lighter Clan technologies. The resulting weapon system promises to offer the Clans a weapon similar to the Inner Sphere rotary AC in many ways, yet far more effective.

CLAN ROTARY AUTOCANNON (RAC)

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Clan (F/X-X-F)
Game Rules: The Clan Rotary Autocannon operates as a rapid-fire weapon (see p. 114, *TW*) and follows the rules for rotary autocannons (see p. 140, *TW*).

BATTLE ARMOR LB-X AUTOCANNON (BA LB-X)

Introduced: 3075 (Clan Nova Cat)

In order to defend against enemies on all sides, Clan Nova Cat scientists have created a battle armor version of the cluster-shot autocannon. Unfortunately, it is too heavy to be carried by any existing Nova Cat battlesuit.

BATTLE ARMOR LB-X AUTOCANNON (BA LB-X)

Rules Level: Advanced
Available to: BA
Tech Base (Ratings): Clan (F/X-X-E)
Game Rules: The BA LB-X causes four separate 1-point cluster hits. Resolve attacks by the BA LB-X like a missile attack (see p. 218, *TW*). When swarming, the BA LB-X always causes the full 4 damage.

BATTLE ARMOR MECHANICAL JUMP BOOSTER

R&D Start Date: 3065 (Lyran Alliance)
Prototype Design and Production: 3070 (Lyran Alliance)

Designed to duplicate the experimental BattleMech Mechanical Jump Booster system on a smaller scale, Battle Armor Mechanical Jump Boosters primarily promise to eliminate a jump-capable battlesuit's dependence on chemical fuels. The original concept for these boosters limited them to quadruped suits. However, by the time the system reached prototype stage, a more innovative piston design made them usable by bipedal battle armor as well.

Though the lack of a BattleMech's long stride and the extended jump jet acceleration phase renders Battle Armor Mechanical Jump Boosters sharply limited in range, the 30-meter leaps made possible by these jump boosters do offer a useful edge in ground speed.

CONSTRUCTION RULES

Battle Armor Mechanical Jump Booster: A suit of battle armor may mount only one Mechanical Jump Booster system. The boosters are limited to 1 Jump MP, but can receive added Jump bonus points through the use of a partial wing (though no such benefit applies for the use of Battle Armor Jump Boosters). A suit with Battle Armor Mechanical Jump Boosters also gains 1 additional Ground MP, even if this bonus exceeds the unit's normal maximum Ground MP limit.

Battle Armor Mechanical Jump Boosters are incompatible with Battle Armor Myomer Boosters.

Battle Armor Myomer Booster: A suit of battle armor may mount only one Battle Armor Myomer Booster system. The boosters add 1 Ground MP to Assault and Heavy suits, and 2 Ground MPs to Medium, Light and PA(L) suits, even if this booster-provided bonus exceeds the unit's normal maximum Ground MP limit. Battlesuits equipped with Myomer Boosters may not mount Stealth or Mimetic Armor. Like armor, myomer slots may be broken up among the battle armor's various body locations.

Battle Armor Myomer Boosters are incompatible with Battle Armor Mechanical Jump Boosters.

Battle Armor Detachable Weapon Pack (DWP): Only Medium, Heavy or Assault battle armor can install a Battle Armor DWP, and may not install this item if the suit's resulting Ground MP will fall below 0. Suits reduced to a Ground MP of exactly 0 for mounting a DWP receive a maximum Ground MP of 1 while carrying any DWPs. Multiple DWPs have no additional effect on a unit's ground MP.

A DWP cannot be installed in any type of modular mount. Each DWP occupies 1 slot in the suit's body or arm, and may carry only one weapon (and its ammunition). Such weapons may include any battle armor weapon except for missile launchers (including LRMs, SRMs, Advanced SRMs, Rocket Launchers and Narcs).

While mounted in a DWP, the weapon and its ammunition are calculated at only 75 percent of their original weight (rounded up to the nearest 5 kilograms), and that weight is used when computing the suit's total weight during construction. (Note that a suit still may not exceed its designed maximum weight in this fashion; it simply treats a DWP-mounted weapon and its ammunition as a lighter weapon during construction.) Because the weapon is installed semi-externally, the normal slot size of a DWP-mounted weapon is not counted against the suit's slot capacity.

BATTLE ARMOR MECHANICAL JUMP BOOSTER

Rules Level: Experimental
Available To: BA
Tech Base (Ratings): Inner Sphere (E/ X-X-F)
Game Rules: Battle Armor Jump Boosters act like standard jump jets, with the following exceptions:

- Because the boosters cannot be steered in mid-flight, Battle Armor using this system cannot use Jump MP and Initiate Anti-'Mech Attacks in the same turn.
- Mechanical Jump Boosters can be used even when submerged (as long as the armor is otherwise capable of underwater operation).
- A single battlesuit may mount standard jump jets and Mechanical Jump Boosters, but cannot use both systems in the same turn. Having one system does not add to the Jumping MP provided by the other, but Battle Armor Mechanical Jump Boosters may also receive the Jumping MP bonus provided by a partial wing (if the suit has one).
- Battle Armor Mechanical Jump Boosters may be used *without* jumping to enhance a suit's standard ground movement. This mode of travel—which replaces the suit's usual stride with a swifter, loping gait more akin to making miniature hops—adds +1 to the suit's Ground MP.
- Mechanical Jump Boosters have no effect when jumping down: the jump may still be made, but the unit takes damage as if it fell as per normal.

BATTLE ARMOR MYOMER BOOSTER

R&D Start Date: 3066 (Clan Ice Hellion)
Prototype Design and Production: 3072 (Clan Ice Hellion)

Initially conceived as a spin-off from failed Ice Hellion efforts to create an enhanced BattleMech MASC system, the battle armor-scaled myomer booster offers to increase the speed and strength of a given battlesuit design. However, the system's greatest drawback is the tremendous amount of heat generated—which not only makes it impossible to employ such enhanced myomer suits in a stealth role, but requires the installation of bulky cooling systems to avoid parboiling the trooper within.

BATTLE ARMOR MYOMER BOOSTER

Rules Level: Experimental
Available To: BA
Tech Base (Ratings): Clan (F/X-X-F)
Game Rules: Battle Armor Myomer Boosters increase the maximum Ground MP for PA(L), Light- and Medium-weight suits by 2 MP. Heavy- and Assault-weight suits receive a 1-point Ground MP bonus. This movement modifier may take the suit movement beyond its normal upper limit.

Battlesuits equipped with Myomer Boosters generate excessive heat, making them incapable of operating as hidden units and rendering any Stealth or Mimetic Armor ineffective. ECM systems will still affect other electronic systems that pass through the ECM "bubble," but the suits themselves remain visible on sensors due to their heat signature.

All Leg and Swarm Attacks performed by battle armor with Myomer Boosters add 2 points (per active trooper) to the total damage inflicted by a successful assault.

BATTLE ARMOR DETACHABLE WEAPON PACK (DWP)

Introduced: 3072 (Clan Hell's Horses), 3073 (Word of Blake)

Recognizing the need for even heavier weapon loads on battle armor, both the Inner Sphere and the Clans have developed the Detachable Weapon Pack (DWP), though the Hell's Horses first debuted the system on their new Rock Golem assault battlesuits. Derived from the proven design of detachable missile pack modules seen on classic Elemental armor, these semi-external non-missile mounts enable battlesuits to exceed their normal load maximums, but at a significant cost in mobility.

BATTLE ARMOR DETACHABLE WEAPON PACK (DWP)

Rules Level: Advanced
Available To: BA
Tech Base (Ratings): Both (E/X-X-F)
Game Rules: Each DWP enables a suit to carry a single non-missile weapon and its ammunition semi-externally, so that heavier and larger weapons may be mounted in slight excess of the suit's design. This expanded carrying capacity, however, impairs the suit's movement and renders it incapable of using Jump MP for as long as the battle armor carries even a single DWP. Medium suits using DWPs also suffer a –3 Ground MP penalty, while heavy and assault suits using DWPs suffer a –2 Ground MP penalty. Mechanical Jump Boosters or Myomer Boosters can increase the Ground MP of a suit using DWPs, but may not be used for Jumping movement as long as the DWP is attached.

A battle armor squad can jettison one, some, or all of the DWPs on its component suits during the End Phase of any turn to regain mobility, though doing so sacrifices the weapons mounted in the DWPs. A battle armor unit only regains full mobility from dumping its DWPs if all DWPs from all of the squad's troopers are jettisoned.

BATTLEMECH HARJEL SYSTEM

R&D Start Date: 3056 (Diamond Sharks), 3062 (Lyran Alliance),
Prototype Design and Production: 3059 (Diamond Sharks), 3067 (Lyran Alliance)

Inspired by the HarJel hull-sealing system used aboard Clan spacecraft and battle armor, both the Clans and Inner Sphere have developed a variant for 'Mechs and vehicles. After being "leaked" to certain pro-Clan stables on Solaris, the Inner Sphere gained access to this technology as well, but since both the Spheroid and Clan versions rely on large amounts of actual HarJel to work, this system has yet to see widespread production and remains in the prototype stage.

BATTLEMECH HARJEL SYSTEM

Rules Level: Experimental
Available To: BM, IM, CV, SV
Tech Base (Ratings): Both (E/X-X-E)
Game Rules: When operating underwater (see p. 121, *TW*) or in a vacuum (see *Vacuum*, p. 52, *TO: AR*) a unit equipped with the HarJel system is not required to check for hull breaches for any location that features a BattleMech HarJel slot *and* has any armor remaining in that location. However, it does not prevent the need to take crush depth checks (see p. 40, *TO: AR*), nor does it prevent crushing if it does occur, though a 'Mech with one or more HarJel slots has a +1 TN modifier to any such checks. Hull breach is still automatic, however, once all armor is destroyed, whether or not the unit mounts a HarJel system in that location. HarJel does not protect any body section that does not have a HarJel slot.

Regardless of the environment in which the unit is operating, a critical hit to a BattleMech HarJel System slot immediately releases its full load of self-hardening sealant, flooding the affected location and disabling all components within it. Treat any weapons or equipment in a location flooded in this fashion as effectively destroyed (though Gauss weapons and other volatile equipment will not explode), but they can still be damaged by subsequent critical hits. Ammunition in a HarJel-flooded section remains explosive and cannot be dumped. Clearing a flooded section and restoring all affected components requires twice as much time as normal.

BATTLEMECH MELEE WEAPONS

Since the Lyrans began fielding the *Hatchetman* in 3025, BattleMech-scaled melee weapons have carved out a dramatic and permanent niche in the arsenals of many Inner Sphere armies. Production-level triple strength myomer has only fueled the growing number of weapons that seek to improve upon the steadfast hatchet. Nowhere is this more evident than the arenas of Solaris VII, where deadlier, showier and more creative ways to crush the enemy in close combat have evolved.

Game Rules (General): Unless otherwise noted, 'Mechs armed with multiple BattleMech Melee Weapons of any type may only attack with one such weapon during a given Physical Attack Phase.

CHAIN WHIP

R&D Start Date: 3069 (Lyran Alliance)
Prototype Design and Production: 3071 (Word of Blake)

Initially researched as another exotic weapon for the Solaran arenas, myomer-cable "whips" were first tested during the initial Blakist attacks on Solaris VII as a special means of close combat aimed at entangling and capturing invader units. Though these initial prototypes failed, the so-called chain whip emerged when the Word of Blake forces on Solaris modified the concept with armor-alloy chains for added strength and resilience. Though the damage from a chain whip impact is not terribly impressive, the entangling effect has proven useful for limiting the mobility of opposing 'Mechs.

CONSTRUCTION RULES

BattleMech HarJel System: BattleMechs and IndustrialMechs may mount a HarJel system in any body location(s) desired, except for the location containing the cockpit. Vehicles may mount HarJel systems in any location(s) desired except the Body and the Rotor.

BattleMech Melee Weapons: All of the advanced BattleMech melee weapons described in these rules may be mounted in accordance with all standard 'Mech construction rules, with special construction rules as noted below. A 'Mech can mount only one physical attack weapon per location, unless one of those weapons is a shield or spikes, such that a single location might have a single physical attack weapon, one shield and spikes.

Chain Whip: A Chain Whip weighs 3 tons and occupies 2 critical slots. A Chain Whip can only be mounted in a 'Mech's arm.

Claws: Each Claws weighs 1 ton and occupies 1 critical slot for every 15 tons of BattleMech weight (rounded up to the nearest ton). Claws may only be installed only in the arms of a 'Mech, where it automatically replaces the hand actuator (but still requires both the upper and lower arm actuators). Two Claws, replacing each hand actuator in both arms, may be mounted.

Flail: The Flail weighs 5 tons and occupies 4 critical slots. Flails can only be mounted in a 'Mech's arms. The Flail's mount replaces the 'Mech's hand actuator, but still requires the upper and lower actuators.

Lance: A Lance weighs 1 ton and occupies 1 critical slot for every 20 tons of 'Mech weight (rounded up to the nearest ton). Lances may only be mounted in a 'Mech's arms. Installing Lances does not require a hand actuator to be located in the same arm, but arms intended to use Lances must have shoulder, upper and lower arm actuators.

Mace: The Mace weighs 1 ton and occupies 1 critical slot for every 10 tons of 'Mech weight (rounded up to the nearest full ton). A Mace can only be mounted in a 'Mech's arm, and then only in an arm that includes a hand actuator.

Shield: Shields come in Small, Medium and Large sizes, and may only be mounted in arm locations. Regardless of size, only 1 Shield may be mounted per arm. Shields have no special actuator requirements, but each missing arm or hand actuator in the arm containing the shield reduces its DA and DC by 1 (see p. 103). If pod-mounted, Shield-based movement modifiers apply to the unit once added.

Spikes: Spike clusters weigh half a ton and occupy 1 critical slot; only one cluster may be mounted in a given location. Torso locations cover both front and back arcs. If pod-mounted, Shield-based movement modifiers apply to the unit once added.

Talons: Talons must be placed in all of the 'Mech's legs, and require 2 critical slots per leg to install. The total weight of all Talons combined is always 1 ton per 15 tons of 'Mech weight (rounded up to the nearest whole ton).

Vibroblades: 'Mech Vibroblades come in three fixed sizes and otherwise follow the standard rules for mounting swords.

CHAIN WHIP

Rules Level: Experimental
Available To: BM, IM
Tech Base (Ratings): Inner Sphere (C/X-X-F)
Game Rules: Against all unit types, the Chain Whip delivers its attack using the same rules as a BattleMech Sword (see pp. 146-147, *TW*), with the same to-hit modifiers, and basic Physical Attack rules. However, the whip's damage is not modified for the use of Triple-Strength Myomer or the weight of the Attacker, as the heavy chain and its myomer cable lack rigidity. Against 'Mech and ProtoMech units, the whip can perform additional bonus attacks if the hit location result yields a target's arms or legs, and the hit does not destroy the limb struck.

In the case of a leg hit on a 'Mech, the whip-wielding unit may attempt to pull its opponent off balance by making a second (bonus) attack immediately after the successful whip attack occurred (during the same Physical Attack Phase). This bonus attack applies an additional –2 modifier if the whip-wielding unit has active Triple-Strength Myomers *and* the target does not. If successful, the attack delivers no damage, but the defending unit must make a successful Piloting Skill Roll at a +3 target modifier to avoid falling.

In the case of an arm hit on a 'Mech (or either the arms or legs of a ProtoMech), the whip-wielding unit may attempt to grapple its opponent, preventing either unit from moving out of their respective hexes the following turn. Once again, this is treated as a bonus attack in the same Physical Attack Phase that applies an additional –2 to-hit modifier if the whip-wielding unit has active Triple-Strength Myomers and the target does not. For every weight class (ProtoMech, Light, Medium, Heavy and so forth) the Attacker outweighs the Defender, a –1 to-hit modifier applies to the grapple attack; if the Defender outweighs the Attacker, a +1 modifier applies for each weight class of difference.

If this bonus attack is successful, the Defender is grappled. Neither unit may move from their respective hexes in the following turn (unless the Attacker chooses to release the Defender by expending any MP in the following Movement Phase). While grappled, both units may make weapon and physical attacks normally, using weapons in any location except for the grappling unit's whip arm and the grappled arm. Apply a –2 to-hit modifier to any attack made by either of the units against the other.

Each turn after making a successful grapple, the grapple roll (but not the initial to-hit roll) must be made to maintain the grapple. If a grapple roll fails, the target is freed. Destruction of the whip or the entangled limb also breaks the grapple, at the end of that Phase. The target falling while grappled does not break the grapple.

CLAWS

Introduced: 3060 (Lyran Alliance)

These specially modified hand actuators are an on-again, off-again crowd favorite in arenas across the Inner Sphere, prompting numerous redesigns until Solaris Arms of Solaris set the final standard in the early 3060s on their *Mantis* dueling 'Mech. Intended for raw, armor-rending strength, claws are far less dexterous than standard hand actuators, making them ill-suited to anything but close-quarters combat.

CLAWS

Rules Level: Advanced
Available To: BM, IM
Tech Base (Ratings): Inner Sphere (B/X-F-E)
Game Rules: Claw attacks are resolved per the rules of a standard punching attack (see p. 145, *TW*), but with an additional +1 to-hit modifier due to the Claw's bulk. If successful, the Claw inflicts 1 point of damage for every 7 tons of BattleMech weight (rounded up), modified for any actuator damage and active Triple-Strength Myomer use.

'Mechs with Claws may lift objects as normal, but must make a successful Piloting Skill Roll with a +2 target modifier to avoid damaging them. If the object is extremely fragile (such as a human being), an additional +1 modifier applies (at the gamemaster's discretion or mutual player agreement). Claws may not be combined with any other melee weapon in the same arm, but they may be used to grab and wield an improvised club, with an additional +2 to-hit penalty (see pp. 145-146, *TW*). A failed attempt to lift an object effectively destroys it, unless using the *Picking Up and Throwing Objects* rules (see p. 90, *TO: AR*), in which case those rules take priority.

FLAIL

R&D Start Date: 3054 (Federated Commonwealth)
Prototype Design and Production: 3057 (Federated Commonwealth)

Inspired by the classic and familiar wrecking ball, the BattleMech-scale flail is nothing more than a ball of spiked tungsten alloy attached to a 'Mech via a short, reinforced myomer tether. Though balanced for swinging, it is still somewhat difficult to use effectively. A missed attack can have grave consequences for the attacker, as the free-swinging flail can double back on its own user.

FLAIL

Rules Level: Experimental
Available To: BM, IM
Tech Base (Ratings): Inner Sphere (B/X-X-E)
Game Rules: A Flail attacks as a Physical Weapon (see p. 146, *TW*) with a +0 to-hit modifier, and on a successful strike it delivers 9 points of damage that is not modified by actuator damage or the use of special myomers.

On a Flail attack roll result of 2, the Attacker automatically misses the intended target, and instead strikes its own unit. Such a self-inflicted strike delivers only 5 points of damage, resolved using the Front Hit Location Table. Additionally, the Attacker must make a Piloting Skill Roll to avoid falling from being thrown off-balance by the shock of such a critical miss (with all normal Piloting Skill modifiers applied).

LANCE

R&D Start Date: 3061 (Lyran Alliance)
Prototype Design and Production: 3064 (Lyran Alliance)

More of a BattleMech stiletto than a 31st-century translation of an actual medieval weapon, the BattleMech-scale lance combines armor-piercing capabilities with a lightweight design. Though an unpopular weapon overall, due to the sheer finesse required to make it effective, the lance nevertheless enjoyed a small yet devout following in several lower-class leagues on Solaris VII (leading to the slightly enhanced design that debuted just before the Word seized the planet in 3068).

LANCE

Rules Level: Experimental
Available To: BM, IM
Tech Base (Ratings): Inner Sphere (C/X-X-F)
Game Rules: A Lance attacks as a Physical Weapon (see p. 146, *TW*) with a +1 to-hit modifier, and on a successful strike it delivers damage equal to the unit's tonnage divided by 5 (round up). If armor remains in the location after a Lance attack, the Attacker rolls 2D6. On a result of 10 or higher, the strike penetrates the remaining armor and inflicts 1 point of internal damage. A Lance that penetrates armor in this fashion rolls on the Determining Critical Hits Table with a –2 modifier to the roll result. (A successful Lance attack that strikes unarmored internal structure rolls for Determining Critical Hits normally.)

MACE

Introduced: 3061 (Lyran Alliance)

A stylized club designed for close-quarters arena combat, the 'Mech-scale mace first appeared in the stables of Solaris VII as a stylized form of the basic hatchet. As popularity (and the sheer number of visual styles) grew, Solaran engineers developed a heavier and more distinctive weapon, though it wasn't until the early 3060s that the weapon reached a reliable, production-level standard.

MACE

Rules Level: Advanced
Available To: BM, IM
Tech Base (Ratings): Inner Sphere (B/X-F-D)
Game Rules: The Mace attacks as a Physical Weapon with a +1 to-hit modifier, but may use the Hatchet's ability to use the Punch or Kick Hit Location Tables, applying all those rules appropriately (see p. 146, *TW*).

If a Mace attack misses its target, the Attacker must make a Piloting Skill Roll with a +2 target modifier to avoid falling.

SHIELD

R&D Start Date: 3065 (Lyran Alliance)
Prototype Design and Production: 3067 (Lyran Alliance)

From hastily wielded armor plates to well designed 'Mech additions, shields are a common sight in the lower-class arenas of several game worlds. The most effective versions, of course, were developed on Solaris shortly before the Jihad (where they had yet to advance beyond the prototype phase before Blakist forces attacked and seized that world). If used well, the 'Mech-scale shield has definite potential in combat, though its bulk can hinder a 'Mech's mobility and combat effectiveness.

SPIKES

Introduced: 3051 (Federated Commonwealth)

Though long used as a popular cosmetic enhancement, providing BattleMechs with a fearsome and barbaric look, it was not until after the demonstrated effectiveness of the hatchet as a 'Mech-scale physical attack weapon that spikes were seriously considered as a potentially viable new weapon (and passive defense system) for close combat. Through the testing grounds of the Game World, spikes gradually evolved from simple decorative cones to the much more effective protrusions they are today. Despite their proven capability, however, spikes remain a rare sight beyond the arenas.

TALONS

Introduced: 3072 (Jade Falcons)

A curious innovation considering the Clans' disdain for physical combat, the Jade Falcons' talons arose as a kind of "functional cosmetic" similar to the spikes on Solaris 'Mechs. Spotted only sporadically on customized variants to date (likely serving as battlefield test-beds), they have demonstrated potential in enhancing the effectiveness of kicking and Death from Above attacks.

SHIELD

Rules Level: Experimental
Available To: BM, IM
Tech Base (Ratings): Inner Sphere (D/X-X-F)
Game Rules: All three sizes of BattleMech Shield have a Damage Absorbance (DA) factor, a Damage Capacity (DC) factor, a Shield Bash to-hit modifier and a Mobility Modifier (as indicated in the 'Mech Shield Table below). A shield's DA indicates how effective it is against incoming damage, while its DC indicates if it is still functioning. A shield's Bash modifier indicates the to-hit modifier applied when making a special Shield Bash attack, and its Mobility Modifier indicates the shield's effect on a 'Mech's Walking, Running and Jumping MPs when carrying a shield. A shield with either a DC or DA value of 0 is no longer effective in combat, but continues to impose movement modifiers until all of the shield's critical slots are destroyed (or the shield-carrying arm is destroyed/blown off). Shields cannot be jettisoned.

Shields are primarily used to defend against most weapon and physical attacks (though they cannot protect against damage caused by successful Death-from-Above attacks, Charge attacks, mines, damage from buildings, falls or heat-effect damage, and they have no effect on floating criticals scored against locations being protected). When a shield is used to defend a location against an attack, subtract the Shield's current DA from the attack damage and apply any remaining points to the hit location protected by the shield. (Damage that does not strike a shield is resolved normally.) Regardless of whether or not the damage penetrates the shield, the shield reduces its DC by 1. Weapons using the Cluster Hits table regard every cluster as a separate hit against the shield. Critical hits to the shield subtract 1 from the DA and 5 from the DC, while hits to the actuators of the arm mounting a shield subtract 1 from DA and 1 from DC (double for the shoulder).

To use a shield, the user must declare at the end of his Movement Phase whether the shield is being employed in passive, active or inactive defense modes.

Active Defense Mode: In this mode, a shield protects all of the 'Mech's locations except for the rear center torso, the side torso (front and rear) opposite to the shield-using arm, and the opposite-side arm and leg. Weapons (including AMS) mounted in a shield-protected location cannot be used in the same turn the shield is protecting them in active defense mode, nor can a unit using a Shield in this fashion make a physical attack that involves its protected locations. If a unit has two shields, both in active defense mode, and is hit in the center torso, the unit's controller chooses which shield takes the hit.

Passive Defense Mode: In this mode, a shield protects only its own arm and the front side torso adjacent to that arm. Weapons and equipment protected by a shield in passive defense mode can be used in the same turn, but at a +2 to-hit modifier. During the Physical Attack Phase, a shield in this mode may also be used to deliver a special attack called a Shield Bash (as long as no other weapons in the shield arm were used in the Weapon Attack Phase). The Shield Bash attacks as a Physical Weapon Attack with a to-hit modifier equal to the value shown in the Shield bash column of the Shield Table below. This attack uses the Hatchet's ability to use the Punch or Kick Hit Location Tables, applying all those rules appropriately (see p. 146, *TW*). The damage from a successful Shield Bash is equal to the Shield's current DA. This damage is not modified by system such as AES, TSM, etc. After a successful Shield Bash, the shield reduces its DC (but not its DA) by 1 point.

Inactive Defense Mode: In this mode, the Shield only protects the arm upon which it is mounted and applies a +1 to-hit modifier to any attacks made using that arm.

'MECH SHIELD TABLE

Size	DA	DC	Shield Bash	Mobility
Large	7	25	–4	–1MP, No jump
Medium	5	18	–3	–1MP
Small	3	11	–2	—

SPIKES

Rules Level: Experimental
Available To: BM, IM
Tech Base (Ratings): Inner Sphere (C/X-E-E)
Game Rules: Defensively, a cluster of spikes reduces the damage from any successful physical attacks against a spiked location by 4 points (to a minimum of 1) that an Attacker would otherwise inflict; if that location is also protected by Ferro-Lamellor Armor (see p. 91), the damage reduction from the spikes is applied first, then the damage reduction from the Ferro-Lamellor Armor is applied. In addition, the attacker suffers 2 points of damage (divided equally) to the body location(s) that delivered the attack (center torso for a 'Mech charge; the appropriate arm for a single-armed punch; the appropriate leg for a kick; both legs for Death From Above; both arms for a push), unless the attack was delivered using a club or other physical attack weapon (like a hatchet).

Offensively, an attacking 'Mech mounting spikes in torso locations may increase the damage inflicted on its opponent during a Charge Attack by declaring such intent before making the to-hit roll. A successful charge with spikes used in this fashion adds 2 points of damage for every torso cluster of spikes the attacking unit has, and absorbs 4 points of damage as normal for any damage groups the Attacker sustains to a spike-protected location.

The Attacker must also roll 2D6 each time a location with spikes suffers damage. On a result of 9 or higher, the cluster suffers a critical hit and is destroyed. If the spike's location is also protected by Ferro-Lamellor Armor (see p. 91), and the damage is reduced to 0, this roll for a possible critical hit is ignored.

TALONS

Rules Level: Experimental
Available To: BM, IM
Tech Base (Ratings): Clan (E/X-X-F)
Game Rules: When performing a kick or a Death from Above attack, multiply damage by 1.5 (round to nearest whole number; .5 rounds up). If using mixed-technology rules, a unit mounting Talons with Triple-Strength Myomers receives the TSM damage bonus for kick attacks, but not for Death From Above attacks. Critical hits to the Talons or the foot actuator in the leg where they are mounted destroy the Talons.

VIBROBLADE

R&D Start Date: 3059 (Draconis Combine)
Prototype Design and Production: 3065 (Draconis Combine)

Vibroblade technology has been around for centuries, but only recently has been adapted for use in 'Mech-scale physical combat weapons. Requiring sophisticated cooling and vibration control systems, vibroblades are seen as more suited to the arena of Solaris VII than the battlefield, which is why these high-frequency blades have yet to advance to full-scale production.

VIBROBLADE

Rules Level: Experimental
Available To: BM, IM
Tech Base (Ratings): Inner Sphere (D/X-X-E)
Game Rules: Vibroblade weapons deliver attacks in the same fashion—and with the same modifiers—as a sword (see p. 146, *TW*), but when a vibrosword attack is delivered, the Attacker must declare whether the weapon is activated or deactivated. When active, Vibroblades generate heat (regardless of whether or not the attack succeeds) and deliver the same damage (regardless of the wielder's size, use of special myomers, or actuator damage).

When deactivated, a Vibroblade delivers damage equal to 1 plus the 'Mech's tonnage divided by 10 (rounding up to the nearest whole number). Special myomers and actuator damage modify the damage dealt by deactivated Vibroblades as normal, but the damage dealt by a deactivated Vibroblade cannot exceed the damage an activated Vibroblade of that size deals.

Any hit to the Vibroblade's critical slots disables the blade and renders it useless.

BATTLEMECH/PROTOMECH MOTIVE SYSTEMS

BattleMechs and ProtoMechs are versatile, all-terrain vehicles with greater flexibility for crossing terrain than perhaps any other ground vehicle, but the endless variety of terrain encountered on the thousands of worlds that bear humankind's battles always turn up some new obstacle. Seeking new edges in BattleMech mobility, engineers across the Inner Sphere have conceived or developed a series of unusual new motive systems for ProtoMechs, BattleMechs and IndustrialMechs.

'MECH JUMP PACK/'MECH DROP PACK

Introduced: 2457 (Terran Hegemony)

The BattleMech jump pack was developed to give jump-incapable BattleMechs a surprise edge in the early stages of battle, to help them cross particularly difficult terrain features, or to deploy them in combat drops. Essentially an externally mounted, self-contained jump jet backpack, the system enables an otherwise ground-bound 'Mech to make a single full-length jump (or a few shorter jumps) in a pinch.

'MECH MECHANICAL JUMP BOOSTERS

R&D Start Date: 3055 (Federated Commonwealth)
Prototype Design and Production: 3060 (Federated Suns)

Intended to provide BattleMechs with heat-free jumping ability, usable even in water, BattleMech mechanical jump boosters use a combination of special myomer bundles and hydraulic rams to achieve what jump jets accomplish through thrust nozzles and plasma streams. While extremely bulky and heavy, mechanical jump boosters offer a distinct surprise advantage in battle.

BATTLEMECH/PROTOMECH PARTIAL WING

R&D Start Date: 3061 (Jade Falcons ['Mech]), 3063 (Blood Spirits [ProtoMech])
Prototype Design and Production: 3067 (Jade Falcons ['Mech]), 3070 (Blood Spirits [ProtoMech]), 3074 (Mercenary ['Mech])

Building on the aerodynamic traits of the blast deflector design featured on the Clan *Vapor Eagle* (*Goshawk*), and inspired further by reports of the Draconis Combine's Kage light battlesuit, the Jade Falcons began to experiment with the concept of a 'Mech-sized partial wing assembly to extend the effective jumping distance of a BattleMech. Not far behind, the Blood Spirit Clan extended this concept to include ProtoMechs. Though both systems have yet to see widespread production and use, additional benefits have become apparent in the sample models seen to date, such as the additional heat-venting effects made possible by the wings' broad surface area.

CONSTRUCTION RULES

BattleMech Jump Pack: A 'Mech may carry only one Jump Pack of any desired weight. The additional weight is treated as externally carried cargo (see *BattleMech Lifting Capabilities*, p. 261, *TW*).

Mechanical Jump Boosters: Mechanical Jump Boosters must be placed in all of the 'Mech's legs, and require 2 critical slots per leg to install. Critical damage to any one of these slots disables the entire booster system. The boosters weigh 5 percent of the 'Mech's tonnage for every Jumping MP desired (rounded up to the nearest half ton). Unlike standard jump jets, the Jumping MP bestowed by boosters is not limited by the 'Mech's Walking MP.

Partial Wings: BattleMechs, IndustrialMechs and ProtoMechs may mount only one Partial Wing system per unit. The BattleMech Partial Wing weight is a percentage of the total mass, 5 percent for Clan and 7 percent for Inner Sphere tech level (rounded up to the nearest half ton). It occupies 3 critical slots for Clan and 4 for Inner Sphere in each of the unit's side torso locations. The ProtoMech Partial Wing weighs 20 percent of the ProtoMech's total mass and occupies one of the Proto's torso weapon slots. Partial Wings may not be combined with jump boosters (mechanical or otherwise), nor may they be pod-mounted. OmniMechs may mount Partial Wings as fixed equipment. For all units, the Jumping MP bonuses provided by Partial Wings may enable a unit to exceed the normal maximum Jump MPs possible under standard construction.

BattleMech UMUs: UMUs are mounted in the same fashion and per the same rules regarding weight and location placement as standard jump jets on both 'Mechs and ProtoMechs (see *TechManual*; p. 51 for BattleMechs, p. 69 for IndustrialMechs and pp. 84-85 for ProtoMechs). Units mounting UMUs may not mount jump jets of any kind, but may mount Mechanical Jump Boosters.

'MECH JUMP PACK/'MECH DROP PACK

Rules Level: Advanced
Available To: PM, BM, IM
Tech Base (Ratings): Both (D/C-D-C)
Game Rules: The BattleMech Jump Pack provides jumping movement in the same manner as normal jump jets, except that the isolated, chemically fueled pack generates no heat. A unit may carry a jump pack of any weight (in half-ton increments, to a maximum of 20 tons), but the unit's weight will affect how many Jumping MPs the pack can provide per ton of pack weight, as well as the jump pack's "fuel efficiency" in fuel points (as shown in the BattleMech Jump Pack Table below).

To determine the number of Jumping MPs a pack can provide per jump, use the unit's weight to find the number of Jumping MPs provided per ton of Jump Pack weight (Jump MPs per Pack Ton), then multiply that figure by the number of tons the pack weighs (rounding the final result up to the nearest whole MP). The maximum MP for a single jump using a BattleMech Jump Pack is equal to that figure, or to the unit's normal Walking MP (whichever is lower). Thus, a 55-ton BattleMech with a Walking MP of 6, when fitted with a 6-ton Jump Pack, would receive a total of 6 Jump MPs out of a possible 12 (2 Jump MPs per ton of Jump Pack = 12, but the unit's Walk MP is 6, which is lower).

In addition, jump packs carry a limited supply of fuel, which is consumed at a rate of 1 Fuel Point per Jump MP expended. Jump pack fuel loses efficiency with the weight of the jumping unit, and so is reflected in the Jump Pack Table as well under the Jump Pack Fuel column, which provides the total number of points (per ton of Jump Pack, rounded up to the nearest whole point). Thus, the 6-ton Jump Pack affixed to a 55-ton 'Mech would receive 72 points of fuel (12 fuel points per pack ton x 6 tons of Jump Pack = 72 points).

BattleMech Jump Packs are not installed components on a 'Mech, but are strapped to the 'Mech's back torso as unprotected cargo and follow most of the appropriate cargo carrier rules (see p. 261, *TW*). Unlike standard unprotected cargo, however, a jump pack can only be destroyed by a successful attack on a rear torso location (for ProtoMech units, the equivalent result occurs with any hit that strikes the torso through the ProtoMech's rear arc). The pack does not absorb a significant amount of the attack's damage, and so full normal damage still applies to the unit. Once a pack's fuel is exhausted or a pack is destroyed, it is automatically jettisoned.

If used in a combat drop the BattleMech Jump Pack enables a 'Mech that lacks integral jump jets (or a Vehicular Drop Chute) to follow the dropping units rules normally. Jump packs used in this fashion, however, burn up all their fuel during the landing action and jettison immediately upon landing. The rules for dropping troops are covered in pages 20-24 of *Strategic Operations*.

'MECH JUMP PACK TABLE

Unit Weight (in tons)	Jump MPs (per Pack Ton)*	Jump Pack Fuel (Points per Pack Ton)
1 to 5	10	20
6 to 19	5	16
20 to 59	2	12
60 to 89	1	8
90 to 100	0.5	6

*Jump Packs can be built no larger than 20 tons.

'MECH MECHANICAL JUMP BOOSTERS

Rules Level: Experimental
Available To: BM, IM
Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: Mechanical Jump Boosters act like standard jump jets, with the following exceptions:

- BattleMech Mechanical Jump Boosters generate no heat and may be used even underwater.
- Units using BattleMech Mechanical Jump Boosters cannot steer in mid-flight and so begin and end their jumps with the same facing.
- BattleMech Mechanical Jump Boosters may not be used to execute a Death From Above attack.
- While a single unit may mount standard jump jets and Mechanical Jump Boosters, the unit may not use both systems in the same turn.

BATTLEMECH/PROTOMECH PARTIAL WING

Rules Level: Experimental
Available To: PM, BM, IM
Tech Base (Ratings): Clan (F/X-X-E) — (Inner Sphere 'Mech only)
Game Rules: Depending on the size of the unit and atmospheric pressure (see p. 52, *TO: AR*), the Partial Wing confers a bonus to a unit's jump and—in the case of BattleMechs or IndustrialMechs—heat sink capabilities. These benefits are shown in the ProtoMech/BattleMech Partial Wing Performance Table on page 107.

The added Jumping MP bonus does not apply if the unit cannot generate Jumping MP, but may allow for jumps beyond the unit's normal maximum Jumping MP limits. Each critical hit suffered by a BattleMech Partial Wing reduces the wing-provided jump bonus by 1, to a minimum of 0. A critical hit against a ProtoMech's Partial Wing destroys it.

The values in the table's 'Mech Heat Modifier column are applied during the Heat Phase of any turn in which the Partial Wing is functional (regardless of whether or not the unit actually used the system). In addition, the bonus Jumping MP provided by a Partial Wing is not included when calculating heat caused by a jump: to calculate the heat generated, subtract the Partial Wing's Jumping MP bonus from the distance jumped. This cannot reduce the heat generated by a jump below the minimum heat points that unit would normally generate by jumping.

continued on p. 107

Beast-Mounted Infantry: The Beast-Mounted Infantry Sample Types Table below provides data for the most common (and a few uncommon) beast-mounted infantry types. This information includes the creature's *Type* (its common name) its *Size* (Large, Very Large or Monstrous) and *Weight* (excluding any human riders, used to compute the platoon's transport weight). Also given are the creature's MPs (including its *Movement Type*: Ground, Submarine, or VTOL), *Bonus Damage* (the amount of damage points the creature adds when attacking other conventional infantry and vehicles in the same hex; this stacks with any anti-'Mech attack damage) and *Damage Divisor* (the value used to divide any damage the unit receives in combat). Finally, the table provides any *Terrain Restrictions* the mounted infantry unit suffers.

The Creature Size Table notes the maximum number of troops that can ride on a creature (*Troops/Creature*), the maximum number of creatures that may be deployed per platoon (*Creatures/Platoon*) and the to-hit modifier that applies to any attacks against the beast-mounted infantry platoon (*Attacker To-Hit*). Finally, any relevant game play restrictions or platoon construction modifications are provided as *Additional Rules*.

After determining a beast-mounted infantry unit's creature type, the platoon may be armed per standard conventional infantry construction rules. Note, however, that infantry mounted on Large-size creatures may not carry support weapons, while infantry mounted on Monstrous-sized creatures may employ up to 3 support weapons per beast. Each Very Large or Monstrous Beast is treated as an individual Squad for sub-unit deployment and support weapon qualifications. These support weapon allowances modify the standard support weapon limits per squad as established in *TechManual*, and reduce the crew needs for support weapons, but no single creature can carry more support weapons than its riders can provide crew for. For example, while the Monstrous-sized hipposaur could carry three support weapons, its rider limit (*Troops/Creature*) of 4 means these three support weapons cannot be Inner Sphere ER heavy support lasers, as each requires 2 crewmen per weapon on the beast's mount (crew 4 ÷ 2 = 2).

For transport purposes, total the weight of all creatures in the platoon, plus the weight of all troopers (factored in as 0.2 tons each, to reflect the rider plus any riding gear such as harnesses). Beast-mounted platoons may not be "broken down" for transport purposes to any weight less than that of a single creature plus its riding trooper(s).

BEAST-MOUNTED INFANTRY SAMPLE TYPES TABLE

Creature Type	Creature Size	Weight*	MP (Type)	Bonus Damage vs. Infantry (Vehicles)	Damage Divisor	Terrain Restrictions
Donkey	Large	0.15 ton	2 (Ground)	0 (0)	1.0	Water (Depth 1+)
Coventry Kangaroo	Large	0.11 ton	3 (Ground)	+1D6 (1)	1.0	Water (Depth 1+)
Horse	Large	0.5 ton	3 (Ground)	0 (0)	1.0	Water (Depth 1+)
Camel	Large	0.65 ton	2 (Ground)	0 (0)	1.0	Water (Depth 1+)
Branth	Large	0.72 ton	6 (VTOL)†	+2D6 (1)	1.0	As VTOLs (see *TW*, p. 54)
Odessan Raxx	Large	2.4 tons	2 (Ground)	+1D6 (1)	1.0	Water (Depth 1+)
Tabiranth	Large	0.25 ton	2 (Ground)	+1D6 (1)	1.0	Water (Depth 1+)
Tariq	Large	0.51 ton	5 (Ground)	0 (0)	1.0	Water (Depth 1+)
Elephant	Very Large	6.0 tons	2 (Ground)	+1D6 (1)	2.0	Water (Depth 2+)
Orca	Very Large	7.2 tons	5 (Submarine)**	+2D6 (1)	2.0	As Submarines (see *TW*, pp. 56-57)
Hipposaur	Monstrous	35.5 tons	2 (Submarine)**	+10D6 (4)	4.0	1 Ground MP on Land

*Per creature; does not include that of the riding trooper(s), each of which is worth 0.2 tons.

**Infantry using submarine-capable creatures must use SCUBA gear; Orcas must surface once every 180 turns to breathe; Hipposaurs must surface once every 2 turns.

†VTOL-capable creatures may not operate on the High Altitude Map and must spend 1 MP per turn, even if remaining stationary.

CREATURE SIZE TABLE

Size Class	Troops/Creature	Creatures/Platoon	Attacker To-Hit	Additional Rules
Large	1	21	+0	May not carry Support Weapons; +0 MP to enter buildings (0 CF damage)
Very Large	2	7	–1	May carry up to 2 Support Weapons per creature with no MP loss (divide weapon crew needs by 2 and round up); +1 MP to enter buildings (2 CF damage)*; No Anti-'Mech Swarm Attacks
Monstrous	4	2	–2	May carry up to 3 Support Weapons per creature with no MP loss (divide weapon crew needs by 2 and round up); +2 MP to enter buildings (4 CF damage)*; No Anti-'Mech Leg or Swarm Attacks

*In addition to standard infantry Building MP modifiers; CF damage applies per platoon when entering or exiting the structure and for each hex moved inside the building.

BATTLEMECH/PROTOMECH PARTIAL WING (CONT.)

BATTLEMECH/PROTOMECH PARTIAL WING PERFORMANCE TABLE

Atmospheric Pressure (Density)	ProtoMech Jumping MP Bonus	'Mech Jump MP Bonus Light/Medium	'Mech Jump MP Bonus Heavy/Assault	'Mech Heat Modifier
Vacuum	+0	+0	+0	+0
Trace	+1	+0	+0	–1
Thin	+2	+1	+0	–2
Standard	+2	+2	+1	–3
High	+3	+2	+2	–3
Very High	+3	+3	+2	–3

'MECH UMU SYSTEM

R&D Start Date: 3062 (Lyran Alliance), 3057 (Goliath Scorpions)
Prototype Design and Production: 3066 (Lyran Alliance), 3061 (Goliath Scorpions)

Derived from the Underwater Maneuvering Unit (UMU) employed by the Undine battlesuit, Inner Sphere and Clan engineers have created a scaled-up version for use on 'Mechs. Though proven in the aquatic arenas on Solaris VII before the Jihad, 'Mech-scale UMUs remain in the prototype stage, as most field commanders consider them more a novelty than a practical motive system.

'MECH UMU SYSTEM

Rules Level: Experimental
Available To: PM, BM, IM
Tech Base (Ratings): Both (E/X-X-E)
Game Rules: UMUs cannot be used to move into or out of water, and have no effect on the unit's movement while it is not completely submerged. When underwater, a unit can use its UMUs to maneuver like a submarine, receiving 1 Cruising MP per operational UMU. Flank movement is not possible using UMU, however, and the normal hull breach and crush depth rules apply (pp. 121, *TW*, and 40, *TO: AR*, respectively). Units using UMU MP do not make Piloting Skill Rolls to avoid falling. If Displacement causes the unit to enter a hex where UMU MP cannot be used, resolve an automatic fall using all applicable modifiers. If a unit with UMUs descends to the bottom of a body of water, the unit may disengage its UMUs to move along the floor per the normal submerged Walking movement rules (see pp. 56-57, *TW*, and *Extreme Depths*, p. 40, *TO: AR*). While the UMUs are disengaged, all standard rules for moving underwater apply.

Use of UMUs imposes a +3 attacker movement modifier on all attack to-hits made by the UMU-equipped unit, as though the unit were jumping. However, UMUs generate only 1 heat point per turn total, regardless of the number of UMU MPs used.

Remember that a BattleMech occupies 2 levels (in this case depths) in height for line of sight purposes and move in an upright position while using UMUs, even when fully submerged. A unit employing UMUs should identify its submerged depth based on the location of its feet relative to the water surface, as an upright 'Mech within 1 depth of the surface is considered only partially submerged, and may no longer employ UMU movement.

BEAST-MOUNTED INFANTRY

Introduced: Pre-spaceflight

The thousands of worlds where humanity has made its home across the Inner Sphere, Periphery and even Clan space include an almost limitless range of biospheres, giving rise to a staggering variety of alien fauna. As humanity expanded, many of these beasts were predators to be overcome, sources for food, or—in the absence of heavy industry—a convenient mode of transportation.

In the centuries that humankind has walked among the stars, literally thousands of new and different alien creatures have joined the ranks of the donkey, the horse and the camel as favored mounts for civilian transportation and in battle. Though rarely seen in modern mechanized warfare, the image of horse-mounted soldiers challenging combat vehicles is not unknown to the outer reaches of the Successor States and the Periphery, where armed warriors raise and train creatures that benefit from life-long adaptations to local terrains and climates.

BEAST-MOUNTED INFANTRY

Rules Level: Advanced
Available To: CI
Tech Base (Ratings): Both (A/A-A-A)
Game Rules: Depending on the creature types used by a beast-mounted infantry unit, the speed, motive type, transport weight and damage absorption capabilities of the platoon will vary. These values—as well as any additional damage that the creatures themselves may inflict against other units, and special restrictions based on the creatures' size or type—are presented in the Beast-Mounted Infantry Sample Types Table on page 106.

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BEAST-MOUNTED INFANTRY (CONTINUED)

For movement, beast-mounted infantry use the appropriate movement rules for their creatures' MP type (ground movement for Ground MP, Submarine movement for Sub MP and VTOL movement for VTOL MP), but with terrain restrictions as noted in the appropriate creature's entry. These restrictions may be further modified by the creature's size (beast-mounted infantry may not use the mechanized infantry rules, however, and may not be deployed as mechanized infantry).

When delivering ranged attacks, beast-mounted infantry units use standard infantry combat rules, based on the number of surviving troopers in the platoon. Furthermore, against targets at point-blank range (0 hexes), some beast-mounted infantry may add extra damage to their base attack in the form of a bonus attack from the riding creatures. This Bonus Damage is listed on the table with two values. The first, outside the parentheses, reflects the additional "burst-fire" damage the beast-mounted unit applies against conventional infantry. The second, inside the parentheses, reflects the additional damage the creatures can inflict (per platoon) against other units such as battle armor, vehicles and 'Mechs.

The size of some creatures used by beast-mounted infantry—also presented on the Beast-Mounted Infantry Table—can impair the unit's ability to conduct Anti-'Mech Leg or Swarm attacks. For units using Very Large creatures (roughly the size of a Terran elephant), the unit may not engage in Leg Attacks. Units riding Monstrous-sized creatures (roughly the size of a Terran humpback whale) may not make anti-'Mech attacks.

Attacks by other units against a beast-mounted infantry unit are resolved in the same basic fashion as attacks made against other conventional infantry, but with a to-hit modifier based on the creatures' size category (Large creatures apply no modifier, Very Large creatures apply a –1 modifier and Monstrous creatures provide a –2 modifier). In addition, thanks to the creatures' added body mass, the amount of damage applied to the platoon is modified by a damage divisor in the same fashion as infantry armor (see p. 129). This value divides the damage points (or, where applicable, the damage dice) inflicted by the attack *before* resolving it against the infantry unit per standard rules (see pp. 215-217, *TW*). Round all final damage values up. For example, if an elephant-mounted infantry platoon is attacked by an AC/20 and a Light Machine Gun, the weapons' damage would be resolved after first dividing the AC's 20-point hit and the Light Machine Gun's 1D6 hit by the platoon's Damage Divisor (2.0), which reduces the AC to a base 10-point hit and the Light Machine Gun to 1/2 D6 (or 1D3); as the AC/20 is a direct-fire ballistic weapon, this damage is again divided by 10, killing 1 trooper, while the Light Machine Gun rolls a 5 on 1D6 and divides the result by 2, rounding up for 3 more troopers killed.

BLUE SHIELD PARTICLE FIELD DAMPER

R&D Start Date: 3051 (Federated Commonwealth)
Prototype Design and Production: 3053 (Federated Commonwealth)

The density of magnetic shielding required to protect units from PPCs was generally considered too high to be practical for battlefield units, but that did not stop NAIS researchers from trying. The resulting technology—the Blue Shield particle field damper—promised a useful degradation of PPC damage for the weight investment, but remains experimental and thoroughly detested by the techs and astechs who must maintain the system.

BLUE SHIELD PARTICLE FIELD DAMPER (PFD)

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF
Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: When active, the Blue Shield reduces damage from all non-capital PPCs (including infantry particle cannons) by half (rounded down, to a minimum of 1 point).

The Blue Shield may be activated and deactivated during the End Phase of any turn. If a unit is equipped with a Null-Signature System or Stealth Armor, the stealth benefits of those systems are negated while the Blue Shield is active (due to system conflicts). Additionally, a unit with Blue Shield active cannot be hidden (see p. 259, *TW*). If a unit mounts both the Blue Shield and Laser Reflective Armor (see p. 93), whenever the Blue Shield is active, halve PPC damage first for the Blue Shield and round down, then halve again for the Reflective Armor and round down again. For example, a Heavy PPC's Damage Value of 15 against such a target would be reduced to 7.5, rounded down to 7 (for the Blue Shield), then reduced to 3.5, rounded down to 3 (for the Reflective Armor), with a final Damage Value of 3 assigned to the target.

For non-fighter units, constant use of the system creates an increasing risk of system failure due to the dust and debris being drawn to the field generators; these turns do not need to be consecutive, but instead accumulate across an entire scenario. For the first 6 turns the shield is active, it is error-free. After the sixth turn of use, however, the controlling player must roll 2D6 at the beginning of the turn to see if the Blue Shield fails. The base chance for failure is 2, plus 1 for each turn after the sixth; if the roll is less than the value, the system fails. If the system fails, it shuts down and will not provide its protection for the rest of the scenario (though it may be automatically "cleaned" between scenarios with no additional expenditure of time or effort).

Finally, anytime a Blue Shield is active and one of its slots receives a critical hit, the hit results in a 5-point ammunition explosion in that location (with all the attendant effects, including warrior damage from feedback) and the system will no longer function for the remainder of the scenario. Subsequent critical hits to Blue Shield slots soak up critical hits and make repairs more difficult, but cause no further explosions and have no additional game play effect. If CASE is present in a location where a Blue Shield explodes, the CASE system will contain the internal damage in the same fashion as an ammo explosion. An inactive Blue Shield (turned off or shut down by damage) will not explode if it suffers a critical hit.

CONSTRUCTION RULES

Blue Shield Particle Field Damper (PFD): In addition to its 3-ton weight, the Blue Shield occupies 1 critical slot in every location except the head. In vehicles and fighters, this item occupies 1 equipment slot per location (front, sides/wings and aft, including turrets if present), but is centrally located in the unit's body and thus does not add to turret weight. Blue Shield is a permanent installation that may not be pod-mounted.

Booby Trap: A unit may carry a maximum of 1 Booby Trap. For all units except for Mobile Structures, the Booby Trap takes up 10 percent of the unit's total weight (rounded up to the nearest half ton for units 5 tons and over, or to the nearest kilogram for units under 5 tons). The Booby Trap must be placed in the same location as the unit's engine (the center torso for 'Mechs, the body for vehicles, and the aft for fighters, and so forth).

For Mobile Structures, each hex must devote 2 tons per level of structure to a Booby Trap device.

BOOBY TRAP

Introduced: Pre-spaceflight

Long a tactic of the desperate and the fanatical, booby traps have been used to deny spoils to a victorious enemy, or to deliver a devastating close-quarters attack after all other weapons have failed.

Though modernized for the mechanized battlefield, the concept of a highly explosive "spoilsport" weapon remains too extreme to become a mainstream weapon system (indeed, the practice went nearly extinct in the centuries after the fall of the first Star League, and the Clans do not seem to employ such devices at all). However, some forces—most notably those of the Capellan Confederation, Taurian Concordat and the Word of Blake—have been known to use booby traps en masse.

BOOBY TRAP

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF, SC, DS, JS, WS, SS, MS
Tech Base (Ratings): Inner Sphere (B/D-F-D)
Game Rules: The Booby Trap is a one-shot device that can be activated during a unit's Weapon Attack or Physical Attack phase, regardless of the unit's engine type. Once activated, a Booby Trap explodes immediately, destroying the booby-trapped unit completely (leaving nothing for salvage).

The controlling player of a unit that activates its Booby Trap may attempt to use any on-board ejection systems to save the warrior or crew at the same time, but must apply a +4 modifier to the target number for a successful ejection (see p. 164, *TO: AR*), in addition to any modifiers based on the ejection system used. If successful, the ejected warriors or crews land outside the exploding unit's hex (either adjacent to it or a number of hexes away, based on the ejection system used) in the following turn.

In ground combat, the damage inflicted by a Booby Trapped unit is treated as area-effect damage similar to an artillery blast. Against all units in the same hex as the exploding unit, this damage is equal to the booby-trapped unit's Engine Rating. If the unit has no Engine Rating, multiply its Cruising or Safe Thrust MP by its tonnage and use that value in place of the Engine Rating (to a maximum of 500). For Mobile Structures, multiply the structure's MP value by its size in hexes times its height in levels, and use that value for Engine Rating (again, to a maximum of 500). In addition, against all units 1 hex away from the exploding unit, the Booby Trap inflicts damage equal to the exploding unit's Engine Rating, divided by 2. This damage is halved again (to one-quarter of the unit's Engine Rating) against units located 2 hexes away, and again (to one-eighth the Engine Rating) against units 3 hexes away. Round all fractions up. Units 4 hexes or more away from an exploding booby-trapped unit suffer no damage.

Airborne units that employ a Booby Trap inflict no damage to other units unless another airborne unit is in the same hex on the Low Altitude map (or, if a non-aerospace airborne unit, within 3 hexes and elevations of the exploding Booby Trapped unit). In such an event, the other airborne unit must make a Control Roll/Piloting Skill Roll when the Booby Trap explodes. If this roll fails, the other airborne unit suffers damage equal to one-quarter of the exploding unit's Engine Rating (as computed above). Aerospace units operating on the space map that activate a Booby Trap inflict no damage to nearby units.

If an atmosphere is present and the underlying terrain is not water, the hex occupied by an exploding Booby Trapped unit is filled with fire after the unit's destruction. Critical hits to a Booby Trap will not set off the device, but will simply disable its arming systems, rendering it inoperable.

C^3 SYSTEMS

Buoyed by the success of battlefield Command, Control and Communications (C^3) networks, further experimentation before and into the Jihad has focused on expanding the potential of this relatively new frontier in electronic warfare.

Game Rules (General): The various advanced C^3 systems here are designed to complement the C^3 computer systems described on pages 131-133 in *Total Warfare* and will follow all rules for such systems except where otherwise noted below.

BATTLE ARMOR C^3 / C^3I (BC^3/BC^3I)

R&D Start Date: circa 3058 (Word of Blake [BC^3i]),
circa 3064 (Draconis Combine [BC^3])
Prototype Design and Production: 3063 (Word of Blake [BC^3i]),
3073 (Draconis Combine [BC^3])

The Word of Blake evidently derived the development of battle armor-scale C^3 systems (dubbed "BC^3" systems) from the cybernetics capabilities of their own elite Manei Domini, whose communications and computer implants enhance their battlefield coordination dramatically. Since then, the technology—which uses a more distributed and semi-redundant wireless network to form a squad-sized "unit"—has made implant-free battlesuit-scale C^3 a demonstrated possibility. Many prototype systems have emerged on the battlefield, first among other Blakist commands, but eventually trickling down to the Houses engaged against them, many of which were already working on similar projects.

BATTLE ARMOR C^3 / C^3I (BC^3/BC^3I)

Rules Level: Experimental
Available To: BA
Tech Base (Ratings): Inner Sphere (E/X-X-E)
Game Rules: In game play, a BC^3/BC^3i-equipped Battle Armor squad functions as a single unit equipped with an appropriate C^3 Slave (for BC^3) or C^3i (for BC^3i) system, enabling them to join into an appropriate network (though existing limits for the network apply). Even though BC^3 and BC^3i are distributed across the squad, the entire battle armor squad counts as 1 unit in an appropriate C^3 network.

All troopers in a full BC^3/BC^3i Battle Armor squad must have the same type of BC^3/BC^3i system to receive these abilities. A squad with less than 3 troopers (either from the start of the scenario or reduced through damage) loses all benefits from its BC^3/BC^3i system.

C³ BOOSTED SYSTEM (C³BS)

R&D Start Date: 3069 (Federated Suns)
Prototype Design and Production: 3073 (Federated Suns)

Only recently entering prototype stage, the C³ Boosted System (C³BS) is actually a hardware-upgraded variation on the standard C³ network systems that FedSuns engineers designed to render their networks immune to hostile ECM.

C³ BOOSTED SYSTEM (C³BS)

Rules Level: Experimental
Available To: BM, IM, CV, SV, MS
Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: Units use the C³BS system (Master and Slaves) in the same fashion and with the same limitations as a standard C³ network, but experience no interference from hostile ECM equipment (except for the Angel ECM Suite). As with a conventional C³ network, the C³BS network requires a functioning Master unit in order to work. The loss of the C³BS Master will disable the entire network. C³BS will not function on a unit that has Stealth Armor engaged.

Standard and boosted C³ systems can be connected together into the same network. However, communication is a two-way street: in such a network, a non-boosted member is still cut off as normal if in the effect radius of any hostile ECM, and a non-boosted master cannot transmit data to boosted members in the effect radius of any hostile ECM.

C³ EMERGENCY MASTER (C³EM)

R&D Start Date: 3066 (Draconis Combine)
Prototype Design and Production: 3071 (Draconis Combine)

With the broadening use of C³ technology on the battlefield, DCMS field commanders gradually noticed that opponents had learned to target their C³ Master units in order to destroy the entire network and (presumably) remove the field commander from the fight. To combat this, researchers developed a redundant unit that could back up a destroyed C³ Master in the event of destruction or ECM interference. Though functional, prototypes of these so-called C³ Emergency Master (C³EM) units lack the computing power of a primary C³ Master, and can only function for a minute before being overwhelmed by incoming data.

C³ EMERGENCY MASTER (C³EM)

Rules Level: Experimental
Available To: BM, IM, CV, SV, MS
Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: A C³ Emergency Master duplicates the operation of a C³ Slave unit and functions as a C³ Master unit for up to 6 consecutive turns after the network's C³ Master unit is destroyed or rendered inoperable by ECM. (Do not count any turns where the C³EM unit itself is in a hostile ECM bubble, however, as the system will simply go into standby mode during such interference. A C³EM may not be deliberately switched off once activated.) After 6 operating turns, a C³EM will shut down from overload and may not be reused until it can be reset after the scenario.

The C³EM cannot function as a TAG unit, whether or not the network's C³ Master unit is functioning.

C³ REMOTE SENSOR (C³RS) LAUNCHER

R&D Start Date: 3070 (Draconis Combine)
Prototype Design and Production: 3072 (Draconis Combine)

Another development dreamed up by the DCMS, the C³ Remote Sensor Launcher (C³RS) is a specialized variant of the now-familiar Narc launcher system. Intended to fill gaps in a damaged or incomplete C³ network, properly deployed C³ remote sensors can be a boon in battle, even though their reduced size, power and non-existent mobility limits their battlefield lifespan.

CONSTRUCTION RULES

Battle Armor C³/C³i: BC³ and BC³i may be mounted on any battle armor suit in accordance with standard construction rules. A battlesuit may carry only one BC³ or BC³i unit (and all troopers in the squad must feature an identical type to gain the network's benefits).

C³ Boosted Slave: C³BS Master and Slave units may be mounted on any available unit in accordance with the unit's standard construction rules.

C³ Emergency Master: The C³ Emergency Master may be mounted on any available unit in accordance with the unit's standard construction rules.

C³ Remote Sensor Launcher: C³ Remote Sensor Launchers may be mounted on any available unit type in accordance with the unit's standard construction rules.

CASE II: As with the standard CASE system, CASE II is required for each location to be protected by it, and protects all ammo bins and other explosive components in that location against explosions. CASE II may be pod-mounted as part of an Omni unit. Units built using either technology base can place CASE II in any body location.

A unit using CASE II may also mount standard CASE in the same (or different) locations, if desired.

Chaff Pod: Chaff Pods may be mounted as weapons on all available units, in accordance with the unit's standard construction rules.

C^3 REMOTE SENSOR (C^3RS) LAUNCHER

Rules Level: Experimental
Available To: BM, IM, CV, SV, SC, MS
Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: The C^3 Remote Sensor Launcher functions as a standard Narc missile launcher, except that the Attacker may only target a hex location, rather than another unit. Upon a successful attack, the launcher places a remote C^3 sensor pod in the target hex that automatically activates in the following turn and functions as a stationary C^3 Slave. The player launching a C^3 Remote Sensor must declare the network to which the sensor will be slaved before the attack, and may not change this assignment once the sensor is deployed. A deployed sensor pod cannot expand C^3 networks beyond the network size limits (see pp. 131-133, *TW*). Furthermore, because its computing power is limited, a C^3 Remote Sensor functions for only 3 full turns after the turn in which it is launched. C^3 Remote Sensors deployed while a network is "full" will have no effect.

On an unsuccessful C^3 Remote Sensor launch (or a to-hit roll result of 2), the sensor pod is destroyed on impact. Deployed sensors can also be destroyed if any weapon capable of delivering more than 2 points of damage successfully attacks the sensor itself. (Attacking the sensor in this fashion applies a +2 to-hit modifier due to the sensor's small size, as well as any standard terrain modifiers and the –4 immobile target modifier.) Critical hits to a C^3 Remote Sensor Launcher's "ammo" will cause 2 points of damage per unfired pod.

The C^3 Remote Sensor system is incompatible with C^3i-based systems.

CASE II

R&D Start Date: 3057 (Free Worlds League), 3059 (Clan Coyote)
Prototype Design and Production: 3064 (Free Worlds League), 3062 (Clan Coyote)

In the late 3050s and early 3060s, the Inner Sphere and the Clans independently launched projects aimed at refining the benefits of Cellular Ammunition Storage Equipment (CASE). After many attempts, both succeeded in prototype deployment of an advanced version of the standard CASE system—dubbed CASE II—just a few years before the start of the Jihad. Though CASE II is bulkier and heavier than the standard (forcing designers to trade off weapons, armor or heat sinks to accommodate the technology), it is stronger and far more effective at channeling internal explosions away from the unit.

CASE II

Rules Level: Experimental
Available To: BM, IM, AF, CF
Tech Base (Ratings): Inner Sphere (E/X-X-F), Clan (F/X-X-F)
Game Rules: When ammunition protected by CASE II explodes (including any ammunition-like explosions, such as critical hits to Gauss weapons), only 1 point of internal damage is inflicted to the location (with the normal chance of critical effects), while any remaining damage is applied to the location's rear armor. If the location is a limb, remove all remaining armor in the location, or half the location's total original armor, whichever is less. Any remaining damage from the explosion does not transfer after that. (For fighters, CASE II reduces ammunition explosion effects against such units—such as described on p. 161, *TW*—to 1 point against the unit's SI.)

Furthermore, for any critical hits rolled up as a result of an ammunition explosion vented by CASE II, the controlling player rolls 2D6 again for each one, and disregards the critical effects on a result of 8+. Otherwise, the critical hit applies as normal. Critical hits on slots occupied by the CASE II itself have no effect and should be re-rolled.

In the case of an ammunition explosion in the head when a small cockpit is used and CASE II is present, one point of internal structure is destroyed. Then, half of the starting head armor (round up) is destroyed (i.e. if a 'Mech has 9 points of head armor it will lose 5 points of head armor, even if it currently only has 6 points remaining). No damage is transferred and the head remains operational.

CASE II does not protect against pilot damage from internal explosions.

CHAFF POD

R&D Start Date: 3066 (Lyran Alliance)
Prototype Design and Production: 3069 (Lyran Alliance)

Developed as a temporary "active defense" against guided missiles and targeting systems, chaff pods release a mixture of metallic confetti and particles in a cloud around the unit that confounds electronic sensors and targeting gear. Though similar in effect to a dedicated anti-missile system with additional ECM benefits, their one-shot nature and requisite manual-release controls can limit the pods' effectiveness in battle.

CHAFF POD

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF, SC, DS, MS
Tech Base (Ratings): Inner Sphere (C/X-X-E)
Game Rules: A unit using a Chaff Pod must declare its use at the end of the unit's Movement Phase. In ground combat, each activated Chaff Pod fills the unit's hex with a cloud of obscurants 2 elevations in height. This cloud is treated as a hex of light smoke for LOS purposes (see p. 45, *TO: AR*), as well as a 1-hex "bubble" of ECM (see p. 134, *TW*: this is not actual ECM and so cannot be negated by ECCM). Furthermore, the chaff cloud acts as an anti-missile system (see pp. 129-130, *TW*) for all missile attacks made against units within the clouded hex, except those delivered by standard MRMs or Rocket Launchers. These effects last only during the Weapon and Physical Attack Phases of the turn in which the pod is activated; the obscurants settle and dissipate during the End Phase. Both friend and foe are affected.

Chaff Pods have no effect in vacuum or space combat, but may be used by landed or airborne aerospace units operating in atmosphere at any altitude for the same effects.

The Chaff Pod is a one-shot item. Unfired pods explode for 3 points of damage each if they suffer a critical hit.

CHAMELEON LIGHT POLARIZATION SHIELD

Introduced: 2630 (Terran Hegemony)
Extinct: 2790 (Inner Sphere)
Recovered: N/A

Created by the first Star League, the so-called Chameleon light polarization shield uses a primitive mimetic system to help mask the 'Mech on which it is installed from visual observation at long and extreme range. While it does not render the unit truly invisible, the effect does blur its outline, making the 'Mech harder to identify or attack. Seen historically as the crown jewel in the design of the *Exterminator* BattleMech, it is commonly misbelieved that all *Exterminator* models sported the LPS system, when in fact only a fraction of those units were so equipped—virtually all of which were lost to the Succession Wars.

CHAMELEON LIGHT POLARIZATION SHIELD (LPS)

Rules Level: Experimental
Available To: BM
Tech Base (Ratings): Inner Sphere (E/F-X-X)
Game Rules: A player may turn the light polarization shield on or off during the End Phase of any turn (or start the game with the system already engaged). While the shield is active, the 'Mech is more difficult to attack at long distance. Medium-range attacks receive an additional +1 to-hit modifier, and Long- or Extreme-range attacks receive an additional +2 to-hit modifier. Unlike most other stealth systems, these modifiers apply even if the attacking unit is infantry. A hit to any of the shield's critical slots (or the destruction of any hit location containing one) destroys the entire system.

While active, the light polarization shield generates 6 points of heat. If used in conjunction with an active Null-Signature System (see p. 148), all modifiers are cumulative. Like all Stealth systems, if a unit is part of a C^3 network and activates the LPS, the unit is disconnected from the C^3 network until the LPS is turned off; the unit is automatically connected again at the start of the turn following the End Phase when the LPS is turned off.

An LPS still generates its heat but provides no to-hit modifiers in any turn that infantry are carried using the mechanized battle armor rules (see p. 226, *TW*).

COCKPIT SYSTEMS

Experimented with since the dawn of the BattleMech, a variety of cockpit system types have been tested on and off for centuries. Rare since the fall of the Star League, occasionally a company will test a new version of a cockpit, only to find that the standard system remains the best for command and control.

COCKPIT COMMAND CONSOLE

Introduced: 2631 (Terran Hegemony)
Extinct: circa 2850
Recovered: circa 3030

Actually little more than a second cockpit mounted behind the main console, the Cockpit Command Console allows a high-level commander to focus on "real time" strategy in the field, while largely leaving a unit's operation to its pilot. First employed during the Star League era, but lost to the Succession Wars' scavenger culture, some command units today occasionally sport modified cockpits that mimic these "dual cockpit" systems.

SMALL AEROSPACE COCKPIT

Introduced: 3070 (Word of Blake)

An adaptation of the 'Mech-style small cockpit, the compact cockpit for aerospace fighters achieves the same weight-saving effects at an equal impact on pilot performance.

TORSO-MOUNTED COCKPIT

R&D Start Date: 3044 (Federated Commonwealth)
Prototype Design and Production: 3053 (Federated Commonwealth)

The most recent attempt to move the cockpit from the most structurally vulnerable part of a 'Mech to its more heavily armored center torso offered the pilot added physical protection, but remained laced with other hazards, not the least of which included ejection difficulties, dangerous proximity to the engine and the paradoxically increased likelihood of suffering physical damage in combat. For these reasons, the concept remains prototypical.

CONSTRUCTION RULES

Chameleon Light Polarization Shield (LPS): The light polarization shield system does not take up tonnage, but takes up 6 critical slots (1 in each of the 'Mech's limbs and 1 each in the left and right side torsos). The Light Polarization Shield cannot be combined with Stealth Armor or the Void-Signature System and may not be pod-mounted on an OmniMech (though Omni units may incorporate the technology into their base chassis).

Cockpit Command Console: Cockpit Command Consoles must always be placed in the same location as the primary cockpit (usually the head of a 'Mech or the body of a vehicle).

Small Aerospace Cockpit: The Small Aerospace Cockpit can only be mounted in aerospace fighters, in place of the standard cockpit.

Torso-Mounted Cockpit: Torso-mounted cockpits replace the standard cockpit and weigh 4 tons. Torso cockpits occupy 2 slots in the unit's center torso: 1 slot for the cockpit and 1 for its added sensor package. In addition, the head's Life Support slots are moved (1 slot each) to the left and right side torsos. Now devoid of cockpit and life support systems, the head retains only the 2 default sensor critical slots. Torso-mounted cockpits may not be used in conjunction with a Standard or Small cockpit and may not used in conjunction with a Cockpit Command Console.

Collapsible Command Module (CCM): The Collapsible Command Module may be mounted on a 'Mech in accordance with the unit's standard construction rules.

COCKPIT COMMAND CONSOLE

Rules Level: Advanced
Available To: BM, IM, CV, SV, AF, CF
Tech Base (Ratings): Both (D/C-F-E)
Game Rules: A unit using a Cockpit Command Console adds a second MechWarrior damage condition monitor to its record sheet, to reflect the commander occupying the command console. During any End Phase, this "secondary warrior" may swap positions with the unit's pilot (or vehicle commander), effectively becoming the unit's pilot (or vehicle commander) while the other warrior takes on the secondary position.

For 'Mech and fighter units (but not vehicles), the secondary warrior suffers no damage from ammunition explosions, though heat effects and damage done to the cockpit location (or vehicle commander slot) does affect both warriors. (In a 'Mech, both warriors must make Piloting Skill Rolls to avoid damage in the event of a fall.) If the primary cockpit slot in a BattleMech or aerospace unit is destroyed, the secondary pilot automatically takes over the unit (though any initiative modifiers provided by the system are lost in the process). If both cockpit slots are destroyed, the unit is considered destroyed per standard gameplay rules for cockpit destruction.

The second MechWarrior may spot for any type of indirect fire (LRMs, artillery, and so on), without incurring the +1 modifier to any attacks from the unit, and ignores the +1 modifier to the indirect fire attack due to any such weapon attacks.

Finally, if the second warrior is the overall commander of a given force (see *Commanders*, p. 159, *TO: AR*), the force commander's presence in a Command Console provides a +2 Initiative modifier for the unit's side as long as the force commander is not the warrior engaged in operating the unit in any way (including moving the unit, making attacks, or making any Piloting Skill Rolls except for those to avoid damage in a fall). To receive this benefit, however, the Command Console unit must be of the heavy or assault weight classes and feature Advanced Fire Control (which is an optional system on non-military units such as IndustrialMechs and Support Vehicles, but is incorporated automatically on all BattleMechs, Combat Vehicles, and Fighters). If, for any reason, the force commander must act as the unit's pilot or gunner for any reason other than to avoid damage from falling, the Initiative modifier does not apply for the following turn. Command Console Initiative modifiers are not cumulative, even if a force has multiple units with this item.

SMALL AEROSPACE COCKPIT

Rules Level: Advanced
Available To: AF
Tech Base (Ratings): Inner Sphere (E/X-X-E)
Game Rules: An aerospace fighter using a Small Aerospace Cockpit suffers the same +1 Piloting Skill Roll target modifier during game play as a Small Cockpit imposes on its MechWarrior equivalent.

TORSO-MOUNTED COCKPIT

Rules Level: Experimental
Available To: BM, IM
Tech Base (Ratings): Both (E/X-X-F)
Game Rules: A MechWarrior using a torso-mounted cockpit receives no pilot damage from hits to the torso area where the cockpit is placed, though ammunition explosions, excess heat, falling damage, and cockpit destruction may affect the warrior as normal. A 'Mech with a torso-mounted cockpit is not considered destroyed, nor is the MechWarrior considered killed, if the 'Mech's head is destroyed. If the 'Mech's head is destroyed, excess damage does not transfer to other locations, and further strikes to the head have their location re-rolled. A +1 to-hit modifier applies on all Piloting Skill Rolls made by a warrior using a torso-mounted cockpit (due to its cramped space). It is impossible to eject from a torso-mounted cockpit.

Because the torso-mounted cockpit requires additional sensors, a 'Mech using this system may survive 2 sensor critical hits and still perform weapon attacks. Instead of the standard modifiers from sensor damage, the first sensor hit incurs a +2 to-hit modifier to all weapon attacks, while the second increases this to a +4 modifier. If both sensor hits are in the head, the +4 modifier at the second sensor hit also applies to all Physical Attacks and Piloting Skill Rolls, as the 'Mech is effectively blinded. Three sensor hits (or more) completely blind a 'Mech with a torso-mounted cockpit, rendering all Weapon Attacks impossible and applying a +4 modifier to all Piloting Skill target numbers.

Finally, because of proximity to the engine, warriors using a torso-mounted cockpit suffer more severe heat effects in the event of life support damage. If a unit with a torso-mounted cockpit takes a life support critical hit, the MechWarrior suffers 1 point of damage for every turn the 'Mech overheats by 1 to 14 points, and 2 points of damage for every turn the unit overheats by 15 points or more. This MechWarrior heat effect replaces the standard MechWarrior heat effects.

COLLAPSIBLE COMMAND MODULE (CCM)

Introduced: 2710 (Terran Hegemony)

The Collapsible Command Module (CCM) is a detachable section that can be mounted on the torso of a BattleMech. Though used since the Star League era, this item is extremely rare, and most famously used by the HQ variant of the venerable *Cyclops* BattleMech. The CCM can be dismounted and set up in the field within 15 minutes, establishing a fully operational headquarters bunker, equipped with enough communications and control equipment to coordinate forces up to a full 'Mech regiment in size.

COLLAPSIBLE COMMAND MODULE (CCM)

Rules Level: Experimental
Available To: BM, IM
Tech Base (Ratings): Both (D/E-F-E)
Game Rules: When dismounted, the CCM is treated as a level 1 Heavy building with a CF of 60. It provides the benefits of a Mobile HQ with 7 tons of communications equipment (see p. 212, *TM*).

While being transported by a BattleMech, the CCM cannot be manned or operational. Any damage that strikes the internal structure of the torso in which the CCM is located also applies to the CCM's CF. Each critical hit on the CCM reduces the operational communications equipment by 1 ton (to a minimum of 0).

Detaching or attaching a CCM takes 5 minutes (30 turns in standard *TW* game play), during which time the transporting unit may not move or engage in combat. Setting up a detached CCM requires an additional 15 minutes (90 turns in *TW* game play) and a specialized crew (treated as a 7-man conventional foot "platoon" that must be brought in separately).

COMBAT VEHICLE CHASSIS MODIFICATIONS

Evolved for the battlefields of the Succession Wars, many conventional vehicles and fighters drew increasingly generalized toward a certain set of standard conditions, which ultimately served to limit their options in terms of environmental functionality. Amphibious capabilities, dune buggy modifications and environmental sealing against vacuum all became optional features, available to a multitude of units, but not commonly seen on the majority.

FLOTATION HULL (HOVERCRAFT, VTOLS, WIGES, CONVENTIONAL FIGHTERS)

Introduced: circa 2470
A flotation hull modifies the design of the appropriate unit's hull so it may float on water when unpowered. This feature is particularly useful for ocean-crossing hovercraft, military vehicles expected to spend a lot of time on the water, carrier-launched conventional fighters and VTOLs.

FLOTATION HULL (HOVERCRAFT, VTOLS, WIGES, CONVENTIONAL FIGHTERS)

Rules Level: Advanced
Available To: CV, CF
Tech Base (Ratings): Both (B/B-B-B)
Game Rules: Units with flotation hull amphibious capability can land on (and take off from) water per their normal rules, as if the water surface is clear terrain. When landed on water, these units are treated as displacement hull naval vessels for purposes of line of sight, hull breaching and sinking rules, and will not sink or be destroyed during water landings unless the armor in one or more non-turret locations is breached.

LIMITED AMPHIBIOUS (WHEELED AND TRACKED VEHICLES)

Introduced: circa 2470
The "limited capacity" amphibious option enables wheeled and tracked vehicles to cross water deeper than Depth 0, and is generally intended for river crossings, shallow battlefield water obstructions and to make amphibious assaults from close to shore.

LIMITED AMPHIBIOUS (WHEELED AND TRACKED VEHICLES)

Rules Level: Advanced
Available To: CV
Tech Base (Ratings): Both (B/B-B-B)
Game Rules: A vehicle with the Limited Amphibious capability receives a maximum of 2 MP in water (or the maximum MP of the vehicle, whichever is less). To move from a land hex onto a water hex, the unit must begin its Movement Phase adjacent to that hex and move onto no other terrain but that body of water. The reverse process must be followed when the unit moves from water onto land. While on water, this MP is always treated as Flanking movement. Moving through water of any depth (including Depth 0) costs Limited Amphibious Vehicles 2 MP per hex. While on water, the vehicle is treated as a displacement hull naval vessel for purposes of line of sight, hull breaching and sinking rules.

CONSTRUCTION RULES

Flotation Hull: The flotation hull option is only available to Hover, WiGE, and VTOL Combat Vehicles, as well as Conventional Fighters, at no cost in weight or space (though flotation hull designs will increase the unit's final cost).
Limited Amphibious: The limited amphibious option is only available to Tracked and Wheeled Combat Vehicles, takes up weight equal to the unit's total tonnage, divided by 25 (rounded up to the nearest half ton) and takes up no space in vehicle design.
Fully Amphibious: The fully amphibious option is only available to Tracked and Wheeled Combat Vehicles. It takes up weight equal to the unit's total tonnage, divided by 10 (rounded up to the nearest half ton) and takes up no space in vehicle design.
Dune Buggy: The dune buggy modification is only available to Wheeled Combat Vehicles, at no cost in weight or space (though dune buggy modifications will increase a unit's final cost).
Environmental (Vacuum) Sealing: See page 216, *TM*. Environmental sealing is automatically featured on Combat Vehicles built as submarines (as well as BattleMechs, ProtoMechs, fighters, Small Craft and Large Craft). The sealing equipment weighs 10 percent (rounded up to the nearest half ton) of the unit's total weight and occupies no weapon or item slots.

FULLY AMPHIBIOUS (WHEELED AND TRACKED VEHICLES)

Introduced: circa 2470

The "full capability" amphibious option for wheeled and tracked vehicles is heavier, but provides a much faster means of getting vehicles across bodies of water. This feature is rare on combat vehicles, and intended for "over the horizon" amphibious assaults.

FULLY AMPHIBIOUS (WHEELED AND TRACKED VEHICLES)

Rules Level: Advanced
Available To: CV
Tech Base (Ratings): Both (B/B-B-B)
Game Rules: A vehicle with fully amphibious capabilities has the same MPs on water (both Cruising and Flanking) as it does on land. However, each water hex (of any depth, including Depth 0) costs 2 MP to cross. While on water, the amphibious vehicle is treated as a displacement hull naval vessel for purposes of line of sight, hull breaching and sinking rules.

DUNE BUGGY MODIFICATION (WHEELED VEHICLES)

Introduced: circa 2470

The dune buggy modification enhances a combat vehicle's standard motive systems with larger wheels and a higher suspension able to cope with the shifting, sandy terrain of most beaches and deserts. Rare on combat vehicles because it overspecializes the unit and can impair performance in other areas, dune buggy-modified combat vehicles nonetheless have found a home in many combat zones.

DUNE BUGGY MODIFICATION (WHEELED VEHICLES)

Rules Level: Advanced
Available To: CV
Tech Base (Ratings): Both (B/B-B-B)
Game Rules: Dune buggy-modified Combat Vehicles disregard the extra MP cost for sand applied to wheeled Combat Vehicles and instead move through sand terrain (see p. 37, *TO: AR*) at a cost of 1 MP per hex. However, the modifications to said vehicles costs 1 Cruising MP in overall performance (with Flanking MP recalculated as normal).

ENVIRONMENTAL (VACUUM) SEALING (COMBAT VEHICLES)

Introduced: circa 2470

Most ground-based Combat Vehicles may be modified for vacuum fairly easily, though to perform in such environs these vehicles require fuel cell, fission or fusion engines for power. Because these modifications are so extensive and costly in terms of weight, environmentally sealed (or vacuum-sealed) units are a relative rarity on the battlefield, leaving most combat in the absence of breathable air to BattleMechs and fighters.

ENVIRONMENTAL (VACUUM) SEALING (COMBAT VEHICLES)

Rules Level: Advanced
Available To: CV
Tech Base (Ratings): Both (B/C-D-C)
Game Rules: All Combat Vehicles with the Environmental (Vacuum) Sealing modification operate normally in toxic or tainted atmospheres, and may even function in vacuum if fitted with a fission, fusion or fuel cell engine. However, this benefit is lost (and the unit is destroyed) if all armor in any location is destroyed, or if the unit suffers a hull integrity breach when taking damage. This hull integrity check is made any time the unit suffers damage, with a breach occurring on a 2D6 roll result of 10 or higher.

COOLANT POD

R&D Start Date: 3041 (Federated Commonwealth),
3055 (Clan Jade Falcon)
Prototype Design and Production: 3049 (Federated Commonwealth),
3056 (Clan Steel Viper)

An outgrowth of double heat sink development in the 3040s, research into more efficient pumps and cooling fluids for combat-grade heat exchange systems has occupied many Inner Sphere (and Clan) scientists over the past few decades. One promising prototype—seen in use by Clan and Inner Sphere engineers—is a specialized high-pressure, one-shot system. While these so-called coolant pods remain unsuitable for a full-scale heat exchange system (as many of the chemicals used are highly corrosive and the high-pressure system poses and explosive risk), they have gained a niche in the Solaris arenas as an emergency cooling system.

COOLANT POD

Rules Level: Experimental
Available To: BM, IM, AF
Tech Base (Ratings): Both (D/X-X-E)
Game Rules: Though a unit may mount multiple Coolant Pods, only one may be triggered per turn, which is done at the start of the unit's Heat Phase. A Coolant Pod increases the cooling capacity of all of the unit's active heat sinks by 1 point each (regardless of heat sink type). If a critical hit strikes an unused Coolant Pod, it explodes for 10 points of damage, as an internal ammo explosion. Each Coolant Pod can only be used once per battle.

DISPOSABLE WEAPONS

Introduced: Pre-spaceflight

In addition to their standard primary and secondary weapons, many infantry troopers in the 31st century have gone into battle equipped with single, one-shot disposable weapons such as LAWs. Used properly, these weapons can provide a platoon or squad with a brief boost in firepower, perhaps even enough to breach a tough opponent such as a BattleMech.

DISPOSABLE WEAPONS

Rules Level: Advanced
Available To: CI, BA
Tech Base (Ratings): Both (see *TechManual* cost and equipment tables)
Game Rules: Once per scenario, the platoon or battle armor squad may make a single attack using these Disposable Weapons (instead of the platoon's standard weapon attack) so long as the infantry unit is not engaged in an anti-'Mech attack. This attack is treated as a standard direct-fire attack, using the range brackets of the Disposable Weapons only.

If the attack succeeds, resolve the damage per a standard infantry ranged attack based on the number of active troopers in the platoon and the damage value of the disposable weapons (see pp. 214-215, *TW*). The total damage inflicted equals three times the disposable weapon's normal damage value, multiplied by the number of troopers who hit using the Cluster Hits Table (rounding normally). Only weapons with an Ammo (Shots) listing of "(1-D)" may be used in this fashion. This damage is applied to the target per a normal conventional infantry weapon attack.

DOCKING HARDPOINT (DOCKING COLLAR)

Introduced: 2304

A necessity in most large spacecraft, docking collars are large, reinforced couplers combined with airlocks and hatches large enough to facilitate the movement of personnel and cargo between two connected spacecraft. Not to be confused with simple personnel airlocks used for EVA work or emergency escape, modern docking hardpoints are primarily used to secure DropShips to the outer hull of a JumpShip or WarShip. Thus, these collars incorporate an interface mechanism that extends the jump-capable craft's Kearny-Fuchida field around the docked vessel. This enables both ships to traverse hyperspace safely.

DOCKING HARDPOINT (DOCKING COLLAR)

Rules Level: Advanced
Available To: JS, SS, WS, MS
Tech Base (Ratings): Both (B/C-C-C)
Game Rules: A vessel with a docking hardpoint (also known as a docking collar) can use the Docking rules also covered in *Strategic Operations.* Mobile Structures with a Landing Deck may also employ a docking hardpoint to secure landed vessels and use the cargo transfer rules also covered in *Strategic Operations.*

CONSTRUCTION RULES

Coolant Pod: The Coolant Pod may be mounted on any available unit in accordance with the unit's standard construction rules.

Disposable Weapons: Any Conventional Infantry unit may be equipped with a singe one-shot Disposable Weapon per active trooper. Battle armor suits may only carry Disposable Weapons if they are also equipped with an anti-personnel weapon mount or two armored gloves. To make use of Disposable Weapons, all troopers in a platoon (or battle armor squad) must have the same Disposable Infantry Weapons. Applicable weapons are noted on the *TechManual* infantry weapons table with an Ammo (Shots) listing of (1-D).

Docking Hardpoint (Docking Collar): Each docking hardpoint weighs 1,000 tons and is available only to JumpShips, WarShips, Space Stations, and Mobile Structures with a Landing Deck. Appropriate aerospace units, massing a minimum of 50,000 tons, may mount up to 1 docking hardpoint for every 50,000 tons of vessel weight (rounded up). Mobile Structures may mount only one Docking Collar per Landing Deck. Docking Collars are not counted as weapon items and do not require a location, with the exception of those mounted on Mobile Structures, where the location and weight must be assigned to the center hex of the landing deck it is attached to.

Docking Thrusters: Only Large-size Naval Vessels can use this equipment. Only one set of Docking Thrusters may be installed per unit.

Drone Carrier Control System: The Carrier Control System for remote drones weighs 2 tons, plus 0.5 tons per controlled drone unit. This tonnage includes the crew accommodations for each drone's operator (1 per drone), as well as the carrier unit's requisite drone-control sensor package. A carrier unit may install multiple Carrier Control Systems, per the unit's standard construction rules.

DOCKING THRUSTERS

Introduced: Pre-spaceflight

A modification common on larger naval vessels to assist in close-quarters maneuvering (such as during docking operations at the typical seaport), docking thrusters are an extensive series of maneuvering propellers or underwater "jets" located along the bow and aft of large vessels and inactive during normal operations. When the vessel is not operating at speed, these systems may be used to spin the vessel in place or even sideslip it into a tight berth.

DOCKING THRUSTERS

Rules Level: Advanced
Available To: SV
Tech Base (Ratings): Both (B/C-C-C)
Game Rules: Docking Thrusters may be used to allow any Large-size Naval Vehicle that is otherwise stationary (that is, expending no MPs on forward or reverse movement in the current turn) to pivot in place or move laterally, in exception to the standard rules for Large Naval Vessel movement (see p. 22). The maximum number of MPs that can be expended using Docking Thrusters equals the vessel's Cruising MP.

Pivoting in place costs a Docking Thruster-equipped vessel 3 MP per hexside of facing change, with the vessel pivoting around its template's pivot point. Lateral movement using Docking Thrusters costs 4 MP per hex of movement, which shifts the entire vessel sideways by 1 hex (with the pivot point moving to any desired adjacent hex except for those directly forward or backward).

Large-size Naval Vessels attempting either maneuver may spend MPs on no other movement type when using Docking Thrusters in this fashion. Also, should a vessel lack sufficient Cruising MPs to complete such maneuvers in a single turn, it may "bank" any remaining Cruising MPs to complete the maneuver in the following turn, executing the full maneuver only in the turn where the accumulated points meet the maneuvering requirements. For example, a Large-size Naval Vessel with a Cruising MP of 3 attempting to make a lateral movement would require 2 turns to execute the maneuver, shifting its position on the map only in the second turn, when the maneuver is completed.

DRONE (REMOTE) SYSTEMS

Introduced: Early spaceflight

Not to be confused with the fully autonomous robotic control systems used by the infamous *Caspar*-class drones of the Star League era, the drone control systems used in the 31st century instead reflect a less sophisticated remote-control command and operating system, where human hands direct the intelligence of unmanned vehicles. Because of their reliance on communications, remote drone systems are highly susceptible to ECM, and they are often far less effective than piloted machines. These factors alone have prevented remote drone control and operating systems from becoming commonplace on the battlefield.

DRONE (REMOTE) CARRIER CONTROL SYSTEM

Rules Level: Advanced
Available To: CV, SV, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Both (C/E-F-F)
Game Rules: To operate any remote drone network, a dedicated carrier control system must be present, functional and free from interference. Drone networks of any available vehicle type can be controlled by any friendly carrier control system (also of any available vehicle type). However, ground-based networks (without satellite aid) have a maximum functional radius of 80 kilometers (about 160 *BattleTech* mapsheets) before ground clutter and background interference renders them incoherent. Aerospace-based carrier control systems (including satellite-based systems) that maintain an unbroken line of sight have a much longer range at 3 million kilometers (after which communications lag makes any drones far less responsive to control).

A drone control unit and all of its attached drones are treated as a single unit for Initiative purposes. Drone control units automatically detect any units detectable by the drones they control (including hidden units adjacent to the drones or within range of drone-based active probes), but must adhere to standard rules for determining line of sight to attack such units. Drones can be used as LRM indirect fire spotters (see p. 111, *TW*). However, when used in such a fashion, the movement modifier for the drone control unit (as well as that of the spotting drone) must also be applied to the attacker's to-hit roll. Furthermore, the +1 modifier for the spotting unit making attacks also applies if the drone control unit makes its own attacks in the same turn (a +2 modifier applies if *both* the spotting drone and the drone control unit make attacks in the same turn as they are used to spot for indirect fire).

All hostile ECM (including Guardian, Angel and Watchdog systems, screen launchers and chaff) disrupts the signal between drone carriers and their drones if they occur in the line of sight between them. If an ECM bubble includes the carrier control unit, all drones in the carrier's network are affected. Otherwise, the bubble only disrupts the operations of the drones to which it blocks the carrier's LOS. Critical hits that affect the sensors of a unit with a carrier control system (or the carrier control system itself) also disable the drone control network. Critical hits that result in a Crew Stunned, Crew Killed or Commander Hit effect on a unit using a drone carrier control system also disable the network. For as long as these effects last, the drone control unit will be unable to communicate with the drones.

Drones suffering from communications failure (either due to damage or the interference as described above) simply cease operations and become immobile targets on the ground (or continue to coast along their last known velocity, vector and facing in space. Airborne drones in the space/atmosphere interface, atmospheric row or ground row hexes of the High-Altitude Map fall 1 hex per turn of communications failure, starting during the Movement Phase (Aerospace) on the turn following the turn communication fails. If there are two equal hexes to fall into, randomly determine which hex the unit enters. If players are using Low-Altitude Movement, the airborne drone falls three altitudes each turn. If it enters a Ground Hex (on the High-Altitude Map) or Altitude 0 (if using Low-Altitude Movement), the airborne drone crashes. If communications are later reestablished—before the carrier control unit or its drones are destroyed—the drones may resume operating normally.

DRONE (REMOTE) OPERATING SYSTEMS

Rules Level: Advanced
Available To: BM, IM, CV, SV, AF, CF
Tech Base (Ratings): Both (C/E-F-F)
Game Rules: Vehicles using a remote drone operating system are automatically considered to have a Crew of 0 for game play purposes, regardless of the construction rules for said unit, and may not use crew-served equipment beyond weapons, communications and sensors. Any Piloting or Gunnery Skill checks made by drone vehicles suffer a +1 modifier (based on the skills of the carrier control unit).

Critical hits against remote drone vehicles that would normally stun or kill a driver or crew do not affect drones (as they have no crew), but all hits to the vehicle commander destroy the drone's remote operating system, rendering the unit inactive and immobile for the remainder of the game. Also, because they lack a crew, remote drone units may not clear weapon or turret jams in combat.

If for any reason (noted above under the drone carrier control system rules) a drone is cut off from its network controller, the drone becomes inactive and immobile. Airborne drones in the space/atmosphere interface, atmospheric row or ground row hexes of the High-Altitude Map fall 1 hex per turn of communications failure, starting during the Movement Phase (Aerospace) on the turn following the turn communication fails. If there are two equal hexes to fall into, randomly determine which hex the unit enters. If players are using Low-Altitude Movement, the airborne drone falls three altitudes each turn. If it enters a Ground Hex (on the High-Altitude Map) or Altitude 0 (if using Low-Altitude Movement), the airborne drone crashes. Drones operating in space under these conditions continue along their last heading and speed, expending no Thrust and making no actions. If communications with the control unit are restored at some point (and the drones are not destroyed in the meantime), any drones affected by such network failures resume normal operation.

Modifiers to Piloting Skill checks from Small and Torso-Mounted Cockpits are ignored.

ENERGY STORAGE BATTERIES

Introduced: 2131 (Terran Alliance)

The key element of recharge stations, these large power generation, storage and distribution systems (generically referred to as energy storage batteries, though they usually include power plants) enable Kearny-Fuchida drive vessels to recharge relatively quickly and safely, without the headache of deploying their huge (and delicate) solar sails. They are particularly useful at small, dim stars where K-F drive recharge times can stretch to ten days or more, and even more useful for vessels with lithium-fusion batteries; energy storage batteries can vastly reduce the travel time needed for JumpShips in a hurry.

ENERGY STORAGE BATTERIES

Rules Level: Advanced
Available To: SS
Tech Base (Ratings): Both (D/C-E-D)
Game Rules: Energy Storage Batteries are an alternative to conventional K-F drive recharge sources (including JumpShip solar sails and fusion engines), but can charge a vessel's K-F drive either through its jump sail (typically via a diffuse microwave beam) or by a direct connection (requiring the vessel to dock with the recharging station).

When an Energy Storage Battery's power is delivered via the vessel's solar sail, normal quick charging rules are followed (see pp. 75-76 of *Strategic Operations*).

If the vessel instead uses a direct connection to the charging station, the Energy Storage Battery applies a –2 modifier to rolls made on the Quick-Charge Table (to a minimum of 2), allowing for relatively safe quick-charges.

Energy Storage Batteries include massive power plants that can recharge their storage systems about as fast as they can be safely discharged into a JumpShip. An Energy Storage Battery can thus prepare a new charge for a JumpShip in 100 hours (which can occur concurrently while recharging a K-F drive). Full rules on constructing space stations are covered in *Strategic Operations*.

CONSTRUCTION RULES

Drone Operating System: Remote drone operating systems occupy 10 percent of the drone unit's total weight and are treated as a single item on the unit's equipment list. An additional half-ton sensor system is required as well, reflecting the drone's communications interface. A vehicle using a remote drone operating system is always considered to have a Crew of 0 for construction purposes (regardless of its normal needs under the vehicle's construction rules).

Energy Storage Batteries: Energy Storage Batteries are limited to Space Stations, which can mount any number of batteries desired in accordance with the unit's standard construction rules.

Combat Vehicle Fission Engines: Available units designed to employ fission engines determine their ratings as normal for the unit's type. To find a fission engine's weight, use the Fission column on the Master Engine Table (see p. 49, *TM*). As with fusion engines, Combat Vehicles must devote an additional 50 percent of the engine's weight into their designs to reflect engine shielding for the crew's benefit. Combat Vehicle Fission Engines also provide a certain number of "weight-free" heat sinks, as noted under the "Free Sinks" column. Combat Vehicles using fission engines do not require power amplifiers for using energy weapons (though heat sinks to fire such weapons are still required, per the normal Combat vehicle construction rules).

Combat Vehicle Fuel Cell Engines: These engines have their ratings determined as normal for their unit type. To determine engine weight, use the Cell column on the Master Engine Table (see p. 49, *TM*). Combat Vehicle Fuel Cell Engines also provide a single "weight-free" heat sink, as noted under the "Free Sinks" column. Combat Vehicles using fuel cell engines still require power amplifiers for using energy weapons (and heat sinks to fire such weapons are still required, per the normal Combat vehicle construction rules).

ENGINE SYSTEMS

A number of alternative power systems for combat vehicles (including BattleMechs and fighters) have been under development ever since the technological renaissance of the mid-3020s. However, it was not until the Clan invasion that the Inner Sphere and the Clans both looked seriously at the notion of expanded combat engine options, in a desperate bid to gain and maintain any battlefield edge.

COMBAT VEHICLE FISSION (CV-FISSION)

Introduced: circa 2470 (Terran Hegemony [Primitive]), 2882 (Taurian Concordat [Modern])

Though theoretically feasible for over a millennium, fission engines have long been rare in small-scale combat vehicle design. The widespread aversion to all things nuclear prevented their use during the twentieth and early twenty-first centuries, while the safer and more plentiful use of fusion engines kept them in the shadows through the Age of War and Star League eras. Only the gradual decline in high tech industries during the Succession Wars brought fission-powered sources back from the grave—if only to a limited extent.

Nonetheless, fission engines for combat vehicles remained hypothetically feasible. During the Succession Wars, some major Periphery powers (notably the Taurian Concordat) explored fission power as a battlefield alternative to fusion, one ideally within the capabilities of local industry. Though exotic and somewhat more dangerous than equivalent fusion plants (not to mention too inefficient for use in most aerospace vehicles), fission-based combat engines can be found today dispersed around the Periphery and Inner Sphere, distributed by the vagaries of war and mercenary wanderings.

COMBAT VEHICLE FISSION (CV-FISSION)

Rules Level: Advanced
Available To: BM, CV, CF
Tech Base (Ratings): Inner Sphere (D/F-E-E)
Game Rules: On BattleMechs, fission engines follow the same rules as IndustrialMech fission engines (see p. 126, *TW*). On Combat Vehicles, when an engine critical hit occurs with a fission engine the Crew is Stunned for 1D6 turns; if the crew remains stunned starting on the fourth turn after the turn in which the engine critical hit occurs, the crew is killed (it is assumed the crew will abandon the vehicle before the fourth turn if they're not stunned). Conventional Fighters powered by fission engines follow the normal fighter engine critical hit rules (see p. 240, *TW*), but receive 160 points per ton of fuel.

COMBAT VEHICLE FUEL CELL (CV-CELL)

Introduced: circa 2046 (Western Alliance [Primitive]); 2470 (Terran Hegemony [Modern])

Though widely used in civilian applications for centuries, the pre-Succession War dominance of fusion engines largely kept fuel cells out of military vehicles. Similarly, the centuries of accumulated inertia behind military IC engines discouraged the use of fuel cells during the Succession Wars. However, engine manufacturers throughout the centuries quietly maintained the option to employ battlefield-grade fuel cells for military customers on request.

COMBAT VEHICLE FUEL CELL (CV-CELL)

Rules Level: Advanced
Available To: BM, CV
Tech Base (Ratings): Both (D/C-C-C)
Game Rules: BattleMechs with fuel cell engines follow the same rules as IndustrialMechs with fuel cell engines (see p. 126, *TW*). Both BattleMechs and Combat Vehicles using fuel cell engines also follow the IndustrialMech fuel consumption rules (see p. 68, *TM*).

LARGE ENGINE (LIC, LLF, LSF, LXL, LXXL)

R&D Start Date: circa 2550 (Terran Hegemony)
Prototype Design and Production: circa 2630 (Terran Hegemony)

The diminishing returns found in combat engines of all types over the centuries led Star League engineers to abandon the development of engines rated beyond the universal power rating of 400 some time during the early 2600s. Since then, conventional wisdom has maintained that combat engines rated over 300 to 360 push the acceptable boundaries of cost-effectiveness and power efficiency—and that viable engines beyond the 400 mark are downright ludicrous. However, real-world engineers have occasionally explored customized combat-grade engines with ratings over 400 (and as high as 500). Unfortunately, these so-called large engines—feasible in internal combustion and fusion varieties alike—are incredibly massive, which has kept them from standard production even though they remain technically possible.

LARGE ENGINE (LIC, LLF, LSF, LXL, LXXL)

Rules Level: Experimental
Available To: BM, IM, CV, AF, CF
Tech Base (Ratings): Both (per base engine availability)
Game Rules: In game play, all Large Combat Engines function in the same fashion as their smaller equivalents. Though Combat Vehicle and Conventional Fighter engines may occupy weapon slots, such engines only suffer critical hits per the unit's standard rules.

Large Engines: The weight and required space requirements (for 'Mechs and Vehicles/Conventional Fighters) of each available type of Large Engine are indicated in the Advanced Fusion Engine Table below. Large Engines are available in internal combustion (ICE), light fusion, standard fusion, XL fusion and even XXL fusion types (but not as fuel cell, fission or compact fusion). Combat Vehicles require additional engine shielding for all Large-sized fusion engines, which weighs an additional 50 percent of the engine's weight. Combat Vehicles and Conventional Fighters using Large Engine types may also require that such engines take up weapon/item slots, as indicated in the Advanced Engine Master Table.

Large Engines of any fusion type also provide 10 "weight-free" heat sinks, as noted under the "Free Sinks" column. Combat Vehicles using these engines do not require power amplifiers for using energy weapons (though heat sinks to fire such weapons are still required, per the normal Combat Vehicle construction rules).

XXL Fusion Engines: An XXL Engine weighs one-third as much as its standard counterpart, but takes up twice as many critical slots in the side torsos as an XL (4 each for Clan technology, 6 each for Inner Sphere technology). XXL Engines are also extremely expensive, costing 5 times as much as a standard XL engine (see the Combined Engines Table). Combat Vehicles require additional engine shielding for all fusion engines, which weighs an additional 50 percent of the engine's weight. Combat Vehicles and Conventional Fighters using XXL fusion engines also require that such engines take up weapon/item slots, as indicated in the Advanced Engine Master Table below.

XXL Engines also provide 10 "weight-free" heat sinks, as noted under the "Free Sinks" column. Combat Vehicles using these engines do not require power amplifiers for using energy weapons (but do require heat sinks to fire such weapons, per the normal Combat Vehicle construction rules).

ADVANCED ENGINE MASTER TABLE

		Additional Item Slots			Large Engine Weight					
Engine Type	Mass (Tons)	'Mech*	Vehicle/ Fighter*	Free Sinks	Engine Rating	ICE	Std.**	Light**	XL**	XXL**
CV-Fission	†	†	0	5	405	113.0	56.5	42.5	28.5	19.0
CV-Fuel Cell	†	†	0	1	410	122.0	61.0	46.0	30.5	20.5
Large-ICE	‡	2 (CT)	1	0	415	133.0	66.5	50.0	33.5	22.5
Large-Fusion	‡	2 (CT)	1	10	420	145.0	72.5	54.5	36.5	24.5
Large-Light	‡	2 (CT), 2 (ST)‡	2	10	425	159.0	79.5	60.0	40.0	26.5
Large-XL (IS)	‡	2 (CT), 3 (ST)‡	3	10	430	175.0	87.5	66.0	44.0	29.5
Large-XL (Clan)	‡	2 (CT), 2 (ST)‡	2	10	435	194.0	97.0	73.0	48.5	32.5
Large-XXL (IS)	‡	2 (CT), 6 (ST)‡	5	10	440	215.0	107.5	81.0	54.0	36.0
Large-XXL (Clan)	‡	2 (CT), 4 (ST)‡	3	10	445	239.0	119.5	90.0	60.0	40.0
XXL Fusion (IS)	x0.333†	6 (ST)	4	10	450	267.0	133.5	100.5	67.0	44.5
XXL Fusion (Clan)	x0.333†	4 (ST)	2	10	455	300.0	150.0	112.5	75.0	50.0
					460	337.0	168.5	126.5	84.5	56.5
					465	380.0	190.0	142.5	95.0	63.5
					470	429.0	214.5	161.0	107.5	71.5
					475	486.0	243.0	182.5	121.5	81.0
					480	551.0	275.5	207.0	138.0	92.0
					485	626.0	313.0	235.0	156.5	104.5
					490	712.0	356.0	267.0	178.0	119.0
					495	811.0	405.5	304.5	203.0	135.5
					500	925.0	462.5	347.0	231.5	154.5

*For 'Mechs, CT = Center Torso; ST = Side Torsos (applies to left and right side locations). All Vehicle slots are allocated to the body; Fighter slots (if applicable) must be located in the rear.

**These Engine Types are fusion-based.

†Per standard construction rules (see *TechManual*); XXL engine multiply the weight of a standard fusion engine by the value shown (rounded up to the nearest half ton).

‡See Large Engine Weight Table

Combat Vehicle Escape Pod: Combat Vehicles of any type may mount a maximum of 1 CVEP, which must be placed in the vehicle's rear location.

Non-Fusion BattleMechs: Non-fusion engines can be mounted on BattleMechs. Also known as "low-tech 'Mechs", these inefficient creations are sometimes found in poorer regions of the Periphery, where fusion engines and techs who can repair them are virtually unknown. Use the following rules when mounting non-fusion engines on BattleMechs:

Rules Level: Experimental

Tech Base (Ratings): Both (Per Engine Type)

Gameplay: Non-fusion powered BattleMechs suffer the same movement, terrain, and environment restrictions as an IndustrialMech mounting the same engine type. The following additional rules apply:

- Critical hits to a non-fusion-powered BattleMech's engine are resolved in the same fashion as critical hits to a non-fusion IndustrialMech engine of the same type (see p. 126, *TW*).
- Non-fusion-powered BattleMechs generate heat in the same manner as BattleMechs (including heat for Walking and Running movement); ICE-powered 'Mechs must check for heat-induced explosions (see p. 160, *TW*).
- ICE- or Fuel Cell-powered BattleMechs also follow the IndustrialMech fuel consumption rules (see p. 68, *TM*).

Construction: A non-fusion powered BattleMech uses the construction rules for mounting non-fusion engines in an IndustrialMech (the engine costs remain the same regardless of whether it is mounted in a BattleMech or an IndustrialMech). As with ICE- or Fuel Cell-powered IndustrialMechs, this includes the need for power amplifiers, and for heat sinks (as none are provided with non-fusion engines). ICE- or Fuel Cell-powered BattleMechs cannot mount jump jets, but may mount UMUs or Mechanical Jump Boosters.

Battle Value (ICE, Fuel Cell, Fission-Powered BattleMechs): When computing the Battle Value of a non-fusion BattleMech perform the calculations as normal (see pp. 302-306, *TM*). Note, however, that when calculating the Heat Efficiency the Heat Sink Capacity will be dependent on the engine type as this will impact the heat sink allotment restrictions.

XXL FUSION ENGINE

R&D Start Date: 2582 (Terran Hegemony)
Prototype Design and Production: 2954 (Clan Diamond Shark), 3055 (Federated Commonwealth)

As soon as Star League engineers brought extra-light fusion technology to life, researchers began wondering if it was possible to reduce a fusion engine's weight by more than half. Though the Terran Hegemony ultimately shelved the project in favor of others deemed more useful, both Inner Sphere and Clan scientists tackled this same concept centuries later. Though they followed different approaches (improved shielding, ultralight containment field electromagnets and so on), both sides came up with roughly the same result. Dubbed Extra-Extralight (XXL) fusion engines, these power plants promised the same capabilities at one-third of the standard mass (and easily twenty times the price). Unfortunately, the extremely bulky and hot-running engines quickly proved better suited for physics laboratories than the battlefield.

XXL FUSION ENGINE

Rules Level: Experimental
Available To: BM, CV, AF, CF
Tech Base (Ratings): Both (F/X-X-F)
Game Rules: XXL fusion engines run hotter than their other fusion equivalents. Standing still (or expending no Thrust) generates 2 heat points per turn, Walking/Safe Thrust movement generates 4 heat points, and Running/Max Thrust movement generates 6 heat points. Heat generated per hex jumped is doubled for XXL engine users, with a minimum of 6 points per jump (the heat modifiers for improved jump jet use and jumping with an XXL engine cancel each other out). Combat Vehicles using XXL engines do not have to track movement heat, as per the standard Combat Vehicle rules.

Though Combat Vehicle and Conventional Fighter engines may occupy weapon slots, such engines only suffer critical hits per the unit's standard rules.

EJECTION SYSTEMS

Though BattleMechs, fighters and many other combat units feature or have access to emergency egress systems, the past century has seen a few new developments in emergency ejection systems designed to enhance the survivability of warriors in hostile environments. Two of the most effective are the Combat Vehicle escape pod and the BattleMech full-head ejection system. Though both are expensive and somewhat risky, these ejection mechanisms nonetheless promise survivability that standard egress systems may not, at least under select circumstances.

COMBAT VEHICLE ESCAPE POD

R&D Start Date: 3032 (Federated Commonwealth)
Prototype Design and Production: 3038 (Federated Commonwealth)

A radical concept in Combat Vehicle escape systems, the Combat Vehicle Escape Pod (CVEP) is a cramped, self-sealing mini-cabin built into a vehicle's rear quarter and used to escape certain destruction in hostile atmospheres. Though it is modeled on the design of the Lyran Commonwealth's revolutionary full-head ejection system for BattleMechs, the compartmentalized design and segregated control stations of most Combat Vehicles negates much of its value by forcing the vehicle crew to decide on their own when the time has come to employ the emergency egress system, rather than auto-ejecting them to safety in the event of catastrophe. This single flaw has effectively prevented the CVEP from entering full-scale production.

COMBAT VEHICLE ESCAPE POD

Rules Level: Experimental
Available To: CV
Tech Base (Ratings): Inner Sphere (D/X-X-E)
Game Rules: Only Combat Vehicles may mount a CVEP, which is treated as a weapon item in the rear and may thus be damaged by any weapon critical hits to that location. During the Movement Phase of any turn, the crew of a Combat Vehicle may choose to use the CVEP to escape their vehicle, so long as the system has not been previously damaged. Once launched, the crew makes a Piloting Skill Roll with a +2 target modifier. If successful, the pod travels up to 4 hexes (at the controlling players' choice) directly behind the vehicle, where a standard MechWarrior Ejection roll (see p. 164, *TO: AR*) with a +2 modifier is required to see if the pod lands safely. A failure on either the launching roll or the landing roll indicates that the ejected crew suffers physical damage from the violent escape, with each failure resulting in a hit to one crewman (determined randomly). Once the pod lands, the crew may step out and make for safety as a conventional foot infantry unit (with a size equal to the surviving crewmen), or—if landed on water or in an otherwise toxic environment—remain in the capsule to await rescue.

Attacks against a jettisoned CVEP may be made as if targeting an immobile unit, in which case the CVEP is considered breached (and its occupants—if any—killed) after sustaining more than 2 points of damage. Once a CVEP is jettisoned (whether successfully or not), the vehicle is considered to have suffered a Crew Killed result and is treated as destroyed for the remainder of the scenario.

Jettisoned CVEPs may not be salvaged and reinstalled once deployed.

Introduced: 3023 (Lyran Commonwealth), 3052 (Clan Wolf)

Debuting with the Lyran Commonwealth's HCT-3F *Hatchetman*, the BattleMech full-head ejection system enables a MechWarrior to blast well clear of his doomed machine in a fully enclosed pod that literally transforms the entire head assembly into a short-range jump glider. Though a violent means of escape, the system is ideal for hostile environment combat, particularly underwater, in vacuum or even in the thick of a massive enemy overrun. Only the dramatic expense and the higher-than-average injury rate for warriors using this system have prevented its wider use, though a handful of recent designs have taken to this revolutionary egress system.

BATTLEMECH FULL-HEAD EJECTION SYSTEM

Rules Level: Advanced
Available To: BM, IM
Tech Base (Ratings): Both (D/X-X-E)
Game Rules: Only BattleMechs and IndustrialMechs with head-mounted cockpits may mount a full-head ejection system. Unlike the vehicular model, this system is integrated with the head assembly's design, and so occupies no additional critical slots. However, any critical hits to the 'Mech's Life Support slots also disable this system, rendering it impossible to eject in the event of disaster.

Because the full-head ejection system incorporates the unit's entire control system, this system may be deployed at any phase of a turn at the player's choosing, or may jettison automatically in the event of an internal explosion. However, because the force of the launch is so extreme, the MechWarrior automatically suffers 1 point of damage when the system is launched.

If the 'Mech (or at least its head) is not submerged, the warrior may then choose any hex within 12 hexes of the 'Mech (if the unit was upright at the time), or within 12 hexes in the 'Mech's forward arc (if it was prone) to make landfall. A Piloting Skill Roll (with a +3 modifier) is required to make this landing on target or the head will scatter 1D6 ÷ 2 hexes (round down) in a random direction. Upon landing, a standard MechWarrior Ejection roll (see p. 164, *TO:AR*) must be made with an additional target modifier of +2 to avoid taking a second point of damage from the ejection.

If the 'Mech is submerged (and the head location has suffered no armor breach), an ejected full-head pod automatically rockets to the water's surface and floats there as an immobile displacement hull vessel with the armor and structure values of whatever remained on the 'Mech's head location. A 'Mech with a submerged head that has suffered a breach cannot employ a full-head ejection system.

Once the pod lands (or surfaces), the warrior may step out and make for safety as a conventional foot infantry unit (with a size of 1), or—if landed on water or in an otherwise toxic environment—remain in the capsule to await rescue.

Because ejection can take place during any combat phase, attacks against a jettisoned full-head pod can only be made after it has landed. In this case, the attack receives a –4 to-hit modifier for targeting an immobile unit. Attacks against a jettisoned head inflict damage to the head's remaining armor, internal structure and critical hit locations per any other attack that strikes a BattleMech's head. Once a full-head ejection system is jettisoned (whether successfully or not), the 'Mech is considered to have suffered a Head Blown Off effect and is treated as destroyed for the remainder of the scenario.

An ejected head module may be salvaged later and reattached to the 'Mech (or jury-rigged to another 'Mech) after the scenario.

ELECTRONIC WARFARE (EW) EQUIPMENT

Introduced: 3025 (Capellan Confederation)

An effort by the Capellan Confederation to replicate the lost capabilities of the Star League-era Beagle Active Probe and Guardian ECM suite, the basic electronic warfare equipment package debuted on their RVN-1X *Raven* BattleMech in 3025. The technology was a landmark in Succession Wars-era development but is largely overlooked today because of the recovery twenty years later of the lighter, more compact and more effective Star League systems it crudely aped.

CONSTRUCTION RULES

Full-Head Ejection System: BattleMechs and IndustrialMechs may mount a maximum of 1 Full-Head Ejection System, which is automatically assigned to the head location. Though the system takes up no tonnage and occupies no critical slots, the launch mechanisms are integrated with the 'Mech's Life Support System. The ejection system is incompatible with torso-mounted cockpits and Cockpit Command Modules.

Electronic Warfare (EW) Equipment: The EW Equipment package may be mounted on any available unit type in accordance with the unit's standard construction rules. The EW Equipment system cannot be used as a substitute for the Guardian ECM on units using Stealth Armor.

Field Guns: Any vehicular-scale autocannon (including light, standard, Ultra, LB-X, rotary, HVAC, and ProtoMech), Gauss weapon (excluding heavy and Hyper-Assault types), or Rifle (Cannon, see p. 150) may be used as a Field Gun and can be towed by any motorized or wheeled/tracked mechanized conventional infantry platoon. Field Guns are added after the rest of platoon creation, but as many Field Guns may be added as the platoon has crew to operate (the crew for a single Field Gun equals the weapon's tonnage rounded up, not counting ammunition, to a minimum of 2). All Field Guns assigned to a platoon must be of the same type and size.

The weight of all Field Guns and their ammunition are added to the platoon's transport weight, and a platoon may not be broken down for transport purposes below the weight of a single Field Gun and its ammunition.

Field Artillery: Field Artillery weapons may include any standard artillery weapon (Sniper, Thumper or Long Tom), Arrow IV artillery piece, or Artillery Cannon (see p. 97). A Field Artillery weapon is added after the rest of platoon creation, but requires a minimum platoon size equal to the weapon's weight in tons (not counting ammunition). The weight of a Field Artillery weapon and its ammunition is added to the platoon's transport weight, and a platoon may not be broken down for transport purposes below the weight of this weapon and ammunition.

ELECTRONIC WARFARE (EW) EQUIPMENT

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF, SC, DS
Tech Base (Ratings): Inner Sphere (D/X-F-E)
Game Rules: The basic EW Equipment system is a one-piece combination that performs the functions of an Inner Sphere Beagle Active Probe and Guardian ECM Suite (see pp. 129 and 134, *TW*). However, the effective range of this combined system is only 3 hexes (for both effects).

Units with multiple active probes and ECM suites of any type may use only one probe and/or ECM at a time in game play. In standard game play, fighters, Small Craft, DropShips and other airborne units may only use probes and ECM suites when interacting with ground units, or in accordance with the advanced rules for aerospace combat covered in *Strategic Operations*.

FIELD GUNS/FIELD ARTILLERY

Field guns and field artillery are essentially unmounted vehicular-scale ballistic and artillery weapons that can be towed into battle by motorized (and some mechanized) conventional infantry platoons. Far larger than standard support weapons, they provide substantial firepower, but are heavy, crew-intensive and can slow down a platoon immensely in battle.

FIELD GUNS

Introduced: Varies

Field guns are more easily moved than field artillery, but are easily destroyed because they are highly exposed.

FIELD GUNS

Rules Level: Advanced
Available To: CI
Tech Base (Ratings): Both (ratings as appropriate *TechManual* Weapon; see pp. 290-291 and 341-343, *TM*)
Game Rules: Only motorized conventional infantry platoons or mechanized conventional infantry platoons with a Wheeled or Tracked motive type may be equipped with Field Guns. Each Field Gun requires a number of troopers equal to its weight in tonnage to operate, rounding up (to a minimum of 2 troopers per Field Gun). A platoon equipped with multiple Field Guns can only operate as many Field Guns as it can keep fully manned (excess Field Guns are considered destroyed as the unit takes damage). If all of a platoon's field guns are considered destroyed, the surviving troopers can move and fire as a normal infantry platoon of its type.

Field Guns attack using the range, damage and any applicable modifiers (including those of the weapon class) as their vehicle-mounted counterparts. The controlling player must designate a single weapon facing for all Field Guns in the platoon (treated like a vehicular turret arc; see pp. 105-106, *TW*). A platoon with multiple Field Guns may fire all such weapons separately—and at multiple targets, if desired (no Secondary Target modifiers apply to these attacks)—but all attacks must be made against targets in the same firing arc. Field Guns may be used against airborne aerospace targets, with LB-X Autocannon Field Guns able to make flak attacks (see *Flak*, p. 114, *TW*). Ultra and Rotary Autocannon Field Guns are immune to jamming or fire control failure effects, and Gauss-based Field Guns are immune to weapon explosion effects.

Field Guns may not be fired in the same turn that the platoon has moved or delivered any attack using its own infantry weapons and, unlike regular infantry attacks, they may not be used to attack targets in the same hex as the attacker. A unit with Field Guns cannot engage in Anti-'Mech attacks such as Leg and Swarm Attacks.

The platoon receives 1 ton of ammunition per field gun it possesses; each ton may be of a varying type. Ammunition expenditure must be tracked, but only at the platoon level; ammunition is not assigned to any specific gun or squad, and isn't reduced by personnel loss. LB-X Autocannon Field Guns must always use cluster munitions.

FIELD ARTILLERY

Introduced: circa 2200 (Terran Alliance)

Field artillery is harder to move than the smaller field guns, making them prone to swift destruction. For this reason, field artillery units rarely operate directly on the front lines.

FIELD ARTILLERY

Rules Level: Advanced
Available To: CI
Tech Base (Ratings): Both (ratings as appropriate Artillery Weapon; see p. 96)
Game Rules: Only motorized conventional infantry platoons or mechanized conventional infantry platoons with a Wheeled or Tracked motive type may be equipped with a single Field Artillery weapon or Artillery Cannon (per platoon). This weapon requires a number of troopers equal to its weight in tonnage to operate, and is considered destroyed if the platoon's number of troops is reduced below its crew needs. A Field Artillery weapon receives 1 ton of ammunition, which must be tracked during game play.

Units with Field Artillery (regardless of motive type) are treated as motorized infantry with 1 MP, and must spend MP to change the weapon's facing, just like a vehicle. The facing of a Field Artillery weapon is treated the same as a vehicular turret arc (see pp. 105-106, *TW*).

Field Artillery weapons attack using the range, damage and any applicable modifiers (including those of the weapon class) as their vehicle-mounted counterparts, but they may not be fired in the same turn that the firing platoon has moved or delivered any attack using its own infantry weapons. Furthermore, in any turn where the Field Artillery is to be fired, its attack must be made into the weapon's appropriate firing arc. Field Artillery may be used against airborne aerospace targets using the flak rules for direct-fire artillery (see *Flak*, p. 153, *TO:AR*).

FLAMERS

Long feared on the battlefield, flamers were often more psychologically terrifying than tactically threatening because of their limited range and effectiveness when used alone. With the return of advanced research and development, even this humble weapon has evolved to ascend from its anti-infantry niche to a potential staple of the modern battlefield.

EXTENDED-RANGE (ER) FLAMER

Introduced: 3067 (Clan Jade Falcon), 3070 (Federated Suns)

First developed by the Clans, the fusion-based extended-range (ER) flamer variation relies on improved magnetic coils and a narrower muzzle aperture to achieve more focus and propulsion at the cost of damage and spread. Though now commercially available to both the Inner Sphere and the Clans, this weapon system has yet to find a home on standard vehicles or 'Mechs.

EXTENDED-RANGE (ER) FLAMER

Rules Level: Advanced
Available To: PM, BM, IM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Both (D/X-X-E)
Game Rules: In game play, the ER Flamer operates as a fusion-based (non-vehicle) flamer. Against non-infantry targets, it delivers the same armor damage as a standard flamer, but with only half the heat effects (rounded down, to a minimum of 1 heat point). Against conventional infantry, the ER Flamer delivers only 2D6 burst-fire damage, rather than 4D6.

HEAVY FLAMER

Introduced: 3067 (Clan Jade Falcon), 3068 (Lyran Alliance)

A heavier, fuel-based version of the flamer, the aptly named heavy flamer provides more power and range through sheer brute force. Also recently made available to both the Inner Sphere and Clans, heavy flamers have yet to see widespread use, but their devastating anti-infantry effects are sure to change that in the near future.

HEAVY FLAMER

Rules Level: Advanced
Available To: BA, PM, BM, IM, CV, SV, MS
Tech Base (Ratings): Both (C/X-X-E)
Game Rules: Based on the vehicular flamer, but with a higher-pressure, wide-angle muzzle, the Heavy Flamer has greater range and does more damage than the standard flamer, but may not be used in vacuum environments (including space). Against non-infantry units, the Heavy Flamer delivers twice the damage and heat effects as a standard flamer. Against infantry units, the Heavy Flamer delivers 6D6 burst-fire damage, rather than 4D6 (4D6 rather than 3D6 for the BA-grade Heavy Flamer). When mounted on a vehicle, Heavy Flamers still function if the vehicle's engine is critically hit. A critical hit to the Heavy Flamer's ammunition, however, causes 5 points of damage per unfired shot, reflecting the combination of the highly volatile fuel mixture and the high pressure under which it is kept at all times.

FLIGHT DECK/HELIPAD

Introduced: Pre-spaceflight

Flight decks and helipads have been a staple of large blue-water naval vessels since the dawn of air power in the early twentieth century. Designed to conduct flight operations, a flight deck consists of a 120-meter deck area, launching catapults, arresting mechanisms and lift platforms to raise and lower units from the hangar bays to the deck. Similar in virtually every way, helipads offer the same capabilities and features for VTOL-capable units with a much smaller area, taking up only 30 meters of deck space.

CONSTRUCTION RULES

Flamers: ER and Heavy Flamers maybe mounted on any of the listed units in accordance with standard construction rules. ER Flamers, however, cannot be mounted on units that do not use a fusion power source.

Flight Deck/Helipad: Flight Decks may only be mounted on Large Naval Support Vehicles and Mobile Structures. Each Flight Deck reduces the number of turrets such units can mount by 3. Large Naval Support Vehicles smaller than a Template C in size cannot mount Flight Decks, while Template C and larger sizes can carry 1 Flight Deck for every 3 hexes of vessel length. Mobile Structures simply require 3 consecutive hexes in a line for each Flight Deck they mount.

Helipads may only be mounted on Large Naval Support Vehicles or Mobile Structures. Each Helipad reduces the number of turrets such units can mount by 1.

Fluid Gun: Fluid Guns may be mounted in accordance with the unit's standard construction rules regarding weapons. Fluid Guns are considered ballistic weapons and rely on ammunition, the effects of which can vary based on the chosen ammo type (see *Flamer/Fluid Gun/Sprayer Ammunition*, p. 172). Fluid Gun ammunition must be purchased in full-ton lots and may not be mixed within a given ton. (If the ammo type is unspecified, presume that the Fluid Gun is using Water Ammo.)

Improved Heavy Gauss Rifle: The Improved Heavy Gauss may only be mounted in the torso location of 'Mech units, or the non-turret locations on vehicles. Fighters and other units may mount Improved Heavy Gauss Rifles in any location per their standard rules. A fusion or fission engine is required for any unit that is to carry an Improved Heavy Gauss Rifle.

FLIGHT DECK/HELIPAD

Rules Level: Advanced
Available To: SV, MS
Tech Base (Ratings): Both (B/A-A-A)
Game Rules: A single Flight Deck can launch or recover 1 aerospace unit up to 200 tons in weight per minute (6 turns in standard *BattleTech* game play), while a single Helipad requires the same amount of time to launch or recover 1 VTOL-capable aerospace unit weighing up to 200 tons in weight. Any aerospace unit that must land and launch horizontally may land on and launch from a Flight Deck, even if it lacks VSTOL capability, thanks to the arresting gear included in the deck's construction. Only VTOLs and aerospace units up to 200 tons that are capable of vertical landings may land on or launch from a Helipad.

When an aerospace unit launches from a Flight Deck, the controlling player must make a Piloting or Control Roll (as appropriate), using the rules for launching fighters and Small Craft (see p. 86, *TW*). In the event of a failed launch roll, any damage is applied to the launching unit's aft, rather than its nose (to reflect the strain of the deck's catapult launch systems). Landing on a Flight Deck uses the same rules for landing fighters and Small Craft (see p. 87, *TW*), but does not require the same runway length, as the deck incorporates arresting gear to "catch" a landing unit more quickly. If a landing roll fails, the landing unit not only suffers the normal crash-landing damage described, but also inflicts damage on the flight deck-equipped unit as if it delivered a successful ramming attack (see p. 241, *TW*). Use the facing from which the landing unit approached to determine the direction of this "attack."

VTOL-capable units may land per their standard rules on a Helipad or a Flight Deck, with damage from any failed Piloting or Control Rolls resolved per the same rules. As with Flight Deck landing failures, any crashes on a Helipad also inflict damage to the helipad-equipped unit. In this case, the damage is equal to half the tonnage of the crashing unit (rounded up).

If using advanced weather rules (see p. 55, *TO: AR*), additional modifiers and rules may apply to all launches and landings on Flight Decks or Helipads.

Once landed on either a Flight Deck or a Helipad, an aerospace unit or VTOL is considered to be "on deck" as unprotected cargo for a minimum of 5 turns after its arrival (before flight deck elevators and the like can bring the unit into its bay), and must have its hex location and facing noted on the unit's template. Any attacks against the carrier unit that strike a hex with a unit on deck also inflict their full damage on the landed unit, resolved against the landed unit's appropriate facing relative to the attack. While a unit may have multiple Flight Decks or Helipads, each Flight Deck can accommodate a maximum of 1 landed fixed-wing unit (including fighters and Small Craft) or 4 landed VTOLs at a time, while each Helipad can accommodate no more than 1 VTOL or aerospace unit at a time.

Submersible units equipped with Flight Decks or Helipads may not perform launching or landing operations while submerged.

FLUID GUN

Introduced: Pre-spaceflight

Essentially a larger version of the commercial sprayer, the fluid gun is an industrial-sized liquid dispenser "weapon" that has gradually expanded its utility over the centuries. Now similar in overall design and range to a vehicular flamer, the fluid gun is a flexible industrial tool (and short-range weapon in some Solaran arenas) that can hose a target down with varying types of liquid "ammunition." However, it remains a highly uncommon sight on the battlefield.

FLUID GUN

Rules Level: Advanced
Available To: BM, IM, CV, SV, AF, CF, SC, DS, MS
Tech Base (Ratings): Both (B/B-B-B)
Game Rules: Similar to a Flamer, the Fluid Gun is a flexible short-range weapon that sprays liquid "ammunition" at its target, allowing for varied uses. A single Fluid Gun may use multiple fluid "ammo" types (installed in 1-ton bins), but only one can be "fired" per turn. A critical hit to any Fluid Gun ammunition (except for water) produces a 2-point ammo explosion (regardless of the number of shots remaining), along with any special effects caused by a single hit by that type of fluid gun ammunition in the affected location. (CASE II reduces the damage from a Fluid Gun ammo explosion to 1 point, but does not negate the fluid gun ammo special effects.)

Fluid Guns may not be fired underwater or in vacuum, nor can they target airborne units such as fighters, Small Craft, DropShips, VTOLs, or Airship, Fixed-Wing and Satellite Support Vehicles.

GAUSS RIFLES

With long reach, massive kinetic damage and low waste heat, Gauss weapons are everything a warrior could want—but heavy. Military engineers across the Inner Sphere have used their ingenuity to add new twists to Gauss weaponry, trying to expand on the one weapon system that nearly parallels Clan technology.

IMPROVED HEAVY GAUSS RIFLE

R&D Start Date: 3061 (Lyran Alliance)
Prototype Design and Production: 3065 (Lyran Alliance)

At its debut, the heavy Gauss rifle became one of the most feared weapons on the battlefield, but its sharp damage degradation led Lyran engineers to an almost immediate effort to develop a more reliable weapon system. Reworking the coils, the improved version promises a more consistent ballistic profile, but sacrifices weight efficiency and range to attain these benefits.

IMPROVED HEAVY GAUSS RIFLE

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: The Improved Heavy Gauss Rifle uses the same rules to mount, move with and fire as the standard Heavy Gauss Rifle (see p. 136, *TW*), but does not suffer the variable damage effects over range. Furthermore, a critical hit to the Improved Heavy Gauss Rifle results in a 30-point internal explosion, but otherwise follows the rules for an exploding Heavy Gauss Rifle.

MAGSHOT GAUSS RIFLE

Introduced: 3072 (Federated Suns)

Derived from the battle armor-scale variation that debuted on the Federated Suns' Infiltrator Mk. II battlesuit, a larger version of the Magshot has since been produced for use on other units.

MAGSHOT GAUSS RIFLE

Rules Level: Advanced
Available To: BM, IM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Inner Sphere (E/X-X-D)
Game Rules: The Magshot functions as a normal, direct-fire ballistic weapon. As with standard Gauss Rifles (see p. 135, *TW*), critical hits to a Magshot result in a 3-point internal explosion, but hits to the weapon's ammunition slots simply render the ammo bin useless.

The Magshot can be linked to a targeting computer.

SILVER BULLET GAUSS RIFLE

R&D Start Date: 3050 (Federated Commonwealth)
Prototype Design and Production: 3051 (Federated Commonwealth)

The NAIS, hoping to combine the cluster effect of the LB-X class autocannon with the heavy punch, low-heat, and substantial range of Gauss rifle, initially attempted to develop a Gauss Rifle capable of delivering alternative "splintering" slug types. Unfortunately, the project was too starved for funds to develop consistently effective flexible ammo-feed mechanisms for the standard Gauss Rifle. Nor were efforts ever completed to adapt pre-fragmented rounds to a conventional Gauss Rifle's barrel or ammo feed. But while this approach met the solicitation requirements to duplicate the LB-X class cluster munitions, the over-specialized Silver Bullet Gauss Rifle and its ammunition proved unattractive to the AFFC, and the project was scrapped.

CONSTRUCTION RULES

Magshot Gauss Rifle: The vehicular Magshot described here may be installed on any applicable unit in accordance with its standard weapon-mounting rules.

Silver Bullet Gauss Rifle: The Silver Bullet Gauss Rifle may be mounted in any available unit in accordance with its standard rules for mounting weapons. The Silver Bullet Gauss Rifle does not count toward the tonnage and size of any targeting computer the unit may install.

Grav Deck: Grav decks vary broadly in size. JumpShips and WarShips may mount grav decks as large as 250 meters in diameter, while space stations may mount decks up to 1,500 meters in diameter. (Ground based grav decks, used on large asteroids, may be even larger, but their construction is beyond the scope of these rules.) The weight of a grav deck varies with its size; decks under 100 meters in diameter weigh 50 tons, while decks 100 to 250 meters in diameter weigh 100 tons, and decks over 250 meters to 1,000 meters in diameter weigh 500 tons each. A given unit may mount up to 3 grav decks, plus 1 additional deck for every 100,000 tons of total weight (or fraction thereof). As non-weapon items, grav decks require no assigned location when installed. Full rules on constructing the units that use these items appear in *Strategic Operations.*

Grenade Launchers, Vehicular (VGL): VGLs may be mounted on any location on a Combat Vehicle, Support Vehicle, Fighter, Small Craft or DropShip in accordance with the unit's standard weapon-mounting rules (except for the Rotor location on VTOLs). VGLs mounted on ProtoMechs, Combat Vehicles, Support Vehicles, and Conventional Fighters are treated as ballistic weapons, and so do not require heat sinks.

'Mech- and ProtoMech mounted VGLs may only be placed in torso locations, but must also designate their hexside facing (side torso VGLs may fire into front, rear, front-side or rear-side arcs; center torso or ProtoMech-mounted VGLs may only fire front or rear).

Handheld Weapons: A Handheld Weapon occupies no tonnage or critical space on the unit carrying it; it is entirely external and self-contained. However, a unit intended to carry a Handheld Weapon must incorporate two full sets of arm and hand actuators. Only 'Mechs and ProtoMechs may carry Handheld Weapons.

A Handheld Weapon may be constructed with up to six items legal for 'Mechs to mount and belonging to one or more of the following types: AE, DB, DE, M, P, PB. Also allowed are Mine Dispensers and TAG (including Light TAG); each counts as one item. Any such item with exceptional location restrictions (such as a Heavy Gauss Rifle) cannot be installed.

Alternatively, a single arm-mounted BattleMech physical weapon may be installed instead, so long as it does not have weight, damage values, or other effects reliant on the weight of the unit carrying it. Shields or Spikes are forbidden.

Non-weapon items that affect a single weapon and are restricted to that weapon's location (such as PPC Capacitors and Apollo and Artemis systems) may be added to weapons the Handheld is carrying; such items do not count towards the Handheld's item limit. If one applicable missile launcher in the Handheld has Apollo or Artemis, all applicable launchers in the Handheld must. However, the choice of weapons or items in the Handheld has no effect on the carrying unit's choice of weapons or items.

Each energy weapon in a Handheld Weapon requires a number of heat sinks equal to the maximum heat it can generate. Any other weapon or item type does not require heat sinks. Only standard (single) heat sinks may be installed in a Handheld. Ballistic and Missile weapons as well as Chemical Lasers must mount ammunition if they are not One-Shot weapons. Ammo can be added to such weapons on a per-shot basis, with each shot's weight (in tons) determined by dividing 1 by the number of shots the weapon normally carries per ton. Neither ammo nor heat sinks count towards the item limit.

Armor may be added to a Handheld Weapon at a cost of 1 ton per 16 points of added armor (or 8 points per half-ton); only standard armor may be used.

The final weight of a Handheld Weapon is equal to the total of all components and armor it carries, rounded up to the nearest half-ton.

SILVER BULLET GAUSS RIFLE

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: The Silver Bullet Gauss Rifle operates under the same rules as an LB-X Autocannon using cluster munitions (using the 15 column of the Cluster Hits Table), including the ability to be used as a flak weapon (see p. 114, *TW*) and the inability to make use of a targeting computer. Unlike LB-X Autocannons, Silver Bullet Gauss rifles may not fire solid slug rounds.

Critical hits to a Silver Bullet Gauss Rifle result in a 20-point internal explosion in the same manner as an exploding standard Gauss Rifle (see p. 135, *TW*), while hits to the Silver Bullet's ammunition bins simply render the affected bins useless.

GRAV DECK

Introduced: Early spaceflight

An amenity created to support long-term living conditions in microgravity (such as on fixed space stations or JumpShips), grav decks are large, structural rings which rotate fast enough to create an approximation of gravity through centrifugal force, allowing for normal activities with few of the distractions produced by a free-floating environment. Most grav decks produce an equivalent force around one-quarter to one-half Gee to avoid nauseating effects, but larger, faster-spinning grav decks do exist that can produce almost terrestrial gravity with relative comfort for the occupants.

GRAV DECK

Rules Level: Advanced
Available To: JS, SS, WS
Tech Base (Ratings): Both (B/C-C-C)
Game Rules: Grav decks have no direct impact in standard gameplay, but can offset many of the debilitating effects of long-term life in microgravity that can crop up during campaign operations. Such effects are beyond the scope of this book and will be covered in later rulebooks.

GRENADE LAUNCHERS, VEHICULAR (VGL)

Introduced: Pre-spaceflight

As a weapon system, vehicle-mounted grenade launchers (VGLs) lost their popularity with the advent of the BattleMech, which could generally shrug off the blasts of an entire platoon's worth of grenades. Nevertheless, as a defensive armament or anti-infantry weapon, VGLs have lingered through the centuries, occasionally appearing on modern units in a one-off fashion.

GRENADE LAUNCHERS, VEHICULAR (VGL)

Rules Level: Advanced
Available To: BM, IM, PM, CV, SV, AF, CF, SC, DS, MS
Tech Base (Ratings): Both (C/D-E-F)
Game Rules: Vehicular Grenade Launchers (VGLs) are one-shot launchers that, when fired, automatically deliver their damage effects to all units in the 3 adjacent hexes of their firing arc. Even though they are one-shot weapons, with ammunition included in their weapon slots, critical hits to a VGL do not result in an ammunition explosion. No to-hit roll is required to use a VGL mounted on a ground-based unit or landed aerospace unit; all targets in the affected hexes suffer the same effects.

VGLs cannot be fired while submerged.

Aerospace-mounted VGLs may not be employed in space combat, but VGLs mounted on airborne units (including VTOLs, WiGEs, Airships, Fixed-Wing Support Vehicles and aerospace units) can use these weapons to deliver a single bombing attack against a single target hex in their line of flight. Such an attack affects only one hex, and must be rolled for as a standard Bombing attack (see pp. 245-247, *TW*).

HANDHELD WEAPONS

R&D Start Date: 3050 (Federated Commonwealth)
Prototype Design and Production: 3055 (Federated Commonwealth)

On today's battlefield, the term "handheld weapons" commonly refers not to the armaments carried by infantry, but heavy-class weapons built on pistol or rifle-like "handhold" mounts to be used by 'Mech-scaled hands. While the most recent efforts to perfect this technology occurred in the wake of the Clan invasion, when FedCom researchers tested pistol-style handheld weapon mounts, it was the Terran Hegemony's earliest efforts to design such weapons for 'Mechs like the *Griffin* and the *Phoenix Hawk* that truly saw the first attempts at a universal, portable weapon mount.

Unfortunately, this oft-repeated project never progressed beyond the testing stage, largely because of weight and bulk issues from the weapons' design, as well as the utter lack of adequate safeguards to prevent hostile units from "stealing" such weapons in mid-battle and turning them on their users. More often than not, in fact, engineers through the ages have settled for hard-mounting their "handheld weapons" to the BattleMechs' framework, retaining only the visual appearance of such giant pistols and rifles, rather than a truly modular mount.

HANDHELD WEAPONS

Rules Level: Experimental
Available To: BM, IM, PM
Tech Base (Ratings): Both (D/E-E-F)
Game Rules: Handheld Weapons may only be picked up and/or used by ProtoMech and 'Mech units with two functioning hand actuators.

A 'Mech or ProtoMech may carry a single Handheld Weapon. This weight counts towards a 'Mech's total cargo limit (10 percent of the unit's total weight, or 20 percent if the unit mounts operating Triple-Strength Myomer; see *'Mech Lifting Capabilities*, p. 261, *TW*). While carrying a Handheld Weapon, the unit cannot make any punching or pushing attacks, use any physical weapon beyond what the Handheld Weapon mounts (if any), or use any weapons mounted in the unit's arms, torso, or Main Gun location (unless the weapons are rear-facing).

When used to attack, a Handheld Weapon may only be fired at one target per turn, even if it carries multiple individual weapons (such as a Handheld with two medium lasers in it). The weapon does not generate heat, but neither can it draw on the unit's on-board ammunition supplies or take advantage of a targeting computer or other electronic enhancements installed within the firing unit's chassis (AES modifiers do apply, so long as the 'Mech has AES in both arms).

To use a Handheld Weapon in a melee attack, it must contain a physical weapon. The weapon behaves as normal, except that two hands are always required to wield it.

If a unit using a Handheld Weapon takes a hit to either arm location, the attacker must roll 1D6. On a result of 6, the Handheld Weapon takes the damage instead, and is destroyed if it sustains more damage from the hit than it has armor points, with excess damage transferring to the arm as normal.

Dropping a Handheld Weapon, intentionally or otherwise, always occurs in the End Phase; the weapon is dropped in the same hex as the unit. Critical hits to a unit's hand actuators force it to drop a Handheld Weapon (critical hits to any other arm actuators only add the cumulative penalties for making attacks with actuator damage). If a TSM-activated unit is carrying a Handheld Weapon that weighs more than 10 percent of its tonnage, and its heat drops below the required activation level of the TSM in any Heat Phase, the weapon must be dropped. If a unit carrying a Handheld Weapon falls, it must make an additional Piloting Skill Roll to avoid accidentally dropping the weapon, applying any arm actuator damage modifiers and any other applicable Piloting modifiers.

A dropped Handheld Weapon must be noted on the map. Dropped weapons may be targeted for weapon attacks by other units. Such attacks are made at a +1 to-hit modifier, but also apply the –4 immobile target modifier. If in the same hex as a unit, a weapon may be picked up during the End Phase of any turn. It can then be used beginning in the next turn. However, a weapon dropped in that End Phase may not be picked up until the End Phase of a subsequent turn.

HEAT SINKS

Advanced heat distribution systems have long diminished the vicious cycle of waste heat accumulated by combat units and the energy required to contain the waste's effects, but there has always been room for improvement. While double heat sinks are more efficient, they are space-consuming. Various innovations hope to fill the needs that still linger between double and regular heat sinks.

COMPACT HEAT SINKS

R&D Start Date: 3056 (Federated Commonwealth)
Prototype Design and Production: 3058 (Federated Commonwealth)

Inner Sphere researchers devised compact heat sink technology as a means of recovering the internal space lost by bulky systems like endo-steel internal structure or massive Gauss rifles. Unfortunately, in order to provide the increased internal space, the resulting smaller heat sinks used denser materials and thus grew heavier than their standard counterparts.

COMPACT HEAT SINKS

Rules Level: Experimental
Available To: BM
Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: Compact Heat Sinks function in the same manner as standard heat sinks for all units capable of carrying them. However, if a 'Mech should suffer a critical hit to a slot that contains 2 Compact Heat Sinks, both sinks are destroyed by the hit.

LASER HEAT SINKS

Introduced: 3051 (Clan Jade Falcon)

The bane of misinformed Inner Sphere physics professors, Clan "laser heat sinks" seemingly violate the laws of thermodynamics by efficiently converting diffuse heat into concentrated laser light that is then ported out of the unit. The overlooked aspect of laser heat sinks is that they are not powered by the heat they are removing (which would be thermodynamically impossible), but by a separate power source (either the unit's engine or emergency batteries in the heat sink). This exotic refrigeration system is somewhat heavier than those of conventional heat sinks, but the elimination of traditional heat sink radiators and large reservoirs of caustic or flammable coolants allows laser heat sinks to match traditional Clan double heat sinks in performance.

One disadvantage of the system is that laser heat sinks function as a "'Kick Me' sign" during combat in darkness because of the bright light emitted from the heat sink ports.

CONSTRUCTION RULES

Heat Sinks: Compact Heat Sinks are added and allocated to BattleMechs in accordance with the standard 'Mech construction rules regarding heat sinks (see pp. 53-54, *TM*). However, Compact Heat Sinks are small enough to fit up to 2 sinks in a single critical slot, rather than just 1. A 'Mech using Compact Heat Sinks also doubles the number of heat sinks that need not be allocated to its critical hits table (see p. 53, *TM*). The number of compact sinks assigned to a given slot beyond these "critical-free" sinks must be noted on the unit's record sheet. Compact Heat Sinks may not be mixed with any other heat sink type.

Laser Heat Sinks may be mounted on any Clan BattleMech in accordance with the standard 'Mech construction rules regarding heat sinks. Laser Heat Sinks are treated as Clan Double Heat Sinks in every way (including tonnage, heat capacity and critical slot space), but cannot be mixed with standard Double Heat Sinks on the same chassis or mounted on non-BattleMech units.

LASER HEAT SINKS

Rules Level: Advanced
Available To: BM
Tech Base (Ratings): Clan (F/X-X-E)
Game Rules: Laser Heat Sinks function as standard Double Heat Sinks, but the reduction in hot coolant inside the 'Mech reduces the chance of ammunition explosions due to heat, translating to a +1 bonus on rolls to avoid heat-induced ammunition explosions. If the 'Mech takes any action in a turn that generates heat (movement, firing weapons and so on), the night combat or dusk modifier for shots against it is reduced by 1, whether or not the heat is dissipated by the sinks. If the 'Mech's overheats at all (its heat scale rises above 0), night or dusk modifiers no longer apply to any attacks against the unit.

INFANTRY ARMOR

Introduced: Various

A wide range of personal armor is available to today's conventional infantryman. While still not much of a match for heavy weapons, the protection afforded by personal armor can drastically improve a platoon's chances against anti-infantry weaponry. Moreover, some armor even offers the additional protection of stealth capabilities.

INFANTRY ARMOR

Rules Level: Advanced
Available To: CI
Tech Base (Ratings): Both (Variable)
Game Rules: The Conventional Infantry Armor Table roughly outlines the range of armor types available to conventional infantry. Each armor type has a Damage Divisor, a value that any damage delivered must be divided by before it can be applied to the platoon (including damage determined by dice rolls, such as Burst Fire or Cluster Weapons). This damage is rounded up to the nearest full point before it is applied against the platoon. (For example, if a platoon using Lyran Field Infantry Armor Kits – with a Damage Divisor of 2 – is attacked by an LB 20-X AC, the damage to the platoon is computed as if the platoon suffered an 2-point hit [((20 ÷ 10) + 1) ÷ 2 = 1.5, round up to 2]; if the same platoon were hit by a machine gun—a 4D6 Burst-Fire weapon that rolls up 17 damage points—the armor reduces the damage to 9 points [17 ÷ 2 = 8.5, round up to 9].)

In addition, some Infantry Armor may be encumbering or offer stealth modifiers in battle. Encumbering armor is noted with an "E" beside its divisor value and prevents the platoon from engaging in anti-'Mech attacks (in addition to slowing the platoon down, per the construction rules below).

Stealth armor provides additional benefits that may include a Camo To-Hit Modifier (the modifier to attacks—effective against all attackers—against a platoon based on the number of hexes it moved in the round), an IR To-Hit modifier (applied to non-infantry attacks against the platoon based on its range from the Attacker, in addition to standard range modifiers) and ECM Effects (that determine whether or not the platoon can avoid being spotted by non-infantry units with an Active Probe, Light Active Probe or similar systems when using *Hidden Unit* rules; see p. 134, *TW*).

To be effective, all troopers in a platoon must carry the same type of armor to gain its effects. Multiple armor types cannot be combined in the same infantry unit.

CONVENTIONAL INFANTRY ARMOR TABLE

Infantry Armor Type	Damage Divisor*	Tech (Rating)	Availability	Introduced (Date)	Cost (C-bills, each)
Ablative, Standard	1E	Both (D)	A-B-A	2300	1,000
Ablative, Concealed	1	IS (E)	E-D-B	2400	1,500
Ablative/Flak, Standard	1	Both (D)	B-C-B	2305	800
Ablative/Flak, Concealed	1	IS (E)	F-D-C	2400	1,400
Ballistic Plate, Standard	2E	Both (D)	C-C-C	2310	1,600
Ballistic Plate, Concealed	1	IS (E)	X-F-D	2820	2,880
Clothing, Fatigues/Civilian/Non-Armored	1	Both (A)	A-A-A	PS	25
Clothing, Leather/Synthetic Hide	1	Both (A)	A-A-A	PS	100
Clothing, Light (e.g. Summer Wear/None)	0.5	Both (A)	A-A-A	PS	15
Engineering Suit	1E**	Both (D)	D-D-D	2350	7,500
Environment Suit, Light	1E	Both (C)	B-B-B	2200	200
Environment Suit, Hostile	2E**	Both (D)	C-C-C	2300	10,000
Environment Suit, Marine	2**	Both (D)	E-E-D	2325	15,000
Flak, Standard	1	Both (C)	A-A-A	2200	150
Flak, Concealed	1	IS (D)	D-C-B	2230	225
Heatsuit	1	Both (D)	C-C-C	2355	100
MechWarrior Combat Suit	1	Both (E)	D-F-E	2790	20,000
MechWarrior Cooling Suit	1	Both (E)	D-F-E	2500	5,000
MechWarrior Cooling Vest (Only)	0.5	Both (D)	C-C-C	2460	200
Myomer, Suit	2E	IS (E)	X-X-E	3047	5,800

CONVENTIONAL INFANTRY ARMOR TABLE (CONT.)

Infantry Armor Type	Damage Divisor*	Tech (Rating)	Availability	Introduced (Date)	Cost (C-bills, each)
Myomer, Vest	2	IS (E)	X-X-E	3045	1,800
Parka	1	Both (C)	A-A-A	PS	50
Neo-Chainmail	1	IS (D)	X-X-C	3065	920
Snowsuit	1E	Both (C)	A-A-A	PS	70
Spacesuit	1E**	Both (C)	B-B-B	ES	5,000
Spacesuit, Combat	1E**	Both (C)	D-D-D	2200	7,000
Faction Armor Kits:					
Capellan Confederation	1	IS (C)	X-X-C	3050	450
Clan (All)	2	Clan (E)	X-E-E	2900	5,560
ComStar	2	IS (F)	X-F-D	2830	4,280
Draconis Combine	1	IS (C)	B-B-B	2625	360
Federated Suns	1	IS (C)	B-B-B	2330	750
Federated Suns/Commonwealth (3030+)	2	IS (C)	X-D-B	3030	1,040
Federated Suns (3067+)	2E	IS (D)	X-X-D	3067	2,080
Free Rasalhague Republic	1	IS (C)	X-X-B	3040	360
Free Worlds League	1	IS (C)	B-B-B	2290	950
Free Worlds League (3035+)	2E	IS (C)	X-E-B	3035	1,830
Lyran Alliance/Commonwealth	1	IS (C)	B-B-B	2425	650
Lyran Alliance (3060+)	2	IS (C)	X-X-B	3060	730
Magistracy of Canopus	1	IS (C)	B-B-B	2610	400
Marian Hegemony	2	IS (C)	X-F-B	3049	1,580
Taurian Concordat/Calderon	1	IS (C)	X-X-B	3047	370
Word of Blake	2	IS (F)	X-X-D	3055	4,300
Other Periphery/Generic	1	Both (C)	B-B-B	ES	330
Sneak Suits					
DEST Infiltration Suit	1†	IS (D)	X-E-E	2840	50,000
Sneak Suit (One system)	1†	Both (D)	C-C-C	2450	7,000
Sneak Suit (Two systems)	1†	Both (D)	D-D-D	2460	21,000
Sneak Suit (Three systems)	1†	Both (D)	D-E-E	2475	28,000

*Armor types designated with an "E" are encumbering: –1 MP to platoon; may not execute anti-'Mech attacks.
**Infantry wearing these armor types may operate in vacuum.
†See Infantry Stealth Modifiers Table for additional game play effects; for Sneak Suits, each different Sneak armor type counts as one "system," with all stealth modifiers applied cumulatively. For non-infantry attackers, the modifiers from both the Camo and IR columns on that table are cumulative.

INFANTRY STEALTH MODIFIERS TABLE

Stealth Armor Type	Camo To-Hit Modifier (0/1/2/3/4+ MPs)*	IR To-Hit Modifier (Short/Med/Long)**	ECM Effect**
DEST Infiltration Suit	+1/0/0/0/0	+1/+1/+2	None
Sneak, Camo	+3/+2/+1/0/0	0/0/0	None
Sneak, IR	0/0/0/0/0	+1/+1/+2	None
Sneak, ECM	0/0/0/0/0	0/0/0	Invisible to Standard/Light Active Probes

*This modifier affects all Attacker to-hits against the stealth unit.
**This modifier affects non-infantry Attacker to-hits against the stealth unit; infantry Attackers ignore these effects.

Infantry Armor: A conventional infantry platoon equipped with Infantry Armor must select one type of armor for the entire platoon. Armor types designated as encumbering (with an "E" beside the Damage Divisor) reduce the platoon's mobility by 1 MP (to a minimum of 1 MP per turn), and prohibit the unit from making anti-'Mech Leg and Swarm attacks. This mobility restriction is cumulative with modifiers caused by carrying 2 Support Weapons per squad.

Landing Deck: A Landing Deck takes up a minimum surface area of 7 hexes (including a central hex and all hexes adjacent to it), and may only be mounted on the top of a Mobile Structure (though the weight of its supports counts against the Mobile Structure's internal tonnage capacity). Landing decks may be built larger, but only by expanding outward from the center hex by 1 hex (to a maximum radius of 3 hexes from the center), and preclude the use of turrets in all hexes the deck occupies. A single Mobile Structure can mount only one Landing Deck. Landing Decks distribute their tonnage across their surface area, so each hex of a Landing Deck weighs the same, regardless of the deck's total size. Any unit smaller than a DropShip can treat a landing deck as paved hex surfaces for landing purposes.

LANDING DECK

Introduced: Early Spaceflight

In essence, a Landing Deck is a broader and more heavily reinforced variation on the on the basic flight deck, built to support the launch, landing, and overland transportation of larger space vehicles. Today's landing decks, primarily built to accommodate DropShips, are rare beasts. Featuring specialized lifting mechanisms, heavy tilt-platform elevator systems, and other components, they can hoist vessels that have landed in special prepared sections of modern spaceports for transport to other landing pads, maintenance shelters, or even facilitate a blastoff from the transport vehicle itself.

LANDING DECK

Rules Level: Advanced
Available To: MS
Tech Base (Ratings): Both (B/C-C-C)
Game Rules: A DropShip-scale extension of the conventional flight deck or helipad, landing decks are massive, multi-hex structures of reinforced, heat-dissipating alloys and ferrocrete intended to handle the massive load of a grounded DropShip and—if possible—its launching blast. So large they may only be carried on the rooftop surface of a Mobile Structure, they feature built-in restraining gear, fold-up blasting deflectors, and even personnel/cargo elevators used to load and offload cargo into their supported units. A single landing deck can support a total weight equal to 1,000 tons per hex, and does not lose that capacity unless the supporting Mobile Structure suffers the loss of a third (or more) of its total hexes in size.

LASERS

The workhorses of modern energy weapons, lasers have been on humankind's battlefields for over a millennium. Evolved to encompass a range of sizes, they have capabilities ranging from the far-reaching ER variety and rapid-cycling pulse types to devastating heavy class lasers. Spurred on by the latest waves of unrelenting war, engineers in the Inner Sphere and the Clans have continued to refine laser technology, introducing newer and more exotic variations.

BINARY LASER (BLAZER) CANNON

R&D Start Date: 2801 (Lyran Commonwealth)
Prototype Design and Production: 2812 (Free Worlds League)

A scale-up of the infantry Blazer Rifle concept, the Binary Laser (Blazer) Cannon is essentially two large laser cores combined with some redundant components removed. Though researched and prototyped several times (and by several states) during the Succession Wars, the resulting weapon was more akin to an "extra-large" laser than two arrayed lasers, with a heat load that stymied the weapon's use and prevented its production debut. Ironically, despite the return of double heat sink technology, the Blazer has remained an experimental weapon thanks to other more effective and economical energy weapon developments, like the heavy PPC. Though currently being re-examined by several Inner Sphere laser manufacturers, the Blazer has yet to reach widespread production.

BINARY LASER (BLAZER) CANNON

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Inner Sphere (D/X-E-E)
Game Rules: The Binary Laser (Blazer) Cannon functions as a standard laser weapon in game play. Though it's technically a twin-barrel laser, hits from a Binary Laser (Blazer) Cannon are resolved as a single hit in gameplay when determining location and critical checks. A unit firing a Binary Laser (Blazer) Cannon may not opt to fire one barrel and not the other.

CONSTRUCTION RULES

Lasers: The advanced laser weapons described above may be mounted in accordance with the appropriate unit's standard construction rules for mounting weapons, with the following modifications for specific instances:

Bombast Lasers: Non-heat scale units mounting Bombast Lasers must have sufficient heat sink capacity to handle the largest Bombast Laser discharge (that is, 12 points).

Chemical Lasers: Chemical Lasers are treated as ballistic weapons rather than energy weapons, and therefore do not require power amplifiers or heat sinks on such units. Chemical Laser ammunition must be installed in full-ton lots for all units except ProtoMechs. When mounting Chemical Lasers on ProtoMechs, ammunition may be purchased at a per-shot rate (determined by dividing 1,000 by the number of shots per ton and rounding up to the nearest kilogram).

X-Pulse Lasers: Non-heat scale units mounting X-Pulse Lasers must also mount sufficient heat sinks to deal with the weapon's increased heat.

Laser Anti-Missile System: The laser anti-missile system follows the standard rules for installing weapons and equipment. The system is considered an energy weapon for purposes of determining the heat sink and power amplifier requirements of units that do not use a heat scale (such as non-fusion powered vehicles and fighters).

BOMBAST LASER

R&D Start Date: 3061 (Lyran Alliance)
Prototype Design and Production: 3064 (Lyran Alliance)

The bombast laser is meant to be the ultimate laser weapon without growing to be the heaviest energy weapon. Unfortunately, weight reduction efforts included sacrifices in the power supply, which left the bombast laser as a slow-charging weapon. Rather than hobble the gunner with a weapon that wasn't ready to fire at a critical time, engineers modified the weapon so that it could be triggered prematurely with whatever charge it had built up. This allowed the bombast laser to be successfully (if not entirely accurately) portrayed as a "flexible" weapon with a "dial-a-yield" feature. In practice, the bombast laser is a distracting weapon for its user, as its variable charging feature is difficult to manage in the middle of combat. But its powerful damage potential and the showy effect of its pre-fire "glow" (a side effect of the electrical buildup that grows the longer the weapon's fire is held) made it a favorite experimental weapon in the Solaris arenas where it first saw testing.

BOMBAST LASER

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Inner Sphere (E/X-X-E)
Game Rules: The Bombast Laser may select the level of damage it inflicts, from 7 to 12 points, but suffers an additional to-hit modifier equal to half of the desired damage value minus 7 (rounded up), reflecting the fire-holding factor. (Thus, a Bombast Laser "dialed up" to its maximum damage potential of 12 suffers an additional to-hit modifier of +3 [12 damage – 7 = 5; 5 ÷ 2 = 2.5, round up to 3].) For aerospace units, always use the +3 to-hit modifier. The Bombast Laser's heat is equal to the points of damage selected that turn. Bombast Lasers may not be fired on secondary targets. In all other respects, Bombast Lasers function per standard direct-fire energy weapon rules.

CHEMICAL LASERS

R&D Start Date: 3057 (Clan Hell's Horses)
Prototype Design and Production: 3059 (Clan Hell's Horses)

Chemical lasers were actually the first effective energy weapons able to physically damage relatively robust targets, like solid-fueled missiles and unarmored military vehicles. With the advent of economical fusion engines and refinements in electrically powered lasing mechanisms, however, they were quickly overtaken by a new generation of "fuel-free" laser weapons that have become today's standard.

Seeking a more weight-economical alternative to vehicle-mounted lasers (which often require power amplifiers on non-fusion units), Clan Hell's Horses recently returned to the chemical laser concept. Though reliance on chemical "ammunition" (which remains as energetic and highly toxic as the early laser versions) promises to reduce their endurance in combat, the resulting weapons may be mounted on non-fusion vehicles without requiring power packs or heat sinks.

CHEMICAL LASERS

Rules Level: Experimental
Available To: BM, IM, PM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Clan (E/X-X-E)
Game Rules: The ammo for Chemical Lasers follows normal ammo explosion rules for critical hits and heat, inflicting damage equal to weapon times the remaining shots in the ammo slot (affected by CASE or CASE II as normal). Although Chemical Lasers are technically energy weapons when fired, because of their ammunition dependency, fighters equipped with these weapons may not use them in a strafing attack. When mounted on a vehicle, Chemical Lasers still function if the vehicle's engine is critically hit.

ER PULSE LASERS

R&D Start Date: 3053 (Clan Wolf)
Prototype Design and Production: 3057 (Clan Wolf)

While under-funded Inner Sphere researchers charged the problem of their short-ranged pulse lasers head-on with power increases (creating X-pulse lasers), Clan Wolf researchers labored under an attempt to mate the best of Clan extended range and pulse technologies, which mostly ended up combining some of the high-temperature features of ER optics and up-rated power supplies to punch the beams out further. The result was a suite of less accurate, longer-ranged pulse lasers. Curiously, these weapons have yet to reach full-scale production, at least partly due to the summary cancellation of the project when many of the original researchers departed with Phelan's Wolves during the Refusal War.

ER PULSE LASERS

Rules Level: Experimental
Available To: BA, BM, IM, PM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Clan (F/X-X-E)
Game Rules: In game play, ER Pulse Lasers function in the same fashion as regular pulse lasers (and are compatible with targeting computers in the same fashion), but receive a –1 to-hit modifier rather than –2. Against conventional infantry, the Small ER Pulse Laser delivers only 1D6 burst-fire damage, rather than 2D6.

IMPROVED HEAVY LASERS

R&D Start Date: 3066 (Clan Goliath Scorpion)
Prototype Design and Production: 3069 (Clan Goliath Scorpion)

While the ER Pulse Laser project was apparently not well supported among the Clans, the success of the Star Adders' heavy laser spurred many Clans to seek a remedy for that weapon's targeting shortcomings. Concerned about the sensor-disrupting and health-endangering radiation emissions of these weapons, but unwilling to compromise on their sheer destructive power, Clan engineers focused on the weakly shielded "plasma lasing mechanism" that generated so much trouble.

Though simpler solutions included additional shielding, Clan Goliath Scorpion reportedly hit upon a more elegant solution meshing limited shielding with a modified plasma lasing chemistry. The only drawback was the more powerful capacitors needed to power these weapons, which are prone to Gauss-like explosions if damaged in combat.

IMPROVED HEAVY LASERS

Rules Level: Experimental
Available To: BM, IM, PM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Clan (F/X-X-F)
Game Rules: Improved Heavy Lasers do not suffer the usual +1 to-hit modifier associated with standard Heavy Lasers. In addition, when an Improved Heavy Laser takes a critical hit, it explodes in the same manner as a Gauss Rifle (see p. 135, TW), but with a damage value equal to half the Improved Heavy Laser's damage. (For instance, an Improved Small Heavy Laser will explode for 3 points [6 damage ÷ 2 = 3], while an Improved Heavy Large Laser will explode for 8 points [16 ÷ 2 = 8].)

VARIABLE SPEED PULSE (VSP) LASERS

R&D Start Date: 3066 (Free Worlds League/Word of Blake)
Prototype Design and Production: 3070 (Free Worlds League/Word of Blake)
Introduced: 3072 (Free Worlds League/Word of Blake)

A variation of the pulse laser concept, the variable speed pulse laser (VSP laser) uses a series of rotating lenses and electronic cut-offs. This system enables the laser to track a target and alternate the speed with which it generates its pulses, based on range to target. This effect allows the VSP a greater range than a standard pulse laser, but at less damage potential and less accuracy, while such damage and accuracy are conversely increased at shorter ranges.

VARIABLE SPEED PULSE (VSP) LASERS

Rules Level: Advanced
Available To: BA, BM, IM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Inner Sphere (E/X-X-E)
Game Rules: In game play, variable speed pulse lasers function as pulse lasers (and are compatible with targeting computers in the same fashion) in every way, except that the to-hit modifier and damage value changes depending upon the range bracket. At short range, VSP Lasers receive a –3 to-hit modifier and their maximum damage value, while at medium range, they receive a –2 to-hit modifier and reduced damage. At long range, a VSP Laser has a –1 to-hit modifier and delivers its lowest potential damage to the target. For aerospace combat, use range modifiers of –3 at short range and –1 at medium range.

Against conventional infantry, VSP Lasers are treated as direct-fire energy weapons, but add 1 point for attacking infantry at long range, 2 points for medium range and 3 points for short. For example, a Large VSP Laser (damage 11/9/7) attacking infantry at short range would inflict 5 casualties ([11 damage at short ÷ 10 = 1.1, round up to 2] + 3 for VSP short range = 5), while a Small VSP Laser hitting infantry at long range would strike only 2 troopers ([3 damage at long ÷ 10 = 0.3, round up to 1] + 1 for VSP long range = 2).

X-PULSE LASERS

R&D Start Date: 3055 (Federated Commonwealth)
Prototype Design and Production: 3057 (Federated Commonwealth)

The X-Pulse Laser began as a FedCom-era experiment aimed at improving the range of existing Inner Sphere-model pulse lasers without sacrificing accuracy. The fracturing of the Federated Commonwealth derailed the project for a while, but not before prototypes were in development that effectively modified existing Spheroid pulse lasers to cycle faster and with greater power. The results were weapons that gained reach while maintaining accuracy and damage, but suffered from a dramatic increase in waste heat. X-Pulse Lasers were in pre-production trials on Solaris when the Jihad erupted and the planet fell to the Word of Blake, and thus have yet to see widespread use.

X-PULSE LASERS

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Inner Sphere (E/X-X-E)
Game Rules: In game play, X-Pulse Lasers function in the same manner as standard pulse lasers. Against conventional infantry, the Small X-Pulse Laser delivers 2D6 burst-fire damage.

LASER ANTI-MISSILE SYSTEM

R&D Start Date: 3045 (Clan Wolf), 3054 (Federated Commonwealth)
Prototype Design and Production: 3048 (Clan Wolf), 3059 (Federated Suns)

Both Clan and Inner Sphere designers have turned to lasers to produce ammunition-independent anti-missile systems. Based on a modified small pulse laser, the so-called Laser Anti-Missile System (L-AMS) has debuted in prototype form, but has yet to hit mainstream production.

LASER ANTI-MISSILE SYSTEM

Rules Level: Experimental
Available To: BM, IM, CV, SV, SC, DS, SS, JS, WS, MS, ASF, CF
Tech Base (Ratings): Inner Sphere (E/X-X-E), Clan (F/X-X-E)
Game Rules: Standard anti-missile system rules apply when using the Laser AMS (see pp. 129-130, *TW*), except the laser system requires no ammunition. Furthermore, an L-AMS attack that reduces a missile flight's Cluster Hits roll to less than 2 completely destroys the incoming flight.

LASER INSULATOR

Introduced: 2575 (Terran Hegemony)
Extinct: 2820
Reintroduced: N/A

Simple in concept, the laser insulator first debuted on the Star League's *Chippewa* fighter. These high quality, rugged aerogel blankets insulated the laser bays of the *Chippewa*'s wings from the superstructure and core systems, giving the aerospace fighter the equivalent of two additional heat sinks. The excellent, lightweight insulation was irreplaceable by the Great Houses during the Succession Wars, but remained within the reach of Clan technology. The Clans did not make widespread use of the system, however, as it suffered a significant drawback: in bottling up the laser's waste heat, rather than allowing it to flow through the entire unit to act as a thermal mass, the lasers became very hot and suffered frequent failures.

LASER INSULATOR

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF, SC
Tech Base (Ratings): Inner Sphere (E/X-F-F), Clan (E/X-E-F)
Game Rules: Laser insulators reduce the heat output of each insulated laser (a laser mated to a Laser Insulator; see below) by 1 point, to a minimum of 1. Multiple Laser Insulators mated to the same weapon have no further effect. When an insulated laser makes an unmodified attack roll with a result of 2, the controlling player must roll 2D6. On an 8 or higher, the insulated laser suffers a critical hit, reflecting damage from overheating.

CONSTRUCTION RULES

Laser Insulator: Laser insulators are limited to smaller units (200 tons and less) with distinct hit locations, and must always be placed in the same location as the weapon they are insulating. Units that do not use BattleMech critical hit space treat insulators as part of the weapon itself. Laser Insulators may only be used in conjunction with standard-scale laser types (including Chemical, ER, Improved Heavy, Heavy, Pulse, Standard and X-Pulse).

Light Sail: Only Satellite Support Vehicles can mount a Light Sail. A Light Sail occupies 1 rear equipment slot on a satellite and masses 10 percent of the satellite's mass (rounded up to the nearest kilogram for Small-sized satellites or to the nearest ton for satellites 5 tons and over).

Lithium-Fusion Battery: A Lithium-Fusion Battery weighs 1 percent of the total mass of the vessel being equipped with the battery, and is automatically considered part of the vessel's main body. Full rules on constructing the units that use these items appear in *Strategic Operations*.

Mass Driver: Mass Drivers can only be installed in WarShips and space stations, and the size of such units limits the size of the largest Mass Driver that may be mounted (see the Mass Driver Vessel Limits Table below). A WarShip may mount only a single Mass Driver of any size, while a space station may mount a maximum of 1 Mass Driver per firing arc.

The Mass Driver is the only capital-scale weapon that can exceed the 70-point limit on weapon bay size, and requires 10 gunners to operate. When computing a vessel's fire control requirements, a Mass Driver counts as 10 capital weapons. Full rules on constructing the units that use these items appear in *Strategic Operations*.

MASS DRIVER VESSEL LIMITS TABLE

Mass Driver	Vessel Minimum Tonnage
Light	750,000
Medium	1,500,000
Heavy	2,000,000

LIGHT SAIL

Introduced: 2165 (Terran Alliance)

Not to be confused with the giant solar sails used by JumpShips and WarShips, the light sail is used by some satellites to maintain longstanding station-keeping positions (typically at or near zenith and nadir jump point positions) without drawing on reaction mass that can be depleted within a month's time. The Terran Alliance introduced these "passive propulsion systems" on surveillance satellites intended to monitor incoming and outgoing JumpShip traffic.

LIGHT SAIL

Rules Level: Advanced
Available To: SV
Tech Base (Ratings): Both (C/C-E-D)
Game Rules: Light Sails are functionally similar to Jump Sails. They have a Sail Integrity of 1, are furled and unfurled like JumpShip sails and may be attacked with the same rules as attacking a JumpShip sail. However, the Light Sail generates no power for the satellite and is considered destroyed if the sail itself suffers more than 1 capital-scale point of damage or the satellite suffers structural integrity damage from the rear. Satellites with thrusters and a Light Sail may not use their thrusters while the Light Sail is deployed.

LITHIUM-FUSION BATTERY

Introduced: 2529 (Terran Hegemony)
Extinct: 2819 (Inner Sphere)
Recovered: 3043 (Federated Commonwealth)

The lithium-fusion battery was a pre-Star League innovation that allowed JumpShips and WarShips to store a second charge for their Kearny-Fuchida (K-F) drives. This second jump could be triggered in short succession to the first, which allowed a JumpShip to cross up to 60 light-years in minutes, avoid ambushes, launch lightning raids at unparalleled distances and conduct other revolutionary interstellar maneuvers. Regrettably, it was never feasible to mount more than one lithium-fusion battery on a JumpShip, and the batteries took as long to recharge as the K-F drive to avoid damage, but the improvement over conventional single-jump vessels was substantial.

LITHIUM-FUSION BATTERY

Rules Level: Advanced
Available To: JS, WS
Tech Base (Ratings): Inner Sphere (E/E-X-E), Clan (E/X-E-D)
Game Rules: A Lithium-Fusion Battery enables a WarShip or JumpShip so equipped to store an additional drive charge. This extra charge allows the vessel to make two jumps in succession, while avoiding the enormous risks of quick-charging the K-F drive through the fusion reactor. Jump point calculations may be made for both jumps prior to making the first jump, or before each jump (those rules are covered in *Strategic Operations*). As with the K-F drive core, a Lithium-Fusion Battery may be charged by the vessel's jump sail, its fusion reactor or a space station's Energy Storage Battery (see p. 118). However, each method can charge only one device at a time. For example, if the jump sail is charging the K-F drive core, the vessel's Lithium-Fusion Battery must receive its charge from the fusion reactor or a space station's Energy Storage Battery.

MASS DRIVER

R&D Start Date: circa 2700 (Terran Hegemony)
Prototype Design and Production: circa 2715 (Terran Hegemony)

Essentially a Gauss rifle built on titanic scale, the weaponized mass driver—derived from early spaceflight mass conveyors used by asteroid miners in the Terran system—propels a solid projectile about the size of a BattleMech at incredible velocities. The kinetic energy released upon impact makes the mass driver almost as destructive as a small nuclear weapon. Theorized and prototyped in the late Star League era, the tremendous expense and size requirements for this weapon—which requires a WarShip-length series of coils and significant reinforcing structures to be effective—prevented its completion and full-scale production. However, FedSuns engineers working at the Galax Yards were rumored to be in the midst of constructing their own prototype just before the start of the Jihad, and some pre-Jihad rumors also suggested that the Word of Blake was fielding industrial mass conveyors modified to function in a similar fashion.

MASS DRIVER

Rules Level: Experimental
Available To: SS, WS
Tech Base (Ratings): Inner Sphere (D/X-X-F)
Game Rules: A Mass Driver has a very limited field of fire, and can only engage targets directly in line with the nose of the vessel on which it is mounted. Space stations suffer from similar restrictions, with the Mass Driver only able to fire at a target directly in line with the firing arc's hex facing. Furthermore, Mass Drivers suffer a +2 to-hit modifier to attack, in addition to all other range and conditional modifiers.

'MECH MORTARS

Introduced: 2531 (Terran Hegemony), 2840 (Clans)
Extinct: 2819 (Inner Sphere)
Reintroduced: 3043 (Federated Commonwealth)

A rather old-fashioned concept, more akin to short-range artillery than a dedicated anti-vehicle weapon system, 'Mech-based mortars never really caught on through the centuries, especially thanks the existence of more effective missile launchers, and had largely vanished from Inner Sphere battlefields by the mid-29th century. Regardless, some agencies—noting these weapons' immunity from anti-missile fire—have explored their potential as a suppression-fire alternative to LRMs, reviving the concept for modern times.

'MECH MORTARS

Rules Level: Advanced
Available To: BM, IM, CV, SV, MS
Tech Base (Ratings): Both (B/D-F-E)
Game Rules: Though their damage effects vary with the mortar types chosen (see p. 185), 'Mech Mortars otherwise operate in the same fashion as LRMs, and may be fired directly or indirectly per the standard game play rules. If fired indirectly, 'Mech Mortars follow all of the standard rules for LRM Indirect Fire (see pp. 111-112, *TW*), but do not require a completely blocked line of sight or a spotter to execute (though an additional +2 to-hit modifier applies if no spotter is present, reflecting the general lack of guidance systems on the mortar shells). If fired directly, a +3 to-hit modifier applies to the 'Mech Mortar attack because the shells still fly in an arcing trajectory towards the target.

'Mech Mortars may only be fired by ground-based units. Airborne units may not fire 'Mech Mortars, nor may 'Mech Mortars be fired while submerged.

Anti-Missile Systems (including Standard and Laser types) may not engage incoming 'Mech Mortar flights.

MECHANIZED VTOL INFANTRY

Introduced: Early spaceflight

The most mobile of the mechanized conventional infantry types, VTOL-mechanized infantry are also the rarest platoon type in the modern battlefield. Employing collapsible, ultra-small aircraft (called "microlites") and helicopters ("microcopters"), these troops are ideal for reconnaissance and spotting duties, but are lightly armed compared to their more conventional kin. The term "mechanized" as it is applied to these infantry is technically a misnomer. Other mechanized troop types (hover, wheeled and tracked) are deployed utilizing full-scale vehicles. As such, technically, these specific troop type should be classified as "motorized," but standard usage by most militaries terms them mechanized.

MECHANIZED VTOL INFANTRY

Rules Level: Advanced
Available To: CI
Tech Base (Ratings): Both (C/D-E-D)
Game Rules: Whether they are comprised of Microlite or Micro-Copter troops, Mechanized VTOL conventional infantry platoons may move using VTOL MPs (including take off, landing, and terrain restrictions while in flight). In addition, these troops may move on the ground at 1 MP per turn as a standard foot infantry platoon, as desired. Microlite VTOL infantry receive a base of 6 VTOL MP, but must enter at least 1 hex per turn to remain in flight, while Micro-Copter platoons start with a base of 5 VTOL MP, and may hover in flight at a cost of 0 MP. As with most other mechanized conventional platoons, VTOL-Mechanized infantry cannot execute anti-'Mech attacks.

CONSTRUCTION RULES

'Mech Mortars: 'Mech Mortars may be mounted on any applicable unit in accordance with the unit's normal weapon-mounting rules. 'Mech Mortar ammunition of any type may only be installed in full-ton lots.

Mechanized VTOL Infantry: Regardless of the technology base used, Mechanized VTOL conventional platoons operate at a maximum of 4 squads. Mechanized VTOL platoons may not be broken down to smaller sub-units than an individual squad, even for transport purposes.
Microlite VTOL Platoons: These platoons assign 2 troopers per squad, but may not carry any Support Weapons.
Micro-Copter VTOL Platoons: These platoons employ 4 troopers per squad, and may carry between 0 and 1 Support Weapon per squad. If any Support Weapons are included in the platoon, however, the platoon suffers a –1 VTOL MP modifier.

MechWarrior Aquatic Survival System (MASS): The MASS must always be mounted in the location where the 'Mech's cockpit is placed.

Mine Dispensers: Only BattleMechs, IndustrialMechs, ProtoMechs, Combat Vehicles, Support Vehicles (excluding satellites), fighters, Small Craft and Mobile Structures may employ Vehicular Mine Dispensers. Only Battle Armor may employ Battle Armor Mine dispensers. Only Satellite Support Vehicles, Aerospace Fighters, Small Craft, DropShips, Space Stations, JumpShips and WarShips may employ Space Mine Dispensers. Mine dispensers may be mounted on any applicable unit in accordance with its standard rules for installing weapons.

Vehicular and Battle Armor Mine Dispensers receive only 2 shots per dispenser (of the same mine type, which may be determined before game play), and may not install additional mine ammo.

Space Mine Dispensers are treated as standard-scale Point-Defense weapons when mounted on Aerospace Fighters, satellites, Small Craft and advanced aerospace units, and follow the standard rules for mounting such weapons on such units, including gunner requirements and weapon limits per location.

MECHWARRIOR AQUATIC SURVIVAL SYSTEM

R&D Start Date: 3045 (Federated Commonwealth)
Prototype Design and Production: 3048 (Federated Commonwealth)

Today's MechWarrior Aquatic Survival System (MASS) was initially developed by Snorkel's of Bracken Swamp for the more exotic underwater arenas on Solaris VII, where it is designed to give warriors trapped in a breached, submerged cockpit time to get clear of the water. The system's weight and bulk, however, combined with the rarity of submerged engagements, consigned the MASS to limited use, and full production never occurred. According to all accounts, the Clan version is derived directly from the Inner Sphere model, likely a result of Diamond Shark exchanges.

MECHWARRIOR AQUATIC SURVIVAL SYSTEM (MASS)

Rules Level: Experimental
Available To: BM, IM
Tech Base (Ratings): Both (D/X-X-D)
Game Rules: A submerged 'Mech equipped with a MASS that suffers an armor breach to the location in which the cockpit is placed must make a 2D6 roll each turn for up to 180 turns (30 minutes) thereafter that the cockpit area remains (or becomes) submerged. On any result of 11 or less, the unit's cockpit and life support systems ignore the full effects of a cockpit breach and the 'Mech may operate at a +1 penalty to Piloting only—though its sensors will be flooded and disabled. If the roll result is 12, or the unit spends more than 180 total turns underwater, the MASS will fail and the cockpit area will completely flood, forcing the MechWarrior to bail out or die.

While this system protects the cockpit and life support systems, allowing them to function in the event of a breach, it does not protect any other systems such as sensors (or the engine and gyro on a 'Mech with a torso-mounted cockpit). In the event of a flooded torso location on a unit using MASS, the 'Mech will be immobilized and the MechWarrior must await rescue or take the risk of bailing out.

MINE DISPENSERS

Almost as old as minesweepers, mine dispensers allow for the seeding of a large area with mines, whether on land, sea or in space.

VEHICLE AND BATTLE ARMOR DISPENSERS

Introduced: Pre-spaceflight (Vehicular),
3050 (Capellan Confederation [Battle Armor])

Vehicle mine dispensers have been in use before man left earth. It was not until the coming of the Clans and the sudden ramp up of development of Inner Sphere battle armor that the Capellan Confederation wedded a mine dispenser to battle armor.

VEHICLE AND BATTLE ARMOR DISPENSERS

Rules Level: Advanced
Available To: BA, PM, BM, IM, CV, SV, AF, CF, SC, MS
Tech Base (Ratings): Both (B/E-E-E [Vehicular], D/X-X-E [Battle Armor])
Game Rules: Vehicular (vehicle- and 'Mech-based) Mine Dispensers are specialized "launchers" that deposit mines in a unit's hex while in motion. Ground-based units, including 'Mechs, ProtoMechs and Combat or Support Vehicles using wheeled, tracked, hover (for this rule WiGEs are also included) motive systems, may deploy any land-type minefield at the beginning or end of their Movement Phase (regardless of the movement mode chosen). The minefield deployed will be a standard-strength field, which automatically fills the unit's designated target hex (either its starting hex or its final hex). Naval vehicles operating on or below the surface of the water (to a maximum of Depth 12) may deploy sea-type mines in the same fashion, but may not deploy mines not specifically identified as sea mines (such as Active mines). Airborne vehicles, Conventional Fighters, Aerospace Fighters and Small Craft operating above the ground map with Vehicular Mine Dispensers may deploy mines per the standard rules for a bombing attack (see pp. 245-246, *TW*).

Battle Armor Mine Dispensers may deploy their mines in the same fashion as ground-based units using a Vehicular Mine Dispenser, but may only use Jumping (or VTOL) MP to do so. Only one trooper per battle armor unit (Squad, Point, or Level I) may deploy mines each turn. Only one trooper per battle armor unit (Squad, Point, or Level I) may deploy mines each turn. Each trooper may carry a different minefield (mark on each record sheet what minefield each trooper carries).

Minefields deployed using Vehicular or Battle Armor Mine Dispensers have a standard damage value of 10 per "shot" regardless of the mine type deployed. Though they incorporate 2 shots into their tonnage and critical space, Vehicular Mine Dispensers do not cause ammunition explosions if hit (or from overheating effects).

SPACE DISPENSERS

Introduced: Early spaceflight (Space)

Introduced during the time of the Terran Alliance, space dispensers—along with space mines—remain relatively rare. Too easy for incoming commercial ships to stray into space minefields, they are often impractical as a defensive strategy, even on the most important of worlds. They are most often employed when an enemy moves to seize control of a system and are looking to isolate it from outside reinforcements.

SPACE DISPENSERS

Rules Level: Advanced
Available To: SV, AF, CF, SC, DS, JS, WS, SS
Tech Base (Ratings): Both (D/E-F-E)
Game Rules: Space Mine Dispensers may only be used on the space map, though any placed closer than 10 hexes (180 kilometers) from a planet's space/atmosphere interface suffer the effects of gravity and drift toward the planet surface at a rate of 1 hex per turn (becoming ineffective if they strike the interface or pass below it). Space minefields are deployed in the hex the dispensing unit occupies at the end of its Movement Phase. If the unit is not stationary (Velocity of 0), the minefield will continue to move in the direction and at the velocity of the unit's travel at the time of deployment (modified for gravity if within 10 hexes of an interface as noted above). Out-of-control units may not deploy space mines.

The damage capacity for a Space Mine Dispenser is based on the size of the unit passing through the field, rather than the launcher itself, and so a space mine cluster receives an attack capacity instead (the number of "attacks" the minefield can make before being too dispersed to remain effective). The value for that attack capacity is 6 for each space cluster deployed.

MINESWEEPER

Introduced: Pre-spaceflight

A technology as old as the widespread use of minefields in Terra's World Wars, minesweepers are designed to detonate mines at a safe distance in front of the vehicle, clearing a path for other units.

MINESWEEPER

Rules Level: Advanced
Available To: CV, SV, MS
Tech Base (Ratings): Both (C/C-C-D)
Game Rules: Minesweeper equipment begins play with an effective Armor Value of 30 points, though the equipment cannot be used as additional armor and will not stop attacks against the Minesweeper vehicle even if the attack passes through the sweeper's facing arc. Maritime Minesweepers are effective only against sea-type minefields; Land Minesweepers are effective only against land-based minefields.

As their name suggests, Minesweepers operate by simply moving a minesweeping vehicle through a mined hex, but their effectiveness varies with the minefield. A Minesweeper can be either activated or deactivated in the End Phase of a turn. Only activated Minesweepers clear mines.

If the hex contains a vibrabomb minefield, the Minesweeper will automatically set off and clear the field if the sweeping vehicle is within 9 tons of the minefield's tonnage setting, taking 10 points of damage to the Minesweeper equipment.

Against active, Inferno and standard (conventional) minefields, the player controlling the minefield must roll a normal mine explosion check upon entering the mined hex, but will set off (and clear) the mines with the sweeper on a result of 6+ (sustaining 6 points of damage to the Minesweeper equipment); if multiple mine types are located in a single hex, this roll must be made for each type of minefield. If this roll fails, the minesweeping vehicle itself may still set off the mines under the mines' normal rules (see p. 175, *TO: AR*), but sustains any minefield damage to the Minesweeper's location rather than to the Minesweeper equipment itself, and leaves the field active per the mines' standard rules.

Minesweepers have no effect on command-detonated minefields. A vehicle may only mount one Minesweeper per hex that it occupies.

Minesweeper equipment remains fully effective until its "armor" falls to 0 (or less), at which point the Minesweeper is treated as a destroyed item. Damage in excess of a minesweeper's Armor Value transfers automatically to the location where the sweeper is mounted.

MISSILE LAUNCHERS

Missiles are a staple of the modern battlefield, among both the Clans and the Inner Sphere. It comes as no surprise, therefore, that these weapons have been targeted for further development over the centuries, with a number of newer missile and launcher types entering the prototype stages in recent years.

ENHANCED LONG-RANGE MISSILE (NLRM) LAUNCHERS

R&D Start Date: 3055 (Federated Commonwealth)
Prototype Design and Production: 3058 (Federated Suns, Lyran Alliance)

One of the earliest efforts to improve on Inner Sphere LRMs in the face of the dramatically superior performance profile of the Clan models, the Enhanced LRM (NLRM) uses more sophisticated arming mechanisms to improve its targeting and tracking in close combat. The effect is a launcher system that sharply reduces its minimum range "blind spot" while retaining the overall effectiveness and flexibility of the centuries-proven technology.

CONSTRUCTION RULES

Minesweeper: Minesweepers are available only in Land-based and Maritime types, which must be designated upon construction. Land-based Minesweepers are available only to ground-based Mobile Structures or vehicles using a Wheeled or Tracked motive system. Maritime Minesweepers may only be mounted on vehicles using displacement hull, hydrofoil or submarine motive systems, or on Mobile Structures with a naval motive system. Minesweeper equipment must always be mounted in a vehicle's front or rear locations (or the front-side/rear-side locations, for particularly large vehicles), or in the outer-most hexes of a Mobile Structure.

Missile Launchers: All of the Missile Launchers described here may be mounted in accordance with the unit's standard construction rules. Improved One-Shot Missile Launchers weigh 0.5 tons less than their standard equivalents, to a minimum of 0.5 tons (0.25 tons for Clan-made systems). ProtoMechs mounting a permitted missile system may install ammunition by the volley rather than by the ton (to find the per-volley weight, divide 1,000 by the weapon's listed ammo-per-ton value for a single tube; then multiply that by the number of missiles in the volley to find the kilogram weight of a single volley, rounded up to the nearest whole kg). Regardless of the number of tubes in a volley, a ProtoMech need only assign a single weapon slot to the launcher.

ENHANCED LONG-RANGE MISSILE (NLRM) LAUNCHERS

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: Enhanced LRM Launchers function just like their standard LRM equivalents in game play, including their ability to fire indirectly, use multiple ammunition types and work with missile enhancement technologies such as Narc and Artemis fire-control systems.

The maritime equivalent of the Enhanced LRM (NLRM) is the Enhanced LRT (NLRT).

EXTENDED LONG-RANGE MISSILE (ELRM) LAUNCHERS

R&D Start Date: 3052 (Federated Commonwealth)
Prototype Design and Production: 3054 (Federated Commonwealth)

Weapon design teams at Coventry Metal Works conceived the so-called extended long-range missile system as a means to offset the tremendous range advantages of most Clan weaponry. Though the first prototypes were plagued by heat problems, the Coventry teams overcame this obstacle by developing a unique two-stage booster system. Unfortunately, these enhanced launchers and their warheads proved incompatible with the enhanced targeting systems and specialized munitions available to standard LRMs. Between efforts to overcome this and the breakup of the Federated Commonwealth, these weapons failed to reach widespread production before the Jihad.

EXTENDED LONG-RANGE MISSILE (ELRM) LAUNCHERS

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: Extended Long-Range Missiles (ELRMs) use the same basic rules for LRMs (including LRM indirect fire), but may not benefit from special LRM munitions or targeting enhancers like Narc, iNarc and Artemis fire control systems. Furthermore, when attacking targets within their minimum range (when the missiles' booster rockets are still in use), ELRMs that make a successful attack must use the Cluster Hits column for half their rated rack size (rounded up). For example, an ELRM-15 that hits within its minimum range would roll on the 8 column for Cluster Hits, rather than the 15 column (15 ÷ 2 = 7.5, round up to 8).

IMPROVED ONE-SHOT (I-OS) MISSILE LAUNCHERS

Introduced: 3056 (Draconis Combine), 3058 (Clan Nova Cat)

One-shot missile launchers were always a quick-fix design, taking existing launchers and sealing off the ammunition feed mechanisms to contain a single, "unchambered" flight of missiles. Developed after the Clan Invasion in an effort to further streamline these weapons, DCMS engineers discovered how to do away with the ammo feed mechanisms entirely by placing the missiles directly in the launch tubes, a trick the Nova Cats would soon copy.

IMPROVED ONE-SHOT (I-OS) MISSILE LAUNCHERS

Rules Level: Advanced
Available To: BM, IM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Both (B/X-X-F)
Game Rules: Improved One-Shot (I-OS) Missile Launchers function exactly as their standard counterparts, but receive only a single volley during game play, and may not carry additional ammunition. The single shot carried by an I-OS launcher may be of any munition type available to the weapon type itself.

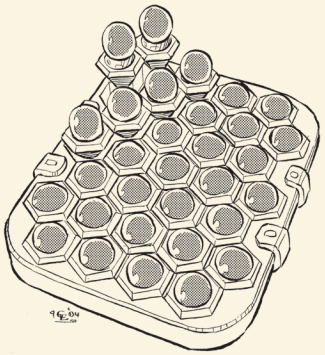
STREAK LRM LAUNCHERS

R&D Start Date: 3055 (Clan Coyote)
Prototype Design and Production: 3057 (Clan Coyote)

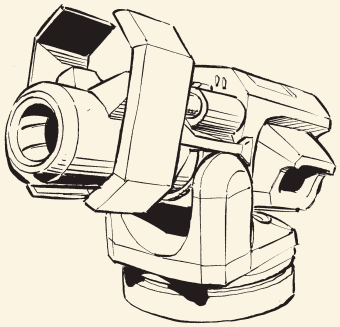
In an effort to enhance the efficiency of existing LRM launch systems, Coyote scientists successfully managed to adapt the powerful Streak targeting technology. The result was a weapon system that sacrifices the indirect-fire capabilities of the standard LRM, but also conserves ammunition as effectively as Streak SRMs, ensuring the maximum possible yield when fired.

STREAK LRM LAUNCHERS

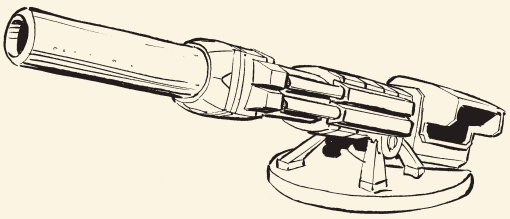
Rules Level: Experimental
Available To: BM, IM, PM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Clan (F/X-X-F)
Game Rules: Streak LRMs function identically to Streak SRMs (see p. 138, *TW*). Streak LRMs may not be fired indirectly, and may not use specialty ammunition.



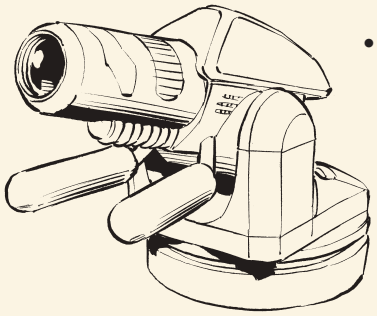
• M-POD •
[PAGE 142]



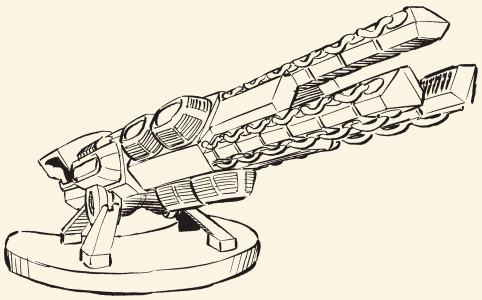
• SUB-CAPITAL CANNON •
[PAGE 155]



• NAVAL AUTOCANNON (CAPITAL AC) •
[PAGE 143]



• SUB-CAPITAL LASER •
[PAGE 155]



• NAVAL GAUSS (CAPITAL GAUSS) •
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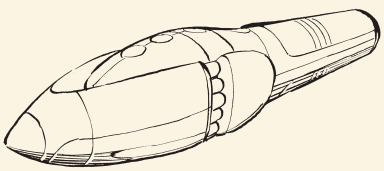
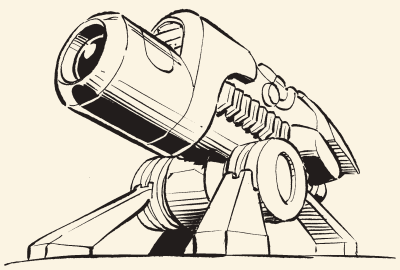
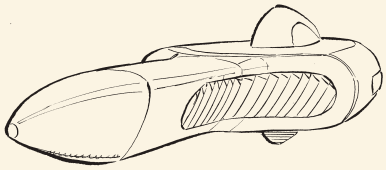


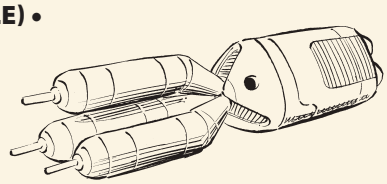
• PIRANHA (SUB-CAPITAL MISSILE) •
[PAGE 156]



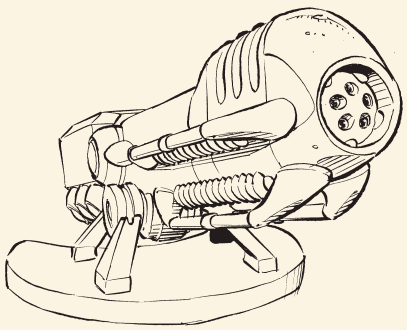
• NAVAL LASER (CAPITAL LASER) •
[PAGE 145]



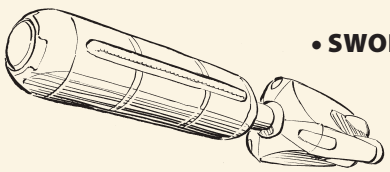
• STINGRAY (SUB-CAPITAL MISSILE) •
[PAGE 156]



• SWORDFISH (SUB-CAPITAL MISSILE) •
[PAGE 156]



• NAVAL PPC (CAPITAL PPC) •
[PAGE 145]



• MANTA RAY (SUB-CAPITAL MISSILE) •
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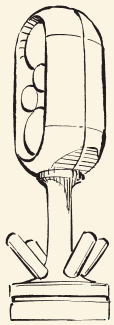

• VTOL MAST MOUNT •
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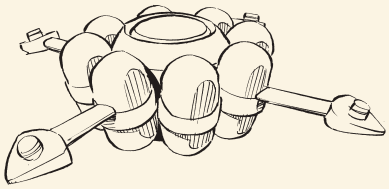
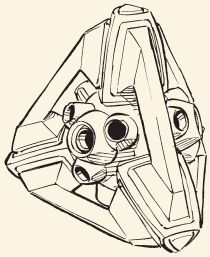
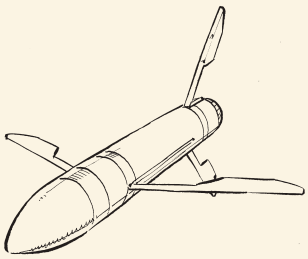


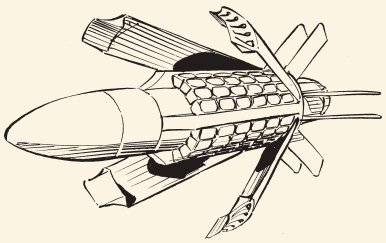
• INFERNO MINE (LAND/SEA) •
[PAGE 178]



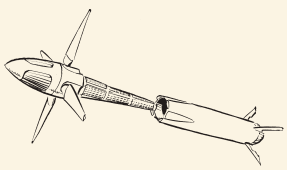
• SPACE MINE (SPACE) •
[PAGE 178]



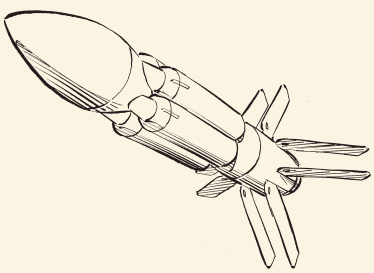
• AIR-DEFENSE ARROW (ADA) MISSILE •
[PAGE 165]



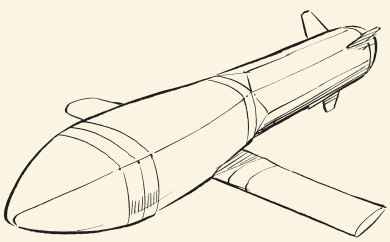
• ARROW IV (CLUSTER) MISSILE •
[PAGE 166]



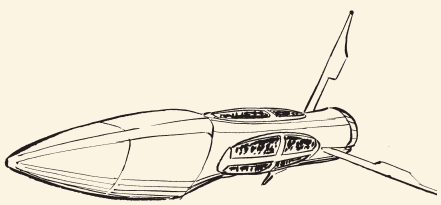
• ARROW IV (ILLUMINATION) MISSILE •
[PAGE 167]



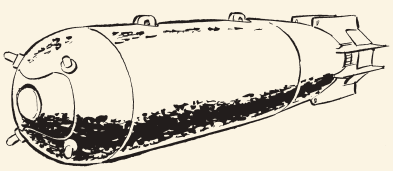
• ARROW IV (LASER-INHIBITING) MISSILE •
[PAGE 168]



• ANTI-SHIP (AS) MISSILE •
[PAGE 170]



• ANTI-SHIP ELECTRONIC WARFARE (ASEW) MISSILE •
[PAGE 170]



• TORPEDO BOMB •
[PAGE 172]

MOBILE FIELD BASE

Introduced: 3059 (Federated Suns, Lyran Commonwealth), 3060 (Coyote)

The mobile field base (MFB) is essentially a self-contained repair gantry equipped with the same welders, grippers and lifting gear incorporated into a DropShip's 'Mech or vehicle cubicle (but lacking the launch mechanisms and support crew amenities that such facilities include).

MOBILE FIELD BASE

Rules Level: Advanced
Available To: CV, SV, MS
Tech Base (Ratings): Both (D/X-X-E)
Game Rules: An MFB has no effect during combat, but it provides a number of benefits during repair and salvage operations, which are detailed in *Campaign Operations*.

MOBILE HYPERPULSE GENERATORS

Introduced: circa 2655 (Terran Hegemony, Mobile), circa 2751 (Terran Hegemony, Ground-Mobile)

Hyperpulse generators (HPGs) are the powerful devices the Inner Sphere and Clans universally rely upon for interstellar communications. Essentially capable of "firing" bursts of information through self-created jump points to receivers up to fifty light-years distant, the standard planetary HPG is a familiar sight in known space, consisting of a gigantic antenna dish surrounded by an installation that includes fortified EMP damping architecture, independent power supplies and large facilities for staff and operators. Far less commonly known are the compact versions, the so-called mobile HPGs.

Produced during the Star League and used heavily by the SLDF, today only the Clans, ComStar and the Word of Blake have access to the 50-ton mobile HPGs used aboard large spacecraft. These groups also reportedly have access to even smaller ground-mobile HPGs, which weigh as little as 12 tons and are designed for transport by ground vehicles or even BattleMechs.

M-POD

Introduced: 3064 (Lyran Alliance)

Based on the A-Pod, the Solaris-designed M-Pod was devised for use against even heavier targets, such as BattleMechs and vehicles. Its short range and one-shot capability prevented this weapon from being used in a battlefield capacity for years, keeping it in the arenas until very recently.

MRM "APOLLO" FIRE CONTROL SYSTEM

Introduced: 3071 (Draconis Combine)

Billed as the MRM's answer to the Artemis IV, the MRM Fire Control System (currently nicknamed the "Apollo", though the name seems unlikely to stick) helps to overcome the targeting inaccuracies of MRMs without forcing an ammunition upgrade and subsequent redesign of the weapon itself. Instead, the MRM FCS attaches to the standard MRM launcher and acts as a kind of targeting computer, aligning the weapon for maximum effect. Though the results are far from perfect due to the missiles' own lack of targeting sensors, the result is a greater chance of acquiring the target to begin with.

CONSTRUCTION RULES

Mobile Field Base: One or more MFBs can be installed in any Combat Vehicle, Support Vehicle or Mobile Structure (DropShips and other applicable units must use the appropriate cubicle bays).

Mobile Hyperpulse Generators (Mobile HPG/Ground-Mobile HPG): Mobile HPGs and Ground-Mobile HPGs require a fusion engine in order to operate.

Mobile HPGs may only be installed on Large-sized Support Vehicles, aerospace units over 200 tons in mass and Mobile Structures. Ground-Mobile HPGs can be mounted on 'Mechs, vehicles, fighters, Small Craft, aerospace units over 200 tons and Mobile Structures. 'Mechs mounting Ground-Mobile HPGs can only place this item in torso locations, but may divide the critical slots among adjacent torso sections. Mobile and Ground-Mobile HPGs are treated as energy weapons in game play, and require enough heat sinks to operate if placed on vehicles and other non-heat tracking units.

A unit may carry only one Mobile HPG or Ground-Mobile HPG at a time. Mobile HPGs have a crew requirement of 10. Ground-Mobile HPGs have a crew requirement of 1, which can be the unit's normal operator. Satellites built as unmanned units may include a Ground-Mobile HPG system at no crew requirement, but such HPGs act only as relays between two other HPGs and may never change their targeting alignment beyond these two HPGs. Drone units (see p. 117) may not employ HPGs.

Mobile HPGs may not be pod-mounted on Omni-units.

In all other respects, Mobile and Ground-Mobile HPGs may be mounted by any unit in accordance with their standard rules.

M-Pod: M-Pods may be mounted in any location (including rear torsos) on a 'Mech or vehicle, or any outer hex of a Mobile Structure, and receive the normal firing arc based on where they are mounted.

MRM "Apollo" Fire Control System: The MRM Fire Control System can only be mounted with an MRM system. As with the Artemis IV Fire Control System, the MRM FCS must be incorporated on all of an individual unit's standard MRM Launchers, and non-'Mech units treat MRMs and their fire control systems as a single item for critical space purposes. The aerospace Attack Value of an MRM modified by an MRM Fire Control System is equal to a result of 6 on the appropriate column of the Cluster Hits Table.

Naval Autocannons (Capital AC): Naval Autocannons may be mounted on advanced aerospace units per the standard rules for capital-scale weapons covered in *Strategic Operations*. Capital ACs mounted on Mobile Structures follow the rules for those units, presented on page 83.

MOBILE HYPERPULSE GENERATORS

Rules Level: Advanced
Available To: SV, JS, DS, SS, WS, MS (Mobile HPG); BM, IM, CV, SV, CF, AF, SC, JS, DS, SS, WS, MS (Ground-Mobile HPG)
Tech Base (Ratings): Both (E/E-X-F [Mobile HPG], F/F-X-F [Ground-Mobile HPG])
Game Rules: Mobile HPGs are not given to casual communications. Small vehicles require a substantial time to charge for transmission and the EMP-like effect of transmission and reception can cause difficulties for any unit within range of an outgoing (or incoming) burst.

To activate a Mobile HPG on a Space Station, DropShip, JumpShip or WarShip, the power demands (approximated as heat) amount to 40 points of heat per minute (turn) of transmission. A Ground-Mobile HPG on a Large Support Vehicle generates 20 points of heat per turn when charging or transmitting. For other units, Ground-Mobile HPGs may not be used more than once every 5 turns (in ground combat scale), with 1 turn of charging before being able to transmit for 1 turn; they can only store enough energy for 1 turn of transmission at a time. (In space combat, this entire process occurs in 1 turn.) When sending a transmission (or charging for one), a unit equipped with a Mobile HPG may make no weapon attacks; units equipped with Ground-Mobile HPGs also may not use any MP during a turn in which they are transmitting (but are not considered immobile). Transmission and reception of HPG signals occurs during the Weapon Attack Phase.

The transmission or reception of HPG signals includes an electromagnetic pulse that "blinds" nearby units. The transmission burst from a Mobile HPG temporarily blinds the sensors of the target (or transmitting) vessel and all other units with 1,000 meters (33 ground hexes), while a Ground-Mobile HPG affects the transmitting unit and all others within 250 meters (8 ground hexes). This effect lasts for a period of 1 minute (1 turn in space or high-altitude combat; 6 turns in vehicle-scale ground combat), during which time aerospace units caught within the burst radius cannot make weapon attacks and all non-conventional infantry ground units suffer a +4 to-hit modifier. Receiving bursts—in the rare instances where the pulse is directed at a receiving HPG on a planetary surface—are much less noticeable, and have an area of effect of only 30 meters (1 hex) away from the receiving HPG (regardless of the transmitter type used). If no HPG is available to receive the pulse, no effect occurs.

Mobile HPGs cannot be used to deliver a pulse directly against a target unit other than another HPG.

M-POD

Rules Level: Advanced
Available To: BM, IM, CV, SV, MS
Tech Base (Ratings): Inner Sphere (C/X-X-E)
Game Rules: M-Pods function as an LB-X type Autocannon using Cluster munitions (including the –1 to-hit modifier), but with a range equivalent to a standard machine gun (1 hex for short, 2 for medium, 3 for long, and—if Extreme Range rules are used—4 for extreme). The damage capacity dramatically decreases at each range bracket, however, using the 15 column for Cluster Hits at 1 hex, the 10 column at 2 hexes and the 5 column at 3 hexes. (If Extreme Range rules are used, the M-Pod uses the 2 column for Cluster damage at a range of 4 hexes.) Unexpended M-Pods that take a critical hit explode for 5 points of damage as an ammunition explosion. Expended M-Pods can still be affected by a critical hit in the same way as empty ammo bins.

M-Pods mounted on airborne Airships, Fixed-Wing or Satellite vehicles have no effect in combat.

MRM "APOLLO" FIRE CONTROL SYSTEM

Rules Level: Advanced
Available To: BM, IM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Inner Sphere (D/X-X-E)
Game Rules: MRM Fire Control Systems negate the +1 to-hit modifier that applies to all standard MRM launchers. However, on a successful hit, the attacking player must subtract 1 from the roll on the Cluster Hits Table to reflect the inaccuracies of the missiles themselves. For 'Mechs, MRM Fire Control Systems are treated as an attachment to the MRM launcher, but separate enough so that if they suffer a critical hit, the launcher continues to function per normal MRM rules. The MRM FCS is unaffected by ECMs.

NAVAL AUTOCANNONS (CAPITAL AC)

Introduced: circa 2200 (Terran Alliance)

These behemoth cannons fling single or bursts of kinetic munitions across hundreds of kilometers of space, achieving enormous muzzle velocities using controlled plasma explosions. Larger naval autocannons trade projectile velocity for mass thanks to engineering limits on the propellant system, which means the heavier naval autocannons have steadily shrinking ranges.

NAVAL AUTOCANNONS (CAPITAL AC)

Rules Level: Advanced
Available To: JS, SS, WS, MS
Tech Base (Ratings): Both (D/E-X-E)
Game Rules: Naval Autocannons use capital-scale range brackets (rather than standard-scale aerospace range brackets) and deliver damage in capital scale as well, every point of which equates to 10 points of standard-scale damage. As with most capital weapons, Naval Autocannons suffer a +5 to-hit modifier against aerospace targets under 500 tons.

NAVAL C³

R&D Start Date: 3055 (Draconis Combine)
Prototype Design and Production: 3065 (Draconis Combine)

An outgrowth of the Combine's C³ systems, this conceptual super network promises to link WarShip squadrons into finely tuned flotillas with greater coordination and firepower than any equivalent aerospace unit. Combine researchers swiftly found the act of constructing such a large and effective coordination network—capable of linking fire control for massive WarShip-mounted batteries—a lot more daunting than it was for ground forces, however. Adding in the unusual time delays of aerospace weapons fire and sensor readings presented additional challenges that nearly scrapped the project. Nevertheless, the Nirasaki Computer Collective persevered and was fielding functional, if limited, prototypes in the late 3060s. Regrettably, with few Combine WarShips and DropShips prepared to fully benefit from the technology, the disruption wreaked by the Jihad on the Combine's shipyards left wide deployment of the naval C³ combat system in limbo.

NAVAL C³

Rules Level: Experimental
Available To: JS, DS, SS, WS
Tech Base (Ratings): Inner Sphere (F/X-X-F)
Game Rules: The Naval C³ system can link up to six Large Craft of 200 tons or more into a coordination network that functions like a ground-based C³i system (see p. 133, *TW*), but because of the speeds and distances involved in aerospace combat, the network's effectiveness varies with the weapons employed. The following exceptions therefore apply to Naval C³ networks:

- The weapon range bracket used (capital or standard) is based on the hex distance of the friendly, networked unit closest to the target. (For example, if a friendly-networked unit is 10 hexes from the target, it provides a range bracket of short for capital weapons, but medium for standard weapons.) If, however, the attack would take place outside a weapon's normal effective range, the attack still cannot be made.
- The Naval C³ system is not affected by fighter- and Small Craft-based ECM systems. Large Craft ECM, however, apply modifiers as described in *Strategic Operations,* but do not negate the capabilities of Naval C³. For example, suppose that a *Sovetskii Soyuz* and an allied *Vincent* are both using Naval C³ and that the *Vincent* is 5 hexes from the *Soyuz*'s target: an enemy *Aegis* using ECM. Meanwhile, an enemy fighter and an enemy *Union*—both also using ECM—lie directly in the 25-hex line between the *Soyuz* and its prey. The *Soyuz*'s NL45s (still within their normal maximum range) would resolve fire as though at Short Range (based on the *Vincent*'s range to the target), but would suffer a +3 ECM effect for passing through the Union and its bubble of ECM (on hex on either side, plus the *Union*'s own hex), and an additional +3 ECM effect from the target *Aegis*' ECM bubble (2 hexes out from the *Aegis*, plus the target WarShip's own hex), for a total modifier of +6. The fighters' ECM would have no impact.
- Aerospace units separated by more than 60 hexes may not operate as part of a Naval C³ network.

NAVAL COMM-SCANNER SUITE

Introduced: circa 2200 (Terran Alliance)

Using a mobile set of multi-spectral telescopes and processing systems, the Naval Comm-Scanner Suite (NCSS) was developed to passively scan entire solar systems for manmade signals of all sorts. A key element of the Terran Hegemony's electronics intelligence (ELINT) monitoring efforts, naval comm-scanners were used most famously by the Star League's *Bug-Eye* surveillance ship to spy on other nations, both within and beyond the League's borders.

Though powerful, the suite's utility in battle has been overstated in the past. Contrary to popular belief, the only way this system could truly overhear spoken conversations aboard enemy vessels was if the suite's operators also had friendly operatives on board the target vessel, relaying these conversations through a covert signaling device. Meanwhile, most modern military communications are heavily scrambled, with schemes that cannot often be deciphered by the NCSS alone. Thus, the comm-scanner suite's greatest utility has long been in monitoring communication traffic patterns and civilian communications, or detecting the emissions of modern spacecraft with greater accuracy than standard sensor suites.

CONSTRUCTION RULES

Naval C³: Only DropShips, JumpShips, Space Stations and WarShips over 200 tons in mass may carry a Naval C³ network. The complex set of fire control servos, sensors and communications arrays occupies tonnage equal to 1 percent of the vessel's total mass, and doubles the weight of any fire control systems present on the vessel. A unit may carry only one Naval C³ network.

Naval Comm-Scanner Suite: An aerospace unit may carry only one Naval Comm-Sensor Suite of any type. The Small NCSS may be installed on any appropriate aerospace unit, including unmanned satellites, and raises the vessel's crew needs by 6. Unmanned satellites require 6 tons of communications equipment instead. The Large NCSS may not be installed on Small Craft or satellites, and any larger unit carrying one requires 12 additional crewmen to operate the system. The first critical hit to the CIC or Sensors on a unit equipped with an NCSS (of either size) disables the system, in addition to the usual effects.

Naval Gauss (Capital Gauss): Naval Gauss weapons may be mounted on advanced aerospace units per the standard rules for capital-scale weapons covered in *Strategic Operations*. Naval Gauss weapons mounted on Mobile Structures follow the rules for those units, presented on page 83.

Naval Laser (Capital Laser): Naval Lasers may be mounted on advanced aerospace units per the standard rules for capital-scale weapons covered in *Strategic Operations*. Naval Lasers mounted on Mobile Structures follow the rules for those units, presented on page 83.

NAVAL COMM-SCANNER SUITE

Rules Level: Advanced
Available To: SC, JS, DS, SS, WS
Tech Base (Ratings): Both (D/D-E-E)
Game Rules: In standard game play, the Naval Comm-Scanner Suite (NCSS) is primarily used to augment a spacecraft's ability to detect other units through Drive Plumes, Emergence Waves, Infrared, Radio Triangulation and Radar sensors. When making checks using such systems per the standard detection rules (as detailed in *Strategic Operations*), a Small NCSS doubles the maximum detection range for all such systems (except Emergence Wave detection) and provides a –1 modifier to the target number to detect a given vessel for all systems. A Large NCSS, meanwhile, triples the effective range of all such detection systems (except Emergence Wave) and provides a –2 target detection modifier for all systems. A +1 modifier applies to these target detection modifiers if the target is a large craft actively using ECM (as detailed in *Strategic Operations*).

In addition, an NCSS of either size not mounted on a satellite provides a +1 initiative modifier in space combat each turn in which the NCSS-equipped unit is in play—though this advantage is negated if the opposing force also possesses an NCSS-equipped unit.

Finally, NCSS-equipped units may also employ these systems to scan a planetary surface, mimicking the functions of a High-Resolution Satellite Imager (see p. 150). Units equipped with a Small NCSS may perform this action if they are within 500 kilometers (28 space map hexes) of a planet surface, while Large NCSS-equipped units may do so from roughly 2,000 kilometers away (111 space map hexes).

NAVAL GAUSS (CAPITAL GAUSS)

Introduced: 2448 (Terran Hegemony)

Even as naval autocannons (NACs) were under development, capital weapons engineers had begun exploring alternative avenues for delivering high-velocity projectiles than the brute-force method of contained laser-ignited plasma (known in some circles as the "Orion in a bottle" technique). Various electromagnetic means of accelerating projectiles—such as coil guns and rail guns—had been studied during the naval autocannon's development, but remained unsuccessful for centuries because the assorted Gauss techniques ran into engineering barriers. Not until the twenty-fifth century did effective and efficient Gauss technology become feasible as an alternative to naval autocannons, providing ballistic weapons that boasted improved range and heat management capabilities over comparable NACs.

NAVAL GAUSS (CAPITAL GAUSS)

Rules Level: Advanced
Available To: JS, SS, WS, MS
Tech Base (Ratings): Inner Sphere (E/E-X-E), Clan (E/E-E-E)
Game Rules: Naval Gauss weapons use capital-scale range brackets (rather than standard-scale aerospace range brackets) and deliver capital-scale damage, every point of which equates to 10 points of standard-scale damage. As with most capital weapons, Naval Gauss weapons suffer a +5 to-hit modifier against aerospace targets under 500 tons.

Though based on the same technology as ground-based Gauss weapons, Naval Gauss weapons do not cause additional explosive damage if hit in combat (the design of these weapons includes blast-containing features that vent such explosions through the weapon's muzzle and other apertures).

NAVAL LASER (CAPITAL LASER)

Introduced: 2305 (Terran Alliance)

Close on the heels of the naval autocannon's debut came the naval laser. Perfected by Terran engineers, these weapons were the first effective large-scale ranged-energy weapons designed to penetrate the ablative hulls of modern spacecraft.

NAVAL LASER (CAPITAL LASER)

Rules Level: Advanced
Available To: JS, SS, WS, MS
Tech Base (Ratings): Inner Sphere (D/D-X-E), Clan (D/D-D-E)
Game Rules: Naval lasers use capital-scale range brackets (rather than standard-scale aerospace range brackets) and deliver capital-scale damage, every point of which equates to 10 points of standard-scale damage. As with most capital weapons, Naval Lasers suffer a +5 to-hit modifier against aerospace targets under 500 tons.

NAVAL PPC (CAPITAL PPC)

Introduced: 2358 (Terran Hegemony)

While many capital weapons developed as upscaled versions of smaller weapons, the same is not true of capital PPCs and lasers. Engineers found it easier to overcome the technological hurdles of particle beam weapons against modern armor at larger scales than at smaller scales, and so today's particle projector cannon (PPC) technology first entered service on WarShips almost a century before the technology was miniaturized effectively enough for ground unit use.

NAVAL PPC (CAPITAL PPC)

Rules Level: Advanced
Available To: JS, SS, WS, MS
Tech Base (Ratings): Inner Sphere (D/D-X-E), Clan (D/D-D-E)
Game Rules: Naval PPCs use capital-scale range brackets (rather than standard-scale aerospace range brackets) and deliver capital-scale damage, every point of which equates to 10 points of standard-scale damage. As with most capital weapons, Naval PPCs suffer a +5 to-hit against aerospace targets under 500 tons.

NAVAL REPAIR FACILITIES

Within a few decades of the dawn of spaceflight, humankind was building spacecraft larger than could be launched from Terra by a single vessel. Unlike the spacecraft of the mid-twentieth century, twenty-first century spacecraft such as the *Altair*-class interplanetary vessels were not expendable and required maintenance. The need for in-orbit assembly and maintenance quickly led to the development of pressurized and unpressurized repair facilities.

STANDARD REPAIR FACILITIES (PRESSURIZED/UNPRESSURIZED)

Introduced: Early spaceflight

The first unpressurized space naval repair bays (and their somewhat smaller, pressurized equivalents) became operational on the Crippen space station in the year 2007. These facilities hosted a number of groundbreaking spacecraft, among them the first manned interplanetary spacecraft (including the *Altair*-class spacecraft that journeyed from Terra to its in-system neighbor world of Mars, and the *Columbia*, humankind's first fusion-powered manned spacecraft), and even supported assembly of the *Magellan*-class slower-than-light interstellar probes.

Repair bays—whether pressurized or not—share many features in common, including a collapsible framework that can be used to aid in repair operations for any ship small enough to fit within the frame. Unpressurized facilities are most common and weight efficient for the station or vessel using them, but pressurized bays, which include an outer shell that can be filled with breathable air, also exist. These pressurized facilities, while heavier and bulkier, nevertheless offer work crews greater ease of operation and improved repair efficiency that can decrease a vessel's downtime.

REINFORCED REPAIR FACILITIES (UNPRESSURIZED)

R&D Start Date: circa 2725 (Terran Hegemony)
Prototype Design and Production: circa 2750 (Terran Hegemony), circa 3065 (Word of Blake)

The reinforced repair facility effectively utilizes a variation of typical naval tug design standards and combines them with the spidery, delicate framework of a standard unpressurized repair facility frame. The result is a repair facility structure that, while limited to airless design and operations, can nonetheless withstand the stress of maneuvering while another unit remains docked within the frame.

Initially researched by the Terran Hegemony during the latter days of the first Star League, design and research into making this "repair tug" frame useful lagged behind many other SLDF projects. The Word of Blake, however, has reportedly managed to revive and complete prototype development for this technology, possibly to address the dangers of servicing their far-flung forces.

NAVAL TUG ADAPTOR

Introduced: Early spaceflight

The first spaceborne tugs were specially built chemical- and ion-powered craft used to help move and join the various modules of Crippen Station—the linchpin of the Western Orbital Defense Network (WODeN). Though spacecraft have grown more sophisticated since those days, the basic premise and engineering of today's space tugs have barely varied. The reinforced structure and mating clamps used in the early twenty-first century designs are much the same as those used on salvage vessels like the Model 97 *Octopus*.

CONSTRUCTION RULES

Naval PPC (Capital PPC): Naval PPCs may be mounted on advanced aerospace units per the standard rules for capital-scale weapons covered in *Strategic Operations*. Capital PPCs mounted on Mobile Structures follow the rules for those units, presented on page 83.

Naval Repair Facilities: Space Stations, WarShips and JumpShips can be constructed with one or more Naval Repair Facilities, each of which requires an assigned facing. Regardless of its capacity, each repair facility a unit mounts incorporates two docking collars as part of its design (and counts against the unit's maximum number of docking collars as noted in the rules for installing Docking Hardpoints; see p. 116). Full rules on constructing the units that use this item appear in *Strategic Operations*.

Regardless of the type chosen, the weight a Naval Repair Facility requires is based on the facility's maximum capacity (in tons). Standard pressurized facilities weigh 7.5 percent of their maximum capacity; standard unpressurized facilities weigh 2.5 percent of their maximum capacity. A Reinforced Repair Facility (available only as an unpressurized facility) weighs 10 percent of its maximum capacity. The tonnage for a repair facility of any type must be rounded up to the nearest full ton.

One or more bay doors must be designated as serving a repair facility during construction.

Naval Tug Adaptor: A Naval Tug Adaptor weighs 100 tons. Additionally, mass equal to 10 percent of the vessel is used as reinforcement. This mass is not Structural Integrity for any game purpose.

STANDARD REPAIR FACILITIES (PRESSURIZED/UNPRESSURIZED)

Rules Level: Advanced
Available To: JS, SS, WS
Tech Base (Ratings): Both (C/C-E-D)
Game Rules: Standard Naval Repair Facilities may accommodate up to 1 JumpShip, Space Station, or WarShip, or 2 DropShips—as long as the total tonnage of docked unit(s) does not exceed the facilities' rated capacity. Fighters, satellites, and Small Craft may not dock inside a Naval Repair Facility (they must use their appropriate bays instead; satellites use either a Small Craft or Cargo bay). Repair facilities have no direct effect during combat, but they provide a number of benefits during repair and salvage operations, which are covered in *Strategic Operations*. Facilities can accommodate docked aerospace units with a combined weight up to the facilities' maximum capacity and can be pressurized or unpressurized. Pressurized facilities allow personnel to work without the encumbrance of bulky life support gear.

WarShip-mounted repair facilities (pressurized or otherwise) prevent their vessels from using any Thrust beyond station-keeping while another vessel is within the repair frame. Any attempt to do so automatically results in the docked unit(s) ramming the mother ship within which it is contained, with damage bypassing the armor and being applied directly to the repair facility ship's structural integrity.

Furthermore, a JumpShip or WarShip may not jump when its repair facilities contain other vessels that possess a K-F drive core (even one that is damaged). If a repair facilities-equipped JumpShip attempts to do so (or the vessels docked within said facilities attempt to do so), both vessels are automatically destroyed. JumpShips or WarShips with repair facilities may jump while the facilities contain non-jump capable vessels, however, as these systems incorporate K-F drive booms.

Any critical hit to a vessel with a repair facility that strikes a Weapon Bay in the facility's assigned facing arc results in damage to any docked units stored within. This damage is equal to half that of the weapon that inflicted the critical hit, divided evenly between all docked units within the repair bay, but the weapon does not automatically receive another chance to inflict critical hits against the docked targets. Assume that any units within the facilities share the same orientation as their mothership when determining the hit location table to be used.

REINFORCED REPAIR FACILITIES (UNPRESSURIZED)

Rules Level: Experimental
Available To: JS, WS
Tech Base (Ratings): Inner Sphere (C/F-X-F)
Game Rules: Reinforced Repair Facilities follow the same repair rules as their standard unpressurized equivalents referenced above, except that the vessel equipped with such facilities is not limited to station-keeping Thrust only when it has another craft docked within. Instead, the repair ship receives a modified Thrust Rating as if it were a tug of equivalent weight (see *Naval Tug Adaptor*, pp. 146–147).

NAVAL TUG ADAPTOR

Rules Level: Advanced
Available To: SC, DS, WS
Tech Base (Ratings): Both (C/C-C-C)
Game Rules: Naval tug operations may only be performed in space; naval tugs that enter an atmosphere while linked to another vessel automatically go out of control.

A unit equipped with a Naval Tug Adaptor (known as the tug) must dock with its target vessel in order to use it, and may not do so if the target vessel is actively resisting efforts to mate with the tug (by expending Thrust Points). To establish the connection, the tug must end its movement in the same hex as the target vessel and match the target vessel's facing and velocity. In the following turn, in place of movement, the tug must then make a successful Control roll, applying +5 modifier if the target vessel or the tug is out of control. If the roll succeeds, in the following turn both the tug and the target vessel are linked up and the tug has "control" over the target vessel's flight. If the roll fails, the tug sustains 2 points of standard-scale damage for every point by which the Control roll failed, and an equal amount of damage is applied to the aft of the target vessel.

A Small Craft tug may only attempt to tug an Aerospace Fighter, Small Craft or Satellite Support Vehicle. DropShip and WarShip tugs may mate with units of any weight above 200 tons. (DropShips and WarShips attempting to "tug" smaller aerospace units should instead use the rules for recovering fighters; see p. 86, *TW*.)

Once mated, neither the tug nor a unit docked with it may engage in combat, though other aerospace units may target both vessels normally. If a tug receives damage to its Sensors or Control systems through the Nose arc, or the target vessel attempts to use Thrust points while mated to a tug, the tug mechanisms are damaged; both the tug and its target vessel go out of control and must immediately check for a collision against each other per standard rules (see pp. 92-93, *TW*).

Once successfully mated to a target vessel, the Thrust values for the tug, which now has control of the pair, are then recomputed as follows:

First, add together the tonnage of the tug and its target vessel. This value is the Total Mass.

Second, divide the tug's tonnage by the Total Mass to find the Thrust Ratio. Multiply the tug's Safe Thrust by this Thrust Ratio to find the tug's Safe Towed Thrust Rating. Multiply this value by 1.5 to find the Maximum Towed Thrust Rating, the maximum thrust the tug can generate for both joined vessels together. Then round both Rating values up to the nearest quarter (0.25) Thrust point. A tug may use some or all of its Towed Thrust when towing a target, including airship-like fractional Thrust points (see pp. 204-205, *TW*).

Tug fuel consumption is based on the Thrust being used. To determine the Thrust spent per turn of towing another unit, multiply the Towed Thrust Points expended by the Safe Towed Thrust Ratio.

NULL-SIGNATURE SYSTEM

Introduced: 2630 (Terran Hegemony)
Extinct: 2790 (Inner Sphere)

Created by the first Star League, the null-signature system is an elaborate series of passive and active electronic countermeasures and heat baffles that combine to mask a BattleMech's heat and electromagnetic signature. Similar to the modern, Capellan-made stealth armor system that derives from it, the null-signature system is somewhat more sophisticated, and does not require the use of a separate ECM unit to attain its capabilities.

NULL-SIGNATURE SYSTEM

Rules Level: Experimental
Available To: BM
Tech Base (Ratings): Inner Sphere (E/E-X-X)
Game Rules: A unit with a Null-Signature System may activate or deactivate the system during the End Phase of any turn, or even start the game with the system already engaged. While the Null-Signature System is engaged, attacks against the unit at Medium range receive an additional +1 to-hit modifier, while attacks at Long and Extreme Range receive an additional +2 to-hit modifier. Beagle Active Probes and their Clan equivalents cannot locate a hidden unit with an active Null-Signature System, and heat-seeking weapons (such as Heat-Seeking Missiles) calculate their to-hit modifiers against the unit as though it is 18 points cooler than it actually is. Only a Bloodhound Active Probe (see p. 90) can penetrate the Null-Signature System's masking. Conventional infantry units are unaffected by the Null-Signature System and ignore these modifiers.

A critical hit to any of the Null-Signature System's critical slots (or the destruction of any hit location containing one) disables the entire system.

While active, the system generates 10 points of heat. If used in conjunction with an active Chameleon Light Polarization Shield (see p. 112), all modifiers are cumulative.

Infantry carried using the mechanized battle armor rules (see p. 226, *TW*) have no effect on the Null-Signature System while it's active.

POWER COLLECTOR AND MICROWAVE TRANSMITTER

Introduced: circa 2200 (Terran Alliance)

For a brief window in the early twenty-first century, humankind experimented with solar-power satellites. Though the test platforms were successful, the Western Alliance made little progress toward constructing the final behemoth-sized, city-powering satellites they had envisioned when the sudden development of fusion power in the 2020s rendered such efforts obsolete. In later centuries, interstellar nations like the Taurian Concordat, Capellan Confederation and even the Federated Suns would find niche applications for small power satellites, as much for industrial usage as for political control (such as the centralized power distribution networks favored by House Liao on many worlds). Today, the technology is well understood and broadly available, but still quite rare in general use.

Despite the popularized account of the rare "high density" PCMT over Kathil (used to dramatic effect in the Fourth Succession War), by far the majority of the PCMTs used today are exceedingly safe "low density" models. A common failsafe feature is that the physics of the transmitters means the transmission becomes harmlessly diffuse (more so than normal) when the beam drifts away from its collector facility. This arrangement is referred to as a retro-directive phased array, where the satellite requires a transmitted "pilot beam" to focus on, and so its beam loses cohesion when no longer aimed at its pilot beam.

PCMTs are normally placed in synchronous orbits, which are generally in near-continuous sunlight and thus deliver power continuously. An associated power storage system on the ground (pumped hydroelectric, compressed air, advanced batteries and so on) carries the load during the brief blackouts (typically occurring near solstices). Planets without suitable synchronous orbits must use several PowerSats (or supplement PowerSats with other power sources) to provide continuous power.

CONSTRUCTION RULES

Null-Signature System: The Null-Signature System does not weigh a significant amount, but takes up 1 critical slot in each of the BattleMech's locations except the head.

A 'Mech with this system may not mount advanced targeting computers, C^3 systems, Stealth Armor, or a Void-Signature System. The unit may carry an active probe, TAG or ECM Suite, but unlike Stealth Armor, the Null-Signature System does not require an ECM Suite.

The Null-Signature System cannot be installed on an OmniMech via OmniPods.

Power Collector and Microwave Transmitter (PCMT), Low-Density: PCMT equipment include solar power collection and transmission equipment. Every 10 tons of PCMT (round fractions down) can provide enough power to a suitably equipped receiver facility to supply a day's worth of the electrical needs for 5 average-sized buildings (each 1 hex across, 3 hexes tall). The enormous transmission antennas and solar arrays required by PCMT systems may not be mounted in any unit other than Satellite Support Vehicles and Space Stations.

The reception equipment for low-density PCMTs generally measures several kilometers across (typically represented in game play as a light or medium non-mobile building), and thus constitutes an item of utility infrastructure beyond the scope of these rules.

PPC Capacitor: PPC Capacitors may be added to any Inner Sphere standard-scale PPC weapon (including Light PPCs, Heavy PPCs, ER PPCs and Snub-Nosed PPCs, but not counting Naval PPCs of any size, or particle cannon weapons carried by infantry units).

The PPC Capacitor weighs 1 ton and occupies 1 critical slot, which must be placed in the same location as the PPC it modifies; when mounting in turrets of any kind, including BattleMech turrets (see p. 159), the PPC Capacitor must be mounted in the turret with the PPC. Capacitors can only modify one PPC and do not stack. For Combat Vehicles and aerospace units, the Capacitor is considered integral to the PPC it modifies and only adds tonnage to the weapon. As PPC Capacitors increase the attached PPC's heat by 5 points, vehicles and Conventional Fighters must account for this added heat when determining their heat sink needs.

If the unit also carries a Targeting Computer, the weight of any PPC Capacitors it carries has no effect on the computer's size or tonnage.

ProtoMech Melee Weapon: A ProtoMech melee weapon weighs one half-ton and takes up one weapon slot on either arm. A ProtoMech may only mount one melee weapon.

Recon Camera: The Recon Camera may be mounted on any applicable unit in accordance with that unit's rules for mounting weaponry. However, as a non-weapon item, the Recon Camera requires no ammunition, power amplifiers or heat sinks to operate.

POWER COLLECTOR AND MICROWAVE TRANSMITTER (PCMT), LOW-DENSITY

Rules Level: Advanced
Available To: SV, SS
Tech Base (Ratings): Both (C/C-C-C)
Game Rules: "Low density" PCMTs—by far the most commonly used of the two—are incapable of causing harm or otherwise affecting game play. "High density" PCMTs—so rare that only one or two examples still exist in the thirty-first century—are beyond the scope of these rules.

In addition to being damaged as a normal item of equipment, if the engine or station-keeping drive of the unit mounting a PCMT is destroyed, the PCMT is also considered destroyed.

PPC CAPACITOR

R&D Start Date: 3057 (Draconis Combine)
Prototype Design and Production: 3060 (Draconis Combine)

The advent of newer PPC types sparked a renewed interest in the experimental PPC capacitor technologies being developed by various Inner Sphere researchers in the 3050s and 3060s. Because the newer PPCs did not differ much from the standard or ER models already in use, designers quickly realized that extant PPC capacitor technologies applied equally well to the newer weapons, expanding on the utility of this experimental technology by the early 3070s.

PPC CAPACITOR

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Inner Sphere (E/X-X-E)
Game Rules: Instead of firing a PPC as normal, the pilot may choose to charge the PPC Capacitor. This requires one turn and builds up 5 points of heat. This charge can be held as long as needed, during which time the charged Capacitor continues to generate 5 points of heat. When the charged PPC is finally fired, the release of the charge builds up an additional 5 points of heat, in addition to the heat from the weapon itself. (Thus, if a 'Mech with an ER PPC with a Capacitor charges the weapon in Turn 1 but does not fire it until Turn 4, it would generate 5 points of heat from the charging Capacitor for Turns 1 through 3 [due to the Capacitor], and 20 points in Turn 4 when it fires [15 for the ER PPC, plus 5 for the Capacitor's charge release].)

A PPC fired with an attached PPC Capacitor that is charged adds 5 points to its normal damage value. For an aerospace unit, assume the Capacitor is always charged when calculating the bay's damage and heat.

Much like a Gauss rifle, a PPC Capacitor explodes if it or its attached PPC suffer a critical hit while charged, resulting in an internal explosion equal to the full combined maximum damage value of the PPC and its capacitor. The explosion also destroys all critical slots for both the PPC and its capacitor. If the PPC was (or is being) fired during the same Attack Phase in which such a critical hit occurs, the weapon is considered to have discharged before the critical hit, and the critical hit simply destroys the affected slot with no explosive effects.

A to-hit roll result of 2 with a capacitor-charged PPC burns out the system before it can fire, damaging the capacitor slot as well as the first critical slot of the corresponding weapon, but inflicting no damage against the target.

PROTOMECH MELEE WEAPON

R&D Start Date: 3066 (Clan Blood Spirit)
Prototype Design and Production: 3067 (Clan Blood Spirit)

Due more to aesthetics than any real combat value, some ProtoMech pilots have begun insisting on mounting melee-style weapons to augment a ProtoMech's physical combat capability. While a variety of such weapon styles now exist, the only practical difference between them is their look; none of them give any particular edge over the others to the ProtoMech in close combat situations, and so such weapons have become as much a piece of flair to express the ProtoMech warrior's personality as a means to inflict damage on an enemy in a melee.

PROTOMECH MELEE WEAPON

Rules Level: Experimental
Available To: PM
Tech Base (Ratings): Clan (C/X-X-E)
Game Rules: When executing a ProtoMech "frenzy" attack (see p. 187, *TW*), a ProtoMech's melee weapon adds 1 point of damage for every 5 tons of ProtoMech weight (or fraction thereof)—regardless of the weapon's style. If the arm carrying a ProtoMech melee weapon is destroyed or the weapon's slot suffers a critical hit, the melee weapon ceases to function.

RECON CAMERA

Introduced: Pre-spaceflight

A modern rendition of centuries-old technology, the recon camera is a battlefield surveillance item rarely seen in the modern age, yet useful nonetheless. Most commonly employed by low-tech reconnaissance planes like the Boomerang, or even by civilian newsvid VTOLs, the recon camera system is actually a group of multiple visual sensors that can provide high-resolution holographic data on a section of terrain overflown by the user.

RECON CAMERA

Rules Level: Advanced
Available To: BM, IM, PM, CV, SV, AF, CF, SC, MS
Tech Base (Ratings): Both (C/B-B-B)
Game Rules: An aerospace unit with a Recon Camera that is between Altitudes 5 and 10 on the Low Altitude map gains the ability to either spot for LRM indirect fire or artillery, or attempt to reveal hidden units. In either case, it may not make any other attacks while attempting to do so.

For an aerospace unit to spot, the base to-hit number to designate a target is the pilot's Gunnery Skill +2. The target must be on the ground mapsheet that corresponds to the camera unit's atmospheric hex.

If the aerospace unit is attempting to reveal hidden units (see p. 259, *TW*), during the Movement Phase of any turn where the camera unit passes over a ground mapsheet that corresponds to its atmospheric hex and contains a hidden unit hostile to its force, the hidden unit may be revealed. The hidden unit's controlling player must roll 2D6 for each such hidden unit. The target number is 9, plus any applicable terrain modifiers; for submerged units, apply a +1 terrain modifier per depth past 1. Rolling equal to or higher than the target number immediately reveals that hidden unit to the camera unit.

Recon Cameras can be mounted on external hardpoints as a bomb type, as described on page 246 of *TW*. A pod-mounted Recon Camera occupies the same space as one bomb.

For ground units, a Recon Camera instead allows the unit to act as a spotter for LRM indirect fire (see p. 111, *TW*) against a single target per turn and still make a weapon attack or spot for artillery (at normal visual ranges) with no additional to-hit penalty. To spot for LRM indirect fire, the unit must 'hit' the target using the same rules and ranges as TAG as appropriate for that unit.

Regardless of the unit type it is mounted on, a Recon Camera can never designate targets for TAG-guided weapons, such as semi-guided LRMs, laser-guided bombs or Arrow IV artillery missiles.

RIFLE (CANNON)

Introduced: Pre-spaceflight

A weapon system hearkening back to the early twentieth century, vehicle-scale rifles (or cannons) were either rifled- or smooth-bore weapons designed with lower reloading and firing rates compared to even the smallest standard autocannons of today. Relying more on larger-caliber rounds and greater concentrations of propellant to deliver their damage, these weapons were developed by various Inner Sphere and Periphery manufacturers for centuries before the autocannon rendered them obsolete. Today, very few are produced in the Inner Sphere (where they are often lumped into the category of retro-tech), while the Clans have abandoned these weapons entirely.

RIFLE (CANNON)

Rules Level: Experimental
Available To: BM, IM, CV, SV, AF, CF, SC, DS, MS
Tech Base (Ratings): Inner Sphere (B/C-F-X)
Game Rules: Rifles lack the power to function effectively at normal space-to-space ranges, but may be employed by aerospace units operating in atmosphere and their ground-based counterparts, where they function as normal direct-fire ballistic weapons. However, because they lack the armor-penetrating power of modern autocannons, rifles of all sizes must subtract 3 points of damage (to a minimum of 0) for successful attacks against any unit except for conventional infantry, battle armor, 'Mechs using Commercial Armor, or Support Vehicles with a BAR rating below 8. Damage dealt to light, medium, or heavy buildings, or to internal structure, is never reduced in this fashion.

SATELLITE IMAGERS

Handy equipment employed by satellites since practically the dawn of spaceflight, satellite imagers are specialized orbit-to-surface cameras that have been used through the centuries to monitor everything from planetary weather and pollution patterns to troop movements and even—under more insidious circumstances—the activities of common folk living under less trusting rulers. The most common imager types seen today perform many of these tasks over almost every civilized world in the Inner Sphere and Clan space. Despite their collective name, satellite imagers may be employed by other spacecraft as well.

HIGH-RESOLUTION (HI-RES) IMAGER

Introduced: Early spaceflight

The high-resolution (Hi-Res) imager is effectively a sophisticated holographic and photographic array capable of distinguishing objects down to a meter in size from orbit. Used in the civilian sector to monitor cloud patterns, and in the military to watch troop movements, these imagers are limited in each mode by local weather conditions and darkness.

CONSTRUCTION RULES

Rifle (Cannon): Rifles of any size may be mounted on any applicable unit in accordance with that unit's rules for mounting weaponry. Rifles are compatible with targeting computers.

Rifles use only standard munitions, which must be installed in full-ton lots.

Satellite Imagers: Satellite Imagers may only be mounted on airborne unit types (including VTOLs, Fixed-Wing, Airship and Satellite Support Vehicles, fighters, Small Craft, other spacecraft and airborne Mobile Structures). On all such units, Look-Down Radars are always mounted in the nose, while other imagers are mounted as a standard-scale weapon and may be placed in any standard weapon bay, but have no damage or heat values, nor do they affect the weight of targeting computers, crew and the like. Imagers must be assigned a "firing arc" appropriate to their mounted location.

HYPERSPECTRAL IMAGER

Introduced: ca. 3055 (Federated Commonwealth)

A more sophisticated variation on the Hi-Res imager, the hyperspectral imager adds electromagnetic and thermal sensors for a more comprehensive sweep of the target area. This enables it to spot camouflaged units that a Hi-Res imager might miss.

SATELLITE IMAGERS

Rules Level (General): Advanced
Available To (General): CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Game Rules (General): Satellite Imagers of all types have a maximum effective sensor range of 30 hexes on the Space or the High-Altitude Map. Imagers used exclusively in space to detect other spaceborne targets provide no significant impact in game play beyond identifying a unit and assessing its condition. However, when an imager is available and focused on a ground battlefield, it can provide bonuses to any force able to access the imager's feed.

Aerospace units and manned satellites equipped with imagers can automatically provide these bonuses to friendly ground forces that include at least one unit with a minimum of 4 tons' worth of manned Communications Equipment. Hostile or neutral units carrying imagers and unmanned units with imagers may be "hacked" for these same benefits by any unit with a minimum of 5 tons' worth of manned Communications Equipment—regardless of the hacking unit's affiliation—on a successful 2D6 roll of 9+ (11+, if the imager is on a hostile unit). To perform this hack, however, the unit may make no Weapon Attacks in that turn, and any benefits obtained from the satellite feed will begin in the following turn.

Units with multiple Satellite Imagers provide all the features of each imager concurrently, but do not stack any Initiative modifiers they provide. Initiative modifiers provided by Satellite Imagers are negated if opposing sides successfully access the same imager type. Hacking a unit with imagers only provides the bonuses of the imager system(s) on the hacked unit, with the same effects as noted above.

Critical hits to a Satellite Imager, or to the Communications Equipment of a receiving unit, the destruction of either the imager unit or its receiver, and any ECM effects (including those of friendly systems; Satellite Imagers are not as sophisticated as military C^3 equipment) between the imager and any receivers automatically disable the link and negate all bonuses provided by the imager's use. If the imager was hacked to attain this link, the connection is lost for the remainder of the scenario; otherwise, the connection can be re-established after (or if) the interference clears.

HIGH-RESOLUTION (HI-RES) IMAGER

Tech Base (Ratings): Both (C/D-E-D)
Game Rules: The High-Resolution Imager provides its bonuses only if the target battlefield is in daylight and the local weather is clear, overcast or vacuum. This imager then provides a +1 initiative modifier for the friendly receiving unit's force as long as the connection is maintained. Furthermore, if the Hi-Res Imager is accessed during the Weapon Attack Phase of the first turn of game play (or prior to the start of play), it also forces the controlling player of any hostile units to roll 2D6 for each hidden unit on the battlefield, revealing the unit on any result of 8+ unless the unit is equipped with active Mimetic Armor, a Chameleon Light Polarization Shield, Void-Signature System, or other camouflage. This imager also may not detect units located underwater, within a building, within heavy or ultra-heavy woods, within any jungle hex, within a smoke-filled hex or underground.

HYPERSPECTRAL IMAGER

Tech Base (Ratings): Inner Sphere (D/X-X-F)
Game Rules: The Hyperspectral Imager provides its bonuses only if the local weather over the target battlefield is clear, foggy, overcast or vacuum. This imager then provides a +1 initiative modifier for the friendly receiving unit's force as long as the connection is maintained. Furthermore, if the Hyperspectral Imager is accessed during the Weapon Attack Phase of the first turn of game play (or prior to the start of play), it also forces the controlling player of any hostile units to roll 2D6 for each hidden unit on the battlefield, revealing the unit on any result of 7+ unless the unit is using a Null-Signature, Void-Signature, or Stealth Armor System. This imager also will not detect units located under more than 1 depth of water, within a building, within ultra-heavy woods or heavy/ultra-heavy jungle, within a smoke-filled hex or underground.

INFRARED IMAGER

Introduced: Early spaceflight

A specialized imager type, the infrared imager is most commonly used in nighttime surveillance or under low-visibility conditions, as it relies on tracking heat rather than visual signals.

INFRARED IMAGER

Tech Base (Ratings): Both (C/D-E-D)
Game Rules: The Infrared Imager provides its bonuses only if the local weather over the target battlefield is clear, foggy, overcast, cloudy, rainy, snowy or vacuum. This imager then provides a +1 initiative modifier for the friendly receiving unit's force as long as the connection is maintained. Furthermore, if the Infrared Imager is accessed during the Weapon Attack Phase of the first turn of game play (or prior to the start of play), it also forces the controlling player of any hostile units to roll 2D6 for each hidden unit on the battlefield, revealing the unit on any result of 8+ unless the unit shutdown without an overheat level, or is actively using a Null-Signature, Void-Signature, or Stealth Armor System. Infrared Imagers also will not detect units located under more than 3 depths of water, within an ultra-heavy jungle hex, within a building of CF 70 or greater, or underground.

Introduced: Pre-spaceflight

Often used as a satellite imager, but also common on aircraft and fighters, look-down radar is an active sensor system that relies on radio signals to map the ground below, picking out targets as anomalies in the terrain contours. However, this system remains susceptible to ECM jamming and similar effects.

LOOK-DOWN RADAR

Tech Base (Ratings): Both (B/D-E-D)
Game Rules: Look-Down Radar is an item that can be installed on tournament-legal units (see p. 227, *TM*) but has no effect. If playing under Advanced Rules, Look-Down Radar provides its bonuses only if the local weather over the target battlefield is clear, foggy, overcast, cloudy, rainy, snowy or vacuum. This item then provides a +1 initiative modifier for the friendly receiving unit's force as long as the connection is maintained. Furthermore, if Look-Down Radar is accessed during the Weapon Attack Phase of the first turn of game play (or prior to the start of play), it also forces the controlling player of any hostile units to roll 2D6 for each hidden unit on the battlefield, revealing any non-infantry unit on a result of 8+ unless the unit mounts an active ECM, Null-Signature System, Void-Signature System, or Stealth Armor of any kind (excepting visual camouflage systems). Infantry units and units located underwater, within heavy or ultra-heavy woods or jungle hexes, within a building or underground are also immune to Look-Down Radar detection.

SPECIALIZED INFANTRY

Introduced: Pre-spaceflight

Since mankind first created warfare, it immediately began creating specialized infantry dedicated to mission specific combat roles. Mountain troops to SCUBA, these specially-trained troops bring expertise to a wide variety of situations. However, it is the combat engineer and all its subspecialties that still remain one of the most important components of any military command. From minesweepers to bridge builders, demolitions to fieldworks; specialized infantry are the true workhorse of any campaign.

SPECIALIZED INFANTRY

Rules Level: Advanced
Available To: CI
Tech Base (Ratings): Both (Various)
Game Rules: As summarized by the Specialized Infantry Types Table below, each Specialized Infantry type imposes varying effects on the maximum troops per squad (Max Squad), maximum platoon size (Max Platoon), maximum number of support weapons per quad (Max Secondary Weapons), movement (MP), transport weight (Added Tons) and terrain restrictions (Prohibited Terrain). Additional rules for each specialized platoon type apply as follows:

Combat Engineers: These troops can perform a variety of tasks in the field, which must be designated before the start of the scenario.

• **Bridge-Building Engineers:** These troops carry assembly parts and tools for their operation, and can raise 2 single-hex Light Bridges or 1 single-hex Medium Bridge per scenario by spending 6 full turns adjacent to a target hex and engaging in no other actions or taking damage while doing so. A Light Bridge built by these infantry receives a CF of 15, while a Medium Bridge receives a CF of 40 (double these values if the bridge is built over water). If a Bridge-Building unit suffers any damage during a turn when it is attempting to build a bridge, the building effort extends by 1 turn (regardless of how many times the unit is attacked). If a Bridge-Building unit is destroyed before completing its task, the bridge is destroyed as well.

• **Demolition Engineers:** These troops plant explosive charges on structures such as bridges and buildings. While setting charges, a Demolition Engineer platoon may not engage in any other movement or combat actions. The damage these charges inflict (on the target structure only) is determined by multiplying

CONSTRUCTION RULES

Specialized Infantry: All Specialized Infantry must be of Veteran experience or greater. When constructing a Specialized Infantry platoon, the designer may select one or more specializations from the Specialized Infantry Table, but must apply the most restrictive values for each of the platoon specialty types. All troops within a Specialized Infantry unit must have the same specialization(s). Furthermore, Specialized Infantry construction modifies the standard Conventional Infantry Construction rules (see pp. 144-155, *TM*) as follows:

The *Max Squad (Troops)* value for the specialist unit sets the maximum number of troops per squad, but based on the Tech Base (Affiliation) chosen, this figure may be revised per the standard Conventional Infantry rules (see pp. 145-147, *TM*).

The *Max Platoon (Troops/Squads)* values set the maximum platoon size in actual troops (left of the slash) and squads (right of slash). Even if it meets the maximum listed number of squads per platoon, the number of actual troopers in a specialist platoon may not exceed the maximum troop numbers per platoon without breaking the unit into "sub-platoons" per the Oversized Platoons rule (see p. 146, *TM*).

The *Max Secondary Weapons* value sets the maximum number of secondary weapons that may be chosen per squad of specialist infantry. As with standard infantry platoons, a specialized platoon suffers the same movement restrictions as dictated by their chosen Motive Type for the number of support-type secondary weapons chosen.

The *MP (Type)* values establish the number of MPs and their type that specialized infantry use in game play. For Combat Engineers and Marines, this can vary with the unit's chosen Motive Type, while Mountain Troops and Paratroops are restricted to a basic Foot Motive Type (modified for their special abilities per the game play rules above), and SCUBA units use submarine movement (as modified by the special abilities rules above).

The *Added Tons* value establishes additional weight over and above the infantry unit's Motive Type (see p. 155, *TM*). For Combat Engineers and Marines, the base per-trooper weight varies with the Motive Type chosen (0.1 ton for Foot, 0.21 for Motorized, 0.18 for Jump, 1 for Hover/Tracked/Wheeled Mechanized, 1.5 for Microlite VTOL and 2 for Microcopter VTOL), while other specializations presume a base weight of 0.1 ton per trooper. For all applied specializations, the value in this column must be added to this weight to find the total per-trooper weight for unit transport purposes. For example, a Motorized Marine Combat Engineer has a per-trooper weight of 0.21 (Motorized) + 0 (Marine) + 0.1 (Combat Engineer) tons, or 0.31 tons for each trooper.

The *Tech Ratings* values are used to determine the Tech level and Availability of the various infantry specialty types.

The unit's *Prohibited Terrain* is also established for game play purposes. In all cases, the narrowest terrain restrictions apply between the unit's chosen Motive Type and Specialty.

Paramedics: Unlike the other specialty infantry types, paramedics are special troops who can replace one, some, or all of the platoon's ordinary secondary weapons troopers (regardless of platoon type). Paramedics carry no weapons, and provide no damage value in combat. As long as a platoon can carry secondary weapons, it can trade one secondary weapon trooper for one paramedic. Any leftover secondary weapons troopers in the platoon can use secondary weapons per the normal construction rules. However, special weapon effects dependent on the number of troopers per squad—such as Heavy Burst Fire—will be affected by any reductions. (For example, in a conventional motorized machine gun platoon of 28 troops, there are 8 secondary troopers—those carrying the machine guns. The designer can choose to designate 1 to 8 of these troops as paramedics instead, while the remainder may still carry their machine guns, but at a cost of the Heavy Burst feature that requires a minimum of 2 troopers per squad to receive.)

the number of turns the platoon spends in the target hex setting them (to a maximum of 6 turns), times the number of damage points listed for an SRM infantry platoon of equivalent numbers (as of when the platoon ceases planting the charges). Once finished setting their charges (announced at the End Phase of the turn), the demolition platoon's controlling player may announce, during any subsequent End Phase, that he is detonating the charges, inflicting the computed damage only against to the hex worth of the structure the platoon spent its turns rigging up. While the charges will not directly damage any other units in the same hex, any damage from the collapsing structure will (see pp. 176-177, *TW*).

• **Firefighting Engineers:** Firefighters carry portable fire suppression gear, ranging from simple compressed water hoses to flame-retardant foams, and may fire these at a single burning adjacent hex (or unit) in place of a weapon attack. The attack automatically hits, but then the controlling player must roll 2D6, subtracting 2 from the roll result if the fire was started by any type of Inferno munition or fuel-fed flamers (such as Vehicular Flamers). On a result of 8+, the target fire is extinguished. (Reduce this target number by 1—to a minimum target modifier of 3—for every consecutive turn the firefighting infantry unit continues to battle a blaze in a single hex; if the platoon stops fighting a fire before it is extinguished, it must start over again. For each additional active platoon fighting the fire, the controlling player may make a sperate roll for each successful attack, or apply a −1 modifier for each additional active platoon to a single roll.

• **Minesweeping Engineers:** Minesweepers are specially trained troops adept at disabling mines without detonating them. When a minesweeper platoon enters a mined hex, they may elect to disable the mines in place of a weapon attack (at the controlling player's discretion). When disabling mines, the platoon's controlling player must make a 2D6 roll; if multiple types of minefields occupy the same hex, a roll must be made for each type of minefield. On a result of 9+, the minefield is cleared. On a result of 3 or less, the field detonates. On any other result, the minesweepers have failed and the minefield remains active. See *Clearing Minefields* for more information.

• **Sensor Engineers:** These troops carry Remote Sensors (see p. 187) and dispenser gear that can set up to 2 Remote Sensors per squad. Only a single Remote Sensor need be deployed per hex in a given turn, at a cost of 1 MP (though the platoon may make ranged attacks as normal). Once established, an infantry-deployed Remote Sensor functions per the Remote Sensor rules referenced above.

• **Trench/Fieldworks Engineers:** These engineers dig trenches and set up ad-hoc field works that can be used as handy cover for any infantry unit. A trench/field-works hex (called a fortified hex) may be established in any hex except for those containing water, pavement or buildings, and provides a +2 modifier to any attacks (except for flamers and area-effect weapons) made against any infantry unit that subsequently "digs into" the fortified hex (see *Digging In*, p. 106, *TO: AR*). (Fortified hexes made of clear terrain are also not treated as clear when determining damage against infantry.) Creating trenches and fieldworks takes 3 full turns to complete, during which time the engineering unit may take no other action. As with Bridge-Building Engineers, damage to a unit during a turn in which it is attempting to fortify a hex in this fashion extends the effort by 1 turn (regardless of the number of attacks made against the unit). If a Trench/Fieldworks unit is destroyed before completing its task, the underlying terrain remains unchanged and provides no modifiers.

Marines: Marines in the *BattleTech* universe are troops trained to fight equally well in zero-G combat and on the ground. During combat operations in vacuum or zero-gravity (see pp. 52-53, *TO: AR*), or boarding actions (see p. 167, *TO: AR*), Marine units suffer no combat penalties associated with vacuum and zero-G operations; instead, they function in such environments as though they were conventional foot infantry under correspondingly normal conditions.

Mountain Troops: These troops are adept at ground combat in high altitudes and are immune to the effects of thin atmospheres (but not vacuum; see p. 52, *TO: AR*). Their climbing gear also enables them to traverse 3 levels per hex, as opposed to the typical 1 level per hex for other ground infantry.

Paramedics: These are conventional infantry units with paramedic equipment and the combat medics to use it. Any infantry unit with Paramedics that moves adjacent to (or into) a hex where there are wounded individuals may tend up to 5 wounded individuals per paramedic in the infantry unit starting in the following turn. Paramedics may be combined with any conventional infantry unit type that can carry secondary weapons.

Paratroops: Paratroops are specialized foot infantry trained and equipped to deploy into combat in parachutes or parafoils. In any atmospheric combat scenario (except for vacuum), paratroop infantry units may deploy via combat drops from any suitable aerospace unit operating within the atmosphere (but below the Space-Atmosphere Interface on the High-Altitude Map). When the troops land, however, the controlling player must roll 2D6 for each squad in a paratroop unit. On a result of 3 or less, the squad suffers 1 casualty and scatters like a scattered battle armor unit. Dropping paratroop infantry may be attacked as other dropping units, with no additional infantry modifiers. Complete rules for Dropping Troops can be found on pages 20-24, *SO.*

TAG Troops: TAG Troops are specialists who replace a platoon's ordinary support weapons troopers with TAG. TAG troops may conduct TAG "attacks" (see p. 142, *TW*), in addition to normal weapons attacks. TAG troops have a range of 3/6/9 hexes for the TAG, regardless of what other weapons the platoon is armed with (the TAG does not determine a platoon's range).

SCUBA (Standard): SCUBA troops operate as normal foot infantry on land, but may enter and move through water at 1 MP per hex (or depth) as a submarine or UMU-equipped unit. SCUBA infantry can submerge as low as 2 depths in game play, and possess weapons modified to fire underwater. However, their primary and secondary weapons have only half their standard range when used underwater (round down), and they may not employ disposable weapons.

SCUBA (Motorized): Similar to standard SCUBA infantry, these troops possess portable underwater propulsion gear in the form of either backpack aquatic "thrusters" or mini-sub "sleds" that can be quickly stowed when on land. As with Standard SCUBA infantry, these troops move at 1 MP per hex on land, but have 2 MP in water, and may—like their standard SCUBA counterparts—submerge as low as Depth 2. As with standard SCUBA units, primary and secondary weapons have only half their standard range when used underwater (round down), and they may not employ disposable weapons.

SCUBA (Mechanized): Mechanized SCUBA infantry operate using the rules governing submarine vehicles.

SPECIALIZED INFANTRY TYPES TABLE

Specialty Type	Max Squad (Troops)	Max Platoon (Troops/Squads)	Max Secondary Weapons	MP (Type)	Added Tons (per Trooper)	Tech Ratings	Prohibited Terrain
Combat Engineers	10	20 / 2	0	*	0.1	(C/A-B-A)	*
Marines	10	30 / 4	*	*	0	(C/A-A-A)	*
Mountain Troops	10	20 / 2	1	1 (Ground)**	0	(B/A-A-A)	Water (Any)
Paratroops	10	30 / 3	1	1 (Ground)**	0.05	(B/A-A-A)	Water (Any)
TAG Troops	†	† / †	†	†	0.0	(E/F-X-E)/ (E-X-E-E)	***, †
Paramedics	†	† / †	†	†	0.05	(B/C-C-C)	†
SCUBA (Standard)	10	30 / 4	0	1 (Sub)**	0.05	(B/B-C-B)	Water (Depth 3+)
SCUBA (Motorized)	6	12 / 2	1	2 (Sub)**	0.1	(B/B-C-B)	Water (Depth 3+)
SCUBA (Mechanized)	5	20 / 4	2	3 (Sub)**	0.9	(C/D-D-D)	Depth 0/ non-water

*As chosen Motive Type (Foot, Motorized, Jump and Mechanized: [Hover, Wheeled, Tracked or VTOL] are all available to these units). **See special game rules. ***Only functions if assigned to a minimum of 2 troopers per squad. †As platoon type chosen. Note: A maximum of 2 paramedics or TAG troops can be assigned per infantry squad, each one replacing 1 secondary weapon trooper (squads with paramedics or TAG troops are not required to match the Support Weapon choices of the rest of the platoon); paramedics and TAG troops do not decrease the speed of an infantry platoon.

STRUCTURE

In the push to get the most from every ton of BattleMech design, researchers continue to experiment with ways to lighten every component possible while not compromising the integrity of these avatars of war. Three promising structural alternatives were reportedly under development in recent years along these lines: composite structure, endo-composite structure and reinforced structure.

COMPOSITE STRUCTURE

R&D Start Date: 3056 (Federated Commonwealth)
Prototype Design and Production: 3061 (Federated Suns)

Composite structure uses advanced fiber-reinforced materials to provide a BattleMech framework that weighs half as much as standard internal structure, but avoids the bulk issues found in equivalent-weight endo-steel structure. Unfortunately, composite structure is markedly easier to damage.

COMPOSITE STRUCTURE

Rules Level: Experimental
Available To: BM
Tech Base (Ratings): Inner Sphere (E/X-X-E)
Game Rules: All damage to the internal structure of a 'Mech using Composite Structure is doubled. Excess damage that transfers to a location still protected by armor must apply in accordance with the rules of the specific armor type, based on the weapon's normal remaining damage.

ENDO-COMPOSITE STRUCTURE

R&D Start Date: 3063 (Lyran Alliance), 3071 (Clan Wolf [in-Exile])
Prototype Design and Production: 3067 (Lyran Alliance), 3073 (Clan Wolf [in-Exile])
Introduced: N/A

Lyran engineers were seeking a solution to the problem of bulky endo-steel structure design without resorting to composites when the Jihad began. Their approach consisted of a mix of endo-steel and standard structure parts, dubbed endo-composite structure. It promised a partial success that unfortunately wound up in Blakist hands for several years—but not before Lyran resistance managed to leak technical details to the Exiled Wolves.

ENDO-COMPOSITE STRUCTURE

Rules Level: Experimental
Available To: BM
Tech Base (Ratings): Both (E/X-X-F)
Game Rules: Functions in game play by the same rules as Endo-Steel; critical hits to Endo-Composite structure slots are treated as Roll Again results.

REINFORCED STRUCTURE

R&D Start Date: 3055 (ComStar), 3060 (Clan Ghost Bear)
Prototype Design and Production: 3057 (ComStar/Word of Blake), 3065 (Clan Ghost Bear)

Prior to the fall of Terra to the Blakists, ComStar engineers were working on an ultra-heavy chassis design intended to better resist the strain of internal damage, but Word of Blake espionage eventually led to the experimental technology leaking beyond the Order's drawing boards. The Clans have since launched their own research into the promise of super-resilient structure design.

CONSTRUCTION RULES

Structure: Composite, Endo-Composite and Reinforced internal structure types are available to BattleMechs only.

The weight for Composite Structure is half as much as standard internal structure (rounded up to the nearest half-ton), but occupies no internal slots on the unit's design.

Endo-Composite Structure weighs three-quarters as much as standard structure (75 percent, rounded up to the nearest half ton), and occupies half as many slots (rounded up) as normal Endo-Steel (7 slots for Inner Sphere Endo-Composite; 4 slots for Clan Endo-Composite), which must be allocated per the standard rules for internal structure slots (see p. 47, *TM*).

Reinforced internal structure weighs twice as much as standard structure, but requires no slot space.

Sub-Capital Weapons: When mounted on appropriate Large Craft (DropShips, JumpShips, Space Stations and WarShips), Sub-Capital Weapons can be grouped in either their own bay or in the same bay as capital weapons of the same type (Sub-Capital Lasers may be combined with capital lasers, Sub-Capital Cannons may combine with capital autocannons and so on). When grouped with standard capital weapons, however, the Sub-Capital Weapons' to-hit modifiers are replaced by those of the capital weapon. Sub-Capital Weapons are mounted on any permissible aerospace unit using the same rules for standard capital weapons, including rules pertaining to gunnery crew needs, targeting system limits, minimum ammunition needs and so forth. (DropShips mounting Sub-Capital Weapons effectively ignore the prohibition concerning only-missile capital weapons.)

Beyond Large Craft, only Mobile Structures and Large-sized Support Vehicles of Tracked, Rail or Naval motive types may mount a Sub-Capital Weapon. For Mobile Structures, mounting a Sub-Capital Weapon follows the same rules as for mounting capital weapons (see p. 83). Support Vehicles intending to mount a Sub-Capital Weapon must incorporate a fusion or fission engine of at least Tech Level D, as well as an Advanced Fire Control System. Support Vehicle-mounted Sub-Capital Weapons may not be placed in a turret or pintle mount, and require 1 gunner for every 50 tons of weapon weight to operate. Sub-Capital Lasers mounted on Support Vehicles also require a number of heat sinks equal to the heat generated by such weapons, while Sub-Capital Cannons and missiles require no heat sinks.

REINFORCED STRUCTURE

Rules Level: Experimental
Available To: BM
Tech Base (Ratings): Both (E/X-X-E)
Game Rules: Each point of Reinforced Structure can sustain two points of damage. To reflect this, when marking damage off on a location with this structure type, draw a single slash through the structure bubble for the first point of damage sustained, and a second slash, making an "X" (or block the structure point out entirely) after the second point (at which point any remaining damage transfers normally, unless any special rules apply). Furthermore, when rolling to determine critical hits on a unit with Reinforced Structure, a –1 modifier applies to the roll result. Reinforced Structure does not allow more armor to be mounted on a 'Mech.

SUB-CAPITAL WEAPONS

Derived from Terra's rebuilt defenses (and likely scrapped naval weapon concepts from the Age of War), the Word of Blake recently unveiled a new, smaller class of naval weapons. Dubbed sub-capital weapons, these systems have apparently been shipped to various key worlds throughout the Protectorate, where a few courageous resistance groups have managed to smuggle out specs and partial samples to the various allied forces.

SUB-CAPITAL WEAPONS

Rules Level (General): Advanced
Available To (General): SV, DS, JS, SS, WS, MS
Game Rules (General): Sub-Capital Weapons use capital-scale attack values and range brackets, and follow all the same basic rules as capital weapons of their equivalent type (Capital ACs for Sub-Capital Cannons; Naval Lasers for Sub-Capital Lasers; Capital Missiles for Sub-Capital Missiles), with the following differences:

- Sub-Capital Weapons firing through the Space/Atmosphere Interface on the High-Altitude Map suffer an additional +2 to-hit modifier in addition to all other modifiers and rules applicable to capital weapons fire through atmosphere (see p. 236, *TW*).
- Ground-based units firing sub-capital weapons (excluding grounded DropShips and Mobile Structures) must stop moving for 1 full Space-scale turn (6 standard ground combat turns) before firing, and also may not move in the firing turn.
- Direct-fire Sub-Capital Weapons (SCCs and SCLs) may attack targets under 500 tons at a +3 to-hit modifier (rather than the normal +5). Sub-Capital Missiles do not apply this modifier.
- Direct-fire Sub-Capital Weapons may not be fired from a Ground hex on the High-Altitude Map against any other unit on the Ground hex row on the High-Altitude Map.
- Sub-Capital Missiles may execute surface-to-surface attacks as artillery (see p. 98, *SO*), but with a range (in Space hexes) equal to their capital hex range, divided by 6 (round up), and a ground combat turn delay of 6 ground-scale turns per Space hex traveled. Such attacks also suffer a +2 to-hit modifier.
- Sub-Capital Weapons used to deliver a strike against ground-based targets deliver their full damage only against the target hex—and all units therein—plus half their rated damage to the adjacent hexes (and all units therein). Remember that 1 point of capital-scale damage translates to 10 points of standard-scale damage when attacking ground units in this fashion.

SUB-CAPITAL CANNONS

Introduced: 3073 (Word of Blake)

These lighter forms of the naval autocannon lack the size and the "burst rate" of their larger kin, but can track smaller targets more effectively than their larger cousins. Since rumors of these weapons leaked out, FedSuns weapon designers and their Combine counterparts have both launched crash programs to develop their own sub-capital cannons, hoping to negate the Blakist advantage before their new weapons went into full production.

SUB-CAPITAL CANNONS

Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: If not grouped with standard Naval Autocannons in a weapon bay, a Sub-Capital Cannon (SCC) receives a +3 modifier to attack units weighing less than 500 tons (in place of the standard +5 modifier for capital weapons). Otherwise, Sub-Capital Cannons function as described in the general rules above.

SUB-CAPITAL LASERS

Introduced: 3073 (Word of Blake)

Though the Word once more beat out the allies for production of these, the preferred sub-capital weapon, all of the Great House states save the Federated Suns and the Capellan Confederation are close to field-testing their own knock-offs on retrofitted "pocket WarShips" of their own.

SUB-CAPITAL LASERS

Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: If not grouped with standard Naval Lasers in a weapon bay, a Sub-Capital Laser (SCL) receives a +3 modifier to attack units weighing less than 500 tons (in place of the standard +5 modifier for capital weapons). Otherwise, Sub-Capital Lasers function as described in the general rules above.

Introduced: 3072 (Word of Blake), 3073 (Clan Wolf [in-Exile])

Sub-capital missiles are the only sub-capital weapon types known to have been under development prior to the Jihad (though suspicions remain that the Word was actively pursuing other sub-capital weapon types at the same time). These weapons lack the range and punch of larger capital missiles, and are also incompatible with the AR-10 launcher, but are adept at anti-fighter work and useful across a broad range of unit types. Their straightforward design and co-development with Free Worlds engineers who later defected to Alys Marik's resistance eventually led to other realms adopting this technology, including the Lyrans, the Combine and even the Clans.

SUB-CAPITAL MISSILE LAUNCHERS

Tech Base (Ratings): Both (E/X-X-F)
Game Rules: Sub-Capital Missiles function in accordance with the general Sub-Capital Weapons rules above. Space-based Point Defenses (see p. 96, *SO*), including Anti-Missile Systems, affect Sub-Capital Missiles in the same manner as capital missiles, but in atmosphere, these defensive armaments have no effect against Sub-Capital Missiles.

Like standard capital missiles, most Sub-Capital Missiles may inflict an additional critical hit against aerospace targets when they deliver a successful hit. The Sub-Capital Missile Critical Table below provides the chances of an additional critical hit on a separate 2D6 roll (made after a successful hit).

Sub-Capital Missiles cannot be launched from an AR-10 launcher, nor do tele-operated versions exist for any of these missiles, but they can be used to deliver surface-to-orbit attacks and vice versa (see pp. 96-98, *SO*).

SUB-CAPITAL MISSILE CRITICAL TABLE

Missile	Critical Chance
Piranha	N/A
Stingray	12+
Swordfish	11+
Manta Ray	10+

SUB-COMPACT K-F DRIVE SYSTEM

Introduced: 2320 (Terran Hegemony)

Inner Sphere naval engineers and historians have long known that the Star League could build Kearny-Fuchida drives as small as 2,500 tons. However, even the recovery of the Helm Memory Core failed to unlock the mystery of these sub-compact cores, leaving vessels like the well-known *Bug-Eye* stuck in ComStar's nostalgic Star League archives (and in Clan naval reserves).

Only the recent and historic collaboration between Inner Sphere naval engineers and their counterparts in Clans Wolf (in-Exile) and Nova Cat finally cracked the counterintuitive secret to compact K-F drive design. Unfortunately, the bare bones, nearly titanium-free design of sub-compact K-F drives proved prohibitively expensive, even when using Clan manufacturing techniques. As a result, sub-compact K-F drives have become rare to the point of virtual extinction.

SUB-COMPACT K-F DRIVE SYSTEM

Rules Level: Experimental
Available To: WS
Tech Base (Ratings): Both (F/F-X-F)
Game Rules: The Sub-Compact K-F Drive follows normal K-F drive rules. However, as the use of a sub-compact drive produces an extra-small hyperspace field, a vessel using a Sub-Compact K-F Drive cannot transport DropShips through hyperspace.

CONSTRUCTION RULES

Sub-Compact K-F Drive System: A WarShip mounting a Sub-Compact K-F Drive must devote 50 percent of the vessel's total mass to the drive. A jump-capable vessel with a sub-compact K-F Drive may be built as small as 5,000 tons, but no larger than 25,000 tons, in 100 ton increments. A vessel with a sub-compact core may not mount DropShip docking collars. Full rules on constructing the units that use this item appear in *Strategic Operations*.

Supercharger: The Supercharger may be mounted on any BattleMech or IndustrialMech. Combat Vehicles and Support Vehicles not powered by Solar Power or External power engines may also mount a Supercharger unless they are also VTOLs, Fixed-Wing, Airship or Satellite vehicle types. All other unit types may not mount a Supercharger. The Supercharger itself occupies 1 critical space, which must be placed in a location that contains engine slots (this can be a left or right torso, provided engine slots exist in those locations) and has a weight equal to one-tenth of the unit's engine weight (rounded up to the nearest half-ton for units 5 tons and over, or to the nearest kilogram for units under 5 tons).

Despite the rules in *TechManual* requiring speed enhancements to be included in the base configuration, Superchargers may be pod-mounted.

Taser: Only battle armor may mount a Battle Armor Taser, and only one Battle Armor Taser may be mounted per battlesuit, unless the Taser is mounted semi-externally, in a Detachable Weapon Pack.

BattleMech Tasers may be mounted on BattleMechs, IndustrialMechs, Combat Vehicles and all Support Vehicle types except for Satellites, Airships and Fixed-Wing units in accordance with the standard construction rules. However, only units powered by a fusion engine can use BattleMech Tasers.

SUPERCHARGER

Introduced: Early spaceflight

Essentially an override for the normal safety governors that limit modern engine performance, superchargers can coax as much as 125 percent output from fusion reactors and internal combustion engines alike. For fusion and fission plants, this generally entails disabling safety inhibitors and the like, while fuel-based systems inject a burst of specially designed chemicals into the fuel mix to achieve similar results.

As might be expected, use of a supercharger carries significant risks to the engine's integrity, up to and including supercharger burnout or even catastrophic engine failure.

SUPERCHARGER

Rules Level: Experimental
Available To: BM, IM, CV, SV
Tech Base (Ratings): Both (C/F-F-F)
Game Rules: The Supercharger enables a unit to move at twice its standard Cruising or Walking MP as an enhanced run, and follows the same rules to operate as MASC (see p. 137, *TW*), with the following exceptions:

- Superchargers mounted on IndustrialMech or Support Vehicle engines apply a –1 modifier to the Supercharger's activation roll result (the 2D6 roll made prior to movement).
- On a failed Supercharger activation roll, regardless of unit type, the controlling player rolls on the Determining Critical Hits Table (p. 124, *TW*) to determine the number of critical hits that results. For 'Mechs, any such hits are applied to the upper-most undamaged critical slot(s) in the center torso. For non-'Mechs, these critical hits are instead applied as motive system hits; if rendered immobile by this and one or more Supercharger motive hits have yet to be applied, the unit's engine is destroyed.
- Regardless of whether or not engine or motive damage occurs, a failed Supercharger activation roll destroys the Supercharger system and the unit may not use it for the remainder of the scenario; the equipment slot is considered destroyed.
- A 'Mech may combine a Supercharger with MASC. If both are used in the same round, the controlling player must make separate activation rolls for each. If successful, the unit receives a Running MP equal to 2.5 times its Walking MP (rounded up).
- A 'Mech may combine a Supercharger with Triple-Strength Myomer. If both are used in the same round, the Triple Strength Myomer modifier is added to the Supercharger-modified speed.
- A 'Mech may combine a Supercharger with Triple-Strength Myomer. If both are used in the same round, the Triple Strength Myomer modifier is added before applying the Supercharger modifier.

TASER

R&D Start Date: ca. 3060 (Word of Blake [Battle Armor Taser]), 3065 (Federated Suns [BattleMech Taser])
Prototype Design and Production: circa 3066 (Word of Blake [Battle Armor Taser]), 3067 (Federated Suns [BattleMech Taser])
Introduced: 3067 (Word of Blake [Battle Armor Taser]), N/A [BattleMech Taser]

Though reportedly developed by the NAIS as a 'Mech-scale weapon first, the radical taser weapon system first appeared at a smaller scale, employed by Word of Blake battle armor. Designed to incapacitate rather than destroy, the weapon uses a wire-based, armor-piercing harpoon to penetrate the outer skin of its target and deliver a powerful electromagnetic charge directly from the shooting unit. This jolt, powerful enough to disable the target for a brief period, relies on high-energy capacitors or a direct feed from the firing unit's engine, and carries with it a major risk of energy feedback that can prove just as harmful to the attacker as to the target.

TASER

Game Rules (General): Taser attacks have a +1 to-hit modifier. The Taser may only target ground-based units (such as 'Mechs, battle armor and vehicles), grounded VTOLs and grounded aerospace units. The Taser has no effect against buildings or units weighing more than 100 tons. A Taser may not be fired underwater, nor does it gain any benefits from a targeting computer.

If the target is conventional infantry, a successful Taser hit automatically kills 1 trooper (regardless of the Taser type used). Against any other target, the weapon inflicts 1 point of damage, after which the Attacker then rolls 2D6 and consults the Taser Effects Table on page 158, then cross-references the target unit type against the columns appropriate for the Taser type used.

If the roll result is equal to or higher than the value outside the parentheses under the appropriate Shutdown column, the Taser causes the target unit to shut down for a number of turns equal to the value in parentheses. Battle armor units that experience a shutdown effect lose one random trooper, which is treated as destroyed for the remainder of the scenario. All other units experiencing a shutdown become immobile targets for the duration of the effect.

If the 2D6 roll is less than the Shutdown column value, the Taser's surge simply disrupts the unit's electronics, creating interference that impairs the unit's function. This interference applies a modifier to the target unit's Piloting and Gunnery target numbers as listed under the Interference column for the appropriate Taser, and lasts for a number of turns equal to the value in parentheses.

Multiple Taser hits do not increase the modifiers for interference effects or the chances of a shutdown effect, but will require shutdown checks for each successful hit (however, a unit shut down by one Taser hit may not be "restarted" by a later Taser hit that fails to roll a shutdown). Any interference effects last from the turn of the most recent successful Taser hit. Shutdown and interference effects end during the End Phase of the final turn of their duration, and so a BattleMech experiencing interference from a Battle Armor Taser hit in Turn 1 will recover from its effects in the End Phase of Turn 4.

BATTLE ARMOR TASER

Appearing suddenly in special Word of Blake battle armor squads, the battle armor-scaled taser is the riskier form of the taser weapon. While its single harpoon—delivered by Gauss-style magnetic accelerators—is hardly damaging, the immense pulse from its integral capacitor invariably disrupts the battlesuit's own electronic systems and can even shut down the suit entirely. For this reason, the battle armor taser sees limited use, even by the Word.

BATTLE ARMOR TASER

Rules Level: Advanced
Available To: BA
Tech Base (Ratings): Inner Sphere (E/X-X-E)
Game Rules (General): The Battle Armor Taser uses all of the general Taser firing rules noted above, with the following additions:

- Battle Armor Tasers are one-shot weapons.
- Even if all troopers in a squad are equipped with a Battle Armor Taser, only 1 trooper fires at a time, so if a full Word of Blake battle armor squad of 6 is equipped with Battle Armor Tasers, they may make up to 6 Taser attacks per scenario.
- Units experiencing shutdown effects from a Battle Armor Taser strike may restart before the effects' full duration by making a 2D6 roll during the End Phase of each turn they are so shut down. BattleMechs restart on a result of 7+; all other units restart on 8+.
- Upon making a successful hit with a Battle Armor Taser, regardless of the effects, the Attacker must make a Feedback check by rolling 2D6 again. On a result of 7+, the firing unit receives a +1 modifier to all attack rolls for the next 3 turns (applied to the entire squad). On a result of 6 or less, the Taser's capacitor explodes from the surge, disabling the battlesuit for the remainder of the scenario. (The trooper is treated as destroyed for scenario purposes, but the suit and its operator may be salvaged later.)
- Unless it simply missed its target when fired, a Battle Armor Taser cannot be reloaded after a scenario; instead, the weapon must be replaced.

BATTLEMECH TASER

First seen in the Solaris arenas during a duel between rival FedSuns stables, the BattleMech taser is a larger, reloadable and far less risky version of the battle armor taser. Combining the micro-Gauss firing system of the battlesuit version with a rocket-propelled harpoon, and designed to tap into the much deeper power reserves of a fusion reactor (rather than the battle armor version's capacitor), the BattleMech taser is somewhat more effective in combat, at decidedly less risk.

BATTLEMECH TASER

Rules Level: Experimental
Available To: BM, IM, CV, SV, MS
Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: The BattleMech Taser uses all the general Taser rules described on page 157, with the following additions:

- BattleMech Tasers are treated like Gauss weapons in the event of a critical hit to the weapon, and explode for 6 points of damage.
- BattleMech Taser ammo can explode in the event of a critical hit, inflicting 6 points of damage per unused shot left in the bin.

TASER EFFECTS TABLE

	Battle Armor Taser		BattleMech Taser	
Target Unit*	Shutdown	Interference	Shutdown	Interference
BattleMech	12+ (3)	+1 (3)	11+ (3)	+2 (3)**
IndustrialMech	11+ (3)	+1 (3)	8+ (4)	+2 (4)**
ProtoMech	11+ (3)	+1 (3)	8+ (4)	+2 (4)
Battle Armor†	9+ (P)	NA	Auto (P)	NA
Vehicles	11+ (3)	+1 (3)	8+ (4)	+2 (4)
Aerospace Fighter/Small Craft‡	11+ (3)	+1 (3)	11+ (3)	+2 (3)**
Conventional Fighters‡	11+ (3)	+1 (3)	8+ (4)	+2 (4)

*Tasers have no effect against units weighing more than 100 tons.
**The unit also generates 5 points of heat per turn while affected.
†Effects apply to one trooper only, for the remainder of the scenario.
‡Grounded units only; Tasers cannot target airborne units.

CONSTRUCTION RULES

Thunderbolt Missile Launcher: Thunderbolt launchers can also be installed as OS or I-OS launchers.

Turrets: All turrets described here have a weight equal to 10 percent of the tonnage of all weapons and equipment assigned to the turret (not including power amplifiers, heat sinks and ammunition). Sponson Turrets—which are always mounted in pairs—do not have to assign the same tonnage of weapons and equipment in each Sponson, but must assign a total of 10 percent of the total tonnage for all Sponson-mounted weapons and equipment to their turret mechanism weight. Round all turret weights up to the nearest half-ton. For 'Mech Turrets, a critical slot must also be assigned to the unit's record sheets to represent the turret mechanism (and the weapons and equipment assigned to that turret must be noted on the record sheet as well).

BattleMech shoulder turrets (available only to biped BattleMechs) must assign the turret mechanism slot to either the left or right torso locations, which may support a maximum of 1 shoulder turret each. Only the items placed in that side torso may be assigned to the shoulder turret.

BattleMech head turrets (available to quad or biped 'Mechs) require a turret critical slot in the center torso. A 'Mech must be using a torso-mounted cockpit (see p. 113) to mount a head turret.

BattleMech quad turrets (available only to four-legged 'Mechs) follow the same construction rules as a BattleMech shoulder turret, but a quad may only carry 1 turret.

THUNDERBOLT MISSILE LAUNCHER

Introduced: 3072 (Federated Suns, Lyran Alliance)

An experimental weapon system first prototyped by NAIS engineers in the mid-3050s for the Solaris arenas, the Thunderbolt missile launcher was derived from standard LRM technology. By using a larger missile, rather than clusters of small warheads, the Thunderbolt can deliver a single concentrated hit to its target, but does so at the expense of range, weapon weight and heat. Nevertheless, the proven nature of this technology led to its eventual mass production by the former FedCom states in the early 3070s.

THUNDERBOLT MISSILE LAUNCHER

Rules Level: Advanced
Available To: BM, IM, CV, SV, AF, CF, SC, JS, DS, SS, WS, MS
Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: Thunderbolt Missile Launchers follow all the standard rules for LRMs in combat, including the ability to launch indirect LRM fire (see pp. 111-112, *TW*). However, unlike LRMs, Thunderbolt missiles do not roll on the Cluster Hits Table. They deliver their damage to a single location, rather than in clusters, and any Thunderbolt missile strike that occurs within the weapon's minimum range delivers only half the missile's rated damage, rounded down (as the missile's warhead does not arm itself until after launch).

Anti-missile systems may engage an incoming Thunderbolt missile, using the standard rules for AMS versus a single missile weapon (see p. 129, *TW*).

Thunderbolt Missile Launchers only use standard Thunderbolt ammunition, and do not benefit from missile enhancement systems such as Artemis and Narc.

TURRETS

Introduced: Pre-spaceflight

Turrets, by and large, are nothing new to the modern battlefield, yet war machines in the thirty-first century have settled into certain design standards, mainly for the sake of simplified engineering. Far more unusual options, however, have cropped up from time to time, including 'Mech-mounted turrets, dual vehicle turrets, sponson turrets and VTOL chin turrets.

BATTLEMECH TURRET

Rules Level: Experimental
Available To: BM, IM
Tech Base (Ratings): Both (Variable)
Game Rules: BattleMech Turrets come in three primary forms: shoulder turrets, quad 'Mech turrets and head turrets. Bipedal (non-quad) 'Mechs may only mount shoulder and head turrets, while quads may only use quad 'Mech turrets and head turrets. In all three cases, the weapons assigned to these turrets—which must be clearly noted on the unit's record sheet—may be rotated to any desired facing in accordance with the rules for vehicle turrets (see pp. 105-106, *TW*). In the case of shoulder turrets, however, the turret may not fire through either of the 'Mech's opposite-side hexsides (as doing so would essentially be firing through the unit's own head). If a quad 'Mech mounts both a quad 'Mech turret and a head turret, then its head turret may not fire to the rear.

Unlike vehicle turrets, BattleMech Turrets have no distinct hit locations and are treated as part of the body location in which they are mounted. Furthermore, all BattleMech Turrets have a critical slot representing the turret mechanism itself. If this slot sustains a critical hit, the turret is locked in the facing it had during the turn in which the critical hit occurred, and remains in that facing until repaired.

Any item that cannot be mounted in a vehicle turret cannot be mounted in a 'Mech turret.

VEHICULAR DUAL TURRET

Rules Level: Experimental
Available To: CV, SV
Tech Base (Ratings): Both (B/F-F-F)
Game Rules: Available to ground-based and naval-based Combat and Support Vehicles (but not airborne units such as VTOLs, WiGEs, Airships, Fixed-Wing units and Satellites), the Vehicular Dual Turret refers to the placement of a second turret in a single-hex Combat or Support Vehicle design. (Multi-hex units can mount one turret per hex, and so do not receive this option.)

Vehicles with a dual turret configuration must note one turret as the forward turret and one as the rear turret. These turrets follow the same rules as standard vehicle turrets, but the forward turret may not fire through the rear hexside, while the rear turret—which is elevated above the forward—has a full 360-degree arc. Both turrets are treated as a separate hit location, each with its own armor and structure; when a vehicle mounting dual turrets suffers a hit to the turret location, the attacker must roll 1D6, applying a –2 modifier for hits through the front arc or a +2 modifier for hits through the rear arc. If the modified result is 3 or less, the front turret suffers the damage; on a modified result of 4 or higher, the rear turret is hit instead. Any critical hits to a vehicle's turret apply to the turret which received the damage.

VEHICULAR SPONSON TURRET

Rules Level: Experimental
Available To: CV, SV
Tech Base (Ratings): Both (B/F-F-F)
Game Rules: Available to ground-based, naval-based, VTOL, and WiGE Combat and Support Vehicles (but not other units such as Airships, Fixed-Wing units and Satellites), Sponson Turrets are larger-scale versions of the pintle mount occasionally seen on smaller Support-grade Vehicles. Sponsons, unlike pintles, may carry heavy weapons and are always mounted in pairs as an alternative to standard side-mounted weapons. Like pintles, however, they receive no independent armor and structure values, and offer the same 180-degree arc of fire, encompassing the whole range of hexes from the hex row directly behind a vehicle to the hex row directly ahead (meaning both Sponsons will overlap directly ahead of and directly behind a vehicle). Unlike other turrets, Sponsons cannot be jammed; the weapons are simply treated as standard side-mounted weapons for the purposes of resolving critical hits.

VTOL CHIN TURRET

Rules Level: Experimental
Available To: CV, SV
Tech Base (Ratings): Both (B/F-F-F)
Game Rules: The VTOL "Chin" Turret is so named because it generally resides beneath the cockpit section of the craft. The Chin Turret follows all the standard rules for a vehicle turret except that it cannot be used to target units standing (or flying) at a higher elevation than the VTOL itself.

A VTOL with a Chin Turret replaces the "Rotor" entry on location 4 of the VTOL Combat Vehicle Hit Location Table with "Turret". Destruction of all internal structure points in the Chin Turret location destroys the VTOL as normal.

VEHICULAR/BATTLE ARMOR DROPCHUTE

Introduced: 2351 (Terran Hegemony [VDC]), 2875 (Clan Hell's Horses [BADC])

Descended from the landing chutes of early spaceflight planetary probes, the combat vehicular dropchute (VDC)—and its battle armor equivalent (BADC)—are not so much a mounted equipment item as an external add-on that enables vehicles, 'Mechs, battle armor and even inert cargo to be dropped from low atmospheric orbit. Intended as an economical alternative to the standard BattleMech drop cocoon, VDCs and BADCs are limited in combat, largely because chute-deployed troops are easier to target by hostile aerospace units, and rely on atmospheric drag rather than controlled thrust to slow their descent. This latter issue is considerably more dangerous when deploying by chute into turbulent atmospheric conditions, such as the height of a storm.

VEHICULAR JUMP JETS

Introduced: 2650 (Terran Hegemony)
Extinct: 2840 (Inner Sphere)

During the heyday of the first Star League, Mitchell Vehicles of Graham IV introduced the first jump-capable hovertank—the KGA-2B Kanga—to the SLDF. Built to compete with the mobility of BattleMechs, the Kanga's unique vehicular jump jet system was a stunning success, but one that few could replicate thanks to the elaborate computer and guidance systems needed to stabilize the hovertank in flight. As a result, few jump-capable vehicles beyond the Kanga were ever created, especially after the destruction of the vehicle line on Graham in 2780. Even the Clans (Hell's Horses notwithstanding), who retained the technology through the Succession Wars, viewed it as prohibitively expensive and complex, all but sidelining the technology in the centuries since the Star League's collapse.

CONSTRUCTION RULES

Vehicular Dropchute (VDC)/Battle Armor DropChute (BADC): Only battle armor, 'Mechs, ProtoMechs and Vehicles with a Wheeled, Tracked, Hover or WiGE motive system may use a VDC. Naval vehicles and vehicles with VTOL, Fixed-Wing, Airship, Satellite or Rail motive types may not employ VDCs. No unit weighing more than 100 tons may use a VDC. Only battle armor and exoskeleton units may use a BADC.

Unless the VDC is reusable, this item occupies no tonnage or critical space within the unit. Instead, it is treated as unprotected cargo for movement and combat purposes (see pp. 260-261, *TW*), except that this cargo is considered strapped to the unit's back, may not be hit except for hits to the unit's rear arc, and leaves any arms or turrets free to act normally. Non-reusable BADCs have no impact in game play.

Reusable VDCs—available to all appropriate units—can only be mounted in a vehicle's rear location, any of a 'Mech's three torso locations or in a ProtoMech's body (taking up a weapon slot). Reusable VDCs add half a ton to their base weight for the retraction and stowing systems, with the total tonnage of the equipment rounded up to the nearest half ton for construction purposes. Reusable BADCs must be located in a battle armor suit's body location.

Vehicular Jump Jets: Vehicular jump jets weigh the same as standard jump jets do on a BattleMech of equivalent weight (see p. 51, *TM*), but occupy only one equipment slot (in the vehicle's body). Because the steering thruster nozzles for such jets must be mounted on the sides of the vehicle, a unit equipped with vehicular jump jets may not mount sponson turrets (above).

Only vehicles with hover, wheeled, tracked, or Wing-in-Ground Effect (WiGE) motive types may mount vehicular jump jets. Each jump jet provides 1 Jump MP. As with standard BattleMech jump jets, a vehicle may not mount more vehicular jump jets than it has Cruise MP. Vehicles do not require heat sinks to mount vehicular jump jets.

Void-Signature System: The Void-Signature System must be combined with one or more ECM suites. The system itself does not weigh a significant amount, but occupies 1 critical slot in each of the BattleMech's locations except the head (that is, one slot each in the right and left arm, or front legs on a four-legged 'Mech, and the right and left leg, and one in the each of the left, right and center torsos, for a total of 7 critical slots).

A 'Mech with this system may not mount an advanced targeting computer or C^3 system, Stealth armor, the Chameleon light polarization shield or a Null-Signature System.

The Void-Signature System cannot be installed on an OmniMech via OmniPods.

VEHICULAR DROPCHUTE (VDC)/BATTLE ARMOR DROPCHUTE (BADC)

Rules Level: Advanced
Available To: BA, PM, BM, IM, CV, SV
Tech Base (Ratings): Both (Variable)
Game Rules: Applicable units using VDCs (or BADCs) during a combat drop (instead of Jump Packs or integral jump jets) follow all the standard rules for a combat drop (see pp. 20-24, *SO*), with the following exceptions:

- VDC/BADC drops may only be attempted over planets with an atmospheric pressure of Thin or higher. VDC/BADC drops cannot be attempted in Very Thin or Vacuum atmosphere.
- VDC/BADC drops by manned units apply an additional +1 modifier to the Piloting Skill Roll upon landing; this modifier rises to +3 if the unit is unmanned (or out of control due to engine shutdown, gyro destruction or pilot incapacitation). Any modifiers for weather conditions in the landing zone are doubled as well.
- While dropping, hostile aerospace units may apply a –2 to-hit modifier (–1 if the unit is using a Stealth VDC/BADC) to attacks against unit's chute (not the unit itself). However, each hit to a VDC or BADC delivers only 1 point of damage (Cluster weapons treat each point cluster as a separate hit). If the target is BADC-deployed battle armor, the attacking unit must roll to see which trooper's chute is hit, as damage to their chutes must be tracked separately.
- If the VDC sustains 15 points of damage or more (BADCs can sustain only 5 points of damage per trooper), or is detached by the controlling unit (requiring a successful Piloting Skill Roll during the Movement Phase), the dropping unit plunges to the ground and is destroyed unless it has jump jets to control its fall (in which case, standard *Dropping Troops* rules apply).

In addition, units deployed by Camouflage or Stealth VDCs or BADCs prior to the start of play may use the chutes to begin play as hidden units. A unit with a functioning active probe will only detect a unit hidden by a Stealth chute if the probe unit enters a hex adjacent to the hidden unit.

Reusable VDCs and BADCs (an option in which the chutes may be retracted and stowed for later use) take 5 minutes (30 standard ground-scale turns) to stow, during which time the chute-equipped unit may not move (but may make attacks normally). Attacks against a Reusable chute in the process of being stowed receive the –4 immobile target modifier, and inflict damage against the chute in the same manner as noted above for aerospace attacks on a deployed VDC or BADC.

VEHICULAR JUMP JETS

Rules Level: Experimental
Available To: CV, SV
Tech Base (Ratings): Both (E/E-X-F)
Game Rules: A vehicle equipped with Vehicular Jump Jets (and a functioning engine) can use Jumping MP in the same manner as suitably equipped BattleMech, with these exceptions:

- Every time the vehicle jumps, the controlling player must roll on the Motive System Damage Table (see p. 193, *TW*) to see what—if any—motive damage occurs upon landing. This roll disregards the standard modifiers for attack direction, however, and replaces the vehicle type modifiers with the following: +2 for Tracked vehicles, +1 for Wheeled vehicles, –1 for hovercraft, and –2 for WiGE vehicles. An additional +1 is applied if the vehicle jumps into Rough, Woods, or Jungle terrain of any kind. If using the *Vehicle Effectiveness* rules (see p. 105, *TO: AR*), ignore the requirement to reduce all Vehicle Type Modifiers by 1.
- Jump-capable vehicles may not jump into any terrain restricted by their motive type, nor may such vehicles execute a Death from Above attack.
- Jump-capable vehicles designated as tractors or trailers may not use Jump MPs while attached to other vehicles.
- Jump-capable WiGEs may only fire their jump jets while airborne, and not on a turn when taking off or landing. When jumping, a WiGE may rise in elevations like any other jumping unit, but will always return to a WiGE's standard one elevation above the underlying terrain at the end of the Movement Phase.

VOID-SIGNATURE SYSTEM

R&D Start Date: 3060 (Word of Blake)
Prototype Design and Production: 3070 (Word of Blake)

An evolution of the Chameleon light polarization shield and the null-signature system, the Word of Blake's experimental void-signature system ties into a unit's sensors and uses a large-scale variation on mimetic armor technology to render a BattleMech virtually invisible.

VOID-SIGNATURE SYSTEM

Rules Level: Experimental
Available To: BM
Tech Base (Ratings): Inner Sphere (E/X-X-E)
Game Rules: A player may turn the Void-Signature System on or off during the End Phase of any turn. A 'Mech may also start the game with the system already engaged. While a Void-Signature System is active, the effect is similar to Mimetic battlesuit armor (see p. 228, *TW*), with the following changes:

- The to-hit penalties for attacks against a BattleMech using a Void-Signature System are based on the number of hexes the 'Mech moved during the Movement Phase. For 0 hexes moved, the to-hit modifier is +3; for 1 to 2 hexes, +2; and for 3 to 5 hexes, +1. If the 'Mech moved 6 hexes or more, no modifier applies. Reduce these modifiers by 1 (to a minimum of 0) if the attacking unit is conventional infantry.
- Only a Bloodhound probe (see p. 90) can penetrate the Void-Signature System's masking effect. The Watchdog system, Beagle Active Probe and their Clan equivalents may not detect a hidden unit using a Void-Signature System.
- A critical hit to any of the Void-Signature System's critical slots will destroy the entire system, as will the loss of all ECM suites mounted on the unit.
- While active, the Void-Signature System generates 10 points of heat per turn, and imposes a +1 to-hit modifier on all weapon attacks made by the controlling unit.
- When the Void-Signature System is engaged, any ECM on the unit has no effect, other than to make the Void-Signature System functional.

A Void-Signature System is considered to be a Null-Signature System (see p. 148) for all game effects in any turn that infantry are carried using the mechanized battle armor rules (see p. 226, *TW*).

VTOL JET BOOSTER

Introduced: 3009 (Federated Suns), 2839 (Clan Hell's Horses)

Though the technology is centuries old, VTOL jet boosters—like superchargers—remained an uncommon enhancement for VTOL aircraft, discouraged by manufacturers for the immense stress they created to airframes and rotor assemblies. In more recent times, however, Davion engineers at Cal-Boeing Industries of Dorwinion perfected a means to produce VTOL jet boosters that lessen the stress on the craft. Still, very few manufacturers offer or encourage this option because of the control issues that arise from the speed boost.

VTOL JET BOOSTER

Rules Level: Experimental
Available To: CV
Tech Base (Ratings): Both (D/X-F-E)
Game Rules: The VTOL Jet Booster enables a VTOL vehicle to move at twice its standard Cruising MP as an enhanced Flanking speed. When engaged (during the unit's Movement Phase), jet boosters do not require an activation roll, but they do add a +3 target number modifier to any Piloting Skill Rolls needed to avoid a sideslip (see pp. 67-68, *TW*). Also, while using jet boosters, a VTOL may not attempt any advanced maneuvers, such as intentional sideslips.

VTOL MAST MOUNT

Introduced: Pre-spaceflight

Used as a means of enhancing the sensor capabilities on scout copters, a mast mount is effectively a sensor extension that rides on a mast extending up from the VTOL's rotor shaft. This extension allows VTOLs to hover just below an obstruction and "peek" over it, minimizing their exposure to enemy fire. While uncommon due to the mass they take up in the often-cramped chassis of modern VTOL designs, mast mounts still appear from time to time on reconnaissance units.

VTOL MAST MOUNT

Rules Level: Advanced
Available To: CV, SV
Tech Base (Ratings): Both (C/F-F-F)
Game Rules: A VTOL with a Mast Mount treats any onboard sensors (including active probes and C^3 systems, but not including weapon-like items, such as TAG) as if they are located 1 elevation above the VTOL's current position. This enables the VTOL to act as a spotter for C^3, artillery, or indirect fire by other units, or even for itself (if using the Mast to spot for itself, treat the Mast as a separate, non-firing unit doing the spotting; apply the unit's movement modifier once, and then add the Indirect modifier). This applies even if the unit with the Mast Mount is hovering just behind the highest level of a hill, building or other obstruction that would otherwise block its line of sight. The Mast Mount does not enable direct-fire over or through cover.

Any damage that hits the VTOL's rotors automatically destroys the Mast Mount and any sensors mounted in it.

CONSTRUCTION RULES

VTOL Jet Booster: The VTOL Jet Booster may only be mounted on non fixed-wing VTOL Combat Vehicles, and is placed in the unit's body. The booster weighs 10 percent of the VTOL's engine weight (rounded up to the nearest half-ton), and takes up one item slot. A VTOL may mount only 1 jet booster. Jet boosters may not be pod-mounted on OmniVehicles.

VTOL Mast Mount: The Mast Mount is available only to VTOL Combat and Support Vehicles. A VTOL unit may carry only one Mast Mount. Items of the Types E and CE may be placed in a Mast Mount, with the following exceptions: no TAG systems of any kind are allowed, while C^3 systems are limited to slave units and C^3i. The Mast Mount is not a location of its own: it and any items it contains are treated as being in the Rotor location.

Xenoplanetary Condition-Trained Troops: To create a conventional infantry unit as Xenoplanetary Condition-Trained (XCT) Troops, the unit must select one of the appropriate Infantry Armor types (see *Infantry Armor,* p. 129) for the environment. XCT Troops may be created for Extreme Temperatures, Hazardous Liquids, Vacuum, Trace Atmospheres, and Toxic or Tainted environments.

Extreme Temperatures (Cold): XCT Troops equipped for extreme cold must use Snowsuit, Environment Suit (Hostile or Marine), or Spacesuit (any) armor types.

Extreme Temperatures (Hot): XCT Troops equipped for extreme heat must use Cooling Suit (any type), Environment Suit (Hostile or Marine), Heatsuit, or Spacesuit (any) armor types.

Hazardous Liquid Environments: XCT Troops equipped for hazardous liquids must use Environment Suit (Any), or Engineering Suit armor types.

Vacuum/Trace Atmospheres: XCT Troops equipped for vacuum or trace atmosphere levels must use Environment Suit (Hostile or Marine), or Spacesuit (any) armor types.

Toxic/Tainted Atmospheres: XCT Troops equipped for toxic or tainted atmosphere conditions must use Environment Suit (Hostile or Marine), or Spacesuit (any) armor types. If the atmosphere is Tainted, but not Toxic, Light Environment Suits may be used instead.

XCT Troops may not be designed as Beast-Mounted or Mechanized (VTOL) infantry if they are to operate in vacuum or trace atmospheres.

Additional construction rules for the required armor types may be found under *Infantry Armor* (see p. 129).

XENOPLANETARY CONDITION-TRAINED TROOPS

Introduced: Early spaceflight

The wide range of hazardous environments that humans have chosen to live and work in has spawned the development of a special form of combat gear and training specifically tailored to operations within the hazardous environments of non-terrestrial worlds (and often not even on a planetary body at all).

While many special forces receive such specialized training, the most famous troops bearing this title are the five thousand-man volunteer force of the Taurian Concordat's Special Asteroid Support Forces, deployed on zero-G assault platforms stationed throughout the Hyades Cluster's vast asteroid field.

Occasionally referred to more simply as "Hazardous Environment" troops, these specialist forces are more formally referred to as Xenoplanetary Condition-Trained troops, or XCT Troops for short.

XENOPLANETARY CONDITION-TRAINED (XCT) TROOPS

Rules Level: Advanced
Available To: CI
Tech Base (Ratings): Both (Variable)
Game Rules: Conventional Infantry with the appropriate hazardous environment equipment (see the Xenoplanetary Condition-Trained Troops Construction rules, p. 162) may operate in environments where conventional infantry might otherwise be disallowed. All XCT Troops in a given conventional infantry unit must be similarly outfitted to gain this effect, which is cumulative with any infantry armor benefits their hazardous environment gear may apply (see *Infantry Armor,* p. 129). Without the appropriate XCT equipment, infantry may not function in hazardous environments.

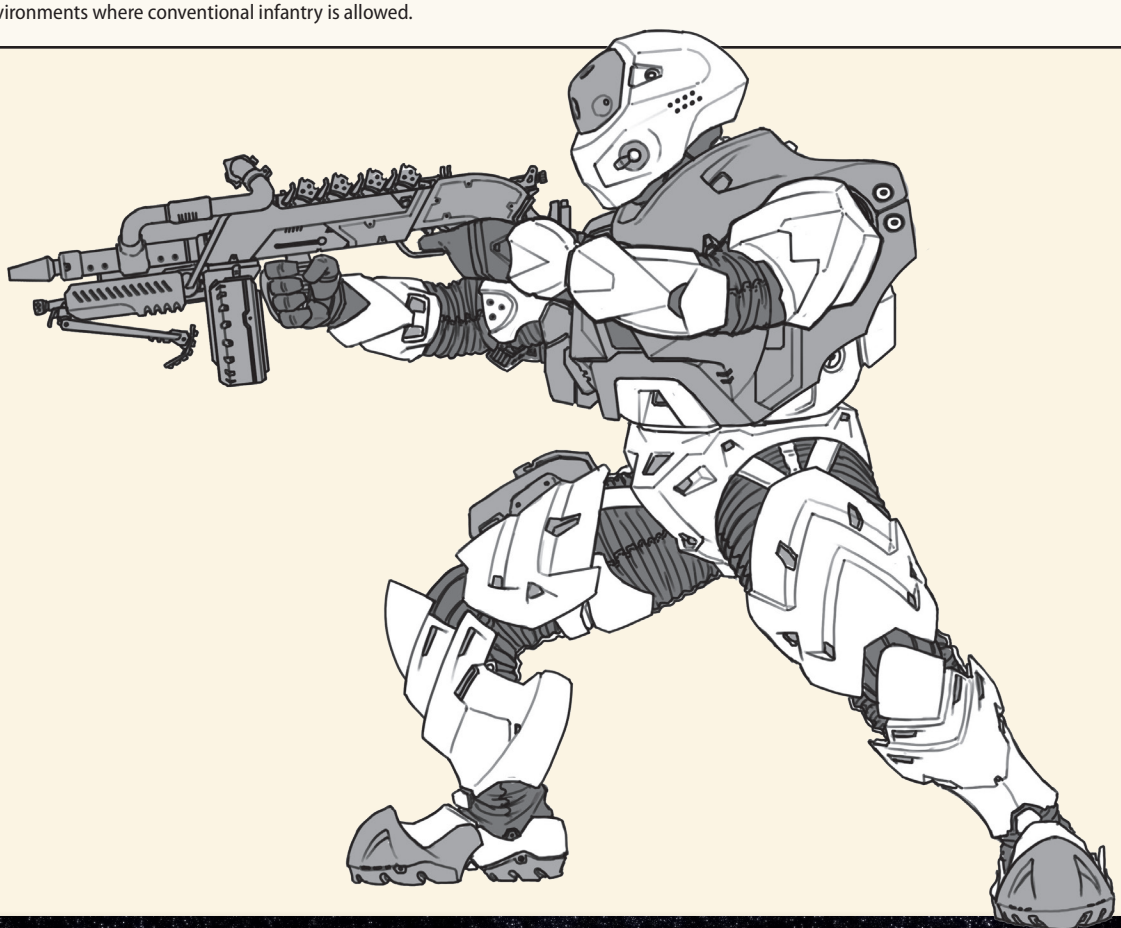
In addition, specific types of XCT Troops may receive added effects, based on the environment in question, as follows (this information is also detailed in the *Planetary Conditions* section; see p. 26, *TO: AR*):

Extreme Temperatures: XCT Troops appropriately equipped for extreme temperatures are unaffected by movement limitations imposed by such conditions.

Hazardous Liquid Pools: XCT troops appropriately equipped for Hazardous Liquids divide any damage caused by hazardous liquid pools (see p. 47, *TO: AR*) by 3, rounding down the result to a minimum of 1.

Vacuum, Trace, Tainted, or Toxic Atmosphere: XCT troops appropriately equipped for Vacuum and Trace Atmospheres double all damage sustained in such environments, reflecting otherwise non-lethal damage magnified by suit breaches.

Note that certain Infantry Armor types designed for hazardous environments may modify damage values and such, per Infantry Armor, page 129. XCT Troops outfitted for one environment or condition may not be deployed in another hazardous environment type, but may be deployed in other environments where conventional infantry is allowed.



ALTERNATIVE MUNITIONS

Expanding on the utility of many existing weapon systems, alternative munitions have offered field commanders a broad range of battlefield flexibility since before the days of the OmniMech. Even so, it took the wake of the Clan invasion to inspire a greater variety of alternative munitions, including specialized rounds for autocannons, artillery, fighter bombs, fluid guns, grenade launchers, missile launchers and mortars.

AUTOCANNON MUNITIONS

While standard rounds and specialty ammunition such as flechette and armor-piercing shells have gained in popularity among standard and light autocannon users, a number of other special-purpose munitions exist as well. Indeed, the likes of anti-aircraft flak and tracer ammunition have existed for centuries before the Federated Suns perfected their modern forms of precision and armor-piercing rounds.

AUTOCANNON MUNITIONS

Game Rules (General): Unless otherwise noted, all of the specialty munitions described here may only be employed by standard and light autocannons, and may only be carried by units able to mount such weapons. All specialty ammunition must be purchased in full-ton lots.

If a weapon uses specialty ammunition of any type, the appropriate ammo slot must be declared prior to the start of game play. If no specialty munitions are noted for a given autocannon, the weapon is presumed to be firing standard ammo.

CASELESS AUTOCANNON AMMO

R&D Start Date: 3055 (Federated Commonwealth)
Prototype Design and Production: 3056 (Federated Commonwealth)

In an effort to extend the field life of autocannons in battle—especially at the heavier grades, where the shots-per-ton ratios grow extremely restrictive—FedCom engineers considered a large-scale adaptation of caseless ammunition technology, in which the shell's primer and powder is replaced with a solid propellant that also acts as a "case" for the round. The result—a lighter shell—allowed for more firing rounds per ton than normal autocannons could boast, but forced designers to briefly explore an alternative weapon to handle the munitions. By 3057, they had found a workaround that enabled standard ACs to fire caseless ammunition, but little could be done about the inherent risk of a critical misfeed when firing such rounds.

CASELESS AUTOCANNON AMMO

Rules Level: Experimental
Tech Base (Ratings): Inner Sphere (D/X-X-E)
Game Rules: Caseless ammunition provides an autocannon with twice the number of shots per ton as an equivalent standard ammo bin. When fired, caseless ammo generates the same heat, reaches the same ranges and delivers the same damage as a standard AC round.

However, on a to-hit roll result of 2 by an autocannon using Caseless AC rounds, the ammo feed breaks down, rendering the weapon useless for the remainder of the scenario. In addition, the shot automatically misses and the controlling player must immediately roll once on the Determining Critical Hits Table, applying all critical hits to the affected autocannon (starting with the uppermost undamaged slot). (Non-'Mech/Non-Support Vehicle units that suffer this effect treat the weapon as if it had suffered a Weapon Destroyed critical hit.) This damage reflects a destructive misfeed, rather than an ammunition explosion per se, and MechWarrior or pilot damage will not occur as a result.

Finally, because the feed mechanisms for caseless ammo replace those of standard autocannons, a weapon designated as firing caseless ammo cannot draw from any other alternative ammunition types, even if they would otherwise be compatible with the autocannon.

FLAK AUTOCANNON AMMO

Introduced: circa 2310 (Terran Alliance)

Despite having been a proven technology in ages past, flak autocannon ammunition remains uncommon today. Intended to deal with airborne combatants such as VTOLs and fighters, this ammunition uses proximity charges to detonate in mid-air. While potent against fast-moving targets susceptible to foreign object damage (FOD), flak ammo is less effective against slower-moving targets on the ground because the charges scatter their shrapnel too far and too quickly to benefit from the target's mobility.

FLAK AUTOCANNON AMMO

Rules Level: Advanced
Tech Base (Ratings): Both (C/D-F-E)
Game Rules: Flak ammunition provides an autocannon with the same number of shots per ton as an equivalent standard ammo bin. When fired, flak ammo generates the same heat and damage and reaches the same ranges as a standard AC round, but is treated as a cluster (ballistic) weapon that deals its damage in 5-point clusters. Against eligible targets, it counts as a Flak attack (see p. 114, *TW*). An autocannon firing flak ammunition cannot make aimed shots and cannot benefit from a targeting computer.

TRACER AUTOCANNON AMMO

Introduced: circa 2310 (Terran Alliance)

Once a favored ammunition type used to help coordinate massed fire in nighttime conditions, self-illuminating "tracer" rounds sacrificed a small amount of hitting power in favor of target-illuminating shots that were carefully interspersed throughout each burst of weapon fire. Centuries of preference for cheap, maximized damage potential led to the evaporation of tracer ammo from most autocannons, to the point where modern ACs may spit out one tracer (if any) for every 50 bursts fired.

TRACER AUTOCANNON AMMO

Rules Level: Advanced
Tech Base (Ratings): Both (B/D-E-F)
Game Rules: Tracer ammunition provides an autocannon with the same number of shots per ton as an equivalent standard ammo bin. When fired, tracer ammo generates the same heat, and reaches the same ranges as a standard AC round, but inflicts 1 point less damage per shot (to a minimum of 1 point). Autocannons firing tracer ammo reduce their to-hit modifiers for night combat to +1 (rather than +2) and eliminate any dusk/dawn modifiers.

ARTILLERY MUNITIONS

With the renaissance of Star League technology during the past couple of decades, many militaries have developed numerous variant rounds for the once sporadically used artillery pieces scattered around the Inner Sphere. Though the Arrow IV artillery missile has proven a favorite weapon for such enhancements, conventional tube artillery have also benefited from recent attention.

ARTILLERY MUNITIONS

Game Rules (General): Each of the munitions described here will identify which standard artillery weapons and/or Arrow IV artillery missile launchers may employ such specialty ammo in game play. Artillery cannons may not fire any of these specialty rounds. All specialty artillery ammunition must be purchased in full-ton lots.

If a weapon uses specialty munitions of any type, the appropriate ammo slot must be declared prior to the start of game play. If no specialty munitions are noted for a given artillery system, the weapon is presumed to be firing its standard "high-explosive" rounds (or, in the case of Arrow IV artillery missile launchers, homing missile rounds).

AIR-DEFENSE ARROW (ADA) MISSILES

R&D Start Date: 3066 (Capellan Confederation)
Prototype Design and Production: 3068 (Capellan Confederation)

Air-defense arrow (ADA) missiles were field-tested by the Capellan Confederation to defend against Duke Hasek's aerospace forces during Operation Sovereign Justice, and since have seen action against the Word of Blake as well. So far, however, only Death Commando units have been observed using this experimental missile with their Arrow IV launchers.

AIR-DEFENSE ARROW (ADA) MISSILES

Rules Level: Experimental
Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: Only ground- or naval-based units (including both surface vehicles and submarines) may fire ADA Missiles from any on-board Arrow IV artillery missile launchers. Aerospace units and airborne units (including VTOL vehicles and Airship, Fixed-Wing or Satellite Support Vehicles) may not use ADA Missiles.

An Arrow IV launcher using ADA Missiles may make a ground-to-air attack against any airborne unit within 2 hexes of the attacker on the Low Altitude Map (or 2 ground mapsheets), unless the target is higher than 8 Altitude (2,000 meters; see pp. 80-81, *TW* for information on Low-Altitude Movement). ADA Missiles follow the rules for a standard flak attack (see p. 114, *TW*), but replace the relevant range modifiers as follows: If the aerospace unit is operating in the same low-altitude hex/over the same ground mapsheet as the firing unit, the attack is considered to be at short range; if the target is 1 low-altitude hex/1 ground mapsheet away from the launching unit, a medium-range modifier applies; at 2 low-altitude hexes/ground-scale mapsheets away, the attack is considered to be long range. (Remember that a ground mapsheet is equal to 17 hexes in distance.)

A unit making a ground-to-air attack using ADA Missiles may make no other attacks in the same turn against secondary targets on the ground.

ARROW IV HOMING MISSILES

Prototype Design and Production: 2593 (Terran Hegemony)
Introduced: 2600 (Terran Hegemony)
Extinct: 2830 (Inner Sphere)
Recovered: 3045 (Capellan Confederation)

The Arrow IV homing missile is, in essence, an enhanced laser-guided variation on the standard Arrow IV missile. Originally designed for the first Star League as an ECM-proof precision artillery weapon, the Arrow IV works in conjunction with target acquisition gear (TAG) to home in on targeted units using the missile's own passive internal sensors, and then deliver a devastating attack. During the Star League era, homing missiles were the munition of choice for the Arrow IV.

ARROW IV HOMING MISSILES

Rules Level: Advanced
Tech Base (Ratings): Both (E/E-F-E)
Game Rules: Only units carrying an Arrow IV artillery missile launcher may carry Arrow IV Homing Missiles.

An attack using an Arrow IV Homing Missile is treated as standard artillery weapon attack (see p. 147, *TO: AR*), with the following exceptions:

- When firing an Arrow IV Homing Missile either directly or indirectly, the firer must first choose a mapsheet within range of the launcher. Next they choose any hex on that mapsheet (LOS is not required, but if fired directly, direct-fire minimum range limitations still apply).
- On the turn the homing missile arrives, it may attack any unit successfully designated by friendly TAG within 8 hexes of the chosen hex. If there are multiple such units, the firer chooses which to attack. If there are no such targets when the missile arrives, it explodes harmlessly over the battlefield. (Undirected or misdirected missiles do not scatter.)
- The firer then rolls 2D6. On a result of 4+, the missile strikes the target. This is treated as a hit from a Direct-Fire Ballistic weapon, resolved against the unit's facing relative to the unit that fired the missile. An additional 5 points of artillery damage applies to all other units in the target's hex (treated as an area-effect weapon, if these other units include infantry). If the missile's 2D6 roll is 3 or less, however, the missile hits the hex occupied by the designated target, and inflicts 5 points of area-effect damage to all units in the target's hex (including the target).
- A friendly TAG may designate targets for any number of Arrow IV Homing Missiles per round, with only one to-hit roll required to designate the target. However, a TAG-equipped unit may not designate multiple targets in a turn, even if it is equipped with multiple TAG. If an on-board Arrow IV launcher using homing missiles also mounts TAG, the unit may designate a target and fire its homing missiles against it in the same turn.
- Alternatively, a homing missile may simply be fired, directly or indirectly, at a single hex without a TAG-designated target. If fired in this fashion, the attack only deals 5 damage to all units in the hex struck. If such an attack misses the target hex, it scatters as would a normal, non-guided artillery attack.
- A target struck by an iNarc Nemesis pod (see p. 142, *TW*) attracts friendly Arrow IV homing missiles. If a Nemesis-tagged 'Mech is in a hex adjacent to the intended target of a homing missile in the turn the homing missile arrives, roll 1D6. On a result of 1–3, the attack hits the Nemesis-tagged target. On a result of 4–6, the attack is resolved against the intended target. If there are multiple adjacent Nemesis-tagged targets, there is an equal chance the homing missile will strike any of them if it does not strike the intended target.

CLUSTER ARTILLERY/ARROW MISSILES

Introduced: Pre-spaceflight ([Artillery]), 2620 (Terran Hegemony [Arrow])
Extinct: 2830 (Inner Sphere [Arrow])
Recovered: 3047 (Capellan Confederation [Arrow])

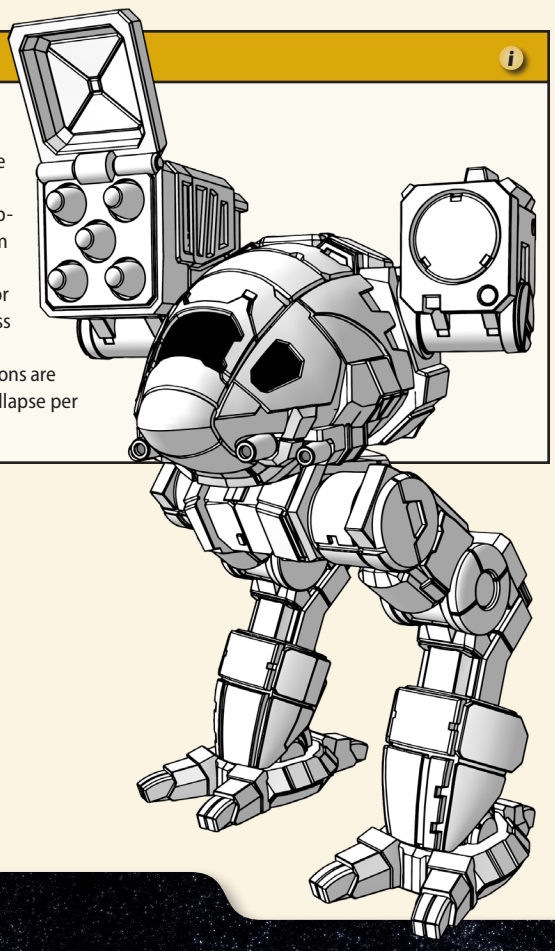
Cluster artillery (and its Arrow IV missile variant) is a variation on standard artillery shells and non-homing missiles, which deliver a low-altitude air-burst designed to rain miniature bomblets. This delivery approach enables an attacker to hit targets that have taken refuge within built-up terrain, such as trenches and fieldworks.

CLUSTER ARTILLERY/ARROW MISSILES

Rules Level: Advanced
Tech Base (Ratings): Both (E/E-F-E)
Game Rules: Cluster Artillery rounds are available only for the Arrow IV artillery missile launcher and the Long Tom, Thumper, and Sniper artillery pieces.

Cluster Artillery munitions function as standard artillery in game play, with all appropriate modifiers and rules applied, including scatter effects. However, damage from Cluster Artillery or Cluster Arrow missiles is applied differently, as follows:

- Against any infantry unit not inside a building, damage from Cluster Artillery or Cluster Arrow munitions is applied as though the unit is in open terrain, regardless of the actual terrain or the construction of fieldworks and trenches.
- Units within a building in a hex struck by Cluster Artillery or Cluster Arrow munitions are protected from damage (though the buildings themselves are not, and may collapse per normal rules).



COPPERHEAD ARTILLERY

Introduced: 2645 (Terran Hegemony)
Extinct: 2825 (Inner Sphere)
Recovered: 3051 (Capellan Confederation)

A sophisticated alternative to standard artillery rounds, Copperhead munitions are effectively a tube artillery adaptation of the Arrow IV homing missile. Rare even during the Star League period, simply because the Arrow IV launch system was much more portable, Copperheads made a return in the Inner Sphere when Capellan weapons designers sought an alternative means of delivering Arrow IV homing rounds beyond laser-guided bombs and their still-limited supply of Arrow launchers.

COPPERHEAD ARTILLERY

Rules Level: Advanced
Tech Base (Ratings): Both (E/E-F-F)
Game Rules: Copperhead Artillery rounds are available for the Long Tom, Thumper, and Sniper artillery pieces only.

Copperhead Artillery munitions function as Arrow IV homing missiles (see p. 166), with all appropriate modifiers and rules applied. The base damage values for Copperhead rounds are listed in the Artillery Ordnance Table (see p. 152, *TO: AR*).

FLECHETTE ARTILLERY

Introduced: Pre-spaceflight

Flechette artillery shells are designed for maximum anti-infantry work. Proximity-fused to detonate just before impact, these shells shower a wide area with dart-like metal flechettes that do little damage to armored units, but can kill or incapacitate a large number of conventional infantry. Use of this artillery munition was banned in the Star League era, but many nations have returned to using these deadly shells in modern times.

FLECHETTE ARTILLERY

Rules Level: Advanced
Tech Base (Ratings): Both (E/F-F-E)
Game Rules: Only units carrying a Sniper, Thumper, or Long Tom artillery piece may carry Flechette Artillery rounds.

Flechette Artillery rounds function as standard artillery weapons in game play, with all appropriate modifiers and rules applied, including scatter effects. However, Flechette ammunition uses the following rules upon a successful attack:

- Flechette shells inflict no armor damage against any armored unit with a BAR of 5 or higher (including battle armor, 'Mechs, ProtoMechs, most vehicles, aerospace units and Mobile Structures). However, for all vehicles with a Wheeled or Hover motive system within a Flechette round's area of effect, the Attacker must make a roll on the appropriate vehicle's Motive System Damage Table (see p. 193, *TW*).
- Against Light, Medium or Heavy buildings, internal structure, and Support Vehicles with a BAR of 4 or less, Long Tom-fired Flechette Artillery rounds inflict 5 points of damage for every point of BAR below 5, a Sniper-fired Flechette round inflicts 3 points of damage per point of BAR below 5, while a Thumper-fired Flechette round inflicts 1 point of damage per point of BAR below 5. (For example, a unit with a BAR of 4 suffers 3 points of damage from a Sniper Flechette round [(5 – 4 = 1) x 3 = 3 points], while a unit with a BAR of 2 suffers 15 from a Long Tom's Flechette round [(5 – 2 = 3) x 5 = 15 points].) This damage is applied to the unit in 5-point clusters as standard artillery damage (see p. 150, *TO: AR*).
- Against conventional infantry, each flechette artillery shell deals double its standard damage. Per the Area-Effect Weapon rules (see p. 113, *TW*) this base damage is further doubled against conventional infantry units, and doubled again if such units are located in clear terrain. For example, a Long Tom flechette round landing in the same hex as a conventional infantry unit would deal 25 × 2 × 2) 100 damage. This would be doubled again, to 200 damage, if the unit was in clear terrain.

ILLUMINATION ARTILLERY/ARROW MISSILES

Introduced: Pre-spaceflight ([Artillery]), 2621 (Terran Hegemony [Arrow])
Extinct: 2831 (Inner Sphere [Arrow])
Recovered: 3047 (Capellan Confederation)

Artillery illumination rounds (and their Arrow-launched cousins) effectively deliver a cluster of high-intensity flares suspended by miniature parachutes over a target area. Used to reveal and mark enemy positions during night or near-night combat, use of these rounds is relatively common in modern warfare.

ILLUMINATION ARTILLERY/ARROW MISSILES

Rules Level: Advanced
Tech Base (Ratings): Both (C/D-D-D)
Game Rules: Illumination rounds are available only for the Long Tom, Thumper, and Sniper artillery pieces and the Arrow IV missile launcher.

All Illumination rounds (including the Arrow IV missile version) function like standard non-homing artillery munitions (see p. 166), with all appropriate modifiers and rules applied. However, instead of inflicting damage, Illumination rounds negate any nighttime, dusk or dawn to-hit modifiers against units within their area of effect (see the Artillery Ordnance Table, p. 152, *TO: AR*). Regardless of artillery type, the illumination begins in the turn the round/missile arrives on the playing area and last five turns. If Wind Conditions are in use, treat the illumination round as smoke (see *Drift*, p. 45, *TO: AR*); add an additional 1 hex for each Wind Strength above Storm.

LASER-INHIBITING (LI) ARROW MISSILES

R&D Start Date: 3052 (Federated Commonwealth)
Prototype Design and Production: 3053 (Federated Commonwealth)

An experimental weapon first conceived at the peak of the Clan invasion, this NAIS-inspired specialty Arrow IV ammunition was discarded for its limited usefulness (as well as a series of problems with the weapon development program and the scientists assigned to it). This missile releases a special chemical "fog" that scatters laser energy, but proved ineffective against particle weapons, ballistics, flamers and missiles.

LASER-INHIBITING (LI) ARROW MISSILES

Rules Level: Experimental
Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: Only units carrying an Arrow IV artillery missile launcher may carry Laser-Inhibiting Arrow IV Missiles.

Laser-Inhibiting Arrow IV rounds are delivered in the same fashion as conventional artillery (see p. 147, *TO: AR*), with the following differences:

- Rather than delivering damage, LI Arrow Missiles fill the target hex and the six surrounding hexes with a specialized smoke round (treated as Light Smoke; see p. 45, *TO: AR*) that rises 2 levels above the underlying terrain (or surface level, if the target is a water hex) and lasts until the End Phase of the turn following the weapon's attack.
- Any attack by all laser weapons that passes through a Laser-Inhibiting smoke hex reduces its damage by 2 points per hex of "interference" (to a minimum of 0).

INFERNO-IV MISSILES

Introduced: 3055 (Capellan Confederation)

Based on the recovered "Thunder" FASCAM concept, the Capellan Confederation explored alternative minefield munitions in their own applications, eventually leading to the development of active and vibrabomb FASCAM rounds via Arrow IV launchers. Before this, however, they introduced the half-successful Inferno-IV missile system. Initially planned to deploy their newly invented Inferno mines, the more volatile mines tended instead to ignite on impact, producing instant, widespread fires.

INFERNO-IV MISSILES

Rules Level: Advanced
Tech Base (Ratings): Inner Sphere (C/X-X-D)
Game Rules: Only units carrying an Arrow IV artillery missile launcher may carry Inferno-IV Missiles.

Inferno-IV Arrow rounds are delivered in the same fashion as conventional artillery (see p. 147, *TO: AR*), with the following differences:

- Rather than delivering damage directly, Inferno-IV Missiles fill the target hex and all adjacent hexes with fire. In addition, units within a hex when it is struck by an Inferno-IV round suffer the effects of being hit by 5 Inferno missiles (see p. 141, TW; for battle armor this damage is applied to the squad as a whole, rather than per suit). Units passing through a hex ignited by Inferno-IV Missiles suffer effects as described under the standard fire rules (see pp. 41-43, *TO: AR*).
- Hexes struck by Inferno-IV Missiles continue to burn (and generate smoke, see p. 43, *TO: AR*) for the remainder of a scenario, unless doused by an appropriate anti-flame system (such as sprayers and fluid guns loaded with using water, coolant or flame-retardant ammo).
- Heat-tracking units carrying Inferno-IV munitions are susceptible to Inferno ammunition explosions from overheating (see pp. 141-142, *TW*).
- When resolving an Inferno-IV attack on a hex with a unit carrying battle armor, the firing player rolls for five hit locations against that unit. Any battle armor riding in one of the locations hit is affected as though struck by a SRM Inferno round.

SMOKE ARTILLERY/ARROW MISSILES

Introduced: Pre-spaceflight ([Artillery]); circa 2620 (Terran Hegemony [Arrow])

Developed over a millennium ago, artillery-delivered smoke rounds have changed little since their inception, allowing armies to produce "mobile cover" that can be used to obscure their movements and activities during battle.

SMOKE ARTILLERY/ARROW MISSILES

Rules Level: Advanced
Tech Base (Ratings): Both (B/A-A-A)
Game Rules: Any conventional artillery weapon or the Arrow IV missile launcher may carry and fire Smoke rounds instead of their normal munitions.

Artillery Smoke rounds are unguided munitions, regardless of the artillery weapon type used to deliver them. They are fired per the normal artillery rules (see p. 147, *TO: AR*). Rather than inflicting damage, artillery Smoke rounds fill the target hex and all adjacent hexes with heavy smoke (see p. 45, *TO: AR*) that rises 2 levels above the underlying terrain.

Artillery smoke dissipates in the End Phase, three turns after it was created (e.g. smoke laid on Turn 1 dissipates in the End Phase of Turn 4).

THUNDER (FASCAM) ARTILLERY/ARROW MISSILES

Introduced: 2621 (Terran Hegemony)
Extinct: 2833 (Inner Sphere)
Recovered: 3051 (Capellan Confederation ["Thunder" FASCAM])
Introduced: 3065 (Capellan Confederation [Active and Vibrabomb-IV])

Initially developed by the Terran Hegemony and maintained by the Clans (though they only sporadically used them), field artillery scattering mine (FASCAM) "Thunder" munitions deploy conventional minefields via traditional indirect-fire delivery systems such as LRMs, standard artillery and Arrow IV artillery missiles. With the arrival of the Clans, Capellan weapon designers raced to revive this technology for their own use, and later moved beyond it to introduce active and vibrabomb-based FASCAM launchers in 3056.

THUNDER (FASCAM) ARTILLERY/ARROW MISSILES

Rules Level: Advanced
Tech Base (Ratings): Clan (C/X-D-D [FASCAM only]), Inner Sphere (C/E-X-E [FASCAM]; D/X-X-E [Active-IV, Vibrabomb-IV])
Game Rules: Only units carrying an Arrow IV artillery missile launcher may carry Thunder (FASCAM) Active-IV or Vibrabomb-IV Missiles. Only units carrying a conventional artillery weapons may carry artillery FASCAM shells.

FASCAM rounds of all types (including Active-IV and Vibrabomb-IV types) are delivered in the same fashion as conventional artillery (see p. 147, *TO: AR*), with the following differences:

- Rather than delivering damage, FASCAM rounds fill the target hex with mines (see p. 175, *TO: AR*). Units within a hex when it is struck by a FASCAM round may exit the hex without setting off the minefields they lay, but all other units entering or passing through a mined hex follow the standard rules for the appropriate minefield (see p. 175, *TO: AR*).
- Consult the Artillery Ordnance Table on page 152, *TO: AR*, for minefield densities by weapon type. These minefields cannot combine with other weapon-delivered minefields to increase their densities. The one exception is if such artillery-laid minefields are placed in a hex with a pre-designated minefield of the same type from the start of the game, in which case the minefield density can be up to 30-points (i.e. an Arrow IV-delivered minefield will never combine with any type of minefield as the 30-point density cannot be exceeded).
- Once deployed, minefields delivered by any appropriate weapon system function in accordance with their standard game rules (standard FASCAM mines use the standard (conventional) minefield rules; Active-IV mines use the active minefield rules; Vibrabomb-IV mines use the vibrabomb minefield rules).

BOMB MUNITIONS

The preferred method for air-to-ground attacks, bombs have always come in a wide variety of types and styles, allowing an airborne unit many different choices in how to attack an enemy formation. Lately, more external air-to-air ordnance has been making an appearance in the battlefield, allowing even smaller fighters a better chance against their heavier brethren.

BOMB MUNITIONS

Game Rules (General): Unless otherwise noted, only Conventional Fighters, Aerospace Fighters and flight-capable vehicles equipped with external bomb mounts (hardpoints) may carry any of the specialty ordnance described here. The same rules apply for carrying bombs.

Applicable units must designate their bomb types prior to the start of game play. If no specialty ordnance is noted for a given bomb, it is presumed to be a standard high-explosive bomb.

AIR-TO-AIR ARROW (AAA) MISSILES

Introduced: 3072 (Lyran Alliance, Clan Wolf [in-Exile])

Attempting to bolster their aerospace strength against Word of Blake and Jade Falcon invaders, the Lyran Alliance and Clan Wolf (in Exile) mutually developed a new externally mounted Arrow IV missile variant specifically designed to enable aerospace fighters to attack other airborne units.

AIR-TO-AIR ARROW (AAA) MISSILES

Rules Level: Advanced
Tech Base (Ratings): Both (E/X-X-F)
Game Rules: Air-to-Air Arrow missiles take up 5 bomb slots per missile when mounted on an external hardpoint (and are unavailable for use by standard Arrow IV launchers).

AAA Missiles may be used by aerospace units traveling at any altitude on the Low-Altitude Map, on any Row on the High-Altitude Map or the Space Map, and may attack any target except for infantry. If used against targets on the ground, such as when engaging in combat over the ground mapsheet (see p. 242, *TW*), AAA missiles suffer a +4 to-hit modifier, plus an additional +3 if fired at a ground target from below an Altitude of 4 (150 meters or less from the ground, per p. 82, *TW*). AAA Missiles may not cross the Space/Atmosphere Interface.

Unlike a standard bomb attack, AAA Missiles attack as a standard direct-fire weapon, and deliver their damage to a single hit location.

Anti-missile systems and other Point Defense weapons affect the AAA Missile as a capital missile (see p. 130, *TW*).

ANTI-SHIP (AS) MISSILES

R&D Start Date: 3069 (Federated Suns)
Prototype Design and Production: 3071 (Federated Suns)

A crash program devised by the Federated Suns with an ultimate goal of breaking naval blockades such as the Word's group over New Avalon, the anti-ship (AS) missile is another Arrow-style external ordnance based on the much smaller tandem-charge SRM. Fitted with extra boosters for enhanced acceleration and kinetic energy, the AS missile is designed to attain incredible velocities so as to achieve armor penetration as much through sheer kinetics as through the detonation of its dual warhead. Lacking a sophisticated guidance system, however, the missile's enhanced speed is as much a hindrance as a boon, making it far more effective against larger and more ponderous targets than smaller, nimbler ones.

ANTI-SHIP (AS) MISSILES

Rules Level: Experimental
Tech Base (Ratings): Inner Sphere (D/X-X-F)
Game Rules: Bulky, because of their booster engines, Anti-Ship Missiles take up 6 bomb slots per missile when mounted on an external hardpoint (and are unavailable for use by standard Arrow IV launchers).

Anti-Ship Missiles function in the same fashion as an Air-to-Air Arrow Missile (see p. 169), with the following exceptions:

- When an AS Missile delivers a successful attack, it inflicts 3 points of capital-scale damage (30 standard-scale damage) to the target's armor; in addition, the Attacker rolls for a penetrating critical hit as a Barracuda missile.
- AS Missiles suffer a +4 to-hit modifier against any unit lighter than 500 tons, and may not target ground units weighing 100 tons or less. Against targets 500 tons and up (or against buildings, Mobile Structures and terrain hexes), the AS Missile suffers no such modifier.
- AS Missiles may only be used by units traveling in space, on the High-Altitude Map, or at Altitude 3 or higher on the Low-Altitude Map.
- Anti-Ship Missiles are affected by Point Defense systems in the same manner as Capital Missiles.

ANTI-SHIP ELECTRONIC WARFARE (ASEW) MISSILES

R&D Start Date: 3065 (Lyran Alliance)
Prototype Design and Production: 3067 (Lyran Alliance)

With one of the smallest fleets of the Inner Sphere powers, Lyran weapon designers conceived of the anti-ship electronic warfare (ASEW) missile as a means of leveling the playing field against capital ships. Based on the screen launcher, prototypes of this experimental weapon were undergoing testing in the days prior to the Jihad. Though mainstream production never began, samples of this weapon system somehow fell into the hands of Alys Rousset-Marik's resistance movement in the Blakist controlled Free Worlds League, where they have been used to aid in raids against larger ships.

ANTI-SHIP ELECTRONIC WARFARE (ASEW) MISSILES

Rules Level: Advanced
Tech Base (Ratings): Inner Sphere (E/X-X-E)
Game Rules: ASEW Missiles take up 6 bomb slots per missile when mounted on an external hardpoint (and are unavailable for use by standard Arrow IV launchers).

ASEW Missiles function in the same fashion as an Air-to-Air Arrow Missile (see p. 169), with the following exceptions:

- When an ASEW Missile delivers a successful attack, it inflicts no damage to the target. Instead, it imposes a +4 modifier to all weapon attacks made by the target vessel by weapons whose arcs cover the hexside where the ASEW hit. In the event of a hit that falls on a line, the defender chooses which hexside is affected. (For example, if an ASEW hits a WarShip through the fore-left hexside, all fore-left and left broadside weapons suffer +4 modifiers, but the nose, aft-left, aft, and all right-side weapons remain unaffected.) These effects begin at the end of the Weapon Attack Phase and last until the End Phase of the turn after the attack.
- Any Naval C^3 or Naval Comm-Suite systems on a target unit struck by an ASEW Missile are rendered ineffective, and any attempt to jump will be delayed—but not aborted—while the electronic static clears. These effects last until the End Phase of the turn after the attack.
- ASEW Missiles suffer a +4 to-hit modifier against any unit lighter than 500 tons.
- ASEW Missiles suffer a +4 to-hit modifier against any unit lighter than 500 tons; such a unit suffers a +4 modifier to all weapons it has, as per above.

ARROW IV HOMING MISSILES (AIR-LAUNCHED VERSION)

Introduced: 2600 (Terran Hegemony)
Extinct: 2830 (Inner Sphere)
Recovered: 3047 (Capellan Confederation)

Originally devised as a companion to the conventional Arrow IV launcher-based missiles of the day, the air-launched rendition of the Arrow IV homing missile was recovered by Capellan weapon designers in 3047, to make up for the fact that their recovered launchers were still in short supply. Carried as external ordnance, the air-launched Arrow IV homing missile proved an elegant solution, enabling fighters to provide precision-guided support fire against a target.

ARROW IV HOMING MISSILES (AIR-LAUNCHED VERSION)

Rules Level: Advanced
Tech Base (Ratings): Both (E/E-F-E)
Game Rules: These are dropped as bombs, not fired as artillery and so they do not use the Airborne Targeting rules (see p. 148, *TO: AR*). Air-launched Arrow IV Homing Missiles occupy 5 bomb slots per missile and function in the same manner as their standard launcher-based version (see p. 167), with the following modifications:

- Air-launched Arrow IV Homing Missiles may not be used to attack other airborne aerospace units or any target in space.
- Air-launched Arrow IV Homing Missiles may not be fired by units at an Altitude of 3 or lower on the Low-Altitude Map.
- Unlike ground-based Arrow launchers, an aerospace unit may not TAG and fire its Arrow IV Homing Missile at the same time. However, a fighter using air-launched Arrow IV Homing Missiles can release these missiles in a turn prior to the missiles' arrival on the target mapsheet, and in that subsequent turn over-fly the intended target using TAG systems on board to designate the target.

ARROW IV NON-HOMING MISSILES (AIR-LAUNCHED VERSION)

Introduced: 2623 (Terran Hegemony)
Extinct: 2859 (Inner Sphere)
Recovered: 3046 (Capellan Confederation)

The non-homing air-launched Arrow IV munition was made as a complement to the air-launched homing missile. Lost in the decades after the fall of the Star League, this ordnance was also recovered by Capellan weapon designers in the mid-3040s, though its enormous drag compared to conventional high-explosive bombs made it an unpopular weapon choice, which remains little used to this day.

ARROW IV NON-HOMING MISSILES (AIR-LAUNCHED VERSION)

Rules Level: Advanced
Tech Base (Ratings): Both (E/E-F-E)
Game Rules: These are dropped as bombs, not fired as artillery and so they do not use the *Airborne Targeting* rules (see p. 148, *TO: AR*). Air-launched Arrow IV Non-Homing Missiles occupy 5 bomb slots per missile and function in the same manner as a standard High-Explosive Arrow IV attack, except that air-launched Arrow IV Non-Homing Missiles may not be fired by units at an Altitude of 3 or lower on the Low-Altitude Map.

INFERNO BOMBS

Introduced: Pre-spaceflight

Long before Inferno SRMs or their artillery-launched cousins came into play, fighters carried incendiary bombs to wreak havoc on enemy conventional formations (or to act as a kind of "instant defoliant" for heavily forested or jungle areas). Today's Inferno bombs are not that far removed from those early napalm weapons, but remain less common in air-to-ground combat than high-explosive bombs.

INFERNO BOMBS

Rules Level: Advanced
Tech Base (Ratings): Both (B/D-D-D)
Game Rules: Inferno Bombs follow all the same rules for bombing (see pp. 245-247, *TW*), except that instead of delivering explosive damage directly, Inferno Bombs instantly create a fire in the target hex (even if it is open water). Units within a hex when it is struck by an Inferno Bomb suffer the effects of being hit by 5 Inferno missiles (see p. 141, *TW*). Units passing through a hex ignited by Inferno Bombs suffer effects as described under the standard fire rules (see p. 41, *TO: AR*).

Hexes struck by Inferno Bombs continue to burn (and generate smoke) for 30 turns unless doused by an appropriate anti-flame system (such as sprayers and fluid guns loaded with water, coolant or flame-retardant ammo).

LIGHT AIR-TO-AIR (LAA) MISSILES

Introduced: 3072 (Free Worlds League)

Not quite as potent as the air-to-air Arrow missiles introduced by the Lyrans and the Wolves, this much smaller air-to-air missile version had its debut with the allied aerospace forces of the Duchy of Tamarind and Duchess Alys Rousset-Marik's resistance movement. Built smaller and leaner, these so-called light air-to-air (LAA) missiles can be carried by smaller fighters and create far less drag during atmospheric operations.

LIGHT AIR-TO-AIR (LAA) MISSILES

Rules Level: Advanced
Tech Base (Ratings): Both (E/X-X-F)
Game Rules: Light Air-to-Air Arrow Missiles take up 2 bomb slots per missile when mounted on an external hardpoint.

LAA Missiles otherwise follow the same rules as Air-to-Air Arrow Missiles (see p. 169).

THUNDER (FASCAM) BOMBS

Introduced: 2623 (Terran Hegemony)
Extinct: 2840 (Inner Sphere)
Recovered: 3052 (Capellan Confederation ["Thunder" FASCAM])
Introduced: 3065 (Capellan Confederation [Active and Vibrabomb])

The air-dropped equivalent to Thunder (FASCAM) artillery and Arrow IV munitions, "Thunder" FASCAM bombs share a nearly identical history with their Arrow-delivered cousins. Returned to popularity since the Clan invasion, these minefield-laying bombs have become a useful means for "herding" enemy troops into bottleneck positions and ambushes.

THUNDER (FASCAM) BOMBS

Rules Level: Advanced
Tech Base (Ratings): Clan (C/X-D-D [FASCAM only]), Inner Sphere (C/E-X-E [FASCAM]; D/X-X-E [Active, Vibrabomb])
Game Rules: Thunder (FASCAM) bombs follow the same rules for bombing (see pp. 245-247, *TW*), with the following exceptions:

- Minefields delivered by Thunder (FASCAM) Bombs may be designated as standard land-based minefields, standard sea-based minefields, active landmine fields or vibrabomb landmine fields. If the type is not specified prior to play, but the bomb is designated as a Thunder bomb, the minefield type is a standard (conventional) landmine field.
- Instead of delivering explosive damage directly, Thunder bombs create a 20-point density minefield in the target hex and all adjacent hexes. (If the affected terrain is water and the minefield is land-based, the mines sink to the floor of the water feature; if the affected terrain is water and the mines are sea-based, they float on the water's surface; sea-type mines deployed on land fail to operate.) While this minefield cannot combined with any other weapon-delivered minefields to increase a minefield density, if it is laid in a hex with a pre-determined minefield laid at the start of the game and is the same minefield type, the total density of the minefield can be 30-point density.
- Units within a hex when it is struck by a FASCAM round may exit the hex without setting off the minefields, but all other units entering or passing through a mined hex follow the standard rules for the appropriate minefield (see p. 175, *TO: AR*).
- Once deployed, minefields delivered by Thunder bombs function in accordance with their standard game rules (standard FASCAM land-mine bombs use the standard (conventional) land-based minefield rules; standard FASCAM sea mines use the standard sea-based minefield rules; Thunder-active mines use the active minefield rules; Thunder-vibrabomb mines use the vibrabomb minefield rules).

TORPEDO BOMBS

Introduced: Pre-spaceflight

A classic weapon dating back to the early twentieth century, torpedo bombs are anti-maritime weapons, designed to penetrate the water's surface and withstand increasing water pressures to deliver strikes below a vessel's waterline. Though modified through the ages, the principles behind the torpedo bomb remain the same, even though maritime combat has virtually become a thing of the past.

TORPEDO BOMBS

Rules Level: Advanced
Tech Base (Ratings): Both (B/C-C-C)
Game Rules: Torpedo Bombs follow all the rules for bombing (see pp. 245-247, *TW*), with the following exceptions:

- Unlike most bombs, Torpedo Bombs target units rather than hexes, and thus take target movement modifiers into account when delivering an attack.
- Torpedo Bombs dropped against targets not located under or on the surface of water inflict only half their damage (round down).
- Torpedo Bombs can target surface naval vessels and other vehicles coasting on the surface of a water feature—including hydrofoils, WiGEs floating on the surface or "flying" at water level (as opposed to 1 level above it) and hovercraft. They can also target any submerged unit to a maximum of Depth 50 below the water's surface.
- If a Torpedo Bomb attack is successful, the weapon inflicts its full damage against the targeted unit, and applies a +1 modifier to the subsequent Hull Breach roll. If the target is a surface-skimming unit (hydrofoil, hovercraft or WiGE), apply this modifier instead to the roll for any Motive System critical hit checks.

FLAMER/FLUID GUN/SPRAYER AMMUNITION

While a staggeringly broad range of fluid types are available and suitable for use by vehicular-scale flamers, fluid guns, and sprayers many can be defined in basic terms. Whatever the combinations, these alternative "ammunition" options for such equipment may be used to hose down targets with everything from coolants, incendiaries, and fire-retardant foam to corrosive chemicals, oils, paints and even water.

FLAMER/FLUID GUN/SPRAYER AMMUNITION

Game Rules (General): Only units equipped with Vehicle Flamers (see p. 218, *TM*), Heavy Flamers (see p. 124), Fluid Guns (see p. 125) or Sprayers (see pp. 248-249, *TM*) may use the special fluid ammunitions described below. Unless otherwise noted (in brackets beside the ammo type's name), any given fluid ammunition type is considered to be available to all such weapon. All Fluid Gun or Flamer ammunition must be installed in full-ton lots. (When used for a Sprayer, however, Fluid Gun ammunition provides half the number of shots as it does for Fluid Guns.)

Units must designate their fluid ammunition types prior to the start of game play; if no specialty ammo is noted for a given Fluid Gun or Sprayer, it is presumed to be firing Water Ammo. If no specialty ammo is noted for a Flamer, it is presumed to be firing standard flamer ammo.

COOLANT AMMO [FLAMERS/FLUID GUNS/SPRAYERS]

Introduced: Early spaceflight

A cryogenic, fast-cooling chemical mix less useful for firefighting than for rapidly reducing the surface temperature of superheated metals, coolant delivered by sprayers and fluid guns can be a huge help in a pitched battle.

COOLANT AMMO [FLAMERS/FLUID GUNS/SPRAYERS]

Rules Level: Advanced
Tech Base (Ratings): Both (C/B-B-B)
Game Rules: If fired on a hex, structure or unit that has caught fire, coolant ammo douses all such fires not created by Inferno munitions (such as Inferno Fuel, Inferno Missiles, Inferno Mines and Inferno Artillery rounds) on a 2D6 roll of 4+. For fires caused by Inferno munitions, a roll of 12 is required to extinguish the flames.

Coolant ammo also reduces the heat level for any heat-tracking target by 3 points (4 points when fired from a Heavy Flamer) per hit (to a maximum of 9 cooling points per turn). Coolant fired at conventional infantry is treated as a 1-point direct-fire (ballistic) weapon when determining damage to the unit (see p. 216, *TW*). Heat-tracking units carrying coolant ammo will not set off the coolant from overheating, but coolant ammo that explodes from a critical hit reduces the heat level of such units by 3 points, in addition to the 2 points of internal damage from exploding Fluid Gun ammo.

CORROSIVE AMMO [FLUID GUNS/SPRAYERS]

Introduced: Pre-spaceflight

Another chemical mixture developed for industrial applications first and foremost, fluid gun corrosive ammo is used to gradually dissolve hard debris, but can endanger military armor.

CORROSIVE AMMO [FLUID GUNS/SPRAYERS]

Rules Level: Advanced
Tech Base (Ratings): Both (C/C-D-D)
Game Rules: On a successful attack against any target except conventional infantry, Corrosive Ammo delivers 1D6 damage points during the Weapon Attack Phase, and another 1D6 ÷ 2 points (rounded up) in the End Phase of the same turn. This damage is resolved in 1-point damage clusters. Against conventional infantry, corrosive ammo inflicts 1D6 burst-fire damage.

Heat-tracking units carrying corrosive ammo will not set off the chemicals through overheating, but corrosive ammo that explodes from a critical hit inflicts 1D6 damage points to the unit's internal structure when the ammo explodes, in addition to the 2 points of internal damage from exploding Fluid Gun ammo. In the End Phase of the following turn, the internal structure takes an additional 1D6 ÷ 2 points of damage (rounded up).

FLAME-RETARDANT FOAM AMMO [FLUID GUNS/SPRAYERS]

Introduced: Pre-spaceflight

This fluid gun ammunition is a foaming liquid that effectively smothers and saturates a target area at the same time. Designed to counter not only normal fires, but also electrical, chemical and even oil-based fires, flame-retardant foam proved ideal for anti-Inferno work, though expense kept it from becoming a battlefield standby.

FLAME-RETARDANT FOAM AMMO [FLUID GUNS/SPRAYERS]

Rules Level: Advanced
Tech Base (Ratings): Both (B/B-B-B)
Game Rules: If fired on a hex, structure or unit that has caught fire, Flame-Retardant Foam douses all fires immediately, including those created by Inferno munitions (such as Inferno Missiles, Inferno Mines and Inferno Artillery rounds). In addition, any rolls to set on fire a hex or unit that has been struck by Flame-Retardant Foam receive a +4 target number modifier (starting from a base target number of zero for any weapons that would otherwise automatically set such targets ablaze).

Heat-tracking units carrying Flame-Retardant ammo will not set off the ammo from overheating, but Flame-Retardant ammo that explodes from a critical hit reduces the heat level of such units by 2 points, in addition to the 2 points of internal damage from exploding Fluid Gun ammo.

INFERNO FUEL AMMO [FLAMERS/FLUID GUNS]

Introduced: 2400 (Terran Hegemony)

A variation on standard non-fusion flamer fuel, Inferno fuel uses the same adhesive-gel formula as found in Inferno SRMs, to deliver a more lingering heat-effect damage to a target. As with Inferno SRMs, Inferno fuel is highly volatile—and even poses a significant threat to non-military vehicles that attempt to carry them.

INFERNO FUEL AMMO [FLAMERS/FLUID GUNS]

Rules Level: Advanced
Tech Base (Ratings): Both (D/D-E-D)
Game Rules: Flamers and Fluid Guns using Inferno Fuel deliver their attacks as normal, but with the following exceptions:

- Each hit from a standard Vehicle Flamer or a Fluid Gun using Inferno Fuel is treated as a hit from a single Inferno SRM missile (see pp. 141-142, *TW*). A hit by a Heavy Flamer using Inferno Fuel is treated as a hit by 2 Inferno SRM missiles (to the same hit location).
- Heat-tracking units carrying Inferno Fuel ammunition must check for heat-induced Inferno Fuel ammunition explosions as if carrying Inferno SRMs (see pp. 141-142, *TW*).
- Support Vehicles lacking the Armored Chassis or Environmental Sealing modifications are particularly ill-suited for using Inferno Fuel. Any such units that suffer any form of external heat damage while using Inferno Fuel ammo (or which suffer a critical hit to a transport bay carrying Inferno Fuel) will suffer an Inferno Fuel ammunition explosion on a 2D6 roll of 10+.

OIL SLICK AMMO [FLUID GUNS/SPRAYERS]

Introduced: Pre-spaceflight

"Oil slick" ammo actually consists of industrial-grade lubricants primarily intended for servicing extremely heavy machinery, but includes a flammable content that has led to its use as an incendiary aid as well. In the arenas of Solaris, some MechWarriors have taken to using this fluid gun "ammunition" against open pavement in the hopes of encouraging their opponents to slip and fall in the tight arena confines. That latter use led to the common name for what is, in essence, another tool for heavy industry.

OIL SLICK AMMO [FLUID GUNS/SPRAYERS]

Rules Level: Advanced
Tech Base (Ratings): Both (B/B-B-B)
Game Rules: Oil Slick Ammo inflicts no damage in a successful attack, but adds a –2 modifier to the target number for igniting a unit or hex that has been doused by a successful oil slick attack.

Furthermore, if applied (through a successful attack) to a clear hex, any ground units other than infantry, hovercraft or WiGE vehicles must make a Piloting Skill Roll at a +1 target number modifier to avoid a skid when passing through the hex (see pp. 62-64, *TW*). This roll is made regardless of whether or not the unit is using Walking/Cruising MP or Running/Flanking MP. If an oil slick is applied to a paved or bridge hex, an additional +1 target number modifier applies to this roll.

Heat-tracking units carrying Oil Slick Ammo check for ammunition explosions from overheating as normal, but Oil Slick Ammo that explodes from a critical hit inflicts 1 point of damage per remaining shot, in addition to the 2 points of internal damage from exploding Fluid Gun ammo.

PAINT/OBSCURANT AMMO [FLUID GUNS/SPRAYERS]

Introduced: Early spaceflight

Though some fluid guns fire simple paint with much the same effect, industrial- and military-grade obscurant ammunition actually describes any opaque chemical adhesives that not only can be used to provide color, but also come laced with ferrous and magnetic additives designed to discourage and confuse sensors and other electronic signals. This has made "paint" ammo an unlikely weapon—at least in the arenas of Solaris—but a moderately effective one, at least.

PAINT/OBSCURANT AMMO [FLUID GUNS/SPRAYERS]

Rules Level: Advanced
Tech Base (Ratings): Both (B/B-B-B)
Game Rules: Upon any successful attack against non-infantry units by a Fluid Gun using Paint/Obscurant Ammo, the Attacker must roll 2D6. On a result of 9+, the obscurants have affected the target's sensors, adding a +1 to-hit modifier for all weapon attacks by the target unit for the remainder of the scenario (unless washed off by a Fluid Gun using water). Additional hits can raise this modifier to a maximum of +3.

Against infantry, Paint/Obscurant Ammo has no effect.

Heat-tracking units carrying Paint/Obscurant Ammo will not set off the ammo from overheating, but Paint/Obscurant Ammo that explodes from a critical hit inflicts 1 point of damage per remaining shot, in addition to the 2 points of internal damage from exploding Fluid Gun ammo.

WATER AMMO [FLAMERS/FLUID GUNS/SPRAYERS]

Introduced: Pre-spaceflight

Water ammo, as the name suggests, is simply a high-pressure water tank used to deliver water to a target hex. This is often used for power-washing purposes, firefighting or even riot control.

WATER AMMO [FLAMERS/FLUID GUNS/SPRAYERS]

Rules Level: Advanced
Tech Base (Ratings): Both (A/A-A-A)
Game Rules: If fired on a hex, structure or unit that is burning, Water Ammo douses all such fires not created by Inferno munitions (including Inferno Fuel, Inferno Missiles, Inferno Mines and Inferno Artillery rounds) on a 2D6 roll result of 3+. For fires caused by Inferno munitions, Water Ammo extinguishes the flames only on a result of 12. Against conventional infantry, a successful hit from a Flamer, Fluid Gun, or Sprayer using Water Ammo inflicts 1D6 ÷ 2 (round up) damage points as a burst-fire weapon (but for purposes of determining casualties, such troopers should be considered knocked out, not killed).

Water Ammo also reduces the heat level for any heat-tracking target by 1 point per hit (to a maximum of 6 cooling points per turn), and can wash off Paint/Obscurant Ammo "damage" on a 2D6 result of 9+ after making a successful attack on a unit struck by paint/obscurant.

Water ammunition will not explode due to overheating effects on heat-tracking units, nor will it explode when the Water Ammo slot suffers a critical hit. Damage to a Water Ammo slot will not cause the affected location to "flood".

GRENADE LAUNCHER MUNITIONS

The grenade launcher is a straightforward piece of equipment, but its munitions give it flexibility in battle. While adaptable for a great many situations, however, the one-shot capability of vehicular grenade launchers means that the forces fielding them must carefully choose their ordnance in advance to maximize their potential.

GRENADE LAUNCHER MUNITIONS

Game Rules (General): Only units equipped with Vehicular Grenade Launchers (VGLs; see p. 127) and Battle Armor Grenade Launchers (see p. 256, *TM*) may use grenade launcher ammunition of any type. The ammunition each VGL unit or battle armor mounts must be identified prior to the start of game play; if no specialty munitions are noted for a given VGL, it is presumed to be using fragmentation grenades. Battle armor-mounted grenade launchers that have more than one ammo clip (such as noted in a TRO entry) may carry multiple ammunition types, which can be switched during game play. All battle armor in a squad equipped with grenade launchers must mount the same ammunition types.

CHAFF GRENADES [VGL]

Introduced: 3052 (Draconis Combine)

Inspired by the elaborate sensor-baffling techniques used on Wolcott during the Clan invasion, the Draconis Combine introduced chaff grenades as a mobile cover weapon concept in 3052. Chaff grenades release a cloud of electromagnetic dust and high-intensity flares intended to confuse most electronic and thermal sensors, but their short battlefield duration led many warriors to forego these weapons in favor of electronics with more lasting potency, and weapons with more lethality.

CHAFF GRENADES [VGL]

Rules Level: Advanced
Tech Base (Ratings): Both (B/D-E-E)
Game Rules: Chaff Grenades produce ECM-like effects in the hexes they attack, interfering with the abilities of advanced sensors and other electronics passing through those hexes per an ECM Suite (see p. 134, *TW*). In addition, a Chaff Grenade cloud is treated as Light Smoke 2 levels high for any weapon attacks passing through the affected hexes (see p. 45, *TO: AR*). The ECM and smoke effects produced by Chaff Grenades last until the End Phase of the following turn, and affect both friend and foe.

FRAGMENTATION GRENADES [VGL]

Introduced: Pre-spaceflight

The standard round found in vehicular grenade launchers, fragmentation grenades are made for anti-infantry work, showering a target area with a cloud of shrapnel intended to maim as much as it kills.

FRAGMENTATION GRENADES [VGL]

Rules Level: Advanced
Tech Base (Ratings): Both (B/B-B-B)
Game Rules: Like all VGL attacks, Fragmentation Grenades automatically affect all units in their target hexes when fired. Against all units except conventional infantry and Support Vehicles with BAR values of 4 or less, Fragmentation Grenades inflict no damage. Against Support Vehicles with BAR values below 5, Fragmentation Grenades inflict damage equal to 5 points minus the unit's BAR (to a minimum of 0 points of damage), resolved as a single direct-fire ballistic attack. Against conventional infantry, Fragmentation Grenades deliver a 2D6 burst-fire attack.

INCENDIARY GRENADES [BA GL/VGL]

Introduced: Pre-spaceflight

Essentially miniature canisters of flammable gels similar to Inferno fuel, incendiary grenades are ideal for setting fires and using the resulting smokescreen for cover.

INCENDIARY GRENADES [BA GL/VGL]

Rules Level: Advanced
Tech Base (Ratings): Both (B/B-B-B)
Game Rules: Incendiary Grenades ignite the hexes in their area of effect as though a single Inferno SRM had struck them (see p. 42, *TO: AR*). Incendiary Grenades launched from battle armor grenade launchers lack an area effect: each such grenade that strikes a target or hex is treated as a single Inferno SRM, with squads rolling on the Cluster Hits Table (see p. 307, *TW*) to determine the number that hit. Units within such hexes suffer effects akin to taking a hit from a single Inferno SRM (see p. 141, *TW*).

SMOKE GRENADES [BA GL/VGL]

Introduced: Pre-spaceflight

Developed simply to provide mobile cover or to mark a unit in distress, smoke grenades are an ancient concept that has retained its value in the modern battlefield.

SMOKE GRENADES [BA GL/VGL]

Rules Level: Advanced
Tech Base (Ratings): Both (A/B-B-B)
Game Rules: When fired, Smoke Grenades produce Light Smoke in all of their target hexes (see p. 45, *TO: AR*). This smoke rises 2 levels above the underlying terrain, and lasts until the End Phase of the third turn after they are fired before dissipating.

MINES

Mines have been a favored tool for static defenses since Terra's Middle Ages, but these explosive booby traps truly earned their place on the battlefield in the 1900s. Development of mine technology has since worked toward the dual goals of making them more effective against hostile units while safer for operators. The recent explosion in minefield technologies has aimed at addressing the realities of the thirty-first century battlefield, enhancing the effectiveness of the mines themselves and their delivery systems.

MINES

Rules Level (General): Advanced (All except EMP Mines); Experimental (EMP Mines)
Available To (General): Mines may be deployed by specialized minelayer infantry, units equipped with appropriate mine dispensers, or (in select cases) as a special ammunition type for certain weapon systems (including LRMs and Artillery).
Game Rules (General): Minefields, when deployed, can vary in damage based on the mine types and deployment methods used. Missile-deployed mines may vary their damage values based on the launcher type and size used, while dispenser-deployed mines receive a set "standard" damage value that reflects the dispenser's capacity.

Additional minefield game rules appear with each mine type outlined below.

ACTIVE MINES (LAND)

Introduced: Early spaceflight

Though technically available for a millennium, active (jumping) mines have been largely under-used in favor of less expensive conventional mines. The coming of the Clans and the increasing numbers of jump-capable infantry, battle armor, hovercraft, and WiGE vehicles have prompted many realms to reinvest in this more active form of static defense. The Capellan Confederation has led this revival in recent decades, debuting dispenser and LRM-launched variations for an ever-wider deployment of these devices.

ACTIVE MINES (LAND)

Rules Level: Advanced
Tech Base (Ratings): Both (D/X-X-E)
Game Rules: See page 175, *TO: AR,* for rules on Active Minefields. As with Standard Mines, unless cleared (see p. 178, *TO: AR*), Active Mines may detonate multiple times in a scenario.

Mines: For the purposes of unit construction, mines are treated as an ammunition type, rather than a specific item that can be mounted and fired. The weapons and equipment tables (see pp. 216–230) define which mines may be deployed as specialty munitions for which weapon types.

COMMAND-DETONATED MINES (LAND/SEA)

Introduced: Pre-spaceflight

The first mines were command-detonated mines, typically set off by nearby soldiers armed with a simple fuse. Today's command-detonated mines, triggered mostly by wireless signals, can be detonated from orbit if desired (though most commanders prefer to have troops in the field with line of sight to ensure that the proper targets are hit). The human-controlled aspect makes command-detonated mines one of the "safer" types in current use.

COMMAND-DETONATED MINES (LAND/SEA)

Rules Level: Advanced
Tech Base (Ratings): Both (B/C-D-C)
Game Rules: See page 177, *TO: AR,* for rules on Command-Detonated minefields. If the Command-Detonated Minefield is sea-based, it also inflicts half its normal damage (rounded up) against any unit(s) within 1 depth above or below their current depth when detonated (up to the surface of the water).

As with Standard Mines, unless cleared (see p. 178, *TO: AR*), Command-Detonated Mines may detonate multiple times in a scenario.

ELECTROMAGNETIC PULSE (EMP) MINES (LAND)

Introduced: 2680 (Terran Hegemony [Vibrabomb]),
3065 (Word of Blake [Command-Detonated])
Extinct: 2825 ([Vibrabomb])
ReIntroduced: 3058 (Free Worlds League [Vibrabomb])

Originally developed by the Terran Hegemony exclusively for the Star League Defense Force, the Electromagnetic Pulse (EMP) Mine was a vibrabomb-based device that delivered a high-energy pulse capable of disabling a BattleMech without causing any actual damage. The sophisticated technology to produce this pulse without a full-scale nuclear blast prevented the weapon from becoming too widespread, and the last major caches of these devices were expended soon after the First Succession War, but enough samples lingered to provide the Free Worlds League (and the Word of Blake) a means to revive the concept in the years leading up to the Jihad. Since then, various resistance groups have also obtained samples of this technology, but demand still far outstrips the production, preventing them from becoming a common sight.

ELECTROMAGNETIC PULSE (EMP) MINES (LAND)

Rules Level: Experimental
Tech Base (Ratings): Both (E/F-X-F)
Game Rules: EMP Mines may not be deployed by launchers, but must instead be deployed by minelayer infantry or mine dispensers, or placed in predetermined hexes (see p. 175, *TO: AR*).

EMP mines are detonated using the same rules as described for their mine type. (See p. 177, *TO: AR*, for Command-Detonated mines, and Vibrabombs.) EMP mines affect all units in the mined hex upon detonation and create a 1-hex ECM "bubble" in the area of effect that lasts until the End Phase of the following turn after detonation, but deliver physical damage only to conventional infantry units (1D6 points, treated as Area-Effect damage, see p. 216, *TW*). Against all other units, the minefield's controlling player must roll 2D6 and consult the EMP Mine Effects Table below (apply a +2 modifier to this roll if the affected unit is a drone, see p. 117). If any electronic systems not mounted upon an active unit (such as Remote Sensors, C^3 Remote Sensors, or Collapsible Command Modules, see pp. 187, 110 and 113, respectively) are inside an EMP mine's area of effect, these electronics are considered destroyed by the pulse.

EMP mines may make only one attack per scenario.

EMP MINE EFFECTS TABLE

Target Unit*	No Effect (2D6 Roll)	Interference (2D6 Roll)	Shutdown (2D6 Roll)
BattleMech	2-6	7-8	9+
IndustrialMech	2-5	6-7	8+
ProtoMech	2-5	6-8	9+
Battle Armor†	2-5	6-7	8+
Combat Vehicles	2-5	6-7	8+
Support Vehicles	2-4	5-6	7+
Aerospace Fighter/Small Craft‡	2-6	7-8	9+
Conventional Fighters‡	2-5	6-7	8+

Interference: The unit suffers a +2 modifier for all weapon attacks and sensor operations for 1D6 turns, during which time all of its electronics are also affected as though operating within a hostile ECM field). The effects wear off in the End Phase of the final turn. 'Mechs, aerospace fighters, and small craft also generate 5 extra heat points per turn while affected.

Shutdown: Unit completely shuts down for 1D6 turns, powering up normally during the End Phase of the final turn. If the unit is a hovercraft or WiGE vehicle at ground level, the unit must make a successful Drive Skill roll with a modifier of +3 to avoid skidding (see p. 62, *TW*).

*EMP Mines have no effect against Mobile Structures or units weighing more than 200 tons.
†For ease of play, all troopers in a battle armor unit are equally affected by the EMP Mine Effects.
‡Grounded units only; EMP Mines cannot target airborne units.

INFERNO MINES (LAND/SEA)

Introduced: 3055 (Capellan Confederation)

Though incendiary mines have existed for centuries, the Capellan Confederation and its Chaos March-based guerillas introduced the current incarnation—dubbed Inferno mines—shortly before Operation Guerrero.

INFERNO MINES (LAND/SEA)

Rules Level: Advanced
Tech Base (Ratings): Both (C/X-X-D)
Game Rules: Inferno Mines use the rules for Standard (Conventional) Mines when making attacks (see p. 176, *TO: AR*), but instead of inflicting normal damage, these mines deliver the equivalent effects of a single Inferno Missile (see p. 141, *TW*) for every 2 points of minefield strength.

Sea-type Inferno Mines may only be employed on the surface of a water feature; Inferno Mines are ineffective when submerged.

As with Standard (Conventional) Mines, unless cleared (see p. 178, *TO: AR*), Inferno Mines may detonate multiple times in a scenario.

SPACE MINES (SPACE)

Introduced: Early spaceflight

Useful when space travel was limited or deployed around important locations, space mines fell into disuse for nearly a millennium. The recent advent of screen launchers has brought space mines back into the modern battlefield.

SPACE MINES (SPACE)

Rules Level: Advanced
Tech Base (Ratings): Both (C/E-F-E)
Game Rules: Space Mines are set up in dense fields, either by combat engineers prior to the battle, by Space Mine dispensers or by a screen launcher during battle. Mines can only be placed on a space hex, and any mines placed within 10 hexes of a space/atmosphere interface suffer gravity effects (moving 1 hex toward the planet per turn), eventually being destroyed if they enter the interface or atmosphere below.

Any unit entering a hex containing Space Mines must make a Control Roll with a +3 modifier. An additional –2 modifier applies if the unit possesses an Active Probe. Craft that fail this Control Roll suffer damage to the Nose (or, if advanced movement rules from *Strategic Operations* are used, to whichever facing entered the field first) equal to their Margin of Failure times a value based on the unit's size. This damage value (and the maximum amount of damage a Space minefield may inflict upon a passing unit) is shown in the Space Mines Table below.

Once a Space minefield inflicts damage in this fashion, it loses a portion of its overall Attack Capacity (which starts at 6, reflecting the maximum number of attacks the minefield can make). This value, as with the base and maximum damage inflicted, also varies with the unit suffering the attack and is shown in the Space Mines Table. Once reduced to an Attack Capacity of 0 (or less), a Space minefield is considered destroyed. A Space minefield inflicts its damage normally until it is reduced to or below an Attack Capacity of 0.

For example, a *Sholagar* aerospace fighter, needing an 8+ to avoid a Space minefield with an Attack Capacity of 3, rolls a 5; the *Sholagar* suffers 15 points of damage (its Margin of Failure of 3 [8 – 5 = 3] x 5 points [because it is an aerospace fighter] = 15), distributing the damage in groups of 5. The minefield, meanwhile, is reduced to an Attack Capacity of 2 (3 – 1 point for a fighter passing through the field). If a WarShip were to then pass through—also with a Control Roll result of 8+ needed to avoid the field—and it rolled a 2, it would suffer 100 points of standard-scale damage (Margin of Failure 6 [8 – 2 = 6], damage of 20 per point of MoF [20 x 6 = 120, but the maximum damage per attack is 100]), and would reduce the field's Attack Capacity to –1 (2 – 3 points for a WarShip passing through the field = –1), rendering it ineffective.

SPACE MINES TABLE

Craft Type	Damage Per Unit (per MoF)	Max. Damage Per Attack	Attack Capacity Reduction
Fighter/Small Craft/Satellite	5	20	1
DropShip	10	50	2
JumpShip/Space Station/WarShip	20	100	3

STANDARD (CONVENTIONAL) MINES (LAND/SEA)

Introduced: Pre-spaceflight

Indiscriminate, standard mines explode when someone or something of significant mass comes into contact with them. Often seeded around key passages or installations, or deployed on the fly for "area denial," most modern mines are built with chemicals that break down after a prescribed time, rendering them inert usually after six months to five years. This feature is designed to minimize civilian casualties once the battlefield has moved elsewhere.

STANDARD (CONVENTIONAL) MINES (LAND/SEA)

Rules Level: Advanced
Tech Base (Ratings): Both (B/C-C-C)
Game Rules: See page 176, *TO: AR*, for full rules on standard (or Conventional) minefields. Note that sea-based Standard minefields attack any unit at their depth (including hovercraft, hydrofoils and WiGEs, if the sea mines are on the water's surface).

Unless cleared (see p. 178, *TO: AR*), Standard minefields may detonate multiple times throughout a scenario.

VIBRABOMB MINES (LAND)

Introduced: 2445 (Lyran Commonwealth)

Vibrabombs are specifically designed with 'Mechs in mind. Using seismic sensors, these minefields are programmed to target units of a specific weight, as measured by their seismic signature. But while they are excellent for targeting a specific heavy unit—vibrabombs are ineffective against conventional infantry—they do not work so well against forces of mixed or unknown weights and sizes.

VIBRABOMB MINES (LAND)

Rules Level: Advanced
Tech Base (Ratings): Both (C/E-E-D)
Game Rules: See page 177, *TO: AR*, for rules on Vibrabomb minefields.

As with Standard Mines, unless cleared (see p. 178, *TO: AR*), Vibrabomb Mines may detonate multiple times in a scenario.

MISSILE MUNITIONS

Among the most versatile weapons employed by modern armies, missiles can deploy all manner of innovative guidance systems and warheads. Moving beyond the recovered technologies of the Star League, both the Inner Sphere and the Clans have continued to develop new missile munitions in ever-increasing varieties since the 3050s.

MISSILE MUNITIONS

Game Rules (General): The following missile munitions are alternative reloads available only to specific launcher types. If a given weapon system does not identify its munitions type at the start of a scenario, presume the weapon is firing its most standard missile type (unspecified LRM munitions are considered to be standard LRMs; unspecified Artemis-equipped launchers use Artemis-capable standard missiles, and so forth).

For all 'Mech and vehicle units mounting appropriate launchers, specialized missile munitions may only be installed in full-ton lots. ProtoMech units may install reloads for permitted missile munitions on a per-missile basis, applying that munition's weight multiplier (if any) per missile.

Missiles (other than Narc and iNarc warheads) that attack a target unit must roll on the appropriate column of the Cluster Hits Table. Missiles fired on a hex automatically hit the target hex with a full volley.

ACID (AX) MISSILES [STANDARD SRMS/MMLS]

R&D Start Date: 3050 (Federated Commonwealth)
Prototype Design and Production: 3053 (Federated Commonwealth)

The AX missile was a NAIS response to the recovered ferro-fibrous armor types entering production (or under development) during the late 3040s and early 3050s. Loaded with industrial-strength acids and enzymes, AX SRMs promised additional damage against ferro-fibrous armor, but the missiles fared poorly after rumors circulated that their liquid payload sloshed during flight, impairing their accuracy. In truth, the missiles' guidance equipment was sacrificed in favor of an enlarged warhead to deliver enough payload for a battlefield effect, as well as the secondary explosive charges necessary to scour the target's armor for maximum chemical saturation.

ACID (AX) MISSILES [STANDARD SRMS/MMLS]

Rules Level: Experimental
Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: AX SRM warheads function as standard SRMs with the following exceptions:

- AX SRMs suffer a –2 modifier when rolling on the Cluster Hits Table.
- AX SRMs inflict a base 3 points of damage per missile against units using any form of Ferro-Fibrous, Ferro-Lamellor, Laser-Reflective or Reactive armor, as well as any unit that has a BAR value of 5 or less. (This damage is not reduced by special armor rules.) Against all other armor (and structure) types, AX SRMs inflict the standard 2 points of SRM damage. Conventional infantry multiply the damage inflicted by AX SRM attacks by 1.5 (rounding up).
- If excess damage from an AX warhead destroys the last of the armor in a given location, no damage carries over into the internal structure (but subsequent AX missile hits directly against internal structure will inflict normal SRM damage).
- AX SRMs are incompatible with Artemis, Narc or Streak technology.

ANTI-RADIATION (ARAD) MISSILES [STANDARD SRMS/STANDARD LRMS/MMLS]

R&D Start Date: 3055 (Clan Smoke Jaguar), 3065 (Free Worlds League)
Prototype Design and Production: 3057 (Clan Smoke Jaguar), 3066 (Free Worlds League)

Avoiding the pitfall of the short-lived Listen-Kill missiles that were swiftly rendered obsolete in the 3040s, these prototype missiles promise to retain their normal range and damage profiles while homing in on active electronic systems with greater accuracy—effectively turning electronic warfare systems against their users.

ANTI-RADIATION (ARAD) MISSILES

Rules Level: Experimental
Tech Base (Ratings): Both (E/X-X-E)
Game Rules: ARAD Missiles use the same rules as Narc-equipped standard missile types for their launcher and size, with the following exceptions:

- ARAD Missiles ignore the effects of hostile ECM when targeting a unit tagged by a friendly Narc pod.
- ARAD Missiles are more accurate against any unit that actively emits electronic signals, and receive a –1 to-hit modifier and a +1 Cluster Hits Table roll modifier if the target is using at least one of the following systems: Active Probes (of any kind), Artemis fire-control systems, the Blue Shield system, C^3 systems (of any kind), communications equipment (3.5 tons or more), or ECM suites (of any kind). These modifiers are not cumulative, even if the target unit is using multiple electronic warfare systems. This effect also occurs if the target has been tagged by a friendly Narc or iNarc homing pod. However, the ARAD missile does not receive any further to-hit bonus from the pod.
- Against any target *not* using the above-listed electronic warfare systems, ARAD Missiles suffer a +2 to-hit modifier and a –2 Cluster Hits Table roll modifier (to a minimum result of 2).
- ARAD Missiles are incompatible with Artemis or Streak systems.

BOLA NARC PODS (NARC LAUNCHER)

R&D Start Date: 3052 (Capellan Confederation)
Prototype Design and Production: 3056 (Capellan Confederation)

Intended as a 'Mech-snaring alternative munition, the bola pod was developed by the Capellan Confederation and tested during the Capellan-Free Worlds invasion of the Federated Commonwealth in 3057. A variation on the explosive Narc pod, charges blast the bola pod apart in flight, unraveling large, industrial-grade chains that, aimed properly, can snag the limbs of a target BattleMech. The weapon's inaccuracy and lack of effectiveness against other units, such as vehicles and fighters, led the Confederation to abandon plans for widespread production.

BOLA NARC PODS (NARC LAUNCHER)

Rules Level: Experimental
Tech Base (Ratings): Inner Sphere (D/X-X-E)
Game Rules: Works only with standard Narc launchers and follows all the same rules as standard Narc pods, with the following exceptions:

- Bola Narc pods suffer a +1 to-hit modifier.
- Bola Narc pods inflict no damage upon a successful hit, and have no effect in combat against any unit other than 'Mechs, ProtoMechs and VTOL Vehicles, for which a hit location roll is needed upon a successful attack. Bola pods that hit a 'Mech in the head or torso locations have no game play effect, nor do Bola pods that hit a ProtoMech in the head, torso or main gun locations, or Bola pods that hit a VTOL in any location other than the rotor.
- A Bola Narc Pod that hits a 'Mech in the legs forces the unit to make a Piloting Skill Roll (with an additional +1 target number modifier) at the end of the Weapon Attack Phase to avoid falling, and the 'Mech cannot deliver a kick attack during that turn. In addition, the 'Mech suffers a –1 MP modifier in the following Movement Phase to break free of the chains.
- ProtoMechs hit in the legs by a Bola pod suffer a –2 MP Walk modifier (and cannot jump) in the following Movement Phase as they break free of the Bola's chains.
- VTOLs hit in the rotor treat the result as a Rotor Destroyed critical hit, regardless of any armor or structure left on the unit's rotors.
- Bola Narc Pods that hit a 'Mech or ProtoMech in an arm impose a +1 to-hit modifier for all weapon and physical attacks made using the affected arm until the End Phase of the following turn.

FOLLOW-THE-LEADER (FTL) MISSILES [STANDARD LRMS/MMLS]

R&D Start Date: 3049 (Federated Commonwealth)
Prototype Design and Production: 3053 (Federated Commonwealth)

Based on experimental Star League-era missiles, FTL missiles improve missile grouping, increasing the damage done to specific areas by a networked guidance system that locks onto the first missile to hit the intended target. Because the missiles sometimes followed the wrong warhead, the system never saw mass production.

FOLLOW-THE-LEADER (FTL) MISSILES [STANDARD LRMS/MMLS]

Rules Level: Experimental
Tech Base (Ratings): Both (E/F-X-E)
Game Rules: Follow-the-Leader (FTL) Missiles use the same rules as standard LRMs, with the following exceptions:

- FTL Missiles suffer a +2 to-hit modifier (reflecting the missiles' occasional tendency to follow the wrong warhead).
- Upon a successful hit, FTL Missiles receive a +1 roll modifier on the Cluster Hits Table, but rather than resolving these missile hits in groups of 5, all FTL Missiles that hit the target will hit the same location.
- FTL Missiles are incompatible with Artemis, Narc or Streak systems, and are treated as regular LRMs if they pass into or through a hostile ECM field.

HARPOON MISSILES [STANDARD SRMS]

Introduced: 2400 (Lyran Commonwealth)

A maritime hunter's weapon not designed for the battlefield, the SRM adaptation of the harpoon—introduced in 2400 by Lyran big game huntsmen—is the heaviest form of its kind. Little more than a kinetic, piercing head and a reinforced, detachable cable, the SRM-launched harpoon can penetrate 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 as well, battlefield armor is effectively immune to the harpoon SRM, and most vehicles or 'Mechs would make quick work of the tow cable even if successfully speared.

HARPOON MISSILES [STANDARD SRMS]

Rules Level: Advanced
Tech Base (Ratings): Both (C/C-C-C)
Game Rules: Harpoon Missiles use the same rules as standard SRMs with the following exceptions:

- Harpoons inflict no damage to (and thus do not penetrate) any target with a BAR value of 5 or more (this includes all types of BattleMech, Combat Vehicle and fighter armor). Against units with a BAR value of 4 or less, each Harpoon Missile inflicts 1 point of damage and "hooks" such units (but any unit with a functioning engine and motive systems can break the harpoon lines by spending 1 MP during the following Movement Phase).
- Harpoons cannot be used on the Space Map or in low-altitude combat by aerospace units (including Airships, Fixed-Wing and Satellite Support Vehicles).
- If the target of a successful Harpoon attack that delivers damage does not break the line, and the target weighs less than half the weight of the firing unit, the firing unit can "reel in" the target at a rate of 1 hex per turn during subsequent Movement Phases. A unit reeling in a harpooned target in this fashion may not move or take any other action. Once the target is fully reeled in (dragged into the firing unit's hex), the target becomes external cargo subject to the *Cargo Carriers* rules (see p. 261, *TW*). If the harpooned target weighs half as much as the firing unit (or more), it cannot be reeled in.
- The harpoon-firing unit may not move while attached to a harpooned target that has not been reeled in, but may make attacks and/or disengage its harpoon lines during any subsequent Weapon Attack Phase.
- A Harpoon Missile launcher may not be fired again until a harpooned target has been reeled in or the harpoon lines have been disengaged in a previous turn.
- Harpoon Missiles receive no benefit from Artemis, Narc or Streak systems.
- Though they lack explosive warheads, the propellant used in Harpoon Missiles remains highly volatile; Harpoon Missiles explode for 1 point of damage per missile in the event of a critical hit or heat-induced explosion.

HEAT-SEEKING (HS) MISSILES [STANDARD LRMS/STANDARD SRMS/MMLS]

Introduced: 2340 (Terran Hegemony [LRM]);
2370 (Terran Hegemony [SRM])

Though the technology dates back to air-to-air combat on pre-spaceflight Terra, heat-seeking guidance systems for LRMs and SRMs did not develop until a few decades after the debut of the launchers themselves. The sensors used to enhance their accuracy against high-heat targets while retaining their range and damage profiles, however, necessitated the removal of other standard electronic sensors. As a result, these missiles are noticeably less accurate against targets that are not radiating a significant amount of heat. For this reason—and the fact that they are easily confused by open fires, such as those set by flamers and Inferno rounds—heat-seeking missiles are far less common than standard missile munitions.

HEAT-SEEKING (HS) MISSILES [STANDARD LRMS/STANDARD SRMS/MMLS]

Rules Level: Advanced
Tech Base (Ratings): Both (C/E-E-E)
Game Rules: Heat-Seeking Missiles use the same rules as standard missile types for their launcher and size, with the following exceptions:

- Against heat-tracking units that have overheated, Heat-Seeking Missiles receive a to-hit modifier equal to the heat-induced MP modifier for the target. (For example, if a target BattleMech has overheated by 12 points—producing a –2 MP movement modifier—the missiles receive a –2 to-hit modifier.) An additional modifier of –2 applies if the target is currently on fire (see p. 41, *TO: AR*), or if the target is a Fighter, Small Craft, DropShip, JumpShip or WarShip and the line of attack passes through its aft hexside.
- Against non-heat tracking units or units that have not overheated, Heat-Seeking Missiles receive a +1 to-hit modifier.
- If a flight of Heat-Seeking Missiles is fired into or through a hex that has been set on fire (see p. 41, *TO: AR*), a +2 to-hit modifier applies to the attack as well.
- Heat-Seeking Missiles are incompatible with Artemis, Narc or Streak systems.

INCENDIARY LRMS (STANDARD LRMS/MMLS)

Prototype Design and Production: 2341 (Terran Hegemony)
Introduced: 2342 (Terran Hegemony)

A variation on conventional LRM loads largely intended for multi-purpose use, incendiary LRM munitions mix fast-burning fuel-filled warheads with conventional missiles in every flight, resulting in volleys that retain their offensive potential, but also gain the ability to ignite structures and terrain in a pinch. The dangers of ammo cook-off and the practice of using such weapons for "scorched earth" tactics led to their eventual abandonment in the later Succession Wars, but in the 3050s, munitions plants in the Free Worlds League initiated the first widescale production of incendiary LRMs for today's generation.

INCENDIARY LRMS (STANDARD LRMS/MMLS)

Rules Level: Advanced
Tech Base (Ratings): Inner Sphere (C/E-X-E), Clan (C/X-E-E)
Game Rules: Incendiary LRMs use the same rules as standard LRMs for their launcher and size, with the following exceptions:

- Incendiary LRMs are combined with other LRM munition types at a rate of 1 missile for every 5. Each flight of LRMs using Incendiary rounds will thus function per its normal game rules as though fired by a launcher 20 percent "smaller" (rounded up). (For instance, an Artemis IV-enhanced LRM 20 will attack a unit as if it were an Artemis-enhanced LRM 16 [20 – (20 x .20) = 20 – (4) = 16].)
- When fired at terrain or structures, Incendiary LRMs lower the success number for fire checks by 4; this has already been included on the Starting Fires Table (see p. 42, *TO: AR*). Incendiary LRMs may not set other units on fire or directly raise a target's heat level, however (unlike Infernos, the chemicals used in Incendiary LRMs do not adhere well to armor).
- Against infantry units (conventional and battle armored), Incendiary LRMs add +1 damage to their attack for every 5 missiles in the volley (round up to the nearest 5 missiles).
- Incendiary LRMs check for heat-induced ammunition explosions as Inferno Missiles (see p. 141, *TW*).

MAGNETIC PULSE (MP) MISSILES [STANDARD LRMS/STANDARD SRMS/MMLS]

R&D Start Date: 3050 (Free Worlds League)
Prototype Design and Production: 3055 (Free Worlds League)
Introduced: 3057 (Free Worlds League, Word of Blake)
Extinct: 3065

Magnetic pulse (MP) missiles were designed to overload modern battlefield electronics suites, but when House Marik designers first tested them, they discovered the warheads also weakened the engine shielding strength of fusion-powered targets (such as BattleMechs). These effects convinced the Captain-General to encourage further research on these weapons, which led to the present missile designs now being fielded-tested (sporadically) by the League and their Word of Blake occupiers.

Early reports of MP weapons proved to be exaggerated. Nevertheless, as rumors of an ultimate "'Mech-stunner" weapon circulated in the 3050s, fusion engine manufacturers across the Inner Sphere responded with updated engine containment software designed to adjust to sudden external influences from magnetic-pulse missile volleys. As a result, while the MP missiles' pulse still produces a brief "heat spike" in fusion engines, this is actually a side effect of strengthened containment fields that never exceed a certain limit. This development has left MP missiles mostly limited to their original role of anti-EW work, and hampered their ability to compete with more effective systems that hit the market at the same time, such as ComStar's less-costly "Haywire" iNarc pods. As a result, MP missiles were discontinued shortly before the Jihad.

MAGNETIC PULSE (MP) MISSILES

Rules Level: Experimental
Tech Base (Ratings): Inner Sphere (E/X-X-F)
Game Rules: Magnetic-Pulse (MP) Missiles use the same rules as standard missile types for their launcher and size, with the following exceptions:

- MP Missiles inflict no damage upon a successful attack. Instead, they impose a +1 to-hit modifier on all of the target unit's weapon attacks starting with the end of the Weapon Attack Phase and lasting until the End Phase of the turn following the attack (additional hits by MP Missiles do not extend this effect, nor do they increase the modifier). MP Missiles have no effect against conventional infantry.
- Against any heat-tracking unit powered by a fusion engine, MP Missiles increase the target's heat by +1 for every 5 LRM warheads (or 3 SRM warheads) that hit the target (rounded down). This heat spike affects the unit only for the turn in which the missiles hit, and is subject to the usual rules for outside heat sources (see p. 159, *TW*).
- MP Missiles are incompatible with Artemis, Narc or Streak systems.

MINE CLEARANCE MISSILES (STANDARD LRMS/STANDARD SRMS/MMLS)

Introduced: 3069 (Federated Suns)

To combat the decades-long explosion in enhanced minefield warfare perfected by the Capellan Confederation and its Chaos March insurgents, the Federated Suns began experimenting with a specialized enhancement for SRM and LRM launchers specifically tailored to anti-mine work. Designed to deliver greater concussive force on ground impact, while showering the area with miniature explosives, the so-called mine clearance charges proved extremely effective against minefields, while also acting as a potent anti-infantry munition.

MINE CLEARANCE MISSILES (STANDARD LRMS/STANDARD SRMS/MMLS)

Rules Level: Advanced
Tech Base (Ratings): Inner Sphere (C/X-X-E)
Game Rules: Mine Clearance (MC) Missiles use the same rules as standard missile types for their launcher and size, with the following exceptions:

- Mine Clearance Missiles can only be used to target hexes, not units. However, any units occupying a hex hit by a Mine Clearance Missile strike that possess a BAR of 6 or lower suffer damage as if from an area-effect weapon strike equal to an equivalent missile volley at one-tenth of the rated size, rounded down (minimum 1 point of damage). For example, a volley of MC Missiles fired by an LRM-20 will inflict damage equal to a 2-point area-effect weapon, while a volley of MC Missiles from an SRM-6 will inflict (12 ÷ 10 = 1.2, round down) the equivalent of a 1-point area-effect weapon. See page 113, *TW*, for rules on area-effect weapons.
- Mine Clearance rounds reduce the density of any minefield type by a value equal to the MC volley's rated damage, to a minimum of 0. If more than one minefield is present in the target hex, all fields are affected equally. (For example, an LRM-15 firing MC munitions will reduce a 20-point density minefield to 5 points.)
- Mine Clearance Missiles are incompatible with Artemis, Narc or Streak systems.

SMOKE MISSILES (STANDARD LRMS/STANDARD SRMS/MMLS)

Introduced: 2333 (Terran Hegemony [LRM]); 2370 (Terran Hegemony [SRM])

Like smoke artillery rounds, smoke LRMs and SRMs represent an ancient technology adapted to LRM and SRM use soon after the debut of the launchers themselves. Through the centuries, however, these missiles have seen little use compared to smoke artillery, mainly because battlefield commanders prefer to keep their missile racks lethal.

SMOKE MISSILES (STANDARD LRMS/STANDARD SRMS/MMLS)

Rules Level: Advanced
Tech Base (Ratings): Both (C/D-D-D)
Game Rules: Smoke Missiles use the same rules as standard missile types for their launcher and size, with the following exceptions:

- Smoke Missiles may only target hexes, not other battlefield units, and will not deliver damage to any units in the target hex.
- Smoke Missiles fill a single target hex with a column of smoke 2 levels high (see p. 45, *TO: AR*).
- This smoke is treated as Light Smoke if the weapon delivers 5 points or less in damage to the target hex. Otherwise, it is treated as Heavy Smoke.
- This smoke dissipates in the End Phase, three turns after the turn it was created.
- Smoke Missiles are incompatible with Artemis, Narc or Streak systems.

SWARM/SWARM-I LRMS (STANDARD LRMS/MMLS)

Introduced: 2621 (Terran Hegemony [Swarm LRMs]),
3057 (Free Worlds League [Swarm-I])
Extinct: 2833 (Inner Sphere [Swarm LRMs])
Recovered: 3053 (Federated Commonwealth [Swarm LRMs])

Using more sophisticated (and expensive) guidance systems than standard LRMs, Swarm LRMs were a Star League weapon design used to impressive effect on tightly grouped formations. Rather than simply continuing on or plunging to the ground after missing their targets, Swarm LRMs home in on any other target in the immediate vicinity and may swerve to hit them if fuel and mobility allow. While dangerous to use when allied forces are in close quarters, the use of Swarm LRMs forced many hostile formations to break up and spread out, rather than risk being caught in a devastating Swarm saturation attack.

After the lost technology was re-introduced by FedCom producers in the wake of the Clan invasion, Free Worlds League designers immediately went to work on a modified version, the Improved Swarm (Swarm-I). Similar in many respects to the standard Swarm, Swarm-Is incorporate a rudimentary friend-or-foe recognition system that allows these missiles to ignore friendly forces and focus on the enemy.

SWARM/SWARM-I LRMS (STANDARD LRMS/MMLS)

Rules Level: Advanced
Tech Base (Ratings): Both (E/E-X-D [Swarm]), Inner Sphere (E/X-X-D [Swarm-I])
Game Rules: Swarm and Swarm-I Missiles use the same rules as standard LRM types for their launcher and size, with the following exceptions:

- When resolving a successful Swarm/Swarm-I LRM attack against a target, note the number of missiles in the flight that fail to hit their target based on the Cluster Hits Table. Any remaining missiles in the flight will attempt to attack a secondary target from among the nearest units (friendly or enemy) in the same hex or in any adjacent hex. (For example, if only 12 missiles from an LRM-20 attack using Swarm Missiles successfully hit their target, 8 missiles survive to attack nearby units [20 – 12 = 8]).
- If the initial Swarm/Swarm-I attack missed its target, but possible secondary targets (friendly or enemy) lie in the target's hex or any adjacent hexes, the missiles attack them as a secondary target.
- Swarm and Swarm-I Missiles resolve secondary attacks starting from the nearest unit (beginning with any units in the target's hex and moving outward), using the modifiers from the original attack for range, Attacker movement, Attacker conditions and weather conditions, but replace the original target's movement and terrain modifiers with those of the secondary target. If multiple secondary targets lie within the same distance, the secondary target is chosen at random. No form of line of sight from the attacker to the secondary target is required.
- If the attack succeeds, use the Cluster Hits column based on the surviving missiles (in the case of the above example, this would mean the Attacker rolls on the 8 column for Cluster Hits). Attack direction is always traced from the original attacker.
- Swarm-I Missiles apply an additional +2 modifier for attacks against friendly units unless said units are operating within a hostile ECM field or have suffered a critical hit to their sensors.
- Swarm-I Missiles operating within a hostile ECM field function as standard Swarm LRMs, while standard Swarm LRMs attacking a target within a hostile ECM field function as standard LRMs.
- If any missiles remain from a Swarm/Swarm-I flight that hits a secondary target as described above, they may carry on to attack another secondary target as though the last target hit was their primary. If no other secondary targets exist within range of the last target (except for those already "attacked" once by a Swarm flight), the attack is completed (and any remaining missiles have missed). Neither the original primary target nor any secondary targets may be attacked more than once by any Swarm or Swarm-I flight.
- Swarm and Swarm-I LRMs are incompatible with Artemis, Narc or Streak systems.
- If a target has an Anti-Missile System, determine the number of missiles that will actually attack that target versus those that will go after other targets as normal; do not apply the –4 AMS modifier. Then consult the Cluster Hits Table, using the column for the number of missiles actually attacking the target with AMS. Apply the "8" result from that column against that target. For example, if an LRM-20 with Swarm Missiles hits a target, roll on the Cluster Table for "20" as normal. If the result is 16 missiles, then 16 attack that target (and 4 move on to secondary targets). The attacker consults the "16" column, and applies the result as if he rolled an 8 on that column, which means 10 missiles hit.

TANDEM-CHARGE (TC) MISSILES [STANDARD SRMS/MMLS]

R&D Start Date: 2753 (Terran Hegemony)
Prototype Design and Production: 2757 (Terran Hegemony)

Tandem-charge (TC) SRMs are specially designed warheads that produce an armor-penetrating effect through the use of a two-stage warhead. The first stage, a shaped-charge explosive, weakens modern armor enough so that the second-stage warhead can reach internal components more easily. Though the Star League never managed to put these weapons into production, enough examples survived in caches that they enabled Fed-Com researchers to resume work on their development in the early 3050s. Difficulties with the development team and funding cuts slowed down production of these armor-penetrating munitions, which unfortunately also doubled the weight of a standard SRM, reducing reload capacities, and proved incompatible with smaller LRM missile types.

TANDEM-CHARGE (TC) MISSILES [STANDARD SRMS/MMLS]

Rules Level: Experimental
Tech Base (Ratings): Inner Sphere (E/X-X-E)
Game Rules: Tandem-Charge (TC) Missiles use the same rules as standard SRMs with the following exceptions:

- Upon a successful hit, each TC warhead that strikes armor inflicts damage as a normal SRM round, but also rolls once on the Determining Critical Hits Table. If the warhead struck armor (but not internal structure), apply a –2 modifier to this roll (a Support Vehicle or IndustrialMech with an armor BAR of less than 10 rolls a critical as normal per p. 206 of *TW*). Neither modifier applies if a TC warhead strikes internal structure directly.
- Against conventional infantry, TC missiles are treated as if they inflict half the base Damage Value of an equivalent flight of SRMs (determined before applying any modifiers for heavy weapons fired against conventional infantry, per pp. 216-217, *TW*). Against battle armor, the attacker rolls 2D6 for each TC missile that hits a trooper, eliminating the trooper on a result of 10+.
- Against aerospace units, TC missiles function as standard SRMs.
- In the event of an ammunition explosion, TC warheads explode for 3 points of damage per missile; for example, a single shot from an SRM-6 using TC missiles would explode for 18 points of damage.
- Tandem-Charge SRMs are incompatible with Artemis, Narc or Streak systems.

TEAR GAS SRMS (STANDARD SRMS/MMLS)

Introduced: 2375 (Terran Hegemony)

Another adaptation of proven technology, tear gas SRMs are primarily used for non-lethal crowd control, delivering canisters of irritant gasses into unruly crowds. Though most battlefield troops come prepared for the eventuality of chemical weapons, many can still be caught off-guard by their use.

TEAR GAS SRMS (STANDARD SRMS/MMLS)

Rules Level: Advanced
Tech Base (Ratings): Both (C/B-B-B)
Game Rules: Tear Gas SRMs use the same rules as standard SRM missiles with the following exceptions:

- Tear Gas SRMs may only target hexes, not other units.
- Any size of strike by Tear Gas SRMs fills the target hex with a cloud of Light Smoke 1 level high. This cloud lasts for 1D6+2 turns and drifts in accordance with the normal Smoke rules (see p. 45, *TO: AR*). Units vulnerable to tear gas (described below) that either enter a tear gas cloud or end their turn in one are exposed to the gas.
- Conventional infantry (except those in any kind of environmental suit or spacesuit; see p. 163) and unsealed battle armor without filters or an air supply (which must be declared prior to the start of the scenario) are automatically affected by exposure. Support Vehicles without the Environmental Sealing chassis modification roll 2D6: on an 8+ the unit (or any affected hexes of the unit, in the case of multi-hex vehicles), as well as any vulnerable infantry or passengers transported within, are affected by the exposure.
- A unit affected by tear gas may still move, but may perform no other action until the effects end. Any skill rolls required by affected units are made with a –3 modifier.
- The effects of tear gas last 1D6+2 turns after that unit contacts the gas, clearing in the End Phase of the last turn. If a unit is affected multiple times, the duration of the effect increases by 1D6+2 turns for each time the unit is affected, to a maximum of 15 turns.
- Tear Gas SRMs are incompatible with Artemis, Narc or Streak systems.

THUNDER LRMS (STANDARD LRMS/MMLS)

Introduced: 2620 (Terran Hegemony [Thunder]), 3056 (Capellan Confederation [Inferno]), 3057 (Capellan Confederation [Augmented, Vibrabomb]), 3058 (Capellan Confederation [Active])
Extinct: 2840 (Inner Sphere)
Recovered: 3052 (Federated Commonwealth)

Much like FASCAM, Thunder LRMs are used to dispense mines on the battlefield. Originally developed by the Terran Hegemony to scatter conventional minefields, Thunder LRMs were lost for most of the Succession Wars, only to be recovered soon after the Clan invasion. The 3050s then saw an explosion of alternative minefield types deployed in this method—all introduced by the Capellan Confederation.

THUNDER LRMS (STANDARD LRMS/MMLS)

Rules Level: Advanced
Tech Base (Ratings): Both (E/D-X-D [Thunder]), Inner Sphere (E/X-X-D [Inferno]), Inner Sphere (E-X-X-E [Active, Augmented, Vibrabomb])
Game Rules: Thunder LRMs (and their variants: Thunder-Active LRMs, Thunder-Augmented LRMs, Thunder-Inferno LRMs, and Thunder-Vibrabomb LRMs) use the same rules as standard LRM missiles, with the following exceptions:

- Thunder LRMs may only target hexes, not other battlefield units.
- A successful attack on a target hex deploys a minefield with a density equal to the strength of the launcher delivering it. Multiple (or overlapping) minefields may be laid in the same hex for additional damage, but the total density of all mines in a hex delivered by Thunder LRMs may not exceed 20 points. The one exception to this rule is if a weapon-delivered minefield is laid in the same hex as a minefield placed prior to the start of play, in which case the maximum density of the hex cannot exceed 30 points; i.e. a pre-designated minefield of 15 points is hit by a 20 point weapon-delivered minefield, in which case it would be a 30-point minefield (see p. 175, *TO: AR*).
- If the attack misses, it scatters as per the normal artillery rules (see pp. 150, 153, *TO: AR*). The minefield density of a scattered Thunder attack is reduced by 5 (applied after any other modifiers, to a minimum of 0).
- Thunder-Augmented LRMs deliver minefields that scatter farther out than standard, and so deploy a minefield equal to half the missile flight's strength (rounded up) to the target hex and all adjacent hexes.
- Units within a hex when it is struck by a Thunder LRM flight may exit the hex without setting off the minefields these missiles lay, but all other units entering or passing through a mined hex follow the standard rules for the appropriate minefield (see p. 175, *TO: AR*).
- Once deployed, minefields delivered by any appropriate weapon system function in accordance with their standard game rules (see pp. 176-177, *TO: AR*; Standard Thunder mines and Thunder-Augmented mines use the standard (conventional) minefield rules; Thunder-Active mines use the active minefield rules; Thunder-Vibrabomb mines use the vibrabomb minefield rules).
- Thunder LRMs are incompatible with Artemis, Narc or Streak systems.

MORTAR AMMUNITION

The lack of variety in 'Mech mortar munitions compared to missiles may be better attributed to this weapon system's relatively low proliferation than to its lack of technological sophistication. But even if these weapons are outclassed by the more versatile LRM system, some variety exists in their ammo selections that offers tactical options unavailable to comparable missile systems.

MORTAR AMMUNITION

Rules Level (General): Advanced
Game Rules (General): 'Mech Mortars (see p. 136) and Battle Armor Mortars (see p. 263, *TM*) may use a variety of ammunition types. If a unit with a 'Mech Mortar does not specify its ammo type, use the rules for Armor-Piercing (Shaped-Charge) ammo. Mortars fired on a unit, rather than a hex, use the appropriate Cluster Hits Table to resolve their effects. Mortars fired on a hex, rather than the unit within, deliver the effects of a full volley and do not need to roll on the Cluster Hits Table. Battle armor-mounted mortars that have more than one ammo clip (such as noted in a TRO entry) may carry multiple ammunition types which can be switched during game play. All battle armor in a squad equipped with mortars must mount the same ammunition types.

AIRBURST MORTARS ['MECH MORTAR]

Introduced: 2544 (Terran Hegemony)

In essence, airburst mortars are a special, heavier version of the anti-personnel mortar with a proximity fuse designed to set off the shells at higher than normal altitude. Intended to flush out forces using trenches and field works for cover, these shells saturate an area with hardened shrapnel that inflicts equal damage on infantry and armored targets alike.

AIRBURST MORTARS ['MECH MORTAR]

Rules Level: Advanced
Tech Base (Ratings): Both (C/B-D-C)
Game Rules: Airburst Mortars are area-effect weapons that are fired at a hex, rather than at a target unit. Airburst Mortars inflict 1 damage point per shell to all targets in the hex, and deliver their damage in 1-point clusters (conventional infantry treat Airburst Mortars as a burst-fire weapon that delivers 1D6 ÷ 2 damage per shell). Only units inside buildings avoid this damage (though the building itself suffers damage to its CF). Each shell of Airburst Mortar ammunition inflicts 2 points of damage in an ammunition explosion (multiplied as normal by the mortar rack's size and the total number of unfired rounds). Under no circumstances do Airburst Mortars apply the –4 immobile target to-hit modifier, regardless of whether the target of the attack is a hex, is shut down or immobile, and so on.

ANTI-PERSONNEL (AP) MORTARS ['MECH MORTAR]

Introduced: 2531 (Terran Hegemony)

A common round used in 'Mech mortars when faced with the prospect of heavy infantry activity, anti-personnel mortars use softer metals and ceramics that create a cloud of deadly shrapnel when the shells detonate at (or close to) ground level. Though less popular than shaped-charge mortars due to their ineffectiveness against armored targets, anti-personnel mortars remain a tried and true munition.

ANTI-PERSONNEL (AP) MORTARS ['MECH MORTAR]

Rules Level: Advanced
Tech Base (Ratings): Both (B/B-B-B)
Game Rules: Anti-Personnel (AP) Mortars inflict 1D6 burst-fire damage points (rounded up) per shell to conventional infantry units (for example, a full flight of 8 AP Mortars delivers 8D6 damage to a conventional infantry platoon). Against all other units, AP Mortars inflict 1 damage point per shell, applied in 1-point clusters. Each shell of AP Mortar ammunition inflicts 1 point of damage in an ammunition explosion (multiplied as normal by the mortar rack's size and total number of unfired rounds).

ARMOR PIERCING (SHAPED-CHARGE) MORTARS ['MECH MORTAR]

Introduced: 2531 (Terran Hegemony)

The standard round used in most 'Mech mortars, armor-piercing mortars use shaped charges to penetrate combat armor more effectively. However, because they throw out less shrapnel, armor-piercing mortars are a poor choice against standard infantry.

ARMOR PIERCING (SHAPED-CHARGE) MORTARS ['MECH MORTAR]

Rules Level: Advanced
Tech Base (Ratings): Both (C/B-B-B)
Game Rules: Each shell in an Armor-Piercing 'Mech Mortar flight delivers 1 damage point to conventional infantry units (resolved as a missile Cluster weapon). Against all other units, the shaped-charge munitions inflict 2 damage points per shell, applied in 2-point groups. Each shell of Armor-Piercing 'Mech Mortar ammunition inflicts 2 points of damage in an ammunition explosion (multiplied as normal by the mortar rack's size and the total number of unfired rounds).

FLARE MORTARS [BA MORTAR/'MECH MORTAR]

Introduced: 2536 (Terran Hegemony)

Using phosphorescent chemicals and impact triggers, flare mortars ignite upon landing. Similar to smoke mortars, these shells are often used to mark targets, or to shed light on hidden units during nighttime combat.

FLARE MORTARS [BA MORTAR/'MECH MORTAR]

Rules Level: Advanced
Tech Base (Ratings): Both (B/A-A-A)
Game Rules: Flare Mortars are fired at a hex, rather than at a unit. A successful Flare Mortar attack illuminates the target hex and all adjacent hexes for a number of turns equal to twice the number of shells in the volley (so a 4-mortar volley would illuminate a target hex and its adjacent hexes for 8 turns). Each shell of Flare Mortar ammunition inflicts 1 point of damage in an ammunition explosion (multiplied as normal by the mortar rack's size and the total number of unfired rounds).

Missed Flare Mortar shots will scatter 1D6 hexes in a random direction.

SEMI-GUIDED MORTARS ['MECH MORTAR]

IIntroduced: 3064 (Free Worlds League)

As an eventual expansion on their semi-guided LRM concept, the Free Worlds League's munitions designers introduced a semi-guided form of the 'Mech mortar in an effort to revive the long-overlooked weapon system. Though these more effective variations on shaped-charge mortars proved more accurate than standard shells, the experiment was only partially successful, as warriors continued to prefer more conventional missile systems.

SEMI-GUIDED MORTARS ['MECH MORTAR]

Rules Level: Advanced
Tech Base (Ratings): Inner Sphere (C/X-X-E)
Game Rules: Semi-Guided 'Mech Mortars receive the same benefits as Semi-Guided Missiles (see p. 142, *TW*) if their target is successfully "lit" by a friendly TAG unit. Otherwise, these mortars work in the same fashion as standard Armor-Piercing (Shaped-Charge) Mortars. Semi-Guided Mortars inflict the same damage as Armor-Piercing (Shaped-Charge) Mortars. Each shell of Semi-Guided 'Mech Mortar ammunition inflicts 2 points of damage in an ammunition explosion (multiplied as normal by the mortar rack's size and the total number of unfired rounds).

Remote Sensors: Remote Sensors are designated as ammunition for any unit equipped with a Remote Sensor Dispenser, but are also considered part of the dispenser itself, and count as part of its total weight. Additional bins for dispenser "ammo" may not be assigned to a unit (each dispenser and its sensors are considered a self-contained item).

Remote Sensors deployed by conventional infantry are covered under the *Specialized Infantry* rules (see p. 152).

SMOKE MORTARS [BA MORTAR/'MECH MORTAR]

Introduced: 2531 (Terran Hegemony)

Another common reload for mortar rounds, intended for mobile cover, training, or target-marking purposes, smoke mortars fill their targeted area with thick smoke.

SMOKE MORTARS [BA MORTAR/'MECH MORTAR]

Rules Level: Advanced
Tech Base (Ratings): Both ('Mech: C/E-F-D; BA: D/F-F-D)
Game Rules: Smoke Mortars are fired at a hex, rather than at a unit. On a successful attack, Smoke Mortars create a 2-level high plume of heavy smoke (see p. 45, *TO: AR*) in the target hex that lasts for a number of turns equal to twice the number of shells in the volley (so a 4-mortar volley would fill the target hex with Heavy Smoke for 8 turns). Each shell of exploding Smoke Mortars inflicts 1 point of damage in an ammunition explosion (multiplied as usual by the mortar's rack size and the total number of unfired rounds).

Missed Smoke Mortar shots will scatter 1D6 hexes in a random direction.

REMOTE SENSORS

Introduced: 2590 (Terran Hegemony)

Available in an array of types, including motion detectors, thermal sensors, portable radar and EM scanners, modern remote sensors are often used to set up a perimeter defense network, but because they are readily destroyed and relatively expensive to produce, their utility on a fluid battlefield waned through the Succession Wars. The return of Star League technology (which made mass deployment of such sensors viable) allowed for their revival in more recent years, but they remain susceptible to battlefield countermeasures.

REMOTE SENSORS

Rules Level: Advanced
Available To: CI, BA, PM, BM, IM, CV, SV, AF, CF, SC, DS
Tech Base (Ratings): Both (E/E-F-E)
Game Rules: Ground units (including VTOLs and WiGEs equipped with a Remote Sensor Dispenser (see p. 236, *TM*), as well as conventional infantry designated as Sensor Engineers (see p. 152), may deploy remote sensors at any point during their Movement Phase, at a cost of 1 MP. Aerospace units with a Remote Sensor Dispenser and capable of flying within 7 Altitudes of the ground may deploy these sensors in game play by using the *Bombing* rules (see pp. 245-247, *TW*).

Once deployed, standard sensors settle to the surface of the underlying terrain (and sink to the bottom of water hexes). Units may instead carry naval sensors (which float on water), or a mix of both, but must designate any naval sensors as such on the unit's record sheet before game play begins.

If within range of a deployed Remote Sensor, any friendly unit can monitor the sensor's readings if equipped with one or more of the following systems: Active Probe (any), C^3 Master Computer, Improved C^3 Computer, Cockpit Command Console, or Communications Equipment (1 ton or more). The maximum number of Remote Sensors each system can monitor is cumulative (see the Remote Sensor Monitor Table below). Sensor Specialist Infantry can monitor up to 2 Remote Sensors for every 7-trooper squad in the unit.

A monitored Remote Sensor can spot hidden units within 2 hexes of the sensor, unless such units are using Stealth Armor, Null-Signature System, Void-Signature System, or ECM of any kind. Remote Sensors may be used to spot for LRM indirect fire and artillery attacks, but add a +3 to-hit modifier to any such attack. Remote Sensors may not operate as part of a C^3 network. Hostile ECM that encompasses a sensor's hex, or passes through a line of sight between the monitoring unit and a target sensor, will disrupt this link. A unit may change which Remote Sensor(s) it is monitoring in the End Phase.

Sensors on the ground determine LOS as infantry units. Sensors may be visual, infrared, or radar; all sensors in a single remote sensor dispenser must be of the same type. Visual sensor range uses the Infantry column on the Visual Range Tables (see p. 189, *TO:AR*). Infrared remote sensors use the Support Vehicle Basic Fire Control IR row on the Sensor Range Tables (see p. 190, *TO: AR*). Radar remote sensors use the Support Vehicle Basic Fire Control row on the Sensor Range Tables.

Airborne non-aerospace units monitoring a sensor have a monitoring range of 67 Elevations in the hex the sensor occupies. Each adjacent ring of hexes, moving away from the hex the sensor occupies, subtracts 1 from that elevation (this creates a dome of "monitor-ability"); in other words the distance in hexes plus the difference in elevations added together cannot exceed 67. Airborne aerospace units can only monitor a sensor if using the *Aerospace Units On Ground Mapsheets* rules (see p. 91, *TW*), and at the end of their movement are within 67 hexes of the sensor (airborne aerospace units ignore the "dome" rule). Remote Sensors do not function in space.

Sensors floating on the surface of water can be monitored by units above or below the surface. Sensors on the bottom of a water hex can only be monitored by units underwater or on the water's surface (ground units need to be fully submerged in the same body of water to monitor the sensor). The range a sensor can be monitored through water is 67 Depths up or down, in the hex the sensor occupies. Each adjacent ring of hexes, moving away from the hex the sensor occupies, subtracts 1 from that depth (this creates a right-side-up or up-side-down dome of "monitor-ability", depending upon whether the sensor is on the bottom of the water hex, or floating on the top of the water hex); in other words the distance in hexes plus the difference in depth added together cannot exceed 67. This "dome" flattens as the depth of the water decreases; i.e. if the depth of a water hex occupied by a sensor on the bottom is only 43 hexes, then the number of hex rings on the surface in which a naval vessel could occupy to potentially monitor the sensor would be 24 (or 49 hexes across).

As a further example of sensor use in water, a group is using the *Double-Blind Rules* (see p. 188, *TO: AR*), and a naval vessel is 65 hexes from a floating sensor. Meanwhile an enemy submarine is at Depth 27 and 39 hexes distant from the sensor. If the naval vessel's controller decides to roll for monitoring the sensor (which he can because he's within 67 hexes of the floating sensor), even if the roll is a success, the submarine is just outside of the "up-side-down" dome and so cannot be detected. However, if the submarine moved towards the sensor by 1 hex in the following turn and the naval vessel decides to roll for monitoring the sensor once more, the submarine might be detected.

Remote Sensors may be targeted and destroyed with any successful weapon attack on the sensor's hex that delivers 1 point of damage (or more). This attack receives the standard –4 immobile target modifier, but also applies a +2 to-hit modifier to account for the sensor's small size. Units passing through a sensor hex during their Movement Phase can also declare that they are destroying a sensor (by stepping on/driving over it), which costs 1 MP.

Because they are treated as part of their dispenser, Remote Sensors are destroyed when their dispenser is hit. They do not explode.

REMOTE SENSOR MONITOR TABLE

Monitoring System	Max Remote Sensor Capacity
Active Probe, Light	1
Active Probe, Standard	2
Active Probe, Bloodhound	4
C^3 Master Computer	4
Improved C^3 Computer	3
Cockpit Command Console	4
Communications Equipment	1 per ton
Sensor Engineer Infantry	2 per squad

ADVANCED CONSTRUCTION OPTIONS

The following additional rules do not reflect components for construction units per se, but modifications to the existing design rules that can add greater flexibility to a design. These options can be used together or separately, offering a greater degree of variance in home-grown units, but reflect experimental-level unit design and are not generally compatible with tournament game play.

FRACTIONAL ACCOUNTING

Fractional accounting relaxes the rounding procedures established by the standard construction rules for various units, paving the way for a more fine-tuned distribution of weight across a unit's design. Under fractional accounting, every component with a calculated weight that the designer is instructed to round up, down or normally to the nearest half ton may ignore such rounding instructions and retain all fractions unchanged. Any item described using the phrase "or fraction thereof," however, must be rounded up.

Fractional rounding can be especially effective when dealing with engine, armor and ammunition weights, as further defined below.

Though open to great flexibility, components and units using fractional accounting should still round any figures up to the nearest kilogram (0.001 tons), to keep accounting simple. For this reason, fractional accounting is less useful when finding component weights for Small-sized Support Vehicles (which already use a kilogram standard for construction purposes).

Engines

Under fractional accounting, the weight of many military engines (used by BattleMechs, IndustrialMechs, Combat Vehicles and fighters) can be further refined as well. Standard fusion engines and their internal combustion equivalents (including those in the Large Engine category) remain the same under this approach, while their alternative forms (Compact, Light, XL, XXL, Fuel Cell and Fission) are generally rounded up in standard construction.

With fractional accounting, these engines receive a weight multiplier that can be used instead of the table references given in *TechManual* (or the Large Engine table on p. 120). To find the weight of a given military engine type, multiply its standard fusion engine weight by the value for that engine type listed in the Fractional Engine Multipliers table shown in the Fractional Accounting Tables below. Do *not* round the final result to the nearest half-ton. For example, a 350-rated standard fusion engine weighs 29.5 tons; its light fusion equivalent (with a fractional multiplier of 0.75) would weigh 22.125 tons (rather than the 22.5 tons listed in *TechManual*).

Support Vehicle engines under fractional accounting are computed per their normal rules, but need not round off their final values to the nearest half-ton.

Fractional accounting does not alleviate any engine weight minimums imposed by the vehicle or engine design, and so even under this method, hovercraft still require a minimum 20 percent of total mass in engine weight, while fusion engines may not be constructed lighter than 0.25 tons and fission engines may not be built lighter than 5 tons.

Armor

When using fractional accounting, armor may be installed on a unit in any desired quantity, rather than in full- or half-ton allotments. In this case, armor may be installed on a tonnage-per-point basis, per the Fractional Armor Table. (Remember when using Support Vehicle armor that the weight per point is given in kilograms for Support Vehicle construction; to find the equivalent weight in tons per point, simply divide the kilogram weight by 1,000.)

Critical requirements for a given unit do not change with the amount of armor mounted on it (unless using the *Patchwork Armor* rule; see p. 189).

FRACTIONAL ACCOUNTING TABLES

FRACTIONAL ENGINE MULTIPLIERS

Engine Type	Fractional Multiplier
Fusion	
Standard	1.0
Compact	1.5
Light	0.75
XL	0.5
XXL	0.333
Non-Fusion	
Internal Combustion (ICE)	2.0
Fuel Cell (Cell)	1.2
Fission	1.75

FRACTIONAL ARMOR TABLE

Armor Type	Tons per Point
Standard/Heavy Industrial	0.0625
Stealth	0.0625
Light Ferro-Fibrous	0.0590
Ferro-Fibrous (I.S.)	0.0558
Ferro-Fibrous (Clan)	0.0521
Heavy Ferro-Fibrous	0.0504
Industrial	0.0933
Commercial	0.0417
Support Vehicle	See p. 134, *TM**
Ferro-Lamellor	0.0714
Hardened	0.1250
Laser-Reflective (I.S.)	0.0625
Laser-Reflective (Clan)	0.0625
Modular	N/A
Reactive (I.S.)	0.0625
Reactive (Clan)	0.0625
Vehicular Stealth	0.0625

*To convert Support Vehicle armor from kilograms per point to tons per point, divide the values shown in the referenced table by 1,000.

Ammo

Fractional accounting also allows units to carry ammunition in quantities other than full-ton (or half-ton) lots. Under these rules, units can mount any desired amount of ammo instead, computing the ammo's weight per shot by dividing a full-ton bin by its number of shots. (For example, a shot of MG ammo weighs 0.005 tons [1 ton ÷ 200 shots per ton = 0.005 tons per shot], while a shot of SRM 4 ammo weighs 0.04 tons [1 ton ÷ 25 shots per ton = 0.040 tons per shot].)

For 'Mech units using these rules, remember that ammunition still consumes 1 critical slot for every full ton (or fraction thereof) carried by a weapon. For non-'Mech units, only 1 slot is required per type of ammunition.

MIXED TECHNOLOGIES

Under standard rules, Clan and Inner Sphere technologies cannot be combined on the same chassis of any unit type, nor can units mounting tournament legal and/or advanced technologies be combined with those that employ experimental technologies. In actuality, battlefield salvage and field-testing have opened the door to hybrid units where standard Inner Sphere technologies cross over with equipment of Clan or even experimental origins.

Any unit may be constructed using a mix of Clan and Inner Sphere technologies, including those described as tournament-legal (with rules described in *TechManual*), advanced or experimental. All such items follow their relevant construction rules when installed, including any requirements for heat sinks and power amplifiers. Both structural items (such as internal structure, cockpits, musculature and engines) and non-structural components (such as weapons and heat sinks) may be taken from different technology bases. However, as the original rules for such items pre-supposed their incompatibility, players must use their judgment to resolve any discrepancies in the rules regarding their use.

PATCHWORK ARMOR

A special variation on armor installation, "patchwork" armor describes mounting armor of varying types on the same unit. Though no major manufacturers in the Inner Sphere, Periphery or Clan space produce units with multiple armor types, centuries of scavenging and maverick technicians (by whim or by necessity) have sent many units into the field with patchwork armor. Under this advanced construction option, units may vary their armor types by location, rather than assigning a single type and uniform application across the entire unit.

Only 'Mechs, Combat Vehicles, Support Vehicles with the Armored Chassis modification and fighters may mount patchwork armor (infantry, battle armor, ProtoMechs, other aerospace units and Mobile Structures may not vary their armor types across the unit). The designer of a unit must designate the armor type to be used in each hit location and, using the Fractional Armor Table on page 188, compute the weight of the armor by multiplying its weight (in tons per point) by the number of points assigned to the location, rounding the final result up to the nearest half-ton. In addition, for armor that takes up critical slots, each location selected to feature that particular armor type must allocate a number of critical slots as noted in the Space (per Location) column of the Patchwork Armor Table below. In this case, the required slot space for 'Mechs and Support Vehicles is noted to the left of the slash, and the slot space for Combat Vehicles and fighters is noted on the right of the slash. If slot space is unavailable to mount an armor type in a given location—even after removing equipment and optional components such as lower arm and hand actuators—the desired armor type may not be mounted there.

Even under patchwork armor rules, a unit may not mount multiple armor types in the same location (including locations with a front and rear facing, such as 'Mech torsos). A unit may also not mount armor types illegal for that unit type to mount.

Remember that even with patchwork armor, all normal armor maximum rules still apply for all unit types. For example, a 'Mech's arm can only support a number of armor points equal to twice its internal structure points in that location, and the armor maximums for fighters and vehicles may not be exceeded by any combination of patchwork armor points.

A player with an old-model GRF-1N Griffin *with standard armor opts to use patchwork armor rules to mount some salvaged Inner Sphere ferro-fibrous armor on its right arm. The 55-ton BattleMech's arm has an Internal Structure Value of 9, and—with its fully actuated arm and PPC mount there—has 5 open critical slots in that location. Consulting the tables, the* Griffin*'s player finds that each point of armor placed on the arm will weigh 0.0558 tons, and that mounting the armor*

PATCHWORK ARMOR TABLE

Armor Type	Space (per Location)*	Notes
Standard/ Heavy Industrial	0 / 0	Available to all units
Stealth	2 / 1	No stealth mods when installed as patchwork
Light Ferro-Fibrous	1 / 1	
Ferro-Fibrous (I.S.)	2 / 1	
Ferro-Fibrous (Clan)	1 / 1	
Heavy Ferro-Fibrous	3 / 2	
Industrial	0 / 0	
Commercial	0 / 0	BAR 5
Support Vehicle	0 / 0	
Ferro-Lamellor	2 / 1	
Hardened	0 / 0	All except VTOL, WiGE, Hover, Airship, or Fixed-Wing**
Laser-Reflective (I.S.)	2 / 1	
Laser-Reflective (Clan)	1 / 1	
Modular	N/A	Modular Armor is treated as an item, not as armor
Reactive (I.S.)	2 / 1	
Reactive (Clan)	1 / 1	
Vehicular Stealth	NA / 1	No stealth mods when installed as patchwork

*Number left of slash applies to 'Mechs and Support Vehicles; Number right of slash is for Combat Vehicles and fighters.

**If no Hardened Armor is mounted in the unit's legs, the –1 Running MP for using Hardened Armor does not apply (see p. 93).

there will require 2 critical slots. Going for broke, the player decides to mount the maximum armor value possible for the location: 18 points (9 x 2 = 18), and finds that this armor will weigh 1.5 tons (0.0558 x 18 = 1.0044, round up to 1.5 tons). To avoid wasting an extra half-ton, the player opts for 17 points instead, which will weigh 1 ton (0.0558 x 17 = 0.9486, round up to 1 ton).

SUPER-HEAVY VEHICLES

This Super-Heavy Vehicle construction option enables designers to exceed the standard weight limits established in the construction rules for Combat Vehicles in *TechManual*, effectively creating a new weight class for such vehicles (Super-Heavy). These rules apply only to the construction of select Combat Vehicles, however, and not to Support Vehicles and other battlefield units.

Construction of super-heavy vehicles follows the same procedures and rules as detailed in *TechManual* (see pp. 94-109), but with the following exceptions:

- Combat Vehicles built with a Tracked, Wheeled, Hover, VTOL, or WiGE motive system, as well as Displacement Hull and Submarine Naval Vehicles, may all be built as super-heavy vehicles. Hydrofoil Combat Vehicles may not be built in the Super-Heavy weight class. The maximum attainable weight for each of these units under the Super-Heavy Construction rules is shown in the Super-Heavy Combat Vehicle Table below.
- Combat Vehicles may use any engine type permitted for Combat Vehicles—including, if desired, the Large-sized engines presented on page 119. Where applicable, each motive type applies its Suspension Factor when computing Engine Ratings. Combat Vehicles, other than those built as trailers, must be constructed with at least 1 Cruise MP.
- All Non-Naval Super-Heavy Combat Vehicles compute their internal structure weight as 20 percent of the vehicle's total weight, rather than 10 percent. Round this value up to the nearest half-ton.
- All Super-Heavy Combat Vehicles apart from VTOLs use the Super-Heavy Vehicle Hit Locations Table, and must apply armor and structure to 6 facings (plus any mounted turrets) rather than 4. These facings are: Front, Front-Left, Front-Right, Rear-Left, Rear-Right, and Rear. The amount of internal structure all Super-Heavy Combat Vehicles receive in each location is equal to the unit's tonnage, divided by 10, rounded up.

Super-Heavy Combat Vehicle Game Rules

Super-Heavy Combat Vehicles of all kinds follow the standard rules for gameplay as their standard weight relatives (though Super-Heavy Ground Vehicles use the Large Ground Support Vehicle Hit Location Table; see p. 206, *TW*), but use the appropriate Super-Heavy Vehicle Record Sheet to track damage and determine armor facings.

Non-Naval Super-Heavy Combat Vehicles may enter Depth 1 water, paying the MP costs for such as shown on page 52 of *Total Warfare*. Additionally, these vehicles may carry two battle armor units at a time (see p. 227, *TW*).

ULTRA-LIGHT BATTLEMECHS

Though rare in the extreme, a few ultra-light BattleMechs are known to exist. To construct a 10 or 15 ton ultra-light BattleMech, use all the standard BattleMech construction rules, but use the IndustrialMech Ultra-Light Internal Structure Table (see p. 66, *TM*) to determine internal structure; note that BattleMechs only pay ten percent for their internal structure, so divide the Industrial Standard weight shown on the table for both tonnages by 2 to find the appropriate internal structure weight for BattleMechs.

Ultra-Light BattleMechs follow all the standard rules for game play as any other BattleMech. If any other part of the 'Mech's construction or gameplay rules relies on the 'Mech's size category, treat Ultra-Light BattleMechs as Light BattleMechs.

ADVANCED BATTLE VALUES

The following rules are additions and/or adjustments to those presented in *TechManual* (pp. 302-314). They allow players to calculate the Battle Value for any unit employing the new equipment introduced in *Tactical Operations*.

SATELLITES

Use the rules for calculating an Aerospace BV (see pp. 312-314, *TM*) to find the BV of a satellite. Satellites have a Vehicle Type Modifier of 0.7 when computing Defensive Battle Rating. When calculating their Offensive Battle Rating, satellites find their Speed Factor based on a Maximum Thrust of 0.

RAIL VEHICLES

Use the rules for calculating a Vehicle BV (see pp. 307-309, *TM*) to find the BV of a Rail vehicle. Rail units have a Vehicle Type Modifier of 0.6 when computing Defensive Battle Rating. When calculating their Offensive Battle Rating, Rail vehicles use their Cruise MP rate, rather than their Flank MP rate, when finding their Speed Factor (to account for their track-based limitations).

SUPER-HEAVY COMBAT VEHICLE TABLE

Combat Vehicle Motive Type	Super-Heavy Weight (tons)	Suspension Factor	Terrain Restrictions
Hover	51-100	235 + (45 for every 25 tons* over 50)	No Woods/Jungle
Naval (Displacement)	301-555	(Tonnage ÷ 10, rounded up to the nearest 5)	Water hexes only (Depth 2+)
Naval (Submarine)	301-555	(Tonnage ÷ 10, rounded up to the nearest 5)	Water hexes only (Depth 2+)
Tracked	101-200	0	No Heavy+ Woods/Jungle or Water Depth 2+
Wheeled	81-160	40	No Woods/Jungle, Rough, Rubble, or Water (Depth 2+)
VTOL	31-60	140 + (45 for every 20 tons* over 30)	No Woods, Hills, or Structures at same elevation
Wing-in-Ground (WiGE)	81-160	140 + (35 for every 30 tons* over 80)	No Woods, Hills, or Structures at same elevation

*Or fraction thereof

LARGE-SIZED AIRSHIPS

Use the rules for calculating an airship's BV (see pp. 312-314, *TM*) to find the BV of a Large-sized airship.

LARGE-SIZED NAVAL VESSELS

Use the rules for calculating a Vehicle BV (see pp. 307-309, *TM*) to find the BV of a Large-sized naval vessel.

MOBILE STRUCTURES

The procedure for calculating the Battle Value (BV) of mobile structures is similar to that of other units, as described below.

STEP 1: CALCULATE DEFENSIVE BATTLE RATING

First, **ADD** the following figures:

Total Armor Factor x 2.5

Total CF 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. Other Defensive Equipment items are identified on the Weapon and Equipment Battle Value Tables by a dagger footnote (†).

Next, MULTIPLY the current value by 0.5. This final result is the mobile structure's Defensive Battle Rating (DBR).

STEP 2: CALCULATE OFFENSIVE BATTLE RATING

Calculate the Offensive Battle Rating. This is done by **MULTIPLYING** the Weapon Battle Rating by the mobile structure's speed factor.

Calculate the Weapon Battle Rating

First, add the BV ratings of all remaining weapons and equipment. Unlike most other units, mobile structures do not modify the BV of weapons that fall outside their "forward" arc.

To prevent excessive ammo from distorting the Battle Value, the BV added for ammunition cannot exceed the Battle Value of the weapon itself. If the ammo BV exceeds that of the weapon, reduce the ammo BV to match the unmodified weapon BV. If a mobile structure is armed with several weapons of the same model, total the BV for that model and the ammunition carried before comparing the two BVs.

Add Number of Mobile Structure Hexes x 50

Multiply the Weapon Battle Rating by the mobile structure's Speed Factor

Multiply the mobile structure's Base Weapon Rating and Speed Factor to determine its Offensive BV. Use the mobile structure's maximum MP rating.

STEP 3: CALCULATE THE FINAL BV

Add the Defensive and Offensive Battle Value Ratings and round the resulting sum to the nearest whole number (0.5 rounds up). The result is the mobile structure's BV.

This formula yields a BV of a mobile structure controlled by personnel with the standard Gunnery 4 and Piloting 5 skill levels. If personnel with a different skill level controls the mobile structure, multiply the BV by the appropriate skill level multiplier (see *Constructing a Battle Force*, p. 315, *TM*).

DEFENSIVE FACTORS MODIFIER TABLE [ADDENDUM]

Special Case	Defensive Factor Modifier*
Beast Mounted Infantry	–
Very Large	–0.1
Monstrous	–0.2
Advanced Infantry Armor	–
DEST Infiltration Suit	+0.2
Sneak, Camo	+0.2
Sneak IR	+0.2
Sneak ECM	+0.1

*Modifiers are cumulative.

ADVANCED INFANTRY

Although the process for calculating the Battle Value (BV) of an advanced infantry unit is fundamentally the same as that for conventional infantry (see p. 309, *TM*), the additional options available offer radical new effects on such units' BV. These minor changes are detailed below.

STEP 1: CALCULATE DEFENSIVE BATTLE RATING

CALCULATE the Base Defensive Battle Rating. The damage divisors are provided by the type of armor worn by the infantry (see p. 129), and from their mounts (if beast-mounted; see p. 107).

Sum of Damage Divisors x 1.5

Next, **MULTIPLY** this by the Defensive Factor, which is based on the unit's highest potential target modifier (including bonuses for jump capability and stealth armor), as shown on the Defensive Factors Modifiers Table (above).

Finally, **MULTIPLY** this value by the number of troopers in the unit. This final result is the advanced infantry unit's Defensive Battle Rating.

STEP 2: CALCULATE OFFENSIVE BATTLE RATING

To calculate the Offensive Battle Rating, **ADD** the following:

Total Weapon Battle Rating

Battle Value of all Field Guns/Field Artillery and ammunition.

Battle Value of all Disposable weapons x 0.2

Anti-'Mech Battle Rating

Next, **MULTIPLY** this sum by the unit's Speed Factor to determine its Offensive BV Rating. Use the infantry unit's fastest movement mode (for example, jump infantry use Jumping movement).

STEP 3: CALCULATE FINAL BATTLE VALUE

Add the Defensive Battle Rating to the Offensive Battle Rating. Multiply the result by the values from the Unit Type Modifiers Table (p. 193), 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 levels. If the unit possesses higher or lower skill levels, multiply the BV by the appropriate skill level multiplier (see *Constructing a Battle Force*, p. 315, *TM*)

ADVANCED WEAPONS AND EQUIPMENT

The following rules and tables outline how the new equipment presented earlier in the Advanced Weapons and Equipment section apply to Battle Value calculations.

Equipment Battle Values: Note that any equipment introduced in *TechManual* or in this book that is not included in the Inner Sphere and Clan Equipment and BV Tables (pp. 194–197) is considered to have a BV of 0 for the purposes of calculating a unit's Battle Value.

ACTUATOR ENHANCEMENT SYSTEM

Multiply by 1.25 the unmodified BV of any weapons (including all physical attack weapons, but not including any ammunition) linked to an AES. In addition, when calculating the Offensive Battle Rating, add 10 percent to the 'Mech's total tonnage for each limb mounting an AES.

> *A* Zeus *mounts an AES in the right arm along side a heavy PPC. When calculating the Offensive Battle Rating, the* Zeus *is computed as if it weighs 88 tons (80 tons, plus 10 percent).*

ANGEL ECM (BA)

This is factored into battle armor BV exactly like ECM (see p. 310, *TM*), but adds 2 instead of 1.

ARMOR

Under *TechManual* rules, only 'Mechs used the 'Mech Armor Type Modifier Table. The advanced armor types made available under *Tactical Operations* allow other units to use alternative armor types. When calculating the Defensive Battle Rating for armor for all units except infantry, apply an additional modifier from the Armor Type Modifier Table, at right.

For where other considerations affect the BV calculation process, see below.

Battle Armor Laser-Reflective/Reactive Armor: The BV for these armor types is factored as fire-resistant armor (see p. 310, *TM*).

Hardened Armor/Shields: The movement modifier applied to BattleMechs using Hardened Armor or Shields must be taken into account when calculating the unit's Defensive Factor and Speed Factor.

Modular Armor: Modular Armor increases the total armor carried. Include this additional armor when calculating the Defensive Battle Rating using the Armor Type Modifier for the armor fitted in the same location as the modular armor. Note that while Modular Armor negates the effects of Stealth Armor, you must still include Stealth Armor in your BV calculations as if it functioned at full effect. Similarly, Modular Armor's speed penalty is not taken into account when calculating any element of BV.

Vehicular Stealth Armor: The vehicle uses the same modifiers as a 'Mech equipped with stealth armor. Aerospace and Conventional Fighters add an extra 0.3 to their unit type modifier.

ARMORED COMPONENTS

The Defensive Battle Rating of an armored component is equal to 5 percent of the BV of the item protected per slot. If the item has no BV, then the value is 5 points per slot.

ARMOR TYPE MODIFIER TABLE (NEW)

Armor Type	Modifier
Blue Shield PFD	+0.2*
Commercial	0.5
Ferro Fibrous (All)	1.0
Ferro-Lamellor	1.2
Hardened	2.0
Heavy Industrial	1.0
Industrial	1.0
Laser Reflective	1.5
Modular	**
Reactive	1.5
Standard	1.0
Stealth	1.0

* Add 0.2 to the unit's Armor Type Modifier

** Equal to the modifier for the type of armor installed in the same location

BATTLE ARMOR MECHANICAL JUMP BOOSTER

Include the Jump MP bonus provided by a Mechanical Jump Booster when determining the unit's Defensive Factor and Speed Factor.

BATTLE ARMOR MYOMER BOOSTER

Include the additional MP provided by a Battle Armor Myomer Booster when determining the unit's Defensive Factor and Speed Factor.

BATTLE ARMOR DETACHABLE WEAPON PACK

Battle Armor outfitted with a detachable weapon pack use their standard movement rates (after all weapon packs are detached) when determining the unit's Defensive Factor and Speed Factor.

BATTLEMECH MECHANICAL JUMP BOOSTERS

Calculate BV as normal using maximum jump distance.

BATTLEMECH/PROTOMECH PARTIAL WING

Calculate BV as normal using maximum jump distance (with the Partial Wing bonus) under standard atmospheric conditions.

BATTLEMECH UMU SYSTEM

Calculate as if equipped with jump jets. If Mechanical Jump Boosters are installed, then use the highest movement mode of the two.

BLUE SHIELD PFD

When calculating the Defensive Battle Rating of a 'Mech outfitted with a BSPFD add 0.2 to the unit's Armor Type Modifier and Internal Structure Type Modifier. Vehicles mounting a BSPFD adjust the Defensive Battle Rating armor and internal structure values using the same Armor Type Modifiers and Internal Structure Type Modifiers as a 'Mech. In a similar manner, aerospace units apply the same modifier to their Armor Type Modifiers. The Internal Structure Type Modifier is applied to the aerospace unit's Structural Integrity.

A 'Mech mounting a Blue Shield treats it as a Gauss weapon with critical space in every location except the head when adjusting the Defensive Battle Rating for explosive components.

A Thunderbolt *has been modified to carry a Blue Shield PFD. Normally the standard armor would give it an Armor Type Modifier of 1.0, but with the Blue Shield that increases to 1.2. Lacking CASE in any location, the* Thunderbolt *must also subtract a total of 7 points from its Defensive Battle Rating (1 for every location except the head) to account for the PFD's explosive nature.*

CASE II

No reduction is made to the Defensive Battle Rating for ammunition or Gauss weapons mounted in the same location as CASE II, or one location out per the Damage Transfer Diagram (excepting the legs).

CHAMELEON LIGHT POLARIZATION SHIELD

When calculating the BV of a unit equipped with a Chameleon Light Polarization Shield, add the long-range to-hit modifier when calculating the unit's Defensive Factor.

COCKPIT SYSTEMS – TORSO-MOUNTED COCKPIT

A torso-mounted cockpit significantly improves the BattleMech's chances of survival, especially if the 'Mech has ample center-torso armor. To reflect this, double the center torso armor (front and rear, combined) when computing the 'Mech's total armor factor (and before applying any Armor Type Modifiers) for the base Defensive Battle Rating. Multiply the resulting Battle Value by 0.95 to get the final Battle Value of the unit.

COMBAT VEHICLE CHASSIS MODIFICATIONS

When calculating the BV of a combat vehicle possessing chassis modifications add the modifiers for all modifications to the Unit Type Modifier (see Unit Type Modifiers Table at right).

COOLANT POD

When computing the heat sink capacity of a unit using Coolant Pods, add the following value to the unit's heat sink capacity: (Number of Heat Sinks carried x [Number of Coolant Pods ÷ 5]), rounded up to the nearest whole—to a maximum value of twice the unit's number of heat sinks.

Also, for Defensive BV calculations, subtract 1 point per Coolant Pod slot, to reflect the explosive nature of this item.

DRONE REMOTE OPERATING SYSTEMS

All weapons on a unit equipped with a Drone Remote Operating System multiply their BVs by 0.8. Do not include ammunition when making these BV adjustments.

In addition, multiply the final unit BV by 0.95. Do not apply any BV modifiers for cockpits.

ENGINE SYSTEMS

'Mechs use the expanded 'Mech Engine Type Modifier Table (at right). Alternative engines have no impact on the BV calculations for other units. A Clan 'Mech with an XXL Engine must subtract 15 points per critical space of explosive ammo from its Defensive BV, as for Inner Sphere XL Engines (see p. 302, *TM*).

HANDHELD WEAPONS

The hand-held weapon has its own BV, which is the total of the BV values of the weapons and ammunition it includes, plus any armor it mounts (Armor Factor x 2). When a 'Mech carries the handheld weapon, this BV is added directly to the unit's final BV.

UNIT TYPE MODIFIERS TABLE [ADDENDUM]

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
Rail	0.6
Satellite	0.7
Fixed Structure	0.25
Mobile Structure	0.5
Combat Vehicle Chassis Modifiers	
Flotation Hull	+0.1
Limited Amphibious	+0.1
Fully Amphibious	+0.2
Dune Buggy Modification	+0.1
Environmental (Vacuum) Sealing	+0.1
Specialized Infantry Type Modifiers	
Combat Engineers	+0.1
Marines	+0.3
Mountain Troops	+0.2
Paratroops	+0.1
SCUBA	+0.1
Special Cases	
Aerospace Fighter with Stealth Armor	+0.3
Conventional Fighter with Stealth Armor	+0.3
Infantry created as XCT Troops	+0.1
Vehicles using Armored Motive System	+0.1

'MECH ENGINE TYPE MODIFIER TABLE [ADDENDUM]

Engine Type	Modifier
Large	1
Large Light	0.75
Large XL (IS)	0.5
Large XL (Clan)	0.75
XXL (IS)	0.25
XXL (Clan)	0.5
Large XXL (IS)	0.25
Large XXL (Clan)	0.5

LASER ANTI-MISSILE SYSTEM
The Laser Anti-Missile System counts as a piece of Defensive Equipment when computing a unit's Defensive Battle Rating.

LASER INSULATOR
When calculated heat generated by a unit, reduce the heat levels by 1 for each weapon equipped with a laser insulator.

LASER – BOMBAST
Use the maximum heat level this weapon generates when making BV adjustments for heat.

NULL-SIGNATURE SYSTEM
When calculating the BV of a unit equipped with a Null-Signature System, add the long-range to-hit modifier when calculating the unit's Defensive Factor.

PATCHWORK ARMOR
Calculate the modified Defensive Battle Rating on a location-by-location basis, and then sum the total before multiplying by 2.5 to get the armor DBR.

PPC CAPACITOR
See the Weapons and Equipment BV Table for the modified BV for PPC weapons fitted with a PPC capacitor. Include the heat generated by the capacitor with that generated by the weapon with which it is paired when determining heat values and BV adjustments.

SHIELDS
Include the ground movement modifier when computing the Defensive Factors and Speed Factors of units equipped with a medium or large shield. If a 'Mech carrying a large shield is also jump capable, use the jump movement rating as normal.

STRUCTURE
For the modifiers appropriate to the new internal structure options for 'Mech construction, see the 'Mech Internal Structure Modifier Table [Addendum] below.

SUPERCHARGER
Use the maximum speed provided by the Supercharger when calculating the Defensive and Speed Factors.

TURRETS
All weapons and equipment mounted on a 'Mech in a turret is counted as being in the front firing arc if the Offensive BV of all forward-firing non-turret mounted equipment is greater than that of rear-firing non-turret mounted equipment (otherwise it is treated as being in the rear arc).

'MECH INTERNAL STRUCTURE MODIFIER TABLE [ADDENDUM]

Internal Structure Type	Modifier
Blue Shield PDF	+0.2*
Composite	0.5
Endo-Composite	1.0
Reinforced Structure	2.0

* Add 0.2 to the unit's Internal Structure Type Modifier

VEHICULAR JUMP JETS
Use jump movement like a 'Mech when calculating Defensive and Speed Factors.

VOID-SIGNATURE SYSTEM
When calculating the Defensive Factor of a unit equipped with a Void-Signature System, use either the unit's normal target modifier or the maximum +3 to-hit modifier provided by the System, whichever is higher. In the case of a tie, apply a +1 to-hit modifier from the System in addition to the unit's normal target modifier.

VTOL JET BOOSTER
Use the maximum speed provided by the VTOL Jet Booster when calculating the Defensive and Speed Factors.

VTOL MAST MOUNT
Increase the cost of each item in the Mount by 10 BV (for items that apply a percentage-based BV modifier, rather than a fixed cost, add 10 to the unit's final Battle Value); if the Mast Mount includes C^3, in addition to the 10 points, apply the standard % Defensive modifier based upon the overall unit's Battle Value.

INNER SPHERE WEAPONS AND EQUIPMENT BV TABLE [ADDENDUM]

Item	Item BV	Ammo BV
Energy Weapons		
ER Flamer	16	—
Binary Laser	222	—
Bombast Laser	137	—
VSP Laser (Large)	123	—
VSP Laser (Medium)	56	—
VSP Laser (Small)	22	—
X-Pulse Laser (Small)	21	—
X-Pulse Laser (Medium)	71	—
X-Pulse Laser (Large)	178	—
PPC (Heavy) + PPC Capacitor‡[K]	370	—
PPC + PPC Capacitor‡[K]	264	—
PPC (Light) + PPC Capacitor‡[K]	132	—
PPC (Snub-nose) + PPC Capacitor‡[K]	252	—
ER PPC + PPC Capacitor‡[K]	343	—
Laser Anti-Missile System	45†	—
Ballistic Weapons		
HV AC/2[Q]	53	7
HV AC/5[Q]	109	14
HV AC/10[Q]	158	20
Fluid Gun	6	1
Heavy Flamer	15	2
Improved Heavy Gauss[K]	385	48
Magshot[K]	15	2
Silver Bullet Gauss[K]	198	25
'Mech Mortar/1	10	1
'Mech Mortar/2	14	2
'Mech Mortar/4	26	3
'Mech Mortar/8	50	6
Rifle (Light)	21	3

INNER SPHERE WEAPONS AND EQUIPMENT BV TABLE [ADDENDUM]

Item	Item BV	Ammo BV
Rifle (Medium)	51	6
Rifle (Large)	91	11
Vehicular Grenade Launcher	15	—
Taser, BattleMech[K]	40‡	5
Taser, Battle Armor	15	—
Artillery Cannon, Long Tom	329	41
Artillery Cannon, Sniper	77	10
Artillery Cannon, Thumper	41	5
Missile Weapons		
Enhanced LRM-5	52/10	7
Enhanced LRM-10	104/21	13
Enhanced LRM-15	157/31	20
Enhanced LRM-20	210/42	26
ELRM-5	67/13	8
ELRM-10	133/27	17
ELRM-15	200/40	25
ELRM-20	268/54	34
Thunderbolt-5	64/13	8
Thunderbolt-10	127/25	16
Thunderbolt-15	229/46	29
Thunderbolt-20	305/61	38
Artillery Weapons		
Arrow IV	240	30
Long Tom	368	46
Sniper	85	11
Thumper	43	5
BA Tube Artillery	27	4
Cruise Missile/50	601	75
Cruise Missile/70	1,031	129
Cruise Missile/90	1,530	191
Cruise Missile/120	2,281	285

Item	Item BV	Ammo BV
Melee Weapons		
Chain Whip	(Dmg x 1.725)	—
Claws	(Dmg x 1.275)*	—
Flail	11	—
Lance	(Dmg x 1)*	—
Mace	(Dmg x 1)*	—
Shield, Small	50†	—
Shield, Medium	135†[N]	—
Shield, Large	263†[N]	—
Spikes	4†	—
Vibroblade, Small	12	—
Vibroblade, Medium	17	—
Vibroblade, Large	24	—
Other Equipment		
Actuator Enhancement System	G	—
Angel ECM Suite	100†	—
Armored Components	J	—
Bloodhound Active Probe	25†	—
CASE II	H	—
C^3, Battle Armor	D	—
C^3, Boosted System	D	—
C^3, Emergency Master	D	—
C^3, Remote Sensor Launcher	30	6
Chaff Pod‡	19†[K]	—
Electronic Warfare Equipment	39†	—
MASS	9†	—
M-Pod‡[K]	5†	—
MRM "Apollo" FCS	L	—
Mine Dispenser	P	—
Minesweeper	30†	—
Naval C^3	D	—
Supercharger	C	—
VTOL Mast Mount	M	—

*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 BV.

‡ Treat as Gauss weapon when calculating defensive battle rating.

C CASE/MASC/Triple Strength Myomer/Industrial Triple Strength Myomer/Supercharger: Thought 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^3 Computers, Boosted C^3, Emergency C^3 Masters, and Naval C^3) 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 [Addendum]*, p. 198.

G Actuator Enhancement System: Multiply by 1.25 the BV of all weapons linked to the AES. Do not include the BV of ammo when calculating this sum.

H CASE II: Though these items are used when calculating the Defensive Battle Rating, they have no individual BV.

J Armored Components: The Defensive Battle Rating of an armored component is equal to 5 percent of the BV of the item protected per slot. If the item has no BV, then the BV is 5 points per slot.

K Explodes: Weapon/Equipment explodes when damaged.

L MRM "Apollo" FCS: Increase by 15 percent the BV of any MRM launcher equipped with an Apollo FCS.

M VTOL Mast Mount: Add 10 to the BV of each item in a mast mount (see p. 194).

N Shields: Include the ground movement modifier for medium or large shields. If a 'Mech is carrying a large shield but is also jump capable, use the jump movement rating as normal.

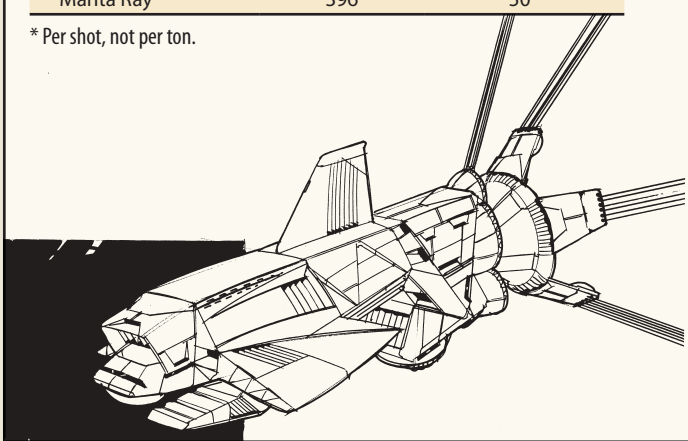
P Mine Dispenser: BV is equal to a 10-point minefield of the appropriate type of mine.

Q HVAC: Treat weapon as a Gauss weapon with one critical slot for defensive BV purposes.

INNER SPHERE CAPITAL SCALE WEAPONS AND EQUIPMENT BV TABLE [ADDENDUM]

Item	Item BV	Ammo BV
Mass Driver		
Mass Driver (Light)	7,056	882
Mass Driver (Medium)	11,760	1,470
Mass Driver (Heavy)	16,464	2,058
Naval Autocannon		
Light SCC	379	47
Medium SCC	708	89
Heavy SCC	991	124
NAC/10	1,896	237
NAC/20	3,792	474
NAC/25	4,740	593
NAC/30	5,688	711
NAC/35	4,956	620
NAC/40	5,664	708
Naval Gauss		
Light N-Gauss	3,024	378
Medium N-Gauss	5,040	630
Heavy N-Gauss	6,048	756
Naval Laser		
SCL/1	237	—
SCL/2	354	—
SCL/3	531	—
NL/35	830	—
NL/45	1,134	—
NL/55	1,386	—
Naval PPC		
Light N-PPC	1,659	—
Medium N-PPC	2,268	—
Heavy N-PPC	3,780	—
Sub-Capital Missiles		
Piranha	589	71*
Stingray	496	62*
Swordfish	317	40*
Manta Ray	396	50*

* Per shot, not per ton.



CLAN CAPITAL SCALE WEAPONS AND EQUIPMENT BV TABLE [ADDENDUM]

Item	Item BV	Ammo BV
Naval Autocannon		
NAC/10	1,896	237
NAC/20	3,792	474
NAC/25	4,740	593
NAC/30	5,688	711
NAC/35	4,956	620
NAC/40	5,664	708
Naval Gauss		
Light N-Gauss	3,024	378
Medium N-Gauss	5,040	630
Heavy N-Gauss	6,048	756
Naval Laser		
NL/35	830	—
NL/45	1,134	—
NL/55	1,386	—
Naval PPC		
Light N-PPC	1,659	—
Medium N-PPC	2,268	—
Heavy N-PPC	3,780	—
Sub-Capital Missiles		
Piranha	589	71*
Stingray	496	62*
Swordfish	317	40*
Manta Ray	396	50*

* Per shot, not per ton.

CLAN WEAPONS AND EQUIPMENT BV TABLE [ADDENDUM]

Item	Item BV	Ammo BV
Energy Weapons		
ER Flamer	16	—
Chemical Laser (Small)	7	1
Chemical Laser (Medium)	37	5
Chemical Laser (Large)	99	12
ER Pulse Laser (Small)	36	—
ER Pulse Laser (Medium)	117	—
ER Pulse Laser (Large)	272	—
Improved Heavy Laser (Small)‡[N]	19	—
Improved Heavy Laser (Medium)‡[N]	93	—
Improved Heavy Laser (Large)‡[N]	296	—
Laser Anti-Missile System	45†	—
Ballistic Weapons		
BA LB-X AC	20	—
ProtoMech AC/2	34	4
ProtoMech AC/4	49	6

CLAN WEAPONS AND EQUIPMENT BV TABLE [ADDENDUM] (CONT.)

Item	Item BV	Ammo BV
ProtoMech AC/8	66	8
Rotary AC/2	161	20
Rotary AC/5	345	43
Fluid Gun	6	1
Heavy Flamer	15	2
'Mech Mortar/1	10	1
'Mech Mortar/2	14	2
'Mech Mortar/4	26	3
'Mech Mortar/8	50	6
Vehicular Grenade Launcher	15	—
Artillery Cannon, Long Tom	329	41
Artillery Cannon, Sniper	77	10
Artillery Cannon, Thumper	41	5
Missile Weapons		
Streak LRM 1	17	2
Streak LRM 2	34	4
Streak LRM 3	51	7
Streak LRM 4	68	9
Streak LRM 5	86/17	11
Streak LRM 6	103	13
Streak LRM 7	120	15
Streak LRM 8	137	17
Streak LRM 9	155	19
Streak LRM 10	173/35	22
Streak LRM 11	190	24
Streak LRM 12	207	26
Streak LRM 13	224	28
Streak LRM 14	241	30
Streak LRM 15	259/52	32
Streak LRM 16	276	35
Streak LRM 17	293	37
Streak LRM 18	310	39
Streak LRM 19	327	41
Streak LRM 20	345/69	43

Item	Item BV	Ammo BV
Artillery Weapons		
Arrow IV	240	30
Long Tom	560	46
Sniper	96	11
Thumper	48	5
Melee Weapons		
Claws	(Dmg x 1.275)*	—
ProtoMech Melee Weapon	(Dmg x 1.25)*	—
Talons	(Kick Dmg x 1)*	—
Other Equipment		
Actuator Enhancement System	G	—
Angel ECM Suite	100†	—
Armored Components	H	—
Artemis V FCS	J	—
CASE II	K	—
Machine Gun Array	L	—
MASS	9†	—
Minesweeper	30†	—
Watchdog CEWS	68†	—
VTOL Mast Mount	M	—

*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 BV.

‡ Treat as Gauss weapon when calculating defensive battle rating.

G Actuator Enhancement System: Multiply by 1.25 the BV of all weapons linked to the AES. Do not include the BV of ammo when calculating this sum.

H Armored Components: The Defensive Battle Rating of an armored component is equal to 5 percent of the BV of the item protected per slot. If the item has no BV, then the cost is 5 points per slot.

J Artemis V FCS: Increase by 30 percent the BV of any missile launcher equipped with Artemis V.

K CASE II: Though these items are used when calculating the Defensive Battle Rating, they have no individual BV.

L Machine Gun Array: BV is the BV of all the weapons on the array (but not the ammunition) x 0.1.

M VTOL Mast Mount: Add 10 to the BV of each item in a mast mount (see p. 194).

N Explodes: Component explodes when damaged.

AEROSPACE WEAPONS AND EQUIPMENT BV TABLE [ADDENDUM]

Item	Item BV	Ammo BV
External Stores		
AAA Missile	—	57 each
AS Missile	—	114 each
ASEW Missile	—	75 each
Arrow IV Non-Homing Missile	—	34 each
Inferno Bomb	—	16 each
LAA Missile	—	17 each
Thunder Bomb	—	*
Torpedo Bomb	—	10 each

*Thunder Bomb has a BV equal to seven 20-point minefields of the appropriate type of mine.

MINEFIELD BV TABLE

Type	BV per 5 Points	BV per Hex
Active Mine	6	—
Command Detonated	6	—
EMP	—	45
Inferno	5	—
Space	5	—
Standard	4	—
Vibrabomb	5	—

CONSTRUCTING A BATTLE FORCE [ADDENDUM]

The following rules are intended to augment the rules for adjusting the Battle Value of a battle force (see p. 315, *TM*). As before, the BV of each unit is adjusted to take into account additional factors such as special equipment, troop quality, and force size.

ALTERNATIVE MUNITIONS (NEW)

Some alternative munitions require the base BV of a unit carrying it to be increased before any other modifiers are applied. Consult the Alternative Munitions Table to find the modifier to the ammunition's base Battle Value. One-shot weapons (such as vehicular grenade launchers) use the BV of their launcher rather than of the ammunition.

ALTERNATIVE MUNITIONS TABLE

Type	BV Modifier*
Autocannon Munitions	
Caseless	1.0
Tracer	0.25
Artillery	
Thunder/FASCAM	†
Flamer/Fluid Gun/Sprayer Ammunition	
Corrosive	2.0
Inferno Fuel	2.0
Grenade Launcher	
Incendiary Grenades	0.5
Missile Munitions	
Acid	1.0
Anti-Radiation	0.3
Follow-the-Leader Missiles	0.5
Heat-Seeking	0.5
Magnetic Pulse	1.0
Swarm-I	0.2
Tandem-Charge	1.0
Thunder/FASCAM	†
'Mech Mortar Munitions	
Armor Piercing	0.2

*Multiplier is applied to each ton of ammunition to find the additional base BV value for the ammunition. For single-shot weapons the modifier is applied to the weapon itself.

†Calculate the BV by finding the total points of mines per ton, then dividing by 5. Multiply the result by the BV given on the Minefield BV Table (p. 197).

TARGET ACQUISITION GEAR (EXPANDED)

When used in conjunction with TAG, certain equipment will increase the base Battle Value of units in a battle force. 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 Arrow IV Homing artillery missiles, Copperhead Artillery ammunition, Semi-guided LRM ammunition, or Semi-guided Mortar ammunition carried in the force (as listed in the Equipment BV Tables). Add this BV to a unit multiple times if it carries multiple instances of TAG. Units whose only such piece of equipment is rear-mounted add half the BV instead.

COMMAND, CONTROL, AND COMMUNICATIONS (EXPANDED)

Two or more units in a battle force equipped with C^3 systems can be designated as part of a C^3 network (see p. 131, *TW*). Add 5 percent of the total BV of all units in a C^3 network to each of the units linked by each network.

Boosted C^3 networks add 7 percent of the total BV of all units in a C^3 network.

For units in a network that mixes regular and boosted C^3, each member calculates the BV modifier based on the C^3 type that unit possesses.

EXTERNAL STORES (EXPANDED)

Tactical Operations introduces a number of new types of external stores from which players can choose. See the Aerospace Weapons and Equipment Table [Addendum] on page 197 for their BV values.

SKILL RATINGS (EXPANDED)

After applying modifiers to the base BV for alternative ammunition, TAG, C^3, and External Stores, adjust the BV value to reflect the skill ratings of the units. (See p. 315, *TM*.)

Cockpits: To reflect the general impact of the control systems, units with a Small Cockpit reduce their Battle Values by a flat 5 percent.

Drones: Use the Piloting and Gunnery skill of drone's operator before adjustments for operating the unit as a drone are made.

MINEFIELDS (NEW)

Potentiality a battle force may start the game with one or more minefields in place. See the Minefield BV Table (see p. 197) for the BV for the different types of minefields available. The BV for any deployed mines is added after all other calculations. Minefields are not included in the unit count when adjusting the BV for the relative sizes to each force.

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BATTLETECH™

ADVANCED 'MECH RECORD SHEET

'MECH DATA

Type: _____

Movement Points: | Tonnage: _____

Walking: _____ | Tech Base:

Running: _____ | Clan ☐

Sprinting: _____ | Inner Sphere ☐

Jumping: _____ | Mixed ☐

UMU: _____

Weapons & Equipment Inventory (hexes)

Qty	Type	Loc	Ht	Dmg	Min	Sht	Med	Lng

LRM Status: Standard ☐ Hot Loaded ☐

Cost: _____ BV: _____

WARRIOR DATA

Name: _____

Gunnery Skill: ___ Piloting Skill: ___

Hits Taken	1	2	3	4	5	6
Consciousness#	3	5	7	10	11	Dead

Name: _____

Gunnery Skill: ___ Piloting Skill: ___

Hits Taken	1	2	3	4	5	6
Consciousness#	3	5	7	10	11	Dead

Cockpit Type:
Standard ☐
Small ☐
Dual Cockpit ☐
Command Console ☐
Torso Mounted ☐
Auto Eject: ☐

NOTES

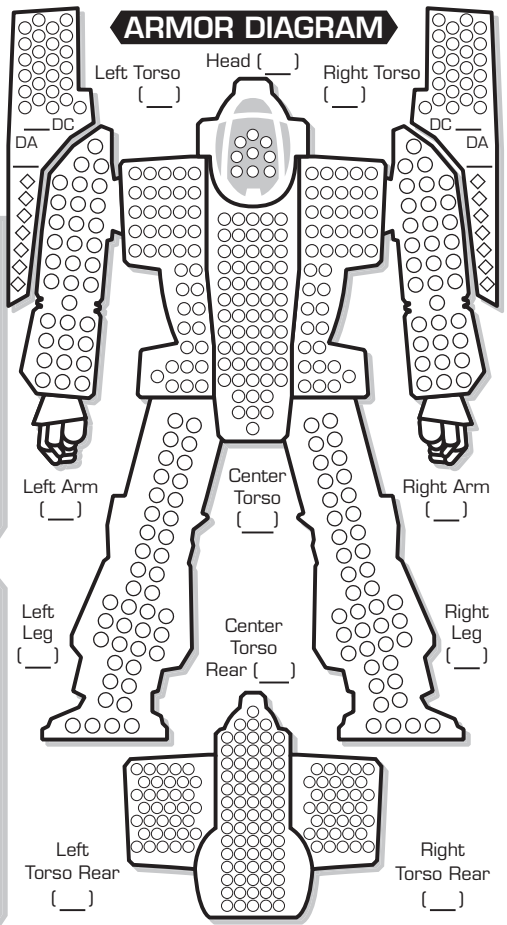
Internal Structure Type:
Standard (S) ☐
Endo-Steel (ES) ☐
Endo-Composite (EC) ☐
Reinforced (R) ☐
Composite (C) ☐
Industrial (I) ☐

Gyro Type:
Standard ☐
Compact ☐
Heavy-Duty ☐
XL ☐

Heat Sink Type:
Single ☐
Double ☐
Compact ☐
Laser ☐

Armor Type:
Standard (S) ☐
Ferro Fibrous (FF) ☐
Ferro-Lamellor (FL) ☐
Light Ferro Fibrous (LF) ☐
Heavy Ferro Fibrous (HF) ☐
Stealth (ST) ☐
Hardened (H) ☐
Reactive (R) ☐
Laser Reflective (LR) ☐
Heavy Industrial (HI) ☐
Industrial (I) ☐
Commercial (C) ☐

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

Turret ☐

1. ○ Life Support
2. ○ **Sensors**
3. ○ Cockpit
4. ○ _____
5. ○ **Sensors**
6. ○ Life Support

Full Head Ejection System ☐

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. ○ _____

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. ○ _____

Left Torso

Turret ☐

1-3
1. ○ _____
2. ○ _____
3. ○ _____
4. ○ _____
5. ○ _____
6. ○ _____

4-6
1. ○ _____
2. ○ _____
3. ○ _____
4. ○ _____
5. ○ _____
6. ○ _____

Right Torso

Turret ☐

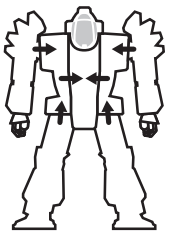
1-3
1. ○ _____
2. ○ _____
3. ○ _____
4. ○ _____
5. ○ _____
6. ○ _____

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. ○ _____

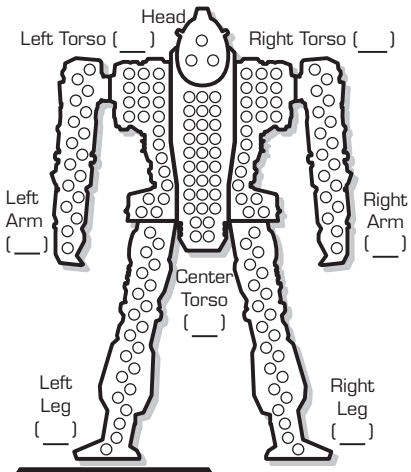


Damage Transfer Diagram

Right Leg

1. ○ Hip
2. ○ **Upper Leg Actuator**
3. ○ **Lower Leg Actuator**
4. ○ **Foot Actuator**
5. ○ _____
6. ○ _____

INTERNAL STRUCTURE DIAGRAM



Heat Scale

Overflow

50* 49* 48* 47* 46* 45* 44* 43* 42* 41* 40* 39* 38* 37* 36* 35* 34* 33* 32* 31* 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
33	+5 Modifier to Fire
32	Pilot Damage, avoid on 8+
31	–6 Movement Points
30	Shutdown, avoid 12+
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 Level*	Effects (cont.)
50	SHUTDOWN
49	–9 Movement Points
48	+7 Modifier to Fire
47	Pilot Damage, avoid on 12+
46	Shutdown, avoid 20+
45	AMMO EXPLOSION
44	System Failure. avoid on 10+
43	–8 Movement Points
42	Shutdown, avoid 18+
41	+6 Modifier to Fire
40	Ammo Exp. avoid on 12+
39	Pilot Damage, avoid on 10+
38	Shutdown, avoid 16+
37	–7 Movement Points
36	System Failure. avoid on 8+
35	Ammo Exp. avoid on 10+
34	Shutdown, avoid 14+

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BATTLETECH™

ADVANCED FOUR-LEGGED 'MECH RECORD SHEET

'MECH DATA

Type: _____

Movement Points: | Tonnage: _____
Walking: _____ | Tech Base:
Running: _____ | Clan ☐
Sprinting: _____ | Inner Sphere ☐
Jumping: _____ | Mixed ☐
UMU: _____

Weapons & Equipment Inventory (hexes)

Qty	Type	Loc	Ht	Dmg	Min	Sht	Med	Lng

LRM Status: Standard ☐ Hot Loaded ☐

Cost: _____ BV: _____

WARRIOR DATA

Name: _____
Gunnery Skill: ___ Piloting Skill: ___

Hits Taken	1	2	3	4	5	6
Consciousness#	3	5	7	10	11	Dead

Name: _____
Gunnery Skill: ___ Piloting Skill: ___

Hits Taken	1	2	3	4	5	6
Consciousness#	3	5	7	10	11	Dead

Cockpit Type: Dual Cockpit ☐
Standard ☐ Command Console ☐
Small ☐ Torso Mounted ☐
Auto Eject: ☐

NOTES

Internal Structure Type:
Standard (S) ☐
Endo-Steel (ES) ☐
Endo-Composite (EC) ☐
Reinforced (R) ☐
Composite (C) ☐
Industrial (I) ☐

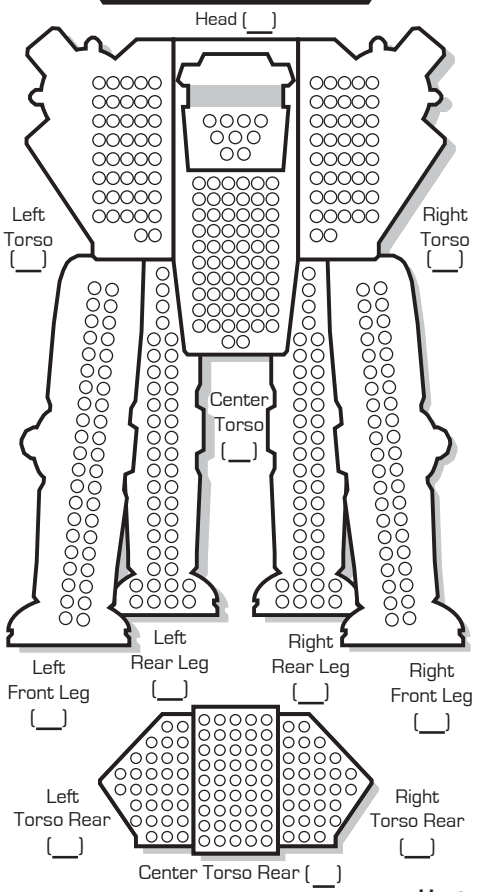
Gyro Type:
Standard ☐
Compact ☐
Heavy-Duty ☐
XL ☐

Heat Sink Type:
Single ☐
Double ☐

Armor Type:
Standard (S) ☐
Ferro Fibrous (FF) ☐
Ferro-Lamellor (FL) ☐
Light Ferro Fibrous (LF) ☐
Heavy Ferro Fibrous (HF) ☐
Stealth (ST) ☐
Hardened (H) ☐
Reactive (R) ☐
Laser Reflective (LR) ☐
Heavy Industrial (HI) ☐
Industrial (I) ☐
Commercial (C) ☐

Compact ☐
Laser ☐

ARMOR DIAGRAM



CRITICAL HIT TABLE

Head Turret ☐
1. Life Support
2. **Sensors**
3. Cockpit
4. _____
5. **Sensors**
6. Life Support

Full Head Ejection System ☐

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. _____

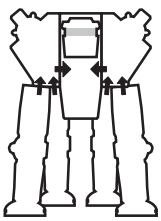
Center Torso
1-3: 1. **Engine** 2. **Engine** 3. **Engine** 4. **Gyro** 5. **Gyro** 6. Gyro
4-6: 1. Gyro 2. Engine 3. Engine 4. Engine 5. _____ 6. _____

Left Torso Turret ☐
1-3: 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____
4-6: 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____

Right Torso Turret ☐
1-3: 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____
4-6: 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____

Engine Hits ○○○
Gyro Hits ○○○
Sensor Hits ○○
Life Support ○

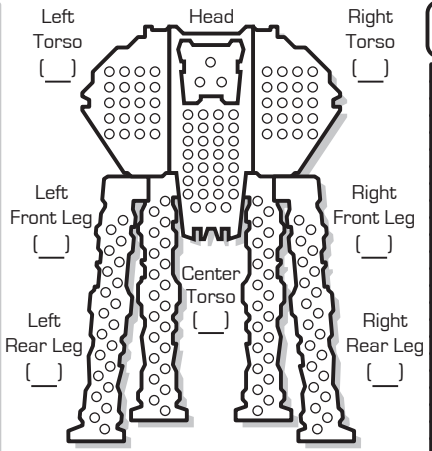
Left Rear Leg
1. **Hip**
2. **Upper Leg Actuator**
3. **Lower Leg Actuator**
4. **Foot Actuator**
5. _____
6. _____



Damage Transfer Diagram

Right Rear Leg
1. **Hip**
2. **Upper Leg Actuator**
3. **Lower Leg Actuator**
4. **Foot Actuator**
5. _____
6. _____

INTERNAL STRUCTURE DIAGRAM



HEAT DATA

Heat Sinks: ____ (____)

Heat Level*	Effects
33	+5 Modifier to Fire
32	Pilot Damage, avoid on 8+
31	–6 Movement Points
30	Shutdown, avoid 12+
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 Level*	Effects (cont.)
50	SHUTDOWN
49	–9 Movement Points
48	+7 Modifier to Fire
47	Pilot Damage, avoid on 12+
46	Shutdown, avoid 20+
45	AMMO EXPLOSION
44	System Failure. avoid on 10+
43	–8 Movement Points
42	Shutdown, avoid 18+
41	+6 Modifier to Fire
40	Ammo Exp. avoid on 12+
39	Pilot Damage, avoid on 10+
38	Shutdown, avoid 16+
37	–7 Movement Points
36	System Failure. avoid on 8+
35	Ammo Exp. avoid on 10+
34	Shutdown, avoid 14+

Heat Scale

Overflow
50* 49* 48* 47* 46* 45* 44* 43* 42* 41* 40* 39* 38* 37* 36* 35* 34* 33* 32* 31* 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

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BATTLETECH™

ADVANCED GROUND VEHICLE RECORD SHEET

VEHICLE DATA

Type: _____

Movement Points:
Cruising: _____
Flank: _____
Jump: _____
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

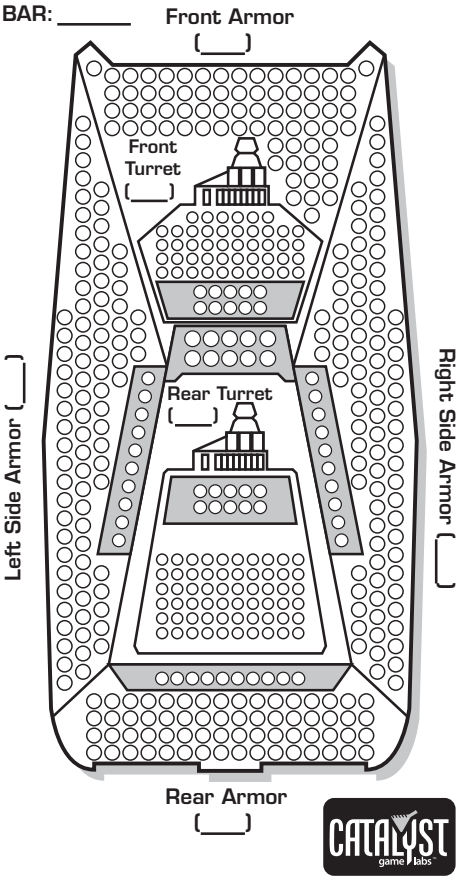
CRITICAL DAMAGE

Front Turret Locked ☐ Engine Hit ☐
Rear Turret Locked ☐
Sensor Hits +1 +2 +3 D
Motive System Hits +1 +2 +3
Stabilizers
Front ☐ Left ☐ Right ☐
Rear ☐ Ft. Turret ☐ Rr. Turret ☐

NOTES

ARMOR DIAGRAM

BAR: _____



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™

ADVANCED V.T.O.L. 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 To-Hit rolls

Pilot Hit +2
Modifier to Driving Skill rolls

CRITICAL DAMAGE

Flight Stabilizer* +3 ☐ Engine Hit ☐
Turret Locked ☐
Sensor Hits +1 +2 +3 D

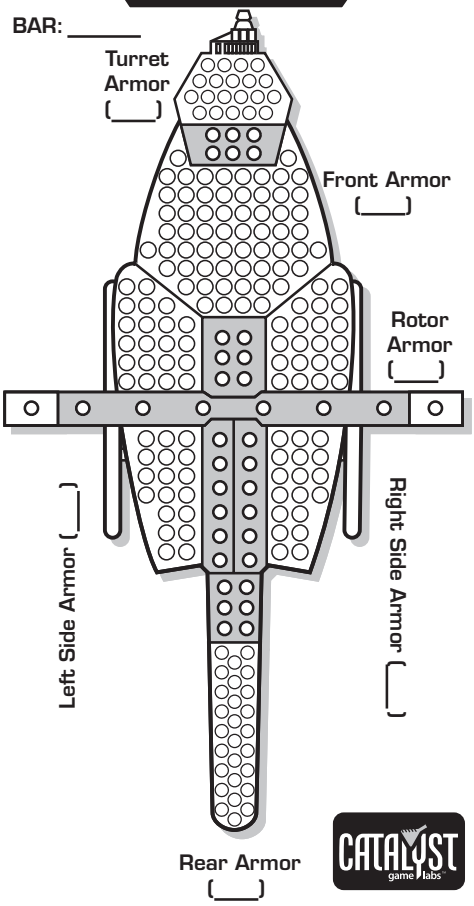
Stabilizers
Front ☐ Left ☐ Turret ☐
Rear ☐ Right ☐

*Move at Cruising speed only

NOTES

ARMOR DIAGRAM

BAR: _____



VTOL COMBAT VEHICLE HIT LOCATION TABLE

2D6 Roll	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, apply 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

2D6 Roll	LOCATION HIT FRONT	SIDE	REAR	ROTORS	TURRET
2–5	No Critical Hit	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™

LARGE NAVAL VESSEL RECORD SHEET

VEHICLE DATA

Type: _____

Movement Points:
Cruising: _____
Flank: _____
Movement Type: _____
Engine Type: _____

Tonnage: _____
Template: _____
Tech Base:
Clan ☐
Inner Sphere ☐

Weapons & Equipment Inventory (hexes)

Qty	Type	Loc	Dmg	Min	Sht	Med	Lng
_	_____	_	_	_	_	_	_
_	_____	_	_	_	_	_	_
_	_____	_	_	_	_	_	_
_	_____	_	_	_	_	_	_
_	_____	_	_	_	_	_	_
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_	_____	_	_	_	_	_	_
_	_____	_	_	_	_	_	_
_	_____	_	_	_	_	_	_
_	_____	_	_	_	_	_	_
_	_____	_	_	_	_	_	_

Cost: _____ BV: _____

CRITICAL DAMAGE

Engine Hit ☐
Sensor Hits +1 +2 +3 D
Turret 1 Locked ☐ Turret 2 Locked ☐
Turret 3 Locked ☐ Turret 4 Locked ☐
Turret 5 Locked ☐ Turret 6 Locked ☐
Turret 7 Locked ☐ Turret 8 Locked ☐
Turret 9 Locked ☐

Stabilizers
Forward ☐ F. Right ☐ Aft Right ☐
F. Left ☐ Aft Left ☐ Aft ☐
Turret 1 ☐ Turret 2 ☐ Turret 3 ☐
Turret 4 ☐ Turret 5 ☐ Turret 6 ☐
Turret 7 ☐ Turret 8 ☐ Turret 9 ☐

CREW DATA

Crew: _____ Life Boats: _____
Gunnery Skill: ___ Driving Skill: ___

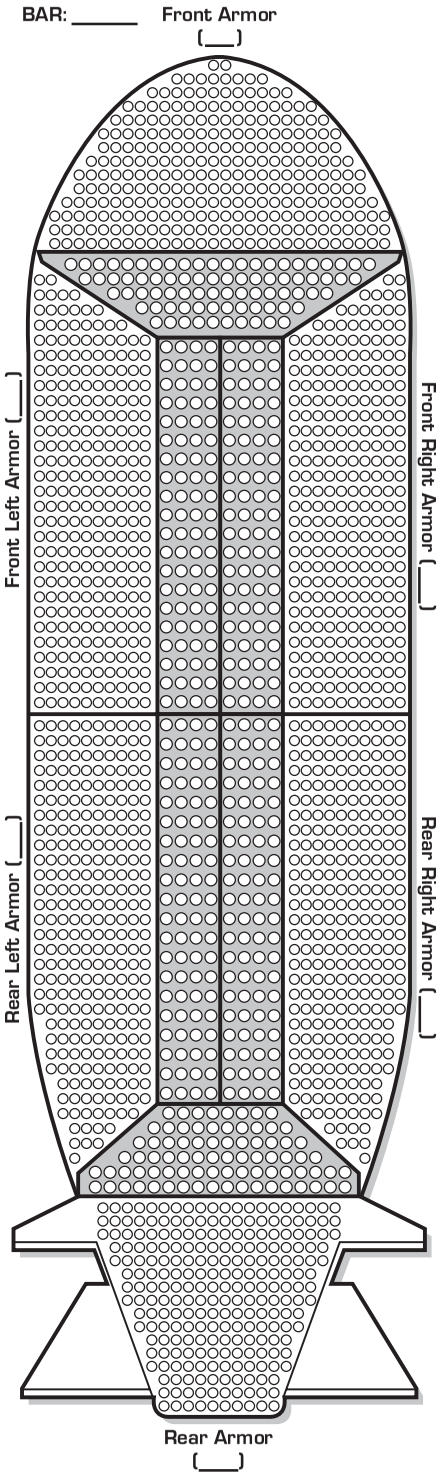
Hits Taken	1	2	3	4	5	6
Modifier	+1	+2	+3	+4	+5	Incp.

DEPTH TRACK

Turn	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Depth																				

ARMOR DIAGRAM

Turret 1 Armor (___)
Turret 2 Armor (___)
Turret 3 Armor (___)
Turret 4 Armor (___)
Turret 5 Armor (___)
Turret 6 Armor (___)
Turret 7 Armor (___)
Turret 8 Armor (___)
Turret 9 Armor (___)



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BATTLETECH™

SUPER-HEAVY 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

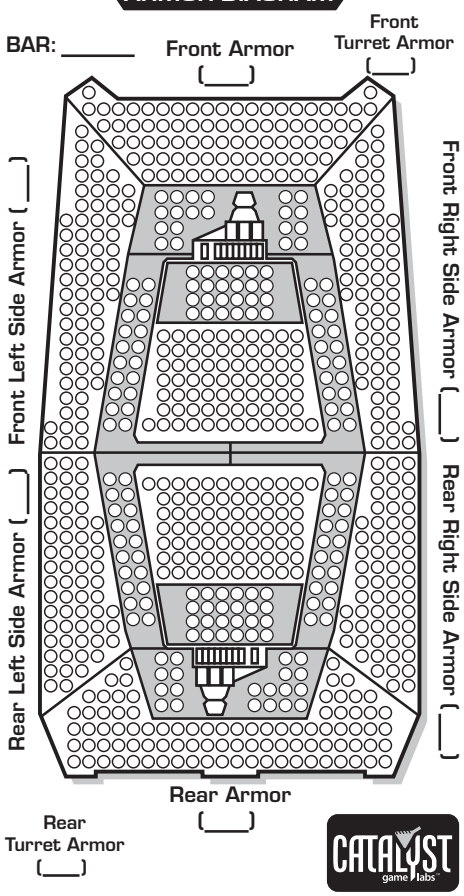
Crew: _____
Gunnery Skill: ___ Driving Skill: ___
Commander Hit +1 ☐ Modifier to all Skill rolls
Driver Hit +2 ☐ Modifier to Driving Skill rolls

CRITICAL DAMAGE

Front Turret Locked ☐ Engine Hit ☐
Rear Turret Locked ☐
Sensor Hits +1 ☐ +2 ☐ +3 ☐ D ☐
Motive System Hits +1 ☐ +2 ☐ +3 ☐
Stabilizers
Front ☐ Left ☐ Right ☐
Rear ☐ Ft. Turret ☐ Rr. Turret ☐

NOTES

ARMOR DIAGRAM



SUPER-HEAVY 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.

SUPER-HEAVY 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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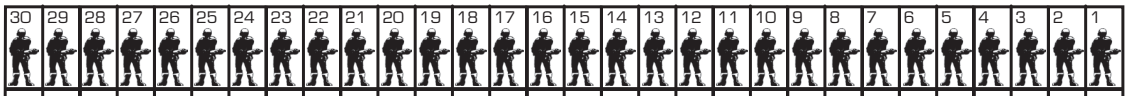
BATTLETECH™

ADVANCED CONVENTIONAL INFANTRY RECORD SHEET

CONVENTIONAL INFANTRY: PLATOON/POINT 1

Armor Type: _____ Divisor: ____

Experience: _____
Gunnery Skill: ____
Anti-'Mech Skill: ____
Max Weapon Damage*
Notes: _____



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																						

Field Gun Type: _____ Ammo: ____ Disposable Weapon: _____ Ammo: ____

Disposable Weapon: _____ Ammo: ____ Disposable Weapon: _____ Ammo: ____

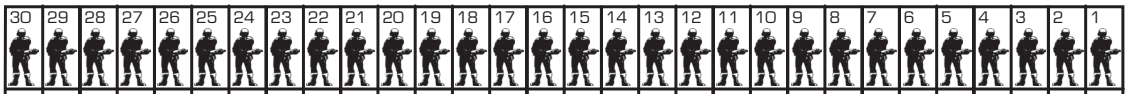
*Damage is always applied in 2-point Damage Value groupings

Movement MP: _____ Type: _____

CONVENTIONAL INFANTRY: PLATOON/POINT 2

Armor Type: _____ Divisor: ____

Experience: _____
Gunnery Skill: ____
Anti-'Mech Skill: ____
Max Weapon Damage*
Notes: _____



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																						

Field Gun Type: _____ Ammo: ____ Disposable Weapon: _____ Ammo: ____

Disposable Weapon: _____ Ammo: ____ Disposable Weapon: _____ Ammo: ____

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

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
Physical Attack††	Damage Value / 10
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.
††Unless the physical attack weapon has a stated anti-infantry value (like the Combine), treat any physical attack as a Damage Value/10.
‡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*).

MORALE TABLE

Experience Level	BattleMechs* Morale Target	Combat Vehicles† Morale Target	Infantry‡ Morale Target	Support Vehicles§ Morale Target
Green	4	6	9	10
Regular	2	4	6	7
Veteran	—§§	2	4	5
Elite	—§§	—§§	2	2

* Includes ProtoMechs and aerospace fighters.
† Includes military conventional fighters, Small Craft and DropShips.
‡ Includes military Support Vehicles.
§ Includes IndustrialMechs (unless piloted by a military MechWarrior, in which case treat as a Combat Vehicle) and all civilian aerospace units.
§§ See Infernos and Cruise Missile Attack (under *Morale Checks*, p.179, *TO:AR*).

SPECIAL SOURCE MODIFIER (ALL)

Inferno	+1/+3*
Cruise Missile	+2

*The modifier to the left of the slash is for all non-infantry units, the modifier to the right of the slash for infantry.

ATTACK SOURCE MODIFIER (INFANTRY ONLY)

BattleMech in LOS	+1
Artillery	+2
Flamer or Fire	+3

OTHER MODIFIERS MODIFIER (INFANTRY ONLY)

Broken Morale	+1
Cumulative Modifiers	
Light or Medium Battle Armor Unit	–1
Heavy or Assault Battle Armor Unit	–2
Anti-'Mech Skill of 5 or less	–1
Conventional Infantry with Armor (see p. 129)	–1
Unit in Building	–2

RECOVERING NERVE TABLE

NOTE: These modifiers only apply if a friendly unit/commander is within seventeen hexes of the unit attempting to recover its nerve.

COMMANDERS*

Sub-force Commander in LOS	–1
Force Commander in LOS	–2

INFANTRY ONLY

Friendly non-'Mech, non-infantry unit in LOS	–1
Friendly 'Mech in LOS	–2
Another Routed Infantry Unit in LOS	+1
Another Routed Non-Infantry Unit in LOS	+2
Routed Unit	+3

*Only applies if the *Commanders* rules (see p.159, *TO:AR*) are in use.

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BATTLETECH™

SATELLITE RECORD SHEET

ARMOR DIAGRAM

Standard Scale

BAR:_____

SATELLITE DATA

Type:_____

Thrust:
Station Keeping Only

Tonnage:_____

Tech Base:
Clan ☐
Inner Sphere ☐

Weapons & Equipment Inventory

Standard Scale

Qty	Type	Loc.	Ht	(0–6) SRV	(6–12) MRV	(13–20) LRV	(21–25) ERV
___	_____	___	___	___	___	___	___
___	_____	___	___	___	___	___	___
___	_____	___	___	___	___	___	___
___	_____	___	___	___	___	___	___
___	_____	___	___	___	___	___	___
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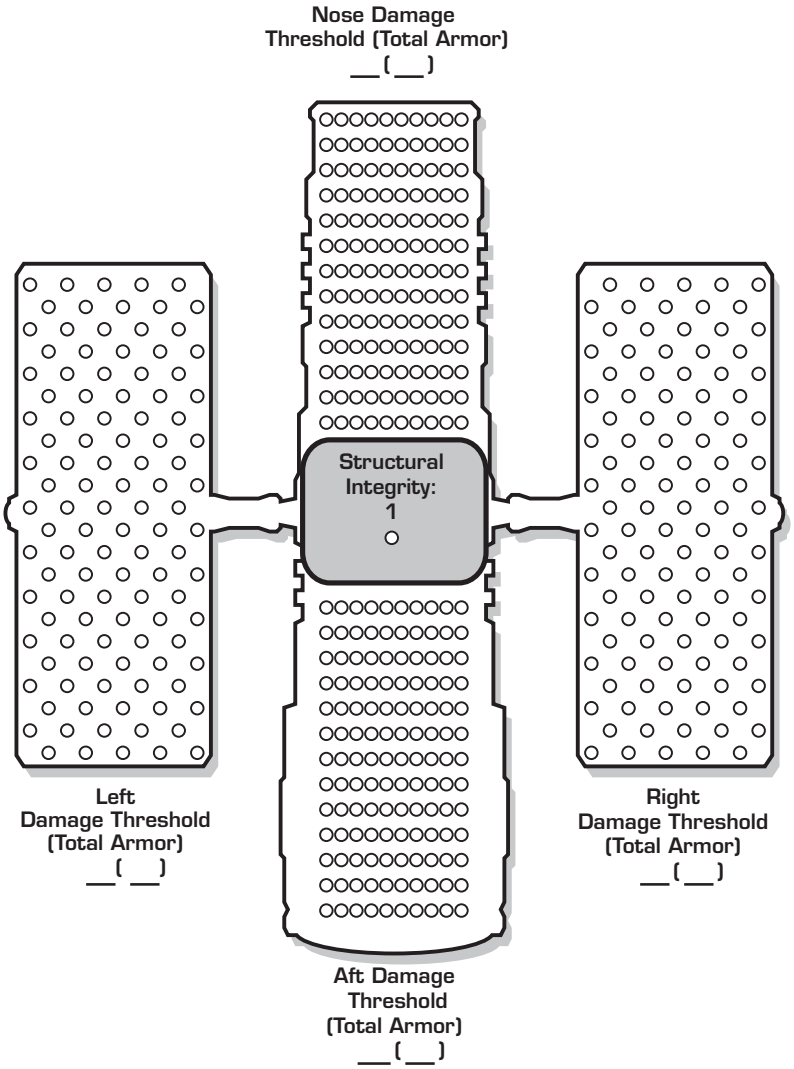
___	_____	___	___	___	___	___	___
___	_____	___	___	___	___	___	___
___	_____	___	___	___	___	___	___
___	_____	___	___	___	___	___	___

Ammo: _____

Cost:_____ BV: _____



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
CIC	+2	+4	D
Sensors	+1	+2	+5
Life Support	+2		
Thrusters			
Left	+1	+2	+3	D
Right	+1	+2	+3	D

NOTES

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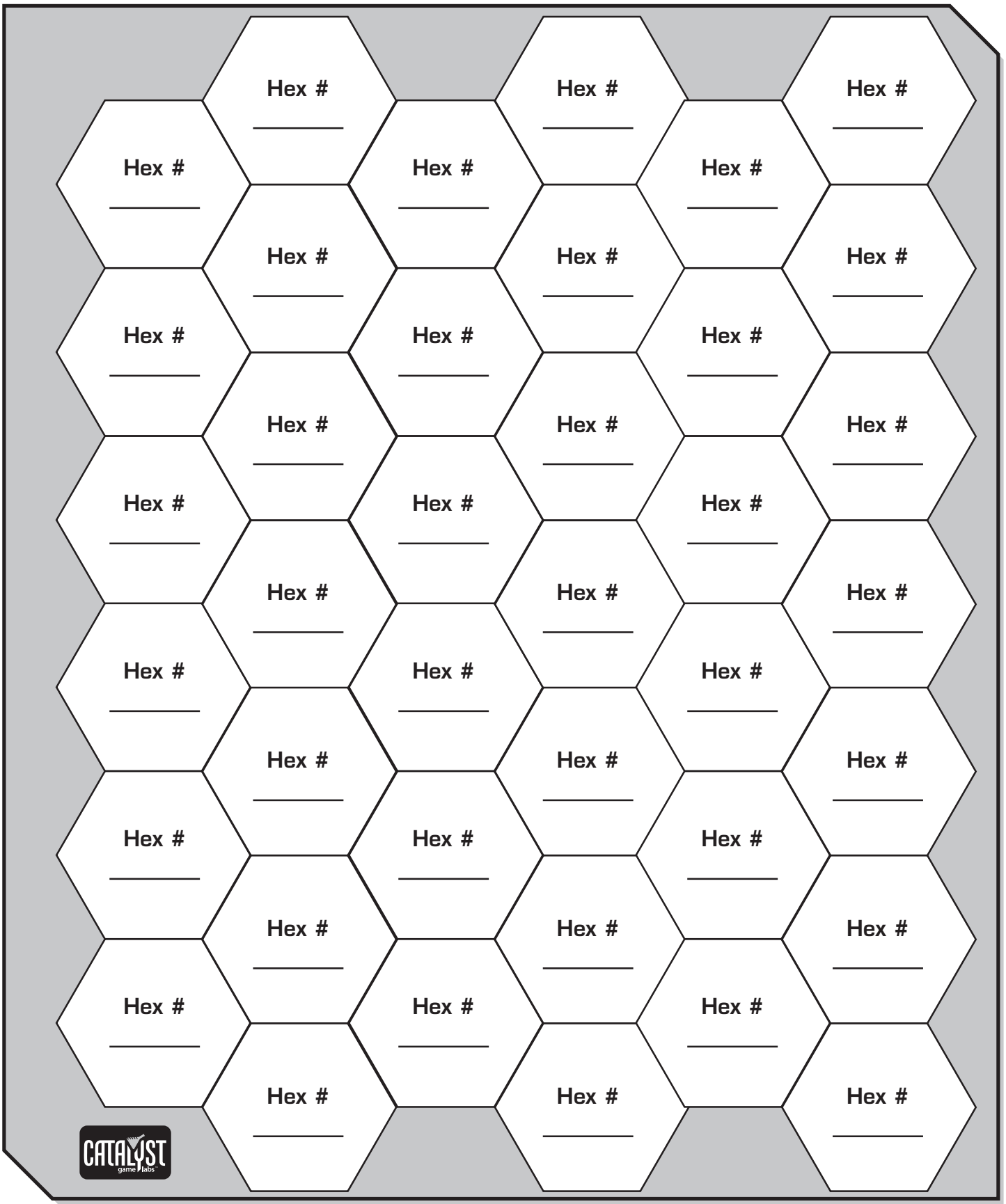
BATTLETECH™

MOBILE STRUCTURE TEMPLATE


Hex #
Hex #
Hex #

BATTLETECH™

STRUCTURE RECORD SHEET

STRUCTURE DATA

Description: _____ Levels: _____

MP: _____ Tech Base:

Movement Type: _____ Clan ☐

Powerplant Type: _____ Inner Sphere ☐

Weapons & Equipment Inventory (hexes)

Qty	Type	Hex/Loc	Dmg	Min	Sht	Med	Lng

Cost: _____ BV: _____

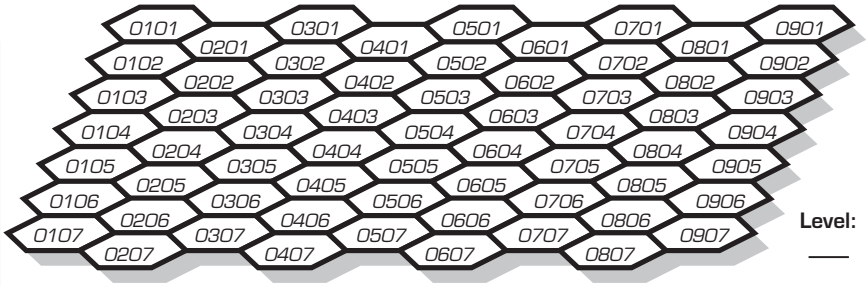
CF & ARMOR

Hex	CF	Armor	Hex	CF	Armor

CREW DATA

Crew: _____ Gunnery Skill: _____

STRUCTURE MAP



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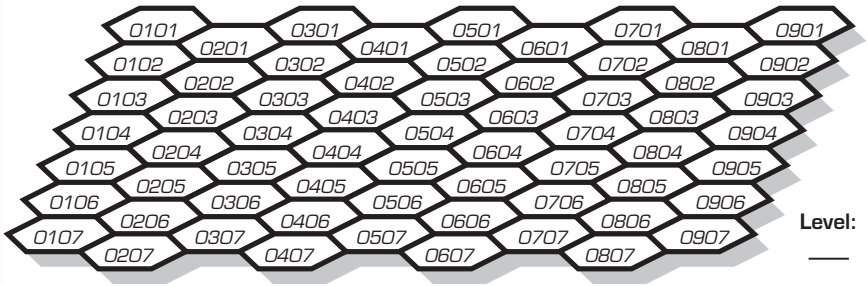

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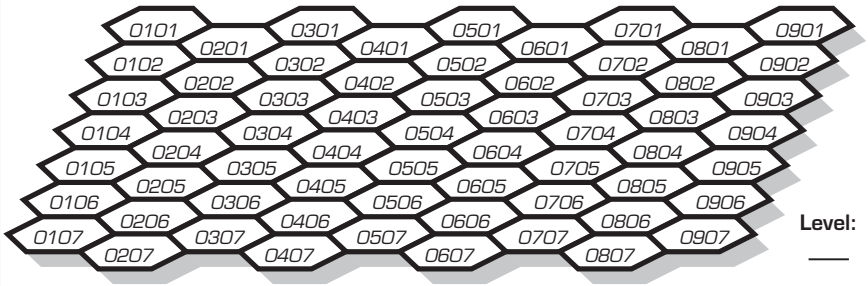

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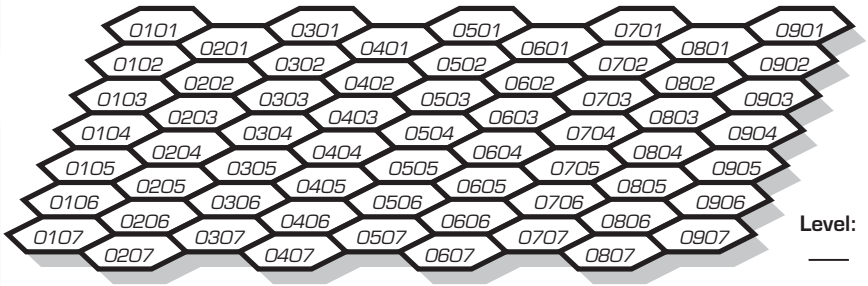

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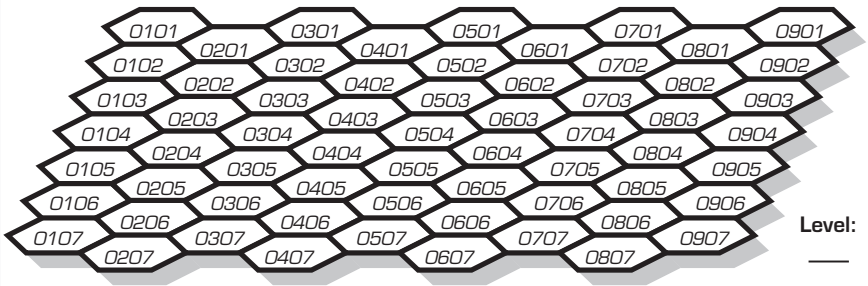

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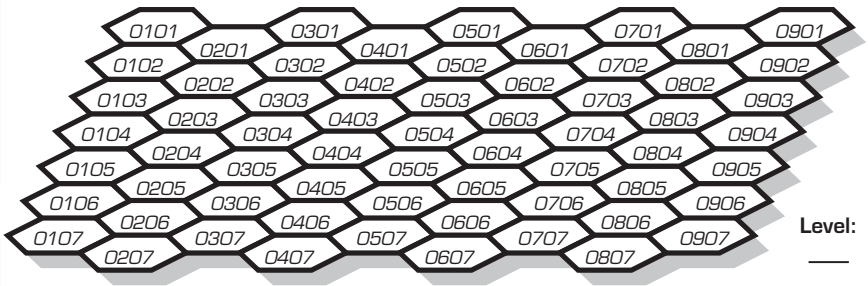

Level: ____

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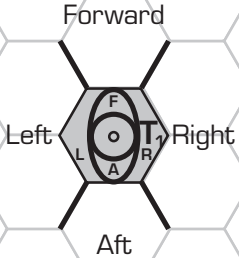
BATTLETECH™

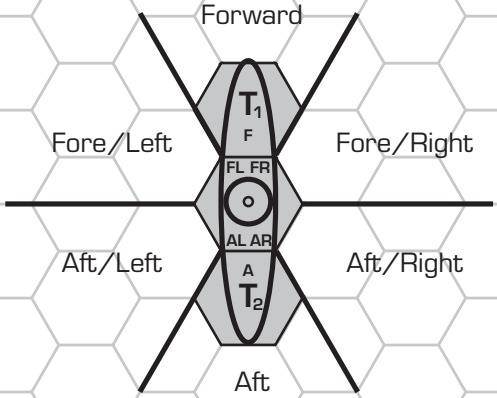
LARGE NAVAL VESSEL TEMPLATES

LEGEND

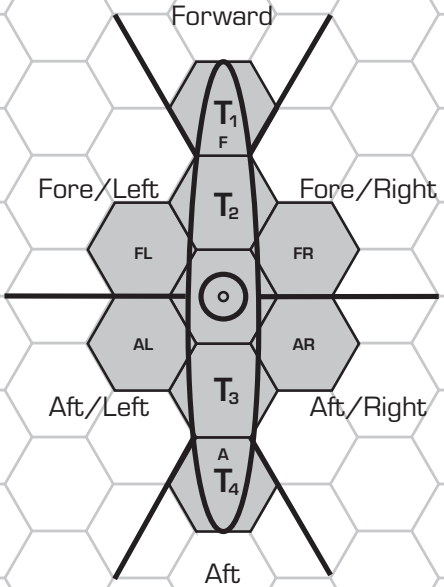
- Pivot Point
- **T** Turret
- **F** Forward Weapons
- **L** Left Weapons
- **R** Right Weapons
- **FL** Fore/Left Weapons
- **FR** Fore/Right Weapons
- **AL** Aft/Left Weapons
- **AR** Aft/Right Weapons
- **A** Aft Weapons



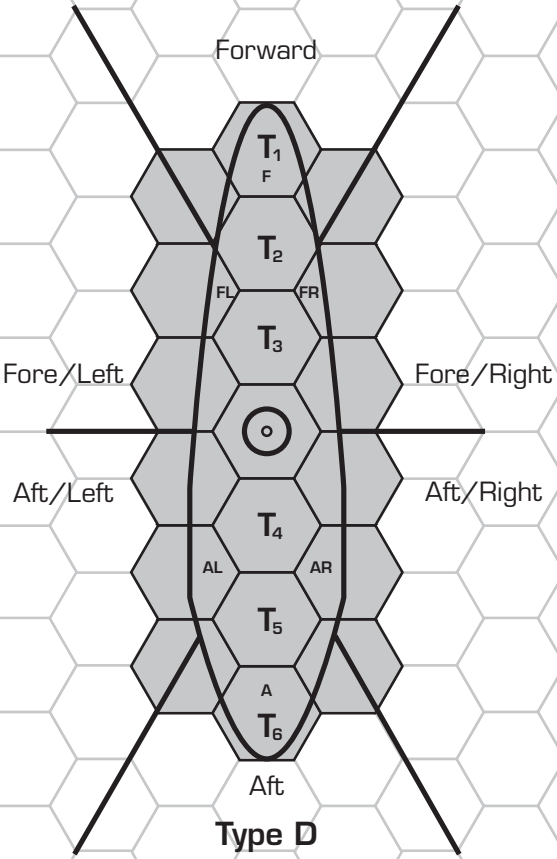
Type A



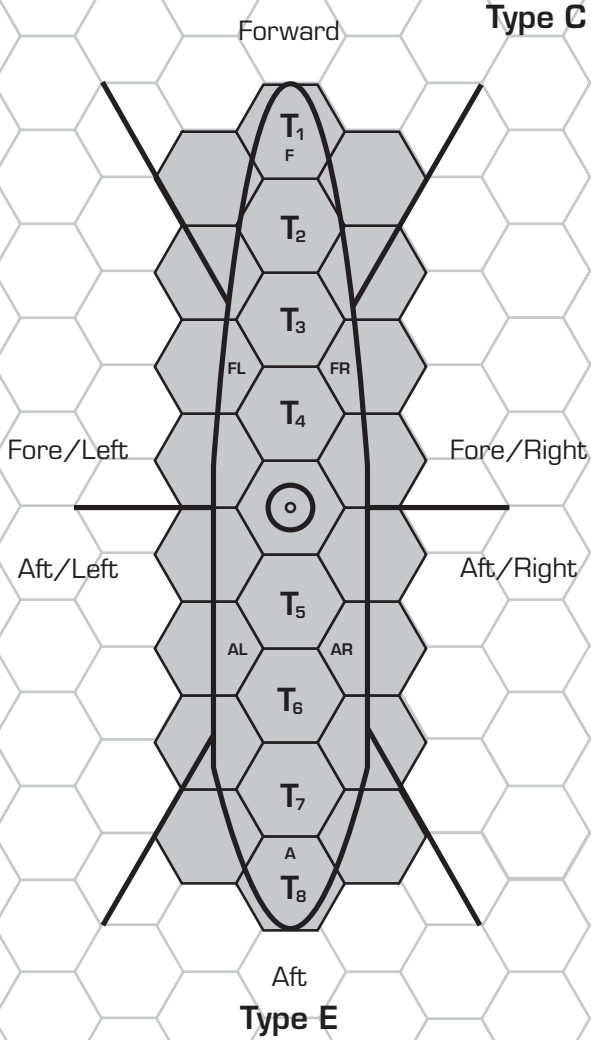
Type B



Type C



Type D



Type E

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HEAVY WEAPONS AND EQUIPMENT COMBAT DATA

Weapon/Item	Type §	Heat Std (Aero)	Damage Std (Aero)	Range Min/Sht/Med/Lng (Aero)	Ammo (per Ton)	To-Hit Modifier	TC Comp	Rules Level	Ref
Active Probes									
Bloodhound AP	E	0 (0)	0 (0)	—/—/—/8 (*)	NA	NA	NA	Exp	90
Watchdog CEWS	E	0 (0)	0 (0)	—/—/—/3 (*)	NA	NA	NA	Exp	90
Actuator Enhancement Sys. (Arm)	T	0	0	NA (NA)	NA	–1*	NA	Exp	91
Actuator Enhancement Sys. (Leg)	PE, T	0	0	NA (NA)	NA	NA	NA	Exp	91
Angel ECM	E	0	0	—/—/—/6 (*)	NA	NA	NA	Exp	91
Armor									
Ferro-Lamellor	Armor	NA	NA	NA	NA	NA	NA	Exp	92
Hardened	Armor	NA	NA	NA	NA	NA	NA	Exp	93
Laser-Reflective (IS)	Armor	NA	NA	NA	NA	NA	NA	Exp	93
Laser-Reflective (Clan)	Armor	NA	NA	NA	NA	NA	NA	Exp	93
Modular	Armor	NA	NA	NA	NA	NA	NA	Exp	93
Reactive (IS)	Armor	NA	NA	NA	NA	NA	NA	Exp	94
Reactive (Clan)	Armor	NA	NA	NA	NA	NA	NA	Exp	94
Vehicular Stealth	E, Armor	10* (10*)	NA	NA	NA	NA	NA	Exp	94
Armored Components	Armor	NA	NA	NA	NA	NA	NA	Exp	95
Armored Motive System (IS)	Armor	NA	NA	NA	NA	NA	NA	Exp	95
Armored Motive System (Clan)	Armor	NA	NA	NA	NA	NA	NA	Exp	95
Artemis V FCS	T	0	0	NA	NA	–1*	N	Exp	95
Artillery									
Arrow IV Missile (IS)	AE, S, F	10 (10*)	20A (NA)*	8 boards (NA)	5	0	N	Adv	96
Arrow IV Missile (Clan)	AE, S, F	10 (10*)	20A (NA)*	9 boards (NA)	5	0	N	Adv	96
Thumper	AE, S, F	6 (6*)	15A (NA)*	21 boards (NA)	20	0	N	Adv	96
Sniper	AE, S, F	10 (10*)	20A (NA)*	18 boards (NA)	10	0	N	Adv	96
Long Tom	AE, S, F	20 (20*)	25A (NA)*	30 boards (NA)	5	0	N	Adv	96
Cruise Missile/50	AE	50	50A (NA)*	50 boards (NA)	1/25	0	N	Exp	97
Cruise Missile/70	AE	70	70A (NA)*	90 boards (NA)	1/35	0	N	Exp	97
Cruise Missile/90	AE	90	90A (NA)*	120 boards (NA)	1/45	0	N	Exp	97
Cruise Missile/120	AE	120	120A (NA)*	150 boards (NA)	1/60	0	N	Exp	97
Artillery Cannons									
Thumper	DB, AE, F	5 (5)	5A (5)	3/4/9/14 (Medium)	20	0	N	Exp	97
Sniper	DB, AE, F	10 (10)	10A (10)	2/4/8/12 (Medium)	10	0	N	Exp	97
Long Tom	DB, AE, F	20 (20)	20A (20)	4/6/13/20 (Long)	5	0	N	Exp	97
Autocannons									
Hyper-Velocity AC/2	DB, X*	1 (1)	2 (2)	3/10/20/35 (Extreme)	30	0	Y	Exp	97
Hyper-Velocity AC/5	DB, X*	3 (3)	5 (5)	—/8/16/28 (Extreme)	15	0	Y	Exp	97
Hyper-Velocity AC/10	DB, X*	7 (7)	10 (10)	—/6/12/20 (Long)	8	0	Y	Exp	97
ProtoMech AC/2	DB, S	1 (1)	2 (2)	—/7/14/20 (Long)	40	0	Y	Adv	98
ProtoMech AC/4	DB, S	1 (1)	4 (4)	—/5/10/15 (Medium)	20	0	Y	Adv	98
ProtoMech AC/8	DB, S	2 (2)	8 (8)	—/3/7/10 (Short)	10	0	Y	Adv	98
Rotary AC/2 (Clan)	DB, R/C	1/sht (6)	2/Sht,R6* (8)	—/8/17/25 (Extreme)	45	0	Y*	Exp	98
Rotary AC/5 (Clan)	DB, R/C	1/sht (6)	5/sht,R6* (20)	—/7/14/21 (Long)	20	0	Y*	Exp	98
BattleMech/Vehicle HarJel	PE	NA	NA	NA (NA)	NA	NA	NA	Exp	100
BattleMech Melee Weapons									
Chain Whip	ME	0 (NA)	3 (NA)	PHYS (NA)	NA	–2*	N	Exp	101
Claws	ME	0 (NA)	1/7T* (NA)	PHYS (NA)	NA	+1	N	Adv	101
Flail	ME	0 (NA)	9* (NA)	PHYS (NA)	NA	0	N	Exp	101
Lance	ME	0 (NA)	1/5T* (NA)	PHYS (NA)	NA	+1	N	Exp	102
Mace	ME	0 (NA)	1/4T* (NA)	PHYS (NA)	NA	+1	N	Adv	102
Shield, Small	ME, PB	0 (NA)	* (NA)	PHYS (NA)	NA	–2*	N	Exp	103
Shield, Medium	ME, PB	0 (NA)	* (NA)	PHYS (NA)	NA	–3*	N	Exp	103
Shield, Large	ME, PB	0 (NA)	* (NA)	PHYS (NA)	NA	–4*	N	Exp	103
Spikes	ME, PB	0 (NA)	* (NA)	PHYS (NA)	NA	NA	N	Exp	103
Talons	ME	0 (NA)	* (NA)	PHYS (NA)	NA	NA	N	Exp	103
Vibroblade, Small	ME, V	3* (NA)	7* (NA)	PHYS (NA)	NA	–2	N	Exp	104
Vibroblade, Medium	ME, V	5* (NA)	10* (NA)	PHYS (NA)	NA	–2	N	Exp	104
Vibroblade, Large	ME, V	7* (NA)	14* (NA)	PHYS (NA)	NA	–2	N	Exp	104
BattleMech/ProtoMech Motive Systems									
Jump Pack / Drop Pack	PE	0 (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	105
Mechanical Jump Boosters	PE	0 (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	105
Partial Wing ('Mech)	PE	* (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	105
Partial Wing (ProtoMech)	PE	0 (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	105
UMUs ('Mech)	PE	1* (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	107
UMUs (ProtoMech)	PE	0 (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	107
Blue Shield PFD	PB, X	0 (0)	NA (NA)	NA (NA)	NA	NA	NA	Exp	108
Booby Trap	AE, OS	NA (NA)	* (*)	* (*)	OS	NA	NA	Exp	109
C^3 Systems									
C^3 Boosted Master	E, CE, T	0 (0)	NA (NA)	NA (NA)	NA	NA	NA	Exp	110
C^3 Boosted Slave	E, CE, T	0 (0)	NA (NA)	NA (NA)	NA	NA	NA	Exp	110
C^3 Emergency Master	E, T	0 (0)	NA (NA)	NA (NA)	NA	NA	NA	Exp	110
C^3 Remote Sensor Launcher	M, E	0 (0)	NA (NA)	0/3/6/9 (Short)	4	NA	N	Exp	110
CASE II (IS)	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	111

*See rules for this equipment in the *Advanced Weapons And Equipment* section, starting on p. 274.

HEAVY WEAPONS AND EQUIPMENT CONSTRUCTION DATA

Weapon/Item	Tech Base	Tech Rating	Latest Intro Date (IS / Clan)	Item / Ammo Cost (C-bills)	Weight (Tons)	Space §§ M	P	CV	SV	F	SC	DS	JS	WS	SS	MS
Active Probes																
Bloodhound AP	IS	E/X-X-F	3058P / NA	500,000	2	3	NA	1	3	1	1	0	NA	NA	NA	1
Watchdog CEWS	Clan	F/X-X-F	NA / 3059P	600,000	1.5	2	1	1	2	1	1	0	NA	NA	NA	1
Actuator Enhancement Sys. (Arm)	IS/Clan	E/X-X-F	3070P / 3070P	500xTT	*	*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Actuator Enhancement Sys. (Leg)	IS/Clan	E/X-X-F	3070P / 3070P	700xTT	*	*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Angel ECM	IS/Clan	F/X-X-F	3057P / 3058P	750,000	2	2	1	1	2	1	1	0	NA	NA	NA	1
Armor																
Ferro-Lamellor	Clan	F/X-X-F	NA / 3070P	35,000xAT	*	12	NA	1	1*	2*	NA	NA	NA	NA	NA	NA
Hardened	IS/Clan	D/X-X-F	3047P / 3061P	15,000xAT	*	0	NA	1*	NA	NA	NA	NA	NA	NA	NA	NA
Laser-Reflective (IS)	IS	E/X-X-F	3058P / NA	30,000xAT	*	10	NA	1	1*	2*	NA	NA	NA	NA	NA	NA
Laser-Reflective (Clan)	Clan	F/X-X-F	NA / 3061P	30,000xAT	*	5	NA	1	1*	1*	NA	NA	NA	NA	NA	NA
Modular	IS/Clan	D/X-X-F	3072P / 3074P	10,000xAT	1*	1*	NA	1	1*	2	NA	NA	NA	NA	NA	NA
Reactive (IS)	IS	E/X-X-F	3063P / NA	30,000xAT	*	14	NA	2	2*	3*	NA	NA	NA	NA	NA	NA
Reactive (Clan)	Clan	F/X-X-F	NA / 3065P	30,000xAT	*	7	NA	1	1*	2*	NA	NA	NA	NA	NA	NA
Vehicular Stealth	IS	E/X-X-F	3067P / NA	50,000xAT	*	NA	NA	2*	2*	2*	NA	NA	NA	NA	NA	NA
Armored Components	IS/Clan	E/X-X-F	3061P / 3061P	150,000xCS	+0.5**	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Armored Motive System (IS)	IS	E/X-X-F	3071P / NA	100,000xIT	0.15xTT*	NA	NA	0	0	NA	NA	NA	NA	NA	NA	NA
Armored Motive System (Clan)	Clan	F/X-X-F	NA / 3057P	100,000xIT	0.10xTT*	NA	NA	0	0	NA	NA	NA	NA	NA	NA	NA
Artemis V FCS	Clan	F/X-X-F	NA / 3061P	250,000 / x5	+1.5**	+2**	NA	+0	+2**	+0	+0	+0	+0	+0	+0	+0
Artillery																
Arrow IV Missile (IS)	IS	E/E-F-E	3044 / 2600	450,000 / 10,000	15	15	NA	1	7	1	1	1	NA	NA	NA	1
Arrow IV Missile (Clan)	Clan	F/E-F-E	NA / 2850	450,000 / 10,000	12	12	NA	1	6	1	1	1	NA	NA	NA	1
Thumper	IS/Clan	B/C-C-C	PS / PS	187,500 / 4,500	15	15	NA	1	7	1	1	1	NA	NA	NA	1
Sniper	IS/Clan	B/C-C-C	PS / PS	300,000 / 6,000	20	20	NA	1	10	1	1	1	NA	NA	NA	1
Long Tom	IS/Clan	B/C-C-C	PS / PS	450,000 / 10,000	30	NA	NA	1	15	NA	1	1	NA	NA	NA	1
Cruise Missile/50	IS	E/X-X-F	3065P / NA	900,000 / 20,000	55	NA	NA	1	25	NA	1	1	NA	NA	NA	1
Cruise Missile/70	IS	E/X-X-F	3065P / NA	1,250,000 / 50,000	80	NA	NA	1	35	NA	1	1	NA	NA	NA	1
Cruise Missile/90	IS	E/X-X-F	3065P / NA	2,550,000 / 90,000	100	NA	NA	1	45	NA	1	1	NA	NA	NA	1
Cruise Missile/120	IS	E/X-X-F	3065P / NA	3,000,000 / 140,000	135	NA	NA	1	60	NA	1	1	NA	NA	NA	1
Artillery Cannons																
Thumper	IS/Clan	B/X-F-E	3012P / 3032P	200,000 / 10,000	10	7	NA	1	7	1	1	1	1	1	1	1
Sniper	IS/Clan	B/X-F-E	3012P / 3032P	475,000 / 15,000	15	10	NA	1	10	1	1	1	1	1	1	1
Long Tom	IS/Clan	B/X-F-E	3012P / 3032P	650,000 / 20,000	20	15	NA	1	15	1	1	1	1	1	1	1
Autocannons																
Hyper-Velocity AC/2	IS	D/X-X-F	3059P / NA	100,000 / 3,000	8	2	NA	1	2	1	1	1	1	1	1	1
Hyper-Velocity AC/5	IS	D/X-X-F	3059P / NA	160,000 / 10,000	12	4	NA	1	4	1	1	1	1	1	1	1
Hyper-Velocity AC/10	IS	D/X-X-F	3060P / NA	230,000 / 20,000	14	6	NA	1	6	1	1	1	1	1	1	1
ProtoMech AC/2	Clan	F/X-X-F	NA / 3073	95,000 / 1,200	3.5	2	1*	1	2	1	1	1	1	1	1	1
ProtoMech AC/4	Clan	F/X-X-F	NA / 3073	133,000 / 4,800	4.5	3	1*	1	3	1	1	1	1	1	1	1
ProtoMech AC/8	Clan	F/X-X-F	NA / 3073	175,000 / 6,300	5.5	4	1*	1	4	1	1	1	1	1	1	1
Rotary AC/2 (Clan)	Clan	F/X-X-F	NA / 3073P	175,000 / 3,000	8	4	NA	1	4	1	1	1	1	1	1	1
Rotary AC/5 (Clan)	Clan	F/X-X-F	NA / 3073P	275,000 / 12,000	10	8	NA	1	8	1	1	1	1	1	1	1
BattleMech/Vehicle HarJel	IS/Clan	E-X-X-E	3067P / 3059P	120,000xCS	1*	1*	NA	1*	1*	NA	NA	NA	NA	NA	NA	NA
BattleMech Melee Weapons																
Chain Whip	IS	C/X-X-F	3071P / NA	120,000	3	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Claws	IS	B/X-F-E	3060 / NA	200xTT	TT÷15*	TT÷15*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Flail	IS	B/X-X-E	3057P / NA	110,000	5	4*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lance	IS	C/X-X-F	3064P / NA	150xTT	TT÷20*	TT÷20*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mace	IS	B/X-F-D	3061 / NA	130,000	TT÷10*	TT÷10*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Shield, Small	IS	D/X-X-F	3067P / NA	50,000	2	3*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Shield, Medium	IS	D/X-X-F	3067P / NA	100,000	4	5*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Shield, Large	IS	D/X-X-F	3067P / NA	300,000	6	7*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Spikes	IS	C/X-E-E	3051 / NA	50xTT	0.5	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Talons	Clan	E/X-X-F	NA / 3072	300xTT	TT÷15*	*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vibroblade, Small	IS	D/X-X-E	3065P / NA	150,000	3	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vibroblade, Medium	IS	D/X-X-E	3065P / NA	400,000	5	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vibroblade, Large	IS	D/X-X-E	3066P / NA	750,000	7	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BattleMech/ProtoMech Motive Systems																
Jump Pack / Drop Pack	IS/Clan	D/C-D-C	2457 / 2457	20,000xIT	Var*	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mechanical Jump Boosters	IS	E/X-X-F	3060P / NA	†	Var*	*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Partial Wing ('Mech)	IS/Clan	F/X-X-E	3074 / 3067P	50,000xIT	*	8/6*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Partial Wing (ProtoMech)	Clan	F/X-X-E	NA / 3070P	50,000xIT	TT÷5*	NA	1*	NA	NA	NA	NA	NA	NA	NA	NA	NA
UMUs ('Mech)	IS/Clan	E/X-X-E	3066P / 3061P	†	Var*	*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
UMUs (ProtoMech)	Clan	E/X-X-E	NA / 3061P	†	Var*	NA	0*	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blue Shield PFD	IS	E/X-X-F	3053P / NA	1,000,000	3	7*	NA	Var*	Var*	4*	NA	NA	NA	NA	NA	NA
Booby Trap	IS	B/D-F-D	PS / NA	100,000	Var*	1*	NA	1*	1*	1*	1*	0*	0*	0*	0*	0*
C^3 Systems																
C^3 Boosted Master	IS	E/X-X-F	3073P / NA	3,000,000	6	6*	NA	1*	6*	NA	NA	NA	NA	NA	NA	1
C^3 Boosted Slave	IS	E/X-X-F	3073P / NA	500,000	3	2*	NA	1*	2*	NA	NA	NA	NA	NA	NA	1
C^3 Emergency Master	IS	E/X-X-F	3071P / NA	2,800,000	2	2*	NA	1*	2*	NA	NA	NA	NA	NA	NA	1
C^3 Remote Sensor Launcher	IS	E/X-X-F	3072P / NA	400,000 / 100,000	4	3	NA	1	3	1	1	NA	NA	NA	NA	1
CASE II (IS)	IS	E/X-X-F	3064P / NA	175,000	1	1	NA	NA	NA	0	NA	NA	NA	NA	NA	NA

*See rules for this equipment in the *Advanced Weapons And Equipment* section, starting on p. 274.

Weapon/Item	Type §	Heat Std (Aero)	Damage Std (Aero)	Range Min/Sht/Med/Lng (Aero)	Ammo (per Ton)	To-Hit Modifier	TC Comp	Rules Level	Ref
CASE II (Clan)	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	111
Chaff Pod	PB, E, OS, X	0 (0)	NA (NA)	NA (NA)	OS	NA	NA	Exp	111
Chameleon LPS	E	6 (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	112
Cockpit Systems									
Cockpit Command Console	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	113
Small Aerospace Cockpit	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	113
Torso-Mounted Cockpit	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	113
Collapsible Command Module	E	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	113
Combat Vehicle Chassis Mods									
Flotation Hull	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	114
Limited Amphibious	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	114
Fully Amphibious	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	115
Dune Buggy	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	115
Enviro (Vacuum) Sealing	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	115
Coolant Pod	PE, OS, X	* (*)	NA (NA)	NA (NA)	OS	NA	NA	Exp	116
Docking Hardpoint	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	116
Docking Thrusters	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	117
Drone (Remote) Systems									
Drone Carrier Control System	E	NA (NA)	NA (NA)	* (*)	NA	NA	NA	Adv	117
Drone Operating System	E	NA (NA)	NA (NA)	* (*)	NA	+1*	NA	Adv	118
Energy Storage Battery	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	118
Engines									
Combat Vehicle Fission	Engine	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	119
Combat Vehicle Fuel Cell	Engine	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	119
Large (ICE)	Engine	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	119
Large (Fusion)	Engine	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	119
Large (Light Fusion)	Engine	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	119
Large (XL – Inner Sphere)	Engine	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	119
Large (XL – Clan)	Engine	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	119
Large (XXL – Inner Sphere)	Engine	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	119
Large (XXL – Clan)	Engine	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	119
XXL Fusion (Inner Sphere)	Engine	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	121
XXL Fusion (Clan)	Engine	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	121
Ejection Systems									
Combat Vehicle Escape Pod	PE, OS	NA (NA)	NA (NA)	NA (NA)	OS	NA	NA	Exp	121
Full-Head Ejection System	PE, OS	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	122
Electronic Warfare Equipment	E	NA (NA)	NA (NA)	—/—/—/3 (*)	NA	NA	NA	Exp	123
Flamers									
ER Flamer	DE, H, AI	4 (4)	2* (2)	0/3/5/7 (Short)	NA	0	N	Adv	124
Heavy Flamer	DE, H, AI	5 (5)	4* (4)	0/2/3/4 (Short)	10	0	N	Adv	124
Flight Deck / Helipad									
Flight Deck	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	125
Helipad	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	125
Fluid Gun	DB, S	0 (0)	* (*)	0/1/2/3 (Short)	20	0	N	Adv	125
Gauss Rifles									
Improved Heavy Gauss	DB, X	2 (2)	22 (22)	3/6/12/19 (Long)	4	0	Y	Exp	126
MagShot	DB, X	1 (1)	2 (2)	0/3/6/9 (Short)	50	0	Y	Adv	126
Silver Bullet Gauss	DB, C, F, X	1 (1)	C1/15 (9)	2/7/15/22 (Long)	8	–1	N	Exp	127
Grav Decks									
(less than 100-meter diameter)	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	127
(100- to 250-meter diameter)	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	127
(over 250-meter diameter)	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	127
Grenade Launcher, Vehicular	AE, OS	1 (1)	* (*)	—/—/—/1 (*)	OS	NA	N	Adv	127
Handheld Weapon	PE	0 (NA)	Var* (NA)	Var* (NA)	Var*	Var*	N	Exp	128
Heat Sinks									
Compact Heat Sinks	PE	–1 (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	128
Laser Heat Sinks	PE	–2 (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	129
Landing Deck	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	131
Lasers									
Binary Laser (Blazer) Cannon	DE	16 (16)	12 (12)	0/5/10/15 (Medium)	NA	0	Y	Exp	131
Bombast Laser	DE, V	* (12)	* (12)	0/5/10/15 (Medium)	NA	Var*	Y	Exp	132
Chemical Laser, Small	DE	1 (1)	3 (3)	0/1/2/3 (Short)	60	0	Y	Exp	132
Chemical Laser, Medium	DE	2 (2)	5 (5)	0/3/6/9 (Short)	30	0	Y	Exp	132
Chemical Laser, Large	DE	6 (6)	8 (8)	0/5/10/15 (Medium)	10	0	Y	Exp	132
ER Pulse Laser, Small	P, AI	3 (3)	5* (5)	0/2/4/6 (Short)	NA	–1	Y*	Exp	132
ER Pulse Laser, Medium	P	6 (6)	7 (7)	0/5/9/14 (Medium)	NA	–1	Y*	Exp	132
ER Pulse Laser, Large	P	13 (13)	10 (10)	0/7/15/23 (Long)	NA	–1	Y*	Exp	132
Improved Heavy Laser, Small	DE, X	3 (3)	6 (6)	0/1/2/3 (Short)	NA	0	Y	Exp	133
Improved Heavy Laser, Medium	DE, X	7 (7)	10 (10)	0/3/6/9 (Short)	NA	0	Y	Exp	133
Improved Heavy Laser, Large	DE, X	18 (18)	16 (16)	0/5/10/15 (Medium)	NA	0	Y	Exp	133
Variable Speed Laser, Small	P, V, AI	3 (3)	5/4/3* (4)	0/2/4/6 (Short)	NA	Var*	Y*	Adv	133
Variable Speed Laser, Medium	P, V, AI	7 (7)	9/7/5* (7)	0/2/5/9 (Short)	NA	Var*	Y*	Adv	133
Variable Speed Laser, Large	P, V, AI	10 (10)	11/9/7* (10/7*)	0/4/8/15 (Medium)	NA	Var*	Y*	Adv	133
X-Pulse Laser, Small	P, AI	3 (3)	3 (3)	0/2/4/5 (Short)	NA	–2	Y*	Exp	133

*See rules for this equipment in the *Advanced Weapons And Equipment* section, starting on p. 274.

Weapon/Item	Tech Base	Tech Rating	Latest Intro Date (IS / Clan)	Item / Ammo Cost (C-bills)	Weight (Tons)	Space §§ M	P	CV	SV	F	SC	DS	JS	WS	SS	MS
CASE II (Clan)	Clan	F/X-X-F	NA / 3062P	175,000	0.5	1	NA	NA	NA	0	NA	NA	NA	NA	NA	NA
Chaff Pod	IS	C/X-X-E	3069P / NA	2,000	1	1	NA	1	1	1	1	1	NA	NA	NA	1
Chameleon LPS	IS	E/F-X-X	2630X / 2630	600,000	0	6*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cockpit Systems																
Cockpit Command Console	IS/Clan	D/C-F-E	3030 / 2631	500,000	3*	1*	NA	1*	1*	1*	NA	NA	NA	NA	NA	NA
Small Aerospace Cockpit	IS	E/X-X-E	3070 / NA	175,000	2*	NA	NA	NA	NA	0*	NA	NA	NA	NA	NA	NA
Torso-Mounted Cockpit	IS/Clan	E/X-X-F	3053P / 3055P	750,000	4*	1*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Collapsible Command Module	IS/Clan	D/E-F-E	2710 / 2710	500,000	16	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Combat Vehicle Chassis Mods																
Flotation Hull	IS/Clan	B/B-B-B	2470 / 2470	1.25xTC	0*	NA	NA	0*	NA	0*	NA	NA	NA	NA	NA	NA
Limited Amphibious	IS/Clan	B/B-B-B	2470 / 2470	10,000xIT	TT÷25*	NA	NA	0*	NA	NA	NA	NA	NA	NA	NA	NA
Fully Amphibious	IS/Clan	B/B-B-B	2470 / 2470	10,000xIT	TT÷10*	NA	NA	0*	NA	NA	NA	NA	NA	NA	NA	NA
Dune Buggy	IS/Clan	B/B-B-B	2470 / 2470	10xTTxTT	0*	NA	NA	0*	NA	NA	NA	NA	NA	NA	NA	NA
Enviro (Vacuum) Sealing	IS/Clan	B/C-D-C	2470 / 2470	1.25xTC	TT÷10*	NA	NA	0*	NA	NA	NA	NA	NA	NA	NA	NA
Coolant Pod	IS/Clan	D/X-X-E	3049P / 3056P	50,000	1	1	NA	NA	NA	1	NA	NA	NA	NA	NA	NA
Docking Hardpoint	IS/Clan	C/C-C-C	2304 / 2304	100,000	1,000	NA	NA	NA	NA	NA	NA	NA	0	0	0	1
Docking Thrusters	IS/Clan	B/C-C-C	PS / PS	15,000xIT	TT÷50*	NA	NA	NA	3*	NA	NA	NA	NA	NA	NA	NA
Drone (Remote) Systems																
Drone Carrier Control System	IS/Clan	C/E-F-F	ES / ES	10,000xIT	Var*	NA	NA	1	1	NA	0	0	0	0	0	0
Drone Operating System	IS/Clan	C/E-F-F	ES / ES	5,000+(10,000xIT)	Var*	1*	NA	1*	1*	1*	NA	NA	NA	NA	NA	NA
Energy Storage Battery	IS/Clan	D/C-E-D	2131 / 2131	1,000,000	100,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
Engines																
Combat Vehicle Fission	IS	D/E-E-D	2470 / 2470	(7,500xERxTT)÷75	*	*	NA	*	NA	*	NA	NA	NA	NA	NA	NA
Combat Vehicle Fuel Cell	IS/Clan	D/C-D-D	ES / ES	(3,500xERxTT)÷75	*	*	NA	*	NA	NA	NA	NA	NA	NA	NA	NA
Large (ICE)	IS/Clan	C/A-A-A	2630P / 2630P	(2,500xERxTT)÷75	*	+2*	NA	+1*	NA	+1*	NA	NA	NA	NA	NA	NA
Large (Fusion)	IS/Clan	D/C-E-D	2630P / 2630P	(10,000xERxTT)÷75	*	+2*	NA	+1*	NA	+1*	NA	NA	NA	NA	NA	NA
Large (Light Fusion)	IS	E/X-X-E	3065P / NA	(30,000xERxTT)÷75	*	+6*	NA	+2*	NA	+2*	NA	NA	NA	NA	NA	NA
Large (XL – Inner Sphere)	IS	E/D-F-E	3045P / 2635X	(40,000xERxTT)÷75	*	+8*	NA	+3*	NA	+3*	NA	NA	NA	NA	NA	NA
Large (XL – Clan)	Clan	E/D-F-E	NA / 2840P	(40,000xERxTT)÷75	*	+6*	NA	+2*	NA	+2*	NA	NA	NA	NA	NA	NA
Large (XXL – Inner Sphere)	IS	F/X-X-F	3057P / NA	(200,000xERxTT)÷75	*	+14*	NA	+5*	NA	+5*	NA	NA	NA	NA	NA	NA
Large (XXL – Clan)	Clan	F/X-X-F	NA / 2970P	(200,000xERxTT)÷75	*	+10*	NA	+3*	NA	+3*	NA	NA	NA	NA	NA	NA
XXL Fusion (Inner Sphere)	IS	F/X-X-F	3055P / 2954X	(100,000xERxTT)÷75	*	+12*	NA	+4*	NA	+4*	NA	NA	NA	NA	NA	NA
XXL Fusion (Clan)	Clan	F/X-X-F	NA / 3030P	(100,000xERxTT)÷75	*	+8*	NA	+3*	NA	+3*	NA	NA	NA	NA	NA	NA
Ejection Systems																
Combat Vehicle Escape Pod	IS	D/X-X-E	3038P / NA	10,000	4	NA	NA	1*	NA	NA	NA	NA	NA	NA	NA	NA
Full-Head Ejection System	IS/Clan	D/X-X-E	3023 / 3052	1,725,000	0	0*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Electronic Warfare Equipment	IS	D/X-F-E	3025 / NA	500,000	7.5	4	NA	1	4	1	1	0	NA	NA	NA	1
Flamers																
ER Flamer	IS/Clan	D/X-X-E	3070 / 3067	15,000	1	1	1	1	1	1	1	1	1	1	1	1
Heavy Flamer	IS/Clan	C/X-X-E	3068 / 3067	11,250 / 2,000	1.5	1	1	1	1	NA	NA	NA	NA	NA	NA	1
Flight Deck / Helipad																
Flight Deck	IS/Clan	B/A-A-A	PS / PS	1,000,000	1,500	NA	NA	NA	10	NA	NA	NA	NA	NA	NA	1
Helipad	IS/Clan	B/A-A-A	PS / PS	200,000	500	NA	NA	NA	5	NA	NA	NA	NA	NA	NA	1
Fluid Gun	IS/Clan	B/B-B-B	PS / PS	35,000 / 500	2	2	NA	1	1	1	1	1	NA	NA	NA	1
Gauss Rifles																
Improved Heavy Gauss	IS	E/X-X-F	3065P / NA	700,000 / 20,000	20	11	NA	1	11	1	1	1	1	1	1	1
MagShot	IS	E/X-X-D	3072P / NA	8,500 / 1,000	0.5	2	NA	1	2	1	1	1	1	1	1	1
Silver Bullet Gauss	IS	E/X-X-F	3051P / NA	350,000 / 25,000	15	7	NA	1	7	1	1	1	1	1	1	1
Grav Decks																
(less then 100-meter diameter)	IS/Clan	B/C-C-C	ES / ES	5,000,000	50	NA	NA	NA	NA	NA	NA	NA	0	0	0	NA
(100- to 250-meter diameter)	IS/Clan	B/C-C-C	ES / ES	10,000,000	100	NA	NA	NA	NA	NA	NA	NA	0	0	0	NA
(over 250-meter diameter)	IS/Clan	B/C-C-C	ES / ES	40,000,000	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
Grenade Launcher, Vehicular	IS/Clan	C/D-E-F	PS / PS	10,000	0.5	1	1	1	1	1	1	1	NA	NA	NA	1
Handheld Weapon	IS/Clan	D/E-E-F	3055P / 2490P	2xIC††	*	*	*	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heat Sinks																
Compact Heat Sinks	IS	E/X-X-F	3058P / NA	3,000	1.5	1*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Laser Heat Sinks	Clan	F/X-X-E	NA / 3051	6,000	1	2*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Landing Deck	IS/Clan	B/C-C-C	ES / ES	500,000xHX	500xHX*	1xHX*	NA	NA	NA	NA	NA	NA	NA	NA	NA	1*
Lasers																
Binary Laser (Blazer) Cannon	IS	D/X-E-E	2812P / NA	200,000	9	4	NA	1	4	1	1	1	1	1	1	1
Bombast Laser	IS	E/X-X-E	3064P / NA	200,000	7	3	NA	1	3	1	1	1	1	1	1	1
Chemical Laser, Small	Clan	E/X-X-E	NA / 3059P	10,000 / 30,000	0.5	1	1	1	1	1	1	1	1	1	1	1
Chemical Laser, Medium	Clan	E/X-X-E	NA / 3059P	30,000 / 30,000	1	1	1	1	1	1	1	1	1	1	1	1
Chemical Laser, Large	Clan	E/X-X-E	NA / 3059P	75,000 / 30,000	5	2	1	1	2	1	1	1	1	1	1	1
ER Pulse Laser, Small	Clan	F/X-X-E	NA / 3057P	30,000	1.5	1	1	1	1	1	1	1	1	1	1	1
ER Pulse Laser, Medium	Clan	F/X-X-E	NA / 3057P	150,000	2	2	1	1	2	1	1	1	1	1	1	1
ER Pulse Laser, Large	Clan	F/X-X-E	NA / 3057P	400,000	6	3	1	1	3	1	1	1	1	1	1	1
Improved Heavy Laser, Small	Clan	F/X-X-F	NA / 3069P	30,000	0.5	1	1	1	1	1	1	1	1	1	1	1
Improved Heavy Laser, Medium	Clan	F/X-X-F	NA / 3069P	150,000	1	2	1	1	2	1	1	1	1	1	1	1
Improved Heavy Laser, Large	Clan	F/X-X-F	NA / 3069P	350,000	4	3	1	1	3	1	1	1	1	1	1	1
Variable Speed Laser, Small	IS	E/X-X-E	3070P / NA	60,000	2	1	NA	1	1	1	1	1	1	1	1	1
Variable Speed Laser, Medium	IS	E/X-X-E	3070P / NA	200,000	4	2	NA	1	2	1	1	1	1	1	1	1
Variable Speed Laser, Large	IS	E/X-X-E	3070P / NA	465,000	9	4	NA	1	4	1	1	1	1	1	1	1
X-Pulse Laser, Small	IS	E/X-X-E	3057P / NA	31,000	1	1	NA	1	1	1	1	1	1	1	1	1

*See rules for this equipment in the *Advanced Weapons And Equipment* section, starting on p. 274.

Weapon/Item	Type §	Heat Std (Aero)	Damage Std (Aero)	Range Min/Sht/Med/Lng (Aero)	Ammo (per Ton)	To-Hit Modifier	TC Comp	Rules Level	Ref
X-Pulse Laser, Medium	P	6 (6)	6 (6)	0/3/6/9 (Short)	NA	–2	Y*	Exp	133
X-Pulse Laser, Large	P	14 (14)	9 (9)	0/5/10/15 (Medium)	NA	–2	Y*	Exp	133
Laser Anti-Missile System (IS)	PB	7 (7)	NA (NA)	NA (NA)	NA	NA	N	Exp	134
Laser Anti-Missile System (Clan)	PB	5 (5)	NA (NA)	NA (NA)	NA	NA	N	Exp	134
Laser Insulator	PE	–1** (–1**)	NA (NA)	NA (NA)	NA	NA	NA	Exp	134
Light Sail	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	135
Lithium-Fusion Battery	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	135
Mass Drivers									
Light Mass Driver	CAP, AE	NA (30)	NA (60-C)	NA (Long-C)	1/30	+2*	N	Exp	135
Medium Mass Driver	CAP, AE	NA (60)	NA (100-C)	NA (Long-C)	1/60	+2*	N	Exp	135
Heavy Mass Driver	CAP, AE	NA (90)	NA (140-C)	NA (Long-C)	1/90	+2*	N	Exp	135
'Mech Mortar/1 (IS)	M, C, S	1 (NA)	* (NA)	6/7/14/21 (NA)	24	+3*	N	Adv	136
'Mech Mortar/1 (Clan)	M, C, S	1 (NA)	* (NA)	6/7/14/21 (NA)	24	+3*	N	Adv	136
'Mech Mortar/2 (IS)	M, C, S	2 (NA)	* (NA)	6/7/14/21 (NA)	12	+3*	N	Adv	136
'Mech Mortar/2 (Clan)	M, C, S	2 (NA)	* (NA)	6/7/14/21 (NA)	12	+3*	N	Adv	136
'Mech Mortar/4 (IS)	M, C, S	5 (NA)	* (NA)	6/7/14/21 (NA)	6	+3*	N	Adv	136
'Mech Mortar/4 (Clan)	M, C, S	5 (NA)	* (NA)	6/7/14/21 (NA)	6	+3*	N	Adv	136
'Mech Mortar/8 (IS)	M, C, S	10 (NA)	* (NA)	6/7/14/21 (NA)	4	+3*	N	Adv	136
'Mech Mortar/8 (Clan)	M, C, S	10 (NA)	* (NA)	6/7/14/21 (NA)	4	+3*	N	Adv	136
MechWarrior Aquatic Survival System	PE	0 (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	137
Mine Dispensers									
Vehicular (Land or Maritime)	PE	0 (0)	* (*)	—/—/—/0 (*)	2*	NA	NA	Adv	137
Space	PE	NA (0)	* (*)	NA (0)	2*	NA	NA	Adv	138
Minesweeper	PE	0 (NA)	* (NA)	NA (NA)	NA	NA	NA	Adv	138
Missile Launchers									
Enhanced LRM 5	M, C, S	2 (2)	1/Msl, C5/5 (3)	3/7/14/21 (Long)	24	0	N	Exp	139
Enhanced LRM 10	M, C, S	4 (4)	1/Msl, C5/10 (6)	3/7/14/21 (Long)	12	0	N	Exp	139
Enhanced LRM 15	M, C, S	5 (5)	1/Msl, C5/15 (9)	3/7/14/21 (Long)	8	0	N	Exp	139
Enhanced LRM 20	M, C, S	6 (6)	1/Msl, C5/20 (12)	3/7/14/21 (Long)	6	0	N	Exp	139
Extended LRM 5	M, C	3 (3)	1/Msl, C5/5 (3)	10/12/22/38 (Ext.)	18	0	N	Exp	139
Extended LRM 10	M, C	6 (6)	1/Msl, C5/10 (6)	10/12/22/38 (Ext.)	9	0	N	Exp	139
Extended LRM 15	M, C	8 (8)	1/Msl, C5/15 (9)	10/12/22/38 (Ext.)	6	0	N	Exp	139
Extended LRM 20	M, C	10 (10)	1/Msl, C5/20 (12)	10/12/22/38 (Ext.)	4	0	N	Exp	139
Improved One-Shot Launcher	PE	* (*)	* (*)	* (*)	OS	NA	NA	Adv	139
Streak LRM 5	M, C*	2 (2)	C5/5 (5)	0/7/14/21 (Long)	24	0	N	Exp	139
Streak LRM 10	M, C*	4 (4)	C5/10 (10)	0/7/14/21 (Long)	12	0	N	Exp	139
Streak LRM 15	M, C*	5 (5)	C5/15 (15)	0/7/14/21 (Long)	8	0	N	Exp	139
Streak LRM 20	M, C*	6 (6)	C5/20 (20)	0/7/14/21 (Long)	6	0	N	Exp	139
Streak LRM (ProtoMech, per tube)	M, C*	1 (NA)	C5/1 (NA)	0/7/14/21 (NA)	120	0	N	Exp	139
Mobile Field Base	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	142
Mobile Hyperpulse Generators									
Mobile HPG	PE	40 (40)	NA (NA)	NA (NA)	NA	NA	NA	Adv	143
Ground-Mobile HPG	PE	20 (20)	NA (NA)	NA (NA)	NA	NA	NA	Adv	143
M-Pod	OS, C, V, X	0 (NA)	15/10/5* (NA)	0/1/2/3 (NA)	OS	–1*	N	Adv	143
MRM "Apollo" FCS	E	0 (0)	* (*)	NA (NA)	NA	–1*	N	Adv	143
Naval (Capital) Autocannons									
NAC/10	CAP, AE	NA (30)	NA (10-C)	NA (Long-C)	5/1	0*	N	Adv	143
NAC/20	CAP, AE	NA (60)	NA (20-C)	NA (Long-C)	5/2	0*	N	Adv	143
NAC/25	CAP, AE	NA (85)	NA (25-C)	NA (Long-C)	5/3	0*	N	Adv	143
NAC/30	CAP, AE	NA (100)	NA (30-C)	NA (Long-C)	5/4	0*	N	Adv	143
NAC/35	CAP, AE	NA (120)	NA (35-C)	NA (Medium-C)	1	0*	N	Adv	143
NAC/40	CAP, AE	NA (135)	NA (40-C)	NA (Medium-C)	5/6	0*	N	Adv	143
Naval C^3	CAP, E	NA (NA)	NA (NA)	NA (*)	NA	NA	NA	Exp	144
Naval Comm-Scanner Suites									
Small NCSS	CAP, E	NA (NA)	NA (NA)	NA (*)	NA	NA	NA	Adv	145
Large NCSS	CAP, E	NA (NA)	NA (NA)	NA (*)	NA	NA	NA	Adv	145
Naval (Capital) Gauss									
Light N-Gauss	CAP, AE	NA (9)	NA (15-C)	NA (Extreme-C)	5	0*	N	Adv	145
Medium N-Gauss	CAP, AE	NA (15)	NA (25-C)	NA (Extreme-C)	5/2	0*	N	Adv	145
Heavy N-Gauss	CAP, AE	NA (18)	NA (30-C)	NA (Extreme-C)	2	0*	N	Adv	145
Naval (Capital) Lasers									
NL35	CAP, AE	NA (52)	NA (3.5-C)	NA (Long-C)	NA	0*	N	Adv	145
NL45	CAP, AE	NA (70)	NA (4.5-C)	NA (Extreme-C)	NA	0*	N	Adv	145
NL55	CAP, AE	NA (85)	NA (5.5-C)	NA (Extreme-C)	NA	0*	N	Adv	145
Naval (Capital) PPCs									
Light N-PPC	CAP, AE	NA (105)	NA (7-C)	NA (Long-C)	NA	0*	N	Adv	146
Medium N-PPC	CAP, AE	NA (135)	NA (9-C)	NA (Extreme-C)	NA	0*	N	Adv	146
Heavy N-PPC	CAP, AE	NA (225)	NA (15-C)	NA (Extreme-C)	NA	0*	N	Adv	146
Naval Repair Facilities									
Unpressurized	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	147
Pressurized	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	147
Reinforced (Unpressurized)	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	147
Naval Tug Adaptor	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	147
Null-Signature System	E	10 (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	148

*See rules for this equipment in the *Advanced Weapons And Equipment* section, starting on p. 274.

Weapon/Item	Tech Base	Tech Rating	Latest Intro Date (IS / Clan)	Item / Ammo Cost (C-bills)	Weight (Tons)	Space §§ M	P	CV	SV	F	SC	DS	JS	WS	SS	MS
X-Pulse Laser, Medium	IS	E/X-X-E	3057P / NA	110,000	2	1	NA	1	1	1	1	1	1	1	1	1
X-Pulse Laser, Large	IS	E/X-X-E	3057P / NA	275,000	7	2	NA	1	2	1	1	1	1	1	1	1
Laser Anti-Missile System (IS)	IS	E/X-X-E	3059P / NA	225,000	1.5	2	NA	1	2	1	1	1	1	1	1	1
Laser Anti-Missile System (Clan)	Clan	F/X-X-E	NA / 3048P	225,000	1	1	NA	1	1	1	1	1	1	1	1	1
Laser Insulator	IS/Clan	*	2575X / 2575X	3,000	+0.5**	+1**	NA	0	0	0	0	NA	NA	NA	NA	NA
Light Sail	IS/Clan	C/C-E-D	2165 / 2165	100,000xIT	TT÷10*	NA	NA	NA	1*	NA	NA	NA	NA	NA	NA	NA
Lithium-Fusion Battery	IS/Clan	*	3043 / 2531	3xKF	TT÷100*	NA	NA	NA	NA	NA	NA	NA	0	0	NA	NA
Mass Drivers																
Light Mass Driver	IS	D/X-X-F	2715P / NA	150M / 150,000	30,000	NA	NA	NA	NA	NA	NA	NA	NA	1*	1*	NA
Medium Mass Driver	IS	D/X-X-F	2715P / NA	280M / 300,000	50,000	NA	NA	NA	NA	NA	NA	NA	NA	1*	1*	NA
Heavy Mass Driver	IS	D/X-X-F	2715P / NA	500M / 600,000	100,000	NA	NA	NA	NA	NA	NA	NA	NA	1*	1*	NA
'Mech Mortar/1 (IS)	IS	B/D-F-E	PS / PS	7,000 / 28,000	2	1	NA	1	1	NA	NA	NA	NA	NA	NA	1
'Mech Mortar/1 (Clan)	Clan	B/D-F-E	PS / PS	7,000 / 28,000	1	1	NA	1	1	NA	NA	NA	NA	NA	NA	1
'Mech Mortar/2 (IS)	IS	B/D-F-E	PS / PS	15,000 / 28,000	5	2	NA	1	2	NA	NA	NA	NA	NA	NA	1
'Mech Mortar/2 (Clan)	Clan	B/D-F-E	PS / PS	15,000 / 28,000	2.5	1	NA	1	1	NA	NA	NA	NA	NA	NA	1
'Mech Mortar/4 (IS)	IS	B/D-F-E	PS / PS	32,000 / 28,000	7	3	NA	1	3	NA	NA	NA	NA	NA	NA	1
'Mech Mortar/4 (Clan)	Clan	B/D-F-E	PS / PS	32,000 / 28,000	3.5	2	NA	1	2	NA	NA	NA	NA	NA	NA	1
'Mech Mortar/8 (IS)	IS	B/D-F-E	PS / PS	70,000 / 28,000	10	5	NA	1	5	NA	NA	NA	NA	NA	NA	1
'Mech Mortar/8 (Clan)	Clan	B/D-F-E	PS / PS	70,000 / 28,000	5	3	NA	1	3	NA	NA	NA	NA	NA	NA	1
MechWarrior Aquatic Survival System	IS/Clan	D/X-X-D	3048P / 3062P	4,000	1.5	1*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mine Dispensers																
Vehicular (Land or Maritime)	IS/Clan	B/E-E-E	PS / PS	20,000 / 20,000	0.5	1	NA	1	1	1	1	1	NA	NA	NA	1
Space	IS/Clan	D/E-F-E	ES / ES	15,000 / 15,000	10	NA	NA	NA	1*	1*	1	1	1	1	1	NA
Minesweeper	IS/Clan	C/D-D-D	PS / PS	40,000	3	NA	NA	1*	1*	NA	NA	NA	NA	NA	NA	1
Missile Launchers																
Enhanced LRM-5 (NLRM 5)	IS	E/X-X-F	3058P / NA	37,500 / 31,000	3	2	NA	1	2	1	1	1	1	1	1	1
Enhanced LRM-10 (NLRM 10)	IS	E/X-X-F	3058P / NA	125,000 / 31,000	6	4	NA	1	4	1	1	1	1	1	1	1
Enhanced LRM-15 (NLRM 15)	IS	E/X-X-F	3058P / NA	218,750 / 31,000	9	6	NA	1	6	1	1	1	1	1	1	1
Enhanced LRM-20 (NLRM 20)	IS	E/X-X-F	3058P / NA	312,500 / 31,000	12	9	NA	1	9	1	1	1	1	1	1	1
Extended LRM-5 (ELRM 5)	IS	E/X-X-F	3054P / NA	60,000 / 35,000	6	1	NA	1	1	1	1	1	1	1	1	1
Extended LRM-10 (ELRM 10)	IS	E/X-X-F	3054P / NA	200,000 / 35,000	8	4	NA	1	4	1	1	1	1	1	1	1
Extended LRM-15 (ELRM 15)	IS	E/X-X-F	3054P / NA	350,000 / 35,000	12	6	NA	1	6	1	1	1	1	1	1	1
Extended LRM-20 (ELRM 20)	IS	E/X-X-F	3054P / NA	500,000 / 35,000	18	8	NA	1	8	1	1	1	1	1	1	1
Improved One-Shot Launcher	IS/Clan	B/X-X-F	3056 / 3058	0.8xIC	–0.5**	+0	NA	+0	+0	+0	+0	+0	+0	+0	+0	+0
Streak LRM-5	Clan	F/X-X-F	NA / 3057P	75,000 / 60,000	2	1	NA	1	1	1	1	1	1	1	1	1
Streak LRM-10	Clan	F/X-X-F	NA / 3057P	225,000 / 60,000	5	2	NA	1	2	1	1	1	1	1	1	1
Streak LRM-15	Clan	F/X-X-F	NA / 3057P	400,000 / 60,000	7	3	NA	1	3	1	1	1	1	1	1	1
Streak LRM-20	Clan	F/X-X-F	NA / 3057P	600,000 / 60,000	10	5	NA	1	5	1	1	1	1	1	1	1
Streak LRM (ProtoMech, per tube)	Clan	F/X-X-F	NA / 3065P	15,000 / 60,000	0.4	NA	1*	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mobile Field Base	IS/Clan	D/X-X-E	3059 / 3060	150,000	20	NA	NA	1	1	NA	NA	NA	NA	NA	NA	1
Mobile Hyperpulse Generators																
Mobile HPG	IS/Clan	E/E-X-F	2655 / 2655	1,000,000,000	50	NA	NA	NA	50	NA	1	1	1	1	1	1
Ground-Mobile HPG	IS/Clan	F/F-X-F	2751 / 2751	4,000,000,000	12	12	NA	1	12	1	1	1	1	1	1	1
M-Pod	IS	C/X-X-E	3064 / NA	6,000	1	1	NA	1	1	NA	NA	NA	NA	NA	NA	1
MRM "Apollo" FCS	IS	D/X-X-E	3071 / NA	125,000	+1**	+1**	NA	+0**	+1**	+0**	+0**	+0**	+0**	+0**	+0**	+0**
Naval (Capital) Autocannons																
NAC/10	IS/Clan	D/E-X-E	2195 / 2195	2M / 30,000	2,000	NA	NA	NA	NA	NA	NA	NA	1-C*	1-C*	1-C*	1*
NAC/20	IS/Clan	D/E-X-E	2197 / 2197	5M / 60,000	2,500	NA	NA	NA	NA	NA	NA	NA	1-C*	1-C*	1-C*	1*
NAC/25	IS/Clan	D/E-X-E	2200 / 2200	7.5M / 75,000	3,000	NA	NA	NA	NA	NA	NA	NA	1-C*	1-C*	1-C*	1*
NAC/30	IS/Clan	D/E-X-E	2200 / 2200	10.5M / 90,000	3,500	NA	NA	NA	NA	NA	NA	NA	1-C*	1-C*	1-C*	1*
NAC/35	IS/Clan	D/E-X-E	2201 / 2201	14M / 105,000	4,000	NA	NA	NA	NA	NA	NA	NA	1-C*	1-C*	1-C*	1*
NAC/40	IS/Clan	D/E-X-E	2202 / 2202	18M / 120,000	4,500	NA	NA	NA	NA	NA	NA	NA	1-C*	1-C*	1-C*	1*
Naval C^3	IS	F/X-X-F	3065P / NA	100,000xIT	*	NA	NA	NA	NA	NA	NA	0*	0*	0*	0*	NA
Naval Comm-Scanner Suites																
Small NCSS	IS/Clan	D/D-E-E	2200 / 2200	50,000,000	100	NA	NA	NA	1*	NA	0*	0*	0*	0*	0*	NA
Large NCSS	IS/Clan	D/D-E-E	2200 / 2200	250,000,000	500	NA	NA	NA	1*	NA	0*	0*	0*	0*	0*	NA
Naval (Capital) Gauss																
Light N-Gauss	IS/Clan	*	2448 / 2448	20.3M / 45,000	4,500	NA	NA	NA	NA	NA	NA	NA	1-C*	1-C*	1-C*	1*
Medium N-Gauss	IS/Clan	*	2448 / 2448	30.35M / 75,000	5,500	NA	NA	NA	NA	NA	NA	NA	1-C*	1-C*	1-C*	1*
Heavy N-Gauss	IS/Clan	*	2449 / 2449	50.05M / 90,000	7,000	NA	NA	NA	NA	NA	NA	NA	1-C*	1-C*	1-C*	1*
Naval (Capital) Lasers																
NL35	IS/Clan	*	2305 / 2305	500,000	700	NA	NA	NA	NA	NA	NA	NA	1-C*	1-C*	1-C*	1*
NL45	IS/Clan	*	2305 / 2305	850,000	900	NA	NA	NA	NA	NA	NA	NA	1-C*	1-C*	1-C*	1*
NL55	IS/Clan	*	2307 / 2307	1,250,000	1,100	NA	NA	NA	NA	NA	NA	NA	1-C*	1-C*	1-C*	1*
Naval (Capital) PPCs																
Light N-PPC	IS/Clan	*	2358 / 2358	2,000,000	1,400	NA	NA	NA	NA	NA	NA	NA	1-C*	1-C*	1-C*	1*
Medium N-PPC	IS/Clan	*	2358 / 2358	3,250,000	1,800	NA	NA	NA	NA	NA	NA	NA	1-C*	1-C*	1-C*	1*
Heavy N-PPC	IS/Clan	*	2356 / 2356	9,050,000	3,000	NA	NA	NA	NA	NA	NA	NA	1-C*	1-C*	1-C*	1*
Naval Repair Facilities																
Unpressurized	IS/Clan	C/C-E-D	ES / ES	5,000xC	0.025xC	NA	NA	NA	NA	NA	NA	NA	0*	0*	0*	NA
Pressurized	IS/Clan	C/C-E-D	ES / ES	10,000xC	0.075xC	NA	NA	NA	NA	NA	NA	NA	0*	0*	0*	NA
Reinforced (Unpressurized)	IS	C/F-X-F	3065P / NA	30,000xC	0.010xC	NA	NA	NA	NA	NA	NA	NA	0*	0*	NA	NA
Naval Tug Adaptor	IS/Clan	C/C-C-C	ES / ES	100,000	100*	NA	NA	NA	NA	NA	0*	0*	NA	0*	NA	NA
Null-Signature System	IS	E/E-X-X	2630X / 2630X	1,400,000	0*	7*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

*See rules for this equipment in the *Advanced Weapons And Equipment* section, starting on p. 274.

Weapon/Item	Type §	Heat Std (Aero)	Damage Std (Aero)	Range Min/Sht/Med/Lng (Aero)	Ammo (per Ton)	To-Hit Modifier	TC Comp	Rules Level	Ref
PCMT Equipment, Low-Density	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	149
PPC Capacitor	X	+5** (+5**)	+5** (+5**)	NA (NA)	NA	0	Y	Exp	149
ProtoMech Melee Weapon	ME	0 (NA)	Var** (NA)	Melee (NA)	NA	0	N	Exp	149
Recon Camera	E	NA (NA)	NA (NA)	* (*)	NA	NA	NA	Adv	150
Rifle (Cannon)									
Light Rifle	DB*	1 (1)	3 (3)*	0/4/8/12 (Medium)	18	0	Y	Exp	150
Medium Rifle	DB*	2 (2)	6 (6)*	1/5/10/15 (Medium)	9	0	Y	Exp	150
Heavy Rifle	DB*	4 (4)	9 (9)*	2/6/12/18 (Medium)	6	0	Y	Exp	150
Satellite Imagers									
Hi-Res Imager	E	NA (NA)	NA (NA)	* (*)	NA	NA	NA	Adv	151
Hyperspectral Imager	E	NA (NA)	NA (NA)	* (*)	NA	NA	NA	Adv	151
Infrared Imager	E	NA (NA)	NA (NA)	* (*)	NA	NA	NA	Adv	151
Look-Down Radar	E	NA (NA)	NA (NA)	* (*)	NA	NA	NA	Adv*	152
Structure									
Composite	Structure	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	154
Endo-Composite (Inner Sphere)	Structure	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	154
Endo-Composite (Clan)	Structure	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	154
Reinforced	Structure	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	155
Sub-Capital Cannons									
Light SCC	CAP, AE	12 (12)	20 (2-C)	* (Long-C)	2	0*	N	Adv	155
Medium SCC	CAP, AE	30 (30)	50 (5-C)	* (Medium-C)	1	0*	N	Adv	155
Heavy SCC	CAP, AE	42 (42)	70 (7-C)	* (Medium-C)	1/2	0*	N	Adv	155
Sub-Capital Lasers									
SCL/1	CAP, AE	24 (24)	10 (1-C)	* (Long-C)	NA	0*	N	Adv	155
SCL/2	CAP, AE	28 (28)	20 (2-C)	* (Medium-C)	NA	0*	N	Adv	155
SCL/3	CAP, AE	32 (32)	30 (3-C)	* (Medium-C)	NA	0*	N	Adv	155
Sub-Capital Missiles									
Piranha	CAP, AE	9 (9)	30 (3-C)	* (Long-C)	1/10	0	N	Adv	156
Stingray	CAP, AE	12 (12)	35 (3.5-C)	* (Medium-C)	1/12	0*	N	Adv	156
Swordfish	CAP, AE	15 (15)	40 (4-C)	* (Short-C)	1/15	0*	N	Adv	156
Manta Ray	CAP, AE	21 (21)	50 (5-C)	* (Short-C)	1/18	0*	N	Adv	156
Sub-Compact K-F Drive	CAP, PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	156
Supercharger	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	157
Taser (BattleMech)	DB, X	6 (6)	1* (1*)	0/1/2/4 (NA)	5	+1	N	Exp	157
Thunderbolt Launcher									
Thunderbolt-5	M	3 (3)	5 (5)	5/6/12/18 (Medium)	12	0	N	Adv	159
Thunderbolt–10	M	5 (5)	10 (10)	5/6/12/18 (Medium)	6	0	N	Adv	159
Thunderbolt–15	M	7 (7)	15 (15)	5/6/12/18 (Medium)	4	0	N	Adv	159
Thunderbolt–20	M	8 (8)	20 (20)	5/6/12/18 (Medium)	3	0	N	Adv	159
Turrets									
BattleMech Turret (Shoulder)	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	159
BattleMech Turret (Head)	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	159
BattleMech Turret (Quad)	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	159
Dual Turret (Vehicular)	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	159
Sponson Turret (Vehicular)	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	160
VTOL Chin Turret	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	160
Vehicular DropChute (VDC)									
Standard VDC	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	161
Camouflage VDC	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	161
Stealth VDC	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	161
Reusable VDC	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	161
Vehicular Jump Jets	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	161
Void-Signature System	E	10 (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	161
VTOL Jet Booster	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Exp	162
VTOL Mast Mount	PE	NA (NA)	NA (NA)	NA (NA)	NA	NA	NA	Adv	162

*See rules for this equipment in the *Advanced Weapons And Equipment* section, starting on p. 86.

NOTES

Damage and Range values noted with a "-C" reflect capital-scale damage and range brackets. Equivalent values without this notation reflect standard-scale damage and ranges. Damage values noted with an "A" reflect artillery weapon damage (see *Artillery,* p. 147, *TO:AR*).

To-hit modifiers reflect base to-hit from warrior/crew's skill, not from "similar" attacks (such as the Chain Whip's similarity to a Hatchet).

TC Comp reflects item's compatibility with the Targeting Computer. If Y, item benefits from use of a Targeting Computer; if N, item cannot benefit from a Targeting Computer; if NA, Targeting Computer has no effect on item use.

§ WEAPON AND EQUIPMENT TYPES TABLE (EXPANDED)

AE: Area-Effect Weapon
AI: Anti-Infantry
Armor: Armor System
C: Cluster Weapon
CAP: Capital-scale Weapon
CE: Counter-Electronics System
DB: Direct-Fire (Ballistic) Weapon
DE: Direct Fire (Energy) Weapon
E: Electronics System
Engine: Engine System
F: Flak
H: Heat-Causing Weapon
M: Missile Weapon
ME: Melee-Enhancement Weapon
OS: One-Shot Weapon
P: Pulse (Energy) Weapon
PB: Point-Blank System
PE: Physical Enhancement
R/C: Rapid-Fire (Multi-Firing)/Cluster Weapon
S: Switchable Ammo Supply
Structure: Internal Structure System
T: Targeting Enhancement System
V: Variable-Damage
X: Explosive Weapon/Component

§§SPACE COLUMN ABBREVIATIONS TABLE

M: BattleMechs/IndustrialMechs
P: ProtoMechs
CV: Combat Vehicles
SV: Support Vehicles
F: Fighters (Conventional and Aerospace)
SC: Small Craft
DS: DropShips
JS: JumpShips
WS: WarShips
SS: Space Stations
MS: Mobile Structures

Weapon/Item	Tech Base	Tech Rating	Latest Intro Date (IS / Clan)	Item / Ammo Cost (C-bills)	Weight (Tons)	Space §§ M	P	CV	SV	F	SC	DS	JS	WS	SS	MS
PCMT Equipment, Low-Density	IS/Clan	C/C-C-C	2200 / 2200	200,000xIT	Var*	NA	NA	NA	1*	NA	NA	NA	NA	NA	1*	NA
PPC Capacitor	IS	E/X-X-E	3060P / NA	150,000	+1**	+1**	NA	+0**	+1**	+0**	+0**	+0**	+0**	+0**	+0**	+0**
ProtoMech Melee Weapon	Clan	C/X-X-E	NA / 3067P	50,000	0.5*	NA	1*	NA	NA	NA	NA	NA	NA	NA	NA	NA
Recon Camera	IS/Clan	C/B-B-B	PS / PS	10,000	0.5	1	1	1	1	1	1	NA	NA	NA	NA	NA
Rifle (Cannon)																
Light Rifle	IS	B/C-F-X	PS / PS X	37,750 / 800	3	1	NA	1	1	1	1	1	NA	NA	NA	1
Medium Rifle	IS	B/C-F-X	PS / PS X	75,500 / 1,000	5	2	NA	1	2	1	1	1	NA	NA	NA	1
Heavy Rifle	IS	B/C-F-X	PS / PS X	90,000 / 3,000	8	3	NA	1	3	1	1	1	NA	NA	NA	1
Satellite Imagers																
Hi-Res Imager	IS/Clan	C/D-E-D	ES / ES	150,000	2.5	NA	NA	1*	1*	1	1	1	1	1	1	1*
Hyperspectral Imager	IS	D/X-X-F	3055 / NA	550,000	7.5	NA	NA	1*	2*	1	1	1	1	1	1	1*
Infrared Imager	IS/Clan	C/D-E-D	ES / ES	250,000	5	NA	NA	1*	1*	1	1	1	1	1	1	1*
Look-Down Radar	IS/Clan	B/D-E-D	PS / PS	400,000	5	NA	NA	1*	1*	1	1	1	1	1	1	1*
Structure																
Composite	IS	E/X-X-E	3061P / NA	1,600xTT	TT÷20	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endo-Composite (Inner Sphere)	IS	E/X-X-F	3067P / NA	3,200xTT	TT÷13.33	7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endo-Composite (Clan)	Clan	E/X-X-F	NA / 3073P	3,200xTT	TT÷13.33	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Reinforced	IS/Clan	E/X-X-E	3057P / 3065P	6,400xTT	TT÷5	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sub-Capital Cannons																
Light SCC	IS	E/X-X-F	3073 / NA	330,000 / 10,000	200	NA	NA	NA	30	NA	NA	1-C*	1-C*	1-C*	1-C*	1
Medium SCC	IS	E/X-X-F	3073 / NA	780,000 / 18,000	500	NA	NA	NA	50	NA	NA	1-C*	1-C*	1-C*	1-C*	1
Heavy SCC	IS	E/X-X-F	3073 / NA	1,300,000 / 25,000	700	NA	NA	NA	60	NA	NA	1-C*	1-C*	1-C*	1-C*	1
Sub-Capital Lasers																
SCL/1	IS	E/X-X-F	3073 / NA	220,000	150	NA	NA	NA	20	NA	NA	1-C*	1-C*	1-C*	1-C*	1
SCL/2	IS	E/X-X-F	3073 / NA	335,000	200	NA	NA	NA	26	NA	NA	1-C*	1-C*	1-C*	1-C*	1
SCL/3	IS	E/X-X-F	3073 / NA	450,000	250	NA	NA	NA	32	NA	NA	1-C*	1-C*	1-C*	1-C*	1
Sub-Capital Missiles																
Piranha	IS/Clan	E/X-X-F	3072 / 3073	75,000 / 15,000	100	NA	NA	NA	18	NA	NA	1-C*	1-C*	1-C*	1-C*	1
Stingray	IS/Clan	E/X-X-F	3072 / 3073	85,000 / 19,000	120	NA	NA	NA	25	NA	NA	1-C*	1-C*	1-C*	1-C*	1
Swordfish	IS/Clan	E/X-X-F	3072 / 3073	110,000 / 25,000	140	NA	NA	NA	30	NA	NA	1-C*	1-C*	1-C*	1-C*	1
Manta Ray	IS/Clan	E/X-X-F	3072 / 3073	150,000 / 30,000	160	NA	NA	NA	38	NA	NA	1-C*	1-C*	1-C*	1-C*	1
Sub-Compact K-F Drive	IS/Clan	F/F-X-F	2320 / 2320	16xKF	TT÷2*	NA	NA	NA	NA	NA	NA	NA	NA	0*	NA	NA
Supercharger	IS/Clan	C/F-F-F	ES / ES	10,000xER§	ET÷10	1	NA	1	1	NA	NA	NA	NA	NA	NA	NA
Taser (BattleMech)	IS	E/X-X-F	3067P / NA	200,000 / 2,000	4	3	NA	1	3	NA	NA	NA	NA	NA	NA	1
Thunderbolt Launcher																
Thunderbolt-5	IS	E/X-X-F	3072 / NA	50,000 / 50,000	3	1	NA	1	1	1	1	1	1	1	1	1
Thunderbolt-10	IS	E/X-X-F	3072 / NA	175,000 / 50,000	7	2	NA	1	2	1	1	1	1	1	1	1
Thunderbolt-15	IS	E/X-X-F	3072 / NA	325,000 / 50,000	11	3	NA	1	3	1	1	1	1	1	1	1
Thunderbolt-20	IS	E/X-X-F	3072 / NA	450,000 / 50,000	15	5	NA	1	5	1	1	1	1	1	1	1
Turrets																
BattleMech Turret (Shoulder)	IS/Clan	C/F-X-F	2450P / 2450P	10,000xIT	TE÷10	1*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BattleMech Turret (Head)	IS	C/X-X-F	3055P / —	10,000xIT	TE÷10	1*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BattleMech Turret (Quad)	IS/Clan	C/F-F-F	2320P / 2320P	10,000xIT	TE÷10	1*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dual Turret (Vehicular)	IS/Clan	B/F-F-F	PS P / PS P	5,000xIT	TE÷10	NA	NA	0*	0*	NA	NA	NA	NA	NA	NA	NA
Sponson Turret (Vehicular)	IS/Clan	B/F-F-F	PS P / PS P	4,000xIT‡‡	TE÷10‡‡	NA	NA	0*	0*	NA	NA	NA	NA	NA	NA	NA
VTOL Chin Turret	IS/Clan	B/F-F-F	PS P / PS P	5,000xIT	TE÷10	NA	NA	0*	0*	NA	NA	NA	NA	NA	NA	NA
Vehicular DropChute (VDC)																
Standard VDC	IS/Clan	D/D-E-B	2351 / 2351	1,000	2*	0	0	0	0	NA	NA	NA	NA	NA	NA	NA
Camouflage VDC	IS/Clan	D/D-E-C	2351 / 2351	3,000	2*	0	0	0	0	NA	NA	NA	NA	NA	NA	NA
Stealth VDC	IS/Clan	D/E-F-D	2355 / 2355	5,000	2.2*	0	0	0	0	NA	NA	NA	NA	NA	NA	NA
Reusable VDC	IS/Clan	E/F-F-E	2353 / 2353	2xIC	+0.5**	2**	1**	1**	2**	NA	NA	NA	NA	NA	NA	NA
Vehicular Jump Jets	IS/Clan	E/E-X-F	2650X / 2650X	†	Var*	*	NA	1*	1*	NA	NA	NA	NA	NA	NA	NA
Void-Signature System	IS	E/X-X-E	3070P / NA	2,000,000	0*	7*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VTOL Jet Booster	IS/Clan	D/X-F-E	3009 / ES	10,000xER	ET÷10	NA	NA	1*	1*	NA	NA	NA	NA	NA	NA	NA
VTOL Mast Mount	IS/Clan	C/F-F-F	PS / PS	50,000	0.5	NA	NA	0*	0*	NA	NA	NA	NA	NA	NA	NA

*See rules for this equipment in the *Advanced Weapons And Equipment* section, starting on p. 86.

**Adds to existing weapon (see Special Rules)

†Jump Booster Cost = 150 x (Unit Tonnage) x (Jump MP x Jump MP); UMU costs = 200 x (Unit Tonnage) x (Number of UMUs x Number of UMUs); Vehicle Jump Jet costs = 200 x (Unit Tonnage) x (Jump MP x Jump MP)

‡An additional 5,000 C-bills must be applied to reflect the drone's sensors

††Includes costs for all weapons and items placed in the mount

‡‡Sponson Turret costs and weights are for two sponsons together. See special rules for this equipment.

§Support Vehicles, which do not have an engine rating, use engine tonnage instead.

NOTES

Introduction Dates marked with a "P" indicate Prototype Production only. Introduction Dates marked with an "X" indicate items that have since become extinct and not recovered. Clan dates prior to 2820 indicate Star League-era equipment

If a single value or formula appears for cost, the item has no ammunition cost; otherwise, the value left of the slash is the item cost and the value right of the slash equals the cost per ton of the weapon's standard ammunition

WEIGHT AND COST FORMULA CODES

"AT" = Armor Tonnage; "C" = Desired Capacity (in tons); "CS" = Critical Slots; "ER" = Engine Rating; "ET" = Engine Tonnage; "HX" = Number of Hexes item occupies; "IC" = Component Cost (based on item being modified); "IT" = Item Tonnage (weight of component itself); "KF" = Cost of all K-F Drive components together; "TC" = Total Unit Cost (in C-bills, applied to final calculations); "TE" = Turret Equipment Tonnage; "TT" = Total Unit Tonnage

BATTLE ARMOR COMBAT DATA

Weapon/Item	Type	Damage Value	Range Min/Sht/Med/Lng	To-Hit Modifier	Rules Level	Ref	Weight per Shot (Ammo)
Angel ECM	E	NA	—/—/—/2	NA	Exp	91	NA
BA LB-X AC	DB, C, F	4*	—/2/5/8	–1	Adv	98	4 kg (10)
BA Tube Artillery	AE, S	3/1 (R1)	2 boards	NA	Exp	96	15 kg (2)
BA Mechanical Jump Boosters	PE	NA	NA	NA	Exp	99	NA
BA Myomer Booster	PE	+2*	NA	NA	Exp	99	NA
BA Detachable Weapon Pack	PE	As Weapon*	As Weapon*	0	Adv	99	NA
BA C^3 System (per Trooper)	E	NA	NA	NA	Exp	109	NA
BA C^3i System (per Trooper)	E	NA	NA	NA	Exp	109	NA
Disposable Weapon	PE	As Weapon*	As Weapon*	0	Adv	116	NA
Heavy Flamer	DE, H, AI	4*	—/2/3/4	0	Adv	124	1 kg (10)
Laser Reflective Armor	Armor	NA	NA	NA	Exp	93	NA
Lasers							
ER Pulse Laser, Small	P, AI	5*	0/2/4/6	–1	Exp	132	0.41 kg (12)
ER Pulse Laser, Medium	P	7	0/5/9/14	–1	Exp	132	0.45 kg (11)
Variable Speed Laser, Small	P, AI	5/4/3*	0/2/4/6	Var*	Adv	133	0.33 kg (15)
Variable Speed Laser, Medium	P, AI	9/7/5*	0/2/5/9	Var*	Adv	133	0.38 kg (13)
Mine Dispenser	PE	*	*	NA	Adv	137	NA
Reactive Armor	Armor	NA	NA	NA	Exp	94	NA
Taser (Battle Armor)	DB	1*	0/1/2/3	+1	Adv	158	OS (1)
Battle Armor DropChute (BADC)							
Standard BADC	PE	NA	NA	NA	Adv	161	NA
Camouflage BADC	PE	NA	NA	NA	Adv	161	NA
Stealth BADC	PE	NA	NA	NA	Adv	161	NA
Reusable BADC	PE	NA	NA	NA	Adv	161	NA

*See rules for this equipment in the *Advanced Weapons And Equipment* section, starting on p. 86.

CONVENTIONAL INFANTRY COMBAT DATA

Weapon/Item	Type	Damage Value	Range Min/Sht/Med/Lng	To-Hit Modifier	Rules Level	Ref
Beast-Mounted Infantry	PE	Var*	Var*	NA	Adv	107
Disposable Weapons	As Weapon*	As Weapon*	As Weapon*	As Weapon*	Adv	116
Field Guns	As Weapon*	As Weapon*	As Weapon*	As Weapon*	Adv	123
Field Artillery	As Weapon*	As Weapon*	As Weapon*	As Weapon*	Adv	123
Infantry Armor	Armor	NA	NA	NA	Adv	129
Mechanized VTOL Infantry						
Microlite VTOLs	PE	NA	NA	NA	Adv	136
Micro-copter VTOLs	PE	NA	NA	NA	Adv	136
Specialized Infantry						
Combat Engineers	PE	NA	NA	NA	Adv	152
Marines	PE	NA	NA	NA	Adv	153
Mountain Troops	PE	NA	NA	NA	Adv	153
Paramedics	PE	NA	NA	NA	Adv	153
Paratroops	PE	NA	NA	NA	Adv	153
SCUBA (Standard)	PE	NA	NA	NA	Adv	153
SCUBA (Motorized)	PE	NA	NA	NA	Adv	153
Xenoplanetary Condition-Trained Troops	PE	NA	NA	NA	Adv	163

*See rules for this equipment in the *Advanced Weapons And Equipment* section, starting on p. 86.

HEAVY WEAPONS AMMUNITION COMBAT DATA

Ammunition Type	Used By (Weapon)§	Damage Type	Damage Std (Aero)	Range Min/Sht/Med/Lng (Aero)	Ammo (per Ton)	To-Hit Modifier	Rules Level	Ref
Autocannons								
Caseless	SAC, LAC	DB	* (*)	* (*)	x2	+0	Exp	164
Flak	SAC, LAC, PAC	DB, F	** (**)	* (*)	x1	**	Adv	164
Tracer	SAC, LAC, PAC	DB	** (**)	* (*)	x1	+0	Adv	165
Artillery								
Air-Defense Arrow (ADA)	AIV	F	20 (NA)	** (NA)	x1	+0	Exp	165
Arrow IV (Homing)	AIV	AE	20 (NA)	* (NA)	x1	+0**	Adv	166
Arrow IV (Non-Homing)	AIV	AE, F	20A (NA)	* (NA)	x1	+0	Adv	166
Arrow IV (Cluster)	AIV	AE, F	20A** (NA)	* (NA)	x1	+0	Adv	166
Cluster (Long Tom)	LAW	AE, F	20A** (NA)	* (NA)	x1	+0	Adv	166
Cluster (Sniper)	SAW	AE, F	15A** (NA)	* (NA)	x1	+0	Adv	166
Cluster (Thumper)	TAW	AE, F	10A** (NA)	* (NA)	x1	+0	Adv	166
Copperhead (Long Tom)	LAW	AE	15** (NA)	* (NA)	x1	+0**	Adv	167
Copperhead (Sniper)	SAW	AE	10** (NA)	* (NA)	x1	+0**	Adv	167

*Values as per standard weapon.

**See rules for this equipment in the *Advanced Weapons And Equipment* section, starting on p. 86.

BATTLE ARMOR CONSTRUCTION DATA

Weapon/Item	Tech Base	Tech Rating	Latest Intro Date (IS / Clan)	Item / Ammo Cost (C-bills)	WT (Tons)	Space
Angel ECM	IS / Clan	F/X-X-F	3063P / 3059P	750,000	250 / 150	3
BA LB-X AC	Clan	F/X-X-F	3075	70,000 / 1,000	400	2
BA Tube Artillery	IS	E/X-X-F	3075P	200,000 / 900	500	4**
BA Mechanical Jump Boosters	IS	E/X-X-F	3070P / NA	As Jump Jet*	2 x Jump Jet**	0
BA Myomer Booster	Clan	F/X-X-F	NA / 3072P	75,000xMP Provided	250	3
BA Detachable Weapon Pack	IS / Clan	E/X-X-F	3073 / 3072	+18,000‡	0.75 x Weapon/Ammo**	1
BA C^3 System (per Trooper)	IS	E/X-X-E	3073P / NA	62,500	250	1
BA C^3i System (per Trooper)	IS	E/X-X-E	3063P / NA	125,000	350	1
Disposable Weapon	As Weapon**	As Weapon**	As Weapon**	As Weapon**	As Weapon**	**
Heavy Flamer	IS / Clan	C/X-X-E	3073	11,250 / 2,000	350	2
Laser-Reflective Armor	IS / Clan	F/X-X-F	3074P	37,000	**	7
Lasers						
ER Pulse Laser, Small	Clan	F/X-X-E	NA / 3059P	30,000 / 200	550	2
ER Pulse Laser, Medium	Clan	F/X-X-E	NA / 3059P	150,000 / 200	800	4
Variable Speed Laser, Small	IS	E/X-X-E	3071 / NA	60,000 / 200	500	2
Variable Speed Laser, Medium	IS	E/X-X-E	3072 / NA	200,000 / 200	900	4
Mine Dispenser	IS / Clan	D/X-X-E	3050 / 3058	20,000 / 5,000	50	2
Reactive Armor	IS / Clan	F/X-X-F	3075P	37,000	**	7
Taser (Battle Armor)	IS	E/X-X-E	3067 / NA	10,000 / 500	300	3
Battle Armor DropChute (BADC)						
Standard BADC	IS / Clan	D/D-E-B	3051 / 2875	1,000	200	0**
Camouflage BADC	IS / Clan	D/D-E-C	3051 / 2875	3,000	200	0*
Stealth BADC	IS / Clan	D/E-F-D	3054 / 2880	5,000	225	0*
Reusable BADC	IS / Clan	E/F-F-E	3053 / 2876	2xBADC Cost	+50†	1

*Battle Armor Mechanical Jump Boosters cost the same amount as jump jets on a battlesuit of the same weight class.
†Adds to existing weapon (see Special Rules)
**See rules for this equipment in the *Advanced Weapons And Equipment* section, starting on p. 86.
‡ In addition to the weapon.

CONVENTIONAL INFANTRY CONSTRUCTION DATA

Weapon/Item	Tech Base	Tech Rating	Latest Intro Date (IS / Clan)	Cost (C-bills)	WT (kg)	Space
Beast-Mounted Infantry	IS / Clan	Var*	PS / PS	5,000xTT	Var*	NA
Disposable Weapons	IS / Clan	As Weapon*	As Weapon*	As Weapon*	As Weapon*	NA
Field Guns	IS / Clan	As Weapon*	As Weapon*	As Weapon*	As Weapon*	NA
Field Artillery	IS / Clan	As Weapon*	As Weapon*	As Weapon*	As Weapon*	NA
Infantry Armor	Var*	Var*	Var* / Var*	Var*	NA	NA
Mechanized VTOL Infantry						
Microlite VTOLs	IS / Clan	Var*	ES / ES	TCx4	+1.4/trooper	NA
Micro-copter VTOLs	IS / Clan	Var*	ES / ES	TCx4.5	+1.9/trooper	NA
Specialized Infantry						
Combat Engineers	IS / Clan	Var*	PS / PS	TCx5	+0.1/trooper	NA
Marines	IS / Clan	Var*	ES / ES	TCx3	+0/trooper	NA
Mountain Troops	IS / Clan	Var*	PS / PS	TCx2	+0/trooper	NA
Paramedics	IS / Clan	Var*	PS / PS	TCx0.375**	+0.05/trooper	NA
Paratroops	IS / Clan	Var*	PS / PS	TCx3	+0.05/trooper	NA
SCUBA (Standard)	IS / Clan	Var*	PS / PS	TCx2	+0.05/trooper	NA
SCUBA (Motorized)	IS / Clan	Var*	PS / PS	TCx2.5	+0.1/trooper	NA
Xenoplanetary Condition-Trained Troops	IS / Clan	Var*	Var* / Var*	TCx1.5	NA	NA

*See rules for this equipment in the *Advanced Weapons And Equipment* section, starting on p. 86.
**Cost is per medic, added to the total platoon cost after finalizing calculations
NOTE: "TT" = Total Unit Tonnage; "TC" Total Unit Cost (in C-bills, applied to final calculations)

HEAVY WEAPONS AMMUNITION CONSTRUCTION DATA

Weapon/Item	Tech Base	Tech Rating	Latest Intro Date (IS / Clan)	Cost (C-bills)	Ammo (per Ton)	WT (Tons)
Autocannons						
Caseless	IS	D/X-X-E	3056P / NA	x1.5	x2	x1
Flak	IS / Clan	C/D-F-E	2310 / 2310	x1.5	x1	x1
Tracer	IS / Clan	B/D-E-F	2300 / 2300	x1.5	x1	x1
Artillery						
Air-Defense Arrow (ADA)	IS	E/X-X-F	3068P / NA	45,000	x1	x1
Arrow IV (Homing)	IS / Clan	E/E-F-E	3045 / 2600	15,000	x1	x1
Arrow IV (Non-Homing)	IS / Clan	E/E-F-E	3044 / 2600	10,000	x1	x1
Arrow IV (Cluster)	IS / Clan	E/E-F-E	3047 / 2620	x1.5	x1	x1
Cluster (Long Tom)	IS / Clan	E/E-F-E	PS / PS	x1.5	x1	x1
Cluster (Sniper)	IS / Clan	E/E-F-E	PS / PS	x1.5	x1	x1
Cluster (Thumper)	IS / Clan	E/E-F-E	PS / PS	x1.5	x1	x1
Copperhead (Long Tom)	IS / Clan	E/E-F-F	3051 / 2645	x1.5	x1	x1
Copperhead (Sniper)	IS / Clan	E/E-F-F	3051 / 2645	x1.5	x1	x1

Ammunition Type	Used By (Weapon)§	Damage Type	Damage Std (Aero)	Range Min/Sht/Med/Lng (Aero)	Ammo (per Ton)	To-Hit Modifier	Rules Level	Ref
Copperhead (Thumper)	TAW	AE	5** (NA)	* (NA)	x1	+0**	Adv	167
Flechette	SAT	AE, AI	** (NA)	* (NA)	x1	+0	Adv	167
Arrow IV (Illumination)	AIV	*	** (NA)	* (NA)	x1	+0	Adv	167
Illumination	SAT	*	** (NA)	* (NA)	x1	+0	Adv	167
Arrow IV (Laser-Inhibiting)	AIV	*	0** (NA)	* (NA)	x0.5	+0	Exp	168
Inferno-IV	AIV	AE, H, AI	** (NA)	* (NA)	x1	+0	Adv	168
Arrow IV (Smoke)	AIV, SAT	AE	0** (NA)	* (NA)	x1	+0	Adv	168
Smoke	AIV, BAAW, SAT	AE	0** (NA)	* (NA)	x1	+0	Adv	168
Thunder (FASCAM) (IS)	AIV, SAT	AE	0** (NA)	* (NA)	x1	+0	Adv	169
Thunder (FASCAM) (Clan)	AIV, SAT	AE	0** (NA)	* (NA)	x1	+0	Adv	169
Thunder Active-IV	AIV	AE	0** (NA)	* (NA)	x1	+0	Adv	169
Thunder Vibrabomb-IV	AIV	AE	0** (NA)	* (NA)	x1	+0	Adv	169
Bombs								
Air-to-Air (AAA) Arrow	EO (5)	M	NA (20)	6/12/18/24 (Medium-C)	1	+0**	Adv	169
Anti-Ship (AS) Missile	EO (6)	M	NA (30)	9/17/25/32 (Long-C)	0.5	+0**	Exp	170
Anti-Ship EW (ASEW) Missile	EO (6)	M, E	NA (**)	7/14/21/28 (Medium-C)	0.5	+0**	Adv	170
Arrow IV Homing Missile (Air Launch)	EO (5)	AE	NA (**)	NA (**)	1	+0**	Adv	171
Arrow IV Non-Homing Missile (Air Launch)	EO (5)	AE	NA (**)	NA (**)	1	+0	Adv	171
Inferno	EO (1)	AE, H	NA (**)	NA (**)	1	+0	Adv	171
Light Air-to-Air (LAA) Missile	EO (2)	M	NA (6)	7/14/21/28 (Medium-C)	2	+0**	Adv	171
Thunder (FASCAM) (IS)	EO (1)	AE	0** (NA)	* (NA)	1	+0	Adv	172
Thunder (FASCAM) (Clan)	EO (1)	AE	0** (NA)	* (NA)	1	+0	Adv	172
Thunder Active	EO (1)	AE	0** (NA)	* (NA)	1	+0	Adv	172
Thunder Vibrabomb	EO (1)	AE	0** (NA)	* (NA)	1	+0	Adv	172
Torpedo	EO (1)	DB	0** (10)	* (NA)	1	+0	Adv	172
Flamer/Fluid Gun								
Coolant	VFL, FLG, SPR	DB	** (**)	* (*)	x1	+0	Adv	173
Corrosive	FLG, SPR	DE, AI	** (**)	* (*)	x1	+0	Adv	173
Flame-Retardant Foam	FLG, SPR	DE	** (**)	* (*)	x1	+0	Adv	173
Inferno Fuel	VFL, FLG	DE, H, AI	** (**)	* (*)	x1	+0	Adv	174
Oil Slick	FLG, SPR	DE	** (**)	* (*)	x1	+0	Adv	174
Paint/Obscurant	FLG, SPR	DE, E	** (**)	* (*)	x1	+0	Adv	174
Water	VFL, FLG, SPR	DE, AI	** (**)	* (*)	x1	+0	Adv	175
Grenade Launcher								
Chaff	VGL	AE, E	** (**)	* (*)	x1	NA	Adv	175
Fragmentation	VGL	AE, AI	** (**)	* (*)	x1	NA	Adv	175
Incendiary	BAGL, VGL	AE, H, AI	** (**)	* (*)	x1	NA	Adv	176
Smoke	BAGL, VGL	AE	** (**)	* (*)	x1	NA	Adv	176
Mines								
Active	LMN**	C	** (**)	** (**)	**	NA	Adv	176
Command-Detonated	LMN, MMN**	C	** (**)	** (**)	**	NA	Adv	177
EMP (Command-Detonated)	LMN**	E, AI	** (**)	** (**)	**	NA	Exp	177
EMP (Vibrabomb)	LMN**	E, AI	** (**)	** (**)	**	NA	Exp	177
Inferno	LMN, MMN**	C, H	** (**)	** (**)	**	NA	Adv	178
Space	SMN**	C	** (**)	** (**)	**	NA	Adv	178
Standard	LMN, MMN**	C	** (**)	** (**)	**	NA	Adv	179
Vibrabomb	LMN, MMN**	C	** (**)	** (**)	**	NA	Adv	179
Missiles								
Acid (AX) SRMs	SRM, MML	M, C	** (**)	0/3/6/9 (Short)	x0.5	+0**	Exp	179
Anti-Radiation (ARAD) SRMs	SRM, MML	M, C, E	** (**)	0/3/6/9 (Short)	x1	Var**	Exp	180
Anti-Radiation (ARAD) LRMs (IS)	LRM, MML	M, C, E	** (**)	6/7/14/21 (Long)	x1	Var**	Exp	180
Anti-Radiation (ARAD) LRMs (Clan)	LRM	M, C, E	** (**)	0/7/14/21 (Long)	x1	Var**	Exp	180
Artemis V Capable	LRM, SRM	M, C	** (**)	* (*)	x1	**	Exp	95
Bola Pods	NMB	* (*)	** (**)	0/3/6/9 (Short)	x1	+1	Exp	180
Follow-the-Leader (FTL) LRMs	LRM, MML	* (*)	** (**)	6/7/14/21 (Long)	x0.5	+2**	Exp	180
Harpoon SRMs	SRM, MML	* (*)	** (**)	0/3/6/9 (Short)	x1	+0	Adv	181
Heat-Seeking (HS) SRMs	SRM, MML	* (*)	** (**)	0/3/6/9 (Short)	x0.5	Var**	Adv	181
Heat-Seeking (HS) LRMs (IS)	LRM, MML	* (*)	** (**)	6/7/14/21 (Long)	x0.5	Var**	Adv	181
Heat-Seeking (HS) LRMs (Clan)	LRM	* (*)	** (**)	0/7/14/21 (Long)	x0.5	Var**	Adv	181
Incendiary LRMs (IS)	LRM, MML	* (*)	** (**)	6/7/14/21 (Long)	x1	+0	Adv	182
Incendiary LRMs (Clan)	LRM	* (*)	** (**)	0/7/14/21 (Long)	x1	+0	Adv	182
Magnetic-Pulse SRMs	SRM, MML	* (*)	** (**)	0/3/6/9 (Short)	x1	+0	Exp	182
Magnetic-Pulse LRMs	LRM, MML	* (*)	** (**)	6/7/14/21 (Long)	x1	+0	Exp	182
Mine-Clearance SRMs	SRM, MML	* (*)	** (**)	0/3/6/9 (Short)	x1	+0	Adv	182

*Values as per standard weapon.

**See rules for this equipment in the *Advanced Weapons And Equipment* section, starting on p. 86.

Weapon/Item	Tech Base	Tech Rating	Latest Intro Date (IS / Clan)	Cost (C-bills)	Ammo (per Ton)	WT (Tons)
Copperhead (Thumper)	IS / Clan	E/E-F-F	3051 / 2645	x1.5	x1	x1
Flechette	IS / Clan	E/F-F-E	PS / PS	x1.5	x1	x1
Arrow IV (Illumination)	IS / Clan	C/D-D-D	3047 / 2621	x0.5	x1	x1
Illumination	IS / Clan	C/D-D-D	PS / PS	x0.5	x1	x1
Arrow IV (Laser-Inhibiting)	IS	E/X-X-F	3053P / NA	x4	x0.5	x1
Inferno-IV	IS	C/X-X-D	3055 / NA	x1	x1	x1
Arrow IV (Smoke)	IS / Clan	B/E-F-E	3044 / 2600	x0.5	x1	x1
Smoke	IS / Clan	B/A-A-A	PS / PS	x0.5	x1	x1
Thunder (FASCAM) (IS)	IS	C/E-X-E	3051 / 2621X	x1.5	x1	x1
Thunder (FASCAM) (Clan)	Clan	C/X-D-D	NA / 2621	x1.5	x1	x1
Thunder Active-IV	IS	D/X-X-E	3065 / NA	x3	x1	x1
Thunder Vibrabomb-IV	IS	D/X-X-E	3065 / NA	x2	x1	x1
Bombs						
Air-to-Air (AAA)Arrow	IS / Clan	E/X-X-F	3072 / 3072	9,000†	NA	1
Anti-Ship (AS) Missile	IS	D/X-X-F	3071P / NA	15,000†	NA	2
Anti-Ship EW (ASEW) Missile	IS	E/X-X-E	3067P / NA	20,000†	NA	2
Arrow IV Homing Missile (Air Launch)	IS / Clan	E/E-F-E	3047 / 2600	3,000†	NA	1
Arrow IV Non-Homing Missile (Air Launch)	IS / Clan	E/E-F-E	3046 / 2623	2,000†	NA	1
Inferno	IS / Clan	B/D-D-D	PS / PS	6,000†	NA	1
Light Air-to-Air (LAA) Missile	IS / Clan	E/X-X-F	3072 / 3074	6,000†	NA	0.5
Thunder (FASCAM) (IS)	IS	C/E-X-E	3052 / NA	12,000†	NA	1
Thunder (FASCAM) (Clan)	Clan	C/X-D-D	NA / 2623	12,000†	NA	1
Thunder Active	IS	D/X-X-E	3065 / NA	36,000†	NA	1
Thunder Vibrabomb	IS	D/X-X-E	3065 / NA	24,000†	NA	1
Torpedo	IS / Clan	B/C-C-C	PS / PS	7,000†	NA	1
Flamer/Fluid Gun						
Coolant	IS / Clan	C/B-B-B	ES / ES	3,000	x1	x1
Corrosive	IS / Clan	C/C-D-D	PS / PS	5,000	x1	x1
Flame-Retardant Foam	IS / Clan	B/B-B-B	PS / PS	1,000	x1	x1
Inferno Fuel	IS / Clan	D/D-E-D	2400 / 2400	2,000	x1	x1
Oil Slick	IS / Clan	B/B-B-B	PS / PS	2,000	x1	x1
Paint/Obscurant	IS / Clan	B/B-B-B	ES / ES	1,000	x1	x1
Water	IS / Clan	A/A-A-A	PS / PS	500	x1	x1
Grenade Launcher (Vehicular)						
Chaff	IS / Clan	B/X-X-E	3052 / 3065	—	x1	x1
Fragmentation	IS / Clan	B/B-B-B	PS / PS	—	x1	x1
Incendiary	IS / Clan	B/B-B-B	PS / PS	—	x1	x1
Smoke	IS / Clan	A/B-B-B	PS / PS	—	x1	x1
Mines						
Active	IS / Clan	D/X-X-E	ES / ES	5,000 (per 5 points)	**	**
Command-Detonated	IS / Clan	B/C-D-C	PS / PS	1,875 (per 5 points)	**	**
EMP (Command-Detonated)	IS / Clan	E/X-X-F	3065 / 3074	18,000 (per 5 points)	**	**
EMP (Vibrabomb)	IS / Clan	E/F-X-F	3058 / 2680	25,000 (per 5 points)	**	**
Inferno	IS / Clan	C/X-X-D	3055 / 3065	1,250 (per 5 points)	**	**
Space	IS / Clan	C/E-F-E	ES / ES	375 (per 5 points)	0.1	10
Standard	IS / Clan	B/C-C-C	PS / PS	1,250 (per 5 points)	**	**
Vibrabomb	IS / Clan	C/E-E-D	2445 / 2445	2,500 (per 5 points)	**	**
Missiles						
Acid (AX) SRMs	IS	E/X-X-F	3053P / NA	x2	x0.5	x1
Anti-Radiation (ARAD) SRMs	IS / Clan	E/X-X-E	3066P / 3057P	x3	x1	x1
Anti-Radiation LRMs (ARAD) (IS)	IS	E/X-X-E	3066P / NA	x3	x1	x1
Anti-Radiation LRMs (ARAD) (Clan)	Clan	E/X-X-E	NA / 3057P	x3	x1	x1
Artemis V Capable	Clan	F/X-X-F	NA / 3061P	x5	x1	x1
Bola Pods	IS	D/X-X-E	3056P / NA	2,000	x1	x1
Follow-the-Leader (FTL) LRMs	IS / Clan	E/F-X-E	3053P / 2755P	x2	x0.5	x1
Harpoon SRMs	IS / Clan	C/C-C-C	2400 / 2400	x2	x1	x1
Heat-Seeking (HS) SRMs	IS / Clan	C/E-E-E	2340 / 2340	x2	x0.5	x1
Heat-Seeking (HS) LRMs (IS)	IS	C/E-E-E	2340 / 2340	x2	x0.5	x1
Heat-Seeking (HS) LRMs (Clan)	Clan	C/E-E-E	2340 / 2340	x2	x0.5	x1
Incendiary LRMs (IS)	IS / Clan	C/E-X-E	2342 / 2341X	x1.5	x1	x1
Incendiary LRMs (Clan)	Clan	D/X-E-E	NA / 2825	x1.5	x1	x1
Magnetic-Pulse SRMs	IS	E/X-X-F	3057X / NA	x5	x1	x1
Magnetic-Pulse LRMs	IS	E/X-X-F	3057X / NA	x5	x1	x1
Mine-Clearance SRMs	IS	C/X-X-E	3069 / NA	x4	x1	x1

**See rules for this equipment in the *Advanced Weapons And Equipment* section, starting on p. 86.

Ammunition Type	Used By (Weapon)§	Damage Type	Damage Std (Aero)	Range Min/Sht/Med/Lng (Aero)	Ammo (per Ton)	To-Hit Modifier	Rules Level	Ref
Mine-Clearance LRMs	LRM, MML	* (*)	** (**)	6/7/14/21 (Long)	x1	+0	Adv	182
Smoke SRMs	SRM, MML	* (*)	** (**)	0/3/6/9 (Short)	x1	+0	Adv	183
Smoke LRMs (IS)	LRM, MML	* (*)	** (**)	6/7/14/21 (Long)	x1	+0	Adv	183
Smoke LRMs (Clan)	LRM	* (*)	** (**)	0/7/14/21 (Long)	x1	+0	Adv	183
Swarm LRMs (IS)	LRM, MML	* (*)	** (**)	6/7/14/21 (Long)	x1	+0**	Adv	183
Swarm LRMs (Clan)	LRM	* (*)	** (**)	0/7/14/21 (Long)	x1	+0**	Adv	183
Swarm-I LRMs	LRM, MML	* (*)	** (**)	6/7/14/21 (Long)	x1	+0**	Adv	183
Tandem-Charge SRMs	SRM, MML	* (*)	** (**)	0/3/6/9 (Short)	x0.5	+0	Exp	184
Tear Gas SRMs	SRM, MML	* (*)	** (**)	0/3/6/9 (Short)	x1	+0	Adv	184
Thunder LRMs (IS)	LRM, MML	* (*)	** (**)	6/7/14/21 (Long)	x1	+0	Adv	185
Thunder LRMs (Clan)	LRM	* (*)	** (**)	0/7/14/21 (Long)	x1	+0	Adv	185
Thunder-Active LRMs	LRM, MML	* (*)	** (**)	6/7/14/21 (Long)	x0.5	+0	Adv	185
Thunder-Augmented LRMs	LRM, MML	* (*)	** (**)	6/7/14/21 (Long)	x0.5	+0	Adv	185
Thunder-Inferno LRMs	LRM, MML	* (*)	** (**)	6/7/14/21 (Long)	x0.5	+0	Adv	185
Thunder-Vibrobomb LRMs	LRM, MML	* (*)	** (**)	6/7/14/21 (Long)	x0.5	+0	Adv	185
Mortars								
Airburst	MMR	M, C, AE, AI	** (**)	6/7/14/21 (Long)	x1	+0	Adv	185
Anti-Personnel	MMR	M, C, AI	** (**)	6/7/14/21 (Long)	x1	+0	Adv	186
Armor Piercing (Shaped Charge)	MMR	M, C	** (**)	6/7/14/21 (Long)	x1	+0	Adv	186
Flare	BAMR, MMR	M, AE	** (**)	6/7/14/21 (Long)	x1	+0	Adv	186
Semi-Guided	MMR	M, C	** (**)	6/7/14/21 (Long)	x1	+0**	Adv	186
Smoke	BAMR, MMR	M, AE	** (**)	6/7/14/21 (Long)	x1	+0	Adv	187
Remote Sensors	**	E	** (**)	** (**)	x1	NA	Adv	187

*Values as per standard weapon.
**See rules for this equipment in the *Advanced Weapons And Equipment* section, starting on p. 86.

ADVANCED AEROSPACE WEAPON CLASSES

Autocannon

Inner Sphere	*Clan*
Standard ACs (All); Light ACs (All); Rotary ACs (All); Ultra ACs (All);	Ultra ACs (All); Gauss Rifles (Standard, HAG, and Rotary); Light Machine Gun;
Hyper-Velocity ACs (All); Gauss (Standard, Heavy, Improved Heavy,	Artillery Cannon (All)
Light, MagShot); Light Machine Gun; Rifle (All); Artillery Cannon (All)	

Lasers

Inner Sphere	*Clan*
ER Lasers (All); Standard Lasers (Medium, Large); TAG; Blazer; Bombast	ER Lasers (All); Heavy Lasers (Small, Medium, Large)*; TAG; Improved Heavy Lasers
Laser*	(Small, Medium, Large)
	Chemical Lasers (Medium, Large)

LB-X Autocannon

Inner Sphere	*Clan*
LB-X ACs (All); Gauss (Silver Bullet)	LB-X ACs (All)

Pulse Lasers

Inner Sphere	*Clan*
Pulse Lasers (Medium, Large); Variable Speed (All); X-Pulse (All)	Pulse Lasers (Small, Medium, Large); ER Pulse Lasers (Small, Medium, Large)*

Point Defense Weapons

Inner Sphere	*Clan*
Anti-Missile System (Standard and Laser); Standard Laser (Small);	Anti-Missile System (Standard and Laser); Pulse Laser (Micro); Flamer (Standard and ER);
Pulse Laser (Small); Machine Gun (Standard and Heavy); Flamer (Standard and ER)	Machine Gun (Standard and Heavy); Gauss (AP)
	Chemical Laser, Small

PPCs

Inner Sphere	*Clan*
PPCs; ER PPCs; Light PPCs; Heavy PPCs; Snub-Nose PPCs;	ER PPCs
PPC Capacitor**	

Plasma Weapons

Inner Sphere	*Clan*
Plasma Rifle	Plasma Cannon

ATMs

Inner Sphere	*Clan*
None	ATMs (All)

LRMs

Inner Sphere	*Clan*
LRMs (All); LRMs + Artemis (All); NLRMs (All); ELRMs (All);	LRMs (All); LRMs + Artemis (All); Streak LRMs (All)
Thunderbolts (All)	

MMLs

Inner Sphere	*Clan*
MMLs (All); MMLs + Artemis (All)	None

MRMs

Inner Sphere	*Clan*
MRMs (All); MRMs + MRM FCS (All)	None

Rocket Launchers

Inner Sphere	*Clan*
Rocket Launchers (All)	None

SRMs

Inner Sphere	*Clan*
SRMs (All); SRMs + Artemis (All); Streak SRMs (All); Narc/iNarc Laucnher;	SRMs (All); SRMs + Artemis (All); Streak SRMs

Capital Missiles

Inner Sphere	*Clan*
Killer Whales, White Sharks, and Barracudas (All); AR-10s (All);	Killer Whales, White Sharks, and Barracudas (Standard only); AR-10s (Standard only);
Kraken-T; Screen Launcher; Piranhas; Stingrays; Swordfishes; Manta Rays	Piranhas; Stingrays; Swordfishes; Manta Rays

Capital Lasers

Inner Sphere	*Clan*
NL35; NL45; NL55; SCL/1; SCL/2; SCL/3	NL35; NL45; NL55

Capital PPCs

Inner Sphere	*Clan*
N-PPCs (All)	N-PPCs (All)

Capital Autocannon

Inner Sphere	*Clan*
NACs (All); SCCs (All); Mass Drivers (All)	NACs (All)

Capital Gauss

Inner Sphere	*Clan*
N-Gauss (All)	N-Gauss (All)

Artillery

Inner Sphere	*Clan*
Thumper; Sniper; Long Tom; Arrow IV; Cruise Missiles (All)	Thumper; Sniper; Long Tom; Arrow IV

*Laser Weapon Bays that include these weapons suffer an additional to-hit modifier as follows: Bombast Lasers (+3); Heavy Lasers (but not Improved Heavy Lasers) +1; ER Pulse Lasers (–1). These modifiers replace the bay's standard attack modifier, using the highest modifier if multiple weapon types are present.
**PPC Capacitors require one of the applicable PPC types

Weapon/Item	Tech Base	Tech Rating	Latest Intro Date (IS / Clan)	Cost (C-bills)	Ammo (per Ton)	WT (Tons)
Mine-Clearance LRMs	IS	C/X-X-E	3069 / NA	x4	x1	x1
Smoke SRMs	IS / Clan	C/D-D-D	2333 / 2333	x1.5	x1	x1
Smoke LRMs (IS)	IS / Clan	C/D-D-D	2333 / 2333X	x1.5	x1	x1
Smoke LRMs (Clan)	Clan	D/D-D-D	NA / 2825	x1.5	x1	x1
Swarm LRMs (IS)	IS / Clan	E/E-X-D	3053 / 2621X	x2	x1	x1
Swarm LRMs (Clan)	Clan	F/E-X-D	NA / 2825	x2	x1	x1
Swarm-I LRMs	IS	E/X-X-D	3057 / NA	x3	x1	x1
Tandem-Charge SRMs	IS	E/X-X-E	2757 / 2757X	x5	x0.5	x1
Tear Gas SRMs	IS	C/B-B-B	2375 / 2375	x2	x1	x1
Thunder LRMs (IS)	IS / Clan	E/D-X-D	3052 / 2620X	x2	x1	x1
Thunder LRMs (Clan)	Clan	F/D-X-D	NA / 2830	x2	x1	x1
Thunder-Active LRMs	IS	E/X-X-E	3058 / NA	x3	x1	x1
Thunder-Augmented LRMs	IS	E/X-X-E	3057 / NA	x4	x1	x1
Thunder-Inferno LRMs	IS	E/X-X-D	3056 / NA	x1	x1	x1
Thunder-Vibrobomb LRMs	IS	E/X-X-E	3057 / NA	x2.5	x1	x1
Mortars						
Airburst	IS / Clan	C/B-D-C	2544 / 2544	48,000	x1	x1
Anti-Personnel	IS / Clan	B/B-B-B	2531 / 2531	24,000	x1	x1
Armor Piercing (Shaped Charge)	IS / Clan	C/B-B-B	2531 / 2531	28,000	x1	x1
Flare	IS / Clan	B/A-A-A	2536 / 2536	14,000	x1	x1
Semi-Guided	IS	C/X-X-E	3064 / NA	60,000	x1	x1
Smoke	IS / Clan	B/A-A-A	2531 / 2531	12,000	x1	x1
Remote Sensors	IS / Clan	Industrial: C/E-F-D; BA: D/F-F-D	2590 / 2590	25,000	x1	x1

*Values as per standard weapon
**See special rules for this equipment
†Bomb costs are per bomb, not per ton

NOTE: Ammo costs are per ton unless otherwise specified. Ammo costs, shots per ton, and weight multipliers apply to the weapon's standard munition type.

§ USED BY (WEAPON) COLUMN ABBREVIATION TABLE

SAC: Standard Autocannon
LAC: Light Autocannon
AIV: Arrow IV Missile System
SAT: Standard Artillery (includes Sniper, Thumper, and Long Tom)
SAW: Sniper Artillery Weapon
TAW: Thumper Artillery Weapon
LAW: Long Tom Artillery Weapon
EO(#): External Ordnance Weapon (Number indicates how many bomb points occupied)
VFL: Vehicular Flamer
FLG: Fluid Gun
SPR: Sprayer
VGL: Vehicular Grenade Launcher
LMN: Land Mine
MMN: Sea (Maritime) Mine
SMN: Space Mine
SRM: Standard SRM Launchers
LRM: Standard LRM Launchers
MML: Multi-Missile Launchers
SSRM: Streak SRMs
NMB: Standard Narc Missile Beacon
MMR: 'Mech Mortar Launchers

ADVANCED UNIT COSTS TABLES

ADVANCED SUPPORT VEHICLE COSTS

Base Unit Cost = (Chassis Cost + Engine Cost + Armor Cost + Weapons and Equipment Cost) x OmniVehicle Multiplier x Vehicle Type Multiplier

Support Vehicle Base Structural Costs	
Chassis	2,500 x Chassis Cost Multiplier* x Chassis Weight (in tons)
Engine	5,000 x Engine Cost Multiplier** x Engine Weight (in tons)
Armor	Armor Points x Cost per Point†
Weapons and Equipment	See appropriate Equipment Cost Tables
OmniVehicle	x 1.25

*Apply all Chassis Cost Multipliers that apply (see Chassis Cost Multipliers)
**See Engine Cost Multipliers
†See Armor Costs (per Point)

Support Vehicle Type Multipliers	
Vehicle Type	**Total Cost Multiplier**
Large Airship	1 + (Vehicle Tonnage ÷ 10,000)
Satellite	1 + (Vehicle Tonnage ÷ 75)
Rail	1 + (Vehicle Tonnage ÷ 250)
Large Naval Vessel	1 + (Vehicle Tonnage ÷ 100,000)

Chassis Cost Multipliers	
Chassis Modifier Type	**Multiplier**
Amphibious	x1.25
Armored	x2
Environmental Sealing	x1.75
External Power Pickup	x1.1
OmniVehicle	x1
Submersible	x3.5
Tractor	x1.1
Trailer	x0.75
Ultra-Light*	x1.5

Engine Cost Multipliers	
Engine Type	**Multiplier**
Steam	x0.8
ICE	x1
External	x1
Batteries	x1.2
Fuel Cell	x1.4
Solar	x1.6
MagLev	x2.5
Fission	x3
Fusion	x2

Armor Costs	
Armor Type	**Cost (per Point)**
BAR 2	50
BAR 3	100
BAR 4	150
BAR 5	200
BAR 6	250
BAR 7	300
BAR 8	400
BAR 9	500
BAR 10	625

BUILDING AND MOBILE STRUCTURE COSTS

Base Unit Cost = (Structure Cost + Engine/Generator Cost + Motive System Cost + Armor Cost + Weapon and Equipment Cost) x (1 + CF ÷ 100)*

*In the case of structures using Capital-scale CF, multiply the CF value by 10 to find the "standard" CF

Structure Costs (per hex)

Structure Type	Structure Cost (per Level)
Tent	1,000 x Structure Cost Multiplier x CF
Hangar	8,000 x Structure Cost Multiplier x CF
Standard Building	10,000 x Structure Cost Multiplier x CF
Gun Emplacement	20,000 x Structure Cost Multiplier x CF
Fortress	20,000 x Structure Cost Multiplier x CF
Castle Brian	1,000,000 x Structure Cost Multiplier x CF
Wall*	5,000 x Structure Cost Multiplier x CF
Fence*	800 x CF
Road/Pavement†	7,500
Bridge	12,000 x CF
Standard Rail†	7,000
MagLev Rail†	14,000

*Wall and Fence costs are per hexside, rather than per hex
†These structures have a fixed Level of 1 for structure cost purposes

Engine/Generator Costs

E/G Type	E/G Cost*
Steam	4,000
Internal Combustion	5,000
Fuel Cell	7,000
Solar	8,000
Fission	15,000
Fusion	10,000
External-Source	5,000

*All Engine/Generator Costs are per ton of engine/generator (not including fuel)

Motive System Costs (Mobile Structures Only)

Motive Type	Motive System Cost*
Ground	10,000 x CF x MP
Air	40,000 x CF x MP
Water (Surface)	20,000 x CF x MP
Water (Submersible)	35,000 x CF x MP

*All Motive System Costs are per hex of Mobile Structure; non-mobile Structures receive a Motive System Cost of 0

Structure Armor

Tech Base	Cost (C-bills)
Inner Sphere	10,000 x Armor Tonnage
Clan	15,000 x Armor Tonnage

Structure Cost Multipliers

Structural Modifications	Final Cost Multiplier
Environmental Sealing	x1.5
Heavy-Metal Superstructure	x1.25
High/Low Ceilings	x1.1
Open-Space Construction	x2.5
Subsurface (Underwater or Underground)	x5
Tunnel	x1.875

Miscellaneous Structure Equipment Costs

Item	Item Cost
Fuel Storage	100 x Total Storage Tonnage
Large Door	10,000 x Door Height (in Levels)
Industrial Elevators	15,000 x Total Elevator Tonnage
Unspecified Equipment	5,000 x CF (per Hex)
Weapon Automation	1,000 x Total Automated Weapon Tonnage*

*Do not count ammunition, heat sinks, power amplifiers or turret mechanisms

UNDERWATER RANGE TABLE (ADVANCED WEAPONS)

Weapon	Underwater Range
Binary Laser (Blazer) Cannon	0/3/6/9
Bombast Laser	0/3/6/9
Chemical Laser, Small	0/1/2/—
Chemical Laser, Medium	0/2/4/6
Chemical Laser, Large	0/3/6/9
ER Pulse Laser, Small	0/1/2/4
ER Pulse Laser, Medium	0/3/6/9
ER Pulse Laser, Large	0/4/10/16
Improved Heavy Laser, Small	0/1/2/—
Improved Heavy Laser, Medium	0/2/4/6
Improved Heavy Laser, Large	0/3/6/9
Variable Speed Laser, Small	0/1/2/3
Variable Speed Laser, Medium	0/1/3/6
Variable Speed Laser, Large	0/2/5/9
X-Pulse Laser, Small	0/1/2/3
X-Pulse Laser, Medium	0/2/4/6
X-Pulse Laser, Large	0/3/6/9
Laser Anti-Missile System (IS)	*
Laser Anti-Missile System (Clan)	*
Naval (Capital) Lasers	**
Naval (Capital) PPCs	**
Sub-Capital Lasers	**

*Laser Anti-Missile Systems used underwater affect torpedoes in the same manner as they do missiles
**Capital-scale energy weapons suffer no range effects when fired while submerged, but do receive a +1 to-hit modifier for every 12 depths below the surface that they are fired from

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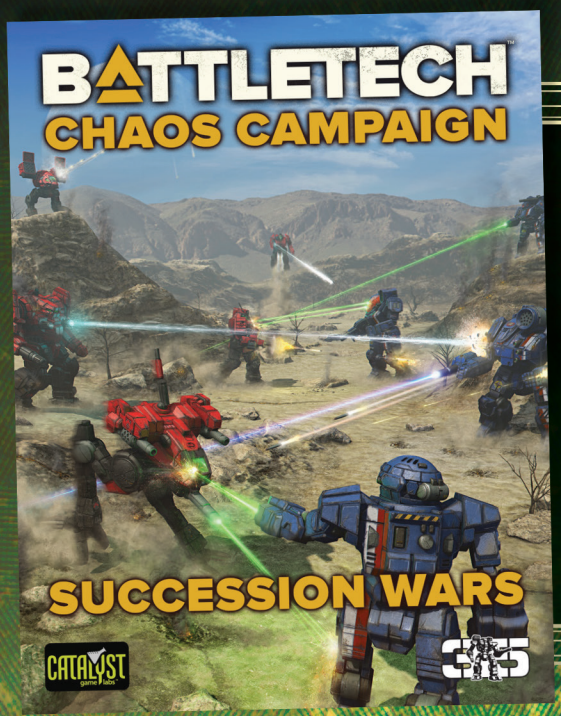

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