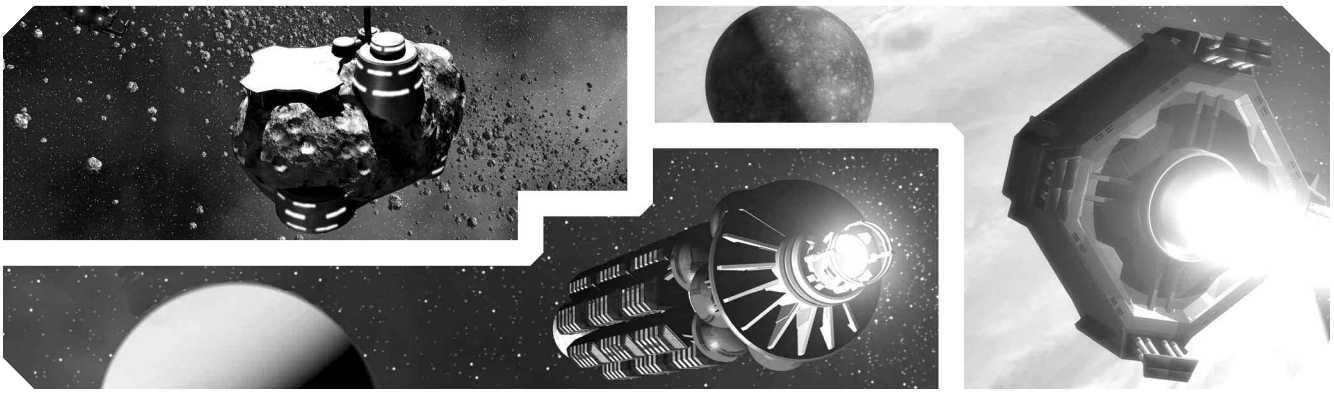
GURPS® Fourth Edition

SPACESHIPS 8

TRANSHUMAN™ SPACECRAFT



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*An e23 Sourcebook for **GURPS**®*

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Contents

Additional Material: Phil Masters, Kenneth Peters, and Jonathan Woodward

Playtesters: Frederick Brackin, Roger Burton West, and Phil Masters

Extra-special thanks to Kenneth Peters for playtest contributions above and beyond the call of duty.

Introduction

This book provides ***GURPS Spaceships*** conversions for the many spacecraft in the ***Transhuman Space*** series, and a guide to designing new vessels for it using the ***GURPS Spaceships*** rules.

Those who don't use ***Transhuman Space*** may still find this book useful as it presents a full range of TL9-10 military and civilian interplanetary spacecraft. With minor changes, they can be adapted to other interplanetary settings or converted to starships for an interstellar campaign.

About the Series

Transhuman Spacecraft is the eighth book in the ***GURPS Spaceships*** series. This line supports ***GURPS Space*** campaigns by providing ready-to-use spacecraft descriptions and rules for space travel, combat, and operations. Each volume offers spacecraft descriptions and supplementary rules.

GMs need ***GURPS Spaceships*** to use this book, along with ***Transhuman Space.*** The supplement ***Transhuman Space: Changing Times*** is also recommended.

Publication History

Most of the spacecraft in this book are adapted from the following works: ***Transhuman Space*** by David Pulver**;** ***Transhuman Space: Deep Beyond*** by David Pulver; ***Transhuman Space: High Frontier*** by John Snead, David Pulver, Phil Masters, Dawn Elliot, Gene Seabolt, Jon F. Zeigler, and James Maliszewski; ***Transhuman Space: In The Well*** by Jonathan Woodward; and, most significantly, ***Transhuman Space: Spacecraft of the Solar System*** by Kenneth Peters.

About *GURPS*

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Bibliographies. Many of our books have extensive bibliographies, and we're putting them online – with links to let you buy the resources that interest you! Go to each book's web page and look for the "Bibliography" link.

Errata. Everyone makes mistakes, including us – but we do our best to fix our errors. Up-to-date errata pages for all ***GURPS*** releases, including this book, are available on our website – see above.

Rules and statistics in this book are specifically for the ***GURPS Basic Set,*** *Fourth Edition.* Page references that begin with B refer to that book, not this one.

Last week we reported a mystery spacecraft sighting at Hyperion Proving Ground near Saturn.

– Deep Beyond

About the Author

David L. Pulver is a freelance writer and game designer based in Victoria, British Columbia. He is the co-author of the ***GURPS Basic Set*** *Fourth Edition,* and author of ***Transhuman Space, GURPS Mass Combat, GURPS Spaceships,*** and numerous other gaming products.

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Chapter One

Spacecraft Design and Operation

"A hundred years from now people will look back and wonder how we ever managed our affairs on this planet without the tools provided by the space program … a world without spacecraft is as hard to imagine as a world without telephones and airplanes."
– Wernher von Braun

Transhuman Space is set in the year 2100. Nanotechnology has transformed life on Earth forever, and gene-enhanced humans share the world with artificial intelligences and robotic cybershells. The major powers are the European Union, China, and the United States, but there are many other power groups, among them the libertarian Duncanites of the outer system and the pariah Transpacific Socialist Alliance (TSA). Extraterrestrial colonies have been established, with major settlements on Luna, Mars, Mercury, the asteroid belt, and the moons of Saturn. Millions of people and machines now live and work in orbit and deep space, aboard hundreds of civilian and military ships and stations scattered through the solar system. This chapter discusses how they can be designed using the ***GURPS Spaceships*** rules.

Transhuman Space Glossary

The following terms from ***Transhuman Space*** are used in this book.

Autonomous Kill Vehicle (AKV): A robot space fighter.
Deep Space Operations Vehicle (DSOV): A scientific vessel or exploration spacecraft.
Executive Space Vehicle (ESV): A space yacht.
Heavy Lift Vehicle (HLV): A ground-to-orbit cargo transport.
Heavy Space Transport Vehicle (HSTV): A large space freighter.
Light Space Dominance Vehicle (LSDV): A light cruiser.
Microgravity Assault Vehicle (MAV): An armored shuttle designed to convey boarding parties to enemy vessels, by docking or ramming.
Orbital Transfer Vehicle (OTV): An orbital or lunar "space truck."
Passenger Space Vehicle (PSV): A passenger liner.
PLAN-SF: People's Liberation Army Navy Space Force; China's space fleet.
Remote Survey Vehicle (RSV): A space probe.
Space Control Vehicle (SCV): A space-marine assault carrier.
Space Defense Platform (SDP): An orbital battle station.
Space Dominance Vehicle (SDV): A space cruiser or battleship.
Transatmospheric Combat Air Vehicle (TCAV): An aerospace fighter.
Transatmospheric Vehicle (TAV): An aerospace plane.
USAF: United States Aerospace Force; America's consolidated air force and space fleet.
Utility Space Vehicle (USV): A light space freighter or mining ship.
Work Pod: A tiny one- or two-man craft equipped with robot arms.

Thousands of space vessels operate in the solar system, ranging from plasma-sail slowhaulers to lethal space dominance vehicles.

– Transhuman Space

Design Guidelines

These guidelines explain how to use ***GURPS Spaceships*** to create craft suitable for the ***Transhuman Space*** setting.

Tech Level

Spacecraft designs in ***Transhuman Space*** are a mix of TL7 to TL11 systems, and they use three "waves" to designate technological development.

Third Wave spacecraft are TL7 to TL9 designs.

Fourth Wave spacecraft are TL9 to TL10 designs.

Fifth Wave spacecraft are TL10 designs (with one TL11 element, the option to use diamondoid armor).

Most new vessels are TL10, but there are plenty of older TL8 and TL9 vehicles. Many spacecraft are decades-old designs still in service, or indigenous models constructed by builders lacking TL10 manufacturing capabilities. Thus, it's common for vessels to have lower-TL components and for low-TL designs to upgrade to TL10 control rooms and comm/sensor arrays.

Spacecraft Hulls

Hull sizes up to 30,000 tons (SM +11) are common. Sizes of 100,000+ tons (SM +12 and above) are rare for spacecraft but common for space stations. The largest L4 and L5 colonies are SM +16 or more, but these are best treated as points of geography rather than built using design rules.

Smaller Systems

Shipbuilders need to cram *several* components into a small space. Since each step up in hull SM represents a rough tripling of loaded mass, there's an easy way to squeeze multiple, inferior systems into the same location: Use the stats for hardware for a vessel one SM smaller, and install *three* systems.

A few systems require special treatment:

Armor: Use 1/3 the dDR of the full-sized system.

Control Room: Since this also represents the ship's attitude thrusters or gyros, a vessel with a smaller control room has a -1 penalty to its Handling and Stability Rating.

External Clamp: An off-size external clamp can only attach to things at least three SM smaller than the vehicle. (A full-sized clamp has no SM limits.)

Factory: Smaller factory systems do not provide a HT bonus.

Fuel, Sails, Drives, and Engines: Use 1/3 the delta-V reserve to create a smaller fuel tank and 1/3 the acceleration of a smaller engine or sail.

Power: Smaller power plants *don't* provide sufficient power for normal-sized systems. A smaller power plant *can* power another scaled-down system that shares the same location.

Soft-Landing System: A smaller soft-landing system can't be used with a larger spacecraft . . . at least, not successfully.

In addition, some systems can be *half-sized* at half cost: cargo holds (halve capacity), factories (halve output), fuel tanks (halve delta-V reserve), habitats (halve cabin-equivalents), mining and refinery systems (halve output), open spaces (halve areas), passenger seating (halve seats), and power plants (fusion and antimatter only – halve Power Points).

Larger Systems

While it's more common to cram in smaller systems, sometimes a *small* ship needs a *big* gun – or a system that isn't normally available at its size. A component one SM larger occupies *three times* its usual number of locations, and has the statistics of a system for a larger ship. (Three high-energy systems that are used to make up a larger system require three Power Points.)

Other components that *might* have additional effects are better handled by using three normal-sized components, since scaling has already been determined.

> *The hull is sharply sloped on the front to make maximum use of its armor . . .*
>
> ***– Spacecraft of the Solar System***

Spacecraft Systems

As a general rule, any ***GURPS Spaceships*** system of TL10 or less that does not use superscience is available in a ***Transhuman Space*** setting. No superscience systems, including limited superscience, are available. Various exceptions, special cases, and design guidelines are covered below.

Armor

The biggest difference between ***GURPS Spaceships*** and ***Transhuman Space*** designs is the latter have much higher DR, especially in the front and rear hull sections of skinny cylindrical models. This reflects differences in the way the systems calculate surface area, volume, and facing. The "front" or "rear" hull of a craft in ***GURPS Spaceships*** is one-third the vessel's area, not a tiny end cap. As such, don't bother trying to match the DR values in any conversion. Simply use whatever armor appears to be necessary for the vessel's mission.

The choice of armor type is much simpler. ***Transhuman Space*** lists several hull materials. Most have ***GURPS Spaceships*** equivalents, as shown on the *Armor Equivalents Table* (below).

Armor Equivalents Table

Transhuman Space	***GURPS Spaceships***
Ice Asteroid	Ice
Rock Asteroid	Stone
Slag	Stone
Steel Alloy	Steel
Aluminum Alloy	Light Alloy
Titanium Alloy	Light Alloy
Foamed Alloy	Light Alloy
Carbon Composite	Metallic Laminate
Metal-Matrix Composite	Advanced Metallic Laminate
Nanocomposite	Nanocomposite
Diamondoid	Diamondoid

Note that diamondoid is available despite being TL11; due to its high manufacturing cost, it is mainly used on smaller craft of very recent design.

Organic Armor: This is currently only used for the skin of the *Nadezhda*-class bioship (p. 36). It can also represent the bark of Duncanite Dyson trees and advanced bio-tech constructs such as Luna City.

Control Rooms

Most vessels employ some AI crew, so spacecraft often reduce the number of control stations or use smaller systems.

To match the superior computer systems used in ***Transhuman Space***, all control-system computers have their Complexity calculated as if they were a full TL higher. (That is, TL9 vessels are +2 Complexity higher, the same as TL10; and TL10 craft are one Complexity higher, the same as TL11.)

Defensive ECM

This technology may be installed if desired, but it's rare. Current designs emphasize weapons, small craft, and armor over ECM.

External Clamp

These can represent the external cradles on ***Transhuman Space*** craft. Since ***GURPS Spaceships*** clamps have no maximum weight (unless installed as smaller systems – see p. 5), a single system serves as all the external cradles.

Factory

Vatfacs (TL10): These are factory facilities that manufacture biological substances such as food, drugs, organs, or bioroids. They otherwise have the same cost and production speed as robofacs.

Fuel Tanks

The ***Transhuman Space*** design system's delta-V values assume only half a ship's reaction mass is used, and it employs an unrealistic formula. Keep this in mind when converting a craft and assigning fuel tanks to the design. However, it does provide an option for more realistic delta-V (***Transhuman Space***, p. 189) and it's possible to match these results using ***GURPS Spaceships***. Before attempting to convert an existing ship designed under ***Transhuman Space*** rules, recalculate that vessel's performance using the *realistic* delta-V, then double that value. Use this as a guideline when choosing the number of fuel tanks.

Power Plant, Reactor

Reactors should be fission or fusion power plants.

Fission: Old fission reactors are TL9; new fission reactors are TL10.

Fusion: Old fusion reactors are TL9; new fusion reactors are TL10.

Antimatter: These have not been developed, but are technically feasible. Experimental prototypes may exist somewhere.

Power Plant, Chemical

Transhuman Space allowed vessels to tap drives or batteries for power. In ***GURPS Spaceships*** that option is not available; use chemical fuel cells or MHD power plants to provide any extra Power Points needed for the craft.

Ramscoop

Ramscoops have yet to be developed in ***Transhuman Space***. Even if a successful design were achievable, it is difficult to achieve minimum ramscoop velocities using TL10 technology without superscience!

Reaction Engine, Chemical and HEDM Rocket

Chemical Rockets: ***GURPS Spaceships*** does not distinguish between the three types of chemical rockets (metal-oxygen, kerosene-oxygen, and hydrogen-oxygen) in ***Transhuman Space***. Just use chemical rocket statistics for all of them.

HEDM Rockets: These represent the metallic hydrogen rockets used in experimental designs such as the X-92 (pp. 37-38). They are currently limited to military prototypes and should be considered TL10 in ***GURPS Spaceships***.

Reaction Engine, Fission

Nuclear light bulbs are available. The TL9+ nuclear thermal rocket is the ***Transhuman Space*** fission drive. Nuclear saltwater rockets are unavailable.

Converting Existing Vessels

Switching vessels built with the ***Transhuman Space*** spacecraft design rules over to ***GURPS Spaceships*** is an art rather than a science. Precision is impossible due to the abstraction of hull mass, shape, and volume in ***GURPS Spaceships*** compared to the more complex system used in ***Transhuman Space***. Instead, conversions should attempt to give the converted craft a similar feel.

Choose a Hull Size close to the original Loaded Mass (ignoring the vessel's dimensions or SM). Select systems and design features using the guidelines in this chapter so the vessel performs the *same mission* as the original model, without worrying too much whether specific statistics are identical. What's important is its capability relative to others of the same class.

Chapter 2 of this book features ***GURPS Spaceships*** conversions of various vessel and stations from the ***Transhuman Space*** sourcebooks. Use them as guidelines when reworking other craft built with the original ***Transhuman Space*** design system.

Reaction Engine, Fusion

The high-impulse fusion torch drive in ***Transhuman Space*** is represented by the TL9 fusion rocket from ***GURPS Spaceships***. The high-thrust fusion torch is represented by the TL9 fusion rocket with high-thrust options.

Fusion rockets on TL10 spacecraft have the same delta-V performance as TL9 systems, but are *not* restricted to SM +9 or larger spacecraft.

Fusion rockets with TL10 performance have not been developed yet; the system that ***GURPS Spaceships*** refers to as a fusion torch is unavailable.

> *A dust cloud can be produced by a surface explosion, drilling and mining, a reaction engine operating within a few yards of the surface, or anything else the GM thinks is likely to raise one.*
>
> **– *Deep Beyond***

Reaction Engine, Nuclear Pulse

Advanced fusion pulse drives (and superscience versions) have not yet been developed, but the standard fusion pulse drive is in common use.

Use the TL10 fusion pulse drive to represent high-impulse fusion pulse drives. Add the high-thrust option to represent high-thrust fusion pulse drives.

External pulsed plasma drives are possible but few have been built due to concerns over nuclear proliferation. This conversion uses them to represent the extremely high-thrust fusion pulse drive models, used by some unmanned spacecraft designed to lift He-3 out of Saturn's gravity well.

Antimatter-Augmented: This design feature is added to fusion pulse drives to represent the more efficient drives in ***Transhuman Space*** that use costlier antimatter-ignited fusion pellets. Drive cost remains the same, but delta-V is multiplied by 1.2 and fuel costs are increased (see *Fuel and Reaction Mass Costs*, p. 10).

Reaction Engine, Total Conversion and Antimatter

None of these engines are in regular use in ***Transhuman Space***.

Antimatter Thermal Rocket: Early space probes used these, but they have since been replaced with the fusion pulse drive. However, they're feasible technology within the setting. They are most likely to be used in small military spacecraft such as AKVs and TCAVs.

Antimatter Plasma Rocket: The technology is feasible, but has not been developed due to the exceedingly high cost of antimatter-boosted fuel. The most likely introduction would be on a small (no more than SM +5-6) space probe for a fast, long-range mission to the Oort Cloud or beyond.

Other antimatter and total conversion engines are unavailable.

Space Sails

Magnetic sails represent the plasma sails used in ***Transhuman Space***. Light sails are less common in ***Transhuman Space***, but are quite feasible.

Space Drive Table

Transhuman Space	***GURPS Spaceships***
Antimatter Pulse Drive, HI	Fusion Pulse Drive (TL10)*
Antimatter Pulse Drive, HT	Fusion Pulse Drive (TL10) + high thrust*
Chemical Rockets (all)	Chemical Rocket
Fission Air-Ram	See p. 8
Fission Drive	Nuclear Thermal Rocket
Fusion Pulse Drive, HI	Fusion Pulse Drive (TL10)
Fusion Pulse Drive, HT	Fusion Pulse Drive (TL10) + high thrust
Fusion Torch Drive, HI	Fusion Rocket (TL9)
Fusion Torch Drive, HT	Fusion Rocket (TL9) + high thrust
Ion Drive	Ion Drive
Laser Rocket	See p. 8
Mass Driver Engine	Mass Driver
Metallic Hydrogen Rocket	HEDM Chemical Rocket
Nuclear Light Bulb	Nuclear Light Bulb
Plasma Sail	Magsail
Turbo-Scramjet	Jet Engine

* Add antimatter-augmented (above) design feature.

Robot Arm

The robot arm system is most appropriate for small vessels (SM +5-6). Bigger craft equipped with arms use the telescoping robot arm (p. 9) design feature.

Weapons Batteries

Ultraviolet lasers are the standard weapons. There's no need to limit them to the specific output ranges listed in ***Transhuman Space***, but they (and other lasers) should not exceed 300 MJ. The rapid fire or very rapid fire options represent continuous beams. Laser towers are represented as turrets.

Improved lasers are sometimes used instead of ultraviolet lasers on vessels intended primarily for atmospheric combat, such as TCAVs.

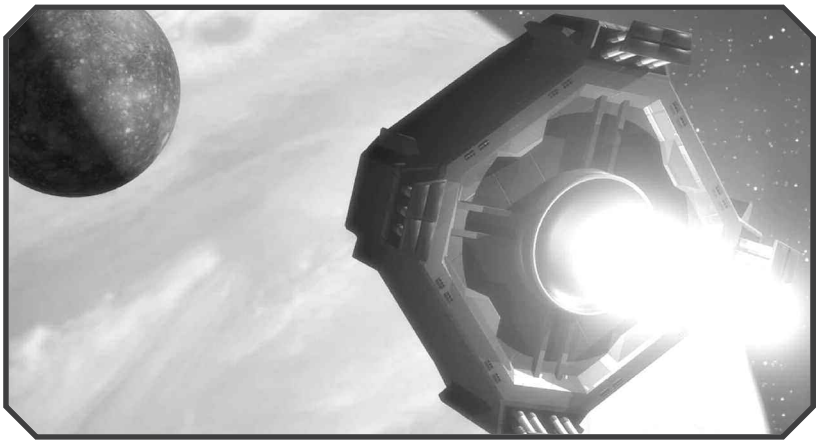
Coilguns are represented by electromagnetic guns. They have conventional or X-ray laser warheads. Nuclear warheads can easily be built, but are rarely deployed.

Particle accelerators in ***Transhuman Space*** become particle beams. They should be in major, medium, or spinal batteries, and installed as fixed mounts with either the rapid fire or very rapid fire options. They should not be installed on spacecraft smaller than SM +8.

Missile launchers are not used. Combat vessels instead employ electromagnetic guns and/or carry AKV spacecraft on external clamps or in hangar bays.

Additional Systems

Two additional systems are common in ***Transhuman Space***:



Jet Engine, Fission Air-Ram (TL7) [Rear]

This uses an integral fission reactor to run a turbofan that sucks in air, heating it and expelling it for thrust. It operates for two years on an internal nuclear fuel supply. The exhaust is slightly radioactive. Each air-ram produces 0.2G (TL7), 0.4G (TL8), or 0.6G (TL9+) acceleration for calculating atmospheric speed.

Fission Air-Ram Table

SM	***+5***	***+6***	***+7***	***+8***	***+9***	***+10***	***+11***	***+12***	***+13***	***+14***	***+15***
Workspaces	0	0	0	0	0	1	3	10	30	100	300
Cost ($)	400K	1.2M	4M	12M	40M	120M	400M	1.2B	4B	12B	40B

Repair Skill: Mechanic (Aerospace).

Craft built to lift from Luna or Mercury usually use fission drive or laser rockets.

– Transhuman Space

Laser Rocket (TL9) [Rear]

Laser rockets use an off-board laser to heat a reaction mass – such as an ablative plastic lining the interior of the drive – which provides thrust. They require a large ground-based laser installation. Each engine provides 3G acceleration. Each fuel tank of ablative plastic provides 0.5 mps delta-V.

Laser Rocket Table

SM	***+5***	***+6***	***+7***	***+8***	***+9***	***+10***	***+11***	***+12***	***+13***	***+14***	***+15***
Workspaces	0	0	0	0	0	1	3	10	30	100	300
Cost ($)	60K	200K	600K	2M	6M	20M	60M	200M	600M	2B	6B

Repair Skill: Mechanic (High-Performance Spacecraft or Rocket).

Design Features

Many vessels use total automation. All other nonsuperscience features are in use on some designs, especially spin gravity.

Unavailable Features: All superscience features are unavailable.

Biomechanical

Experimental "bioships" that use a mix of living tissue and cybernetic implants are possible. Bioships are similar to other designs, but utilize organic armor on their hull and must have the total automation design feature, representing their onboard self-regulating qualities. In addition, they may have the following design features:

Biomechanical Self-Repair: The ship is capable of self-repair. If the spacecraft is reduced to -5 times its HP, it can no longer fix itself – there isn't enough structure left. Otherwise, regeneration rate is 10% of the spacecraft's dHP every day. This option costs $0.02M per ton of mass, e.g., for an SM +7 (300 ton) spacecraft it costs $6M.

Requires Nutrients: Current bioships require nutrient supplements to function properly. If they are not fed they are unable to heal, and starvation results in the craft falling apart (reduce HT by one per *day* of starvation). Nutrient requirement is one man-day times ST; nutrients cost and mass the same as human food (***GURPS Spaceships***, p. 47). For example, a ST 100 bioship requires the equivalent of 100 man-days of food per day (which would cost $200 and mass 0.2 tons). They should be stored in cargo.

Methane and Ammonia Reaction Mass

Two common alternatives for reaction mass are ammonia and methane. Either may be used in fusion rocket and nuclear thermal rocket engines. Like water, these increase acceleration at the expense of greater fuel consumption (i.e., reducing the delta-V).

Ammonia: Use of ammonia multiplies acceleration by 2.9 but divides delta-V by 2.9.

Methane: Use of methane multiplies acceleration by 2.8 but divides delta-V by 2.8.

Telescoping Robot Arms

The robot arms in ***Transhuman Space*** are different from those in ***GURPS Spaceships***, and are treated as design features rather than systems. A robot arm is a telescopic mechanical appendage that folds snugly inside the hull. It is intended for loading and external manipulation. There are three sizes:

Large: The arm is 19' long and has ST 83. $280,000. Only usable on SM +6 or larger vessels.

Medium: The arm is 15' long and has ST 66. $150,000. Only usable on SM +6 or larger vessels.

Small: The arm is 12' long and has ST 53. $100,000. Only usable on SM +5 or larger vessels.

Design Switches

Two design switches are used:

Advanced Computers

All computers are treated as one TL higher for the purpose of calculating Complexity and running software; see *Control Rooms* (p. 6).

Exposed Radiators

These are used as detailed in ***GURPS Spaceships*** (p. 31).

Action

GMs using ***GURPS Spaceships*** designs for ***Transhuman Space*** should also use the ***GURPS Spaceships*** travel and combat rules. This section addresses certain special considerations.

Travel in the Solar System

All space travel uses the *Newtonian Space Flight and Delta-V* rules (***GURPS Spaceships***, p. 37). Use the *Interplanetary Distances* table in ***Transhuman Space*** (p. 51) for precise distances in the year 2100.

Gas Giants and Equatorial Velocity

Spacecraft may operate in gas giant atmospheres to perform activities such as He-3 mining or research. Climbing directly out of a gas giant's gravity well may take more delta-V than most vessels can manage, so ships exploit another characteristic of gas giants: their rapid rotation.

By taking off along the equator in the direction of the planet's rotation, a spacecraft can reduce the velocity required to reach orbit by an amount equal to the gas giant's rotation speed. The table below shows rotation speeds for Jupiter, Saturn, Uranus, and Neptune.

As the largest planet, Jupiter continues to fascinate scientists and public alike. An active program of exploration is underway using cybershell probes, much of it under the auspices of the European Space Agency.

– Deep Beyond

Gas Giant Rotation Speed Table

Planet	*Rotation Speed*	*Planet*	*Rotation Speed*
Jupiter	7.83 mps	Uranus	1.6 mps
Saturn	6.13 mps	Neptune	1.66 mps

Combat Scales

For most space actions, standard scale with 10-minute turns is appropriate. (Feel free to adjust the scale if ships have out-of-the-ordinary performance.)

Somewhat different (but arguably more realistic) assumptions regarding laser and ultraviolet ranges have been made in ***GURPS Spaceships***, compared to those assumptions used in ***GURPS*** *Third Edition.* Beam weapon ranges are reduced.

X-Ray Laser Munitions (TL10)

X-ray laser warheads are available for missiles and 16cm+ guns. This is a targeting system and set of lasing rods wrapped around a nuclear bomb. As it approaches the target, it aligns itself and detonates. The bomb explosion pumps multiple powerful (but short-ranged) X-ray laser beams.

X-ray laser warhead-equipped missiles and gun shot do not make ballistic attack rolls. Instead, they make beam fire attacks. The warhead has a RoF equal to its (diameter in cm)/2, *not* modified by turn length (since it fires all shots at once). It detonates far enough from the target that the small nuclear blast does not itself inflict damage.

In the basic space combat system, the X-ray laser has the same range as a missile (of whatever type), but attacks once, as if it were a beam weapon.

In the tactical space combat system, a beam or missile with an X-ray laser warhead attacks in the beam fire phase (self-destructing as it does so). Range is 300/1,000 miles: 0/1 hex for 1,000-mile scale, 3/10 in 100-mile scale, or 30/100 in 10-mile scale.

In either system, when it fires roll against the missile gunner's Gunner (Beams) skill instead of Artillery (Guided Missile). Each hit inflicts 10d(5) burning damage, with the radiation and surge modifiers.

X-ray laser warheads have the same cost and legality as antimatter warheads.

Radiation

Radiation is a significant hazard in the ***Transhuman Space*** setting, and radiation protection is calculated for entities occupying vessels on a system-by-system basis where necessary.

Radiation protection is measured by a Protection Factor (PF); see the rules for radiation on pp. B435-436. Manned spacecraft are configured so the mass of the vessel serves as radiation shielding. That is, living quarters, control rooms, and similar inhabited systems are surrounded by other unoccupied systems, providing natural "mass-shielding." Further, habitats or control rooms are often placed in a shielded core location ("a storm shelter").

To determine the PF shielding one of these systems, total the number of non-core systems placed in that hull section, excluding any cargo, habitat, hangar bay, open space, or passenger seating systems. Cross-index that number with the SM of the spacecraft on the *Radiation Protection Table* (below) to find PF. Characters who find themselves in non-mass-shielded systems calculate radiation PF from such components with the same procedure, but only count armor systems.

Example: A SM +9 utility space vehicle's central hull has one armor, one habitat, one cargo hold, and three fuel tank systems, plus a control room in its core. There are therefore four non-core systems (the armor and fuel tanks) that count for radiation protection, so the habitat's occupants receive PF 300 and the control room PF 600 (since it's in the core). If an occupant was not in the mass-shielded control room or habitat (e.g., visiting the cargo hold) only the one armor system would count, and so he would get only PF 70.

Radiation Hazards

A variety of radiation hazards are discussed in ***Transhuman Space***, including weapon attacks, solar flares, cosmic background radiation, and the radiation belts of worlds with magnetic fields.

Cosmic Rays: These are highly penetrating radiation from interstellar space that inflicts one rad per week and, since they are so invasive, all radiation PF is divided by 100. However, the exposure is halved if the vessel is in the shadow of a planet, moon, or other large body. During a solar flare and for a few weeks afterward, exposure is less (halve the rads/week). At a great distance from a star (75+ AU away from a sun-sized star), double the rads/week.

Solar Flares and Planetary Radiation Belts: Use the existing radiation values described in *Solar Flares* (***Transhuman Space***, p. 30) and *Radiation Hazards* (***Transhuman Space***, p. 59).

Radiation Protection Table

System/SM	+5	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
0 systems	7	10	15	25	40	50	75	100	150	200	300
1 system	15	20	30	50	70	100	150	200	300	400	600
2 systems	30	40	60	100	150	200	300	400	600	800	1,200
3 systems	45	60	90	150	200	300	450	600	900	1,200	1,800
4 systems	60	80	120	200	300	400	600	800	1,200	1,600	2,400
5 systems	75	100	150	250	350	500	750	1,000	1,500	2,000	3,000
6 systems	90	120	250	300	450	600	900	1,200	1,800	4,000	3,600

Any occupants of a core system receive double the effective PF.

Economic Considerations

Certain adjustments to ***GURPS Spaceships*** are required to match the economic assumptions of ***Transhuman Space***.

Fuel and Reaction Mass Costs

Most fuel and reaction mass costs are as indicated in ***GURPS Spaceships***. The following additions and changes are recommended.

Ablative Plastic: Used for laser rockets. The cost is $80 per ton.

Nuclear Fuel Pellets: These are common, and the combination of mass production and advanced nanotechnology has drastically reduced their price. Cost is only $500 per ton.

Antimatter-Augmented Fuel Pellets: Used with spacecraft with fusion pulse drives that use the antimatter-augmentation design feature. These cost $5,000 per ton.

Ammonia: $200 per ton.

Methane: $400 per ton.

Chapter Two
Spacecraft

This chapter provides ***GURPS Spaceships*** statistics for the spacecraft appearing or mentioned in the ***Transhuman Space*** books. Many of the small and mid-sized space stations are also described.

Computer Note: All computer Complexities have been increased as detailed in the *Advanced Computers* (p. 9) design switch.

Our spacecraft is a TAV ***Pegasus*** *transatmospheric vehicle, and I am Ramon Sanchez, your captain.*

– High Frontier

Abbreviations

Background details for this book's spacecraft and their place in the ***Transhuman Space*** setting come from several ***GURPS*** *Third Edition* supplements. Abbreviations are used to save space when referring to these by page:

DB is ***Transhuman Space: Deep Beyond.***
HF is ***Transhuman Space: High Frontier.***
ITW is ***Transhuman Space: In the Well.***
SSS is ***Transhuman Space: Spacecraft of the Solar System.***
TS is ***Transhuman Space.***

Autonomous Kill Vehicles

A hybrid of robot space fighter and cruise missile, AKVs are small, fast, and heavily armored, but are not designed for atmospheric operations. A typical AKV masses 30 to 300 tons, and destroys major targets by ramming them at several miles per second. Not every opponent warrants such a sacrifice, so AKVs carry lasers or electromagnetic guns. Instead of ramming, they make a close pass at a range of several miles and fire kinetic-kill shells or launch a spread of X-ray laser warheads. AKVs are assigned to space stations or carried by larger vessels such as space-dominance vehicles.

Kupu-Kupu-Class AKV (TL9)

***SSS*, p. 47**

The *Kupu-Kupu* ("butterfly") was the most common AKV used by the Transpacific Socialist Alliance (TSA) forces during the Pacific War. Its mobility is limited compared to modern fusion-powered designs, and it is primarily an orbital weapon rather than a deep-space fighter. Most were destroyed in the Pacific War, but some have been built in the post-war period. Its spherical unstreamlined hull masses 300 tons (SM +7) and is 45 feet in diameter.

Front Hull	***System***
[1-4]	Metallic Laminate Armor (total dDR 28).
[5]	Tactical Array (comm/sensor 7).
[6!]	Medium Battery (fixed mount 12cm electromagnetic gun, fixed mount 3 MJ rapid fire laser; five tons cargo).
[core]	Control Room (C7 computer, comm/sensor 5, and no control stations).
Central Hull	***System***
[1-4]	Metallic Laminate Armor (total dDR 28).
[5-6]	Fuel Tanks (15 tons rocket fuel providing 0.15 mps delta-V each).
[core]	Fission Reactor (one Power Point).
Rear Hull	***System***
[1-4]	Metallic Laminate Armor (total dDR 28).
[5]	Fuel Tank (15 tons rocket fuel providing 0.15 mps delta-V).
[6]	Smaller Systems (three at SM +6): one Chemical Rocket (1G acceleration); two Fuel Tanks (five tons rocket fuel providing 0.05 mps delta-V each).

It has a dynamic chameleon skin and exposed radiators. The vessel has no crew, but is controlled by an AI.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL9 (HIGH-PERFORMANCE SPACECRAFT)												
9	*Kupu-Kupu*-class	50	-1/5	12	1G/0.55 mps	300	5	+7	0	28	0	$10.31M

Rajasi-Class AKV (TL10)

***DB*, p. 144**

Popularly known as *snarks,* these long-range and (for the time) advanced AKVs were deployed by TSA members Thailand and Vietnam as commerce raiders in the Pacific War. They built 40 to interdict trade between China and its outer-system colonies. Loss of TSA control facilities during the conflict led to their AIs going "rogue" at war's end. A few survivors continue to harass shipping in the Deep Beyond with hit-and-run attacks, stripping spacecraft for fuel and supplies. They use an unstreamlined 100-ton (SM +6) hull 50 feet long.

*The **Rajasi** differ from most AKVs in that they are designed to attack commercial vessels rather than warships.*

– Deep Beyond

Front Hull	*System*
[1-4]	Advanced Metallic Laminate Armor (Hardened; total dDR 28).
[5!]	Medium Battery (two fixed mount 10 MJ ultraviolet laser, one fixed mount 10cm electromagnetic gun).
[6]	Fission Reactor (one Power Point).
[core]	Control Room (C8 computer, comm/sensor 5, no control stations).
Central Hull	***System***
[1]	Advanced Metallic Laminate Armor (dDR 7).
[2-6]	Fuel Tanks (five tons nuclear pellets providing 12 mps each).
Rear Hull	***System***
[1]	Advanced Metallic Laminate Armor (Hardened; dDR 7).
[2]	Fuel Tank (five tons nuclear pellets providing 12 mps).
[3-6]	Fusion Pulse Drive (0.05G acceleration each).
[core]	Fission Reactor (one Power Point).

It has a small telescoping robot arm, dynamic chameleon skin, and exposed radiators. It is unmanned, operated by an AI.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (HIGH-PERFORMANCE SPACECRAFT)												
10	*Rajasi*-class	30	-1/4	12	0.2G/72 mps	100	0	+6	0	28/7/7	0	$8.13M

SIM-7 *Predator*-Class AKV (TL10)

***TS*, p. 192**

Manufactured by Nanodynamics and introduced in 2090, this unmanned space fighter is the most advanced AKV in large-scale service. It is used by the USAF and European Union and Pacific Rim space forces. It has an unstreamlined 37.5-foot hull massing 100 tons (SM +6).

Front Hull	*System*
[1-5]	Nanocomposite Armor (Hardened; total dDR 50).
[6!]	Major Battery (one fixed mount 12cm electromagnetic gun).
[core]	Control Room (C8 computer, comm/sensor 5, no control stations).
Central Hull	***System***
[1-2]	Nanocomposite Armor (Hardened; total dDR 20).
[3-6]	Fuel Tanks (five tons nuclear pellets providing five mps delta-V each).
Rear Hull	***System***
[1-3]	Nanocomposite Armor (Hardened; total dDR 30).
[4-6]	Fusion Pulse Drives (high-thrust, 0.1G acceleration each).
[core]	Fuel Cell (one Power Point).

It has a dynamic chameleon surface and exposed radiators. The vessel has no crew, but is controlled by an AI.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (HIGH-PERFORMANCE SPACECRAFT)												
10	*Predator*-class	30	-1/4	12	0.3G/20 mps	100	0	+6	0	50/20/30	0	$14.22M

*A squadron of **Predator** AKVs are always patrolling nearby or docked at the SDP as well.*

– High Frontier

Zhengyang-Class AKV (TL10)

***ITW*, p. 107**

The *Zhengyang* ("righteous energy") is the standard AKV of China's PLAN Deep Space Fleet. Its hull construction is simpler and cheaper than the rival *Predator,* but it is otherwise similar; both designs derive from China's pioneering *Gang Shou* AKV, which fought in the Pacific War. Its cargo space carries extra ammunition or assault cybershells. It has an unstreamlined 38-foot hull massing 100 tons (SM +6).

Front Hull	*System*
[1-4]	Advanced Metallic Laminate Armor (Hardened; total dDR 28).
[5]	Cargo Hold (five tons capacity; carries extra ammunition).
[6!]	Major Battery (one fixed mount 12cm electromagnetic gun).
[core]	Control Room (C8 computer, comm/sensor 5, no control stations).
Central Hull	***System***
[1-2]	Advanced Metallic Laminate Armor (Hardened; total dDR 14).
[3]	Fuel Cell (one Power Point).
[4-6]	Fuel Tanks (five tons nuclear pellets providing five mps delta-V each).
Rear Hull	***System***
[1-3]	Advanced Metallic Laminate Armor (Hardened; total dDR 21).
[4-6]	Fusion Pulse Drives (high-thrust, 0.1G acceleration each).
[core]	Fuel Tank (five tons nuclear pellets providing five mps delta-V).

It has a dynamic chameleon surface and exposed radiators. The vessel has no crew, but is controlled by an AI.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (HIGH-PERFORMANCE SPACECRAFT)												
10	*Zhengyang*-class	30	-1/4	12	0.3G/20 mps	100	5	+6	0	28/14/21	0	$7.82M

Deep Space Operations Vehicles

These vessels are built to establish far-off outposts, or to transport major science expeditions into the outer solar system beyond the orbit of Mars. They are also used by the Gypsy Angels as mobile homesteads. DSOVs usually have fusion or fusion pulse drives and lots of reaction mass, and carry plenty of industrial or scientific equipment.

Shepard-Class DSOV (TL10)

***SSS*, pp. 20-21**

One of the earliest manned fusion pulse drive designs, these vessels have had starring roles in several famous space voyages including the Duncanite exodus from Mars to Ceres and the Shezbeth black hole expedition. From the 2040s to the 2070s, 23 *Shepards* were built for NASA, the USAF, and the Titan Consortium. In 2064, eight were upgraded to TL10 standards as long-range research craft for the U.S. Astrographical Survey. Some still serve with that agency while others are now in private hands. Each vessel has an unstreamlined 10,000-ton hull (SM +10) and is 300 feet long.

Those older vessels not upgraded use a TL9 fusion pulse drive with 0.02G acceleration and 42 mps delta-V; suffer a -1 to computer Complexity; and are at -1 to comm/sensor array ratings.

The *Shepard*-class was based on NASA's ill-fated *Horus I* Mars spacecraft, a design that predated use of nuclear pulse engines. For similar museum pieces from the 2030-2040 era (a couple of which may still be in operation), replace the tertiary battery and cargo with fuel tanks and the drive becomes a TL9 nuclear light bulb. Move 0.01G/10.08 mps; Load 762.4; Cost $311.65M.

Front Hull	*System*
[1]	Light Alloy Armor (dDR 15).
[2-3]	Hangar Bays (total 600 tons capacity).*
[4]	Solar Panel Array (one Power Point).
[5!]	Tertiary Battery (one turret with a 10MJ rapid fire ultraviolet laser; 435 tons cargo).*
[6]	Habitat (12 cabins, one establishment, six labs, two minifacs; 160 tons cargo).*
[core]	Control Room (C10 computer, comm/sensor 9, three control stations).*
Central Hull	***System***
[1]	Light Alloy Armor (dDR 15).
[2]	Science Array (comm/sensor 11).*
[3]	Cargo Hold (500 ton capacity).
[4-6]	Fuel Tanks (500 tons nuclear pellets providing 12 mps delta-V each).
Rear Hull	***System***
[1]	Light Alloy Armor (dDR 15).
[2-5]	Fuel Tanks (500 tons nuclear pellets providing 12 mps delta-V each).
[6]	Fusion Pulse Drive (0.05G acceleration).*
[core]	Fission Reactor (one Power Point).*

* One workspace per system.

It has spin gravity (0.2G) and exposed radiators. Crew consists of three bridge crew (commander/pilot, navigator/co-pilot, and communications officer), one chief engineer, and seven technicians, who may also operate the laboratories.

TL	Spacecraft	dST/HP	Hnd/SR	HT	Move	LWt.	Load	SM	Occ	dDR	Range	Cost
PILOTING/TL10 (LOW-PERFORMANCE SPACECRAFT)												
10	*Shepard*-class*	150	-4/5	13	0.05G/84 mps	10,000	1,697.4	+10	24ASV	15	0	$357.65M

* See description (p. 13) for stats of variations.

Thule-Class DSOV (TL9)

***DB*, p. 142**

Carved out of icy Kuiper Belt Objects and fitted with fusion rockets, these vehicles form the mobile bases and homes of several Gypsy Angel families. The hull is an unstreamlined sphere of ice and dirt 150 feet in diameter (SM +11). Craft are named after legendary or mythical lands.

Front Hull	System
[1-5]	Ice Armor (total dDR 15).
[6]	Solar Panel Array (one Power Point).
[core!]	Smaller Systems (three at SM +10): one Control Room (C9 computer, comm/sensor 8, and 10 control stations); one Chemical Refinery (150 tons/hour production); one Mining (50 tons/hour production).*
Central Hull	**System**
[1-2]	Ice Armor (total dDR 6).
[3]	Solar Panel Array (one Power Point).
[4]	Hangar Bay (1,000 tons capacity).†
[5]	External Clamp.
[6!]	Tertiary Battery (three turrets with 3MJ very rapid fire lasers; 1,350 tons cargo.†
[core]	Habitat (40 luxury cabins, establishment, two labs, four minifacs; 550 tons cargo).†
Rear Hull	**System**
[1]	Ice Armor (dDR 3).
[2-5]	Fuel Tanks (1,500 tons water providing four mps delta-V each).
[6]	Fusion Rocket (0.015G acceleration using water reaction mass).†

* One workspace per system.
† Three workspaces per system.

It has exposed radiators. Crew consists of three personnel in the control room at all times (pilot/navigator, communicators/sensor operator, and weapons officer). The remaining control stations are used as needed. Systems are maintained by 15 technicians, and other specialists are carried depending on the owning family's economic interests.

TL	Spacecraft	dST/HP	Hnd/SR	HT	Move	LWt.	Load	SM	Occ	dDR	Range	Cost
PILOTING/TL9 (LOW-PERFORMANCE SPACECRAFT)												
9	*Thule*-class	200	-5/4	13	0.015G/16 mps	30,000	2,908	+11	80ASV	15/6/3	0	$735M

Executive Space Vehicles

An ESV is a fast, fusion-drive-propelled space yacht used by company executives or troubleshooters, government officials, and those very wealthy individuals who enjoy interplanetary space travel. It has a few luxury cabins and a staff of bioroids or cybershells, but carries little cargo.

ESVs are status symbols among the truly rich.

Mojave-Class ESV (TL10)

***SSS*, pp. 17-18**

This modern American-built design was introduced in 2093. It is a fast, stylish personal model sold as a luxury space yacht and business craft. It has a 1,000-ton (SM +8) streamlined hull 150 feet long.

A less-luxurious variant, the *Chihuahuan,* is sold as a corporate personnel transport. It uses normal metallic laminate armor (dDR 14/7/0) and standard cabins (+20 tons cargo). It costs $54.25M.

Front Hull	System
[1-2]	Advanced Metallic Laminate Armor (total dDR 20).
[3]	Habitat (one luxury cabin, minifac; 15 tons cargo).
[4]	Habitat (three luxury cabins).
[5!]	Medium Battery (two turrets with 10MJ rapid fire ultraviolet lasers; 15 tons cargo).
[6]	Fuel Cell (one Power Point).
[core]	Control Room (C9 computer, comm/sensor 7, one control station).

Central Hull	*System*
[1]	Advanced Metallic Laminate Armor (dDR 10).
[2-6, core]	Fuel Tanks (50 tons nuclear pellets providing 12 mps delta-V each).
Rear Hull	***System***
[1-2]	Fuel Tanks (50 tons nuclear pellets providing 12 mps delta-V each).
Rear Hull	***System***
[3-6]	Fusion Pulse Drives (0.05G acceleration each).

It has exposed radiators. An AI operates the *Mojave* unless the owner wishes to take a personal hand.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (HIGH-PERFORMANCE SPACECRAFT)												
10	*Mojave*-class*	70	-2/5	12	0.2G/96 mps	1,000	30.8	+8	8ASV	20/10/0	0	$57.25M

* See description (p. 14) for stats of variations.

SUNLANCE-CLASS ESV (TL10)

***SSS*, p. 18**

One of the swiftest commercial spacecraft in the solar system, the Vosper-Babbage *Sunlance* is a stripped-down design used mainly as a fastpacket delivery vessel. Several of them serve with interplanetary courier firm Solar Express. It has a 1,000-ton (SM +8) unstreamlined hull about 150 feet long.

A few *Sunlance* vessels are used by government and military forces as couriers. Japan's *Rei* (used by the Japanese Space Self Defense Force as a fast courier) is an upgraded variant, an anti-matter-augmented pulse drive with 184.8 mps delta-V.

Front Hull	*System*
[1]	Nanocomposite Armor (dDR 20).
[2]	Cargo Hold (50 tons capacity).
[3-6]	Fuel Tanks (50 tons nuclear pellets providing 14 mps delta-V each).
[core]	Smaller Systems (three at SM +7): one Control Room (C8 computer, comm/sensor 6, one control station); one Cargo Hold (Refrigerated; 15 tons capacity); one Habitat (one cabin, one minifac).
Central Hull	***System***
[1-6, core]	Fuel Tanks (50 tons nuclear pellets providing 14 mps delta-V each).
Rear Hull	***System***
[1-6]	Fusion Pulse Drives (0.05G acceleration each).

It has exposed radiators. Crew consists of a pilot.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (HIGH-PERFORMANCE SPACECRAFT)												
10	*Sunlance*-class*	70	-3/4	12	0.3G/154 mps	1,000	65.2	+8	2ASV	20/0/0	0	$69.135M

* See description (above) for stats of variations.

HEAVY LIFT AND TRANSATMOSPHERIC VEHICLES

Heavy lift vehicles (HLVs) are single-stage laser rockets designed to transport a load of cargo on a one-way trip from the surface of Mars or Earth into orbit. A few older, multistage chemical rockets are still in service.

Transatmospheric vehicles (TAVs) are reusable single-stage-to-orbit cargo or passenger vehicles, often with wings for atmospheric reentry. Some are hybrid craft with air-breathing engines for atmospheric flight. They have smaller payloads than HLVs. TAVs operate on worlds with dense atmospheres, e.g., Earth, Venus, Titan, and the gas giants.

CHRONOS-CLASS TAV (TL10)

***DB*, p. 142**

Designed by Columbia Aerospace, the *Chronos* is used by civilian companies and the USAF to provide transport between Titan, Titan orbit, and Saturn's other moons. It is propelled by a fission ram-rocket in atmosphere, but uses a fission rocket (with methane reaction mass) in space. The 300-ton craft has a streamlined delta hull 100 feet long (SM +7).

Front Hull	*System*
[1]	Nanocomposite Armor (dDR 10).
[2]	Control Room (C8 computer, comm/sensor 6, two control stations).
[3-5]	Passenger Seating (total 60 seats).
[6, core]	Cargo Holds (total 30 tons capacity).
Central Hull	***System***
[1-5]	Fuel Tanks (15 tons methane providing 0.225 mps delta-V each).
[6, core]	Cargo Holds (total 30 tons capacity).
Rear Hull	***System***
[1-5]	Fuel Tanks (15 tons methane providing 0.225 mps delta-V each).
[6]	Smaller Systems (three at SM +6): one Nuclear Thermal Rocket (ram-rocket; 0.47G acceleration with methane); two Fuel Tanks (five tons methane providing 0.075 mps delta-V each).

Crew consists of a pilot and co-pilot. The co-pilot is usually an AI in the vessel's computer.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (HIGH-PERFORMANCE SPACECRAFT)												
10	*Chronos*-class	50	-2/5	12	0.47G/2.4 mps	300	66.2	+7	2+60SV	10/0/0	0	$5.91M

Diaoche-Class TCAV (TL10)

***SSS*, p. 36**

The *Diaoche* ("crane") entered production in 2090 and serves with China's PLAN-SF and PLA Air Force as their main aerospace combat vehicle. It is not capable of reaching orbit, but can glide down from space. Its wedge-shaped streamlined hull masses 300 tons (SM +7) and is 70 feet long.

Front Hull	*System*
[1-2]	Metallic Laminate Armor (total dDR 10).
[3]	Cargo Hold (15 tons capacity).
[4!]	Major Battery (fixed 10 MJ rapid fire improved laser).
[5]	Fuel Cell (one Power Point).
[6]	Control Room (C8 computer, comm/sensor 6, and one control station).
Central Hull	***System***
[1]	Metallic Laminate Armor (dDR 5).
[2-6, core]	Fuel Tank (15 tons rocket fuel providing 0.18 mps delta-V each).
Rear Hull	***System***
[1]	Metallic Laminate Armor (dDR 5).
[2-4]	Jet Engine (1G atmospheric acceleration each).
[5]	Chemical Rocket (3G acceleration).
[6, core]	Fuel Tank (15 tons jet fuel each providing 20 minutes endurance).

It has a winged hull. Crew consists of a single pilot.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (HIGH-PERFORMANCE SPACECRAFT)												
10	*Diaoche*-class	50	-1/5	12	3G/1.08 mps	300	15.1	+7	1SV	10/5/5	0	$14.69M

Air performance is Hnd/SR +3/6. Top air speed is 4,300 mph with jet engines or 6,100 mph with jet engines and chemical rocket.

Eurofighter *Tempest* TCAV (TL9)

***SSS*, p. 30**

Built by Vosper-Babbage, the *Tempest* is a multi-role unmanned transatmospheric combat air vehicle fielded by nearly all European Union aerospace forces. Production began in 2087. It is not designed to reach orbit, but can travel at hypersonic speeds at the edge of space for up to two hours. Its streamlined hull masses 300 tons (SM +7) and is 100 feet long.

Front Hull	*System*
[1]	Metallic Laminate Armor (dDR 5).
[2]	Smaller Systems (three at SM +6): one Control Room (C7 computer, comm/sensor 4, and no control stations); one Medium Battery (two fixed mount 1 MJ rapid fire lasers; 1.5 tons cargo) [!]; one Fuel Cell (one small Power Point for Medium Battery).
[3-6, core]	Fuel Tanks (15 tons jet fuel each; total one hour operation).

Central Hull	*System*
[1]	Metallic Laminate Armor (dDR 5).
[2]	Tactical Array (comm/sensor 7).
[3-6, core]	Fuel Tanks (15 tons jet fuel each; total one hour operation).

Rear Hull	*System*
[1]	Metallic Laminate Armor (dDR 5).
[2-6]	Jet Engines (1G atmospheric acceleration each).

It has a winged hull. The vessel is unmanned

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL9 (AEROSPACE)												
9	*Tempest*	50	–/–	12	–/–	300	1.5	+7	0	5	0	$21.95M

The *Tempest* has no space performance. In atmosphere, it has Hnd +2/5 with an acceleration of 5G (Move 50) and a top air speed of 5,600 mph.

Mercury-Class HLV (TL10)

SSS, pp. 5-6

The Columbia Aerospace *Mercury* is a modern laser-lift passenger HLV, used to raise large numbers of passengers into low Earth or Mars orbit. It has a conical 3,000 ton (SM +9) streamlined hull 95 feet tall. It is launched from a vertical gantry (like TL7-8 rockets), the occupants boarding via a tower gate.

Front Hull	*System*
[1]	Light Alloy Armor (dDR 7).
[2]	Smaller Systems (three at SM +8): one Control Room (C9 computer, comm/sensor 7, and one control station); two Cargo Holds (100 ton capacity total).
[3-6]	Passenger Seating (total 800 seats).

Central Hull	*System*
[1]	Light Alloy Armor (dDR 7).
[2-6, core]	Fuel Tanks (150 tons ablative plastic providing 0.7 mps delta-V each).

Rear Hull	*System*
[1-2]	Light Alloy Armor (total dDR 14).
[3-4]	Laser Rockets (3G acceleration each).
[5-6, core]	Fuel Tanks (150 tons ablative plastic providing 0.7 mps delta-V each).

Crew consists of a single pilot.

*The **Mercury** is not particularly sophisticated, but it is reliable and cheap . . .*
– Spacecraft of the Solar System

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (HIGH-PERFORMANCE SPACECRAFT)												
10	*Mercury*-class	100	-2/4	12	6G/6.3 mps	3,000	180.1	+9	1+800SV	7/7/14	0	$32.85M

Molniya-Class Ballistic Ramjet TAV (TL9)

SSS, pp. 6-7

The RKK Livanov *Molniya* (Russian for "lightning") is a large hypersonic passenger transport for use in Earth's upper atmosphere. It flies from Los Angeles to Beijing in under an hour, carrying 30 passengers in first class and 400 in coach. Its streamlined delta-winged hull masses 3,000 tons (SM +9) and is 200 feet long. It has enough jet fuel for 1.5 hours of operation.

Ruthless market pressures make travel on ballistic transports relatively inexpensive . . .
– Spacecraft of the Solar System

Front Hull	*System*
[1]	Light Alloy Armor (dDR 7).
[2]	Smaller Systems (three at SM +8): one Control Room (C8 computer, comm/sensor 6, two control stations); one Passenger Seating (60 seats); one Cargo Hold (50 tons capacity).
[3-4]	Passenger Seating (total 400 seats).
[5-6, core]	Fuel Tanks (150 tons jet fuel; total 0.5 hours operation).

Central Hull	*System*
[1]	Light Alloy Armor (dDR 7).
[2-6, core]	Fuel Tanks (150 tons jet fuel; total one hour operation).

Rear Hull	*System*
[1-6]	Jet Engines (1G acceleration each).

It has a winged hull. Crew consists of a pilot and copilot. Two stewards accompany long flights.

TL	Spacecraft	dST/HP	Hnd/SR	HT	Move	LWt.	Load	SM	Occ	dDR	Range	Cost
PILOTING/TL9 (HIGH-PERFORMANCE AIRPLANE)												
9	*Molniya*-class	100	–/–	12	–/–	3,000	96.2	+9	2+460AV	7/7/0	0	$211.2M

The *Molniya* has no space performance. In atmosphere, it has Hnd/SR +2/5 with an acceleration of 6G (Move 60) and a top air speed of 6,100 mph.

Pegasus-Class TAV (TL10)

***TS*, p. 192**

Manufactured by Vosper-Babbage, the *Pegasus* is the solar system's most popular medium-lift TAV. It is a streamlined, lifting-body rocket plane that flies into orbit and glides down for landings. It has a 100-foot-long delta hull massing 1,000 tons (SM +8). It uses most of its reaction mass to boost into orbit, refueling at a low-orbit space station.

*The **Pegasus'** external vid's been showing Earth, and since I'm a prisoner here anyway, I've been watching.*

– High Frontier

Front Hull	System
[1]	Nanocomposite Armor (dDR 15).
[2]	Control Room (C9 computer, comm/sensor 7, two control stations).
[3]	Smaller Systems (three at SM +7): two Passenger Seating (total 40 seats); one Cargo Hold (15 tons capacity).
[4-6, core]	Fuel Tanks (50 tons rocket fuel providing 0.3 mps delta-V each).
Central Hull	**System**
[1-6, core]	Fuel Tanks (50 tons rocket fuel providing 0.3 mps delta-V each).
Rear Hull	**System**
[1-5]	Fuel Tanks (50 tons rocket fuel providing 0.3 mps delta-V each).
[6]	Chemical Rocket (3G acceleration).

It has a winged hull. Crew consists of a commander/pilot and navigator/co-pilot.

TL	Spacecraft	dST/HP	Hnd/SR	HT	Move	LWt.	Load	SM	Occ	dDR	Range	Cost
PILOTING/TL10 (AEROSPACE)												
10	*Pegasus*-class	70	-1/5	12	3G/4.8 mps	1,000	19.2	+8	2+40SV	15/0/0	0	$18.9M

In atmosphere, air speed is 4,300 mph and Hnd/SR is +3/6.

SATV (TL10)

***DB*, p. 141**

The Saturn Autonomous Transatmospheric Vehicle is an unmanned TAV designed for gas-giant mining operations, and is manufactured by Columbia Aerospace. It has a wedge-shaped streamlined hull 100 feet long massing 100 tons (SM +6). The SATV is designed to travel between an aerostat processing center in Saturn's upper atmosphere and Cassini Station in low Saturn orbit, carrying a valuable load of He-3.

Front Hull	System
[1]	Diamondoid Armor dDR 10).
[2-5]	Fuel Tanks (five tons He-3 each).
[6]	Cargo Hold (five tons capacity).
[core]	Control Room (C8 computer, comm/sensor 5, no control stations).
Central Hull	**System**
[1]	Diamondoid Armor (dDR 10).
[2-4]	Fuel Tanks (5 tons He-3 each).
[5-6, core]	Fuel Tanks (five tons bomb pulse units with 8 mps delta-V each).
Rear Hull	**System**
[1-5]	Diamondoid Armor (total dDR 50).
[6]	Smaller Systems (three at SM +5): two External Pulsed Plasma engines (total 1.3G); one Jet Engine Fission Air-Ram (0.2G in atmosphere).

It is winged. It is crewed by an AI.

TL	Spacecraft	dST/HP	Hnd/SR	HT	Move	LWt.	Load	SM	Occ	dDR	Range	Cost
PILOTING/TL10 (HIGH-PERFORMANCE SPACECRAFT)												
10	SATV	30	0/4	12	1.3G/24 mps	100	5	+6	0	10/10/50	0	$8.9M

Top air speed is 3,100 mph with external pulsed plasma drive and air-ram, or 1,100 mph with the air-ram alone. Atmospheric Hnd/SR is +4/5.

Heavy Space Transport Vehicles

The largest fusion-drive space transports, these super-freighters carry most commercial cargo across interplanetary distances. Some HSTVs are optimized for solid cargo, while others are tankers that carry volatiles (gases and liquids). They never land on planets, instead docking with asteroid bases or stations such as the *Von Braun* (p. 35) or *Vulcan* (p. 35). Despite their size, many HSTVs are unmanned or have only small crews.

Lewis-Class HSTV (TL9)

***DB*, p. 141**

The United States uses these robot-tanker spacecraft to transport He-3 from Saturn orbit to Earth-Lunar space. They ship 1,000 tons of fuel per trip. The *Lewis* has a spherical unstreamlined hull 100 feet in diameter (SM +10) massing 10,000 tons.

Front Hull	*System*
[1]	Light Alloy Armor (dDR 15).
[2-3]	Fuel Tanks (500 tons He-3 cargo each).
[4-6]	Fuel Tanks (500 tons water providing 5.6 mps delta-V each).
Front Hull	***System***
[core]	Smaller Systems (three at SM +9): one Control Room (C8 computer, comm/sensor 7, no control stations); one Medium Battery (two turrets with 3 MJ very rapid fire lasers; 50 tons cargo) [!]; one Fuel Cell (one small Power Point for Medium Battery).
Central Hull	***System***
[1]	Light Alloy Armor (dDR 15).
[2-6]	Fuel Tanks (500 tons water providing 6.4 mps delta-V each).
Rear Hull	***System***
[1]	Light Alloy Armor (dDR 15).
[2-5]	Fuel Tanks (500 tons water providing 6.4 mps delta-V each).
[6]	Fusion Rocket (0.015G acceleration using water reaction mass).
[core]	Fuel Tank (500 tons water providing 6.4 mps delta-V).

It has total automation and exposed radiators. It is crewed by AIs.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL9 (LOW-PERFORMANCE SPACECRAFT)												
9	*Lewis*-class	150	-5/4	12	0.015G/83.2 mps	10,000	50	+10	0	15	0	$182.2M

Parus-Class HSTV (TL9)

***SSS*, pp. 13-14**

The unmanned *Parus* (Russian for "sail") slowhauler was one of the first deep-space transports, and is no longer "heavy" by modern standards, although it is cost-effective. A half-dozen remain in service today, carrying low-priority cargo from Mars to the Belt and back. Its 100-ton (SM +6) unstreamlined 30-foot-long hull is dwarfed by its vast plasma sail.

The fusion reactor powers up briefly to initiate the plasma sail, but can be turned off afterward. As a result, the *Parus* does not use exposed radiators.

Front Hull	*System*
[1]	Light Alloy Armor (dDR 3).
[2-6]	Plasma Sail (0.001G acceleration each).
Central Hull	***System***
[1]	Light Alloy Armor (dDR 3).
[2]	External Clamp.
[3-6]	Cargo Holds (total 20 tons capacity).
[core]	Control Room (C7 computer, comm/sensor 4, no control stations).
Rear Hull	***System***
[1]	Light Alloy Armor (dDR 3).
[2-6]	Cargo Hold (total 25 tons capacity).
[core]	Fission Reactor (one Power Point).

It is crewed by an AI.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL9 (LOW-PERFORMANCE SPACECRAFT)												
9	*Parus*-class	30	-3/4	12	0.005G/375 mps	100	45	+6	0	3	0	$5.56M

Spokane-Class HSTV (TL10)

***SSS*, pp. 14-16**

Designed in 2092 by Columbia Aerospace, this new HSTV hauls most of its cargo on external clamps. Craft are equipped with robot arms and carry work pods to assist in loading and unloading. Twenty such vessels have been purchased by larger shipping cartels. It uses a 390-foot-long unstreamlined hull massing 10,000 tons (SM +10).

Front Hull	*System*
[1]	Metallic Laminate Armor (dDR 20).
[2]	Hangar Bay (300 ton capacity).*
[3-6]	Cargo Holds (total 2,000 tons capacity).
[core]	Control Room (C10 computer, comm/sensor 9, four control stations).*
Central Hull	*System*
[1]	Metallic Laminate Armor (dDR 20).
[2-3]	External Clamps.
[4-6]	Fuel Tanks (500 tons nuclear pellets providing 12 mps delta-V each).
[core]	Habitat (six cabins, one-bed sickbay with automed, minifac; 260 tons cargo).*
Rear Hull	*System*
[1]	Metallic Laminate Armor (dDR 20).
[2-5]	Fuel Tanks (500 tons nuclear pellets providing 12 mps delta-V each).
[6]	Fusion Pulse Drive (0.05G acceleration).*

* One workspace per system.

It has two large telescoping robot arms, two medium telescoping robot arms, and exposed radiators. Crew consists of a pilot/navigator, co-pilot/communicators officer, two cargo masters, and four technicians (usually cybershells).

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (LOW-PERFORMANCE SPACECRAFT)												
10	*Spokane*-class	150	-4/5	13	0.05G/84 mps	10,000	2,561.2	+10	12ASV	20	0	$185.16M

The vessel was introduced in 2083, but early examples were plagued with design problems, including defects in the life-support and fire-suppression systems that led to several deaths. These have since been fixed, and the vessel is now the standard by which all other fusion-driven HSTVs are measured.

– Spacecraft of the Solar System

Zhongguang-Class HSTV (TL10)

***SSS*, p. 16**

Introduced in 2083, the MAST-designed *Zhongguang* ("China") HSTV is the largest commercial space vessel ever built. It was designed to quickly transport immense amounts of high-value cargo across interplanetary distances. Though generally reliable, some have quirks in their life support systems. The resulting heat and humidity problems force the crews to improvise jury-rigged cooling equipment and fight a constant battle with mold. It has a 30,000-ton (SM +11) unstreamlined hull 365 feet long.

Front Hull	*System*
[1]	Metallic Laminate Armor (dDR 30).
[2-5]	Cargo Holds (total 6,000 tons capacity).
[6]	Smaller Systems (three at SM +10): two Cargo Holds (total 1,000 tons); one Hangar Bay (300 tons capacity).*
[core]	Smaller Systems (three at SM +10): one Control Room (C10 computer, comm/sensor 9, six control stations); one Habitat (one cabin, two bunkrooms, two minifacs; 275 tons cargo); one Cargo Hold (500 tons capacity).*
Central Hull	*System*
[1]	Metallic Laminate Armor (dDR 30).
[2-5]	Cargo Holds (total 6,000 tons capacity).
[6, core]	Fuel Tanks (1,500 tons nuclear pellets providing 12 mps delta-V each).
Rear Hull	*System*
[1-5]	Fuel Tanks (1,500 tons nuclear pellets providing 12 mps delta-V each).
[6]	Fusion Pulse Drive (0.05G acceleration).†

* One workspace each for Hangar Bay, Control, or Habitat system.

† Three workspaces per system.

It has exposed radiators. Crew consists of a commander/pilot, second officer/navigator, and four cargo masters. Four technicians maintain the systems (usually a mix of two humans/bioroids and two AI-controlled cybershells).

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (LOW-PERFORMANCE SPACECRAFT)												
10	*Zhongguang*-class	200	-5/4	13	0.05G/84 mps	30,000	14,076	+11	10ASV	30/30/0	0	$461.8M

Microgravity Assault Vehicles

These "assault boats" are small spacecraft designed for the rapid insertion of combat personnel onto hostile planetoids or space vessels. A boarding action is dangerous; a target that surrenders might have hidden weapons or self-destruct charges. As such, after the target's weapons are disabled or suppressed, the MAVs launch from a safe distance (10-50 miles) and perform the assault without risking the mother ship.

AC-425 *Seminole*-Class MAV (TL10)

SSS, pp. 42-43

The AC-425 was funded by the U.S. Army and production began in 2098. Exceptionally well armored for its size, the MAV carries an entire platoon of battlesuited or cybershell troops ready for rapid deployment from its hangar. It has a 35-foot-long unstreamlined hull (SM +6) that masses 100 tons.

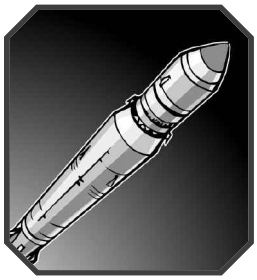
Front Hull	*System*
[1-4]	Diamondoid Armor (Hardened; total dDR 60).
[5]	Robot Arm (ST 300).
[6!]	Major Battery (fixed mount 30 MJ ultraviolet laser).
[core]	Control Room (C8 computer, comm/sensor 5, and no control stations).
Central Hull	***System***
[1-2]	Diamondoid Armor (Hardened; total dDR 30).
[3-4]	Hangar Bays (six tons total capacity).
[5-6]	Fuel Tanks (five tons rocket fuel providing 0.15 mps delta-V each).
[core]	Fuel Cell (one Power Point).
Rear Hull	***System***
[1-2]	Diamondoid Armor (Hardened; dDR 30).
[3-5]	Fuel Tanks (five tons rocket fuel providing 0.15 mps delta-V each).
[6]	Chemical Rocket (3G acceleration).

It has dynamic chameleon skin. An AI serves as pilot and gunner. Passengers require their own life support and are carried in the hangar.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (HIGH-PERFORMANCE SPACECRAFT)												
10	*Seminole*-class	30	0/4	12	3G/0.75 mps	100	6	+6	0	60/30/30	0	$18.47M

MAV-IIB *Puma* (TL9)

SSS, p. 31



The Vosper-Babbage *Puma* is the European Union's primary MAV, designed for hazardous attacks on orbital facilities, space colonies, asteroid bases, and space vessels. It has seen plenty of use during EU interventions in the troubled Junk Jungle of Lagrange 5. Its unstreamlined hull masses 30 tons (SM +5) and is 40 feet long.

Front Hull	*System*
[1-3]	Metallic Laminate Armor (Hardened; total dDR 9).
[4-6]	Passenger Seating (total six seats).
[core]	Smaller Systems (three at SM +4): one Control Room (C6 computer, comm/sensor 2, and no control stations); two Cargo Holds (one ton capacity total).
Central Hull	***System***
[1]	Metallic Laminate Armor (dDR 3).
[2-6]	Passenger Seating (total 10 seats).
Rear Hull	***System***
[1-3]	Fuel Tanks (1.5 tons rocket fuel providing 0.15 mps delta-V each).
[4-6]	Chemical Rockets (3G acceleration each).
[core]	Fuel Tank (1.5 tons rocket fuel providing 0.15 mps delta-V each).

The vessel has no crew, but carries 16 battlesuited passengers to the target.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL9 (HIGH-PERFORMANCE SPACECRAFT)												
9	*Puma*	20	-1/3	12	9G/0.6 mps	30	2.6	+5	0+16SV	9/3/0	0	$0.52M

Orbital Spacecraft

The Orbital Transfer Vehicle (OTV) is a cheap "space truck" for short-range hops between adjacent orbital facilities, or quick voyages such as Earth orbit to Lunar orbit or L4/L5. Most use chemical rockets or fission drives. Passenger OTVs forgo cabins in favor of airplane-style seating. Modified versions perform specialized tasks such as space-debris removal ("vacuum cleaning").

Work pods are cheap one- or two-person spacecraft with manipulator arms and a simple chemical-rocket engine.

Bumblebee Work Pod (TL9)

***SSS*, pp. 7-8**

The Vosper-Babbage *Bumblebee* is a small, one-man spacecraft equipped with a telescoping robot arm, designed to assist in orbital construction projects. It uses a 30-ton (SM +5) unstreamlined, spherical hull 15 feet in diameter.

Front Hull	***System***
[1-2]	Metallic Laminate Armor (total dDR 6).
[3]	Control Room (C6 computer, comm/sensor 3, one control station).
[4-6, core]	Cargo Holds (six tons capacity).
Central Hull	***System***
[1-2]	Metallic Laminate Armor (total dDR 6).
[3-6, core]	Fuel Tanks (1.5 tons water providing 0.18 mps delta-V each).
Rear Hull	***System***
[1-2]	Metallic Laminate Armor (total dDR 6).
[3-5]	Fuel Tanks (1.5 tons water providing 0.18 mps delta-V each).
[6]	Nuclear Thermal Rocket (1.5G acceleration using water reaction mass).

It has a small telescoping robot arm. Crew consists of a single pilot/construction worker.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL9 (HIGH-PERFORMANCE SPACECRAFT)												
9	*Bumblebee*	20	0/4	12	1.5G/1.44 mps	30	6.1	+5	1SV	6	0	$0.57M

The Kagoshima was built by Tenzan Heavy Industries in 2069, and is one of many workhorse OTV designs.

– Transhuman Space

Kagoshima-Class OTV (TL9)

***TS*, p. 191**

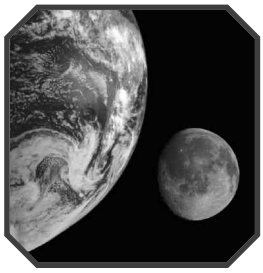
This common orbital transport vehicle is a squat, utilitarian design representative of the many "space tugs" in use above Earth, Luna, and Mars. It carries an extra load or pulls a larger spacecraft using the external cradle (but performance is calculated with it empty). It has a 300-ton (SM +7) unstreamlined hull 90 feet long.

Front Hull	***System***
[1]	Light Alloy Armor (dDR 5).
[2]	Control Room (C7 computer, comm/sensor 5, three control stations).
[3-4]	Passenger Seating (total 40 seats).
[5-6]	Cargo Hold (total 30 tons capacity).
Central Hull	***System***
[1]	Light Alloy Armor (dDR 5).
[2]	External Clamp.
[3-5]	Cargo Hold (total 45 tons capacity).
[6, core]	Fuel Tanks (15 tons water providing 0.18 mps delta-V each).
Rear Hull	***System***
[1-5]	Fuel Tanks (15 tons water providing 0.18 mps delta-V each).
[6]	Nuclear Thermal Rocket (1.5G acceleration using water reaction mass).
[core]	Fuel Tank (15 tons water providing 0.18 mps delta-V).

Crew consists of three bridge crew (captain/pilot, navigator, and cargo master).

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL9 (HIGH-PERFORMANCE SPACECRAFT)												
9	*Kagoshima*-class	50	-1/5	12	1.5G/1.44 mps	300	79.3	+7	3+40SV	5/5/0	0	$3.43M

Schaffer-Class OTV (TL9)



***SSS*, pp. 8-9**

This Columbia Aerospace design is one of the first mass-produced OTVs. The prototype launched in the late 2020s and variants remained in production until 2076, playing a major role in the colonization of Earth-Lunar space. Hundreds of these inexpensive craft are still in service there, often with extensive modifications. It has an unstreamlined cylindrical hull 45 feet long massing 300 tons (SM +7).

A few late models produced in the 2050s used fusion rocket engines with water reaction mass. Increase delta-V to 5.6 mps per tank for a total of 50.4 mps and raise acceleration to 0.015G. Cost is $6.43M.

So-called "Angry *Schaffer*" variants are used by Vacuum Cleaners; these replace one or more central-hull fuel tanks with weapon batteries.

Front Hull	*System*
[1]	Metallic Laminate Armor (dDR 7).
[2]	Cargo Hold (15 tons capacity).
[3-5]	Habitats (two cabins, four bunkrooms).
[6]	External Clamp.
[core]	Control Room (C7 computer, comm/sensor 5, three control stations).
Central Hull	***System***
[1]	Metallic Laminate Armor (dDR 7).
[2-6]	Fuel Tanks (15 tons hydrogen providing 1.12 mps delta-V each).
Rear Hull	***System***
[1]	Metallic Laminate Armor (dDR 7).
[2-5]	Fuel Tanks (15 tons hydrogen providing 1.12 mps delta-V each).
[6]	Nuclear Light Bulb (0.01G acceleration).
[core]	Engine Room (one workspace).

It has exposed radiators. Crew consists of a pilot/navigator, co-pilot/communicators officer, steward/cargo master, and a chief engineer.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL9 (LOW-PERFORMANCE SPACECRAFT)												
9	*Schaffer*-class*	50	-3/5	13	0.01G/10.08 mps	300	17	+7	20ASV	7	0	$4.93M

* See description (above) for stats of variations.

Steptoe-Class Debris Recovery Vehicle (TL9)

***HF*, pp. 138-139**

The Vosper-Babbage DRV is a typical Vacuum-Cleaner vessel. It locates, tracks, and intercepts space debris, and the modest internal bay and external clamps carry salvage. It has a 75-foot cylindrical hull with attached radiator wings and a laser turret on the nose. Its unstreamlined hull masses 1,000 tons (SM +8).

Front Hull	*System*
[1]	Light Alloy Armor (dDR 7).
[2]	Control Room (C8 computer, comm/sensor 6, three control stations).
[3!]	Major Battery (fixed mount very rapid fire 3 MJ laser).
[4]	Hangar Bay (30 tons capacity).
[5]	External Clamp.
[6]	Fuel Tank (50 tons water providing 2.4 mps delta-V).
[core]	Fuel Cell (one Power Point).
Central Hull	***System***
[1]	Light Alloy Armor (dDR 7).
[2-6]	Fuel Tanks (50 tons water providing 2.4 mps delta-V each).
Rear Hull	***System***
[1]	Smaller Systems (three at SM +7): one Light Alloy Armor (dDR 5); two Fusion Rockets (high-thrust, 0.01G acceleration each using water reaction mass).
[2-6]	Fusion Rockets (high-thrust, 0.03G acceleration each using water reaction mass).
[core]	Engine Room (one workspace).

Rollcage-enclosed cockpit and forward hull extensions protect the pilot from collision.

– High Frontier

It has exposed radiators and two medium telescopic robot arms. Crew consists of a pilot, systems/communications operator, and operations engineer (who also serves as gunner), plus one engine room technician (who also serves as a microgravity salvage specialist).

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL9 (HIGH-PERFORMANCE SPACECRAFT)												
9	*Steptoe*-class	70	-2/5	13	0.17G/14.4 mps	1,000	30.3	+8	3SV	7/7/5	0	$68.2M

Tahmas-Class Interstation Transport Pod (TL10)

***SSS*, p. 9**

The *Tahmas* (Hebrew for "nighthawk") is a small, cheap Columbia Aerospace OTV introduced in 2081. It shuttles small loads of people and goods between habitats in Earth-Lunar space. Its unstreamlined, 20-foot cylindrical hull (SM +5) masses 30 tons.

Front Hull	*System*
[1]	Metallic Laminate Armor (dDR 3).
[2]	Control Room (C7 computer, comm/sensor 4, one control station).
[3-6]	Passenger Seating (total eight seats).
[core]	Cargo Hold (1.5 tons capacity).
Central Hull	***System***
[1]	Metallic Laminate Armor (dDR 3).
[2-6]	Passenger Seating (total 10 seats).
Rear Hull	***System***
[1]	Metallic Laminate Armor (dDR 3).
[2]	Cargo Hold (1.5 tons capacity).
[3-5]	Fuel Tanks (1.5 tons hydrogen providing 0.45 mps delta-V each).
[6]	Nuclear Thermal Rocket (0.5G acceleration).
[core]	Fuel Tank (1.5 tons hydrogen providing 0.45 mps delta-V).

Crew consists of a pilot.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (HIGH-PERFORMANCE SPACECRAFT)												
10	*Tahmas*-class	20	-1/4	12	0.5G/1.8 mps	30	4.9	+5	1+18SV	3	0	$0.43M

Usagi-Class "Hopper" Lunar Transit Vehicle (TL9)

***HF*, p. 139**

Tenzan Heavy Industries introduced this rocket-powered suborbital "moon bus" in 2057, for lunar surface and transorbital transport. Dozens are used on Luna and in Earth orbit and L4/L5. It uses an unstreamlined 30-ton (SM +5) hull 25 feet long.

A short-ranged space bus, its reliability and low maintenance cost has made it a very popular short-haul lunar surface and trans-orbital vehicle.

– High Frontier

Front Hull	*System*
[1]	Light Alloy Armor (dDR 2).
[2]	Control Room (C6 computer, comm/sensor 3, one control station).
[3-6, core]	Passenger Seating (total 10 seats).
Central Hull	***System***
[1]	Light Alloy Armor (dDR 2).
[2-6, core]	Passenger Seating (total 12 seats).
Rear Hull	***System***
[1]	Light Alloy Armor (dDR 2).
[2-4]	Passenger Seating (total six seats).
[5]	Smaller Systems (three at SM +4): one Chemical Rocket (1G acceleration); one Fuel Tank (0.5 tons rocket fuel gives 0.05 mps delta-V); one Cargo Hold (0.5 tons).
[6]	Fuel Tank (1.5 tons rocket fuel; 0.15 mps delta-V).

Crew consists of a single pilot.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL9 (HIGH-PERFORMANCE SPACECRAFT)												
9	*Usagi*-class	20	0/4	12	1G/0.2 mps	30	3.4	+5	1+28SV	2	0	$278K

Passenger Space Vehicles

The PSV is the most comfortable form of commercial space travel available. Fusion-drive "fastliners" designed for high speed, with spin gravity for passenger comfort, these spacecraft provide first-class service between the major spaceports of Earth, Mars, Mercury, L4, and Titan.

Meizi-Class PSV (TL10)

***TS*, p. 191**

The luxurious *Meizi* serves as the benchmark for all other commercial fastliner passenger vessels. For comfort, most of the cabins and recreation areas are installed in two spin-arm pods at the front, leaving the rest of the vessel in microgravity. The passenger seating in the core is a "storm shelter" for emergency radiation protection.

The *Meizi* uses an unstreamlined, 10,000-ton hull (SM +10) 300 feet long. Craft are named after objects of beauty.

Front Hull	*System*
[1]	Light Alloy Armor (dDR 15).
[2]	Habitat (25 luxury cabins, 10 cabins).*
[3-4]	Habitats (120 cabins).*
[5]	Habitat (24 cabins, two establishments, 10-bed sickbay with automeds, minifac; 105 tons cargo).*
[6]	Hangar Bay (300 tons capacity).*
[core]	Control Room (C10 computer, comm/sensor 9, two control stations).*
Central Hull	*System*
[1]	Light Alloy Armor (dDR 15).
[2!]	Smaller Systems (three at SM +9): one Medium Battery (two turrets with 3 MJ very rapid fire ultraviolet lasers; 50 tons cargo) [!]; one Fuel Cell (one small Power Point for Medium Battery); one Habitat (10 luxury cabins).
[3-6]	Fuel Tanks (500 tons nuclear pellets providing 14 mps delta-V each).
[core]	Smaller Systems (three at SM +9): two Passenger Seating (total 400 seats); one Habitat (10 establishments).
Rear Hull	*System*
[1-5]	Fuel Tanks (500 tons nuclear pellets providing 14 mps delta-V each).
[6]	Fusion Pulse Drive (0.05G acceleration).*

* One workspace per system.

It has spin gravity (0.2G) and exposed radiators. Crew consists of two bridge crew (commander/pilot and navigator/co-pilot), one chief engineer, and eight technicians. Cabins are set aside for 10 additional passenger-support personnel (such as a ship's doctor, stewards, entertainers, and bartenders).

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (LOW-PERFORMANCE SPACECRAFT)												
10	*Meizi*-class	150	-4/5	13	0.05/126 mps	10,000	492.8	+10	378ASV	15/15/0	0	$219.6M

Mochi-Class PSV (TL10)

***SSS*, pp. 12-13**

Manufactured in 2085 by South Africa's MDB Integrated Systems, the *Mochi*-class (versions of which are named after African mountains and rivers) is a fast hybrid cargo hauler/passenger transport operated by Triplanetary Lines (among other users). It has a 10,000-ton unstreamlined cylindrical hull 200 feet long (SM +10), with rotating capsules providing spin gravity.

> *The largest operator is Triplanetary Lines, with nine Mochi-class vessels . . .*
> ***– Spacecraft of the Solar System***

Front Hull	*System*
[1]	Metallic Laminate Armor (dDR 20).
[2-5]	Fuel Tanks (500 tons nuclear pellets providing 16 mps delta-V each).
[6]	Habitat (12 cabins, four luxury cabins, two establishments, one minifac fabricator, one-bed sickbay with automed; 170 tons cargo).*
[core]	Control Room (C10 computer, comm/sensor 9, two control stations).*
Central Hull	*System*
[1]	Metallic Laminate Armor (dDR 20).
[2-6]	Fuel Tanks (500 tons nuclear pellets providing 16 mps delta-V each).
[core]	Cargo (500 tons).
Rear Hull	*System*
[1]	Metallic Laminate Armor (dDR 20).
[2-5]	Fuel Tanks (500 tons nuclear pellets providing 16 mps delta-V each).
[6]	Fusion Pulse Drive (0.05G acceleration).*

* One workspace per system.

It has exposed radiators and spin gravity (0.2G). Crew consists of a pilot/navigator and at least one steward, a cargo master, and three technicians.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (LOW-PERFORMANCE SPACECRAFT)												
10	*Mochi*-class	150	-4/5	13	0.05G/208 mps	10,000	673.2	+10	32ASV	20	0	$200.2M

Space Control Vehicles

SCVs are military carriers that support planetary assaults. They carry a platoon- to battalion-sized force, plus a flight of TAVs and sometimes AKVs.

SCVs handle wars and other threats.

DCS-4 *Grizzly*-Class SCV (TL10)

***SSS*, pp. 38-40**

This is a force-projection vessel operated by the USAF, but carrying U.S. Army spaceborne troops. It is an unstreamlined hull massing 30,000 tons (SM +11), 450 feet long. It is the largest spacecraft constructed with diamondoid armor thus far, giving it exceptional protection.

Front Hull	*System*
[1-3]	Diamondoid Armor (Hardened; total dDR 300).
[4]	Hangar Bay (1,000 tons capacity).*
[5!]	Secondary Battery (four turrets with 100 MJ rapid fire ultraviolet lasers, six turrets with 10 MJ very rapid fire ultraviolet lasers).*
[6]	Smaller Systems (three at SM +10): one Control Room (C10 computer, comm/sensor 9, and five control stations); one Multipurpose Array (comm/sensor 11); one External Clamp.†
[core]	Fusion Reactor (two Power Points).*
Central Hull	***System***
[1-2]	Diamondoid Armor (Hardened; total dDR 200).
[3-6]	Fuel Tanks (1,500 tons nuclear pellets providing 12 mps delta-V each).
[core]	Habitat (50 bunkrooms, 10 cabins, three establishments, five-bed automed sickbay, minifac fabricator; 640 tons cargo).*
Rear Hull	***System***
[1]	Diamondoid Armor (Hardened; dDR 100).
[2-5]	Fuel Tanks (1,500 tons nuclear pellets providing 12 mps delta-V each).
[6]	Fusion Pulse Drive (0.05G acceleration).*

* Three workspaces per system.

† One workspace each for control room and multipurpose array.

It has dynamic chameleon skin and exposed radiators. Crew consists of four bridge crew (commander, pilot, navigator, and weapons officer). Others include 17 technicians and 100 battlesuited troopers or other military personnel.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (LOW-PERFORMANCE SPACECRAFT)												
10	*Grizzly*-class	200	-5/4	13	0.05G/96 mps	30,000	1,662	+11	220ASV	300/200/100	0	$4,699.75M

Gang Lung-Class SCV (TL10)

***ITW*, pp. 106-107**

The enormous *Gang Lung* ("steel dragon") is China's most modern space control vehicle. It entered service with the PLAN deep-space fleet in 2090. It uses a 30,000-ton (SM +11) hull 450 feet long.

Front Hull	*System*
[1-3]	Advanced Metallic Laminate (total dDR 150).
[4]	Smaller Systems (three at SM +10): one Tactical Array (comm/sensor 11); one External Clamp; one Hangar Bay (300 tons capacity).*
[5]	Hangar Bay (1,000 tons capacity).†
[6]	Habitat (Eight cabins and 20 bunkrooms with total life support; two 10-bed sickbay clinics; establishment; ops center; two fabricator minifacs; 550 tons cargo).†
[core]	Control Room (C10 computer, comm/sensor 10, eight control stations).†
Central Hull	***System***
[1-2]	Advanced Metallic Laminate (total dDR 100).
[3]	External Clamp.
[4!]	Tertiary Battery (four turrets with 30 MJ rapid fire ultraviolet lasers, 10 turrets with 3 MJ very rapid fire ultraviolet lasers; 800 tons cargo).†
[5-6]	Fuel Tank (1,500 tons fuel pellets providing 12 mps delta-V each).
[core]	Fusion Reactor (two Power Points).†
Rear Hull	***System***
[1]	Advanced Metallic Laminate (dDR 50).
[2-5]	Fuel Tank (1,500 tons fuel pellets providing 12 mps delta-V each).
[6]	Fusion Pulse Drive (0.05G acceleration).†

* One workspace each for tactical array and hangar bay.

† Three workspaces per system.

The largest SCV currently in service.

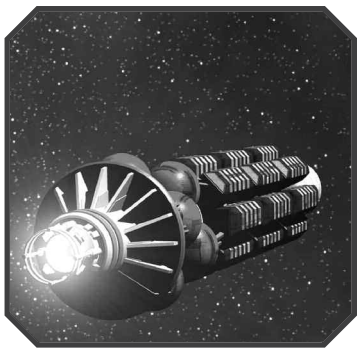
It has two medium telescoping robot arms and exposed radiators. Crew consists of six bridge crew (commander, pilot, navigator, two weapons officers, and a mission specialist); the other two control stations are used by personnel as the mission dictates. In addition, operations need 20 technicians, and it accommodates 70 officers and troops. It carries dozens to thousands of military cybershells in its cargo.

TL	Spacecraft	dST/HP	Hnd/SR	HT	Move	LWt.	Load	SM	Occ	dDR	Range	Cost
PILOTING/TL10 (LOW-PERFORMANCE SPACECRAFT)												
10	*Gang Lung*-class	200	-4/5	13	0.05G/72 mps	30,000	2,659.6	+11	96ASV	150/100/50	0	$1,288.95M

Shengzi-Class SCV (TL9)

***DB*, pp. 139-140**

China's *Shengzi* ("victory") class is an elderly space control vehicle that entered service in the 2060s. Three remain with the PLAN-SF and one was sold to the South African Aerospace Force. It delivers a platoon of troops or armed police to a remote trouble spot, lands them via carried TAVs, and supports them with onboard weaponry and AKVs. The vehicle is a cylindrical, 250-foot-long unstreamlined hull massing 30,000 tons (SM +11), equipped with spin-gravity capsules.



Front Hull	System
[1-3]	Steel Armor (total dDR 45).
[4!]	Major Battery (one fixed mount 10GJ particle beam).*
[5]	Hangar Bay (1,000 tons capacity).*
[6]	Habitat (40 cabins, five bunkrooms, two briefing rooms, minifac; 760 tons cargo).*
Front Hull	**System**
[core]	Control Room (C9 computer, comm/sensor 9, eight control stations).*
Central Hull	**System**
[1]	Steel Armor (dDR 15).
[2]	Tactical Array (comm/sensor 11).*
[3!]	Tertiary Battery (two turrets with 30 MJ rapid fire lasers, four turrets with 3 MJ very rapid fire lasers, two fixed mount 16cm electromagnetic guns; 1,100 tons cargo).*
[4]	External Clamp.
[5-6]	Fuel Tank (1,500 tons water providing 4.8 mps delta-V each).
[core]	Fusion Reactor (two Power Points).*
Rear Hull	**System**
[1-5]	Fuel Tank (1,500 tons water providing 4.8 mps delta-V each).
[6]	Fusion Rocket (0.015G acceleration using water reaction mass).*

* Three workspaces per system.

It has a small telescoping robot arm, spin gravity (0.3G), and exposed radiators. Crew consists of six bridge crew (commander, pilot, navigator, two weapons officers, and a mission specialist); the other two control stations are used by personnel as the mission dictates. In addition, operations need 24 technicians, and it accommodates 20 on-board troops.

TL	Spacecraft	dST/HP	Hnd/SR	HT	Move	LWt.	Load	SM	Occ	dDR	Range	Cost
PILOTING/TL9 (LOW-PERFORMANCE SPACECRAFT)												
9	*Shengzi*-class	200	-4/5	13	0.015G/33.6 mps	30,000	2,870	+11	100ASV	45/15/0	0	$1,283.25M

Space Defense Platforms

An SDP is an orbital battle station. These heavily armored vessels range from small warsats to asteroid-sized monitors. They bristle with weapons, but have little or no mobility. Many are satellites operated solely by artificial intelligence.

Avskèrmar SDP (TL10)

***SSS*, p. 31**

Created by Hvide Stjerne A/S of Denmark, the *Avskèrmar* ("shield") is the standard European Union space defense platform since the design entered service in 2070. It is used mainly in Earth, Luna, and Mercury orbits due to its reliance on solar power. Its unstreamlined hull masses 300 tons (SM +7) and is a 25-foot-diameter sphere.

Front Hull	System
[1-5]	Metallic Laminate Armor (total dDR 35).
[6]	Solar Panel Array (one Power Point).
Central Hull	**System**
[1-5]	Metallic Laminate Armor (total dDR 35).
[6!]	Major Battery (one turret with 100 MJ ultraviolet laser).
[core]	Control Room (C8 computer, comm/sensor 6, and no control stations).

Rear Hull	*System*
[1-5]	Metallic Laminate Armor (total dDR 35).
[6]	Smaller Systems (three at SM +6): one Chemical Rocket (1G acceleration); two Fuel Tanks (5 tons rocket fuel providing 0.05 mps delta-V each).
[core]	Fuel Cell (one Power Point).

It has a dynamic chameleon skin. It is crewed by an AI.

The platform remains in low-power mode . . . until alerted or attacked.

– Spacecraft of the Solar System

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL9 (HIGH-PERFORMANCE SPACECRAFT)												
9	*Avskèrmar*	50	-1/5	12	1G/0.1 mps	300	0	+7	0	35	0	$9.06M

Barricade-Class SDP (TL9)

***DB*, p. 139**

Built by Tenzan Heavy Industries, this is a small SDP equipped with a chemical-rocket maneuvering system. Cheap enough to be almost disposable, *Barricade* satellites provide point defense for many corporate and national stations around the solar system. Its hull is an unstreamlined cylinder 50 feet long massing 30 tons (SM +5).

Front Hull	*System*
[1-5]	Metallic Laminate Armor (Hardened; total dDR 15).
[6!]	Spinal Battery (one 30MJ laser).

Front Hull	*System*
[core]	Control Room (C6 computer, comm/sensor 3, no control stations).
Central Hull	*System*
[1-3]	Metallic Laminate Armor (Hardened; total dDR 9).
[4-6]	Fission Reactors (total three Power Points).
[core!]	Spinal Battery.
Rear Hull	*System*
[1-2]	Metallic Laminate Armor (Hardened; total dDR 6).
[3!]	Spinal Battery.
[4-5]	Fuel Tanks (1.5 tons rocket fuel providing 0.15 mps delta-v each).
[6]	Chemical Rocket (3G acceleration).

It has exposed radiators. It is crewed by an AI.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL9 (HIGH-PERFORMANCE SPACECRAFT)												
9	*Barricade*-class	20	0/4	12	3G/0.3 mps	30	0	+5	0	15/9/6	0	$1.49M

Shanzi-Class SDP (TL9)

***HF*, pp. 137-138**

The Shanghai Orbital Industries *Shanzi* ("mountain") class is one of the oldest PLAN-SF space defense platforms used by China. A dozen are deployed in Earth orbit; a few were sold off to other nations (India bought one in 2094). Its unstreamlined hull is a steel sphere 124 feet in diameter, massing 100,000 tons (SM +12). In addition to serving as orbital weapons platforms, the stations are bases to maintain and support China's SDV fleet and hangars for TCAVs and AKVs.

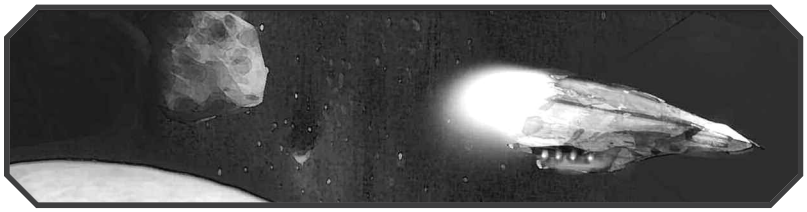
Front Hull	*System*
[1-4]	Steel Armor (total dDR 80).
[5!]	Major Battery (fixed mount 3 GJ rapid fire particle beam).*
[6]	Smaller Systems (three at SM +11): one Control Room (C9 computer, comm/sensor 9, 15 control stations); one Habitat (50 bunkrooms, 50 cabins, 35 establishments, five labs, five office, 10 minifacs, five-bed sickbay); one Cargo Hold (1,500 tons).†

Central Hull	*System*
[1-4]	Steel Armor (total dDR 80).
[5!]	Tertiary Battery (15 turrets with 100 MJ rapid fire lasers; 2,250 tons cargo).*
[6, core]	Fuel Tanks (5,000 tons each, for refueling other vessels).
Rear Hull	*System*
[1-4]	Steel Armor (total dDR 80).
[5]	Hangar Bay (3,000 tons).*
[6]	Smaller Systems (three at SM +11): one Fusion Rocket (0.005G using water reaction mass); one Fuel Tank (1,500 tons water, 1.3 mps delta-V); one Tactical Array (comm/sensor 11).‡
[core]	Fusion Reactor (two Power Points).*

* 10 workspaces per system.

† 3 workspaces each for control room and habitat.

‡ 3 workspaces each for fusion rocket and tactical array.



It has exposed radiators. Crew consists of a commander, pilot, communications officer, sensor operator, 16 weapons officers, and 52 technicians, plus two dozen techs for servicing other vessels. It carries extra crew, lab technicians, and civilian contractors, plus a squad- to company-sized force of Space Infantry Division troops.

TL	Spacecraft	dST/HP	Hnd/SR	HT	Move	LWt.	Load	SM	Occ	dDR	Range	Cost
PILOTING/TL9 (LOW-PERFORMANCE SPACECRAFT)												
9	*Shanzi*-class	300	-6/4	13	0.005G/1.3 mps	100,000	6,780	+12	300ASV	80	0	$2.92B

Space Dominance Vehicles

The premier space battleship of 2100, the SDV is a heavily armored vessel propelled by a fusion or antimatter pulse drive. It is armed with a particle accelerator, laser turrets, and hangars or external clamps carrying several AKVs. An SDV usually has a squad of troops or cybershells for boarding operations or performing police actions at small stations.

DFS-3C *Archangel*-Class SDV (TL10)

***DB*, p. 143**

The Columbia Aerospace *Archangel* is the fastest SDV in the USAF and, with its antimatter pulse drive, one of the most advanced in service anywhere in the solar system. An upgrade of the earlier *Angel,* its hull is a 375-foot-long unstreamlined cylinder (SM +11) dotted with AKV bays and laser towers.

The DFS-3 *Angel* is almost identical, except it does not have antimatter-augmented drives. Thus each tank only provides 14 mps of delta-V. Move is 0.1G/126 mps.

The competition's design, the Nanodynamics YDSF-2, was similar to the current *Archangel*. Front Medium Battery becomes one fixed mount 300 MJ rapid fire particle beams, one fixed mount 24cm electromagnetic gun, and 500 tons cargo. The central hull's Tertiary Battery becomes 14 turrets with 300 MJ ultraviolet lasers, 10 turrets with 30 MJ rapid fire ultraviolet lasers, 300 tons cargo. Load 2,123.6; Cost $2,757.85M.

Front Hull	System
[1-2]	Nanocomposite Armor (Hardened; total dDR 140).
[3!]	Medium Battery (two fixed mount 300 MJ rapid fire particle beams, one fixed mount 24cm electromagnetic gun).
[4]	Smaller Systems (three at SM +10): two Hangar Bays (total 600 tons capacity); one Multipurpose Array (comm/sensor 11).
[5-6]	Fuel Tanks (1,500 tons antimatter-augmented nuclear pellets providing 16.8 mps delta-V each).
[core]	Smaller Systems (three at SM +10): one Control Room (C10 computer, comm/sensor 9, five control stations); one Habitat (eight cabins, five bunkrooms, one-bed sickbay with automed, two minifacs; 220 tons cargo); one Cargo Hold (500 tons).
Central Hull	**System**
[1]	Nanocomposite Armor (Hardened; dDR 70).
[2!]	Tertiary Battery (10 turrets with 300 MJ ultraviolet lasers, six turrets with 30 MJ rapid fire ultraviolet lasers, 700 tons cargo).
[3-6]	Fuel Tanks (1,500 tons antimatter-augmented nuclear pellets providing 16.8 mps delta-V each).
[core]	Fusion Reactor (two Power Points).
Rear Hull	**System**
[1]	Nanocomposite Armor (Hardened; dDR 70).
[2-4]	Fuel Tanks (1,500 tons antimatter-augmented nuclear pellets providing 16.8 mps delta-V each).
[5-6]	Fusion Pulse Drives (0.05G acceleration each).

It has total automation, dynamic chameleon skin, and exposed radiators. Crew consists of five bridge crew (commander, pilot, navigator, and two weapons officers). Although no technicians are necessary, it carries several cybershells for damage control, plus a ship's doctor and at least one mission specialist. The *Archangel* comfortably transports 20 infantry with their associated equipment.

TL	Spacecraft	dST/HP	Hnd/SR	HT	Move	LWt.	Load	SM	Occ	dDR	Range	Cost
PILOTING/TL10 (HIGH-PERFORMANCE SPACECRAFT)												
10	*Archangel*-class*	200	-4/4	13	0.1G/151.2 mps	30,000	2,023.6	+11	36ASV	140/70/70	0	$2,767.85M

* See description (above) for stats of variations.

LSDV-5 *Hermann Oberth*-Class SDV (TL10)

***SSS*, pp. 27-28**

This is the European Union's standard SDV class. It uses an unstreamlined hull massing 3,000 tons (SM +9) measuring 160 feet long. Built by System Technologies AG and MedAir SpA, the LSDV-5 entered service in 2096 with the German, Italian, French, and Spanish space forces. It is optimized for operation in the inner system, prioritizing acceleration over high delta-V.

LSDV-5s can carry four *Predator* AKVs (p. 12) on external clamps. This drops acceleration from 0.2G to 0.176G.

Japanese and Indian space forces have purchased an export variant, the LSDV-6. It reduces operational expenses by using conventional nuclear pellets rather than antimatter-augmented: Move is 0.2G/36 mps.

Front Hull	*System*
[1-4]	Advanced Metallic Laminate Armor (Hardened; total dDR 80).
[5!]	Smaller Systems (three at SM +8): one Major Battery (fixed mount 16cm electromagnetic gun) [!]; one Multipurpose Array (comm/sensor 9); one External Clamp.
[6]	Habitat (two cabins, two bunkrooms, minifac, one-bed sickbay with automed; 70 tons cargo).
[core]	Control Room (C9 computer, comm/sensor 8, six control stations).
Central Hull	*System*
[1]	Advanced Metallic Laminate Armor (dDR 20).
[2!]	Secondary Battery (four turrets with 100 MJ ultraviolet lasers, four turrets with 10 MJ rapid fire ultraviolet lasers; 30 tons cargo).
[3-5]	Fuel Tanks (150 tons antimatter-augmented pulse units providing 7.2 mps delta-V each).
[6]	Smaller Systems (three at SM +8): three External Clamps.
Rear Hull	*System*
[1]	Advanced Metallic Laminate Armor (dDR 20).
[2-4]	Fuel Tanks (150 tons antimatter-augmented pulse units providing 7.2 mps delta-V each).
[5-6]	Fusion Pulse Drives (high-thrust, 0.1G acceleration each).
[core]	Fusion Reactor (two Power Points).

It has dynamic chameleon skin and exposed radiators. Crew consists of five bridge crew (commander, pilot, navigator, and two weapons officers). Crew quarters are extremely cramped.

The LSDV-5's HT antimatter pulse drive gives it exceptional acceleration . . .
– Spacecraft of the Solar System

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (HIGH-PERFORMANCE SPACECRAFT)												
10	*Hermann Oberth*-class*	100	-2/5	12	0.2G/43.2 mps	3,000	101.2	+9	12ASV 80/20/20	0		$207.5M

* See description (above) for stats of variations.

Königsberg-Class SDV (TL10)

***SSS*, pp. 28-29**

This System Technologies spacecraft was built for the German and French space forces. The class entered service in 2081. Intended for operations in the busy region of Earth-Lunar space, it has all-around armor and multiple laser turrets instead of the particle accelerator and heavy frontal armor that characterize later deep-space warfare designs. It uses an unstreamlined 10,000-ton (SM +10) spherical hull 95 feet in diameter.

The newer French *Cyrano de Bergerac* variant uses standard (rather than high-thrust) fusion pulse drives for greater cruising range (14.4 mps per tank) at the cost of less acceleration. Move is 0.1G/115.2 mps.

Front Hull	*System*
[1-2]	Nanocomposite Armor (Hardened; total dDR 100).
[3]	Smaller Systems (three at SM +9): two Hangar Bays (total 200 tons); one Tactical Array (comm/sensor 10).
[4-6]	Fuel Tanks (500 tons antimatter-augmented nuclear pellets providing 7.2 mps delta-V each).
[core]	Smaller Systems (three at SM +9): one Control Room (C9 computer, comm/sensor 8, six control stations); one Habitat (eight cabins, one bunkroom, minifac, one-bed sickbay with automed; 45 tons cargo); one Cargo Hold (150 tons).
Central Hull	*System*
[1-2]	Nanocomposite Armor (Hardened; total dDR 100).
[3!]	Tertiary Battery (eight turrets with 100 MJ ultraviolet lasers, 12 turrets with 10 MJ rapid fire ultraviolet lasers; 150 tons cargo).*
[4-6]	Fuel Tanks (500 tons antimatter-augmented nuclear pellets providing 7.2 mps delta-V each).
Rear Hull	*System*
[1-2]	Nanocomposite Armor (Hardened; total dDR 100).

Rear Hull	*System*
[3-4]	Fuel Tanks (500 tons antimatter-augmented nuclear pellets providing 7.2 mps delta-V each).
[5-6]	Fusion Pulse Drives (high-thrust, 0.1G acceleration each).*
[core]	Fusion Reactor (two Power Points).*

* One workspace per system.

An example of sphere warcraft design.

It has dynamic chameleon skin and exposed radiators. Crew consists of five bridge crew (commander, pilot, navigator, and two weapons officers). Four technicians are required for maintenance.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (HIGH-PERFORMANCE SPACECRAFT)												
10	*Königsberg*-class*	150	-4/4	13	0.2G/57.6 mps	10,000	547	+10	20ASV	100	0	$1.0112B

* See description (p. 30) for stats of variations.

Riguang-Class SDV (TL10)

***SSS*, pp. 34-35**

The standard new-generation Chinese warship, the *Riguang* ("sun spear") class was designed by MAST in 2096 and produced by Hsaio Ch'u at the Phobos spaceyards. This is the most advanced such craft for PLAN-SF and the first to use an antimatter pulse drive. Ten vessels are scheduled for production between 2101 and 2108. It has an unstreamlined hull massing 10,000 tons (SM +10) and is 200 feet long.

Front Hull	*System*
[1-3]	Nanocomposite Armor (Hardened; total dDR 150).
[4!]	Major Battery (fixed mount rapid fire 300 MJ particle beam).*
[5!]	Secondary Battery (fixed mount 16cm electromagnetic gun, three fixed mount 300 MJ ultraviolet lasers; 300 tons cargo).*
[6]	Smaller Systems (three at SM +9): one Control Room (C9 computer, comm/sensor 8, and six control stations); one Tactical Array (comm/sensor 10); one Habitat (six cabins, one-bed sickbay with automed, minifac; 60 tons cargo).
Central Hull	*System*
[1-2]	Nanocomposite Armor (Hardened; total dDR 100).
[3!]	Tertiary Battery (six turrets with 100 MJ ultraviolet lasers, eight turrets with 10 MJ rapid fire ultraviolet lasers; 240 tons cargo).*
[4]	Hangar Bay (300 tons capacity).*
[5-6]	Fuel Tanks (500 tons antimatter-augmented nuclear pellets providing 14.4 mps delta-V each).
[core]	Fusion Reactor (two Power Points).*
Rear Hull	*System*
[1]	Nanocomposite Armor (Hardened; dDR 50).
[2-5]	Fuel Tanks (500 tons antimatter-augmented nuclear pellets providing 14.4 mps delta-V each).
[6]	Fusion Pulse Drive (0.05G acceleration).*
[core]	Fuel Tank (500 tons antimatter-augmented nuclear pellets providing 14.4 mps delta-V).

* One workspace per system.

It has dynamic chameleon skin and exposed radiators. Crew consists of five bridge crew (commander, pilot, navigator, and two weapons officers). Additional crew includes six technicians.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (LOW-PERFORMANCE SPACECRAFT)												
10	*Riguang*-class	150	-5/4	13	0.05G/100.8 mps	10,000	901.2	+10	12ASV	150/100/50	0	$980.6M

*The **Salahudin Samboja**-class is purely a warship, designed with the maximum feasible amount of armor and firepower in a vessel of its size.*

– Spacecraft of the Solar System

Salahudin Samboja-Class Unmanned SDV (TL10)

***SSS*, pp. 44-45**

This is a revolutionary, fully automated space dominance vehicle. It is manufactured as of 2100 for the Transpacific Socialist Alliance with the help of the Red Duncanites. Its unstreamlined hull masses 10,000 tons (SM +10) and is 220 feet long.

Front Hull	*System*
[1-4]	Advanced Metallic Laminate Armor (Hardened; total dDR 120).
[5!]	Major Battery (fixed mount 3 GJ particle beam).
[6!]	Tertiary Battery (two fixed mount 14cm electromagnetic guns, four fixed 100 MJ ultraviolet lasers, 10 turrets with 100 MJ ultraviolet lasers, four turrets with 10 MJ rapid fire ultraviolet lasers, three turrets with 1 MJ very rapid fire ultraviolet lasers; 105 tons cargo).
[core]	Control Room (C10 computer, comm/sensor 9, and no control stations).

Central Hull	*System*
[1-2]	Advanced Metallic Laminate Armor (Hardened; total dDR 60).
[3-6]	Hangar Bays (total 1,200 tons capacity).
[core]	Fusion Reactor (two Power Points).
Rear Hull	*System*
[1]	Advanced Metallic Laminate Armor (Hardened; dDR 30).
[2-5]	Fuel Tanks (500 tons nuclear pellets providing 10 mps delta-V each).
[6]	Fusion Pulse Drive (0.05G acceleration).

It has total automation, dynamic chameleon skin, and exposed radiators. The vessel is unmanned.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (LOW-PERFORMANCE SPACECRAFT)												
10	*Salahudin* *Samboja*-class	150	-4/5	13	0.05G/40 mps	10,000	1,305	+10	0	120/60/30	0	$673.5M

SDV-90 (*Resolution*- and *Gram*-Classes) (TL10)

***TS*, pp. 192-193**

These spacecraft were developed by an Anglo-German team led by Vosper-Babbage and System Technologies AG. The resulting designs entered service in 2091, and 17 serve with the Bundesraumwaffe (*Gram*-class) and Royal Navy Space Service (*Resolution*-class). They have unstreamlined hulls massing 10,000 tons (SM +10) 300 feet long.

Front Hull	*System*
[1-3]	Advanced Metallic Laminate Armor (Hardened; total dDR 90).
[4-5]	Hangar Bays (total 600 tons capacity).
[6!]	Major Battery (one fixed mount rapid fire 300 MJ particle beam).
[core]	Control Room (C10 computer, comm/sensor 9, three control stations).
Central Hull	*System*
[1-2]	Advanced Metallic Laminate Armor (Hardened; total dDR 60).
[3]	External Clamp.

Central Hull	*System*
[4!]	Tertiary Battery (12 turrets with 100 MJ ultraviolet lasers, 10 turrets with 10 MJ rapid fire ultraviolet lasers, three turrets with 14cm electromagnetic guns; 75 tons cargo).
[5-6]	Fuel Tanks (500 tons nuclear pellets providing 10 mps delta-V each).
[core]	Habitat (six cabins, three bunkrooms, one office, one-bed sickbay with automed, minifac; 240 tons cargo).
Rear Hull	*System*
[1]	Advanced Metallic Laminate Armor (Hardened; dDR 30).
[2]	Fusion Reactor (two Power Points).
[3-4]	Fuel Tanks (500 tons nuclear pellets providing 10 mps delta-V each).
[5-6]	Fusion Pulse Drives (0.05G acceleration each).

It has total automation, dynamic chameleon skin, and exposed radiators. Crew consists of two bridge crew (a commander/pilot and navigator), five technicians, a cargo master, and a ship's doctor.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (HIGH-PERFORMANCE SPACECRAFT)												
10	*Resolution*-class	150	-3/5	13	0.1G/40 mps	10,000	917.4	+10	24ASV	90/60/30	0	$747.25M

Xingzhai-Class SDV (TL10)

***SSS*, pp. 35-36**

This Chinese spacecraft revolutionized space dominance vehicle design after the Pacific War. The *Xingzhai* ("star") class was introduced to the PLAN-SF in 2073 and pioneered several new concepts, including abandoning the use of spin capsules in favor of microgravity-adapted crews, and an emphasis on frontal armor and powerful particle beam weapons. It has an unstreamlined hull massing 30,000 tons (SM +11) 500 feet long.

Front Hull	*System*
[1-3]	Metallic Laminate Armor (total dDR 90).
[4!]	Major Battery (fixed mount 1 GJ rapid fire particle beam).*

Front Hull	*System*
[5!]	Tertiary Battery (four fixed 300 MJ ultraviolet lasers, six turrets with 300 MJ ultraviolet lasers, 10 turrets with 3 MJ very rapid fire ultraviolet lasers; 500 tons cargo).*
[6]	Smaller Systems (three at SM +10): one Control Room (C10 computer, comm/sensor 9, and five control stations); one Tactical Array (comm/sensor 11); one Habitat (four cabins, six bunkrooms, four briefing rooms, one-bed sickbay with automed, minifac; 220 tons cargo).*
Central Hull	***System***
[1]	Metallic Laminate Armor (dDR 30).
[2]	Hangar Bay (1,000 tons capacity).*
[3!]	Secondary Battery (eight turrets with 10 MJ very rapid fire ultraviolet lasers; 300 tons cargo).*

Central Hull	*System*
[4-6]	Fuel Tanks (1,500 tons nuclear pellets providing 12 mps delta-V each).
[core]	Fusion Reactor (two Power Points).*
Rear Hull	***System***
[1]	Metallic Laminate Armor (dDR 30).
[2-5]	Fuel Tanks (1,500 tons nuclear pellets providing 12 mps delta-V each).
[6]	Fusion Pulse Drive (0.05G acceleration).*
[core]	Fuel Tank (1,500 tons nuclear pellets providing 12 mps delta-V).

* Three workspaces per system (or triplet of smaller systems).

It has dynamic chameleon skin and exposed radiators. Crew consists of five bridge crew (commander, pilot, navigator, and two weapons officers). Additional crew includes 21 technicians.

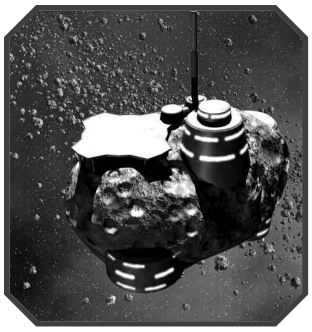
TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (LOW-PERFORMANCE SPACECRAFT)												
10	*Xingzhai*-class	200	-4/4	13	0.05G/96 mps	30,000	2023.2	+11	32ASV	90/30/30	0	$1,348.35M

STATIONS

Space stations are scattered across the solar system, from small asteroid bases to the giant commercial and industrial ports of Earth-Lunar space.

ASTEROID BASE (TL9)

***DB*, pp. 138-139**



This station represents many small microgravity beehive or shell habitats, such as Duncanite freeholds, a small corporate station, the homestead of an isolate or survivalist group, or a Martian Triad criminal base. It is an irregular, 500-foot-long chunk of stony iron massing 300,000 tons (SM +13, counts as an unstreamlined hull), partially tunneled out. On its surface are scattered solar panels, external clamps and a few laser towers. The station has plenty of room to expand, in the existing habitat section and in the unmined areas of the asteroid.

Front Hull	*System*
[1-4]	Stone Armor (total dDR 40).
[5]	Solar Panel Array (one Power Point).
[6]	External Clamp.
[core]	Control Room (C10 computer, comm/sensor 11, five control stations).*
Central Hull	***System***
[1-3]	Stone Armor (total dDR 30).
[4!]	Tertiary Battery (three turrets with 30 MJ very rapid fire laser; 13,500 tons cargo).*
[5]	Fusion Reactor (two Power Points).*
[6]	Open Space (50 areas).*
[core]	Habitat (100 luxury cabins, 20 labs, 10 minifacs, 2-bed sickbay with automeds; 8,740 tons cargo).*
Rear Hull	***System***
[1-4]	Stone Armor (total dDR 40).
[5!]	Chemical Refinery (5,000 tons/hour production).*
[6]	Hangar Bay (10,000 ton capacity).*

* Three workspaces per system.

It has high automation, three large telescoping robot arms (one internal to hangar bay), and exposed radiators. Crew consists of three bridge crew (station master, operations officer, and security officer), together with the 21 farmers, technicians, and medics needed for station services.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
SPACER/TL9												
9	Asteroid Base	500	–	12	–	300,000	32,260	+13	200ASV	40/30/40	0	$6,149.79M

Cynosure-Class Station (TL10)

***HF*, p. 137**

This microgravity space station is a multipurpose facility serving as a residence, port, lab, or industrial park. They often supply workers for other orbital facilities. The station is an unstreamlined steel cylinder 250 feet long massing 10,000 tons (SM +10). Its facilities include a medium-sized space dock, large warehouses, and enough tank space to refuel a small spacecraft. The steel armor on each hull section is layered over the stone armor.

Front Hull	*System*
[1]	Steel Armor (dDR 10).
[2]	Stone Armor (dDR 3).
[3]	Habitat (10 luxury cabins, 20 establishments).*
[4]	Habitat (30 luxury cabins).*
[5]	Habitat (10 luxury cabins, 20 establishments).*
[6]	Cargo Hold (500 tons capacity).
[core]	Habitat (10 minifacs, 20 luxury cabins; 50 tons cargo).*
Central Hull	*System*
[1]	Steel Armor (dDR 10).
[2]	Stone Armor (dDR 3).
[3]	External Clamp.
[4]	Habitat (30 luxury cabins).*
[5]	Open Space (five areas).*
[6]	Cargo Hold (500 tons capacity).
[core]	Smaller Systems (three at SM +9): one Control Room (C9 computer, comm/sensor 8, six control stations); one Fission Reactor (one small Power Point for robofac); one robofac [!].
Rear Hull	*System*
[1]	Steel Armor (dDR 10).
[2]	Stone Armor (dDR 3).
[3]	Hangar Bay (300 tons capacity).*
[4]	Fuel Tank (500 tons reaction mass to refuel other vessels).
[5-6]	Cargo Holds (total 1,000 tons capacity).

* One workspace per system.

Crew consists of six operations and administration staff and seven technicians. It houses 200 workers.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
SPACER/TL10												
10	*Cynosure*-class	150	–	13	–	10,000	2,370	+10	200ASV	13	0	$382.5M

Omnistar-Class Space Platform (TL9)

***HF*, p. 138**

This small station is a common commercial design used in Earth-Lunar space. It consists of an unstreamlined, 1,000-ton (SM +8) truss 300 feet long, fitted with solar panels, a full-sized robot arm, and multiple external clamps to which other modules or docking spacecraft attach. If a larger station is desired, two, three, or four *Omnistar*s clamp together to form a cross, triangle, or square.

Front Hull	*System*
[1]	Steel Armor (dDR 5).
[2]	Solar Panel Array (one Power Point).
[3]	Engine Room (one workspace).
[4]	Robot Arm (ST 700).
[5-6]	External Clamps.
[core]	Control Room (C8 computer, comm/sensor 6, four control stations).
Central Hull	*System*
[1]	Steel Armor (dDR 5).
[2]	Fuel Tank (50 tons reaction mass to refuel other vessels).
[3-6]	External Clamps.
[core]	Habitat (luxury cabin, bunkroom, three minifacs).
Rear Hull	*System*
[1]	Steel Armor (dDR 5).
[2]	Hangar Bay (30 tons capacity).
[3-6]	External Clamps.

Crew consists of a stationmaster, systems operator, flight engineer, and three technicians. Additional crew may be assigned to modules installed in the external clamps.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
SPACER/TL9												
9	*Omnistar*-class	70	–	13	–	1,000	30.6	+8	6ASV	5	0	$21.8M

Von Braun-Class Station (TL10)

***HF*, p. 140**

The *Von Braun*-class is typical of the largest and most modern stations in Earth or Mars orbit. These are the system's major spaceports and orbital hotel complexes, with secondary roles as factories and spaceyards. This is a classic spinning space station, shaped like a giant bicycle wheel with a central hub. The station has an unstreamlined 300,000-ton hull (SM +13) 1,000 feet across. The rotating wheel is devoted to residential and office space, along with a few acres of recreational and shopping plazas and gardens. The hub is in zero-G and contains industrial facilities, power systems, and warehouses.

Front Hull	*System*
[1]	Steel Armor (dDR 30).
[2]	Solar Panel Array (one Power Point).
[3]	Habitat (500 luxury cabins, 100 establishments, 11 minifacs, 39 briefing rooms, 175 offices, 75-bed clinic with automeds; 2,500 tons cargo).*
[4-5]	Open Spaces (total five acres gardens, shopping, and recreational plazas).*
Front Hull	*System*
[6]	Habitat (500 establishments, 5,000 tons cargo).*
[core]	Control Room (C11 computer, comm/sensor 12, 20 control stations).*
Central Hull	*System*
[1]	Steel Armor (dDR 30).
[2]	Fuel Tank (15,000 tons reaction mass to refuel other vessels).
[3]	Hangar Bay (10,000 tons).*
[4-5!]	Fabricators (total $30M/hour production).*
[6]	Fusion Reactor (de-rated; one Power Point).*
[core!]	Robofac ($30M/hour production).*
Rear Hull	*System*
[1]	Steel Armor (dDR 30).
[2]	Habitat (100 bunkrooms, 500 labs, 100 minifacs; 4,000 tons cargo).*
[3-6]	External Clamps.

* 30 workspaces per system.

The *Von Braun* has spin gravity (0.7G) and exposed radiators. Crew consists of 30 operations and 175 administrative staff, seven medics, and 330 technicians.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
SPACER/TL10												
10	*Von Braun*-class	500	–	14	–	300,000	21,640	+13	1,400ASV	30	0	$65.5325B

Vulcan-Class Station (TL9)

***HF*, p. 139**

This elderly midsize station is a microgravity factory complex and spaceyard. It has an unstreamlined, 100,000-ton (SM +12) hull 300 feet in diameter. The main spherical section is a large zero-G workspace, while attached spin-gravity sections contain living quarters for skilled workers. Many *Vulcan* stations were built as temporary housing for the construction teams assembling the large space colonies in Lagrange 4. They continue to be used as factories, though some were sold off to settlers who towed them to L5 to serve as improvised colonies.

Front Hull	*System*
[1]	Steel Armor (dDR 20).
[2]	Solar Panel Array (one Power Point).
[3]	Habitat (125 luxury cabins, 20 bunkrooms, four minifacs, two offices, 10-bed clinic with automeds, 12 establishments; 1,450 tons cargo).*
[4-6]	Hangar Bays (total 9,000 tons capacity).*
Front Hull	*System*
[core]	Control Room (C10 computer, comm/sensor 10, 20 control stations).*
Central Hull	*System*
[1]	Steel Armor (dDR 20).
[2]	Fuel Tank (5,000 tons reaction mass to refuel other vessels).
[3-6]	Hangar Bays (total 12,000 tons capacity).*
[core!]	Fabricator ($5M/hour production).*
Rear Hull	*System*
[1]	Steel Armor (dDR 20).
[2]	Solar Panel Array (one Power Point).
[3]	Habitat (125 luxury cabins, 20 bunkrooms, four minifacs, two offices, 10-bed clinic with automeds, 12 establishments, 1,450 tons cargo).*
[4-6]	Hangar Bays (total 9,000 tons capacity).*

* 10 workspaces per system.

It has spin gravity (0.5G). Crew consists of 24 operations and administrative staff, and two medics. It runs 24 hours a day with three shifts of 140 technicians each (total 420 technicians).

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
SPACER/TL9												
9	*Vulcan*-class	300	–	14	–	100,000	32,966	+12	660ASV	20	0	$6.606B

Unusual Vessels

These are examples of highly specialized, one-of-a-kind, or experimental spacecraft.

Ernst Opik-Class (TL10)

***Oort Cloud Expeditions, DB*, p. 78**

This is one of the newest – and fastest – manned spacecraft in the solar system. It was custom-built at Hawking Station in partnership with the European Space Agency for their upcoming Oort Cloud expedition to 2098 D2, an icy body 1,100 AU distant from the sun believed to contain a primordial black hole. The vessel has a 3,000-ton (SM +9) unstreamlined hull 200 feet long. The *Ernst Opik* is a stripped-down deep space vessel almost entirely devoted to reaction mass, except for the necessary scientific payload and crew. The mission profile involves a year of acceleration, 12 years of cruising, and another year of deceleration.

> *The situation is complicated because the body in question is small enough that the Revised Outer Space Treaty actually allows it to be claimed.*
>
> **– *Deep Beyond***

Front Hull	*System*
[1]	Smaller Systems (three at SM +8): one Control Room (C9 computer; comm/sensor 7, four control stations); one Hangar Bay (30 tons capacity); one Habitat (bunkroom with total life support, four hibernation chambers, robofac minifac, Physics lab).
[2-6]	Fuel Tanks (150 tons hydrogen providing 30 mps delta-V each).
Central Hull	***System***
[1-6, core]	Fuel Tanks (150 tons hydrogen providing 30 mps delta-V each).
Rear Hull	***System***
[1]	Smaller Systems (three at SM +8): one Fusion Rocket Engine* (0.0017G acceleration); one Mining (5 tons/hour production) [!]; one Fusion Reactor (de-rated; one small Power Point for Mining).
[2-6, core]	Fuel Tanks (150 tons hydrogen providing 30 mps delta-V each).

* Fusion rocket has TL9 performance.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (LOW-PERFORMANCE SPACECRAFT)												
10	*Ernst Opik*-class	100	-5/4	12	0.0017G/540 mps	3,000	30.4	+9	4ASV	0	0	$52.1M

Nadezhda Bioship (TL10)

***SSS*, pp. 21-23**

This is an experimental bioroid spacecraft assembled by Macrotech and Manticore Genetics. Named *Nadezhda* (Russian for "hope") by her designers, the vessel is a cyborg combining organic living components and electromechanical implants. Its fat, whale-shaped unstreamlined hull masses 3,000 tons (SM +9) and is 75 feet long. The habitat's cargo hold stores a 7,500 man-day supply of nutrients.

Front Hull	*System*
[1]	Organic Armor (dDR 10).
[2]	Control Room (C9 computer, comm/sensor 8, and three control stations).
[3]	Habitat (four cabins with total life support, four labs, one-bed sickbay with automed; 15 tons cargo).
Front Hull	***System***
[4-6]	Cargo Holds (150 tons rock dust providing 0.42 mps delta-V each).
Central Hull	***System***
[1]	Organic Armor (dDR 10).
[2-6]	Cargo Holds (150 tons rock dust providing 0.42 mps delta-V each).
[core]	Fusion Reactor (de-rated; one Power Point).
Rear Hull	***System***
[1]	Organic Armor (dDR 10).
[2-5]	Cargo Holds (150 tons rock dust providing 0.42 mps delta-V each).
[6!]	Mass Driver (0.01G acceleration).
[core]	Engine Room (no workspaces).

It has a dynamic chameleon skin, stealth hull, total automation, and biomechanical self-healing, and it requires nutrients (100 man-days per day of operation). Crew consists of three control room crew and five laboratory researchers.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (LOW-PERFORMANCE SPACECRAFT)												
10	*Nadezhda*	100	-3/5	13	0.01G/5.04 mps	3,000	1,815.8	+9	8ASV	10	0	$120.45M

SEM-23B *Peregrine* Remote Survey Vehicle (TL10)

***SSS*, p. 42**

Vosper-Babbage's *Peregrine* is a very fast unmanned space probe, designed to extend the range of a larger vessel's sensor network and perform long-range interplanetary survey operations. It is used by U.S., French, and South African military and civilian space agencies, and several corporations. Its unstreamlined hull masses 100 tons (SM +6), and it is 60 feet long.

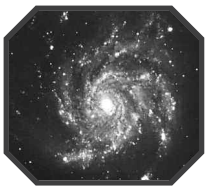
Front Hull	*System*
[1-3]	Metallic Laminate Armor (total dDR 15).
[4-6]	Larger System (one at SM +7): Multipurpose Array (comm/sensor 8).
[core]	Control Room (C8 computer, comm/sensor 5, no control stations).
Central Hull	***System***
[1]	Metallic Laminate Armor (dDR 5).
[2-6, core]	Fuel Tanks (five tons nuclear pellets providing 14 mps delta-V each).
Rear Hull	***System***
[1]	Metallic Laminate Armor (dDR 5).
[2-4]	Fuel Tanks (five tons nuclear pellets providing 14 mps delta-V each).
[5-6]	Fusion Pulse Drives (0.05G acceleration each).

It has a dynamic chameleon skin and exposed radiators. It is crewed by an AI.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (HIGH-PERFORMANCE SPACECRAFT)												
10	*Peregrine*	30	-1/4	12	0.1G/126 mps	100	0	+6	0	15/5/5	0	$9.22M

Solaris (TL9)

***DB*, p. 78**



The *Solaris* is the first fusion-driven interplanetary spacecraft ever built. Constructed by Vosper-Babbage, it is an unmanned vessel that made an ultra-long-range journey to establish a telescope 550 AU from the center of the solar system. At this distance, it is far enough away from the sun that it can take advantage of the way the sun's gravity bends and refocuses the light of distant stars (a phenomenon known as gravitational lensing), vastly enhancing its resolution. It was built with a 10,000-ton (SM +10) unstreamlined hull 300 feet long, and designed to transform itself into an observatory on reaching its destination. The plentiful onboard self-repair and manufacturing capabilities keep it running and allow it to rebuild itself as sensor technology improves.

Solaris is one of the solar system's most important astronomical observatories. In the decades since it reached its destination, it has upgraded its comm/sensor and control room systems to TL10. It has exhausted most of its hydrogen reaction mass, and has only a dozen or so mps of delta-V left, a reserve retained as a contingency for emergency maneuvers. However, its fusion reactor has sufficient onboard fuel to power the *Solaris* for a further 44 years of operation.

Front Hull	*Systems*
[1-3]	Larger System (one at SM +11): Science Array (comm/sensor 12).
[4-6]	Fuel Tanks (500 tons hydrogen providing 19.2 mps delta-V each).
[core]	Control Room (C10 computer, comm/sensor 9, no control stations).
Central Hull	***Systems***
[1-5]	Fuel Tanks (500 tons hydrogen providing 19.2 mps delta-V each).
[6]	Fusion Reactor (de-rated; one Power Point giving 100 years endurance).
[core!]	Fabricator ($0.5M/hour production).
Rear Hull	***Systems***
[1]	Fusion Rocket Engine (0.005G acceleration).
[2-6]	Fuel Tanks (500 tons hydrogen providing 19.2 mps delta-V each).

The spacecraft has total automation and exposed radiators. It is crewed by AIs and mind emulations (ghosts), with several cybershells aboard.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL9 (LOW-PERFORMANCE SPACECRAFT)												
9	*Solaris*	150	-5/5	13	0.005G/249.6 mps	10,000	0	+10	0	0	0	$1,043.5M

X-92 AKV (TL10)

***DB*, pp. 135 and 153**

The X-92 is an AKV prototype similar to the SIM-7 *Predator* (p. 12), but its nuclear pulse drive is replaced by a rocket engine using stabilized metallic hydrogen propellant.

This significantly improves acceleration (at the expense of reduced delta-V) and allows it to dispense with vulnerable radiator wings. The X-92 was developed by Columbia Aerospace for the USAF. Its cylindrical hull masses 100 tons (SM +6) and it is 60 feet long.

Front Hull	*System*
[1-5]	Nanocomposite Armor (Hardened; total dDR 50).
[6!]	Major Battery (one fixed mount 12cm electromagnetic gun).
[core]	Control Room (C8 computer, comm/sensor 5, no control stations).
Central Hull	*System*
[1-2]	Nanocomposite Armor (Hardened; total dDR 20).
[3]	Fuel Cell (one Power Point).
Central Hull	*System*
[4-6]	Fuel Tanks (five tons HEDM fuel providing 0.5 mps delta-V each).
Rear Hull	*System*
[1-3]	Nanocomposite Armor (Hardened; total dDR 30).
[4-5]	HEDM Rocket Engines (2G acceleration each).
[6, core]	Fuel Tank (five tons HEDM fuel providing 0.5 mps delta-V each).

It has a dynamic chameleon surface. It is crewed by an AI.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (HIGH-PERFORMANCE SPACECRAFT)												
10	X-92	30	0/4	12	4G/2.5 mps	100	0	+6	0	50/20/30	0	$11.85M

The X-92's prototype engine is unreliable. For every 0.1 mps of delta-V used up, roll 3d. On an 18, the drive suffers a catastrophic malfunction, destroying the spacecraft.

Utility Space Vehicles

The USV is a multipurpose space freighter used to carry people, haul cargo, or perform prospecting and mining operations. Some are general-purpose craft for corporations; others are owned by companies specializing in high-value freight and passenger charters to out-of-the-way ports too small for service from regular HSTV or PSV routes.

Do not use metal tools to work on an active magnetic levitation system!

*– **High Frontier***

Golub-Class USV (TL9)

***SSS*, pp. 11-12**

AVPK Moiseyev's *Golub* (Russian for "dove") is one of the few serving vessels to use mass-driver propulsion. Built for near-Earth asteroid mining in the 2050s, several "vintage" examples serve as inexpensive USVs in trans-lunar space (especially in the Junk Jungle of L5); among the near-Earth asteroids; and in the Main Belt. Its unstreamlined cylindrical hull is 250 feet long (SM +10).

Installing a mining system makes it a mobile processing facility, replacing one cargo hold. Make delta-V 6.24 mps, Load 6,630.8, and Cost $94.85M. This requires one additional technician.

Front Hull	*System*
[1]	Light Alloy Armor (dDR 15).
[2!]	Smaller Systems (three at SM +9): one Control Room (C8 computer, comm/sensor 7, three control stations); one Medium Battery (two turrets with 3 MJ very rapid fire lasers; 50 tons cargo) [!]; one Habitat (four cabins; 80 tons cargo).
[3-6]	Cargo Hold (500 tons capacity each; 0.3 mps delta-V each if used for reaction mass).
Central Hull	*System*
[1]	External Clamp.
[2-6]	Cargo Hold (500 tons capacity each; 0.3 mps delta-V each if used for reaction mass).
Rear Hull	*System*
[1-5]	Cargo Hold (500 tons capacity each; 0.3 mps delta-V each if used for reaction mass).
[6!]	Mass Driver (0.01G acceleration).*
[core]	Fission Reactor (one Power Point).*

* One workspace per system.

Crew consists of a pilot/navigator, co-pilot/communicators officer, cargo master, and two technicians.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL9 (LOW-PERFORMANCE SPACECRAFT)												
9	*Golub*-class*	150	-5/4	13	0.01G/6.72 mps†	10,000	7,130.8	+10	8ASV	15/0/0	0	$84.85M

* See description (above) for stats of variations.

† Assumes that all cargo holds are being used for reaction mass.

The *Golub* cannot power the weapons battery and the mass driver engine at the same time.

MUDLARK-CLASS USV (TL10)

***DB*, p. 140**

An austere, no-nonsense design from Tenzan Heavy Industries, the rugged *Mudlark* was meant to provide affordable passenger and light cargo transport between Earth-Lunar space and Main Belt stations. Introduced in 2075, it has also proven popular with small companies based in the asteroid belt and beyond, such as Duncanite family corporations. Its use of a fusion engine with water reaction mass makes it easy to refuel at outer-system "gas station" asteroids. Its unstreamlined hull is a 105-foot-long cylinder (SM +7) massing 300 tons.

A popular modification for *Mudlarks* on long voyages is to replace water with hydrogen, dividing the acceleration by three but tripling the delta-V.

*The **Nestor Makhno**-class is an armed variant produced by the Red Duncanites.*

– Deep Beyond

Front Hull	*System*
[1]	Steel Armor (dDR 3).
[2]	Control Room (C8 computer, comm/sensor 6, two control stations).
[3]	Habitat (one cabin, one bunkroom).
[4]	Habitat (two cabins).
[5-6]	Cargo Holds (total 30 tons capacity).
Central Hull	***System***
[1-2]	Cargo Holds (total 30 tons capacity).
[3]	External Clamp.
[4-6, core]	Fuel Tanks (15 tons water providing 5.6 mps delta-V each).
Rear Hull	***System***
[1-5]	Fuel Tanks (15 tons water providing 5.6 mps delta-V each).
[6]	Fusion Rocket (0.015G acceleration using water reaction mass).*
[core]	Fuel Tank (15 tons water providing 5.6 mps delta-V).

* Fusion rocket has TL9 performance.

It has a small telescoping robot arm and exposed radiators. Crew consists of two bridge crew (pilot/navigator and communications/sensor operator). Other crew includes a cargo master. Technician tasks are handled by cybershells.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (LOW-PERFORMANCE SPACECRAFT)												
10	*Mudlark*-class	50	-3/5	12	0.015G/56 mps	300	61	+7	10ASV	3/0/0	0	$5.34M

SUDBURY-CLASS USV (TL10)

***TS*, p. 193**

The popular *Sudbury* has become the archetypical utility space vehicle since Vosper-Babbage introduced it in 2072, and is a common sight throughout the solar system. The vessel uses an unstreamlined hull massing 10,000 tons (SM +10) and is 250 feet long. They are named after large meteor craters on Earth.

Front Hull	*System*
[1]	Light Alloy Armor (dDR 15).
[2]	External Clamp.
[3-6]	Cargo Holds (total 2,000 tons capacity).
[core]	Control Room (C10 computer, comm/sensor 9, two control stations).*
Central Hull	***System***
[1]	Light Alloy Armor (dDR 15).
[2-3]	Cargo Holds (total 1,000 tons capacity).
Central Hull	***System***
[4]	Smaller Systems (three at SM +9): one Medium Battery (one turret with 3 MJ very rapid fire ultraviolet laser; 100 tons cargo) [!]; one Fuel Cell (one small Power Point for Medium Battery); one Hangar Bay (100 ton capacity).
[5-6]	Fuel Tanks (500 tons nuclear pellets providing 12 mps delta-V each).
[core]	Habitat (13 cabins, one-bed sickbay with automed, minifac; 225 tons cargo).*
Rear Hull	***System***
[1-5]	Fuel Tanks (500 tons nuclear pellets providing 12 mps delta-V each).
[6]	Fusion Pulse Drive (0.05G acceleration).*

* One workspace per system.

It has a medium telescoping robot arm and exposed radiators. Crew consists of two bridge crew (commander/pilot and navigator/co-pilot), three technicians, the ship's doctor, and a cargo master.

TL	*Spacecraft*	*dST/HP*	*Hnd/SR*	*HT*	*Move*	*LWt.*	*Load*	*SM*	*Occ*	*dDR*	*Range*	*Cost*
PILOTING/TL10 (LOW-PERFORMANCE SPACECRAFT)												
10	*Sudbury*-class	150	-4/5	13	0.05G/84 mps	10,000	3,427.6	+10	26ASV	15/15/0	0	$169.15M

Chapter Three
Alternate Settings

The spacecraft in this book are intended for a hard-science technology TL9-10 background. However, that doesn't have to be ***Transhuman Space!*** This chapter suggests alternative settings for these spacecraft.

Cyber Space 2100

After flags-and-footprints spectacles like the Apollo program, big government abandoned outer space, preferring to budget for social welfare and military adventures. However, space development was only beginning. In the mid-21st century private industry discovered ways to start the Third Industrial Revolution, exploiting the moon, asteroids, and gas giants, and developing new industrial processes that took advantage of the lack of regulation in space. Expanding into a vacuum left by government, innovative corporations used cybernetics and AIs to adapt and change themselves to profit in the High Frontier, and in so doing became powers unto themselves: the transolar megacorporations. Now it's 2100. These groups are more powerful than ever, dominating the solar system. Many are even puppets of their own artificial intelligences, more predatory and visionary than any human executives! The governments of Earth are their pawns, their warships used to enforce the dictates of their corporate paymasters. The transolars rule . . . but the corporate "company towns" on the moon, Mars, and the Outer Systems are struggling against corporate oppression and threaten to rise in revolt . . .

Red Star, White Star

Sometime in the next century, a new cold war erupts between major terrestrial superpowers, such as the United States and China. Each nation establishes semi-automated mining bases and outposts throughout the solar system, and builds a fleet of spacecraft to protect them. Rising tensions on Earth are reflected in the heavens as the great powers clash over control of space resources, such as near-Earth asteroids and the He-3 of Luna and the gas giants. Hawks on both sides argue a "limited war" can be successfully fought in deep space without necessarily triggering an all-out war on Earth. The victor will achieve hegemony over the solar system.

Transhuman Stars

This is the ***Transhuman Space*** setting with one added element of superscience. Research at Hawking Station into the Shezbeth primordial black hole results in the achievement of a "theory of everything" that unifies gravity and quantum mechanics. The spinoff is the development of a faster-than-light drive that opens the way to the stars.

The effect on the setting depends on the speed, nature, and cost of the device. A jump-drive system based on wormholes channels exploration and possible settlement along specific paths of jump points. Alternatively, a warp drive or hyperdrive (especially a fast one) sees a chaotic explosion of humans and posthumans into interstellar space. The latter may be more in keeping with the wide-open spirit of the setting.

Either way, long-range observatories identify habitable worlds (like the already discovered Virginia) and semi-habitable, terraformable worlds (like Mars). Unless the stardrive has an exceptional speed or range, only a few such worlds are within easy reach. Any alien life-forms in extrasolar ecosystems are eagerly sought and studied by terrestrial geneticists, and used to make new breakthroughs in biotechnology. People alter themselves or their children into strange new forms based on discoveries about alien physiology and genetics, or adapt themselves to thrive in a variety of extrasolar environments.

Major conflicts between nations and ideologies center on the settlement, study, and colonization of these desirable worlds, policed and squabbled over by the system's principal powers. These are the dynamic early years of star exploration, as humans and posthumans begin to seed the galaxy (taking the role of the Precursors in more conventional SF). Even if no advanced alien civilizations are found, rivalry between human nations and their creations presents plenty of challenges and drama. If multiple life-bearing worlds are discovered within range of whatever stardrive is available, the ideological conflicts over whether to settle, terraform, or preserve such worlds will dwarf those over Mars and Europa!

However, habitable worlds aren't the only impetus to exploration. With minifacs, cybershells, vatfacs and nanotechnology, humans and machines can live anywhere. There are several times more stars in the galaxy than there are people on Earth. For anyone who thinks about homesteading an asteroid or living in a can in the Junk Jungle, the lure of their own *solar system* (even if it's just a red dwarf with a few gas giants) is a prize beyond compare! The vastness of the galaxy may initiate a great diaspora as individual subcultures hare off into the interstellar void to claim territory for themselves.

Imperial Earth

There's no need to posit a transhumanist civilization to use this book's range of spacecraft in an interstellar campaign. In this setting, the spacefaring peoples of a TL9-10 Earth discover a low-cost faster-than-light means of travel and the existence of many habitable extrasolar planets . . . and that some are inhabited with primitive alien races.

A new era of exploration and colonization dawns, with interplanetary ships refitted for interstellar voyages. It could even recapitulate the nineteenth century colonial era, but with modern (or emerging) spacefaring powers replacing the European settlers of the past. Some nations and corporations of Earth race to claim, settle, or civilize such worlds, while others prefer to enforce a more enlightened hands-off policy, establishing protectorates to prevent their exploitation. But if ultra-tech alien races are encountered, all bets are off . . .

Two major threats are global war and a machine singularity, but the big danger on the horizon is aliens.

– *Transhuman Space*

The First Interstellar War

A TL9-10 interplanetary human civilization finds itself in the path of extraterrestrial aggression. Earth's nations ally as the UN Space Force in an interstellar war with newly encountered hostile aliens. Vessels like those described in Chapter 2 represent the civilian and military armadas of human space.

If the alien invader's only big advancement is a star drive, humanity may have a chance. The odds of survival increase if our solar system is only one front in a larger interstellar war and Earth can find alien allies, or if we're already experienced in space war (from inter-human conflicts). The playing field is further leveled if Earth is first contacted by alien traders or explorers, which gives time to prepare a defense before warships come calling.

Since planets are easy to devastate at a remove, space war is more interesting if invaders have an ideological motive requiring them to conquer and convert humanity rather than exterminate it.

Galactic Federation

Contact with powerful alien races need not lead to war. What if an interplanetary Earth has just colonized the solar system and is on the verge of venturing forth into the stars, when it encounters an existing interstellar government?

Humanity is invited to become junior members of a galactic federation, converting their old interplanetary ships into interstellar vessels. Perhaps, as the new kids on the block, we are courted by other races, becoming an important part of their politics despite our youth.

Or Earth may be the equivalent of a "developing" third-world star-nation. If the aliens are TL11 or higher, the traders, explorers, and space forces of Earth end up struggling to purchase the latest alien technology to upgrade "museum-piece ships." Merchants earn scraped-together interstellar credits on backwater shipping routes, exploration and colony vessels settle dangerous worlds no one else wanted, and our freshly united-and-integrated space military (with brand-new but "obsolete" TL10 craft) strives to prove itself by taking on the dirty jobs no one else wants to do.

Interstellar Starships

GMs may wish to use ***Transhuman Space*** ship designs from Chapter 2 for an interstellar setting that, except for an FTL drive, is hard science fiction. Several example settings are described in this chapter.

The simplest way to modify the existing spacecraft designs is to remove one or two fuel tanks or cargo holds and replace them with a stardrive and, if necessary, a power plant, adjusting cost and delta-V or cargo capacity accordingly.

The exact workings of a stardrive are up to the GM. Jump drive (using wormholes) or warp drive are a bit more plausible than a hyperdrive.

Downgrading the Computers

In an alternative interstellar or interplanetary setting that does not share the advanced computers of ***Transhuman Space***, GMs may wish to restore control system computers to the default values of ***GURPS Spaceships***. To do that, just subtract 2 from Complexity for TL9 vessels and 1 from Complexity for TL10 vessels.

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