Alternate Systems

Version 2.0 RC 29

Armor: Spread dDR

This design feature spreads out the dDR of all installed armor systems across all three hull sections, giving extra points first to the Front, then Rear, then Center sections. Spread dDR is most useful for ships that are designed to be lightly armored; having only one or two armor systems for the entire ship. e.g. if a ship has one Steel Armor System giving dDR 5, with spread dDR it would have dDR 2/1/2 for Front/Center/Rear hull sections.

Armor: Semi-Ablative

Any laminated Armor (including Nanocomposite, Diamondoid, Structural Field, and Organic) can be designated as Semi-Ablative (p. B47); it has the same cost as standard Armor of its type but provides x4 the dDR. Semi-Ablative Armor must be the outermost layer of Armor if non-ablative armor is also used. Semi-Ablative Armor loses 1 dDR for every 10 points of d-damage it resists. Semi-Ablative Armor dDR heals at the same rate as ship dHP if the ship has Regeneration or Self-Healing (see p. SS7:22), otherwise it must be removed and replaced. Semi-Ablative is incompatiable with the Open-Frame option.

Armor: Unavailable SMs

Some Armor systems are listed as unavailable below a particular SM because the dDR value drops below 1. However, there's no reason multiple systems with a partial point of dDR can't be stacked and added together if desired. To compute how much dDR these Smaller SM armor systems have find the dDR value for a system six SM larger and divide it by 10, dropping fractions after you've added the dDR of all systems together. For example, SM+6 Stone Armor (p. SS11) would have 1/10 the dDR of SM+12, or 0.7 points. So two Stone Armor would dDR 1.4, rounded to 1, and three would have dDR 2.1, rounded to 2.

If using the Armor and Volume rules from Pyramid #3/34 don't drop fractions until after you multiply for volume. So if you have two Rear armor systems that provide dDR 0.7 each and a total of 10 Armor systems on the ship, giving a 1.5× multiplier, the total dDR would be 2×0.7×5 = 2.1, dropping fractions provides a final dDR of 2.

Cargo Hold - Collapsible Fuel Tank (TL6)

Cargo Holds may be fitted with a Collapsible Fuel Tank, allowing them to carry one specific kind of fuel. Capacity doesn't change, but the cost is $10k per ton of capacity. Fuel must be pumped into the ships normal Fuel Tanks before it may be used.

Any Fuel that is normally Volatile is considered Extremely Volatile in a Collapsible tank (-2 to HT rolls; see p. P3/40:7). Any maneuver of 1.5G greater than can't be compensated for with Gravitic Compensators will cause the tank to rupture on a failed HT roll, spilling the contents into the Cargo Hold.

Drop Capsule Launcher (TL8) [Hull]

These systems contain an integrated Launcher as well as a number of Drop Capsules. A launcher can fire one capsule ever 20-seconds. The system may contain either standard Drop Capsules or Stealth Capsules - standard capsules cost the listed amount and may each carry two people; stealth capsules have extra cost and can carry only one person. Based loosely on the Drop Capsules from the Spaceships Designers Notes: http://www.sjgames.com/pyramid/sample.html?id=6603

Standard Drop Capsule (TL8)

A basic landing capsule; not reusable; it breaks open a mile up to allow occupants (or packages) to descend via parachute, parawing, grav belt, etc.

Stealth Capsule (TL10)

As above, but packed with countermeasures with a stealth hull. Either treat as if it had three Defensive ECM systems, or use the more detailed rules in Ultra-Tech. LC2.

	+6*	+7*	+8	+9	+10	+11	+12	+13	+14	+15
Cost w/Standard Capsules	$250k	$500k	$500k	$1.5M	$5M	$15M	$50M	$150M	$500M	$1.5B
Cost w/ Stealth Capsules	$0.65M	$1.3M	$1.3M	$3.9M	$13M	$39M	$130M	$390M	$1.3B	$3.9B
Launchers	1	2	2	6	20	60	200	600	2,000	6,000
Capsules	10	20	20	60	200	600	2,000	6,000	20,000	60,000

*An SM+7 Launcher takes up 3 system slots. An SM+6 Launcher takes up 5 slots.

Energy Bank (TL5) [Any]

"Energy Banks" feature prominantly in many fictional universes, being used to quickly power-up FTL drives (particularly Jump drives), to provide extra emergency power for combat, or even as a backup power source should the main reactor go down. Batteries are also used in many real-world designs such as electric cars and non-nuclear submarines. These energy banks can represent realistic Battery Banks or "Capacitors," or they may be superscience Power Cells with far greater energy density than realistic batteries.

Instead of providing Power Points (PP) Energy Banks are rated for providing power over a number of hours - for instance they may be rated at 4 Power Point Hours (4PPh), which allows them to provide 1 PP for 4 hours, 4 PP for 1 hour, or even 2 PP for 2 hours. If powering long-term systems (such as an FTL drive) simply calculate duration by dividing PPh capacity by the number of PP all active systems require.

However, Energy Banks can only provide a number of Power Points equal to their PPh rating; that is, if a bank is rated for 3PPh it can only provide 3PP at once, so it can run 3 high energy systems (however, see Fast Discharging below). To run more systems simply install more Energy Banks. Note that Power Cells multiply PPh, but not the discharge rate.

For tracking energy usage during space combat the bank will also be rated in Power Point Turns (PPt); this is equal to the PPh multiplied by a factor based on turn length (see table below). Each Power Point drained from an energy bank for a Space Combat turn costs one PPt; e.g. if you are powering a Force Screen for 2PP, a Weapon Battery for 1 PP, and a Reactionless Drive for 1PP this would cost a total of 4PPt for every turn the bank is being used to power those systems.

Recharging Power Banks is accomblished by assigning Power Points to them for a length of time; for every Power Point assigned for a full hour they recharge one PPh. i.e. a 4PPh energy bank can be recharged at a rate of 1PPh per hour if assigned only 1 Power Point, or 2PPh per hour if assigned 2PP, or 4PPh per hour if assigned 4 Power Points, etc. However, standard batteries will be limited to being assigned 1 Power Point per ship system installed; for superscience Power Cells or Fast Discharging Capacitor banks this is increased up to 1PP per PPh capacity (allowing them to fully recharge in one hour if provided 1 Power Point for each PPh capacity).

Turn Length	Multiplier
20-second	×180
1-minute	×60
3-minute	×20
10-minute	×6

Fast Discharging energy banks may discharge all of their energy in a short period of time, effectively allowing them to provide any number of PP or using all of their PPt in a single space combat turn. This doesn't cost extra, however the banks become Volatile (p. SS1, p. 62).

Magical or *Psionic* energy banks (see SS7, p. 20-21) cost only half-price but may only power and be re-charged by *Magic* or *Psi* sources.

	TL5	TL6	TL7	TL8	TL9	TL10	TL11	TL12
Power Point Hours (PPh)	0.2	0.5	1	2	3	4	5	6

SM	+5	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
Cost ($)	$100k	$300k	$1M	$3M	$10M	$30M	$100M	$300M	$1B	$3B	$10B

Multiply cost and PPh by 5 for Power Cell Banks.

Habitat

SM +4 or SM +5 craft may have Habitats; each Habitat in a SM +4 craft contains 0.1 slots; a SM +5 Habitat contains 0.3 slots. Multiple Habitat systems must be combined to allow for the installation of standard Cabins.

Hangar Bay

Hangar Bays may given the following options:

Optimized for Craft **-** Hangar Bays may be optimized for launching and recovering one particular craft. This can represent launch tubes, specialized landing grapples, etc. This kind of optimization is sometimes used onboard Carriers or Commercial ships that have their own shuttles to offload their cargo. This kind of Optimization has ×4 the listed launch and retreival rates (see p. SS1:18) for that type of craft *only*, but rates are ×1/4 normal for other craft. There is no extra cost.

Hidden Hangar Bays cannot be seen from the outside. These bays cost ×1.5 times normal and reduce their launch rate by 50% (most will have Optimized for SM or Craft to offset this launch rate penalty; see p. SS4:38).

Helicopter Rotor

Helicopter Rotors aren't given an acceleration in Spaceships 7. Assume an Acceleration of 10 mph/s (5 yps/s) per installed system.

Horvercraft Skirt (TL7) [Center]

A Hovercraft is a Ground Effect Vehicle (GEV), using a semi-flexible skirt to contain an air cushion underneath the main hull. This allows them to move quickly over rough terrain or water. Hovercraft must use a Ducted Fan (see Propellers below) for propulsion. Their performance statistics are listed there.

SM	+5	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
Cost	30K	100K	300K	1M	3M	10M	30M	100M	300M	1B	10M

Intermediate SM (SM +0.5)

A ship of intermediate SM has twice the mass of a ship of the previous SM, but is treated as the next higher SM for purposes of being targeted or detected. So a SM +8.5 ship has a Loaded Mass of 2,000 tons (twice that of a SM +8 ship) but is considered SM +9 for purposes of attack and detection. All other statistics are extrapolated from the existing systems.

Jet Engine - Electric Turbofan (TL8) [Rear]

These operate similarly to standard Turbofans except they use electricity to heat the air and drive the turbine. They are somewhat less efficient than fueled jet engines, but have the advantage that they can work in any atmosphere. They produce 0.25G if provided with 1 Power Point or 0.5G if provided with 2 Power Points.

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

Jet Engine - Super Fusion Air-Ram (TL10^) [Rear]

A more advanced version of the Fusion Air-Ram (p. SS7:10). It produces 0.8G (TL10), 1.2G (TL11), or 2G (TL12) of thrust for calculating atmospheric speed.

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	$2M	$6M	$20M	$60M	$200M	$600M	$2B	$6B	$20B	$60B	$200B

Modular Section (TL9) [Hull*]

Some ships are designed so that sections of their hull are modular self-contained pods. Standard and Large sized pods are attached externally to the rest of the ship, while Small and Tiny modules are mounted internally and thus protected by that sections armor (if it has any; some ships with many container pods may not have any armor in that section, essentially mounting them externally). These modules can be easily swapped in and out, allowing the ship to fulfill a wide variety of mission roles simply by installing a different module. Many times these modules are designed to be used on their own, independent of a ship, allowing a modular ship to take a module to a planet and drop it off or leave it in orbit for use there.

Each module should be designed as a ship of the appropriate SM. It can draw power from the ship it will be attached to (if available), but most power using modules should be designed to be completly self-sufficient, including their own power plant. Since larger modules are mounted externally they are not protected by the ships Armor, however this also means that they can mount weapons, sensors, and other "external" systems. Cost is $10k per ton of mass of the module.

A "Standard" module s designed as a ship -1 SM smaller than the ship it's attached to and takes up the entire Front Hull section, leaving the Center and Rear Core systems available.

"Dual Standard" has two Standard modules and take up the entire Front and Center Hull sections, including one Core system, leaving the Rear Core system available (the extra mass is necessary for the latching clamps and umbilicals).

A "Large" module is -0.5 SM smaller than the ship and takes up the entire Front and Center Hull sections, including one Core system.

"Small" modules may be mounted in Front, Center, or Rear hull sections and are -1.5 SM, taking up 4 adjacent hull systems.

"Tiny" modules are -2 SM, taking up 2 adjacent hull systems.

"Mini" modules are -2.5 SM, taking up 1 hull system. These are essentially the same as a single Vehicle Dock (below).

Propellers [Front, Rear!] (TL5*)

Propellers require an atmosphere to generate thrust. They are typically directly powered by an oxygen-breathing Internal Combustion or Gas Turbine engine, however some TL7 prototypes paired them with a Fission Reactor. A ship may not have more than two Propeller systems. Up to three Power Points per system may be allocated, with more power increasing air performance as detailed below.

Propellers (TL5): These start being used on powered airplanes at mid-TL5. They require the vehicle to have wings and streamlining (Spaceships, p. 30). TL5-6 propellers and streamlining were very inefficient, and performance suffered until TL7+ improvements are available.

Ducted Fans (TL7) : These propellers are placed inside a duct, which directs and improves their performance slightly. The main advantage of Ducted Fans is that they generate less noise than Propellers and their ability to direct thrust also makes them useful for designing Hovercraft. Vehicles with Ducted Fans must either be Winged and Streamlined or have the Hovercraft Skirt system (see above).

Power Points	Acceleration		Propeller Top Speed		Ducted Fan Top Speed*		
			TL 6-	TL7+	Air	Ground	Water
1	0.1G	2 mph/s	75 MPH	200 MPH	250 MPH	0 MPH	0 MPH
2	0.3G	6 mph/s	100MPH	250 MPH	300 MPH	15 MPH	20 MPH
3	0.5G	11 mph/s	120 MPH	325 MPH	400 MPH	25 MPH	40 MPH
4	0.7G	15 mph/s	130 MPH	400 MPH	500 MPH	35 MPH	60 MPH
5	0.85G	18 mph/s	140 MPH	450 MPH	550 MPH	45 MPH	70 MPH
6	1G	21 mph/s	150 MPH	500 MPH	600 MPH	55 MPH	80 MPH

*Ground & Water speed are for Hovercraft. Air Speed is for Airplanes with Streamlining and Wings.

* Propellers are available starting at TL5, but are limited in SM to the TL of the vehicle (e.g. at TL7 vehicles up to SM+7 may have propellers).

On craft with SM greater than TL they require superscience, becoming TL5^.

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 (Propeller)

Multiply cost by two for Ducted Fan.

Reactionless Engines

Reactionless Engines may have an *Afterburner* installed, allowing them to gain more thrust by increasing their energy usage (the name is a holdover from the days of fuel using engines). Afterburner Reactionless Engines cost 1.5× as much but can provide 1.5× as much thrust if an extra Power Point is applied.

SM +3 Spaceships

Stats for SM+3 have been included for most ship systems, allowing either Smaller SM Systems in SM+4 ships or the creation of SM+3 ships.

SM+3 Control Rooms are not allowed to have Ejection Systems, however they can be added as a separate component, taking up a system slot, at a cost of $50k.

SM+3 and SM+3.5 Control Rooms and Passenger Seating don't include any access space - halls, bathrooms, or other amenities. This is the difference between passenger seats in a commercial airplane or a bus and those in a car or van.

SM+3 Control Rooms take up two system slots if using the Unofficial rules (per Pyramid #3/34 p. 7 they only take up one slot, but there is a discrepency between Passenger Seating and Control Rooms that can only be resolved by having them take up two slots).

SM+3 Passenger Seating provides 0.5 seat at SM+3. To get full seats combine multiple systems and/or use NBC Only or No Life Support options (the seats described in Pyramid #3/34 are described as having No Life Support, which would double the seats to 1 seat per system).

Structural Reinforcement (TL0) [Any]

Some ships are designed with a great deal of structural reinforcement - supports, extra bulkheads, reinforced doors, etc. Each Structural Reinforcement installed doubles dHP (so two would give x4 HP, three x8 HP, etc). For Smaller SM Systems multiply by cube root of 2 for -1 SM systems (×1.26) and square root of 2 for half-sized system (×1.415), dropping fractions. Multiple systems must be spread evenly between the Front, Center, and Rear locations. This does not affect dST, however three or more systems installed gives +1 to a Ships HT.

SM	+5	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
Cost ($)	$6k	$20k	$60k	$200k	$600k	$2M	$6M	$20M	$60M	$200M	$600M

Upper Stage (TL7) [Special]

A Medium Upper Stage (see p. SS1:26 & p. SS7:18) takes up only 4 system slots and holds an upper-stage-craft that is -1.5 SMs smaller than that of the "launching" vessel; for example a SM+10 spacecraft can carry a SM+8.5 medium upper stage. If a hit location roll strikes these four systems reroll the hit location and apply damage against the upper-stage spacecraft. Otherwise, use the normal rules for upper stages.

A Large Upper Stage takes up the entire Front and Center hull of the ship, including one Core system. It holds an upper-stage-craft that is -0.5 SMs smaller than that of the "launching" vessel.

Vehicle Dock (TL0) [Hull]

A vehicle dock is similar to a hangar bay, but it only accepts one specific Class of vehicle; "a SM +8 shuttle" is not specific enough, but "a Wilting Flower-class shuttle" is. This is not a true internal system -- it is a recessed area in the hull with which the smaller vehicle mates (think Serenity and its shuttles). As with hanger bays, vehicle docks may be combined to hold one large vehicle or split among multiple smaller ones. Docking time is the same for a vehicle dock as for a hanger bay, though there is no "launch rate" - each dock can launch its vehicle in one minute.

If a vehicle dock is targeted in combat and no vehicle is present, use the dDR of the larger spaceship; a disabled system prevents future docking. If the carried vehicle is present, the spaceship's dDR does not protect it! Treat the attack as a general attack against the vehicle, usually against the front or central hull (work this out when designing the spaceship or roll randomly). The spaceship itself does not take any damage from this attack unless it overpenetrates.

SM	+5	+6	+7	+8	+9	+10	+11	+12	+13	+14	+15
Capacity (Tons)	1.5	5	15	50	150	500	1,500	5k	15k	50k	150k
Workspaces	0	0	0	0	0	1	3	10	30	100	300
Cost ($)	$1k	$3k	$10k	$30k	$100k	$300k	$1M	$3M	$10M	$30M	$100M

Weapon Battery - Oversized [Hull]

This is essentially just a Major Battery built as a Larger System (see p. SS7:5) - it houses a single weapon the size of a Spinal Mount and takes up three System Slots.

Weapon Battery [Hull]

Seven new sizes of Weapon Mount have been made available. These mounts continue scaling at the same rates as the Major through Tertiary mounts do, with larger numbers of smaller weapons being available. Quaternary (SM+8 & 100 Mounts), Quinary (SM+9 & 300 Mounts), Senary (SM+10 & 1,000 Mounts), Septenary (SM+11 & 3,000 Mounts), Octonary (SM+12 & 10,000 Mounts), Nonary (SM+13 & 30,000 Mounts), and Denary (SM+14 & 100,000 Mounts).

Weapon Battery - Peripheral [Hull]

This system is only available for ships of SM+15 or larger. Very large ships sometimes mount a large number of relatively small weapons for anti-fighter or anti-missile defense. These weapons stay a constant size, equivalent in size to a SM +7 Tertiary Battery; the number of mounts depends on ship SM. Ships should normally be limited to one Peripheral Mount, due to surface area restrictions.

SM	+15	+16	+17	+18	+19	+20	+21	+22
Mounts	300k	1M	3M	10M	30M	100M	3B	30B

Weapon Battery - Mixed [Hull]

A mixed weapon battery contains weapons mounts of several different sizes. This is particularly useful for non-combat ships which may only need to mount a single mixed battery, giving it more weapon options taking up fewer ship systems, or for larger ships which may wish to flesh out their defense grid.

	Medium	Secondary	Tertiary
Mixed Med/Sec	2	3	—
Mixed Med/Tert	2	—	10
Mixed Med/Sec/Tert	1	3	11
Mixed Sec/Tert	—	5	15

Weapon Options

High-Thrust Missiles

Have twice the Accel but half the Delta-V.

Super Drone

A Sensor Drone using the Super Missile drive. Use all statistics of both warheads.

Quantum Warheads (TL11^)

Quantum missile warheads take advantage of one of several Quantum effects - Total Conversion, Zero Point Vacuum Energy, Micro-Singularities - to create an explosion even more devistating than similarly sized antimatter warheads are capable of producing.

Whichever effect the warhead uses its explosive force is rated in kilotons or megatons just like Nuclear and Antimatter warheads. The primary advantage of Quantum Warheads is that they can fit in smaller missiles, while larger missiles can have a warhead with a larger effective yield. The other advantage is that they are not considered Volatile like antimatter.

TL	Warhead	Min. Size	Cost
11^	25 kiloton Quantum	7cm	$250k
11^	100 kiloton Quantum	10cm	$500k
11^	2.5 megaton Quantum	16cm	$2.5M
11^	10 megaton Quantum	24cm	$5M

Alternate Habitats

Matter Transmission Booth (TL10^) (20)

These use enclosed Matter Transmission (MT) booths which can only transmit to another booth on the other end. The range is about 50,000 miles, which is far enough to reach the entire surface of an Earth-sized planet from an orbiting ship. Cost is $100M. Each booth can teleport 1 person or 0.1 tons of cargo. See **GURPS Ultra-Tech** p. 233 for more information.

Telegate (TL11^) (20)

Telegates work similarly to MT booths, except that they hold a doorway open and can transport 1 person or 0.1 tons of cargo per second. Larger booths may be combined together to provide a larger radius gateway, equal to 1 yard per booth connected. Range is 50,000 miles. Cost is $100M; see **GURPS Ultra-Tech** p. 234 for more information.

For *half* cost the gate can be Paired to another, meaning that it can *only* be used with its counterpart. These are most usful when one end is placed on a mothership or orbiting space station and the other on a landing craft or stationary land base.

Teleport Projector (TL12^) (0.5)

Teleport projectors may be installed in 0.5 slot increments, each capable of transporting 1 person or 0.1 tons.

Teleport Projector: Cargo Only (TL12^) (0.5)

This projector cannot transport living matter; x0.5 cost of normal projector. Can be combined with Send Only or Receive Only options for x0.25 cost.

Energy Bank: Battery/Power Cell (1)

Full sized Energy Banks may provide far more power than a design really needs. These smaller banks take up Habitat slots, but can be useful for short duration needs (such as powering weapon and defensive systems in combat). To determime how many PPh and PPt each of these units provides first calculate the PPh and PPt based on the ships TL (see above), then divide that amount by the number of cabin slots that a Habitat provides for the ship (see p. SS1:17). E.g. a full sized TL8 Battery provides 2 PPh, if using 20-second combat turns it would provide 360PPt. A habitat battery in a SM+9 ship would divide these values by 20, so would proivide 0.1PPh and 18PPt for each cabin installed. Extra cost is $300k for a Battery bank and $1.5M for a Power Cell bank.

Bunkroom: Cramped (0.5)
A small bunkroom large enough for only two people. Uses 0.5 Habitat slots.

Cabin: Cramped (0.5)
A small cabin large enough for only one person. Uses 0.5 Habitat slots.

Super-Luxury Cabin (4)
The ultimalte in opulant suites. Uses 4 Habitat Slots.

Establishment: Holosuite (TL10^) (2)
A holosuite takes advantage TL10^ Super Holographic Projectors (Ultra-Tech, p. 52). The projectors add an additional $200,000 to the Habitat cost. By TL12^ they can incorporate force field and replicator technology to provide a full tactile and sensory simulation.

Establishment: Library (2)
A library with books, reference material, and computer terminals for up to 20 people.

Galley (1)
A small kitchen and dining area. Has a table for up to 8 people, refrigerator, stove, dishwasher, microwave, and other accoutrements. Note that larger ships automatically devote some space from each cabin for common areas such as a Galley; this module is intended for smaller ships that wish to install a larger common room than it might otherwise have available.

Hydroponics Bay (1)
A small garden capable of growing enough food and providing life support for four people. This bay provides much better food than Total Life Support, but requires one Gardener for every five bays (rounded up).

Hot Tub (1)
A hot tub capable of holding 10 people, contains about 600 gallons of water. The water is heavy, weighing almost 2.5 tons all by itself. Weighs about 5 tons, taking up 1 Habitat slot.

Small Swimming Pool (10)
A small swimming pool, typical of what an average family home might have. 4.5 feet deep and about 18 foot square or 20 foot diameter circle, or a diving pool 12 feet deep, 12×10 feet on the surface. Contains about 11,000 gallons of water, 10 people can comfortably swim at a time; uses 10 habitat slots.

Medium Swimming Pool (60)
A single lane of an Olympic Sized pool or a square pool 4.5 feet deep and 45×45 foot square, or 19×19 foot and 13 feet deep sutible for diving. 1-2 can swim laps or 60 people can swim. Contains about 73,000 gallons of water; uses 60 Habitat slots.

Olympic Sized Swimming Pool (600)
Ten lanes of swimming, measuring 2 meters deep (6.5 ft), 25m wide (82 ft) and 50m long (164ft). Contains approximately 660,000 gallons of water. 10 can race or up to 600 can swim in it. Uses 600 Habitat slots.

Steerage Cargo: Partial (0.05)
0.25 tons of steerage cargo. Uses 0.05 Habitat slots.

Life Pod (0.2)
An Escape Pod capable of carrying 4 people. Takes up 0.2 Habitat slots. Adapted from the Spaceships Designers Notes: http://www.sjgames.com/pyramid/sample.html?id=6603

Microfac (1)
Similar to the Minifac (p. SS1:18), but has the same cost and statistics as a SM+6 Factory. These require considerable power, so cannot function unless the ship is currently producing at least 1 Power Point.

Garage w/Vehicle (TL8+) (1)

This is a vehicle bay just large enough to fit one specific auxiliary craft - either a Utility Truck, Utility Helicopter, Utility Plane, Grav-Plane, or Grav-Sled. These vehicles are normally used as auxiliary craft onboard spaceships that are designed to land, so that the crew can travel around while planetside. Each of these vehicles has been designed using the Spacecraft design rules (see Unofficial Ships) using a SM+3.5 vehicle frame and masses under 5 tons when unloaded.

These vehicles can be stored in a Hangar Bay or they may be placed in a Garage which is sized specifically for the vehicle and takes up one Habitat slot. On smaller spacecraft (SM +9 and under) the Garage includes a hatch that opens and allows the auxiliary craft to exit. Much like Cargo Bay doors, the Garage doors do not act as an air lock; the Garage bay is opened to the outside elements when the auxiliary exits. On larger vehicles (SM+10 or larger) Garage bays normally open into Hangar Bays or Cargo Holds, and the auxiliaries must pass through to leave the spaceship.

Each Vehicle is designed to use a Solar Panel Array as its primary power plant, with an Energy Bank providing a reserve for when sunlight is not plentiful enough or extra power is needed (several of the designs can get better performance by tapping into the reserve). The listed duration is for the number of PPh the Enrgy Reserve provides, and is the maximum duration the vehicle can operate without sunlight.

An -F variant is provided for each vehicle; these variants use a Fission Reactor at TL8-9 or a Fusion Reactor at TL10+. This allows them to operate for an extended duration without refueling. Fission Reactors are often deemed too dangerous for civilian use, but may be appropriate for some exploration vessels. Fusion is generally considered safe enough that it may be usable on civilian vehicles.

The Passenger Seats are all designed to be moduler, allowing them to be removed and the space to used as a Cargo Hold, storing 0.3 tons per seat (0.4 tons per seat on Grav-Plane and Grav-Sleds). The modular design of the vehicles allows for a great deal of versatility by adding modular components to them.

Utility Truck (TL8)

This heavy truck is similar in design to a modern military cargo truck such as the M35 "deuce and a half". Designed for both settled worlds and wilderness, it has off-road as well as limited water capabilities, allowing it to ford rivers but not to travel on the open ocean particularly well. Its hull is sealed but only offers NBC protection rather than full life support.

Utility Helicopter (TL8)

A heavy duty cargo Helicopter with folding rotors. It must be wheeled out of its Garage and its rotors extended before it can take off. Like the Utility Truck has a sealed hull with NBC protection only. Unlike other designs, the helicopter isn't be able to utilize the solar panels while flying as it lacks the surface area, so its duration is limited to battery power. Once landed it can unfurl the panels to recharge.

Utility Plane (TL8)

This small plane uses and is capable of flying on any world with an atmosphere, though like the other vehicles it's designed with only NBC protection. It has folding wings, and must be removed from the spacecraft and the wings unfolded before it can fly, requiring a relatively short but clear runway to take-off from; take-off may be difficult on completely wild worlds. All standard versions use Electric Turbofans (see above). The -F variant uses Fission Air Rams at TL8-9; at TL10+ it uses a Fusion Reactor and Electric Turbofans.

Grav-Plane (TL10^)

This superscience plane uses Reactionless engines for propulsion and wings to stay aloft. It has a Vacuum Sealed Hull and is capable of independent operation in space.

Grav-Sled (TL10^)

Similar in design to the Grav-Plane, bit instead of wings it uses Contragravity Lifters to stay aloft. This allows it to float on and take off from planets with gravity up to 10 G, but if it loses power it loses all lift.

Auxillary Craft Table

TL	Name		dST/dHP	Hnd/SR	HT	Move	LWt.	Load†	SM	Occ	dDR	Duration	Cost
9	Life Pod	-Space	5	-5/1	13	0.1G / 0.3 mps	1	0.5	+2	4SV	2/10/2	—	$100k
10	Drop Capsule	-Space	5	—	13	—	1	0.5	+2	2SV	2/10/2	—	$10k
10	Stealth Capsule	-Space	5	—	13	—	1	0.5	+2	1SV	2/10/2	—	$50k
8	Utility Truck	-Ground	12	-1/4	12	6 / 40	6	1.2+0.15	+4*	1+11SV	1	5hr	$153.4k
		-Water		+0/4		0.5 / 7							
9	Utility Truck	-Ground	12	-1/4	12	4 / 35	6	1.3+0.15	+4*	1+12SV	1	6hr	$153.4k
10	Utility Truck	-Ground	12	-1/4	12	6 / 40	6	1.3+0.15	+4*	1+12SV	1	10hr	$175.4k
10^/11	Utility Truck	-Ground	12	-1/4	12	6 / 40	6	1.4+0.15	+4*	1+13SV	1	12.5hr	$184.6k
8	Utility Truck-Fi	-Ground	12	-1/4	12	4 / 35	6	1.3+0.3	+4*	1+12SV	1	25yr	$117.5k
		-Water		+0/4		1 / 10							
9	Utility Truck-Fi	-Ground	12	-1/4	12	4 / 35	6	1.4+0.15	+4*	1+13SV	1	50yr	$127.4k
10	Utility Truck-Fu	-Ground	12	-1/4	12	6 / 40	6	1.5+0.15	+4*	1+14SV	1	200yr	$193.2k
10^/11	Utility Truck-Fu	-Ground	12	-1/4	12	6 / 40	6	1.6+0.15	+4*	1+15SV	1	200yr/600yryr	$212.8k
8	Utility Helicopter	-Air	12	+0/4	12	5 / 100	6	1.1+0.15	+4*	2+9SV	1	7hr	$198k
9	Utility Helicopter	-Air	12	+0/4	12	10 / 125	6	1.2+0.15	+4*	2+10SV	1	7.5hr	$208k
10	Utility Helicopter	-Air	12	+0/4	12	10 / 125	6	1.3+0.15	+4*	2+11SV	1	8hr	$223.2k
11	Utility Helicopter	-Air	12	+0/4	12	10 / 125	6	1.3+0.15	+4*	2+11SV	1	12.5hr	$248k
8	Utility Helicopter-Fi	-Air	12	+0/4	12	10 / 125	6	1.2+0.3	+4*	2+10SV	1	25yr	$162.3k
9	Utility Helicopter-Fi	-Air	12	+0/4	12	10 / 125	6	1.3+0.3	+4*	2+11SV	1	50yr	$172.3k
10	Utility Helicopter-Fu	-Air	12	+0/4	12	10 / 125	6	1.5+0.15	+4*	2+13SV	1	200yr	$221.2k
11	Utility Helicopter-Fu	-Air	12	+0/4	12	10 / 125	6	1.5+0.3	+4*	2+13SV	1	600yr	$236k
8	Utility Plane	-Air	12	+2/4	12	6 / 900	6	1.1+0.15	+4*	2+9SV	1	5hr	$348.2k
9	Utility Plane	-Air	12	+3/5	12	6 / 900	6	1.2+0.15	+4*	2+10SV	1	7.5hr	$358.2k
10	Utility Plane	-Air	12	+3/5	12	6 / 900	6	1.3+0.15	+4*	2+11SV	1	8hr	$373.2k
11	Utility Plane	-Air	12	+3/5	12	6 / 900	6	1.3+0.15	+4*	2+11SV	1	12.5hr	$398.2k
8	Utility Plane-Fi	-Air	12	+3/4	12	13 / 1,350	6	1.3+0.3	+4*	2+11SV	1	2yr	$356k
9	Utility Plane-Fi	-Air	12	+4/5	12	20 / 1,700	6	1.4+0.3	+4*	2+12SV	1	2yr	$366k
10	Utility Plane-Fu	-Air	12	+3/5	12	6 / 900	6	1.4+0.15	+4*	2+12SV	1	200yr	$427.2k
11	Utility Plane-Fu	-Air	12	+3/5	12	6 / 900	6	1.4+0.3	+4*	2+12SV	1	600yr	$442.3k
10^	Grav-Plane	-Space	12	+0/4	12	1G/c	6	1.5+0.15	+4*	2+13SV	1	20hr	$321.2k
		-Air		+4/5		11 / 1,250							
11^	Grav-Plane	-Space	12	+0/4	12	2G/c	6	1.5+0.3	+4*	2+13SV	1	25hr	$360k
		-Air		+4/5		22 / 1,750							
10^	Grav-Plane-Fu	-Space	12	+0/4	12	1G/c	6	1.6+0.15	+4*	2+14SV	1	200yr	$255.2k
		-Air		+4/5		16 / 1,550							
11^	Grav-Plane-Fu	-Space	12	+0/4	12	2G/c	6	1.6+0.3	+4*	2+14SV	1	600yr	$205.2k
		-Air		+4/5		22 / 1,750							
10^	Grav-Sled	-Space	12	+0/4	12	1G/c	6	1.4+0.15	+4*	2+12SV	1	10hr	$327.2k
		-Air		+2/4		11 / 1,250							
11^	Grav-Sled	-Space	12	+0/4	12	2G/c	6	1.4+0.15	+4*	2+12SV	1	18.75hr	$322k
		-Air		+2/4		22 / 1,750							
10^	Grav-Sled-Fu	-Space	12	+0/4	12	1G/c	6	1.5+0.15	+4*	2+13SV	1	200yr	$261.2k
		-Air		+2/4		11 / 1,250							
11^	Grav-Sled-Fu	-Space	12	+0/4	12	2G/c	6	1.5+0.15	+4*	2+13SV	1	600yr	$261.2k
		-Air		+2/4		11 / 1,750							

* Built as a SM+3.5/+4 spaceship

System Quality Modifiers

In fiction, and in real life, vehicles are often times depicted as having equipment of varying quality installed onboard, whether it's an old Sensor System which doesn't work as well or a state-of-the-art Cloaking Device which is better than anything anybody else has developed. While the Spaceships design system doesn't allow for this kind of customization, the Basic Set includes a system for adjusting Equipment Quality (p. B345) which can be used as the basis for modifying modifying Spaceship systems for quality. Note that *Cheap* quality can be the result of neglect or disrepair, while *Fine* and *Very Fine* can be the result of a system that has been heavily modified and personalized. This can give PCs room for buying used *Cheap* systems or tweaking existing systems for better performance.

As a *general* rule a *Cheap* system costs ×0.8 list price, *Good* equipment costs list price, *Fine* equipment costs ×5 list price, and *Very Fine* systems cost ×20 list price. If a system gives a skill bonus or has a value which goes up linearly with ship SM (i.e. a Comm/Sensor Array's Scan rating) then its value gets +1 if *Fine*, +2 if *Very Fine*, and -1 if *Cheap*. If the rating stays the same at all SM's, such as a Rocket Engine's thrust, then it's rating is multiplied by ×1.2 if *Fine*, ×1.4 if *Very Fine*, and ×0.75 if *Cheap*.

If it doesn't make sense to have a partial point for a given system the fractions should be dropped; e.g. you can't have a partial Power Point, but having 0.2G of added thrust is useful. If necessary multiple systems can be combined to get a meaningful bonus, but all must be of the same quality. i.e. 3 Fission Plants can be made Very Fine, producing ×1.4 more Power, or 4.2 Power Points (rounding to 4).

Rules for Specific Systems

- *Armor* and *Force Screens* Multiply dDR by ×1.2 if *Fine*, ×1.4 if *Very Fine*, and ×0.75 if *Cheap*, dropping fractions. Add up dDR of identical systems in the same Hull Section before multiplying dDR; multiply dDR for the *Armor & Volume Rule* before dropping fractions. Ice, Stone, and Indestructible Armor cannot have quality modifiers applied.
- *Nuclear Damper* multiply radius by ×1.2 if *Fine*, ×1.4 if *Very Fine*, and ×0.75 if *Cheap.*
- *Cloaking Devices, IR Masking,* and *Stealth Hull* have their *detection* ***penalty*** increased by -1 if *Fine*, -2 if *Very Fine*, and reduced by +1 if *Cheap*.
- *Control Rooms* get +1 *Computer Complexity* and +1 *Comm/sensor Array Level* if *Fine*, +2 if *Very Fine*, and -1 if *Cheap*.
- *Comm/Sensor Arrays* get +1 *Array Level* if *Fine*, +2 if *Very Fine*, and -1 if *Cheap*.
- *Digestive Systems* have their *dDamage* multiplied by ×1.2 if *Fine*, ×1.4 if *Very Fine*, and ×0.75 if *Cheap*,
- *Factories, Mining,* and *Chemical Refineries* have their *Production* rates multiplied by ×1.2 if *Fine*, ×1.4 if *Very Fine*, and ×0.75 if *Cheap*,
- *Hangar Bays* have their *Launch Rate* multiplied by ×1.2 if *Fine*, ×1.4 if *Very Fine*, and ×0.75 if *Cheap*. In addition their *Capacity* is multiplied by ×1.1 if *Fine*, ×1.2 if *Very Fine*, and ×0.75 if *Cheap*.
- *Soft-Landing Systems* get a quality bonus to Piloting skill rolls for Atmospheric Landing (see p. 40 of Spaceships). -1 if *Cheap*, +1 if *Fine*, +2 if *Very Fine*.
- *Ramscoops* have their minimum velocity decreased to 1,620 mps if *Fine*, 1,440 mps if *Very Fine*, and increased to 1,980 mps if *Cheap*.
- *Robot Arms* and *Tails* have *dST* and *dDamage* multiplied by ×1.2 if *Fine*, ×1.4 if *Very Fine*, and by ×0.75 if *Cheap*.
- *Sapient Brains* get +1 IQ, +1 DX, and +1 Scan if *Fine*, +2 if *Very Fine*, and -1 if *Cheap*.
- *Energy Banks* multiply *capacity* by ×1.2 if *Fine*, ×1.4 if *Very Fine, and ×0.75 if Cheap*.
- For ×5 cost *Power Plants* may be *Fine (Efficient)* and get ×1.2 longer *Fuel Duration* or they may be *Fine (Power)* for ×1.2 higher *Power Point* output (combine multiple power plants before dropping partial power points). For ×10 cost it can be both. For ×20 cost it may be *Very Fine (Efficient)* for ×1.4 *Fuel Duration* or *Very Fine (Power)* for ×1.4 *Power Points*. For ×40 cost it may be both, or for ×25 cost it may be *Fine (Efficient)/Very Fine (Power)* or *Fine (Power)/Very Fine (Efficient)*.
- For ×5 cost *Reaction Drives* may be *Fine (Efficient)* for ×1.2 *delta-V* or *Fine (Power)* for ×1.2 more *Thrust*. For ×10 cost it can be both. For ×20 cost it may be *Very Fine (Efficient)* for ×1.4 *delta-V* or *Very Fine (Power)* for ×1.4 *Thrust*. For ×40 cost it may be both, or for ×25 cost it may be *Fine (Efficient) /Very Fine (Power)* or *Fine (Power) /Very Fine (Efficient)*.
- *Reactionless Drives* get ×1.2 *Thrust* if *Fine*, ×1.4 *Thrust* if *Very Fine*, and ×0.75 *Thrust* if *Cheap*.
- Each *Mount* in a *Weapon Battery* may be *Cheap* for ×0.8 cost, giving -1 Acc and -1 damage level (see below). For ×5 cost they may be either *Fine (Accurate)* giving +1 Acc or *Fine (Powerful)* giving +1 damage level; for ×10 cost they may be both. For ×20 cost they may be either *Very Fine (Accurate)* giving +2 Acc or *Very Fine (Powerful)* giving +2 damage levels. For ×40 cost they may be both, or for ×25 cost they may be *Fine (Accurate) / Very Fine (Powerful)* or *Fine (Powerful) / Very Fine (Accurate)*.

  A "damage level" effectively increases it's Energy Output or Bore Size *only* for the purpose of calculating damage, as if it were SM±0.5 for each damage level.

  Example: A SM+6 Beam Weapon in a Major Battery would normally be 30MJ, but if it's *Fine (Powerful)* its damage would be calculated as if it were 60MJ, if it were *Very Fine (Powerful)* its damage would be calculated as if it were 100MJ. Similarly, the caliber is of a SM+6 Gun is 12cm, but a *Fine (Powerful)* gun would calculate damage as if it were 13cm and a *Very Fine (Powerful)* gun would calculate damage as if it were 14cm.

If not all weapons in a single Weapon Battery are going to have the same quality modifier then caluclate the cost of each mount individually. First find the cost of each individual mount by dividing the Batteries total cost by the number of mounts;

Example: a SM+6 Secondary Battery has 10 mounts and costs $600k, so each mount has an individual cost of $600k/10=$60k. Next add any Quality modifiers to the weapons you want to modify multiply cost accordingly. If four of those mounts are going to be *Very Fine (Power)* then the cost will be 4×20×$60k = $4,800k. Next add the cost of the other six mounts, 6×$60k = $360k for a final cost of $4,800k + $360k = $5,040k or $5.04M.

Mass Combat and Troop Strength

In the article from 'Pyramid 3/30: Spaceships' in the article 'Mass Combat in Space' the rules for calculating Troop Strength have a significant bias towards smaller Spaceships. The base multiplier for TS in the default rules is dDR + dST/dHP, but these values scale roughly with ship length while increasing size/mass/firepower does not. It gives larger ships a significantly lower TS when compared to smaller craft. As one example take two TL 12^ spaceships the Mirage Star Figher (SM+4) which has a calculated TS of 257,400 while the Intrepid-Class Frontier Cruiser (SM+12) has a TS of 2,640,000 - just over ×10 the TS for a ship massing ×10,000 times as much. This may be appropriate for a strictly realistic game (where a million dollar missile can easily take out a billion dollar naval ship) but it does not fit the expectation in most Sci-Fi universes.

To help correct this discrepancy the Alternate Troop Strength option multiplies the final TS by dHP/150, effectively scaling TS with ship surface area (rather than length). This still biases TS towards smaller ships, but not quite so drastically as the default rules. In the previous example the SM+4 ship has a TS 1/10th of the default rules while multiplying a SM+12's TS by 2, so now in the two ships have TS 25,740 and 5,280,000 - a difference of about x200 the TS. A large number of smaller ships still have an advantage, but at least a small squadron is not as powerful as a single large Cruiser.

SM:	**+4**	**+5**	**+6**	**+7**	**+8**	**+9**	**+10**	**+11**	**+12**	**+13**	**+14**	**+15**
TS Multiplier:	×0.1	×0.133	×0.2	×0.333	×0.467	×0.667	×1	×1.333	×2	×3.333	×4.667	×6.667

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Vorkosigan Saga Sourcebook | Pyramid #3/30 | Pyramid #3/34 | Pyramid #3/40 | Pyramid #3/64 | Pyramid #2/6603

Rules for using **GURPS Spaceships** with **GURPS Traveller** were adapted from Jason "RPK" Devine's MyGURPS:

http://www.mygurps.com/pmwiki.php?n=Main.UsingGURPSSpaceshipsInTraveller