

GURPS®

Fourth Edition

SPACESHIPS 7

DIVERGENT AND PARANORMAL TECH™



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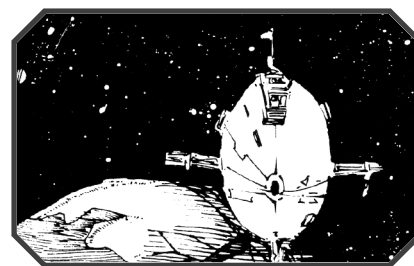
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INTRODUCTION

Space travel doesn't just mean rocket ships and warp drives. *GURPS Spaceships 7: Divergent and Paranormal Tech* expands the *GURPS Spaceships* design rules with weird-and-wonderful systems, features, and switches. The seventh book in the series introduces magic, psi-tech, steam-tech, weird science, and giant space monsters!

PUBLICATION HISTORY

Rules for some shipboard systems are adapted from the *GURPS Vehicles Expansion* volumes, some of which drew on material that originated in *GURPS Steampunk*, *GURPS Ultra-Tech*, and *GURPS Warehouse 23*. Rules for zombie vehicles first appeared in *GURPS Undead*. Certain game

About the Series

GURPS Spaceships 7: Divergent and Paranormal Tech is one of several books 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. GMs need the core book, *GURPS Spaceships*, to use this book.

mechanics for hulls and systems came from *Vorkosigan Saga Sourcebook and Roleplaying Game*.

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.

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 Spaceships*, and numerous other gaming products.

*I'll soon be
leaving for the
planet Mongo, in
a rocket-ship of
my own design.*

*– Dr. Zarkoff,
Flash
Gordon:
Rocketship*

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CHAPTER ONE

SPACECRAFT

DESIGN OPTIONS

Trailblazer was NASA's first manned interplanetary spaceship. Designed in the high-mana labs in the New Mexico desert, then teleported piece by piece into orbit and carefully assembled, she would carry 17 humans and four mutant chimera to the Red Planet and back.

Her drive was a VASIMR plasma rocket . . . but it was powered by a magical NEMA reactor. The nuclear-enhanced mana area it created not only heated the ship's reaction mass, it provided a steady stream of oz particles the ship's astromancers could draw upon to conjure up food, water, and other supplies while in deep space. That same power would also be tapped to teleport the explorers directly from Mars' orbit to the planet's surface and power a variety of exotic weapons if they ran into any trouble. After what happened to the mission to asteroid 272426 Choronzon, everyone knew space was not empty . . . nor particularly friendly.

In theory, it would do the job. But no one had ever operated a NEMA reactor of this size before in space. The launch had been scrubbed six times already. Gremlins.

This was the seventh attempt.

The commander's wife had sent him a fresh four-leaf clover that their daughter had found. NASA had paid to teleport it up. It was in his suit pocket, next to his heart.

And they were nearing the end of the launch checklist . . .

"Astrological forecast?"

"All signs are positive."

"Warding?"

"Shields up," his co-pilot purred. "Sigils drawn and checked."

"Demonic activity?"

"Negative. Looks like our exorcism worked."

"Affirmative." Filling the reaction-mass tanks with essential hydrogen had seemed like a dumb idea, but it cured their gremlin problems and boosted their delta-V.

"NEMA reactor status?" That was the big one. But if the gremlins were gone . . .

"Nominal. Oz particle count is log 2.5 and rising. All pentagrams in the core are holding." Some excitement crept into the engineer's laconic drawl. "We have very high mana in the core, commander. Feed me some mass and let's hit the road!"

"Houston, this is *Trailblazer*," the commander signaled. "We are good to go for Mars!"

This chapter describes new systems and design options that can create out-of-the-ordinary spaceships. Some use super-science or divergent technology; others are quite realistic.

SHIP DESIGN

An ordinary spacecraft design is made of 20 systems. Further customization is possible with rules for off-size systems.

SMALLER SYSTEMS

Shipbuilders often need to cram *several* components into a small space. Since each step up in hull SM roughly represents a 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 in the same amount of space.

A few systems require special treatment:

Armor or Force Screens: Use 1/3 the dDR or reflected damage dice of the full-size system (and 1/3 the lift of armor systems that provide contragravity lift). It's very inefficient to spread a smaller ship's defenses over a larger vessel!

Banned Systems: A smaller exophase field, helicopter rotor, lightspeed drive, ornithopter wings, stasis web, stardrive, or

soft-landing system can't be used with a larger ship. At least, not successfully.

Contragravity Lifters: These produce one-third the G (round to one decimal place).

Control Room or Sapient Brain: Since this also represents the spaceship's attitude thrusters, gyros, etc., a vessel with a smaller system additionally has a -1 penalty to Handling and Stability Rating. If a sapient brain is smaller, apply a further -2 to DX.

External Clamp: A smaller external clamp can only be attached to things that are at least three SM smaller than the vehicle. (A full-size clamp has no SM limits.)

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

Fuel Tanks, Sails, Drives, or Engines: Use 1/3 the delta-V reserve of a smaller fuel tank and 1/3 the acceleration of a smaller engine or sail. A scaled-down ramscoop can only provide unlimited fuel to a smaller thruster. When using the *Delta-V Increase Table* (*GURPS Spaceships*, p. 17), smaller tanks count as only one-third of a tank; round fractions down.

Power: Smaller power plants *do not* provide sufficient power for normal-size systems, but they *can* power another scaled-down system sharing the same location.

In addition, some systems can be *half-size* at half cost:

- Cargo holds (halve capacity).
- Factories (halve output).
- Fuel tanks (halve delta-V reserve, count as a half-tank for delta-V increase).
- Habitats (halve cabin-equivalents).
- Mining and refinery systems (halve output).
- Open spaces (halve areas).
- Passenger seating (halve seats).
- 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 device that isn't normally available at its size. A system that's 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 used to make up a larger system require three Power Points.)

One class of systems requires special treatment:

Defenses: Use *twice* the dDR or reflected damage dice of the original system.

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

SYSTEM DESCRIPTIONS

These are additional systems that can be built into spacecraft, as detailed in *GURPS Spaceships* (p. 9). The cost and other statistics vary according to the spacecraft's hull SM, as indicated in the tables in this section.

ARMOR, WOODEN (TL0) [HULL]

Wood is a natural composite material with a high strength-to-weight ratio. This represents ordinary wood (in contrast to

The core of our defense is the faith we have in the institutions we defend.

– Franklin D. Roosevelt

Wooden Armor Table

SM	+5	+6	+7	+8	+9	+10*	+11*	+12*	+13*	+14*	+15*
US dDR	1	1	2	2	3	4	5	6	7	10	15
SL dDR	0	1	1	1	2	3	3	4	5	7	10
Cost (\$)	2K	6K	20K	60K	200K	600K	2M	6M	20M	60M	200M

* Structural limitations mean that ordinary wood cannot be used on vessels larger than SM +9.

Repair Skill: Carpentry.

ARMOR, ETHERWOOD (TL1^)[HULL]

Etherwood is a tough wood that has innate contragravity properties. It may be hard to find. Perhaps it grows in the sky forests of Venus or Jupiter's atmosphere, or can be found only in great trees that sprout from comets in the outer solar system! Maybe it has a mystical origin, springing from seeds of the primal world-tree that supports the heavens, or is imported from the aerial forests of the sky elves in the elemental plane of air.

Wherever it came from, it has special capabilities. In addition to serving as armor, every etherwood system provides the vessel with 1/3G of lift. If the lift of etherwood exceeds the planetary gravity, the vessel flies as if it had contragravity lifters (save for the lower lift and lack of power consumption).

Etherwood dDR is treated as semi-ablative vs. burning or corrosion damage. Due to the vast size that etherwood trees can grow and the innate antigravity properties, it does not have the structural limitations of ordinary wood. Etherwood vessels can have any hull size.

Etherwood Armor Table

SM	+5	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
US dDR	1	1	2	2	3	4	5	6	7	10	15
SL dDR	0	1	1	1	2	3	3	4	5	7	10
Cost (\$)	10K	30K	100K	300K	1M	3M	10M	30M	100M	300M	1B

Repair Skill: Carpentry.

ARMOR, ADAMANT (TL2⁺) [HULL]

Many fantasy craft are made of “crystal.” Adamant represents this: a material far tougher than ordinary stone, yet

easily fabricated (magically or otherwise) into armor material. Earth enchanted by the Essential Earth spell (*GURPS Magic*, p. 53) and turned to stone is treated as adamant. Adamant is semi-ablative: It loses 1 dDR for every 10 points of d-damage it resists (see *Semi-Ablative*, p. B47).

Adamant Armor Table

SM	+5	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
US dDR	1	2	3	5	7	10	15	20	30	50	70
SL dDR	no	1	2	3	5	7	10	15	20	30	50
Cost (\$)	10K	30K	100K	300K	1M	3M	10M	30M	100M	300M	1B

Repair Skill: Armoury (Vehicle Armor).

ARMOR, SKYSTONE (TL2⁺) [HULL]

This is an arcane crystal that combines the properties of etherwood and adamant. It might originate in rare meteorites or asteroids, or be quarried from the quintessence of the crystal spheres that separate the heavenly bodies. Perhaps it is made from petrified air elements or fossilized dragon bone. Maybe it's the very substance of heaven brought to Earth. It has as much lifting ability as etherwood (1/3G per system) but is far tougher. Like adamant it is semi-ablative, losing 1 dDR

for every 10 points of d-damage resisted. The contragravity lift of skystone and etherwood are cumulative.

My grandfather swore it was the skystone that made the difference.

– Varrus, *The Skystone*

Skystone Armor Table

SM	+5	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
US dDR	1	2	3	5	7	10	15	20	30	50	70
SL dDR	no	1	2	3	5	7	10	15	20	30	50
Cost (\$)	20K	60K	200K	600K	2M	6M	20M	60M	200M	600M	2B

Repair Skill: Armoury (Vehicle Armor).

ARMOR, IRON (TL5) [HULL]

This is riveted iron plate. It is somewhat less protective than the high-grade steel described in *GURPS Spaceships*. It may also be available at TL2-4 but is significantly more expensive, costing at least five times as much.

Iron Armor Table

SM	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
US dDR	1	2	3	5	7	10	15	20	30	50
SL dDR	1	1	2	3	5	7	10	15	20	30
Cost (\$)	12K	40K	120K	400K	1.2M	4M	12M	40M	120M	400M

Repair Skill: Armoury (Vehicle Armor).

ARMOR, ORICHALCUM (TL2⁺) [HULL]

A legendary metal with triple the strength of the strongest bronze. It can also represent various other super-strong fantasy metals.

Orichalcum Armor Table

SM	+5	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
US dDR	4	6	9	12	18	25	40	60	90	120	180
SL dDR	3	4	6	9	12	18	25	40	60	90	120
Cost (\$)	50K	150K	500K	1.5M	5M	15M	50M	150M	500M	1.5B	5B

Repair Skill: Armoury (Vehicle Armor).

ARMOR, STRUCTURAL FIELD (TL11[^]) [HULL!]

This is armor made of unstable exotic matter reinforced by energy fields. Unlike other armor, it has a Power Point requirement. If a structural field armor system ever loses power, the armor itself is destroyed, losing its dDR.

Structural Field Armor Table

SM	+5	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
US dDR	30	50	70	100	150	200	300	500	700	1,000	1,500
SL dDR	20	30	50	70	100	150	200	300	500	700	1,000
Cost (\$)	1M	3M	10M	30M	100M	300M	1B	3B	10B	30B	100B

Repair Skill: Armoury (Vehicle Armor and Force Shields).

DIGESTIVE SYSTEM (TL7) [ANY!]

This is an internal bay equipped with specialized features: crushers, melting furnaces, digestive super-acids, or something similar. When activated, anything held inside (up to its rated capacity) takes the indicated damage; spacecraft suffer this to *each* hull section simultaneously.

If a digestive system is placed in a hull location, it can also function as a hangar bay and cargo hold (although its capacity is lower, as shown below). If placed in a core location it can carry cargo, but to access it there must be a hangar bay, cargo bay, or maw system in the same hull section.

Specify the type of damage the bay inflicts per space combat turn: burning, crushing, cutting, or corrosion. For example,

a ship inside an SM +10 crushing disposal bay takes 4d+2 damage to the front, central, and rear hulls. High-TL bays also apply an armor divisor: Cutting or burning get a (2) armor divisor at TL9, (3) at TL10, (5) at TL11, and (10) at TL12. Corrosion ignores armor dDR at TL12[^]. This damage is d-scale; characters who have the misfortune to be caught in such a bay take 10 × damage.

The damage assumes a 20-second turn. Multiply the damage (after subtracting DR) by three for a 1-minute turn, 10 for a 3-minute turn, or 30 for a 10-minute turn.

To use the system, objects must enter, be placed, or be pulled (via robot arms, tractor beam, or by being swallowed via a maw) into the digestive system. After material has been destroyed the system can expel the processed residue or direct it into a refinery, fuel tank, mass driver engine, total conversion power plant, etc.

Digestive System Table

SM	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
Capacity (tons)	1	3	10	30	100	300	1,000	3,000	10K	30K
d-Damage	2d+2	3d	3d+2	4d	4d+2	5d	5d+2	6d	6d+2	7d
Workspaces	0	0	0	0	1	3	10	30	100	300
Cost (\$)	100K	300K	1M	3M	10M	30M	100M	300M	1B	3B

Repair Skill: Mechanic (Vehicle Type).

Crushing bays are half cost.

ETHER PROPULSION (TL[^]) [HULL!]

These interact with the ether (see *Etheric Cosmos and Ether Drives*, p. 22), stealing momentum and energy from light. For a minor variation in technobabble, substitute the term “astral” and assume the drive interacts with flow of extra-planar astral energies.

All ether or astral propulsion systems work like reactionless drives, although the boost-drive design switch (p. 23) is a common modification.

Ether Oars (TL[^]): Each system produces an acceleration of 0.1G. Ether oars do not use Power Points, they require manual operation by the number of crew members indicated below. To propel the ship they must constantly row, moving the oar-like vanes to interact with the surrounding ethereal medium. They cannot be used on craft greater than SM +7. Crew manning the oars must be in passenger seating in the same hull section as the oars.



Ether Screw (or Ether Flukes) (TL[^]): This electromechanical propeller- or rotor-like device churns the ether, offering 0.2G acceleration per system. Each is a high-energy system that requires one Power Point. Alternately, ether screws can be defined as “ether flukes” representing fin-like devices used to propel a biological space beast.

Ether Sail (TL[^]): This functions like an ether screw but slower, limited to 0.1G. However, it does not require Power Points, drawing energy entirely from the ether. Unlike space sails they do not cover many square miles, and they resemble normal seagoing masts and rigging in size. They might even *be* normal equipment made from eldritch substances (cloth spun by the giant moon spiders, etc.). They are exposed systems and are targeted as if they were radiator wings. Vessels that sail in air or space can include an “ether keel” or similar device to let them maneuver freely (unlike realistic space sails).

Powered Ether Sails (TL5+2^): These are ether sails augmented by additional power, allowing them to extend force fields farther into ether space. They require one Power Point and have 0.3G acceleration. Like ether sails, this is an exposed system not protected by armor.

The drive's interactions with the ether can produce exotic visual effects. For example, iridescent wakes and shadowy lees may follow etheric vessels across the sky; the craft's shadow becomes a black, tapering cone surrounded by a rust-colored

fringe. (Add +2 to rolls to detect the vessel with passive sensors). In engineering or habitat spaces, interior lights may become red-shifted when the drive is operating (perhaps necessitating ultraviolet lighting aboard the vessel).

Like reactionless engines, ether propulsion can be used in atmosphere unless the GM rules otherwise. If the GM does not want ether propulsion to be useful for atmospheric thrust, he can restrict them to functioning in thin air, at high altitudes, in vacuum, etc.

Ether Propulsion 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
Oar crew	2	6	20	—	—	—	—	—	—	—	—
Cost (\$)	30K	100K	300K	1M	3M	10M	30M	100M	300M	1B	3B

Repair Skill: Mechanic (Reactionless Drive).

Halve cost for oars; double cost for sails; triple cost for powered ether sails.

EXOPHASE FIELD (^) [ANY!]

This allows a spacecraft to go out of phase with reality, perhaps shifting into an adjacent dimension or level of hyperspace. Everything in an exophase field enters an insubstantial state – one that has only limited interactions with ordinary matter and energy. Exophase fields can be explained as moving a ship into a parallel universe, altering its subatomic structure, or turning it into an odd form of “dark matter.”

The ship is affected normally by gravity and by graviton or tractor beam weapons. Other physical and energy attacks cannot harm it (nor can it harm others). An exophased ship is also vulnerable to psionic and nonmaterial magical attacks.

It can pass through solid matter, provided it can escape its gravity. It cannot rematerialize inside a solid object; attempting to do so prevents materialization. If the system is depowered while inside a solid object the spacecraft is destroyed, disintegrating in the other dimension while leaving the solid object unharmed.

The field's outline is visible as a ghost-image across the electromagnetic spectrum – this is a

side effect of whatever keeps it anchored in reality. A ship using an exophase field is invisible to active sensors, but remains visible to passive sensors at a -8 penalty to detection. It uses its own passive sensors at -8 and detects communication signals at the same penalty, but it cannot use active sensors or communications. The ship can interact normally with other ships using exophase fields, however! Whether they can affect (or be affected by) someone who has the Insubstantiality advantage depends on the form of Insubstantiality.

An exophased ship cannot pass through a force field that stops solid objects or uses the reality-stabilized variant. The GM may rule that certain other materials, energy barriers, or magic spells are impenetrable to exophased craft.

Only objects within the exophase can be carried. Objects released from it materialize.



Exophase Field 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 (\$)	20M	50M	100M	200M	500M	1B	2B	5B	10B	20B	50B

Repair Skill: Electronics Repair (Parachronic).

EXTRADIMENSIONAL INTERFACE (TL12^) [CORE!!]

The spacecraft is larger inside than on the outside! Hull size of the vessel refers to the extradimensional hull. Thus, an SM +5 ship has an extradimensional mass of 30 tons but it appears much smaller!

The system reduces the effective SM of the vehicle for the purposes of external access (doors, etc.) to it, attacking it, or detecting it; and its effective mass and volume when storing

or holding it. The craft is reduced by -4 SM per system. For example, installing two systems reduces the external SM by -8. A lesser reduction can be specified if desired when the vessel is created.

A ship with an extradimensional interface cannot have ram-scoops, solar panel arrays, reaction engines, hot reactionless thrusters, or any type of sails (e.g., lightsails or ether sails). Its weapon batteries cannot have guns or missile launchers, and any beam weapons must use the energy-phasing surface option. Otherwise, all systems can operate normally.

The destruction of the dimensional interface component can result in the vessel being trapped in the other dimension or destroyed (GM's option).

Extradimensional Interior 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 (\$)	10M	30M	100M	300M	1B	3B	10B	30B	100B	300B	1T

Repair Skill: Electronics Repair (Parachronic).

FACTORY (TL5) [ANY!]

This is an industrial system capable of manufacturing goods from appropriate components. Two additional types of factories (*GURPS Spaceships*, p. 16) are available:

Factory Shop (TL5): This facility must be dedicated toward manufacturing goods of a specific engineering skill and specialization. Use the statistics for a fabricator but reduce the production speed from \$/hour to \$/week and divide the cost by 10.

Production Line (TL6): This factory must be dedicated to building a single product. Use the statistics for a fabricator but reduce the production speed from \$/hour to \$/day and divide the cost by five.

Any TL8+ factory system (fabricator, production line, etc.) can be designated a *bio-tech* facility that makes vat-grown products (in accord with its TL). At TL9+ a production line can even represent an artificial womb that, in conjunction with other appropriate design switches, gestates a baby spaceship (see *Maturing Living Ship*, p. 23).

GASBAG (TL5*) [HULL]

This is a membrane filled with lighter-than-air gas, such as a hydrogen or helium balloon. A gasbag is rated for its tons of lift.

The Lift row of the *Gasbag Table* (p. 10) shows the tons of lift per gasbag. A spacecraft needs lift greater than its weight to rise (usually four gasbag systems).



Lifting Gas (TL5): The gasbag is filled with hydrogen or helium. The differences are minimal in *GURPS Spaceships* terms. Large quantities of helium are difficult to acquire at TL5-6; hydrogen is flammable, and hydrogen-filled gasbags are considered volatile systems if damaged when operating in an oxygen atmosphere.

Antigravity Gas (TL^): Weird science gases provide lift beyond that possible for buoyancy alone: 10 times the lift of hydrogen is typical. The origin is up to the GM. Destructive distillation of some natural antigravity material is a logical source, but exposure to radioactivity and the action of acid on "unobtainium" metals are also popular.

Habitat Options

These are modifications to habitat systems (*GURPS Spaceships*, p. 17).

Magical Life Support

In settings where enchantment exists, a habitat can use magic to provide life support. This is practical in an abundant-magic setting where the expense of upgrading items with self-powered Create Air and Create Water spells (using the Power spell) is low enough to factor into the ordinary cost of a habitat system. If magical life support is used a habitat has greater room, since it can omit some machinery. This allows twice the normal number of cabin equivalents. However, this benefit does not extend to steerage cargo, minifacs, teleport projectors, or hibernation systems, so they also take up twice as many cabin equivalents. (Thus, the ship doesn't gain an advantage when using those rooms). For cargo, it means that each unused cabin equivalent gives 2.5 tons cargo, which works out to the same amount, as a ship gets twice the cabin equivalents.

Additional Tech Level Restrictions

If creating lower-TL ship designs, minifacs are unavailable before TL8 and automeds before TL9.

Craft Shops

These rooms can be placed in habitats (*GURPS Spaceships*, p. 18). The number of cabin equivalents taken up are shown in parentheses as usual.

Craft Shops (2): This is a workspace and a set of tools and spare parts for use with a particular skill, most commonly a craft or repair skill like: Artist, Armoury, Carpentry, Cooking, Electrician, Electronics Repair, Explosives, First Aid, Hazardous Materials, Housekeeping, Leatherworking, Machinist, Mechanic, Photography, Prospecting, Sewing, Smith, and Veterinary. A craft shop gives a +2 equipment bonus for the skill; 10 shops provide +3; 100 create a state-of-the-art facility with +TL/2 bonus (minimum +4). A shop contains space and equipment for three people to work at once and enough resources to count as basic equipment for any related craft or science as well. Shops for arts and crafts that use fewer or lighter tools (e.g., painting or sewing) take up half the space (one cabin-equivalent).

Passenger Seating and Magical Life Support

Passenger seating benefits from the same enchantments described above in Magical Life Support. In an abundant-magic setting, replacing their limited life support systems with magical equivalents doubles the number of seats accommodated.

Gasbag Table

SM	+5	+6	+7	+8	+9	+10*	+11*	+12*	+13*	+14*	+15*
Lift	9	30	90	300	900	3,000	9,000	30k	90K	300K	900K
Workspaces	0	0	0	0	0	1	3	10	30	100	300
Cost (\$)	50K	100K	200K	500K	1M	2M	5M	10M	20M	50M	100M

* Lifting gas on SM +10 or larger spacecraft requires superscience.

Repair Skill: Mechanic (Lighter-Than-Air).

Multiply cost by five for antigravity gas.

HELICOPTER ROTOR (TL7*) [HULL]

This is a set of rotor blades and a transmission for vertical takeoff and landing. The blades fold up or lock into rigid air foils during any high-speed maneuvers (e.g., when a

streamlined ship reenters atmosphere). It is only usable in an environment with at least 0.1 atmospheres of pressure. Ships can install one or two systems; each requires one Power Point. A single rotor provides an air speed of 200 mph if streamlined or 80 mph if not. Two rotor systems increase this to 250 mph or 100 mph. This is not cumulative with air performance provided by other systems.

Helicopter Rotor 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 (\$)	100K	300K	1M	3M	10M	30M	100M	300M	1B	3B	10B

* Rotors are TL7 on vessels of up to SM +6. On craft of SM +7 or higher they require superscience, and are TL7^.

Repair Skill: Mechanic (Helicopter).

HOLOPROJECTOR (TL10^) [HULL]

This is a superscience holographic system that projects an image around the spacecraft to visually disguise it as anything of the same, or one higher, SM. For example, an SM +5 spacecraft could appear as an SM +6 house.

Holoprojector 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: Electronics Repair (Media).

JET ENGINE (TL7) [HULL]

In addition to the jet engines detailed in *GURPS Spaceships*, the following types are available:

Turbofan (TL7): A turbofan is a jet engine with an added fan that increases the air flow to improve thrust and fuel efficiency. However, it cannot operate at hypersonic speeds. Maximum air speed is 2,000 mph. Each engine provides 0.5G acceleration for calculating atmospheric speed, and consumes one fuel tank worth of jet fuel per hour (TL7) or two hours (TL8+).

Afterburning Turbofan (TL7): As above, but fitted with a reheat system that can augment the thrust by squirting raw fuel into the exhaust, providing a temporary burst of speed at the expense of greatly increased fuel consumption. It has the same normal performance as a turbofan, but the acceleration is multiplied by 1.5 when the afterburner is used (increasing top speed). This quadruples fuel consumption, using one fuel tank every 15 minutes (TL7) or half-hour (TL8).

I want you to get out of this part of space and back home just as fast as you can.

– Michael Garibaldi,
Babylon 5 #5.15

Fission Air-Ram (TL7): This engine uses a fission reactor to operate a turbofan that sucks in air, heating and expelling it for thrust. It operates 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.

Fusion Air-Ram (TL10): This sucks in air, heats it using a fusion reaction, then expels it as reaction mass. It operates five years on an internal fuel supply. The weight includes a high-efficiency fusion reactor that serves only to power the engine. Each air-ram produces 0.2G acceleration for calculating atmospheric speed.

Jet Engine 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 (\$)	200K	600K	2M	6M	20M	60M	200M	600M	2B	6B	20B

Repair Skill: Mechanic (either Aerospace or Jet Engines).

Multiply cost by 1.5 for afterburning turbofan, by two for fission air-ram, or by five for fusion air-ram.

LIGHTSPEED DRIVE (TL⁺) [ANY!]

This drive permits the spacecraft to accelerate instantly to the speed of light and move through space in a direct path until it intersects a large gravity well (usually in proximity to a star or planet). At that point it drops back to the speed and course it had when it activated the lightspeed drive.

Thus, this is not a faster-than-light stardrive – a journey across 100 light-years takes 100 years of real time. However, no

subjective time at all passes aboard the vessel, since it is moving at light speed. Optionally, close passage to celestial bodies can warp its path without deactivating the drive. A successful Navigation (Space) roll (aided by good star charts) ensures the drive deactivates at the correct point; a mistake under- or overshoots its destination by many light-years. Vessels moving with a lightspeed drive are treated as a beam of weakly interacting particles (analogous to neutrinos) so they pass through other objects, interstellar dust, etc. without ill effect. Speed is equal to the speed of light.

Lightspeed Drive

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 (\$)	300K	1M	3M	10M	30M	100M	300M	1B	3B	10B	30B

Repair Skill: Mechanic (Stardrive).

MAGNETIC PLANETARY DRIVE (TL9⁺) [SPECIAL!]

A popular system for flying saucers, this propels the vehicle via interactions with a star or planet's magnetic field – it's essentially a superscience magnetic levitation device. Each system provides 0.5G (TL9), 1G (TL10), or 2G (TL11+) acceleration, but is also a high-energy system requiring one Power Point. The drive must be installed in a core system or the rear hull.

The drive only works if the craft is within the magnetosphere of worlds with strong magnetic fields. In our solar system, the



Sun, Earth, Mercury, Jupiter, Saturn, Uranus, and Neptune have strong magnetic fields (that extend up into the orbital space around them); the other planets and most smaller bodies (such as the moon) do not. The drive can cause odd electromagnetic effects beneath it. Headlights blink out, instruments (particularly magnetic compasses) react wildly, etc. The

effect is unpredictable; it happens whenever the GM wants it to and does whatever he likes. It is +4 to be detected by any senses that detect magnetic fields.

Magnetic Planetary Drive 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 (\$)	20K	60K	200K	600K	2M	6M	20M	60M	200M	600M	2B

Repair Skill: Mechanic (Reactionless Drive).

MANEUVER ENHANCEMENT (TL6) [HULL]

Maneuver enhancement represents mass devoted to aerodynamic control systems, and structural strengthening to facilitate high-g maneuvers in a planetary atmosphere. Each system installed adds +1 to air performance Handling.

Maneuver Enhancement 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 (\$)	50K	150K	500K	1.5M	5M	15M	50M	150M	500M	1.5B	5B

Repair Skill: Mechanic (Aerospace).

MAW (TL8) [FRONT HULL]

This is a powered jaw and mouth, which can deliver a bite attack, swallow food, etc. An ordinary mechanical jaw inflicts thrust-1 crushing damage; when attacking spacecraft, this converts to d-damage (divide by 10). For +50% cost, a maw inflicts cutting damage instead of crushing.

If a digestive system or hangar bay is in the same section as the maw, a successful attack allows the ship to swallow whole anything small enough to fit in that system. The swallowed object is moved to that location.

Maws and Other Melee Attacks

Melee attacks using systems such as a maw, robot arms, or a tail are not intended for space combat, but can be employed in regular **GURPS** combat if the GM is using vessels designed with these rules; see *When Not to Use These Rules* (**GURPS Spaceships**, p. 50) and *Weapons in Ordinary Combat* (**GURPS Spaceships**, p. 66). Convert from d-scale to ordinary scale where appropriate.

Maw 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 (\$)	30K	100K	300K	1M	3M	10M	30M	100M	300M	1B	3B

Repair Skill: Mechanic (Robotics or Mecha).

ORNITHOPTER WINGS (TL5+2) [HULL!]*

This is a set of motors and actuators for powered, flapping wings. A vessel given ornithopter wings must be given the winged design feature (**GURPS Spaceships**, p. 30). Each system provides 0.25G acceleration in atmosphere only, and adds +1 to Handling in the air. A ship using ornithopter wings cannot exceed a top air speed of 500 mph.

* Ornithopter wings can only be installed in the central hull.

The craft became a full 'thopter as the Duke banked it, holding the wings to a gentle beat, pointing with his left hand off to the east beyond the factory crawler.

– Frank Herbert, *Dune*

Ornithopter Wing 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 (\$)	150K	500K	1.5M	5M	15M	50M	150M	500M	1.5B	5B	15B

Repair Skill: Mechanic (Heavy Airplane).

PARACHRONIC FLUX AND TIME-FLUX DRIVE (TL^*) [ANY!!]

These superscience drives allow a spacecraft to travel in time or other dimensions. Each flux drive is a high-energy system requiring *two* Power Points to operate. For both drives, the GM uses the operating procedures of a probability drive (see *Jump Drive Variations*, **GURPS Spaceships**, p. 41). That is, a Navigation skill roll is required, at a penalty (typically -10) if the destination is unknown; failure sends the vessel somewhere else and disables it until it is repaired.

Time-Flux Drive: This device lets the vehicle travel *any* distance into the past and/or future, subject to whatever limitations the GM imposes on time travel to manage paradoxes. The user must set specific temporal coordinates, e.g., “200 years, 27 days, three hours, 17 seconds into the past.”

The device transports the vehicle to that time, though it does not move in space relative to the surface of the Earth (or the nearest other large mass). That is, the drive corrects automatically for planetary rotation, orbit, stellar movement, and so on.

Parachronic Flux Drive: This system is identical in statistics to the time flux drive, but permits travel only to alternate *parallel* worlds (like a parachronic conveyor).

Flux drives can also have either or both of these options:

Speed-Limited: The vehicle is not instantly transported through time. Instead, it moves the vehicle out of conventional time/space and enters a hyperdimension (similar to hyperspace) where it travels forward or backward through the timestream. If this is a time flux drive, the speed in years per hour is equal to the number of flux systems installed. (Cutting the power drops the vehicle out of the timestream at whatever date it has reached.) If it is a parachronic flux drive, use “para-years”: the number of years since the destination reality diverged from the reality the vehicle presently occupies, *plus* any extra time travel.

For example, a trip from our 2006 to the 2006 of a world where things deviated in the year 1916 has a divergence distance of 90 para-years. For a vehicle equipped to travel through time *and* between parallel worlds, if the journey also involves travel in para-time, e.g., from our 2006 to the year 1950 of a parallel world that diverged in the year 1916, add the temporal distance (56 years) to the “length” of the trip (90 years, for a total of 146 years). It’s up to the GM whether this is possible.

Anywhere: This option lets the vehicle travel to any point in time or space. It can go anywhere and *anywhen*. The standard version can travel anywhere in the universe instantly as per a probability drive with infinite range (*GURPS Spaceships*, p. 41). For the speed-limited version of a time-flux drive, the vehicle can travel as many light-years per hour as it can travel years per hour; thus, add the spatial distance in light-years to the temporal distance in years when calculating travel times.

Parachronic and Time-Flux Drive 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 (\$)	600K	2M	6M	20M	60M	200M	600M	2B	6B	20B	60B

Repair Skill: Electronics Repair (Parachronic or Temporal).

Costs are for the parachronic flux drive. A time-flux drive is 10 times cost. Multiply cost by 25 for the anywhere option and by 0.5 for the speed-limited option.

POWER PLANT, ETHER FURNACE (TL5+2^)

This power plant recreates in miniature the bizarre ether flux found in the core of a sun, which permits it to burn many

times longer than its chemical nature otherwise allows. Each ether furnace provides one Power Point for three months on internal fuel. Endurance can be extended. Each fuel tank of nebulous fuel (containing a mixture of liquids and metals similar to the primal solar nebula) operates an ether furnace for an additional year.

Ether Furnace 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

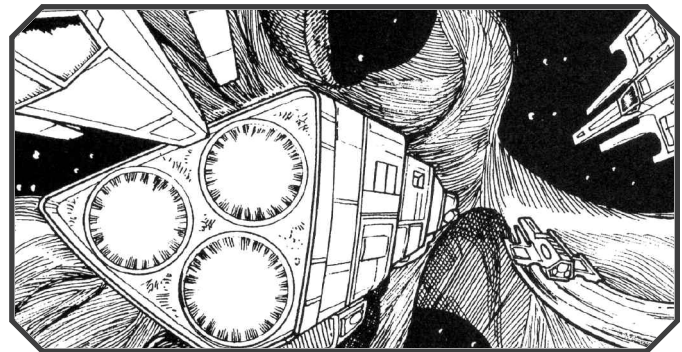
Repair Skill: Mechanic (Ether Furnace).

POWER PLANT, MAGICAL (TL^)[ANY]

These power plants are enchanted items. All of them cease to function in regions where magic doesn’t work at work at all (no-mana areas). They generate magic power points, which work like normal Power Points except they also power systems with the magic-powered design feature (p. 20).

Mana Engines (TL^): These devices gather ambient magical energy and transform it into mechanical or electrical power. They range from glowing crystals to complex techno-magical machinery. They do not require fuel and produce one magical Power Point.

Soulburner (TL^): A necromantic power plant fuelled by the torment of the souls of sapient beings, who are bound within the device using the Soul Jar spell. Souls burn out (roll vs. Will each year) and need replacement. Assuming Will 10, half the souls are lost every year (on average), or 1/18 of them every month. Any soul with Magery tends to last longer (for up to Magery *squared* years), which may not be to their comfort. Soulburners do not function in no-mana areas. A soulburner generates two Power Points if it has its full complement of souls, or one Power Point if it has at least half as many souls. These are trapped within the machine in a remnant of their body (e.g., as skulls, corpses, etc.). If the machine is destroyed the souls are freed from torment (but still dead).



NEMA Reactor (TL7^): This is an enchanted nuclear fission reactor whose radiation output is partially shifted from hard radiation to magical energy. (NEMA stands for nuclear-enhanced mana area). It generates one ordinary Power Point *and* an additional Power Point that can only run magic-powered systems. The disadvantage is a critical reactor meltdown can blow a hole in reality or release marauding demons; the effects are up to the GM, but they’re usually unpleasant. A NEMA operates 25 years on internal fuel, increased to 50 at TL9 or 75 at TL10+.

Caged Spirit: These power plants draw magical energy from a trapped demon lord, ancestral spirit, ghost, minor god, or other spirit of great power (relative to the size of the ship). If the power plant or vehicle is destroyed, the entity is released – usually in a bad temper! Caged spirit power plants generate five magical Power Points.

Magical Power Plant 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
Souls*	10	30	100	300	1K	3K	10K	30K	100K	300K	1M
Cost (\$)	100K	300K	1M	3M	10M	30M	100M	300M	1B	3B	10B

* The souls a soulburner requires to generate full Power Points.

Repair Skill: Mechanic (Magical Power Plant). NEMA also requires Mechanic (Fission).

Multiply cost by 1.5 for NEMA and 8 for caged spirit.

Power Siphoning

Optionally, mages or psis can draw power (as FP) directly from any power plant that provides magical or psi Power Points, respectively. This does not require a spell or ability, but the user must remain in contact with a power outlet in a control station within either the power plant or the engine room. Mages can draw up to $(HT \times 0.7 \times \text{Magery squared})$ FP per second; those with Magery 0 draw $HT/3$ FP per second. Round up. Psis use the same formula, replacing Magery with their best psionic Talent. This FP only powers supernatural abilities; it cannot replenish the user's personal points.

On a small ship, or if many users are siphoning power at once, this fully uses one or more Power Points. Divide the ship's weight in tons by four; round up. This is the maximum FP per second that *each* Power Point can provide.

Up to 1/20 of this amount can be siphoned away with negligible effects – some lights dim and flicker. If more is used, the engineer must treat the users as a high-energy “system,” allocating one or more Power Points to them specifically for the purpose of siphoning.

a planetary ecosystem to function. (It can operate in orbit around Earthlike worlds.)

It only works in deep space by installing at least one open space system devoted to a functioning ecology of trees, plants, small animals, etc., or, optionally, if the spacecraft is *itself* a living creature. Unlike a soulburner, an orgone engine does not destroy the life-force it feeds upon.

If the engine is disabled or tampered with, roll vs. spacecraft HT. Failure means the engine malfunctions, producing deadly orgone radiation, a toxic anti-life exhaust. The radiation affects everyone in the radiation zone radius shown on the table including all occupants of the spacecraft. Living things slowly sicken, wither, and die. For each hour of exposure, roll vs. Will-3. Failure results in the loss of 1d HT. If his HT is reduced to zero, the victim dies; otherwise, lost HT is recovered at one HT per hour of rest outside the zone.

At the GM's discretion, orgone engines generate psi Power Points instead of regular Power Points, making them only useful for operating psi-powered (p. 21) equipment.

If orgone energy does not exist as such, engine statistics can simply supply another name but have it work the same way, drawing on a living world's life energy (psychic energy, chi, prana, etc.) for power and releasing anti-life energy as exhaust.

POWER PLANT, ORGONE (TL[^]) [ANY]

These use a technology distantly related to the soulburner (p. 13) to convert orgone, a type of life-force, to electricity. Each such engine generates two Power Points indefinitely. However, an orgone engine must remain within (SM-3 × 10,000) miles of

Orgone Power Plant 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
Rad zone (yards)	20	30	50	70	100	150	200	300	500	700	1,000
Cost (\$)	50K	150K	500K	1.5M	5M	15M	50M	150M	500M	1.5B	5B

Repair Skill: Mechanic (Orgone Power Plant).

POWER PLANT, PERPETUAL MOTION MACHINE (TL[^]) [ANY]

These are divergent-technology power sources that operate without requiring fuel, in violation of thermodynamic laws such as conservation of energy. Typical devices are mechanical or electromechanical in nature and involve a complicated array of self-moving wheels, rolling balls, spinning disks, magnetic fields,

Some divergent-technology power sources violate thermodynamic laws.

or pressurized gases and liquid, all somehow managing to generate more power than they consume in operation.

Perpetual motion machines generate one Power Point. They never require fuel.

Perpetual Motion Power Plant 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 (\$)	200K	600K	2M	6M	20M	60M	200M	600M	2B	6B	20B

Repair Skill: Mechanic (Perpetual Motion Machine).

POWER PLANT, PSYCHOTRONIC (TL9⁺) [ANY]

This power plant draws energy from the minds of psionic individuals connected to it. The plant may be able to tap any psi or it may require people with latent or actual telekinetic or electrokinetic psi ability.

Power Points from a psychotronic power plant can only be used to operate systems designed with the psi-powered design feature (p. 21). They cannot be used for other purposes.

For the psychotronic power plant to work, a minimum number of individuals serving as living psi-batteries must be hooked up to it with psi-amplifying helmets or other devices. This is in addition to the system's workspace requirement.



The GM may allow those with powerful psi abilities to count as two or more individuals. Every 10 character points worth of psi powers count as one person.

If an *Emergency Power Task* (*GURPS Spaceships*, p. 52) for the plant fails, the plant is disabled *and* the psis powering it are reduced to 1 FP at the start of the next turn. On a *critical* failure, each psi must immediately roll against HT; success results in unconsciousness for 1d hours while failure causes a heart attack (p. B429).

A psychotronic power plant generates four psi Power Points if installed in an SM +5-6 ship, and two if installed in an SM +7 or larger ship. The table shows the number of psis needed (modified as detailed above). Plants that need two or more psis but have fewer than the required number work with half the required psis and generate only one psi Power Point. Those with less than half don't function at all.

Psychotronic Power Plant 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
Psis	1	1	1	2	4	10	30	100	300	1,000	3,000
Cost (\$)	200K	600K	2M	6M	20M	60M	200M	600M	2B	6B	20B

Repair Skill: Electronics Repair (Psychotronics).

POWER PLANT, SOLAR BOILER (TL7) [ANY]

This system draws upon the intense solar radiation in outer space as a heat source. It is a steam engine whose heat comes not through fuel consumption but via a solar mirror (p. 18).

The solar boiler is a closed-cycle steam engine designed to operate in vacuum. Large mirrors focus sunlight on water pumped through pipes on the sunward side of the spacecraft;

the liquid is vaporized into high-pressure steam. This drives turbines to generate power. The steam is then pumped into pipes under shadow where it rapidly cools and condenses into liquid.

Each solar boiler includes its own water and generates one Power Point indefinitely, but it requires a solar mirror system to do so. There must be solar mirror systems equal to the number of boilers installed.

A solar boiler is only useful when reasonably close to a star. Beyond a distance of two AU from a Sun-like star, it no longer produces significant Power Points.

Solar Boiler 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 (\$)	10K	30K	100K	300K	1M	3M	10M	30M	100M	300M	1B

Repair Skill: Mechanic (Steam Engine).

POWER PLANT, VACUUM ENERGY (TL9⁺) [ANY]

This power plant draws energy from the random electromagnetic fluctuations that exist even at absolute zero. The sum

of all the possible frequencies is interpreted as a large (or for some methods of calculation infinite) energy density present even in vacuum. Each system produces three Power Points and operates indefinitely. It can be *de-rated* to produce two Power Points at 2/3 cost or one Power Point at 1/3 cost.

Vacuum Energy Power Plant 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 (\$)	750K	2.4M	7.5M	24M	75M	240M	750M	2.4B	7.5B	24B	75B

Repair Skill: Mechanic (Vacuum Energy).

REACTION ENGINE, LASER ROCKET (TL9) [REAR]

This provides thrust by evaporating a reaction mass. A ground-based laser installation heats the mass; the ship needs no receiver. It provides 2G acceleration. A fuel tank of ablative

plastic offers 0.5 mps delta-V. Each laser rocket engine requires one external laser battery. The required output depends on the size of the spacecraft.

Laser Rocket Engine 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
Laser	30GJ	100GJ	300GJ	1TJ	3TJ	10TJ	30TJ	100TJ	300TJ	1PJ	3PJ

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

REACTION ENGINE, PLASMA (TL9) [REAR!]

These are additional variations of the electric rockets described in *GURPS Spaceships*.

VASIMR Electric Rockets (TL9): These variable-specific impulse magneto-plasma rockets heat reaction mass electrically (via radio waves) and expel it as plasma for thrust. They are fuel-efficient, but heavy and power-intensive. As the name suggests, they can vary their performance. Each engine is a

high-energy system requiring one Power Point. It operates in a fuel-efficient low-thrust mode producing 0.0002G acceleration or in a high-thrust mode producing 0.002G. Each fuel tank of hydrogen reaction mass gives 10 mps delta-V in low-thrust mode or 0.5 mps in high-thrust mode.

Plasma Torch (TL10⁺): This is a typical space-opera “plasma rocket” propulsion system. Each engine is a high-energy system that produces 5G acceleration. A fuel tank of hydrogen reaction mass gives 2.5 mps delta-V. It can also operate in a high-efficiency low-thrust mode: It gives 1G acceleration per engine, and each tank of hydrogen has 12.5 mps delta-V.

Plasma Engine 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 (\$)	200K	600K	2M	6M	20M	60M	200M	600M	2B	6B	20B

Repair Skill: Mechanic (Low-Performance Spacecraft) for VASIMR, or Mechanic (High-Performance Spacecraft) for plasma torch.

Multiply cost by five for plasma torch engines.

REACTION ENGINE, SOLAR THERMAL (TL8) [REAR]*

Solar thermal rockets use solar mirrors (p. 18) to directly heat reaction mass. The heated propellant is then expelled via the nozzle to produce thrust. Solar thermal engines offer better thrust than electric rockets without the costs and environmental concerns of nuclear engines.

Each solar thermal engine system requires a functioning solar mirror system to focus sunlight; the combination produces 0.05G acceleration. A fuel tank of hydrogen reaction mass provides 0.3 mps delta-V (TL8) or 0.4 mps delta-V (TL9+).

Acceleration is affected by the vehicle’s distance from a star. Divide this by the square of the average distance in AU. For stars with a different luminosity than our own sun, multiply by relative luminosity. However, acceleration can never increase to more than 0.2G per engine.

* Requires one solar mirror system per engine.

Solar Thermal Engine 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 (\$)	50K	150K	500K	1.5M	5M	15M	50M	150M	500M	1.5B	5B

Repair Skill: Mechanic (Low-Performance Spacecraft).

SAILS, RADIOISOTOPE (TL7) [HULL]

Also known as a “fission sail,” this system uses a giant foil sail thick enough to provide some degree of radiation shielding. One side is coated with a thin layer of radioactive isotope; as it decays, radioactive particles escape in the unshielded direction, producing thrust.

The isotope produces 0.000001G acceleration for about 14 years. There is no fuel consumption, but as the substance

decays thrust is reduced, so halve the thrust every 14 years (the isotope’s half-life).

Unprotected individuals on the emitting side of the sail are exposed to some radiation, but since the isotopes are designed to emit particles stoppable by a thin foil, any radiation shielding (PF 2+) provides full protection. Assume exposure on the wrong side of the sail is rads/second equal to $(2,000 \times \text{thrust (in G)} \times \text{spaceship mass divided by the square of distance in yards})$.

These are exposed systems but more compact than light-sails: Use the spacecraft’s SM +2 instead of SM +3 to target them (see *GURPS Spaceships*, p. 66).

Radioisotope Sails 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 (\$)	500K	1.5M	5M	15M	50M	150M	500M	1.5B	5B	15B	50B

Repair Skill: Mechanic (Low-Performance Spacecraft).

I wish to have no connection with any ship that does not sail fast; for I intend to go in harm’s way.

– John Paul Jones

SAILS, TACHYON (TL^)[HULL]

What if a wind of faster-than-light particles blew out from the galactic core? Perhaps there are strange-matter hyperstars there, and these sails can catch the tachyon wind they emit! In conjunction with gravitational orbits around the galactic center and a system for charging the sails to use the galactic magnetic field to make grand turns, a tachyon sailship can travel between the stars at high sublight speeds!

Tachyon sails are similar to lightsails, but with far greater acceleration. Each system produces 0.1G acceleration. Tachyon intensities vary with distance from the core, but the nearby stars are at essentially the same distance so the effect is negligible. Like lightsails, the performance is direction

dependent, which is unimportant on the scale of interstellar trips but limits the device’s usefulness as an in-system drive. As a result, a tachyon sailship may have to travel one direction to build up speed before altering its heading for the intended destination.

These exposed systems are targeted and affected as if they were lightsails.

Tachyon Hypersails: What if hyperspace were like an ocean and the tachyon winds blew through that, rather than through normal space? A stardrive engine is needed to enter hyperspace, but once there, hypersails are unfurled and used for propulsion! As long as they are in use there is no energy cost to remain in hyperspace. FTL speed is based on sail thrust: Each 0.1G of sail acceleration gives FTL 1. Hyperspatial storms or currents can also exist, further influencing FTL speed.

Tachyon Sails Table

SM	+5	+6	+7	+8	+9	+10	+11	+12	+13 or more
Workspaces	0	0	0	0	0	1	3	10	–
Cost (\$)	1.2M	4M	12M	40M	120M	400M	1.2B	4B	–

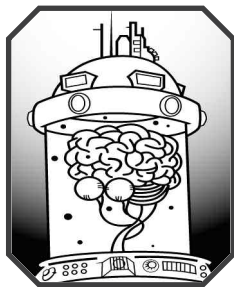
Repair Skill: Mechanic (Low-Performance Spacecraft).

Hypersails cost twice as much as ordinary tachyon sails.

SAPIENT BRAIN (TL10*) [ANY]

The spacecraft has an integral biological brain with sensory and nervous systems that take up a significant amount of its total mass. A brain allows the spacecraft to operate just like a vessel with an unmanned computer-controlled system. However, it does not have a Complexity rating, and its Comm/Sensor level is equal to its SM-3.

A brain system communicates via radio. It uses active sensors (radar) and passive sensors but not laser communication. The GM can vary this. A brain has no control stations.



The GM assigns attributes, skills, and other traits. By default, assume a ship's brain has DX 12 and IQ 7, but GMs alter these values as desired.

Any damage sustained by a brain system is multiplied by four (after penetrating dDR). If the only brain system is disabled, the ship is unconscious and cannot control its own systems; if it is destroyed, the ship is effectively disabled. If a ship has multiple brains, the workload is divided among them as if they had the Compartmentalized Mind advantage.

An additional variation is available for a sapient brain:

Psionic Sapient Brain (TL^): The brain also produces one psionic Power Point (see *Psi-Powered*, p. 21).

* For genetically engineered ship brains. No TL for natural creatures.

Sapient Brain 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 (\$)	50K	150K	500K	1.5M	5M	15M	50M	150M	500M	1.5B	5B

Repair Skill: Surgery.

If the brain is psionic, multiply cost by four.

SMALL UPPER STAGE (TL7) [SPECIAL]

An upper stage (as described in *GURPS Spaceships*) does not have to take up all six systems; an alternative is the *small upper stage*. It occupies two systems in the front hull rather than the whole section. The small-upper-stage spacecraft is two SMs smaller than its "launching" ship; for example, an SM +10 vessel's small upper stage would be SM +8. If a hit location roll strikes these two systems, reroll the hit location and apply damage against the front hull of the upper-stage spacecraft. Otherwise, use the normal rules for upper stages.

SOLAR MIRROR (TL5) [HULL]

This is an array of large mirrors primarily designed to focus solar energy on a solar boiler (p. 15) or solar thermal rocket

There are two ways of spreading light: to be the candle or the mirror that reflects it.

– Edith Wharton

engine (pp. 16-17), but useful for other functions (e.g., signaling or mining). It is not a power plant as such, but each operating solar boiler or solar thermal rocket requires a solar mirror system to power it.

Solar mirrors are exposed systems. They can be attacked using the *Targeting Exposed Systems* rule (see *GURPS Spaceships*, p. 66) as if they were radiators, but unlike other exposed systems they are not diffuse: Mirrors sustain full damage from any attack that hits them.

Solar Mirror 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 (\$)	10K	30K	100K	300K	1M	3M	10M	30M	100M	300M	1B

Repair Skill: Mechanic (Solar Power).



TAIL (TL8) [REAR HULL]

This is a long flexible tail attached to the rear of a spacecraft to strike or manipulate things. It can attack anything behind the vessel using d-damage for the spacecraft's ST.

Impaling Tail: The tail strikes for swing/impaling damage.

Prehensile Tail: The tail functions as a robotic arm with Bad Grip (p. B123). It strikes for thrust/crushing damage.

Striking Tail: The tail strikes for swing/crushing damage.

Weapon Tail: The tail mounts a single weapon system equivalent to one medium battery (rather than the usual three weapons of such a battery) plus an integral power supply. It has the same arc of fire as a central turret (despite being mounted in the rear). The tail also strikes for thrust/crushing damage.

Tail 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: Electronics Repair (Robotics or Mecha).

WEAPONRY

This section expands the *Weapon Types* section of **GURPS Spaceships** (pp. 28-29) with beam, gun, and launcher types. Since ultra-tech weapons have been covered, the emphasis is on low-tech devices. Weapons batteries are available at TL2 to TL6. Turrets are not available until TL5.

*Only technology has
permitted us to put a city to
the sword without quite
realizing what we are doing.*

– Joseph Wood Krutch

Lightning Cannon (TL5+2^): A low-tech particle beam based around etheric science. It has a visible effect (even in vacuum) similar to a lightning bolt, due to the etheric disturbances it leaves in its wake. See p. 30 for statistics.

Mind Disruptor (TL11^): Fires a beam that only affects sentient minds. The effects are detailed on p. 30.

Guns

Conventional guns of TLs 3-6 run the gamut from black-powder muzzle loaders to rifled firearms. Their performance is greatly reduced since they do not fire guided munitions, but they are effective at point-blank or rendezvous ranges in space combat. Guns built at TL3-4 cannot have rapid fire or very rapid fire. Those built at TL5 cannot be very rapid fire.

Catapults

Space catapults (TL2) are direct-fire spring- or torsion-powered devices. They fire iron balls or rocks rather than arrows, since there's no need to stabilize flight in vacuum. They can be installed in place of guns. They have one-quarter the caliber of a gun, and cannot have the improved, rapid fire, or very rapid fire options. Thus, an SM +7 ship's major battery could have a 3.5cm catapult.

Beam Types

Electromagnetic Disruptor (TL10^): This is a superscience weapon that affects electronics but not people, such as cinematic versions of "ion cannon," "magnetic pulse," and "maser" technologies. See p. 30 for a description of the effects.

Launcher Types

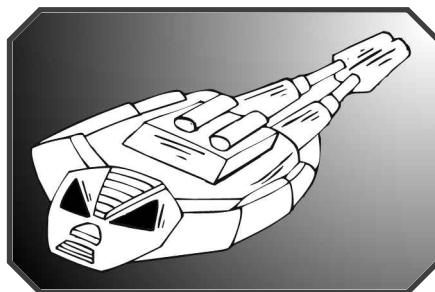
TL3+ launchers may fire *unguided* rockets. Those at TL3-5 use black-powder propulsion; higher TLs use modern solid fuels. Rocket launchers, unlike other launchers, use the same rapid fire or very rapid fire options as guns.

DESIGN FEATURES

This is a list of options for systems or vessels. They do not count as systems.

Biomorphics

Any vessel with an appropriate shape can be sculpted to resemble a statue or mannequin of a living thing; for example, a cylinder made to look like a giant whale or



a space mecha with arms and legs resembling a humanoid giant. There is no extra cost for this; it's just a matter of how the vessel's appearance is described.

Realistic Biomorphics (TL9): A spacecraft can be coated with a layer of real or synthetic tissue, complete with details such as hair, scales, fur, or even a face. This may fool some into believing it is a giant creature. A biomorphic vessel's cost depends on its SM.

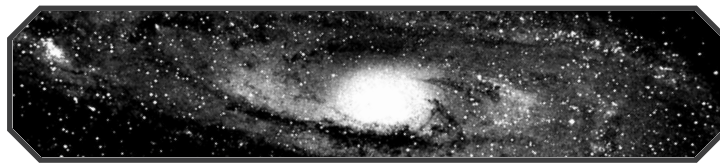
Biomorphics Table

SM	+5	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
Cost (\$)	1M	2M	5M	10M	20M	50M	100M	200M	500M	1B	2B

There is no cost or TL requirement if the spacecraft actually *is* a living thing.

Energy-Phasing Surface (TL12⁺)

The spacecraft is surrounded by a superscience array of *force lenses*, which allows fixed beam weapons mounted anywhere aboard to fire through any point on the surface. They all effectively have universal arcs of fire.



Energy-Phasing Surface Table

SM	+5	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
Cost (\$)	1M	2M	5M	10M	20M	50M	100M	200M	500M	1B	2B

Essential Fuel

The Essential Fuel spell (*GURPS Magic*, p. 179) increases spacecraft performance; the engine gets 10 times the delta-V. Since the spell's energy cost is one point per pound of fuel, the

efficient casting method is to enchant small quantities (e.g., 10-60 lbs.) repeatedly. As wages vary by TL, the additional cost per ton is \$2,000 multiplied by the number shown on the table (depending on the TL of the mage).

Magic Cost Table

TL	TL0	TL1	TL2	TL3	TL4	TL5	TL6	TL7	TL8	TL9	TL10	TL11	TL12
Cost Multiplier	0.89	0.92	0.96	1	1.1	1.6	2.3	3	3.7	5.1	8	11	15

Grabber

A robot arm (*GURPS Spaceships*, p. 24) can have reduced dexterity at a significantly lower cost. This cheap, clunky arm is only 10% the normal price, but operates as if it had two levels of Bad Grip (p. B123).

Hidden Weapons Batteries

At extra cost, weapons batteries can be hidden. They might be disguised as other systems (such as sensors or cargo doors), be concealed by false facades, use pop-up turrets, etc.

Detection at point-blank or short range (see *GURPS Spaceships*, p. 44) does not reveal a hidden weapon battery unless it was fired on its last turn. They *can* be detected via a successful sensor analysis task.

If using 20-second turns, it takes one turn to ready a hidden turret or to hide a revealed turret, during which time it can't fire. No time is required for fixed batteries. If using longer turns, time requirements are ignored.

A hidden weapons battery is 1.5 times the cost of an ordinary battery.

Lacks Automation

A spacecraft can have a reduced level of automation provided it has a control room with at least one control station. This is the norm for vessels built at TL6 and lower, and common at TL7. Higher TL vessels, especially manned warships, use it on the theory that a larger crew can absorb casualties and perform damage control. A lack of automation gives them intimate familiarity with the ship's workings and prevents them growing bored with nothing but make-work duties.

With this feature, systems require additional workspaces and all multitasking penalties are doubled. Spacecraft no longer require an engine room to perform onboard maintenance and avoid HT penalties.

Lacks automation does not significantly reduce a vessel's cost due to the need for extra maintenance facilities, etc. However, there are fewer things to break down (provided the maintenance crew is on the job) and therefore HT is raised by +1.

If a system type installed on a vessel that lacks automation has a workspaces entry, calculate required workspaces using the *Workspace Table* (below).

Workspace Table

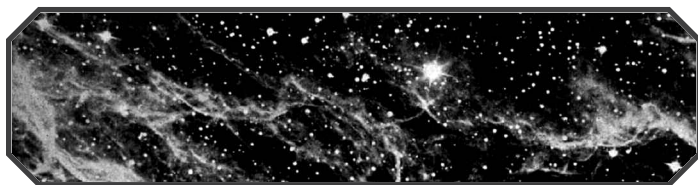
SM	+5	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
Workspaces	1	1	1	2	3	10	30	100	300	1,000	3,000

Magic-Powered

A high-energy system [!] can be designated as magic-powered. This means it uses "magic Power Points" as generated

by a magical power plant (pp. 13-14). It cannot use ordinary Power Points.

A magic-powered system is half-price and may be available at a lower or divergent TL.



Magnetic Tractor Beams

Tractor beams can be defined as superscience magnetic beams. Like heat rays, these are suitable TL7⁺ weaponry. They only affect vessels with an iron or steel armor system; otherwise they function just like tractor beams.

Methane and Ammonia Reaction Mass

GURPS Spaceships uses hydrogen as the standard reaction mass and provides an option to use water. Two alternatives are ammonia and methane, both of which are abundant on Earth and many celestial bodies. These increase acceleration at the expense of greater fuel consumption (i.e., reducing the delta-V).

Antimatter thermal rocket, antimatter plasma rocket, antimatter plasma torch, fusion rocket, fusion torch, nuclear thermal rocket, solar thermal rocket, super antimatter plasma torch, and super fusion torch engines can use these alternative reaction masses.

Ammonia: Use of ammonia multiplies acceleration by 2.9 but divides delta-V by 2.9. It costs \$250 per ton. Extraterrestrial sources include gas giant atmospheres and comet ice.

Methane: Use of methane multiplies acceleration by 2.8 but divides delta-V by 2.8. Methane costs \$500 per ton. Extraterrestrial sources include the atmospheres of Mars and the gas giants, and methane ice from outer system moons, asteroids, and comets.

Nautical Lines

A *streamlined* vessel can have nautical lines. Its hull is boat-shaped like a ship or flying boat, improving its performance should it land in water (or other liquid). However, they are not optimal for air propulsion, and a streamlined craft with nautical lines has only 20% of its normal top air speed.

At TL5 and lower, aerodynamic principles are poorly understood. The GM may require all streamlined vessels to use the nautical lines feature by default.

Open-Frame Armor

Armor systems can be designated as open frame. This has four times the normal dDR but only protects against crushing damage from collision with spacecraft and large objects of SM +4 or more. Open-frame armor gives no protection against weapons fire (including missile impacts, even if the missiles are themselves SM +4).

Phased Arrays

Advanced laser weapons can incorporate phased-array optics: a two-dimensional emitter composed of numerous cells that projects either a single powerful beam or multiple smaller beams, of variable intensity.

Any major battery equipped with a fixed mount or ultraviolet laser can be designated a phased array. Such batteries appear two TLs later than usual (TL11 for lasers and TL12 for ultraviolet lasers) and cannot be combined with the improved, rapid fire, or very rapid fire options. A phased-array laser or UV laser has the option of firing as a rapid fire

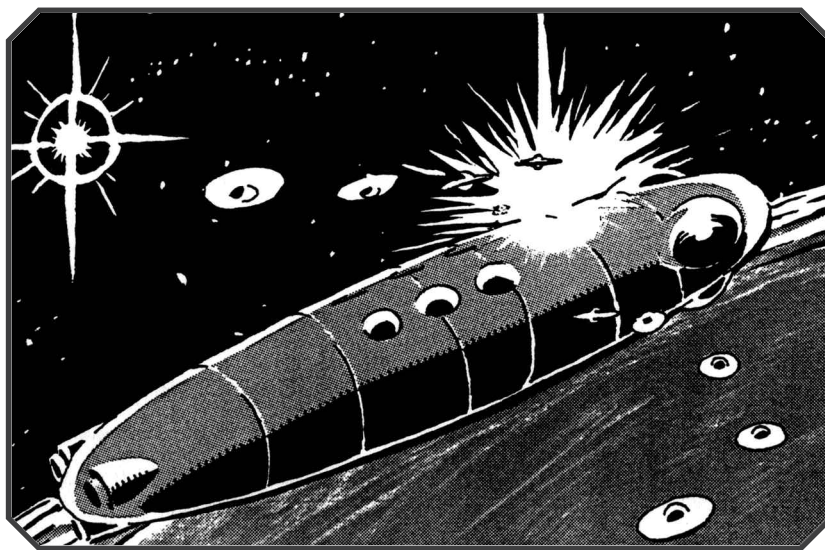
weapon at one-tenth output or as a very rapid fire weapon at 1/100 output. In addition, if a phased array does not fire it can perform the active sensor (ladar) or laser communicator functions (only) of an equivalent-SM tactical array.

Psi-Powered (TL[^])

A high-energy system [!] can be designated as psi-powered. This means it uses “psi Power Points” as generated by a psychotronic power plant (p. 15). It cannot use ordinary Power Points.

This feature is most suitable for systems that can be explained as psionic in nature. In particular, contragravity lifters, cloaking devices, force screens, standard or rotary reactionless drives, and stardrive engines are appropriate expressions of psi-powered technology. So are weapons batteries that mount graviton or tractor beams (explainable as telekinesis) and heat rays (pyrokinesis).

A psi-powered system is half-price and may be available at a lower or divergent TL.



Psi Shielding (TL[^])

This psychotronic grid generates a telepathic mind shield that alerts the crew if a telepath outside the vessel attempts to affect or scan those within it. The system's resistance bonus is its TL-6 (minimum +2). Add the resistance bonus to IQ or Will when the occupants resist a mind-disruptor attack (p. 30) or an advantage with a telepathic power modifier. The shield also resists attempts to locate the occupants' minds using psionic abilities. Such powers must win a Quick Contest against an occupant's Will + the shield's resistance bonus. The GM may allow psi shielding to protect against *Communication* and *Empathy* or *Mind Control* spells (see **GURPS Basic Set** or **GURPS Magic**). The cost depends on the vessel's SM; see the *Psi Shielding Table* (below).

Psi Shielding Table

SM	+5	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
Cost (\$)	500K	1M	2M	5M	10M	20M	50M	100M	200M	500M	1B

Ram

A streamlined spacecraft with an armored front hull can be reinforced for ramming attacks. Double the dDR of its front-section armor vs. the crushing damage inflicted when it initiates a collision. The ram costs 50% of the price of the front section armor.

Regeneration and Self-Healing

The spacecraft's hull and structure materials incorporate swarms of self-repair microbots or nanomachines or, if a living thing, their biological equivalent. Damage is rapidly patched. If the vessel is reduced to $-5 \times \text{HP}$, it can no longer repair itself: There isn't enough structure left.

Regeneration (TL[^]): The spacecraft regenerates 1% of its dHP every minute. This option costs \$0.2M per ton of vessel mass, e.g., for an SM +7 (300 ton) spacecraft it costs \$60M.

Self-Healing (TL10 or TL[^]): As above, but the rate is per day. The option costs \$0.02M per ton of spacecraft mass.

Spin Tethers

A common method of producing higher spin gravity on small vessels is a *spin tether*: Two separate spacecraft with the same Size Modifier are linked by a cable and spun using the vehicles' reaction-control thrusters. Their separation is 100 yards (300') per G, and at least one of the vessels must have an external clamp system.

The cable must be carried in one vessel's cargo or hangar bay and is 1/20,000 of the mass of both vehicles per 100 yards of tether length. It costs \$10 per ton of loaded mass. If sufficient cargo space is available, the tether can be retracted. A spacecraft using spin tethers must retract them and cancel its spin before accelerating or changing facing.

Top Deck

A spacecraft can have a flat upper deck (like that of a seagoing ship) on one of its surfaces, where occupants can move about. A vessel with a top deck has a maximum air speed of 500 mph.

Behold the Wonkamobile. A thing of beauty is a joy forever. Places, please, the dance is about to begin. Better grab a seat, they're going fast.

– Willy Wonka, Willy Wonka and the Chocolate Factory

DESIGN SWITCHES

These are setting-specific design “switches”; added to any spacecraft, they emulate various scientific or setting paradigms. Specific switches are sometimes applied to *all* spacecraft in a campaign.

Accelerator Tube Limits

In a hard science campaign, GMs may rule certain weapon systems require massive linear accelerator tubes. This means they are only installed in spacecraft with a minimum hull size. This restriction is reasonably applied to particle beams, antiparticle beams, ghost particle beams, gamma-ray lasers, and X-ray lasers. The table below shows the minimum hull SM to install a weapon of this sort in a given battery. For example, a medium battery with a fixed mount weapon that required an accelerator tube could only be installed on an SM +11 or larger vessel. (Logically, if this switch is used, it means these weapons are unfeasible as personal weapons or on small vehicles.)

Minimum Hull SM for Weapons Table

Battery Type	Fixed	Turret
Spinal battery	+9	N/A
Major battery	+10	+12
Medium battery	+11	+13
Secondary battery	+12	+14
Tertiary battery	+13	+15

Drive Field

The drive field option (*GURPS Spaceships*, p. 31) can also be applied to ether and astral propulsion. Often a life support field (p. 23) is the only option for such a drive.

Exophase Drives: In some settings, the field generated by a warp or pseudovelocitv drive is the same as that of an exophase field (p. 8). If this is the case, activating a warp drive automatically puts the spacecraft into exophase; it cannot be used without doing so. There is no added cost if this is a standard setting feature; otherwise, a drive that is also an exophase field costs double the price of *both* of these components.

Etheric Cosmos and Ether Drives

In the 19th century (TL5) light was shown to be a wave, like sound, but what did it travel through, especially in the airless void of space? Physicists speculated the universe was filled with a tenuous form of matter so thin, solid planets passed through it unhindered. They named this substance the luminiferous (“light-carrying”) ether.

In addition to *Ether Propulsion* (pp. 7-8), reactionless engines (*GURPS Spaceships*, p. 24) can be defined as “ether engines” that interact with that substance for propulsion. This is a divergent technology (splitting from the mainstream path at TL5). For example, a TL10 standard reactionless engine can become a TL5+5 standard ether reactionless engine.

Exotic Force Screen Variants

The following expand the options for spaceship force screens. The cost modifiers need not be applied if the feature is standard for all force screens in the setting.

Force Wings: A vessel with the adjustable force screen variant can also try to extend and shape that screen to form streamlined, aerodynamic wings providing lift. Readjusting it to serve as force-field wings is an engineering task; it can be done whether the shield is powered up or not. When a screen is used this way its dDR is halved, but the spacecraft gains all the benefits of streamlining and the winged design option. (If it's already streamlined, it gains the benefit of being winged.) This option is incompatible with the energy and nuclear damper force-screen variants. It adds +50% to force screen cost. The screen must also have the adjustable variant (**GURPS Spaceships**, p. 32).

Life Support Field: A light force screen can have this option. It is low-powered (DR 0), sufficient only to create a bubble of atmosphere around the vessel. The field's radius is equivalent to the spacecraft's longest dimension (so a 100-yard ship has a field that protrudes 100 yards in either direction extending out from the hull). It provides no protection against attacks, but keeps out rain, snow, or gases (up to five atmospheres of pressure), and there is no risk of depressurization even if holes are blown in the hull. Similarly, in space people can venture onto the ship's surface without suits. A magically powered screen with a life support field is a good option for low-tech spacecraft (see the *Sealed Vessels at Low Tech Levels*, below). This is incompatible with other force field options. It is -80% to cost, and it can be integrated at no extra cost with a drive field (p. 22).

Sealed Vessels at Low Tech Levels

Spacecraft designed prior to TL5 need force screens to seal occupied areas against vacuum; materials technology is inadequate to do so on its own. (The simplest method is a life support field; see *Exotic Force Screen Variants*, above).

Boost Drives

Any reactionless drive (including ether or astral drives) can be designated a boost drive. Such designs instantly raise a ship to a substantial velocity without acceleration effects. Boost drives suffer other campaign-specific restrictions at the GM's option, e.g., not functioning, or reduced function, when close to a planet or star's gravity well.

Boost drives have a limited top speed (less than reactionless drives) but can reach that velocity immediately. Instead of constant acceleration, they have a set speed; the GM should establish a figure to suit his campaign. Multiply the acceleration of all boost drives by this base speed. Some suggestions are given below.

One game-balance issue is speeds suitable for local maneuvering and combat are too slow for lengthy interplanetary voyages. The GM can remedy this by giving boost drives a jump in performance under certain conditions, as when they are outside a world's gravity, or outside a solar system in interstellar

space. A sample set of numbers for converting reactionless drives into boost drives is:

- Top speed is 10 mps × acceleration within 10 planetary diameters of a world or other large celestial body.
- Top speed is 100 mps × acceleration outside the above radius but within a solar system.
- Top speed is that of light (as a lightspeed drive), or FTL-1 per engine (if a stardrive with the reactionless design switch) once outside a solar system (e.g., about 75 AU from a Sun-like star; see *Warp Drive*, **GURPS Spaceships**, p. 41).

The GM varies these figures as appropriate. For example, in a geocentric universe where solar systems sit within crystal spheres floating in an astral void, the GM may rule top speed (say, light speed or FTL) is only obtained when the crystal spheres are breached.

Boost drives always use the pseudovelocity design switch (**GURPS Spaceships**, p. 33), so there's no need to record this in the ship's description.

Boost drives can use cosmic power, drive field, negative mass propulsion, and stardrive (reactionless) design switches (**GURPS Spaceships**, pp. 31-33). Special rules apply to combat and travel with boost drives; see Chapter 2 for details.

Maturing Living Ship

Living spacecraft can become larger over time. To create such a race, the GM determines their longevity and growth cycles. A vessel can be bought as an infant and grown to adulthood. For simplicity, assume ships go through three growth phases and maturation takes (initial Size Modifier) years per phase:

Initial SM: Infant (or egg).

Initial SM + 1: Child (reached after (initial SM) years as an infant).

Initial SM + 2: Adolescent (reached after (initial SM) years as a child).

Initial SM + 3: Maturity (reached after (initial SM) years as an adolescent).

Whether the individual systems of the ship become larger (the usual assumption) or actually change from infancy to adolescence is up to the GM.

Higher-TL vessels benefit from bioengineering by maturing faster. At TL9, divide the time by 2; TL11, by 4; and TL12, by 8.

Slower Industrial Systems

The production capacity for industrial systems can be too high for economic realism or game balance (especially if they are owned by player characters). This design switch reduces the production or refining rate of mining, refinery, fabricator, robofac, nanofac, and replicator systems from "per hour" to "per day." Systems at TL5 drop to "per month" and at TL6, to "per week."

Hazardous Drives and Power Plants

Much of the mass of a fission rocket or reactor is radiation shielding. Any fission reactor, air-ram, or reaction engine can be built with minimal shielding. This doubles the acceleration of an engine or air-ram, or doubles the Power Points of a reactor, but makes the device dangerous. It is safe until turned on.

However, during operation it gives off a lethal radiation flux (6,000 rads/second). Once used it remains highly radioactive for the next few thousand years. The worst of the waste products decay after a few weeks of disuse, dropping the radiation to 2,000 rads/hour.

Full radiation applies only in the same system (e.g., in a workspace). Exposure is divided by 25 elsewhere within the same hull section and is negligible in other hull sections.

Spacecraft with unshielded engines or power plants are harder to maintain due to the difficulty of working with irradiated systems, and the risk of cumulative damage to other



components such as electronics. Apply a -1 to the vessel's HT for each *hull section* that contains any unshielded systems.

Hyperdynamic Field (TL⁺)

What if hyperspace is filled with a medium significantly denser than vacuum (or the ether)? A vessel with a hyperdynamic field generates a superscience energy field across its body surface that extends into this hyperspace even as the vessel itself occupies normal space. This generates friction; the result is that a spacecraft can then maneuver through space as if it were in an air-filled zero-g environment. Power requirement is negligible. The cost depends on the vessel's SM; see the *Hyperdynamic Field Table* (below).

For more details see *Hyperdynamic Cosmos* (p. 26) for operating parameters. The maximum speed a vessel can achieve varies, but depends mainly on its drag: Fast hyperdynamic craft are streamlined!

In some universes, a hyperdynamic field is an integral part of all reactionless drives. If so, the GM may assume the hyperdynamic field is part of the drive and need not be purchased separately.

Hyperdynamic Field Table

SM	+5	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
Cost (\$)	500K	1M	2M	5M	10M	20M	50M	100M	200M	500M	1B

No Computer

This is applied to a control room, particularly in divergent-technology vessels with (TL5+1) or (TL5+2). Computerized systems are completely replaced with manual systems. For targeting and navigational calculations officers rely on their own abilities and charts, slide rules, books of logarithmic tables, etc. Encyclopedias of planetary data, large libraries of expensive photo-slides, complex mechanical steering and stabilization systems, and bulky electromechanical keypunch devices all take the place of computers (and are just as expensive!).

A control room with no computer cannot be unmanned (i.e., built with no control stations).

In addition to being unable to benefit from any computer programs or run AI software, the following effects are applied:

Multitasking: All multitasking penalties are doubled. Ships with no computers tend to have larger crews!

Gunnery Tasks: Attacks are made at a -5 penalty. Point-defense fire is realistically impossible, but the GM may allow it at a further -5 penalty (total -10).

Sensor and Navigation Tasks: These take 10 minutes each; apply haste penalties from p. B346 to do them faster. Thus, trying to fight in 1-minute turns while performing navigation or sensor analysis requires a really skilled crew.

Communication Tasks: The rules for sensor and navigation tasks apply to signal-enhancement tasks.

Pre-Radio

This option, typical of TL5 and lower designs and their divergent technologies, can be applied to a control room or comm/sensor array. Sensor arrays use only optical telescopes (with no active sensors). No comm systems are included at TL3 or lower; and at TL4+, radio and laser communications are replaced with a heliograph for signaling.

Zombie Spaceships

These are undead vehicles created and reanimated via magic. They appear badly damaged or crippled, showing the violence that disabled them. They do not hold atmosphere, or do so only in a few compartments.

A zombie vessel behaves as if it had the Automaton meta-trait, with an IQ equal to its (modified) computer's (Complexity/2) + 3, regardless of whether originally sentient! If it did not possess any computer system, assign IQ 2.

They appear (and show on sensor arrays) as cripples. Their drives and power plants have no IR signature (*GURPS Spaceships*, p. 44); treat as minimal power.

Despite apparent damage, most systems still function. Exceptions are noted below.

Armor: Functions normally.

Control Room: Reduce computer Complexity by 1.

Comm/Sensor Array: Signals are scarily distorted, as if the person or machine using the communicator had Disturbing Voice (p. B132).

Force Screens: Zombie ships can spontaneously develop other force screen variants such as nuclear damper ("Nukes won't stop it!"), opaque ("Its screen was solid black"), or reality-stabilized ("Why can't we teleport out of here?").

Habitats: These no longer function (or optionally, only function if the spaceship wishes, so it can turn life support on or off, usually at inconvenient moments for any visitors). If they don't function, occupants have to look after their own life support needs. Automeds appear to function ("Looks like sick bay was sealed off") but may be imbued with the vessel's malign spirit. If used, they inflict 1d+1 cutting damage per turn as they flay and dissect the patient. (To escape, roll vs. ST-5 each turn to force the automed's lid open or disable it.) If a corpse is left in the automed for an hour or more, it is reanimated under the ship's control as per the Zombie spell (p. B252).

Power Systems: These provide exactly enough Power Points to operate all high-energy systems, but do not consume fuel, use up endurance, or produce excess power.

Fuel Tanks: These are no longer required, though the GM may rule a vampire ship needs a tank full of blood, which it devours at the usual rate of fuel consumption. Reaction engines no longer require reaction mass, effectively becoming reactionless engines, yet somehow are unable to accelerate faster than their original delta-V.

Weaponry: Ammunition is still required. If the battery runs out, it can't be used unless the vessel has appropriate factory systems to produce it or it captures more.

Except as noted above, a zombie vessel's performance statistics remain as they were in "life." Undead vehicles don't require maintenance, but lost HP are repaired normally.

Zombie Vehicle Spell

Creates an undead vehicle. The target must be disabled (i.e., 0 HP or less) but not utterly destroyed ($-5 \times \text{HP}$ or worse). Robotic vehicles must also have an intact computer.

Duration: Remains animated until destroyed.

Cost: 400 energy points per ton; minimum cost is 8.

Time to Cast: 1 minute.

Prerequisites: Animate Machine and Zombie.

Zombie vessels that had Regeneration or Self-Repair design features by virtue of being living creatures lose their abilities upon becoming undead.

STATISTICS

Statistics for divergent and paranormal spacecraft are calculated normally, but certain design choices and systems affect crew numbers and the performance stat block.

CREW

Some spacecraft are more labor-intensive than high- and ultra-tech vessels, as detailed in the lacks automation design feature (p. 20).

There were on board the ship a great number of officers and seamen, who had never yet gone South of the Tropics, consequently were to be initiated into the mysteries of crossing the Equinoctial line, and entering the dominions of Neptune . . .

*– John Bechervaise, **Thirty-Six Years of a Sea Faring Life***

Nonhuman Accommodations and Crew Stations

Statistics assume the occupants are typical humans: 1.5 to 2 yards tall, less than a yard across, around 150 pounds, and of course, human-shaped. The GM may modify the cabin equivalents in a habitat, control stations in a control room, workspaces in any system, or seats in passenger seating by the difference between the race's SM and the standard SM 0. For example, an SM +5 race treats its habitat as five SM *smaller* when determining the number of cabin equivalents. In general, large nonhumans have a minimum spaceship size of (their own SM + 4). So an SM +4 race operates ships of at least SM +8.

Races with the same SM but different body shapes can use each other's stations, seats, or quarters, although not comfortably. Assess a -1 (*or worse*) penalty on skill rolls when using controls designed for a significantly different species.

BASIC STATISTICS BLOCK

HT: The lacks automation feature adds +1 to HT. For each hull section with hazardous drives, apply a -1 to HT.

Hnd/SR: If the vessel's control room is one SM smaller, reduce Hnd and SR by 1.

AIR PERFORMANCE

Certain design features affect air performance.

Nautical Lines: The top speed is multiplied by 0.2 after other calculations.

Top Deck: The top speed cannot exceed 500 mph.

See also the description of ornithopter wing (p. 12) and helicopter rotor (p. 10) systems.

BOOST DRIVE

Boost drives further change performance calculations.

Hnd/SR: Replace the acceleration-derived modifier on the *Hnd Modifier* table (**GURPS Spaceships**, p. 35) with a flat +3 for the boost drive. Thus, a boosted spacecraft's Hnd is the Hnd value from the *Hull Table* + 3 (or +2 at TL7-8).

Move: Do not record an acceleration or delta-V. Instead, list a boost-drive spacecraft's (sublight) speed in miles per second, e.g., "**Move:** 300 mps." If the GM determines speed varies depending on proximity from a gravity well (or some other limitation), record the slowest speed and indicate the others with a footnote.

Air Speed: If capable of operating in atmosphere, use the space performance rather than the air performance. In practice, the speed can't exceed orbital velocity.

CHAPTER TWO

TRAVEL AND COMBAT

Spacecraft with boost and pseudo-atmospheric drives have special rules for travel and combat. This chapter explains how to use these drives and provides mechanics for the weaponry presented in Chapter 1.

Divergent and paranormal vessels may exist in a cosmos very different from our own. The bizarre features of such a universe affect how space travel works, as described in the *Fantastic Cosmology* section.

FANTASTIC COSMOLOGY

In some fantasy and science-fiction settings, space itself behaves differently.

THE CRYSTAL SPHERES

In early models of geocentric cosmology, the sun and planets rotated around Earth, attached to invisible crystal spheres powered by divine movers, with the “fixed stars” on the outermost non-rotating shell. The universe’s boundaries may be somewhat circumscribed: For example, in Ptolemy’s cosmos (a standard model in the Middle Ages) the moon was the correct distance from Earth, but other planets were much nearer, and the fixed stars a mere 80,000,000 miles (0.86AU) away. Complicated sub-motions, called epicycles, were invented to ensure they matched the observed motions of the sun and planets, but a fantasy world could avoid this with heavenly bodies in circular orbits.

If the crystal spheres are themselves ethereal in nature (as was often believed), it’s possible a vessel simply passes through them to visit other solar systems (if these exist). Outer spheres might form a barrier to travel, in which case a stardrive engine is required to “break through” them. What lies beyond may be some form of astral space or hyperspace – perhaps best treated as if it *were* hyperspace, with the normal rules for travel in place.

THE EDGE OF THE WORLD

A flat or gently curving world can have a literal edge! If so, there may be no such thing as a planetary orbit. Perhaps air and gravity terminate as soon as this limit is crossed and a vessel pushed or sailed off finds itself drifting in space.

HYPERDYNAMIC COSMOS

In this universe, hyperspace has *friction*, and spaceships extend special fields or wings into it to maneuver much like flying in the air. This is a justification for having spaceships maneuver in cinematic fashion.

The GM must set the *hyper-factor* of hyperspace. A factor of 100 (constant at all TLs) is the default, but it can be less or more. It’s possible various “levels” of hyperspace exist, with other factors accessible to higher-TL fields, or the value can go up with increasing distance from a stellar or planetary mass. The hyper-factor could vary by region of space. Hyperspace might even have currents, winds, or calms that locally modify the hyper-factor or the vessel’s speed.

A spacecraft in a hyperdynamic field maneuvers exactly like an aircraft, flying in a pseudo-atmosphere in zero gravity. Thus, it has no stall speed but is still affected normally by the gravity of planets and stars.

With this option, spacecraft benefit from streamlined hulls even if they never enter atmosphere.

Handling: Use the Air Performance Hnd/SR modifiers.

Hyperdynamic Top Speed: Use the top air speed except the acceleration performance is based on those engines that function in vacuum (that is, jet engines and rotors don’t count). Then multiply the top speed by the hyper-factor, representing the reduced drag of hyperspace compared to normal air.

AIR-FILLED COSMOS

What if the universe was full of air and the motions of the planets and stars were driven by aetherial winds? In game terms this works just like a hyperdynamic cosmos, except there’s no need for a doubletalk hyperdynamic field generator and top speed is not multiplied by a hyper-factor. If the medium is breathable the vessel doesn’t require air, and habitats get by with no life support even without magic. If so, the bonus doubles the effective number of cabins, as for *Magical Life Support* (p. 9). These qualities might only exist in or near planetary- and solar system-scale megastructures.

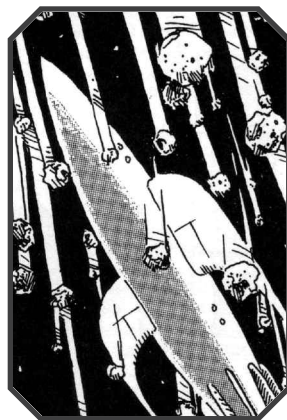
Interstellar voyages are possible in an air-filled cosmos. The GM may determine the stars are a lot closer or allow vessels to sail into natural wormholes (“aether vortices”), or the eye of a celestial storm could emerge in another star system!

BOOST-DRIVE MOVEMENT

Spacecraft using boost-drive movement can instantly accelerate or decelerate, so all that matters is their *top speed* (in miles per second).

TRAVEL

A vessel traveling with a boost drive typically cruises at its top speed, but it can operate at any velocity up to that value. Since it doesn't accelerate, the calculation for travel time is simple: multiply the cruising speed by the time spent cruising. The formulas given below specify how to calculate travel times for various distances.



Getting into Space

The requirements for *Getting into Space* (see **GURPS Spaceships**, p. 37) apply to boost-drive ships, but use the top speed instead of delta-V. There is no need for acceleration to exceed the world's gravity since acceleration is instant. Thus, to reach orbit, a vessel needs a top speed of 80% of that world's escape velocity. Time required to get into space is simply the time needed to boost from the surface directly out of the planet's atmosphere.

Space Travel with Boost Drives

For long-range journeys measured in astronomical units, the formula is:

$$\text{Travel time (days)} = tD \div 1,076/V.$$

tD is the distance to the destination in astronomical units (AU). V is the cruising speed in miles per second, up to a maximum of the spacecraft's top speed using boost drive.

Since planets and other bodies in a solar system orbit the star at different velocities, a boost drive needs a higher top speed than the difference between the orbital velocity it begins with and the orbital velocity of the destination. (This assumes the bodies orbit the star in the same direction, as is normally the case. If not, use the sum of their velocities.). For orbital velocities for planets in our solar system, see the *Solar System Travel Table* (**GURPS Spaceships**, p. 37).

Example: The starship *Dawn's Arrow* has a boost drive with a top speed of 60 mps. Traveling from Earth to Mars (1.5 AU) takes $1.5 \times 1,076/60 = 26.9$ days (or 26 days, 21 hours, and 36 minutes). Earth orbits the sun at 18.5 mps; Mars at 15.1 mps; the difference is 3.4 mps. This is well within the top speed of *Dawn's Arrow*, so there is no problem matching velocities.

Limitations

The GM may opt to limit boost drives in much the same way as stardrives. For example, they may not work in close proximity to a planet's gravity well, thus requiring some other propulsion system to reach orbit or fly in atmosphere. The boost-drive design switch (see p. 23) presents one possible set of modifiers.

BASIC COMBAT

Boost drives move differently from other drives, and this affects combat.

Turn Length and Encounter Distance

If the reference vessel (see *Turn Length* in **GURPS Spaceships**, p. 48) uses a boost drive, refer to the table below to determine a suitable combination of turn length and encounter distance. Find the top speed of one of its boost drives (its fastest boost engine, sail, etc.) and cross-index it with the chosen encounter scale to find the suggested turn length. A "no" means none of the turn scales are suitable; try a different encounter distance or use another vessel as the reference spacecraft.

Scale Table for Boost Drives

Top Speed	Close-Scale	Standard-Scale	Distant-Scale
3 mps+	20-second	1-minute	10-minute
10 mps+	no	20-second	3-minute
30 mps+	no	20-second	1-minute
100 mps+	no	no	20-second

Example: The starship *Dawn's Arrow* has two boost engines, each rated for a top speed of 30 mps. If we chose a standard scale (based on its weapon ranges), a suitable time scale would be a 20-second turn.

Acceleration Bonus and Speed Bonus

Boost drives don't accelerate; instead they have a speed bonus. A speed bonus is used in all respects like an acceleration bonus. When pilot maneuvers refer to an acceleration bonus, read it as a speed bonus.

To achieve a speed bonus, the spacecraft requires at least one functional boost drive. Drives are rated for their top speed, and high-energy systems [!] only apply while allocated power.

To determine the speed bonus, refer to the *Acceleration Bonus Table* (**GURPS Spaceships**, p. 55). Ignore the requirement for acceleration (G) in the "Requirements" column. Instead, use the parenthetical miles per second (mps) as the minimum top speed required for a +2 speed bonus. (Each +1 bonus is half the required mps).

Example: The starship *Dawn's Arrow* has two engines with a top speed of 30 mps each for a total of 60 mps top speed if both are powered up. It is fighting a space battle at standard scale with 20-second turns. The *Acceleration Bonus Table* shows the requirement is 10 mps per +2. Therefore, if it moved at 60 mps, its speed bonus is +12.

TACTICAL COMBAT

These rules explain how to adapt boost-drive vessels to the tactical combat system presented in **GURPS Spaceships 3: Warships and Space Pirates**.

A boost-drive spacecraft in this system is rated for its Movement Points (MP). Using its top speed, calculate MP based on the hex scale and turn length on the *Movement Points Table* (p. 28).

If boost-drive engines can be powered up individually, calculate the MP per engine.

Movement Points Table

Turn Scale	10-mile	100-mile	1,000-mile	10,000-mile
20-sec.	mps × 2	mps/5	mps/50	mps/500
1-min.	mps × 6	mps × 2/3	mps/15	mps/150
3-min.	mps × 20	mps × 2	mps/5	mps/50
10-min.	mps × 60	mps × 6	mps × 2/3	mps/15

Example: The *Dawn's Arrow* has a top speed of 30 mps per boost drive. If the tactical space battle is fought at 100-mile hex scale using 20-second turns, each engine has $30/5 = 6$ MP. Note this value is identical to the speed bonus it receives in the basic space combat system.

Movement Points

Vector counters are not used for boost-drive movement. Spacecraft move during their pilot's maneuver step rather than the space movement phase. Vessels expend some, none, or all of their MP during a turn; unused MP do not accumulate from turn to turn. A spacecraft regains all its MP each turn, provided its drives are powered up.

It costs one MP to enter each hex when moving forward. "Forward" is a move into one of the spacecraft's three front hexes. Going directly ahead, facing doesn't change. Otherwise the spacecraft turns one hex side (if it goes into its forward-left hex, it must turn one hex side to the left as it goes). Thus, a boost spacecraft can change direction or even turn about while moving "forward" by maneuvering in a wide circle. A vessel can keep its original facing by spending an extra MP.

At the end of a pilot's turn, if his spacecraft used up to half its MP it can turn to face any direction. If it used more than half its MP, it can change facing by one hex-side. It can also change facing before or during movement, but this costs one MP per hex side.

Boost Drives and Vector Movement: GMs may combine the vector and boost-drive movement rules. A boost-drive spacecraft may also have a vector counter if it's affected by gravity, or was launched by a moving ship, or has a conventional maneuver drive rated for acceleration in G. It is possible to move using boost-drive and vector movement simultaneously.

Heliographs

Heliographs are a means of signaling with the pre-radio design switch. A stabilized heliograph is standard equipment in a control room or comm/sensor array built at TL4 and higher.

A heliograph consists of a mirror and a sighting device. A pulse code is sent by moving a reflected beam from the mirror on and off the target. Messages cannot be sent while the vessel is maneuvering or using spin gravity.

The transmission rate is the same as telegraphy (see Electronics Operation (Communications) skill, p. B189). Use the *Active Sensor and Comm Range Table* (*GURPS Spaceships*, p. 45) to determine range, reading the range on the table as "tens of miles."

For interplanetary communications, a solar mirror or lightsail can be pressed into service as a giant heliograph. Look up the operating ship's SM on the *Active Sensor and Comm Range Table*, reading that as the "level" of the array. The result is the range in AU. A solar mirror sends signals at the same speed as a heliograph. A lightsail is slow to manipulate and can send, at best, a few characters per hour.

PSEUDO-ATMOSPHERIC MOVEMENT

This movement system lets spacecraft maneuver like airplanes. It is suitable for both a fantastic air-filled cosmos and spacecraft using hyperdynamic fields.

TRAVEL

Spacecraft can accelerate to their top speed in a matter of minutes; thus, space travel is effectively the same as for boost-drive vessels (p. 27).

BASIC COMBAT

Spacecraft maneuver using the normal basic combat rules, with the following exceptions to the pilot maneuver rules. These are drawn from the optional rules in *GURPS Spaceships 4: Fighters, Carriers and Mecha*:

1. You cannot choose a controlled drift maneuver – you have to pick a maneuver that requires acceleration, or use an uncontrolled drift.

2. You cannot choose a closing maneuver against an enemy spacecraft if the target was, on its last turn, advantaged against you, *and* the target's pilot decided that your vessel's rear hull faced toward his craft.

3. Fast passes are not allowed.

TACTICAL COMBAT

Use the rules as described in *Spaceships 3*, except as noted below. The rules for vector counters are not used. Instead, record each spacecraft's or missile's current velocity in hexes/turn on scrap paper.

Tactical Maneuvering

Spacecraft do not wait until the movement phase to move. Instead, they move during their tactical maneuvering phase, combining maneuver and movement.

Each turn, a vessel gets thrust points equal to its current thrust rating. The pilot spends any thrust points during phase 4, piloting tasks, on his turn. He must also move his vessel. Spacecraft can launch, enter formation, rendezvous, and recover under certain circumstances. All happen during the same piloting phase. However, acceleration or deceleration must occur before movement.

At the start of a spacecraft's turn its pilot can use thrust points to accelerate or decelerate, or can choose to coast and retain its current velocity. Then the spacecraft moves in the direction it faces. Unused thrust points can change the spacecraft's facing and thus its direction of movement.

A spacecraft can accelerate or decelerate before it moves. The thrust points used are added to or subtracted from its velocity. For example, if a spacecraft at velocity 5 uses two thrust points to accelerate, its velocity becomes 7. A spacecraft cannot decelerate below 0 velocity.

When a spacecraft moves, its position counter is moved directly forward into the hex in front of it. Unless the vessel turns, it moves forward a number of hexes equal to its current velocity (after any acceleration or deceleration). A vehicle at velocity 7 moves seven hexes directly forward unless it turns (see below).

Moving spacecraft can change facing during their movement by expending any remaining thrust points that were not used for acceleration or deceleration. It costs a number of thrust points equal to the spacecraft's current velocity to change facing by one hex side. This also changes the spacecraft's direction of movement.

Spacecraft are *also* limited by the *Facing Change Table* in *Spaceships 3* (p. 28). Thus, a SM +13 vessel in a 20-second

turn could not change facing by more than one hex side, even if it had sufficient thrust points left to do so.

To dodge, a spacecraft must have spent at least one thrust point. To qualify for an evasive maneuver bonus, it must have changed facing this turn. (There is no need to both change facing and accelerate, as in the standard rules.)

Fractional Thrust and Extended Burns

If a spacecraft has a fractional thrust rating, it requires multiple turns (an *extended burn*) to accumulate thrust points. It can only accelerate, decelerate, or turn; it cannot combine these. For example, a vessel with thrust rating 1/50 requires a 50-turn extended burn to produce one thrust point.

Launched Craft

Launched craft *always* have the same facing as the launching vehicle.

Formations, Rendezvous, Docking, and Recovery

A spacecraft is considered to be "in formation" (see *Formations*, *GURPS Spaceships*, p. 65) with another vessel if their position counters are in the same hex; both craft face the same direction; and both have the same velocity.



Gun and Missile Salvos

Place the salvo's position counter in the same hex as the launching vessel's position counter, facing the same direction, and give it the same velocity. Missile counter facing is important; use the same rules as spacecraft.

CONSUMABLES

In addition to those fuels and consumables listed in *GURPS Spaceships* (pp. 46-47), the following logistical considerations are significant.

FUEL

Ablative plastic (for laser rockets) costs \$80 per ton.

Nebulonic fuel (for ether furnaces) costs \$4,000 per ton. Recharging an ether furnace power plant is 25% of the cost to refuel a tank for that same SM of vessel.

SUPPLIES

Low-tech spacecraft face additional challenges since they lack advanced life support systems. Even if a ship has magical life support, much of its magical enchantment is invested in providing air. Whether it offers drinking and bathing water, fresh food, etc. is up to the GM (and the availability of spells like *Create Food* and *Create Water*).

Before TL5, canning hasn't been invented and fresh food tends to spoil within a month or so. There are plenty of other

foods that keep longer, but scurvy (induced by vitamin-C deficiency, caused by a lack of fresh fruit) is a serious threat after several weeks in space.

The figures for supplies given in *GURPS Spaceships* (*Food*, p. 47) assume partial recycling of water via the ship's life support system. If a spacecraft has magical life support based on *Create Air* spells but lacks the ability to *Create Water*, the mass required is one ton of water per 100 man-days (\$20 per ton).

These issues can be avoided with the listed spells; by using crews who need not eat or drink, such as golems or zombies; or even by placing passengers in suspended animation or turning them into stone for the voyage. *GURPS Magic* provides many spells that can help with logistical problems.

WARHEADS

Ammunition for TL3-6 conventional guns has its usual mass but is one-tenth the cost. Catapult ammunition has the same mass as that of electromagnetic guns, and rocket launchers use missile ammunition; both of these are also one-tenth the cost. Nuclear warheads are unavailable before TL7.

WEAPONRY

Special rules apply to some of the weapons described in this book.

Slow Rate of Fire for TL3-5 Guns, Rockets, and Catapults

Catapults, rocket launchers, and TL3-5 guns use the *Slow Rate of Fire Table* (below).

Slow Rate of Fire Table

Class of Weapon	20-sec.	1-min.	3-min.	10-min.
Catapult,				
TL3 Gun, to 20cm†	1*	1	3	10
TL4-5 Gun, to 14cm†	1	3	10	30
TL4-5 Gun, over 14cm†	1*	1	3	10
Rocket Launcher,				
TL3 Gun, over 20cm†	1‡	1‡	1‡	1

* Takes two 20-second turns to reload after firing.

† If fixed mount, multiply RoF by the number of fixed mounts in the battery. Double the RoF of improved guns, but note these are only available for TL5 guns of 6cm or less and for TL6 guns.

‡ Takes 30 turns (20-second scale), 10 turns (1-minute scale), or three turns (3-minute scale) to reload after firing.

Proximity and Timed Fuses with TL3-6 Guns, Rockets, and Catapults

Proximity fuses are unavailable at TL3-6. Instead these weapons use timed fuses on their warheads.

Timed Fuse: These are treated as proximity fuses, but reduce the bonus they provide to +1 at TL4-5 or +2 at TL6.

Electromagnetic Disruptors (EM Disruptors)

These superscience beam weapons temporarily disrupt electronics or computer systems without affecting the vessel itself or its occupants. They have no effect on non-sentient entities or those with the Digital Mind advantage.

DR protects normally against them, but they do not inflict their damage on the ship's HP. If the beam's penetrating damage is at least 10% of the ship's dHP, whichever TL7+ system it hits is disabled as vital electronics fail. (Exceptions: armor, cargo hold, engine room, hangar bay, fuel tank, radioisotope sail, soft landing, solar mirror, and any previously disabled systems.) If the penetrating damage exceeds half the ship's dHP, it affects any such vulnerable systems in the hull section hit. If it's equal to or greater than the ship's dHP, it affects every vulnerable system in the entire vessel.

No damage is actually inflicted to the vessel's dHP, nor is damage cumulative over time.



Mind Disruptors

These beam weapons affect occupants without affecting the vessel itself. They have no effect on non-sentient entities or those with the Digital Mind advantage.

Normal DR is ineffective against them but force screens protect at 1% of dDR. If the beam's penetrating damage is at least 10% of the ship's dHP, any being in the *system* struck is affected. They must make a Will-6 roll to resist (Will-3 beyond 1/2D range). If the penetrating damage exceeds half the ship's dHP, it affects anyone in the *hull section* hit. If it is equal to or greater than the ship's dHP, it affects every being in the entire vessel.

No damage is actually inflicted to the vessel's dHP, nor is damage cumulative over time. A mind disruptor has the No Wounding modifier: Damage is only rolled to determine whether people are affected.

Mind shields and psi shielding (p. 21) add to the roll to resist.

Mind disruptor hits produce one of the following effects, chosen before firing.

Hypnagogic Beam: The standard mind disruptor fires a beam of telepathic noise. If the victim fails to resist, he suffers the daze incapacitating condition (p. B428). He is unable to act until struck or shaken, or until a number of minutes pass equal to his margin of failure. If he fails by 5 or more he falls unconscious (p. B429) and is dazed as above after recovery. It also disrupts short-term memory: Victims never remember what happened to them during the second they were shot, or the second before that.

Death Beam: This beam carries a hypnotic compulsion to die. If the resistance roll fails, the victim suffers the choking incapacitating condition (p. B428) for a number of seconds equal to twice his margin of failure. There's nothing lodged in his throat, but he loses 1 FP per second unless he doesn't need to breathe. If he fails by 5 or more, the victim suffers the heart attack mortal condition.

Insanity Beam: This beam unleashes bizarre and terrifying visions from the victim's subconscious mind. He suffers the hallucinating incapacitating condition (p. B429) for one minute times his margin of failure. If he fails by 5 or more, the result is a coma (p. B429) in which he is tormented by horrific dreams. If the victim survives the coma, he gains the Nightmares (12) disadvantage for 1d weeks after.

Psionic Neutralizer: If psychotronic technology exists, psionic neutralizer is another possible setting for neural and mind disruptors. The beam scrambles the areas of the nervous system that control psi powers. Anyone struck loses all his psionic powers for a number of minutes equal to his margin of failure.

New Beam Weapons Table

TL	Weapon	Damage	sAcc	Range	Rcl
5+2^	Lightning Cannon*	burn sur(2)	-3	R1	1
10^	EM Disruptor	special	0	R2	1
11^	Mind Disruptor	special	0	R2	1

* See p. 19 for details.

CHAPTER THREE

FANTASTIC

SPACECRAFT

This chapter presents examples of unusual spacecraft designed with this expansion. These vessels draw from several tech paradigms, but all involve the use of divergent technology, magic, or superscience.

GURPS has no default interstellar background setting, so there are thousands of possible combinations of spaceship

systems and degrees of superscience. However, since the basic **GURPS Spaceships** system is modular, it's easy to swap out components and adjust designs to fit a campaign. Feel free to remove any system and replace it with another, adjusting statistics according to **GURPS Spaceships** rules.

MAGICAL SHIPS

GURPS Spaceships is optimized for vessels TL7 and up. However, low-tech spacecraft exist in some fantasy settings where the cosmology makes it possible. In a world where sails catch the astral winds, and planets and stars move on crystal spheres, who is to say an enterprising wizard cannot reach these heavens?

Vessels of this sort often have the boost-drive design switch (p. 23), but this option has not been added to allow easier customization.

*I must down to the seas again,
to the lonely sea and the sky,
And all I ask is a tall ship and a
star to steer her by,
And the wheel's kick, and the
wind's song and the white sail's
shaking . . .*

– John Masefield, “Sea Fever”

STAR GALLEON (TL4⁺)

A star galleon is a wooden-hulled sailing ship, but it is equipped with enchanted astral sails enabling it to fly in the air and voyage through space. It uses a 300-ton (SM +7) streamlined hull 90 feet long with nautical lines. It also functions as a conventional sailing ship. Most crew are gunners and loaders

for the several black-powder muzzle-loading cannon carried aboard. They also serve as a boarding party when capturing other vessels or raiding ashore.

Front Hull System

- [1] Etherwood Armor (dDR 1).
- [2] Wooden Armor (dDR 1).
- [3-4] Habitat (magical life support; four bunkrooms each).*
- [5] External Clamp (for ship's boats).
- [6] Cargo Hold (15 tons capacity).

Central Hull System

- [1] Etherwood Armor (dDR 1).
- [2] Wooden Armor (dDR 1).
- [3] Secondary Battery (six fixed mounts with 10 cm guns; six tons cargo).*
- [4] Astral Sails (0.1G acceleration).*
- [5] Cargo Hold (15 tons capacity).
- [6] Astral Sails (0.1G acceleration).*
- [core] Habitat (magical life support; three bunkrooms and one cell).*

Rear Hull System

- [1] Etherwood Armor (dDR 1).
- [2] Wooden Armor (dDR 1).
- [3] Habitat (magical life support; bunkroom and three-bed sickbay).*
- [4] Medium Battery (two fixed mount 12cm guns; five tons cargo).*
- [5] Habitat (magical life support; two cabins, two bunkrooms).*
- [6] Control Room (three control stations, pre-radio, no computer).*
- [core] Cargo Hold (15 tons capacity).

* One workspace per system.

The ship has nautical lines and a top deck, and lacks automation. It has the drive-field design switch with a low-power life support field.

Crew consists of a captain, two officers (one of whom is usually a mage, if the captain is not), a surgeon, 10 sailors (who also serve as loaders), and six gunners.

TL	Spacecraft	dST/HP	Hnd/SR	HT	Move	LWt.	Load	SM	Occ	dDR	Range	Cost
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PILOTING/TL4 (HIGH-PERFORMANCE SPACECRAFT)

4^	Star Galleon	50	-3/4	13	0.2G/c	300	62.4	+7	64ASV	2	–	\$5.59M
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In atmosphere, air speed is 200 mph and Hnd/SR is -1/4.

*He's the king of the
ninth world,
The twisted son of
the fog bell's toll.
In each and every
lobster cage,
A tortured human
soul.*

– Sting,
“The Soul Cages”

SOUL SLAVER (TL3^)

An enchanted warship created by a mighty necromancer, this dread craft is built with a 300-ton (SM +7) streamlined hull 90 feet long. The sleek exterior is decorated with sinister sigils and the bow terminates in a skull-headed adamantine ram. It has ether sails, but its real speed comes from its astral screw, the power for which is provided by a soulburner. The vessel is also armed with a magical artifact: a powerful lightning-bolt thrower fed by the souls of the damned! To sate the ravenous appetite of this infernal device, *Soul Slaver* holds room for a few dozen captives, who rot in its brig until their souls are devoured. In addition to its crew (see below), the

ship's master can pack the cargo holds with undead, who won't strain its life support.

Soul Slaver is designed as a comfortable nest for an evil mage, with a luxury cabin and a magical laboratory. Unlike other low-tech ships, it does not have the lacks automation feature. The necromancer has spirits bound into the vessel to perform such routine tasks.

Front Hull System

- [1-2] Adamant Armor (total dDR 4).
- [3] Etherwood Armor (dDR 1).
- [4!] Medium Battery (fixed mount 30 MJ lightning beam, magic-powered; 10 tons cargo).
- [5] Habitat (magical life support; four bunkrooms).
- [6] Cargo Hold (15 tons capacity).

Central Hull System

- [1] Etherwood Armor (dDR 1).
- [2-4] Habitats (magical life support; four cells each).
- [5] Habitat (magical life support; four bunkrooms).
- [6] Astral Sail (0.1G acceleration).
- [core] Cargo Hold (15 tons capacity).

Rear Hull System

- [1] Etherwood Armor (dDR 1).
- [2] Habitat (magical life support; magical laboratory, luxury cabin).
- [3] Engine Room (one workspace).
- [4] Cargo Hold (15 tons capacity).
- [5] Control Room (three control stations, pre-radio, no computer).
- [6!] Astral Screw (magic-powered; 0.2G acceleration).
- [core] Soulburner (two magic Power Points when fed).

The ship has nautical lines and a ram. It has the drive field design switch with a low-power life support field.

Crew consists of three officers (including the master), one sailor, and one gunner. Several additional minions can serve as companions, a boarding party, and prison guards.

TL	Spacecraft	dST/HP	Hnd/SR	HT	Move	LWt.	Load	SM	Occ	dDR	Range	Cost
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PILOTING/TL3 (HIGH-PERFORMANCE SPACECRAFT)

3^	Soul Slaver	50	-3/4	13	0.3G/c	300	63.2	+7	82ASV	5/1/1	–	\$6.15M
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In atmosphere, air speed is 300 mph and Hnd/SR is -1/4.

STEAMPUNK AND WEIRD-SCIENCE SHIPS

What if Victorian inventors had developed spaceships? They're just the thing for extending the Earthman's Burden to Mars or Venus, don't you know. Or perhaps these ether ironclads are the answer to Mr. Wells' Martians if they get uppity!

Other divergent technological and superscience assumptions lead to different sorts of spacecraft. The psi-jammer (detailed below) comes from a universe advanced in both psionic research and psi-technology ("psychotronics").

ETHER STEAMSHIP (TL5+2^)

An elegant spaceship from a Victorian age that never was, it may be the pioneering creation of a brilliant inventor, or a space yacht carrying bureaucrats and adventurers to the farthest corners of Her Majesty's Solar Empire. This 300-ton vessel (SM +7) uses an unstreamlined, iron-clad etherwood hull to reach high altitude, then ether screws powered by a closed-cycle solar steam engine for interplanetary travel. Despite the limited space aboard, the interior is luxuriously fitted out with fine woods, paintings, and furnishings. There are cabins for the captain and passengers and bunks for the crew, as well as a small library and science lab. There are no weapons aboard aside from any small arms carried by the crew.



TL	Spacecraft	dST/HP	Hnd/SR	HT	Move	LWt.	Load	SM	Occ	dDR	Range	Cost
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PILOTING/TL(5+2) (HIGH-PERFORMANCE SPACECRAFT)

5+2^	Ether Steamship	50	-3/4	13	0.2G/c	300	47	+7	20ASV	3	-	\$4.92M
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In atmosphere, air speed is 100 mph and Hnd/SR is -1/4.

ETHER IRONCLAD (TL5+2^)

The naval cousin of the ether steamship, this 10,000-ton ironclad space battleship shows the flag and projects imperial power to distant parts of an interplanetary empire. It has an unstreamlined hull 300 feet long (SM +10).

It is heavily armed with two batteries of six-inch turret-mounted rifled guns, a battery of two-inch mechanical rotary cannons, an experimental heat-ray (based on a recovered Martian artifact), and a magnetic tractor beam.

The ironclad carries a complement of marines for colonial operations; to that end, it is capable of deep space flight and serves as an aerial battleship. It is waterproof and lands on the ocean where a space port is not available. However, its two etherwood systems provide 2/3G of lift – sufficient for levitation on Mars, the Moon, or Mercury, but not to overcome Mother Earth's embrace. Thus, it was probably built in space or at a colonial navy yard.

Front Hull System

[1]	Iron Armor (dDR 2).
[2]	Etherwood Armor (dDR 2).
[3-4]	Habitats (one luxury cabin each).*
[5]	Habitat (cabin and office [as library]).*
[6]	Habitat (cabin and bunkroom).*
[core]	Control Room (three control stations, comm/sensor 3, no computer).*

Central Hull System

[1]	Iron Armor (dDR 2).
[2]	Etherwood Armor (dDR 2).
[3]	Habitat (lab).*
[4]	Habitat (two-bed sickbay).*
[5]	Habitat (two bunkrooms).*
[6]	Cargo Hold (15 tons capacity).

Rear Hull System

[1]	Iron Armor (dDR 2).
[2]	Etherwood Armor (dDR 2).
[3]	Solar Mirror (powers solar boiler).*
[4!]	Ether Screw (0.2G acceleration).*
[5-6]	Cargo Holds (30 tons total capacity).
[core]	Solar Boiler (one Power Point with solar mirror).*

* One workspace per system.

It has artificial gravity and lacks automation. Crew consists of three control room officers, a surgeon, a purser, and 11 technicians.

Front Hull System

[1-2]	Iron Armor (total dDR 14).
[3]	Etherwood Armor (dDR 4).
[4]	Habitat (5 cabins, 25 bunkrooms and 150 tons cargo).*
[5]	Medium Battery (three turrets with 20cm TL5 guns).*
[6]	Solar Mirror (for one solar boiler).*
[core]	Control Room (10 control stations, comm/sensor 6, no computer).*

Central Hull System

[1-2]	Iron Armor (total dDR 14).
[3!]	Medium Battery (two turrets with 1 GJ heat rays and one turret with 1 GJ magnetic tractor beam).*
[4]	Solar Boiler (one Power Point).*
[5]	Solar Mirror (for one solar boiler).*

<i>Central Hull</i>	<i>System</i>
[6]	Tertiary Battery (10 turrets with TL5 7cm rapid fire conventional guns; 300 tons cargo).*
[core]	Habitat (25 cabins, 25 bunkrooms, briefing room, two offices, one science lab, and five-bed sickbay).*
<i>Rear Hull</i>	<i>System</i>
[1]	Iron Armor (dDR 7).
[2]	Etherwood Armor (dDR 4).

<i>Rear Hull</i>	<i>System</i>
[3]	Medium Battery (two turrets with 20cm TL5 conventional guns; 150 tons cargo).*
[4]	Solar Boiler (one Power Point).*
[5-6!]	Ether Screws (0.2G acceleration each).*
* 10 workstations per system.	
It has artificial gravity and lacks automation. Crew consists of a captain and nine control room officers, a surgeon, 15 gunners, and 130 technicians. It also carries a company of marines.	

TL Spacecraft dST/HP Hnd/SR HT Move LWt. Load SM Occ dDR Range Cost

PILOTING/TL(5+2) (HIGH-PERFORMANCE SPACECRAFT)

5+2^ Ether Ironclad 150 -4/4 14 0.4G/c 10,000 626 +10 260ASV 18/14/11 – \$275M

In atmosphere on a world with no more than 0.66G, air speed is 200 mph and Hnd/SR is -2/4.

PSI-JAMMER (TL11^)

This is a multipurpose vessel for a universe where psi powers have merged with science and starships are powered psychokinetically. A psi-jammer serves as a commercial trader, an explorer, and, if necessary, a warship. Psionic energy powers all major systems. It uses a 100,000 ton (SM +12) unstreamlined hull 600 feet in diameter.

It has a large suspended-animation capacity for transporting a mass of “normals” to new worlds; psi-jammer crews prefer not to carry normal passengers as the buzz of their unshielded thoughts is distracting. The vessel has two minor oddities for its size: It has no briefing rooms (as everyone is telepathic!) and no sickbay (as psionic healers are used).



<i>Front Hull</i>	<i>System</i>
[1]	Nanocomposite Armor (dDR 100).
[2-4!]	Stardrive (subwarp, psi-powered).*
[5]	Habitat (2,000 hibernation chambers; 500 tons cargo).*

<i>Front Hull</i>	<i>System</i>
[6]	Psychotronic Power Plant (two psionic Power Points; 100 psis).*
[core]	Control Room (C11 computer, comm/sensor 12, and 20 control stations).*
<i>Central Hull</i>	<i>System</i>
[1]	Nanocomposite Armor (dDR 100).
[2!]	Major Battery (fixed 30 GJ mind disruptor, psi-powered).*
[3]	Cargo Hold (5,000 tons capacity).
[4]	Psychotronic Power Plant (two psionic Power Points; 100 psis).*
[5!]	Light Force Screen (dDR 300; psi-powered).*
[6]	Major Battery (fixed 30 GJ tractor beam; psi-powered).*
[core]	Habitat (250 cabins, five establishments, 10 science labs, and 1,600 tons cargo).*
<i>Rear Hull</i>	<i>System</i>
[1]	Nanocomposite Armor (dDR 100).
[2]	Hangar Bay (3,000 tons capacity).*
[3!]	Contragravity Lifter (psi-powered).*
[4]	Open Space (one acre of gardens, for meditation and extra life support).*
[5-6]	Cargo Holds (total 10,000 tons capacity).
* 10 workspaces per system.	

It rotates for spin gravity (0.5G) and has the FTL comm/sensor array, multiscanner array, stardrive (reactionless), and boost-drive design switches. The force screen is adjustable and reality-stabilized.

Crew consists of 20 control room crew, 20 scientists (some of whom may be psionic healers), 200 psis for the generator, and 150 technicians.

TL Spacecraft dST/HP Hnd/SR HT Move LWt. Load SM Occ dDR Range Cost

PILOTING/TL11 (HIGH-PERFORMANCE SPACECRAFT)

11^ Psi-Jammer 300 1/5 13 1,500 mps‡ 100,000 20,150 +12 500ASV* 100† 3× \$7.982B

* Plus 2,000 in suspended animation.

† Plus dDR 300 if force screen is powered up.

‡ Slowest speed, within 10 AU of world; see *Boost Drives* (p. 23).

OPERATOR-CLASS REALITY POLICE CRUISER (TL12^)

This capable vessel carries “reality police” troubleshooters to deal with crises anywhere in the multiverse, and provides them with the support needed to save the day. On the outside, it’s a small (SM +1) box or sphere (about 80 cubic feet), easily disguised by its holoprojector as an innocuous object such as a large bush, packing crate, refrigerator, phone booth, sentry box, or public restroom. Once past its concealed doorway, however, a visitor finds himself in a 3,000 ton (SM +9) ultra-tech space/time vessel fully equipped to meet any contingency!

*It’s still a police box!
Why hasn’t it changed?
Dear, dear – how very
disturbing!*

*– The Doctor,
Doctor Who
(1963) #1.2*

Front Hull	System
[1]	Exotic Laminate Armor (dDR 70).
[2]	Habitat (10 cabins with total life support).
[3]	Defensive ECM.
[4]	Multipurpose Array (comm/sensor 12).
[5]	Control Room (C10, comm/sensor 10, six control stations).
[6]	Cargo Hold (150 tons capacity).
Central Hull	System
[1]	Exotic Laminate Armor (dDR 70).
[2!!]	Heavy Force Screen (dDR 150).
[3!]	Reconfigurable System (configures into fixed Major Battery with 1GJ tractor beam or 1GJ graviton beam).
[4!]	Replicator (15 lbs./hr.).
[5]	Engine Room (two workspaces).
[6]	Holoprojector.
[core!!]	Extradimensional Interface.
Rear Hull	System
[1]	Exotic Laminate Armor (dDR 70).
[2]	Total Conversion Reactor (five Power Points).
[3]	Total Conversion Reactor (five Power Points).
[4!]	Time-Flux Drive (Anywhere).
[5!]	Subwarp Drive (500G).
[6!]	Stardrive (jump drive).
[core!!]	Extradimensional Interface.

It has artificial gravity, gravitic compensators, and an energy-phasing surface. It uses the following design switches: FTL comm/sensor arrays, multiscanner array, pseudovelocisty, and boost drive.

TL	Spacecraft	dST/HP	Hnd/SR	HT	Move	LWt.	Load	SM	Occ	dDR	Range	Cost
12^	Operator-class	100	+1/5	14	500G/c	3,000	152	+9/+1*	20ASV	70	1x	\$20.982B

* SM +1 is external size.
† Plus dDR 150 if force screen is powered up, or 300 with second Power Point.
Top air speed is 5,600 mph and Hnd/SR is -1/5.

BIOSHIPS AND SPACE MONSTERS

These are *living* spaceships. They are created through genetic engineering (or magic), or evolve naturally.

GOD SHIP (TL3+4^)

God Ship is the upper torso, head, and arms of a colossal 150-foot-tall humanoid. It masses 1,000 tons (SM +8) and is unstreamlined. It is the corpse of a star god, piloted by his priests and followers. They built a temple inside and kept the body preserved, vitrifying it into adamant via strange rites that maintain their deity’s cosmic energies. Perhaps they’re on a mission to bring his remains back to heaven, or were the losing side in a war of the gods and are on a quest to resurrect him. The dead god’s brain still functions but is now under the priests’ control, who give it orders through prayers from their temple.

Front Hull	System
[1]	Skystone Armor (dDR 5).
[2-3]	Adamant Armor (total dDR 10).
[4!]	Major Battery (turret with 300 MJ heat ray, magic-powered).
[5]	Habitat (magical life support; luxury cabin, seven cabins, briefing room, and two-bed sickbay).
[6]	Hangar Bay (30 tons capacity; in mouth).
[core]	Sapient Brain (comm/sensor 5).
Central Hull	System
[1]	Skystone Armor (dDR 5).
[2-3]	Adamant Armor (total dDR 10).
[4-5]	Robot Arms (ST 700).

<i>Central Hull</i>	<i>System</i>
[6]	Habitat (magical life support; five temple establishments, one office, 2.5 tons cargo).
[core]	Caged Spirit Power Plant (the god's spirit; five Power Points).
<i>Rear Hull</i>	<i>System</i>
[1]	Skystone Armor (dDR 5).
[2-3]	Adamant Armor (total dR 10).
[4!]	Powered Astral Sails (0.3G acceleration, magic-powered).

<i>Rear Hull</i>	<i>System</i>
[5!]	Stardrive Engine (FTL-1, magic-powered).
[6]	Habitat (magical life support; two cells, two craft shops, 15 tons cargo).

It has the (basic) biomorphic feature: It resembles half a crystal giant. Crew consists of 20 priests performing various duties. Novices live in the cells unless they're occupied by unbelievers or sacrifices.

<i>TL</i>	<i>Spacecraft</i>	<i>dST/HP</i>	<i>Hnd/SR</i>	<i>HT</i>	<i>Move</i>	<i>LWt.</i>	<i>Load</i>	<i>SM</i>	<i>Occ</i>	<i>dDR</i>	<i>Range</i>	<i>Cost</i>
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PILOTING/TL(3+4) (HIGH-PERFORMANCE SPACECRAFT)

3+4^	<i>God Ship</i>	70	-3/4	12	0.3G/c	1,000	49.9	+8	24ASV	15	1x	\$61.7M
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In atmosphere, air speed is 100 mph and Hnd/SR is -1/4.

SPACE AMOEBA

A giant blob of protoplasmic matter, this starfaring horror masses 3,000,000 tons. Its semi-solid nucleus is equivalent to an unstreamlined SM +15 hull occupying a 700 yard diameter. Its undulations warp space-time around it, allowing it to move as if using ether sails. It may or may not be sapient, but it is hungry! Its normal prey is other star beasts but it has no compunction about absorbing and devouring ships and space stations. This size amoeba cannot survive in a gravity field, however, so it stays away from planets.

Although its core is a few hundred yards, its highly diffuse bulk covers several hundred miles. Spacecraft maneuver inside the amoeba without doing it (or themselves) any damage; the creature's ability to grasp, slow, and eat objects within that area



with its cilia is represented by batteries of tractor beams, which capture food and propel it toward its nucleus. The space amoeba was built as if it were a TL12 vessel.

<i>Front Hull</i>	<i>System</i>
[1-3]	Organic Armor (total dDR 300).
[4!]	Powered Ether Sails (0.3G).
[5!]	Tertiary Battery (30 turrets with 30 GJ tractor beams).
[6!]	Digestive System (corrosive).
<i>Central Hull</i>	<i>System</i>
[1-3]	Organic Armor (total dDR 300).
[4!]	Digestive Systems (corrosive).
[5!]	Powered Ether Sails (0.3G).
[6!]	Tertiary Battery (30 turrets with 30 GJ tractor beams).
[core]	Sapient Brain (comm/sensor 12).
<i>Rear Hull</i>	<i>System</i>
[1-3]	Organic Armor (total dDR 300).
[4!]	Powered Ether Sails (0.3G).
[5!]	Digestive System (corrosive).
[6!]	Tertiary Battery (30 turrets with 30 GJ tractor beams).
[core]	Total Conversion Power Plant (five Power Points).

It has regeneration and total automation. It has no crew.

<i>TL</i>	<i>Spacecraft</i>	<i>dST/HP</i>	<i>Hnd/SR</i>	<i>HT</i>	<i>Move</i>	<i>LWt.</i>	<i>Load</i>	<i>SM</i>	<i>Occ</i>	<i>dDR</i>	<i>Range</i>	<i>Cost</i>
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PILOTING/TL^ (HIGH-PERFORMANCE SPACECRAFT)

^	<i>Space Amoeba</i>	1,000	-4/5	13	0.9G/c	3,000,000	0	+15	0	300	-	N/A
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SPACE WHALE

This space-going leviathan is a vaguely whale-shaped star-beast that swims through the ether. (In settings without an ether cosmos, it might use a biological reactionless engine instead.) As an adult it has a streamlined 300,000-ton (SM +13) body 900 feet long.

The space whale's production line represents a womb that "manufactures" additional space whales, although genetic

engineering might reconfigure it to make other products. The GM may assume space whales reproduce through parthenogenesis, or call this a female and invent a male version that lacks a fabricator.

The hangar bay represents a "brood pouch" that holds one SM +10 baby space whale. The cargo in the habitat is filled with biomass: spongy, air-filled tissues that contain "space parasites" (or lost adventurers). Half the beast's total mass is usable as meat (should anyone eat the space whale).

Front Hull	System
[1-2]	Organic Armor (total dDR 60).
[3]	Maw.
[4!]	Digestive System (corrosive).
[5-6]	Habitat (each has 10,000 tons cargo and/or biomass).
[core]	Sapient Brain (comm/sensor 10).
Central Hull	System
[1-2]	Organic Armor (total dDR 60).
[3!]	Contragravity Lifter (10G).
[4-5]	Orgone Power Plant (four Power Points).

Central Hull	System
[6]	Hangar Bay (10,000 tons).
[core!]	Fabricator: Bio-Tech Production Line (\$15M/hr, 1,500 lbs./hr.).
Rear Hull	System
[1-2]	Organic Armor (total dDR 60).
[3-5!]	Ether Flukes (0.2G each).
[6!]	Tail (striking).

It is biological with total automation and self-healing, and has nautical lines. It uses the etheric cosmos design switch.

TL	Spacecraft	dST/HP	Hnd/SR	HT	Move	LWt.	Load	SM	Occ	dDR	Range	Cost
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PILOTING/TL^ (HIGH-PERFORMANCE SPACECRAFT)

^	Space Whale	500	-4/5	14	0.6G/c	300,000	30,000	+13	0	60	–	\$29.28B
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In atmosphere, top air speed is 1,900 mph, with -2/5 Hnd/SR.

TREE SHIP (TL10^)

This ship consists of a ball of cometary ice and dirt out of which grows a giant tree (a Dyson tree, after scientist Freeman Dyson, who came up with the idea). Its trunk and branches are modified with toughened bark and roots, plus symbiotic bacteria that enable it to tap the comet's icy body for nutrients. Most of its space-black leaves function as a vast solar collector, while the rest are part of its sensors' detector array.

The tree ship has an SM +13 hull and masses 300,000 tons. Its trunk is thin but over 1,600 feet tall; the branches extend out over a much greater distance.

The Consul remembered his first glimpse of the kilometer-long treeship as he closed for rendezvous, the treeship's details blurred by the redundant machine and erg-generated containment fields which surrounded it like a spherical mist, but its leafy bulk clearly ablaze with thousands of lights which shone softly through leaves and thin-walled environment pods, or along countless platforms, bridges command decks, stairways and bowers.

– Dan Simmons, *Hyperion*

The rear hull represents the comet; the other components are the tree. The occupants and systems are in capsules attached to the branches and trunk, or integrated into the base comet body. This ship is equipped with a stardrive and designed as a mobile interstellar cruise ship or space commune. Its occupants can be a bio-tech oriented race or culture, nature lovers, tourists, or even members of a tree-worshipping cult.

Front Hull	System
[1]	Organic Armor (dDR 50).
[2]	Habitat (500 luxury cabins with total life support).*
[3]	Control Room (C10 computer, comm/sensor 12, 30 control stations).*
[4-5]	Solar Panel Array (one Power Point each).
[6]	Enhanced Array (comm/sensor 14).*
Central Hull	System
[1-2]	Organic Armor (total dDR 100).
[3]	Hangar Bay (10,000 tons capacity).*
[4]	Open Space (2.5 acres).*
[5]	Habitat (500 luxury cabins with total life support).*
[6]	Habitat (800 establishments; 100 offices; 200-bed hospital; 500 tons cargo).*
[core!]	Rotary Reactionless Engine (0.1G acceleration).*
Rear Hull	System
[1-4]	Ice Armor (total dDR 28).
[5]	Fabricator (\$15M/hour).*
[6]	Cargo Hold (15,000 tons capacity).
[core!!]	Super Stardrive Engine (FTL 2).*

* 30 workspaces per system.

The vessel is self-healing. Crew consists of 30 control crew, 10 medics, and 300 technicians.

TL	Spacecraft	dST/HP	Hnd/SR	HT	Move	LWt.	Load	SM	Occ	dDR	Range	Cost
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PILOTING/TL10 (HIGH-PERFORMANCE SPACECRAFT)

10^	Tree Ship	500	-4/5	14	0.1G/c	300,000	25,700	+13	2,000ASV	50/100/28	2×	\$41.585B
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