

Book 2—Starships

Book 2  
Starships

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**TRAVELLER**<sup>TM</sup>  
Science-Fiction Adventure  
in the Far Future

Game Designers' Workshop

*Book 2*  
*Starships*

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*Science-Fiction Adventure*  
*in the Far Future*

Game Designers' Workshop

TRAVELLER, Book 2, Starships  
Second Edition

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# Travelling

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Travellers travel. They move between worlds as well as on their surfaces. The distances such travel covers may be interplanetary or interstellar in scale.

**Interplanetary Travel:** Worlds orbiting the same star are accessible by interplanetary travel, on ships operated by local entrepreneurs, or with a variety of small craft. But, interplanetary travel takes long periods of time; since most stellar systems have only one major world, interplanetary travel is infrequent.

Interplanetary travel takes time. The travel formulae and diagram on page 10 show a typical interplanetary journey, and equations which can determine time required (if distance and acceleration are known), acceleration required (if distance and time are known), and distance travelled (if time and acceleration are known). All of the formulae use the MKS (meters, kilograms, seconds) unit system, and assume that the ship is undertaking a journey from rest, that it accelerates continuously to midpoint of the trip, and then decelerates to rest again. In addition, several travel times and travel distances have been calculated out for ready reference.

Interplanetary travel usually involves the individual's own vessel, or a charter. Scheduled service is rarely available.

**Interstellar Travel:** Worlds orbiting different stars are reached by interstellar travel, which makes use of the jump drive. Once a starship moves to a safe distance from a world, it may activate its jump drive. Jump drives are rated from 1 to 6: the number of parsecs which can be travelled in one week. Actually, making any jump takes about one week, regardless of the distance travelled. Transit time to 100 diameters from a size 8 world takes 5 hours at 1 G.

Commercial starships usually make two jumps per month. They spend one week in jump, followed by one week in the star system, travelling from the jump point to the local world, refuelling, marketing cargo, finding passengers, leaving the starport and proceeding to a jump point again. The week in the system usually provides some time for crew recreation and wandering around the planet.

Non-commercial ships usually follow the same schedule of one week in jump and one week in a system. If haste is called for, a ship may refuel at a gas giant immediately, and re-jump right away. This allows the ship to make one jump per week, but makes no provision for cargo, passengers, or local stops.

Interstellar travel is priced on the basis of accommodations; prices cover a trip from starport to starport, encompassing one jump, regardless of length. There are four types of passage:

**High Passage—** The best method of travel is called high passage, which involves first class accommodations and cuisine. High passengers have the services of the ship's steward, entertainment and complete attention to their comfort. There is a baggage allowance of up to 1,000 kilograms. High passage costs Cr10,000.

**Middle Passage-** In order for starships to fill their staterooms with passengers, middle passage is offered on a standby basis, in the event that not enough high passages are sold. While middle passengers occupy staterooms normally similar to those occupied by high passengers, they do not receive the service or entertainment accorded the higher paying passengers. In addition, the quality of the cuisine

is rather low. Baggage totalling 100 kilograms is allowed. A middle passenger may be 'bumped' and the stateroom taken by a late arriving high passenger; the middle passenger's ticket is returned, but no other compensation is made. (The middle could then buy a high passage and 'bump' another middle passenger, if the extra cost seemed worth it. Middle passage costs Cr8,000.

**Working Passage—** A starship captain with a crew shortage may hire an individual to fill the vacant position, paying not money but passage in return. Working passage may not continue for more than three jumps, or the individual is considered to have been hired for standard salary. In order to be hired for working passage, the individual must have some expertise in the position for which he is hired (jack-of-all-trades may be substituted). Baggage totalling 1,000 kilograms is allowed.

**Low Passage—** Transportation while in cold sleep (suspended animation) is possible at relatively low cost to the passenger. The passenger is placed in a low passage berth before the ship takes off, and travels the entire journey in a state of suspended animation. He does not age, and requires very little life support. Unfortunately, the low passage system involves some intrinsic dangers to the passenger, and he runs some risk of not surviving the voyage. Throw 5+ for each passenger, when he is revived after the ship has landed. DMs: Attending medic of expertise of 2 or better, +1; low passenger with an endurance of 6 or less, -1. Failure to achieve the throw to revive results in death for the passenger. Refunds or civil liability if a low passenger fails to survive the trip are not allowed. Low passage costs Cr1,000 and includes a baggage allowance of 10 kilograms.

## LESSER KNOWN ASPECTS OF SPACE TRAVEL

As interstellar travel has developed, the field has developed its own dangers and customs. The following are just a few.

**The Low Lottery:** It is customary for the captain to contribute Cr10 out of each low passage towards a lottery. Each low passenger randomly guesses the number of low passengers who will survive the trip. If the winner does not himself survive, the captain receives the money. The ship's steward administers the lottery.

**The Travellers' Aid Society:** Individuals who have decided that they wish to pursue a life of travel and adventure may elect to join the Travellers' Aid Society, in order to take advantage of its facilities and passage dividends. See Book 1.

**Hijacking:** Starships can be easy prey for hijackers. Starship crews maintain a constant guard against hijackers, and the ship's computer can run an anti-hijacking program which denies access to control areas to potential hijackers. Passengers are required to check all weapons (except blades and daggers) into the ship's locker; they are returned at the end of the voyage. Nevertheless, there is a chance of an attempted hijacking, for ransom, or to steal the multi-million credit vessel. Roll three dice for 18+ to indicate a hijacking attempt (this throw does not apply if all passengers are player-characters). When an attempt occurs, randomly determine the number of hijackers, their identities, characteristics, and weapons, and implement their attempt at some point during the voyage. They will gain complete control of the ship only after defeating all other individuals on the ship. If the anti-hijacking program is functioning, the hijackers will be able to enter the bridge (gaining access to the controls) only on a throw of 5-.

**Skipping:** Most starships are purchased on credit, and the monthly payments

required against the multi-million credit debt are staggering. The owner or captain may decide to steal the ship himself instead of remaining under that load. Passengers have no way themselves of determining if a specific ship is in such a status. Throw 12+ to determine that a commercial ship is of this type. Ships which have skipped are subject to repossession attempts if detected by the authorities. Such attempts may range from the formal service of papers through legal injunctions to armed boarding parties. On each world landing, throw 12+ to avoid a repossession attempt; apply a DM of +1 per 5 parsecs distance from the ship's home planet, to a maximum of +9. If the ship has called on the same world twice within the last two months, apply a DM of -2.

**Piracy:** A starship may be attacked by pirates while entering or leaving a system. Similar encounters may involve customs agents or military vessels, including blockades. The ship encounter table later in this book indicates the procedure.

## STARSHIP MALFUNCTIONS

As with any mechanical device, a starship can malfunction. The two major malfunctions are drive failure and misjump. The primary influencing factors are unrefined fuel and lack of maintenance.

Refined fuel is available at starports at about Cr500 per ton; unrefined fuel is available at starports for Cr100 per ton, or can be skimmed from gas giants for free. In addition, water can be taken from oceans or lakes (if there are any on the world) and used as unrefined fuel. Military and quasi-military starships often use unrefined fuel because it is more available, and because their drives are specially built to use it. Commercial ships sometimes use unrefined fuel because it is cheaper.

Starships require continuing maintenance as they operate, and an annual maintenance overhaul to keep them in top running order. Ships which are undercrewed and do not carry enough dedicated or full-time skilled engineers and those which avoid or delay their annual maintenance run the risk of malfunction.

**Drive Failure:** Each week, throw 13+ for drive failure; apply the following DMs: +1 if using unrefined fuel (and not equipped to do so), +1 per engineer missing from the crew list, +1 per week past annual maintenance overhaul date. If a malfunction occurs, then throw 7+ for each drive in use (jump, maneuver, power plant) to determine which actually fail, (if any). Failed drives cease operations completely; maneuver drives will no longer thrust, jump drives will fail and indicate that they cannot support jump; power plants stop delivering power. Batteries will provide life support and basic lighting for 1 D days. Throw 10+ per day of repair attempt with DM +engineering skill of the attending engineers to fix them temporarily. More complete repairs must be made at a starport by qualified personnel.

**Misjump:** Each time the ship engages in a jump, throw 13+ for a misjump: Apply the following DMs: +1 if using unrefined fuel (and not equipped to do so), +5 if within 100 planetary diameters of a world, +15 if within 10 planetary diameters of a world. If the result is 16+, then the ship is destroyed.

A misjump is an unpredictable random jump. Throw one die to determine the number of dice thrown (1 to 6); throw that number of dice to determine the number of hexes in length the misjump is. Then throw one die to determine the direction of the misjump (one of the six directions possible on the hex grid). Finally, throw one die to determine the number of weeks spent in jump space before the ship re-emerges at its new location.

# Starship Economics

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The operation of starships in interstellar commerce requires an understanding of the economics which governs trade between the stars. Prices and returns on effort and investment are controlled by the supply and demand which exists in the commercial system. Because starships are so expensive, many of the prices in this section are expressed in megacredits (abbreviated MCr); a megacredit is one million credits.

## STARSHIP PURCHASE

Bank financing is available to qualified individuals for the purchase of commercial starships. After a down payment of 20% of the cash price of the starship is made, the shipyard will begin construction of a specific vessel. Upon completion, the vessel is delivered to the buyer, with the bank paying off the purchase price to the shipyard. Because the bank now holds title to the ship, the price must be paid off in a series of monthly payments to it. Standard terms involve the payment of 1/240th of the cash price each month for 480 months. In effect, interest and bank financing cost a simple 120% of the final cost of the ship, and the total financed price equals 220% of the cash purchase price, paid off over a period of 40 years.

In addition, the bank will insist that the purchaser submit an economic plan detailing the projected activity which will guarantee that monthly payments are made. Unless a character has some form of guaranteed income (perhaps large rents from some property he owns), this condition will generally rule out purchases (at least financed purchases) of yachts, military vessels, or exploratory vessels.

**Subsidies:** The government may subsidize larger commercial vessels (built on type 600 hulls or larger), primarily to assure consistent service to specific worlds. These subsidized merchants are generally assigned a specific route connecting from 2 to 12 worlds of varying characteristics. The route will generally be determined before a subsidized merchant is purchased, to allow tailored design features as may be necessary. When a subsidized merchant is ordered, the character himself must make the 20% down payment, with the government assuming responsibility for the payments upon delivery, and taking 50% of the gross receipts of the ship while in service. The character is responsible for all expenses and costs of operation.

Subsidized merchants are also subject to mobilization (and use as auxiliaries) in the event of emergency or hostilities. At the end of 40 years, the vessel is completely paid off, and full title passes to the character, but the vessel remains subject to mobilization in case of government need.

## STARSHIP EXPENSES

There are five basic expenses (in addition to the bank payment, if necessary) associated with starship operation:

1. Fuel. Starship fuel costs Cr500 per ton (refined) or Cr100 per ton (unrefined), at most starports. Fuel consumption is based on formulae related to the size of the starship power plant and the jump drive.
2. Life Support. Each occupied stateroom on a starship involves an overhead



cost of Cr2000 per trip (two weeks) made. Each occupied low passage berth involves an overhead cost of Cr100 per usage. There is a normal limit of one person per stateroom, travelling couples or groups usually taking adjoining staterooms. Military vessels or chartered ships may be used with a double occupancy system (two persons per stateroom), but this requires twice the normal cost.

**3. Routine Maintenance.** Annually, a starship should be given a complete overhaul in order to insure that it is kept in good working order. Such maintenance costs 0.1% (1/1000th) of the cash price of the ship, and requires two weeks at a class A or B starport. The owner must make provision for payment of the maintenance fee when it comes due. Crew members generally take their vacations at this time, but must still be paid. The ship owners must make provision for the expected loss of revenue while the ship is out of service.

**4. Crew Salaries.** Crew members must be paid monthly. Non-player characters must be paid using the standard crew salary schedule (with suitable modifications for expertise or seniority, generally +10% for each level of expertise above level 1). Player-characters may bargain for better pay rates, or they may elect to accept worse. In addition, player characters may participate with the owner-captain and accept shares in the proceeds of the ship's activities.

Characters who take working passage are not paid, receiving passage, room and board in lieu of salary (but continuous working passage for more than three trips results in automatic hiring and receipt of salary). The starship captain is usually the pilot or navigator, and serves as owner-aboard, drawing his pay from the profits. Not all crew positions are required on all ships, and some ships will have more than one person performing the same function. For example, a large liner would have more than one steward.

**5. Berthing Costs.** Landing fees, handling costs, facilities use charges, and other starport fees are a common practice, and such costs must be paid as they occur. The average cost is Cr100 to land and remain for up to six days; thereafter, a Cr100 per day fee is imposed for each additional day spent in port. In some locations this fee will be higher, while at others local government subsidies will lower or eliminate it.

## REVENUE

Starships generate revenue by carrying passengers, cargo, and mail.

**Cargo:** Starships may inquire at a starport about the number, sizes, and destinations of cargos awaiting transportation. The referee should determine all worlds accessible to the starship (depending on jump number), and roll for each such world on the cargo table. He should roll to determine the number of major, minor, and incidental cargos available on the world of origin; modifiers take into account the world of destination. After rolling for the number of cargos, roll one die for each cargo to determine its size. Multiply the die roll for major cargos by 10, minor cargos by 5, and incidental cargos by 1 to determine the number of tons in each. For example, if a ship is on a population 6 world, going to a population 3 world with a tech level 3 less than the current world, the referee rolls one die for major cargos; he rolls a 4 (+2 from the table, -4 for the low population of the destination, +3 for the tech level difference), giving 5 major cargos. He then rolls one die for each cargo and multiplies each result by 10 to determine their individual tonnages. Each cargo is a distinct shipment and cannot be subdivided, but the ship may accept or reject specific cargos based on the best fit within the cargo hold. All car-

gos are carried at Cr1,000 per ton. Starship owners may purchase goods locally and ship them at their own expense, speculating that they can later sell them at a profit.

**Passengers:** After a starship has accepted cargo for a specific destination, passengers will present themselves for transport to that destination. The passenger table is used to determine the number of passengers desiring passage to the announced world based on the origin world's population and on the destination world's population and travel zone status. Roll the number of dice specified (3D-1D, for example, indicates that three dice are rolled, and from that total, the result of another one die roll is subtracted). Apply any indicated DMs.

Passengers will pay the standard fare for the class of transportation they choose: Cr10,000 for high passage, Cr8,000 for middle passage, and Cr1,000 for low passage. Passage is always sold on the basis of transport to the announced destination, rather than on the basis of jump distance.

Differences in starship jump drive capacity have no specific effect on passage prices. A jump-3 starship charges the same passage price as a jump-1 starship. The difference is that a jump-3 ship can reach a destination in one jump, while the jump-1 ship would take three separate jumps (through two intermediate destinations, and requiring three separate tickets) to reach it. Higher jump numbers also may make otherwise inaccessible destinations within reach. But for two ships of differing jump numbers going to the same destination in one jump, each would charge the same cargo or passage price.

**Mail and Incidentals:** Subsidized merchants may receive mail delivery contracts, usually as an adjunct to their established routes. Five tons of ship cargo capacity must be committed to postal duty on a full time basis, the ship must be armed, and a gunner must be a part of the crew. The starship is paid Cr25,000 (Cr5,000 per ton of postal cargo area) for each trip made, regardless of the actual mail tonnage carried. Such tonnage will not exceed 5 tons per trip.

Other ships may be approached to deliver private messages, at times through the ship's owner or captain, and at times clandestinely through a crew member. Private mail is usually intended for delivery to a specific point (such as the Travellers' Aid Society building, or a tavern keeper), and is generally accompanied by a Cr20 to Cr120 honorarium. Throw 9+ for a private message to be awaiting transmittal, and determine randomly which crew member is approached to carry it. Serving as a carrier for private mail also serves as an introduction to the recipient as a dependable, trustworthy person.

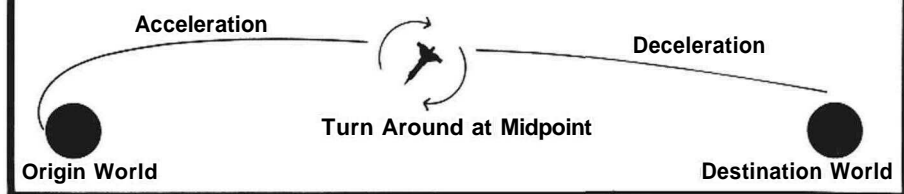
## TRADE CUSTOMS

Goods taken on in orbit are delivered when placed in orbit around the destination. Goods taken on on a planetary surface are delivered when off-loaded on the surface of the destination. This custom applies to cargo, passengers, and mail.

At any location with a class A, B, or C starport, shuttles routinely operate between orbit and world surface. Typical shuttle price is Cr10 per ton and Cr20 to Cr120 per passenger.

**Charters:** Standard price to charter a non-starship is Cr1 per ton per hour, usually with a twelve hour minimum. Charter price for a starship is computed based on its revenue-generating capacity. Starships are chartered in 2-week blocks; the charge is Cr900 per ton of cargo hold plus Cr9,000 per high passage berth and Cr900 per low passage berth. The owner pays all overhead and supplies a crew.

## A Typical Interplanetary Journey



$$T = 2\sqrt{D/A} \quad D = AT^2/4 \quad A = 4D/T^2$$

The three travel formulae assume constant acceleration to midpoint, turnaround, and constant deceleration to arrive at the destination at rest, as shown in the diagram above. There are three variables; if any two are known, the third can be determined using one of the formulae above. The variables are time (T) in seconds, distance (D) in meters, and acceleration (A) in meters/second<sup>2</sup>. Other units must be converted to these three before using the formulae. For example, suppose a player, using the units in the miniatures rules described later in this book, wishes to determine how long it would take (in 1000-second turns) to travel 3 scale meters (or 300,000 kilometers — each millimeter equals 100 kilometers) at 1 G. To get meters from kilometers he must multiply by 1,000 (300,000 km=300,000,000 meters); to get meters/second<sup>2</sup> from Gs he must multiply by 10 (1G=10 meters/second<sup>2</sup>). The formula is then: T(in seconds)=2x√(300,000,000/10), or 10,954. To translate into 1000-second turns, he divides by 1,000 to get about 11 turns.

Below are listed a number of typical travel times for various distances and accelerations. Times are in the most convenient unit: s=seconds, m=minutes, h=hours, and d=days.

### TYPICAL TRAVEL TIMES

Kilometers	Acceleration					
	1-G	2-G	3-G	4-G	5-G	5-G
1,000	633s	447s	365s	316s	283s	258s
10,000	2000s	1414s	1155s	1000s	894s	816s
100,000	105m	74m	61m	53m	47m	42m
300,000	183m	129m	105m	91m	82m	73m
400,000	211m	149m	122m	106m	94m	86m
1,000,000	333m	236m	192m	167m	149m	136m
10,000,000	17.6h	12.4h	10.1h	8.8h	7.9h	7.2h
45,000,000	37.3h	26.4h	21.5h	18.6h	16.7h	15.2h
100,000,000	55.6h	39.3h	32.1h	27.8h	24.8h	22.3h
255,000,000	88.7h	62.7h	51.2h	44.4h	39.7h	36.2h
600,000,000	136.1h	96.2h	78.6h	68.0h	60.9h	55.6h
900,000,000	166.7h	117.9h	96.2h	83.4h	74.5h	68.0h
1,000,000,000	7.3d	5.2d	4.2d	3.7d	3.3d	2.9d

## CREW SALARIES

<i>Position</i>	<i>Skill Level</i>	<i>Monthly Salary</i>
Pilot	Pilot-1	Cr6,000
Navigator	Navigator-1	Cr5,000
Engineer	Engineer-1	Cr4,000
Steward	Steward-0	Cr3,000
Medic	Medic-1	Cr2,000
Gunner	Gunner-1	Cr1,000

## SHIP EXPENSES

Bank Payment	Monthly.
Fuel	To replace fuel consumed.
Life Support	Per passenger and crew.
Maintenance Fund	In anticipation.
Salaries	For crew.
Berthing Costs	Per starport.

## TYPICAL DISTANCES

World Surface to Orbit	10,000km
Satellite	400,000km
Close Neighbor World	45,000,000 km
Far Neighbor World	255,000,000km
Close Gas Giant	600,000,000 km
Far Gas Giant	900,000,000 km

## PASSENGERS

<i>World Pop</i>	<i>Available at World of Origin</i>		
<i>Digit</i>	<i>High</i>	<i>Middle</i>	<i>Low</i>
0	—	—	—
1	—	1D-2	2D-6
2	1D-1D	1D	2D
3	2D-2D	2D-1D	2D
4	2D-1D	2D-1D	3D-1D
5	2D-1D	3D-2D	3D-1D
6	3D-2D	3D-2D	3D
7	3D-2D	3D-1D	3D
8	3D-1D	3D-1D	4D
9	3D-1D	3D	5D
A	3D	4D	6D

DMs for destination world:

If population 4-, -3.

If population 8+, +3.

If Red Zone, -12; no middle or low.

If Amber Zone, -6.

Tech Level: add (or subtract) difference between origin and destination.

## SHIP REVENUES

Per High Passage	Cr10,000
Per Middle Passage	Cr8,000
Per Low Passage	Cr1,000
Per Cargo Ton	Cr1,000
Mail (if fitted)	Cr25,000

## MALFUNCTIONS

**Drive Failure:** Throw 13+ per week of operation, with the following DMs.

Using unrefined fuel +1

Per missing required engineer +1

Per month past annual

maintenance date, if not performed +1

**Misjump:** Throw 13+ each time a ship jumps, with the following DMs.

Within 100 diameters of world +5

Within 10 diameters of world +10

Using unrefined fuel +1

If naval ship -1

If scout ship -2

If result is 16+, ship is destroyed.

If result is 13+, ship has misjumped.

## CARGO

<i>World Pop</i>	<i>Available at World of Origin</i>		
<i>Digit</i>	<i>Major</i>	<i>Minor</i>	<i>Incidental</i>
0	—	—	—
1	1D-4	1D-4	—
2	1D-2	1D-1	—
3	1D-1	1D	—
4	1D	1D+1	—
5	1D+1	1D+2	—
6	1D+2	1D+3	1D-3
7	1D+3	1D+4	1D-3
8	1D+4	1D+5	1D-2
9	1D+5	1D+6	1D-2
A	1D+6	1D+7	1D

DMs for destination world:

If population 4-, -4.

If population 8+, +1.

If Red Zone, no cargo.

If Amber Zone, no major cargo.

Tech Level: add (or subtract) difference between origin and destination.

# Design and Construction

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Space ships are constructed and sold at shipyards throughout the galaxy. Any class A starport has a shipyard which can build any kind of ship, including a starship with jump drives; any class B starport can build a small craft and ships which do not have jump drives. The military procures vessels through these yards, corporations buy their commercial vessels from these shipyards, and private individuals can purchase ships that they have designed through them as well. The major restriction on the purchase of ships is money.

**Definitions:** A vessel is any interplanetary or interstellar vehicle. A ship is any vessel of 100 tons or more. A starship is a ship which has jump drives and can travel on interstellar voyages. A non-starship is a ship without jump drives. A small craft is any vessel under 100 tons; all small craft are incapable of jump.

## SHIP DESIGN

Most vessels are constructed from standard design plans which use time-tested designs and combinations of features. Shipyards work from these plans which cover every detail of construction and assembly.

**Naval Architecture:** Small design corporations can produce design plans for any vessel type once given the details of what is desired. The design procedure is followed to determine what is available and allowed, and the results are presented to the naval architect firm. They produce a detailed set of design plans in about four weeks for a price of 1% of the final ship cost; they can be hurried to finish the job in two weeks if paid 1.5%. Once the design plans are received, the shipyard may be commissioned to produce the vessel desired.

**Standard Designs:** There are a number of standard design plans available; they have been in use for a long time, and are available for a nominal fee (Cr100 for the set). Standard starship plans available are: 100-ton Scout/Courier, 200-ton Free Trader, 200-ton Yacht, 400-ton Subsidized Merchant, 600-ton Subsidized Liner, 800-ton Mercenary Cruiser, and 400-ton Patrol Cruiser. Standard plans are also available for the following small craft: 20-ton Launch, 30-ton Ship's Boat, 30-ton Slow Boat, 40-ton Pinnace, 40-ton Slow Pinnace, 50-ton Cutter, 95-ton Shuttle, and 10-ton Fighter. Other standard plans may be available at various localities.

Standard designs are easier to produce; their prices reflect a 10% reduction in normal pricing. The details of the standard designs are shown at the end of this chapter. Standard design vessels are often available used (10 to 40 years old) at reductions in price ranging from 10% to 40%, as indicated by the referee.

**Construction Times:** Time required for building any vessel depends primarily on the hull. The drive potential table indicates construction time for each tonnage of hull; any hull over the indicated tonnage requires the next higher construction time. The standard hulls table gives shorter construction times for those hulls; they are more familiar to the shipyard and easier to build.

**Costs and Payments:** A shipyard will insist upon a 20% down payment with the order for the vessel, as well as requiring a demonstration that proper financing is available to cover the balance when due.

## REQUIRED STARSHIP COMPONENTS

Starships are constructed on the foundation of a hull, into which are fitted the drives and power plants, the fuel tankage, life support equipment, computers, controls, armaments, and other fittings that adapt it to its intended function. The total tonnage of the installed fittings cannot exceed the tonnage of the hull.

**The Hull:** Hulls are identified by their mass displacement, expressed in tons. As a rough guide, one ton equals 14 cubic meters (the volume of one ton of liquid hydrogen). When hulls are constructed, they are divided into an engineering section for the drives and the main compartment for everything else. All drives and power plants must be located in the engineering section, and only drives and power plants may be placed in that section. All other ship components, including fuel, cargo hold, living space, and computer must be located in the main compartment.

The standard hulls table shows six standard hulls which are available at reduced prices and construction times. Any other hull must be produced on a custom basis at a cost of MCr0.1 per ton; minimum price MCr20. Construction (or build) times for custom hulls are shown in the last column of the drive potential table.

Hulls vary in their requirements for drives and power plants based on tonnage. Any specific drive will be less efficient as the tonnage it must drive increases. The drive potential table lists 24 standard drive types, identified by the letters A through Z (omitting I and O to avoid confusion). Also listed are various tonnage levels for hulls; any tonnage which exceeds a listed level should be read at the next higher level. Correlating hull size with drive letter indicates drive potential. For maneuver drives, this potential is the Gs acceleration available. For jump drives, the potential is the jump number (Jn), or jump range in parsecs. For power plants, it is power plant rating (Pn). For example, a 200-ton hull equipped with maneuver drive-A can produce 1-G acceleration; an 800-ton hull equipped with jump drive-K can produce jump-2.

**The Engineering Section:** Drives are installed in the engineering section. A non-starship must have a maneuver drive and a power plant. A starship must have a jump drive and a power plant; a maneuver drive may also be installed, but is not required. In all cases, the power plant letter must equal or exceed either the maneuver drive letter or the jump drive letter, whichever is higher. The prices and masses of drives and power plants are described on the drives and power plants table; their total tonnage may not exceed the tonnage of the engineering section of the vessel.

It is important to note from the drive potential table that some drives will not produce results in some tonnages of hulls, as indicated by a dash instead of a number on the table; the drives and power plants table also indicates that some drives will not fit into some hulls. During the design process, it may also turn out that after fitting a set of drives and power plant into a hull, there may be insufficient tonnage remaining for fuel, basic controls or life support.

Drive ratings greater than six are not available from the equipment shown here.

**The Main Compartment:** The ship's main compartment contains all non-drive features of the ship, including the bridge, ship's computer, the staterooms, the low passage berths, the cargo hold, fuel tanks, armament, and other items.

**A. The Bridge:** All ships must allocate 2% of their tonnage (minimum 20 tons) to basic controls, communications equipment, avionics, scanners, detectors, sensors, and other equipment for proper operation of the ship. The cost for this bridge is

MCr0.5 per 100 tons of ship.

The basic controls do not include the ship's computer, which is installed adjacent to the bridge. The computer is identified by its model number; the computer table indicates details of price, tonnage, capacity, and tech level available. In general, larger computers are more advantageous in combat situations. In addition, the model number indicates the highest level of jump which can be achieved by the ships. For example, a ship must have a Model/4 computer before it can perform jump-4, in addition to the proper size jump drive.

CPU refers to the computer's central processing unit, indicating its capacity to process programs; storage refers to the additional capacity available to hold programs in readiness for processing. Programs themselves are classified by size, using a point indicator to specify how much of the CPU or storage capacity is required for that program to fit into the computer. The number of programs (and the exact types of programs) which are on hand, in storage, or in the CPU is important in the operation of the starship, especially in combat.

Computer software (programs) must normally be acquired separately by purchase (or they may be written by a character who has computer expertise). Each computer model is originally furnished with a basic software package of commonly used programs. This package is selected by the purchaser from the list of available programs; the computer model (1 through 7) indicates the credit value which may be selected. For example, Model/1 allows a package with a value of MCr1, while Model/6 allows a value of MCr6.

There are two bis models of computer available. Each is treated as the next higher level for jump support, but as the next lower level for software selection. Thus, the Model/1bis can support jump-2, but is allowed a software package value of only MCr1.

Fire control equipment is required if weaponry is to be installed. Each installed turret requires one ton of displacement committed for the installation of fire control equipment.

Original design plans for ships often include reserve tonnage for later use in installing fire control equipment, or for upgrading computers.

**B. Staterooms:** Quarters for the crew and passengers are provided in the form of staterooms containing sleeping and living facilities. Each stateroom is sufficient for one person, displaces 4 tons, and costs Cr500,000. In some starships (especially exploratory vessels, military ships, and privately-owned starships), double occupancy is allowed in staterooms. No stateroom can contain more than two persons however, as it would strain the ship's life support equipment. A commercial ship must have one stateroom for each member of the crew.

**C. Low Passage Berths:** Facilities for carrying passengers in cold sleep may be installed in a ship. One low passage berth carries one low passenger, costs Cr50,000, and displaces one-half ton. Low berths also serve well in emergencies, in that they can provide suspended animation facilities for characters when medical care, rescue, or assistance is not immediately available.

Emergency low berths are also available; they will not carry passengers, but can be used for survival. Each costs Cr100,000 and displaces one ton. Each holds four persons who share the same revival die roll.

**D. Fuel:** Total fuel tankage for a ship must be indicated in the design plans. There is no cost, but the capacity does influence how often the ship must refuel.

At a minimum, ship fuel tankage must equal  $0.1 MJ_n + 10P_n$ , where M is the tonnage of the ship,  $J_n$  is the ship's jump number, and  $P_n$  is the ship's power plant rating. Power plant fuel under the formula ( $10P_n$ ) allows routine operations and maneuver for four weeks. Jump fuel under the formula ( $0.1 MJ_n$ ) allows one jump of the stated level. Ships performing jumps less than their maximum capacity consume fuel at a lower level based on the jump number used.

**E. Cargo Hold:** The design plan must indicate cargo capacity. There is no cost but cargo carried may not exceed cargo capacity.

**F. Armaments:** Any ship may have one hardpoint per 100 tons of ship. Designation of a hardpoint requires no tonnage, and costs 0100,000. Hardpoints may be left unused if desired.

One turret may be attached to each hardpoint on the ship. When it is attached, one ton for fire control must be allocated. Turrets themselves are available in single, double, and triple mounts which will hold one, two, or three weapons respectively. Prices for turrets and weapons are indicated on the weapons and mounts table, (see below).

Turrets and weapons may be altered or retrofitted. For example, a single turret can have its pulse laser replaced by a beam laser when it becomes available; a single turret can be replaced by a triple turret when it becomes available. Weapons for installation in turrets include pulse and beam lasers, missile racks, and sandcasters. All are used in the space combat system described later in this book.

## OPTIONAL COMPONENTS

The following optional components can be included in design plans, or may be acquired for later installation on a vessel.

**Atmospheric Streamlining:** The hulls specified are rough deep space configurations incapable of entering atmospheres. They may be streamlined by indicating in the design plans, at a cost of MCr1 per 100 tons of ship. This streamlining includes fuel scoops which allow the skimming of unrefined fuel from gas giants and the gathering of water from open lakes or oceans. Streamlining may not be retrofitted; it must be included at the time of construction.

**Ship's Locker:** Every ship has a ship's locker. The actual cost of much of the equipment within the locker is inconsequential when compared to hull and drive costs; the referee should administer what is actually within the ship's locker based on the situation. Typical equipment carried aboard will include protective clothing, vacc suits, weapons such as shotguns or carbines, pistols, ammunition, compasses and survival aids, and portable shelters.

**Ship's Vehicles:** A ship may have one or more subordinate vehicles specified as part of the ship's equipment, and tonnage may be devoted to the permanent stowage or hangarage of the vehicles. The vehicles list indicates those vehicles and small craft commonly available.

Air/rafts, ATVs, GCarriers, and speeders are covered in Book 3. In most cases, vehicles will have ports or bay doors opening to the outside; air/rafts, GCarriers, and speeders can reach orbit, and are often launched to a world surface from orbit. If an ATV is carried, provision must be made to move it to a world surface if the ship is not streamlined, unless, of course, the vehicle is intended for use only on worlds without an atmosphere. Small craft are covered later in this chapter. When carried on a ship, tonnage sufficient to hold them must be allocated.



## SHIP CREWS

Each ship requires a crew. On small ships, the crew may be one person; on larger ships, the crew can be quite large. The following basic crew positions must be filled:

**Pilot:** Each starship and non-starship requires a pilot, who must have at least pilot-1 skill. Small craft require a pilot who must have at least ship's boat-1.

**Navigator:** Each starship displacing greater than 200 tons must have a navigator. The pilot of a small craft or non-starship can handle its navigation requirements.

**Engineer:** Any ship with tonnage 200 tons or more must have one engineer (with minimum engineer-1 skill) per 35 tons of drives and power plant. If there is more than one engineer, then the most skilled (or the oldest) becomes chief engineer with 10% more pay. Ships under 200 tons and small craft do not require an engineer, although engineering skill may prove useful.

**Steward:** If high passengers are carried, then a steward is required. There must be at least one steward (steward skill-0 or better) per eight high passengers on the ship. If there is more than one steward, the most skilled is designated chief steward (or purser) and draws 10% more salary.

**Medic:** Each starship of 200 tons or more must have a medic (medic-1 skill or better). In addition, there must be at least one medic per 120 passengers carried. If there is more than one medic, the most skilled is designated ship's doctor and draws 10% more pay. Non-starships and small craft do not require medics.

**Gunner:** One gunner (gunnery skill-1 or better required) may be hired per turret on a ship. Armed small craft require a gunner in addition to the pilot. If there is more than one gunner, the most skilled is designated the chief gunner and draws 10% more pay. The gunner position may be omitted if there is no major threat to the ship.

One person may fill two crew positions, providing he or she has the skill to otherwise perform the work. However, because of the added burden, each position is filled with skill minus one, and the individual draws salary equal to 75% of each position; thus, to fill two positions, the character must have at least skill level-2 in each (except steward: level-1).

Other crew positions may be created depending on the facilities of the starship: for example, a starship with a cutter would have a position for cutter pilot (and possibly cutter gunner) in addition to the normal positions. Specific jobs or tasks require crew members to perform them.

For starships of greater than 1000 tons hull mass displacement, the crew should also include a commanding officer (or captain), his executive officer, and at least three administrative personnel. Extremely large starships should have at least 10 crew members for each 1000 tons of mass displacement.

## WEAPONRY

The four commonly available weapons types are pulse lasers, beam lasers, missile launchers, and sandcasters.

**Pulse Lasers** fire short bursts of energy at targets and are more effective at inflicting damage than are beam lasers.

**Beam Lasers** fire continuous beams of energy at targets and are more effective in achieving hits than are pulse lasers.

**Missile racks** are launchers for small anti-ship missiles. The typical missile is a

homing type which constantly seeks the target ship, ultimately being destroyed by the target's defenses, or exploding and doing damage to it. Such missiles may also be converted to planetary surface bombs, or to surveillance drones (mechanical and electronic skill should apply in such cases). Individual missiles weigh about 50 kg, and cost Cr5,000 each.

**Sandcasters** are defensive weapons; they dispense small particles which counteract the strength of lasers and protect the ship. The specific particles used are similar to ablat personal armor; replacement canisters of this special sand weigh about 50 kg and cost Cr400.

## **SMALL CRAFT**

Vessels under 100 tons are considered to be small craft. There are eight standard designs available; each design plan is available for Cr100. All take approximately twelve months to build. All are streamlined, and can enter atmospheres. All can operate with unrefined fuel; they have fuel scoops which allow them to skim fuel from a gas giant.

Each small craft design is intended to be as useful as possible. As a result, the description covers basic performance of the craft, and indicates price, crew, and other details. Each craft also has a feature called excess space: this interior tonnage may be used by the purchaser for a wide variety of purposes. In effect, when the craft is procured, it is customized by the purchaser for some specific use. Any fitting or combination of fittings shown on the fitting table may be specified for a standard design small craft. The prices, however, are ignored, and are considered to be included in the standard design price. For example, the launch, with 13 tons excess space, could utilize that space for 5 tons of fuel, 10 passenger couches, a small craft cabin, and one ton of cargo; or the vessel could have all 13 tons allocated to cargo. In either case, the price of the launch remains MCr14.

**Fittings:** The fittings table indicates items which may be allocated to small craft. Staterooms, low berths, and emergency low berths are the same as those used in larger ships. The small craft cabin is a small, one passenger stateroom for use on longer duration voyages. It can be used double occupancy in a pinch, but the crowding will increasingly affect the abilities of the crew to function as time passes. Couches are individual passenger seats; one is required for each passenger carried (if a stateroom or cabin is not provided). Each small craft except the fighter already has two small craft passenger couches installed (the fighter has one). Cargo and fuel tankage are simply allocated; one ton of cargo space carries one ton of cargo, while one ton of fuel tankage carries one ton of fuel.

The fuel tankage listed for each craft is sufficient for four weeks of operations.

Listed crew for all small craft except the fighter is two: pilot and rider. The craft may be operated by one pilot if desired. The pilot must have ship's boat skill (or may use pilot skill minus one). The rider may be a gunner, a passenger, or a co-pilot. If the craft is armed, but carries no gunner, the pilot may fire the weapon at -1 skill level.

Computers may be added to small craft, but such computers must be purchased normally. Specific computer restrictions for models are indicated in the specific small craft descriptions.

Weaponry may be added to small craft. Each small craft may allocate one ton to weaponry and install up to three weapons. The individual listings indicate

specific weapons which are available on the craft.

**Launch** (also called Lifeboat): Using a 20-ton hull, the launch is capable of 1-G acceleration, carries 1 ton of fuel tankage, and has a crew of two. A launch may mount missile racks and sandcasters; it may not mount lasers as weapons. The craft has 13 tons excess space available for custom use, and costs MCr14.

**Ship's Boat:** Using a 30-ton hull, the ship's boat is capable of 6-G acceleration, carries 1.8 tons of fuel tankage, and has a crew of two. A ship's boat may mount one beam or pulse laser; remaining weapons must be missile racks and sandcasters. The craft has 13.7 tons of excess space available, and costs MCr16.

**Slow Boat:** Using a 30-ton hull, the slow boat is capable of 3-G acceleration, carries 1 ton of fuel tankage, and has a crew of two. A slow boat may mount one beam or pulse laser; remaining weapons must be missile racks or sandcasters. The craft has 19.9 tons of excess space, and costs MCr15.

**Pinnace:** Using a 40-ton hull, the pinnace is capable of 5-G acceleration, carries 2 tons of fuel, and has a crew of two. It may mount two lasers, and any remaining weapons must be missile racks or sandcasters. It has 22.4 tons of excess space, and costs MCr20.

**Slow Pinnace:** Using a 40-ton hull, the slow pinnace is capable of 2-G acceleration, carries 1 ton of fuel, and has a crew of two. It may mount one beam or pulse laser; remaining weapons must be missile racks or sandcasters. It has 31.6 tons of excess space, and costs MCr18.

**Cutter:** Using a 50-ton hull, the cutter is capable of 4-G, carries 2 tons of fuel, and has a crew of two. It has 30 tons committed to special detachable modules; it has 2.5 tons of excess space available for weaponry, computer, and maybe a couch for a third crewmember. The cutter may mount up to two lasers; remaining weapons must be missile racks or sandcasters. The cutter, without any modules, costs MCr28.

Three modules are routinely available for the cutter.

The ATV module, which includes either a wheeled or a tracked ATV, masses 30 tons. It can deposit an ATV on a world surface, as well as pick it up again later. The module can serve as an ATV storage location, if desired. It costs MCr1.8.

The fuel module, with 30 tons of fuel tankage, serves as a fuel skimming vehicle and can be used to ferry fuel from point to point. It costs MCr1.

The open module is a customizable frame with 30 tons of excess space which can be allocated to passenger couches, fuel, cargo, cabins or staterooms. It costs MCr2.

**Shuttle:** Using a 95-ton hull, the shuttle is capable of 3-G acceleration, carries 2.85 tons of fuel, and has a crew of two. It may mount up to two lasers; remaining weapons must be missile racks or sandcasters. It has 71 tons of excess space, and costs MCr33.

**Fighter:** Using a 10-ton hull, the fighter is capable of 6-G acceleration, carries 1 ton of fuel, and has a crew of one. It includes a computer Model/1 and can mount only one type of weapon: one laser, up to three missile racks, or up to three sandcasters. It has one ton of excess space, and costs MCr18.

## STANDARD SHIP DESIGN PLANS

The following ships are standard designs available at almost any shipyard. Each description indicates the ship's performance and details of its design. Design plans for each are available for CR100; prices shown reflect the 10% reduction in price

normally allowed standard designs.

**Scout/Courier** (type S): Using a 100-ton hull, the scout/courier is intended for exploration, survey, and courier duties, with many in service throughout known space. It mounts jump drive-A, maneuver drive-A, and power plant-A, giving performance of jump-2 and 2-G acceleration. A 40-ton fuel tank provides fuel for the power plant and provides sufficient fuel for one jump-2. Adjacent to its bridge is a computer Model/1bis. There are four staterooms and no low berths. One double turret with its fire control is installed on the ship's hardpoint, but no weaponry is mounted. One air/raft is carried in a specially fitted hangar within the ship. Cargo capacity amounts to 3 tons. The hull is streamlined.

The scout/courier requires a crew of one, assuming the duties of pilot and engineer. The ship costs MCr 29.43 and takes 9 months to build.

**Free Trader** (type A): Using a 200-ton hull, the free trader is an elementary interstellar merchant ship plying the space lanes carrying cargo and passengers. It has jump drive-A, maneuver drive-A, and power plant-A, giving performance of jump-1 and 1-G acceleration. There is fuel tankage for 30 tons, sufficient for the power plant and one jump-1. Adjacent to the bridge is a computer Model/1. There are ten staterooms and twenty low berths. No turrets or weaponry are installed, but there are two hardpoints and two tons are set aside for fire control. There are no ship's vehicles. Cargo capacity is 82 tons. The hull is streamlined.

The free trader requires a crew of four: pilot, engineer, medic, and steward. Gunners may be carried if the ship is armed. The ship costs MCr37.08 and takes 11 months to build.

**Subsidized Merchant** (type R): Using a 400-ton hull, the subsidized merchant (nicknamed fat trader) is a trading vessel intended to meet the commercial needs of clusters of worlds. It has jump drive-C, maneuver drive-C, and power plant-C, giving performance of jump-1 and 1-G acceleration. There is fuel tankage of 50 tons, supporting the power plant and allowing one jump-1. Adjacent to the bridge is a computer Model/1. There are thirteen staterooms and nine low berths. No turrets or weaponry are installed, but there are two hardpoints and two tons are set aside for fire control. The ship has one 20-ton launch. Cargo capacity is 200 tons. The ship is streamlined.

The fat trader requires a crew of five: pilot, navigator, engineer, medic, and steward. The pilot also operates the launch; gunners may be added to the crew list as required. The ship costs MCr101.03 and takes 14 months to build.

**Subsidized Liner** (type M): Using a 600-ton hull, the subsidized liner is a passenger and freight carrier committed to long-haul routes. It has jump drive-J, maneuver drive-C, and power plant-J. Fuel tankage for 210 tons supports the power plant and allows one jump-3. Adjacent to the bridge is a computer Model/3. There are thirty staterooms and twenty low berths. No turrets or weapons are installed, but there are three hardpoints and three tons are set aside for fire control. The ship has one 20-ton launch. Cargo capacity is 129 tons. The hull is unstreamlined.

The subsidized liner requires a crew of nine: pilot, navigator, three engineers, three stewards, and one medic. The pilot operates the launch; gunners may be added to the crew list as required. The ship costs MCr236.97 and takes 22 months to build.

**Yacht** (type Y): Built on the 200-ton hull, the yacht is a noble's plaything used to entertain friends and undertake political or commercial missions. The ship

mounts jump drive-A, maneuver drive-A, and power plant-A, giving performance of jump-1 and 1-G acceleration. Fuel tankage of 50 tons supports the power plant and allows two successive jump-1. Adjacent to the bridge is a model/1 computer. There are fourteen staterooms; two have been combined into a suite for the owner aboard. There are no low berths. No turrets or weaponry are installed, but there is one hardpoint and one ton has been set aside for fire control. The yacht carries an air/raft and a ship's boat in hull compartments; an ATV is also carried, and the ship's boat is fitted to ferry it from orbit to surface and back. There is a cargo compartment for 11 tons. The yacht is unstreamlined.

The yacht requires a crew of four: pilot, engineer, medic, and steward. Gunners, additional stewards, and other personnel may be added as required. The yacht costs MCr51.057 and takes 11 months to build.

**Mercenary Cruiser** (type C): Using an 800-ton hull, the mercenary cruiser is built to carry small troop units for corporate or government operations. It has jump drive-M, maneuver drive-M, and power plant-M, giving jump-3 and 3-G acceleration. Fuel tankage of 318 tons supports the power plant, provides for one jump-3, and holds 48 tons in reserve for its small craft and for long term operations. Adjacent to the bridge is a computer Model/5. There are 25 staterooms and no low berths. Eight turrets are installed, with fire control, but no weaponry is carried. The ship carries two 50-ton cutters, each with an ATV module (which includes an ATV). There is provision inside the ship for two additional modules. There is an air/raft carried in a hull compartment. Cargo capacity is 80 tons. The hull is unstreamlined.

The minimum crew necessary for the mercenary cruiser is nine: commanding officer, pilot, navigator, four engineers, and medic. Gunners, cutter pilots, troops, and administrative personnel may be added as desired. The ship costs MCr445.95 and takes 25 months to build.

**Patrol Cruiser** (type T): Using a custom 400-ton hull, the patrol cruiser is a military vessel used for customs inspections, piracy suppression, and normal safety patrols. It has jump drive-F, maneuver drive-H, and power plant-H, giving the ship performance of jump-3 and 4-G acceleration. Fuel tankage of 120 tons supports the power plant and allows one jump-3. Adjacent to the bridge is a Model/3 computer. There are twelve staterooms and four low berths. There are four triple turrets installed, with fire control; two mount lasers and two mount missile racks. A GCarrier and a ship's boat are carried. There is a 50-ton cargo bay, and the ship is streamlined.

The patrol cruiser has a crew of 18: pilot, navigator, three engineers, medic, four gunners, and eight troops for boarding parties. Double occupancy for the gunners and troops is required. The ship costs MCr221.04 and takes 14 months to build.

## **BUILDING SHIPS**

Should one of the standard design ships not meet an individual's or a government's needs, a naval architect will assist in providing the design plans for any specific vessel, directing them to the starship design checklist for details. The following notes should also be made available to the prospective ship designer and purchaser:

1. Custom hulls with mass displacements other than the hull sizes shown on

the drive potential table are treated as the next larger size. The maximum hull possible in these rules is 5000 tons.

2. Only the drives and power plants shown on the drive potential table are possible. Drives marked with a dash (-) may not be used with that hull size.

3. In order to build a starship, the hull tonnage must be at least 100 tons. In order to build a non-starship, the hull tonnage must be at least 100 tons and the jump drive is omitted; pricing remains otherwise the same. This design and construction procedure does not apply to small craft, but the standard small craft shown on pages 17 and 18 may be customized to a great extent.

4. Typically, hardpoints are designated on a ship design plan, but turrets and weapons are left off to reduce the total ship cost as well as the architect's fee. They may be added later.

5. The naval architect will insist on receiving his 1% fee upon delivery of the plans and specifications.

## FORMATS

Once a custom ship has been constructed, it must be described in such a way as to allow the characters and players to utilize it and to understand its configuration. There are two ways to describe a ship: with a paragraph of description, and with a form.

**Paragraph Description:** Using the starship design checklist, determine the exact design of the ship, including tonnages, prices, and details. Then write a paragraph of description using each portion of the outline as a guide. The standard starship designs are written using this system. The end result, if done right, should be sufficient to allow anyone reading it to understand the ship enough to use it.

**TAS Form 3:** The Travellers' Aid Society Form 3 shown on pages 24 and 25 of this book can be photocopied and used to note all of the important aspects of the ship. It is intended to be supporting documentation on the ship as it is used in **Traveller** adventures, and so includes provisions for dates and background details as well as the basic ship information.

In practice, the two methods should be combined. The ship designer should write up a paragraph description on the ship as an introduction. The actual ship user should fill out and keep current the TAS Form 3 that covers the ship while in operation.

**Deck Plans:** If the referee or the designer should feel that detailed deck plans for a ship are required, then they may be drawn up using square grid graph paper. The preferred scale for the interior should be 1.5 meters per square, with the space between decks put at about 3.0 meters. One ton of ship displacement equals approximately 14 cubic meters. Therefore one ton equals about two squares of deck space.

When allocating space within the ship for deck plans, assume that only a portion of stateroom tonnage must actually be in staterooms; the remainder should be used for common areas and other accommodations for the crew.

Finally, a leeway of plus or minus 10% to 20% should be allowed. If the final deck plans come within 20% of the tonnage of the ship specifications, then they should be considered acceptable.

Keep completed deck plans available for use in campaigns and adventures.

## STANDARD HULLS

Tons	Main	Drives	MCR	Time
100	85	15	2	9
200	185	15	8	11
400	350	50	16	14
600	515	85	48	22
800	635	165	80	25
1000	835	165	100	27

The hulls listed above are standard sizes, readily available at the reduced prices or times shown. All others must be custom produced at MCR0.1 per ton.

## COMPUTERS

Model	MCR	Tons	Capacity	TL
1	2	1	2/ 4	5
1bis	4	1	4/ 0	6
2	9	2	3/ 6	7
2bis	18	2	6/ 0	8
3	18	3	5/ 9	9
4	30	4	8/15	A
5	45	5	12/25	B
6	55	7	15/35	C
7	80	9	20/50	D

Computer cost is indicated in MCR; tonnage required in tons. TL is the minimum tech level required to produce the equipment. Capacity is used to determine program holding capacity. Model also affects jump ability.

## DRIVES AND POWER PLANTS

Jump		Maneuver		P-Plant	
Mass	MCR	Mass	MCR	Mass	MCR
A	10	10	1	4	4
B	15	20	3	8	7
C	20	30	5	12	10
D	25	40	7	16	13
E	30	50	9	20	16
F	35	60	11	24	19
G	40	70	13	28	22
H	45	80	15	32	25
J	50	90	17	36	28
K	55	100	19	40	31
L	60	110	21	44	34
M	65	120	23	48	37
N	70	130	25	52	40
P	75	140	27	56	43
Q	80	150	29	60	46
R	85	160	31	64	49
S	90	170	33	68	52
T	95	180	35	72	55
U	100	190	37	76	58
V	105	200	39	80	61
W	110	210	41	84	64
X	115	220	43	88	67
Y	120	230	45	92	70
Z	125	240	47	96	73

For each drive letter, this table indicates price in MCR and tonnage required for jump, maneuver and power plant.

## DRIVE POTENTIAL

Hull	Jump Drive, Maneuver Drive, or Power Plant Type																							Build	
Tons	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y	Z	Time
100	2	4	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
200	1	2	3	4	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12
400		1	1	2	2	3	3	4	4	5	5	6	6	-	-	-	-	-	-	-	-	-	-	-	16
600	-	-	1	1	1	2	2	2	3	3	3	4	4	4	5	5	5	6	6	6	-	-	-	-	24
800	-	-		1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5	6	6	6	28
1000	-	-	-	-	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	5	6	6	6	30
2000	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	2	2	3	4	6	32
3000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	2	2	4	34
4000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	2	3	35
5000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	2	36

Comparing hull tonnage to drive letter indicates performance of that drive in that sized hull. Use next larger size hull for intermediate tonnages. Performance is Gs acceleration for maneuver drives, jump number for jump drives, and power plant number for power plant.

## CREW REQUIREMENTS

Pilot: 1 per ship.  
Navigator: 1 per ship over 200 tons.  
Engineer: 1 per 35 tons of drives.  
Steward: 1 per 8 high passengers.  
Medic: 1 per ship of 200 tons or more; 1 per 120 passengers.  
Gunner: As required.

## WEAPONS AND MOUNTS

Type	Cost (Cr)
Hardpoint	100,000
Single Turret	200,000
Double Turret	500,000
Triple Turret	1,000,000
Pulse Laser	500,000
Beam Laser	1,000,000
Missile Rack	750,000
Sandcaster	250,000

## FITTINGS

Fitting	Tons	Cost (Cr)
Stateroom	4	500,000
Low Berth	0.5	50,000
Emergency Low Berth	1	100,000
Small Craft Cabin	2	50,000
Small Craft Couch	0.5	25,000
Cargo		as required
Fuel		as required

## VEHICLES

Vehicle	Tons	MCr
ATV, Wheeled	10	0.03
ATV, Tracked	10	0.03
Air/Raft	4	0.6
Speeder	6	1.0
GCarrier	8	1.0
Launch	20	14
Ship's Boat	30	16
Pinnace	40	20
Cutter	50	28
Fuel Module	30	1.0
ATV Module	30	1.8
Open Module	30	2.0
Slow Boat	30	15
Slow Pinnace	40	18
Shuttle	95	33
Fighter	10	18

## CONSTRUCTION FEES

Architect: 1% of final ship cost.  
Standard Designs: 90% of list.  
Financing: 20% down, plus 1/240th of list price per month for 480 months.

## STARSHIP DESIGN CHECKLIST

Use this checklist to control design and construction of starships.

1. Select hull size.
2. Select drives.
  - A. Jump drive.
  - B. Maneuver drive.
  - C. Power plant.
3. Fuel Tankage.
  - A. Power plant and maneuver fuel.Formula: 10Pn.
  - B. Jump Fuel. Formula: 0.1MJn.
4. Bridge (2% of tonnage; minimum 20 tons; MCr0.5 per 100 tons of hull).
5. Computer.
6. Allocate accommodations for passengers and crew.
  - A. Staterooms.
  - B. Low Berths.
7. Armament.
  - A. Hardpoints.
  - B. Turrets.
  - C. Fire Control (1 ton per turret).
  - D. Weapons.
8. Vehicles. Select ship's vehicles and small craft.
9. Allocate cargo capacity.
10. Streamlining (MCr1 per 100 tons).
11. Determine crew.
12. Subtotal ship tonnage and costs.
13. Architect's fees (1% of total cost).
14. Note total price and construction time required.

## TAS FORM 3

The blank form on the next two pages is intended to be photocopied and used to keep details of specific ships designed and constructed in accordance with these rules. Dates should be provided as necessary.



<b>SHIP'S PAPERS (COMMERCIAL)</b>			1. Date of Preparation	
2. Ship Name		3. Registration Number		
4. Ship Type	5. Builder	6. Homeworld		
7. Laid Down	8. First Flight	9. Cost ( <i>new</i> )	10. Occupation	
<b>STATISTICS</b>		Basic ship information for classification and registration purposes.		
11a. Hull Tonnage <input type="checkbox"/> Standard <input type="checkbox"/> Custom		11b. Streamlined? <input type="checkbox"/> Yes <input type="checkbox"/> No	11c. Max Atmosphere	
12. Acceleration	13. Jump	14. Power Plant	15. Cargo ( <i>in tons</i> )	
16. Staterooms	17. Low Berths	18. Full Crew	19. Minimal Crew	
20. Ship's Vehicles ( <i>describe</i> )				
21. Crew Manifest ( <i>list names, UPPs, skills, salaries, and shares for all crew members</i> )				
22. Owner ( <i>include full particulars on owner, whether, present or not</i> ) <input type="checkbox"/> Aboard <input type="checkbox"/> Absent				



23. Ship Name

## SHIP'S COMPUTER

Data concerning the on-board computer and available programs.

24a. Computer Model

24b. CPU and Storage

24c. Mass

24d. Value

25. Computer Programs (*note those programs available*)

Routine	Space — Cr	Defensive	Space — Cr	Offensive	Space — Cr
<input type="checkbox"/> Maneuver	1 - 0.1	<input type="checkbox"/> Maneuver/evade 1	1 - 1.0	<input type="checkbox"/> Predict 1	1 - 2.0
<input type="checkbox"/> Jump 1	1 - 0.1	<input type="checkbox"/> Maneuver/evade 2	2 - 2.0	<input type="checkbox"/> Predict 2	2 - 4.0
<input type="checkbox"/> Jump 2	2 - 0.3	<input type="checkbox"/> Maneuver/evade 3	3 - 3.0	<input type="checkbox"/> Predict 3	1 - 6.0
<input type="checkbox"/> Jump 3	2 - 0.4	<input type="checkbox"/> Maneuver/evade 4	4 - 4.0	<input type="checkbox"/> Predict 4	3 - 8.0
<input type="checkbox"/> Jump 4	2 - 0.5	<input type="checkbox"/> Maneuver/evade 5	2 - 5.0	<input type="checkbox"/> Predict 5	2 - 10.0
<input type="checkbox"/> Jump 5	2 - 0.6	<input type="checkbox"/> Maneuver/evade 6	3 - 6.0	<input type="checkbox"/> Gunner Interact	1 - 1.0
<input type="checkbox"/> Jump 6	2 - 0.7	<input type="checkbox"/> Auto/evade	1 - 0.5	<input type="checkbox"/> Target	1 - 1.0
<input type="checkbox"/> Navigation	1 - 0.4	<input type="checkbox"/> Return Fire	1 - 0.5	<input type="checkbox"/> Selective 1	1 - 0.5
<input type="checkbox"/> Generate	2 - 0.8	<input type="checkbox"/> Anti-Missile	2 - 1.0	<input type="checkbox"/> Selective 2	2 - 0.8
<input type="checkbox"/> Anti-Hijack	1 - 0.1	<input type="checkbox"/> ECM	3 - 4.0	<input type="checkbox"/> Selective 3	1 - 1.0
<input type="checkbox"/> Library	1 - 0.3			<input type="checkbox"/> Multi-target 2	1 - 1.0
				<input type="checkbox"/> Multi-target 3	2 - 2.0
				<input type="checkbox"/> Multi-target 4	4 - 3.0
				<input type="checkbox"/> Launch	1 - 2.0
				<input type="checkbox"/> Double Fire	4 - 4.0

## ADDITIONAL DATA

Information on armaments, inventories and services performed.

27. Turrets (*list turrets by hardpoint; indicate installed weaponry*)

28. Ship's Locker (*inventory contents*)

29. Annual Maintenance (*indicate date of last performance*)



# Space Combat

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When starships encounter in space, they may be forced into battle as a result of circumstance. Starship battles may be resolved by spaceship combat with miniatures in accordance with the following rules. These rules serve well in nearly all situations, from simple encounters where a free trader attempts to outrun a pirate or revenue cutter, to the complex engagements between starship squadrons of rival systems or empires.

## BASIC PARAMETERS

Starship combat uses the following scale for movement and combat resolution:

1. Time: Each game turn represents 1,000 seconds.
2. Space: A playing surface is required, representing space as a two-dimensional surface at the scale of 1:100,000,000; one millimeter equals 100 kilometers. Three meters equal one light-second. Planetary template disks may be produced to show, the presence of worlds and the effects of gravity.
3. Thrust: Maneuver drive thrust is measured in Gs (gravities) expressed as a vector of both length and direction. While direction is variable, the length of the arrow is represented at the scale 100 mm equals 1 G (1,000 seconds acceleration at 1 G will produce a velocity change of 10,000 km, or 100 mm in scale, per turn).
4. Units: Starships and space vehicles are individually represented by spacecraft miniatures, or (if necessary) by counters or markers. Because spacecraft miniatures are almost certainly oversize for the scale in use, each should be marked with a spot or point to designate the exact true location of the ships in play.

## TURN SEQUENCE

Starship miniature battles are resolved in a series of game turns, each representing 1000 seconds elapsed time. Most battles, regardless of the number of ships or players participating, will involve only two sides. These two sides alternate player turns within a game turn. Thus, each 1000 second game turn includes two player turns, one for each combatant side. Each player turn is further divided into several phases which allow specific activity to be performed in a regular, orderly manner.

For convenience, the two sides in the battle are referred to as the intruder and the native. This terminology is intended to avoid possible confusion when one side is called the attacker but is in reality defending. Other terms could (and sometimes should) be used instead.

The sequence of the complete turn is given in the game turn sequence table. Activity must be performed only in the appropriate phases of the game turn or player turn; for example, spacecraft may not move during the laser fire phase, ordnance may only be launched during the ordnance launch phase, and computers may only be reprogrammed in the computer reprogramming phase.

## PREPARATION FOR PLAY

Each ship involved in space combat must have a data card prepared for it. This card contains basic information about the ship, serving as a reference for the players

during the course of the battle. As damage occurs, it is marked on the card to reduce the ship's abilities in later turns.

To prepare a data card, note the name and ship type on the top line of a blank 3 x 5 index card. Below the name, on succeeding lines along the left side of the card, write the six basic sections of the ship, followed by their capacities or values: 1) M-drive (followed by the drive letter), 2) power plant (followed by the power plant letter), 3) J-drive (followed by the drive letter), 4) fuel (followed by the fuel tonnage), 5) hold (followed by the cargo hold tonnage and all vehicles carried), and 6) bridge (followed by the pilot expertise).

Below this data, list all turrets (numbered consecutively starting with T-1). After each turret designation, indicate the armament with which each turret is equipped, using the letters B (beam laser), P (pulse laser), M (missile launcher), and S (sand-caster). A triple turret would have up to three letters indicating the weapons installed in it, while a single turret would only have one. After the letters for the weapons, indicate the expertise of the gunner manning the turret. Also indicate the number of missiles present in each launch rack.

To the right of the card, indicate the computer model, as well as the CPU and storage capacity. Below that, indicate the computer programs which are carried on board the ship. During the game, these programs will be entered into the computer, and will be cycled from storage to CPU and back, so leave room to mark them with a pencil to indicate their status.

The data card example shows how a typical type S Scout would be represented, armed with typical weaponry. Data cards must be created for all starships and non-starships. When creating cards for non-starships which were designed and built in accordance with the design rules, the above format applies. The jump drive letter designation is simply left blank. When a data card is made for small craft, the standard format is used, and appropriate items are left blank. Maneuver drives for small craft are labelled with drive letter zero. Computers and programs are listed only if they are actually installed. Weaponry is listed as all being in a single turret.

## **MOVEMENT**

Ships move using their maneuver drives; use of the jump drive exits a ship into interstellar space, out of the area of play. Maneuver drive uses thrust to accelerate a ship in a specific direction for a specified distance. This direction and distance is expressed as an arrow (a line in one direction) called a vector. Vectors determine how far, and in what direction, a ship can travel.

Each ship has a vector, which expresses that ship's velocity as a line (arrow) of a specific direction. For example, a ship might have a vector of 150 mm at 90 degrees, or of 100 mm at 277 degrees. It is possible to have a vector of 0 mm, where-upon the direction becomes irrelevant because the ship is stationary. Vectors are marked on the playing surface using string or soft wire. On some playing surfaces chalk can be used.

A ship's vector determines the direction and distance a ship will travel in the next turn, provided it is not changed by voluntary acceleration or by gravitational effects. With a vector of 150 mm at 90 degrees, a ship will travel 150 mm at 90 degrees in its next movement phase. In clear space, without gravitational influence, and without voluntary acceleration by the ship, it could travel at 150 mm per turn (direction 90 degrees) forever.

Acceleration involves altering a ship's vector by adding another to it; this new vector can come from thrust using the maneuver drive, or it can come from gravity. In either case, the method is the same. Vectors are added by placing them in a chain, head to tail, and drawing a new vector from the tail of the first to the head of the last.

The diagram on page 30 illustrates vector addition. As shown in figure A, to add two vectors (vector 1 is 75 mm at 90 degrees, and vector 2 is 25 mm at 90 degrees), place the tail of vector 2 at the head of vector 1, and draw a line from the tail of the first to the head of the second. The result is a vector of 100 mm at 90 degrees.

Figure B is a more complex example of vector addition. Two vectors are at angles to each other (vector 1 is 75 mm at 90 degrees and vector 2 is 75 mm at 180 degrees). To add them, the tail of vector 2 is placed at the head of vector 1, and a new vector is drawn from the tail of vector 1 to the head of vector 2. In this case, the new length is approximately 106 mm with a direction of 135 degrees.

The important thing to note, however, is that mathematics is not required for the solution of vector problems; a new vector is generated by simply laying all required vectors on the playing surface, and connecting them as shown above.

In a player's movement phase, he or she will indicate the acceleration (new vector) desired and note any gravitational influence vector called for. They are all added to the ship's present vector. The ship then moves in the direction of its new vector, for the length of the vector. This vector then remains on the playing surface for reference during the next applicable movement phase.

Ships are restricted in the amount of acceleration which they may add to their current vector in one movement phase. Generally, a ship cannot accelerate more than 100 mm times its maneuver drive rating in Gs. Thus, a standard design type A free trader is capable of 1-G acceleration, and cannot add more than a 100 mm vector per turn. This does not count acceleration due to gravitational influence, and does not restrict repeated acceleration in succeeding turns. While a free trader can only accelerate 100 mm per turn, after 10 turns of continuous acceleration, it would have accumulated a vector 1 meter long.

There is no restriction on the number of accelerations which may be made by a fueled ship, but the total acceleration in a turn in millimeters may not exceed 100 mm times the rating of the maneuver drive. Should the letter class of the maneuver drive (or the power plant) be reduced by combat damage, it may not exceed the revised size rating. Unused acceleration may not be saved or conserved to allow excess acceleration in following turns.

## **GRAVITY**

The section on planetary templates later in this chapter covers the construction on specific world disks, complete with gravitation bands which can affect movement. When the vector of a ship passes through the gravity bands of a world, the gravity may alter that vector. During the movement phase, lay out the vector of the ship to determine where it will move. If the exact midpoint of the vector lies in a gravity band, a gravity vector will be added to the course vector to create a new vector. The length of this gravity vector is equal (in millimeters) to the strength of the gravity band in Gs x 100. Thus, a vector dictated by the 0.5 G band of a world is 50 mm long. The gravity vector is parallel to a line connecting the regular course midpoint to the planetary template center. It is added to the regular course vector

(along with any ordinary course change vector) during a player's movement phase.

## **LASER FIRE**

In the laser fire phase of a player turn, the phasing player may fire laser weaponry at enemy targets. The following procedure dictates the order of actions taken by ships using laser fire. Several variables may affect this action.

First, the firing player selects the target at which the turrets of a single ship will fire. All lasers from one turret must fire on the same target; lasers from different turrets may fire on different targets if a multi-target program is running and allows such activity. The firing player then designates the targets for all of his ships.

Second, the firing player determines all applicable attack DMs and sums them to create one specific DM which he will use. Because of differences in ships, he may create one DM for each ship involved. Most attack DMs are the result of computer programs, but some may be forced by ship damage.

Third, the target player determines all applicable defense DMs and sums them to create a single defense DM to be used against the enemy fire. Defense DMs result from such circumstances as obscuring sand, range, or defensive programs.

Fourth, two dice are thrown, and that result modified by both the attack and defense DMs. If the modified result equals or exceeds 8, a hit is achieved. The dice throw is made once for each firing laser weapon. The total number of hits is noted.

Fifth, each hit received is located on the target ship. Using another two dice throw for each hit, the hit location table is consulted, and a specific effect is obtained and marked on the ship data card.

Laser fire is possible only for the phasing player, and hits are imposed on the target ship immediately. Return fire occurs in the following phase, and may be conducted only by ships which are capable of doing so after this phase.

**Shifting Fire:** Each firing ship must allocate its fire to a specific target before any ship has actually fired. Such allocation may be changed (shifted) if the target is destroyed before any weapons on the attacking ship have fired, but such a shift is subject to a DM of -6 in addition to all other applicable DMs.

## **LASER RETURN FIRE**

Laser return fire is conducted by those ships which have been targets for laser fire from enemy weaponry in the preceding laser fire phase. Both the target and return fire programs must be in the CPU for return fire to be performed. Laser return fire may only be directed at an enemy ship which fired at this ship. Laser return fire may be made against multiple enemy ships only if the multi-target program is also present.

Anti-missile fire also takes place in the laser return fire phase. It is dependent on the anti-missile fire program. For anti-missile fire to be performed, no target program is necessary.

## **ORDNANCE LAUNCH**

During the ordnance launch phase, missiles or sand or both, may be launched, provided both launch and target programs are running. In addition, lifeboats or ship's vehicles may be launched (without programs being necessary) as desired.

During the ordnance launch phase, missiles or sand which contacted a target in

## ATTACKER'S DMs

Predict-1	+1	Two	Non-	Small
Predict-2	+2	Dice	Starship	Starship
Predict-3	+2	2	Powerplant	Powerplant
Predict-4	+3	3	Maneuver	Maneuver
Predict-5	+3	4	Jump	Maneuver
Gunner Interact	+gunner skill	5	Fuel	Fuel
Select-1	-2	6	Hull	Hull
Select-2	-1	7	Hull	Hull

## HIT LOCATIONS

## DEFENDER'S DMs

Maneuver/Evade-1	-¼ pilot skill	10	Turret	Turret	Weapons
Maneuver/Evade-2	-½ pilot skill	11	Turret	Turret	Weapons
Maneuver/Evade-3	-¾ pilot skill	12	Critical	Critical	Critical
Maneuver/Evade-4	-pilot skill	If no small craft computer, treat as drive.			
Maneuver/Evade-5	-pilot skill				

## CRITICAL HITS

Maneuver/Evade-6	-5	One	Non-	Small
Auto/Evade	-2	Die	Starship	Starship
Range greater than 2500mm	-2	1	Powerplant	Powerplant
Range greater than 5000mm	-5	2	Maneuver	Maneuver
Obscuring sand (per 25mm)	-3	3	Jump	Maneuver
		4	Crew	Crew
		5	Computer	Computer
		6	Explode	Explode

If no small craft computer, treat as drive.

## VECTORS

Figure A.

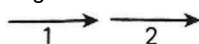


Figure B.



## SHIP'S DATA CARD EXAMPLE

Suleiman (Type S)			
1. M-Drive (A, 2G)	Model/1		
2. J-Drive (A, Jump-2)	CPU = 2		
3. Power Plant (A)	Storage = 4		
4. Fuel (40)			
5. Hold (3 tons, plus Air/Raft)	1-Target	1-Auto/Evade	
6. Bridge (Pilot-1)	1-Return Fire	2-Anti-Missile	
	1-Launch	1-Jump-1	
T-1 (B,M) Gunner-1	1-Predict-1	2-Jump-2	
five missiles on board	1-Navigate	1-Library	

## **GAME TURN SEQUENCE**

### **Intruder Player Turn—**

A. Intruder Movement. The intruder moves his ships using the movement, gravity, and other applicable rules. Ordnance (missiles and sand) which he has launched in previous game turns is moved at the same time.

B. Intruder Laser Fire. The intruder may fire his ships' laser weaponry at enemy targets, subject to the combat, computer, and other applicable rules. Only laser weaponry may fire in this phase.

C. Native Laser Return Fire. The native may return fire with his laser weaponry at enemy ships which have fired on him, provided his return fire computer program is running during this phase, and in accordance with the computer program and combat rules. Anti-missile fire may be performed in this phase if the appropriate computer program is running.

D. Intruder Ordnance Launch. The intruder may launch ordnance (missiles and/or sand) at enemy targets or on specific missions, subject to the applicable rules. Ordnance which has contacted enemy ships explodes in this phase. Lifeboats and ship's vehicles are launched in this phase.

E. Intruder Computer Reprogramming. The intruder may remove computer programs from his on-board computer, and input other programs in anticipation of their use in later turns.

### **Native Player Turn—**

A. Native Movement. The native moves his ships using the movement, gravity, and other applicable rules. Ordnance (missiles and sand) which he has launched in previous game turns is moved at the same time.

B. Native Laser Fire. The native may fire his ships' laser weaponry at enemy targets, subject to the combat, computer, and other applicable rules. Only laser weaponry may fire in this phase.

C. Intruder Laser Return Fire. The intruder may return fire with his laser weaponry at enemy ships which have fired on him, provided his return fire computer program is running during this phase, and in accordance with the computer program and combat rules. Anti-missile fire may be performed in this phase if the appropriate computer program is running.

D. Native Ordnance Launch. The native may launch ordnance (missiles and/or sand) at enemy targets or on specific missions, subject to the applicable rules. Ordnance which has contacted enemy ships explodes in this phase. Lifeboats and ship's vehicles are launched in this phase.

E. Native Computer Reprogramming. The native may remove computer programs from his on-board computer, and input other programs in anticipation of their use in later turns.

### **Game Turn Interphase—**

The end of one game turn is marked. All non-player items such as planets, worlds, and satellites move in accordance with the rules. Other miscellaneous activity may also be necessary. The game then proceeds to the movement and combat of the next game turn.



the preceding movement phase now explode or take effect.

Ordnance must be specified as launched during the launch phase, and only one missile or sand canister may be launched from a launch rack or sandcaster. The launched item does not actually move until the following friendly movement phase. All ordnance which is launched has the launching ship's vector, which must be taken into account.

**Reloading:** Each launcher (sand or missile) has an inherent capacity for three missiles or canisters. This means that a triple turret with three missile launchers has a total of 9 missiles in ready position.

When a launcher's missiles or canisters are exhausted, it may be reloaded by the turret's gunner in one turn. Reloading three launchers would take three turns. A gunner engaged in reloading is unable to fire other weaponry in the turret.

**Missile Detonation:** Ordnance which impacts a target in a movement phase, and which then survives anti-missile fire, detonates in the ordnance launch phase. This detonation will inflict 1 to 6 hits depending on the range at detonation. For each missile, throw one die. The result is the number of hits inflicted; determine each resulting hit location separately.

## DETECTION

Ordinary or commercial starships can detect other ships out to a range of about one-half light-second; about 1,500 millimeters. Military and scout starships have detection ranges out to two light-seconds; 6,000 mm or 6 meters.

Ships which are maintaining complete silence cannot be detected at distances of greater than half detection range; ships in orbit around a world and also maintaining complete silence cannot be detected at distances greater than one-eighth detection range. Planetary masses and stars will completely conceal a ship from detection.

**Tracking:** Once a vessel has been detected, it can be tracked by anyone up to three light-seconds (about 9,000 mm, or 9 meters).

## DAMAGE DEFINITIONS

Once combat results in hits against a vessel, the damage must be implemented. The precise portion of a ship affected by hits is determined from the hit location table. Separate columns are provided for starships, non-starships, and small craft. The following instructions detail the manner in which damage affects ships.

**Drives and Power Plants:** Each hit achieved on a drive or power plant reduces its letter classification by one. Thus C becomes B, X becomes W, etc. The potential of the drive or power plant is then computed based on its temporary new letter. Note that the letter rating of a power plant must equal or exceed that of a maneuver or jump drive in order for the drive to function.

A drive or power plant which is reduced to a level of the maximum drive potential table where its capabilities are marked with a dash cannot function, and if reduced to less than A is destroyed, and must be replaced rather than repaired.

**Turrets:** Each turret hit incapacitates a turret, preventing it and its weaponry from functioning. In cases where multiple hits occur on a ship with more than one turret, dice randomly to determine which turret or turrets are hit. A turret may be hit more than once, while another may not be hit at all.

**Hull:** A hull hit decompresses the ship's hull. Further hull hits have no effect.

**Hold:** A hold hit allows potential damage to items in the hold, including ship's

vehicles and small craft, as well as cargo. Each hit destroys ten tons of cargo, or one vehicle, or one small craft. Dice to determine randomly which items are damaged.

**Fuel:** Each fuel hit punctures a fuel tank, and releases about 10 tons of fuel. When sufficient fuel hits have been inflicted to reduce the remaining fuel to less than is required for a jump, the vessel may not make a jump; when all fuel is accounted for, the vessel may not use its maneuver drive or fire its lasers.

**Computer:** Each hit on the computer increases its chance of malfunctioning. The basic throw for a computer to operate in any situation is 1+, indicating extreme reliability. Each hit on the computer serves as a DM of -1 on the throw to operate. Thus, after three hits are inflicted on the computer, a DM of -3 is applied to the throw of 1+ to operate. The throw to operate is made each time the computer is used (in combat, this is generally once per phase). A computer which does not make its throw to operate malfunctions for the remainder of the phase. A new throw is made at the beginning of the next phase. A computer which has received 12 hits is permanently malfunctioning. Persons with computer expertise may apply their skill levels as DMs on the throw to operate. A computer which is not operating effectively paralyzes a starship.

A computer hit on a small craft which does not have one is treated as a hit on the craft's drives instead.

**Small Craft Cabin:** A hit on a small craft cabin results in explosive decompression if depressurization has not already occurred. Additional hits have no effect. Persons in vacc suits within the craft are unaffected.

**Small Craft Weaponry:** A hit on the weaponry of a small craft destroys that weaponry. Additional hits have no effect.

**Small Craft Drive:** A hit on the drive of a small craft destroys the drive; the craft cannot maneuver, accelerate, or fire its lasers.

Hits as a result of laser fire, laser return fire, or missile detonation are located on the target vessel through the use of the hit location table. Such damage as indicated above is then marked on the ship's data card.

If a select program is being used to influence attacks, the firing player rolls one die for each hit inflicted. On a roll of 1 or 2, he or she picks the hit location, specifying one of the following: maneuver, power plant, jump, fuel, hull, hold, computer, or turret. If the roll is 3 or greater, roll hit location normally.

Damage to ships gradually wears away their capabilities, but will not generally destroy them in one shot. The exception to this is the critical hit. If a critical hit is achieved, then the critical hit table is consulted with one die. The result is complete destruction or incapacitation of the indicated item. Unlike ordinary hits, the entire item is destroyed (crew is not necessarily killed, but is rendered unable to function).

## SPECIAL SITUATIONS

The following are descriptions of several special situations and how they may be handled when they arise. In addition to the specific instructions given, they also serve as a model for dealing with other special situations.

**Decompression:** Starships (and other vessels) depressurize their interiors before combat whenever possible, the passengers and crew resorting to vacc suits for safety and comfort. This procedure minimizes the danger due to explosive decompression

as a battle result. In some cases, selected areas may remain pressurized (perhaps the hold, for the safety of delicate cargo) while other areas are depressurized.

Any number of areas in the ship may be depressurized in the span of one turn (1,000 seconds). Repressurization requires one turn. In practice, the following parts of the ship may be individually pressure regulated: engineering section, hold, bridge, staterooms (all as one group; on some ships, in groups of four or more), turrets (individually). The pilot controls depressurization from the bridge.

Hull hits result in explosive decompression if pressure has not already been lowered. Explosive decompression kills all persons in that section unless a vacc suit is available and put on immediately. Throw dexterity to put on a vacc suit in an emergency; apply DMs of double vacc suit skill.

**Atmospheric Braking:** Ships passing very close to the surface of a world with a standard or dense atmosphere may slow their speed through atmospheric braking. If any portion of a ship's vector passes within 10 mm of a world's surface, that vector is reduced by 10 mm in length.

**Abandon Ship:** Should circumstances warrant, a ship may be abandoned using ship's vehicles or other methods. Military vessels (including exploratory vessels) can generally board the full passenger and crew complement of their ship's vehicles in one turn, and launch them during the ordnance phase, provided those individuals perform no other activity during the turn. If individuals are encumbered by vacc suits, each boards in the first turn on a throw of 6+, boarding in the next turn if unsuccessful.

Non-military vessels require 1D turns to fully load all ship's vehicles. Crew members in the vehicles may elect to abandon ship without waiting for stragglers.

Individuals in vacc suits may abandon ship during the ordnance launch phase providing no other activity is performed during the player turn. Such persons may then be picked up by other ships or vessels. If no one is available to perform a rescue, then an attempt at landing on a local world is possible. A vacc suit can support its occupant for up to 21 one-thousand second turns; an additional air tank set will provide another 21 one-thousand second turns. A typical vacc suit is capable of a total of 100 mm of acceleration. A foamed atmospheric reentry ablation shield (part of the vacc suit kit) can protect the individual while entering atmosphere, provided his vector, while entering atmosphere, does not exceed 75 mm. Accident or mishap can occur during the process. Throw 7+ to survive provided all else is performed properly; allow a DM of + vacc suit skill.

**Damage Control:** Damage inflicted on starships in combat can be repaired or controlled by crew members during the battle. Especially in the case of player-characters, expertise or skill in specific fields may be used to remove or repair damage. Usually, a throw of 9+ will repair one hit of damage, with skill serving as a positive DM. One repair attempt may be made per one-thousand second turn. Any part of a ship which has been completely destroyed cannot be repaired.

**Repair Parts:** Most malfunctioning or damaged items in a vessel can be temporarily repaired from the stock of emergency materials in the ship's stores. Malfunctions usually occur in terms of a specific assembly (ship's computer, jump drive, etc.), and the cost of the repair is based on the cost of the original assembly. After determining the cost of the assembly (from the component cost section of these rules), roll two dice: this indicates the cost of replacement of the item in 10% increments; allow a DM -2 if the repair installation will be made by ship's crew

rather than a shipyard. Because the repair cost can run to 120% in some cases, complete replacement of the item is sometimes cheaper. In the case of minor malfunctions, DMs may be applied to the repair cost throw as considered appropriate. Repair parts cost of 0% is considered to be inconsequential.

## STARSHIP ENCOUNTERS

When a starship enters a system, there is a chance that it will encounter any one of a number of different ships going about their business. Very often, the exact encounter is the responsibility of the referee; for routine encounters, or for inspiration, the accompanying starship encounter table is provided.

The table classifies each system by the starport within it. Two dice are rolled and modified by the presence of scout or naval bases in the system. If a dash is shown on the table, then there is no encounter. The letter codes indicate the various types of standard design ships described earlier in this book. The referee should examine the specific type of ship involved and determine the precise nature of the encounter. Free traders may want to swap rumors and gossip; scouts may want information; patrol cruisers may want to inspect for smugglers.

The suffix P on any ship type can be construed as pirate; such a ship will probably attack, or at least try to achieve a position where it can make the attempt.

It is also possible to encounter a variety of small craft in a system. If an asterisk appears on the table entry, a small craft has also been encountered. Roll one die and consult the standard small craft table to determine type. This encounter occurs either before or after the large ship encounter.

The referee may want to use the reaction table from the encounter section of Book 3 to determine the precise reaction of any type of ship and crew.

### STANDARD STARSHIPS

A	200-ton Free Trader
C	800-ton Mercenary Cruiser
M	600-ton Subsidized Liner
R	400-ton Subsidized Merchant
S	100-ton Scout/Courier
T	400-ton Patrol Cruiser
Y	200-ton Yacht

### STANDARD SMALL CRAFT

Die	Craft
0	20-ton Launch
1	30-ton Ship's Boat
2	30-ton Slow Boat
3	40-ton Pinnace
4	40-ton Slow Pinnace
5	50-ton Cutter
6	95-ton Shuttle
7	10-ton Fighter

### STARSHIP ENCOUNTERS

2-	Starport Type					
Die	A	B	C	D	E	X
2	—	—	—	—	—	—
3	—	—	—	—	—	—
4	—	—	—	—	—	—
5	—	—	—	—	—	—
6	S	A	—	—	—	—
7	A	S	R	—	—	—
8	R	A	A	S	—	—
9	M*	R*	R*	SP	S	T
10	Y	M	TP	A	A	TP
11	T	R	T	R	TP	CP
12	R*	C"	Y	M	CP	C
13	M*	Y*	A	Y	—	—
14	C*	T*	S*	TP	—	—
15	T*	C*	Y*	—	—	—

DM +2 if naval base in system.

DM +1 if scout base in system.

DM +1 if naval base in system.

DM -1 if scout base in system.

## PLANETARY TEMPLATES

A planetary template must be constructed for each world or moon present in the scenario, showing the size of the planet itself and of its zones of various gravitational strengths. All required information may be generated using the formulae below. D is the planetary size from the UPP; R is its radius in millimeters (hundreds of kilometers); M is its mass in Earth masses; G is gravity in Gs at various distances from its center (and  $G_s$  is its surface gravity); K is its density in Earth densities (most planets will have a density of 1); L is the distance from the planetary center at which gravity equals the value of G for a planet of mass M (when G is set equal to  $G_s$ , L should equal R). The planetary template is constructed in the following steps.

**Step 1.** Using the known values of D and K, compute the values of R, M, and  $G_s$ .

**Step 2.** Compute several values of L, for several values of G, beginning at 0.25 and increasing in increments of 0.25 until the value of G equals or exceeds  $G_s$  (that is, until L is equal to or less than R).

**Step 3.** Using a compass and ruler, draw concentric circles on a paper or cardboard template. Indicate the planetary surface by drawing a circle of radius R. Then draw further circles around the same center with radius equal to each value of L determined in step 2. Each circle should be labeled, and the interior of the planetary disc should be marked with the planet's name, its mass, density,  $G_s$ , and any other data the referee thinks useful.

As an example of this process, here is how to determine a template for Earth:

Step 1. Earth has a diameter (D) of 8 and a density (K) of 1.0; thus,  $R=8 \times 8$  or 64mm,  $M=1 \times (8/8)^3$  or 1 Earth mass (surprise!), and  $G_s=1.0 \times 8/8$  or 1G.

Step 2. Since  $G_s=1$ , it is necessary to determine L for G-values of 0.25, 0.50, and 0.75. At  $G=0.25$ ,  $L=64 \times$  the square root of  $1/0.25$  or 128mm; at  $G=0.50$ ,  $L=64 \times$  the square root of  $1/0.50$  or 91mm; at  $G=0.75$ ,  $L=64 \times$  the square root of  $1/0.75$  or 74mm.

Step 3. The template is now drawn using the values derived. Four concentric circles are drawn: one of radius 64mm for the planet's surface, and one each of radii 74, 91, and 128mm for G-values of 0.75, 0.50, and 0.25 respectively.

**Some Notes of Interest:** In the scale presented for miniatures combat, there should generally be at most one world or moon of appreciable size on the average size playing surface. The Earth's moon is 380,000 km from Earth, a scale separation of 3.8 meters. However, a ship travelling at reasonable game speeds can cross this distance in only a few turns; thus, it will be necessary to shift the positions of templates frequently as a battle progresses.

A template for the sun, if anyone cared to do one, would be almost 74 meters in radius (out to the  $G=0.25$  circle); the physical surface of the sun would have a radius of 7 meters.

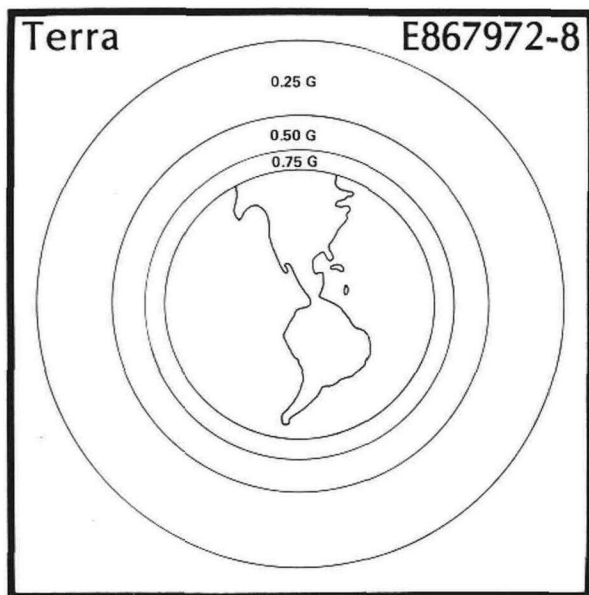
Asteroids, planetoids, and small moons such as those of Mars have no significant gravity or atmospheres, and would be essentially pinpoint-sized at this scale. The average density of an asteroid belt is about one asteroid per 1000 square millimeters (approximate separation: 30 millimeters) or 1000 asteroids per square meter. Asteroids should probably be placed on a template for ease of shifting.

The sample planetary template on page 37 shows Terra (the Earth) complete with gravity bands for 0.25, 0.50, and 0.75 Gs. Noted next to the world on the template are the universal planetary profile (explained in Book 3) and the world

name. If you are going to construct templates for specific worlds, then it may prove interesting to show continental outlines or other surface features, although such embellishment is purely optional.

**Formulae:** The four formulae shown under the sample planetary template indicate how to achieve the information needed for producing any planetary template.

**Typical Worlds:** The standard worlds table shows the template values (in millimeters) for world sizes (D) of one through ten; in all cases K is assumed to be 1. In addition, the four gas giants of the solar system are listed for reference.



$$R=8D$$

$$G_s = K D/8$$

$$M=K(D/8)^3$$

$$L=64\sqrt{M/G}$$

#### STANDARD WORLDS

Size	R	M	Gs	0.25	0.50	0.75	1.0	1.25
One	8	0.002	0.125	—	—	—	—	—
Two	16	0.016	0.250	16	—	—	—	—
Three	24	0.053	0.375	29	—	—	—	—
Four	32	0.125	0.500	45	32	—	—	—
Five	40	0.244	0.625	63	45	—	—	—
Six	48	0.422	0.750	83	59	48	—	—
Seven	56	0.670	0.875	105	74	60	—	—
Eight	64	1.000	1.000	128	91	74	64	—
Nine	72	1.424	1.125	153	108	88	76	—
Ten	80	1.953	1.250	179	126	103	89	80
Jupiter	714	1318.7	2.643	4648	3287	2684	2324	2079*
Saturn	600	743.6	1.159	3490	2468	2015	1745	—
Uranus	254	14.6	1.11	489	346	282	246	—
Neptune	243	17.2	1.21	531	375	306	265	—

\*Note: Jupiter has many further bands for which there was no room on the table. You can easily work them out for yourself using the formula.

# Computers

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The computer installed on a ship controls all activity within, and is especially used to enhance weapons fire and defensive activity. It also transmits control impulses for maneuver and jump drives, and conducts the routine operation of all ship systems. What the computer actually does is based on the programs actually installed and operating at any one time.

Computers are specified in terms of their capacity to process and store programs. All programs in the computer's CPU are processed simultaneously, while programs in storage are available on a revolving basis to replace those in the CPU as needed.

For example, a model/1 computer has a CPU capacity of two, and an additional storage capacity of four. The computer might have in it six programs (each of size or space 1): return fire, predict-1, gunner interact, auto/evade, maneuver, and target. Of these six, only two (the capacity limit of the CPU) can function at any one time (in one phase). In the laser return fire phase, both target and return fire programs would be required, and only those programs could be used with this capacity CPU to effect laser return fire. During a laser fire phase, as before, only two programs could be used: target is required, but the player could select between predict-1 or gunner interact for the program to be processed, depending on which would provide the greater benefit.

During the computer reprogramming phase, specific programs may be removed from the computer and others inserted. To continue the example above, both jump-1 and navigation would be required for the performance of an interstellar jump. Both programs would be fed into the computer during the reprogramming phase, but only after sufficient space had been cleared (perhaps by removing the maneuver and auto-evade programs).

**The Software List:** The computer software list indicates the various programs that are available. It shows space required by a specific program in CPU or storage, its price in MCr, and its title. Also shown is a brief overview of its effects. The two right-hand columns indicate various requirements for individual characters producing the programs. Such a course will save money, but may have some pitfalls. Program generation is explained later.

Programs in the list are classified as offensive, defensive, and routine.

Offensive programs are intended to allow the use of weapons mounted on a ship to damage or destroy enemy vessels.

**Target** identifies enemy vessels and controls all turrets on board ship. It is required for all laser fire and launches except anti-missile fire. It provides no DMs of its own.

**Predict** is a series of five programs which predict the future position of the target and allow insertion of lead into laser fire. Predict applies only to laser fire, and allows an advantageous DM to hit.

**Gunner interact** interfaces the expertise of the gunner in a specific turret to the hit probability of those lasers hitting the target. The expertise of the gunner becomes a positive DM to hit when using laser fire.

**Select** allows a gunner to attempt to choose the part of the target ship he hits.

Select-1 and select-2 insert DMs against the probability of hitting the target, but all three allow the gunner a one-third chance of hitting the exact area of the target he chooses, if the weapon does hit.

**Launch** allows missiles to be launched from launch racks and sand to be fired from sandcasters. The target program is also required.

**Multi-target** is a series of programs that interface the ship's detectors and radar with several turrets and allows an attack on more than one target at one time. Each turret may still only fire at one specific target, but different turrets may fire at different targets. This program is required if more than one ship target is fired on in the same phase. The target program is also required.

**Double fire** allows a ship to draw excess power (if available) from the power plant and thus increase the output of laser weaponry. When this program is functioning, a vessel with a power plant rated at least one letter higher than its maneuver drive (and which has not yet taken damage to reduce the current letter rating to equal to or below the M-drive letter) can fire a double beam or double pulse with laser weaponry. The normal dice throw to hit is made twice. Each time double fire is used, a throw must be made to determine if overload has occurred: For the first phase of such fire, throw 1+ to survive overload; for the second phase, throw 2+ to survive, and so on. DM -1 for each turn in which lasers do not fire at all. If the throw is not achieved, a hit is received on the ship's power plant.

Defensive programs are used to protect a starship against enemy action.

**Maneuver/evade** is a series of six programs which automatically produce minor movement for a ship, thus reducing the chances of the ship being hit by laser fire. Each has a DM based on pilot expertise (take the fraction of pilot skill and drop any fractions). In addition, these programs allow the use of the maneuver drive as required, in lieu of the normal maneuver program.

**Auto/evade** is similar to maneuver/evade, but performs at a lower level; it allows a defensive DM against laser fire of -2.

**ECM** is an electronic countermeasures program which jams and confuses the homing heads of incoming missiles, forcing them to explode prematurely in many cases. During the laser return fire phase, all missiles in contact with the ship are destroyed without damage to the ship on a throw of 7+.

**Return fire** allows a ship's lasers to fire at enemy ships which fired at the ship in the immediately previous fire phase. Use of this program also requires the target program, and DMs allowed by other programs (such as gunner interact) are allowed. If more than one enemy ship is fired on, the multi-target program is also required.

**Anti-missile** allows any or all laser weaponry to fire at enemy missiles which have contacted the ship during the preceding movement phase. The target and multi-target programs are not required. Other programs do not effect the functioning of this program (with DMs, etc.).

Routine programs are used to operate systems other than weaponry, and without regard to violent interaction.

**Maneuver** is required to allow the use of maneuver drive. In combat it is often replaced by the maneuver/evade program.

**Jump** is required to allow the ship to perform a jump through interstellar space. The specific program for the jump distance required must be used. For example, a jump-6 ship which is going to perform jump-3 must use the jump-3 program.

**Library** is an encyclopedic compendium of information concerning the local



stellar region. Crew and passengers often refer to this program before disembarking on a world. The referee will often find this a handy method of imparting commonly known information to the players. The note should be made that the library program is not all inclusive, and may be incorrect in some facts.

**Generate** creates a flight plan which will govern the use of the jump program. The navigator or pilot can input specific co-ordinates into the computer concerning a destination, and the generate program will create a flight plan to take the ship there. In cases where a generate program is not available, starports have single-use flight plans (in self-erasing cassettes) available for all worlds within jump range for Cr10,000 per jump number. The generate program may be used independently and produces the required flight plan, which is then used by the computer when jump is performed.

**Navigation** controls the jump process after a flight plan has been produced. Flight plans must be fed into the navigation program, which then interfaces with the jump program to actually take a ship to its destination. To actually make a jump, both the jump and navigation programs must be functioning in the computer (the generate program need only run long enough to actually create the flight plan).

**Anti-hijack** protects the ship against potential takeovers. This program constantly monitors conditions within the starship, and automatically locks the access doors to the bridge and controls when a hijack situation occurs. Because this system is not foolproof, would-be hijackers may gain access in spite of the program on a throw of 5 or less.

## WRITING COMPUTER PROGRAMS

Player-characters can, and should, seek out new and different computer programs to assist them in the use and performance of their spacecraft. Generally, writing a program requires computer skill, and also some skill which relates to the actual task being programmed. The computer software list indicates in two columns the computer skill level required as a minimum to write the program, any other skill required, and the throw per week of work to succeed, computer skill above the required level is allowed as a DM on the throw to succeed. The other skill required may be possessed by another person helping the programmer.

**Fatal Flaws:** Any home written program may have a fatal flaw concealed within. This bug may not appear until the program is really needed. The referee should note the potential for a fatal flaw and roll as required (suggested roll: 11+ for the bug to appear).

## SMALL CRAFT COMPUTERS

Small craft do not require computers, and ordinarily do not have them. They utilize their weapons with negative DMs of -1 and cannot add in gunner skill when they are used. However, if a small craft adds a computer to its weapon system, then the ordinary computer programming rules apply to it (except that ship's boat skill is needed instead of pilot skill when writing such programs).

## COMPUTER SOFTWARE LIST

<i>SpaceMCr</i>	<i>Program</i>	<i>Title and Effects</i>	<i>Skills</i>	<i>Thr</i>
Offensive Programs—				
1	2.	Predict-1; +1 on to hit throw	1, Navig-1	10+
2	4.	Predict-2; +2 on to hit throw	1, Navig-2	10+
1	6.	Predict-3; +2 on to hit throw	1, Navig-3	10+
3	8.	Predict-4; +3 on to hit throw	1, Navig-4	11+
2	10.	Predict-5; +3 on to hit throw	2, Navig-5	10+
1	1.	Gunner Interact; adds gunner expertise	2, Gunnery-2	11+
1	1.	Target; required in order to fire turrets	2, Navig-2	10+
1	0.5	Select-1; allows target selection but -2 to hit	1, Gunnery-2	9+
2	0.8	Select-2; as select-1 but -1 to hit	2, Gunnery-3	9+
1	1.	Select-3; as select-1 but no hit penalty	3, Gunnery-4	9+
1	1.	Multi-target-2; allows engagement of 2 targets	2, Gunnery-2	9+
2	2.	Multi-target-3; allows engagement of 3 targets	2, Gunnery-3	10+
4	3.	Multi-target-4; allows engagement of 4 targets	3, Gunnery-4	8+
1	2.	Launch; allows launch of missiles and sand	1, Gunnery-2	11+
4	4.	Double Fire; allows firing twice	2, Engineer-3	11+
Defensive Programs—				
1	1.	Maneuver/Evade-1; -¼ pilot skill	1, Pilot-2	10+
2	2.	Maneuver/Evade-2; -½ pilot skill	1, Pilot-3	11+
3	3.	Maneuver/Evade-3; -¾ pilot skill	2, Pilot-4	10+
4	4.	Maneuver/Evade-4; - pilot skill	2, Pilot-5	11+
2	5.	Maneuver/Evade-5; - pilot skill	3, Pilot-6	10+
3	6.	Maneuver/Evade-6; -5	3, Pilot-7	11+
1	0.5	Auto/Evade; -2	2, Pilot-4	11+
1	0.5	Return Fire; automatic response if attacked	2, Gunnery-3	12+
2	1.	Anti-Missile; allows laser anti-missile fire	3, Gunnery-3	10+
3	4.	ECM; may explode incoming missiles	4, Electronics-3	9+
Routine Programs—				
1	0.1	Maneuver; allows use of maneuver drive	1, Pilot-1	9+
1	0.1	Jump-1; allows use of jump drive	1, Pilot/Navig-1	10+
2	0.3	Jump-2; allows use of jump-2	2, Pilot/Navig-2	11+
3	0.4	Jump-3; allows use of jump-3	2, Pilot/Navig-3	12+
4	0.5	Jump-4; allows use of jump-4	3, Pilot/Navig-4	11+
5	0.6	Jump-5; allows use of jump-5	3, Pilot/Navig-5	12+
6	0.7	Jump-6; allows use of jump-6	4, Pilot/Navig-6	11+
1	0.4	Navigation; controls use of jump drive	3, Navig-3	10+
1	0.8	Generate; produces flight plans for jump	3, Navig-4	10+
1	0.1	Anti-Hijack; helps prevent hijacking	1, Tactics-1	9+
1	0.3	Library; contains local information	1, no others	4+

**Standard Software Packages:** Each computer comes with a standard software package of programs for use with the equipment. Because each computer may be used differently, this package consists of a credit in MCr equal to the model number of the computer (treat 1 bis and 2bis as 1 and 2 respectively). This credit may not be converted to cash.

# Experience

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As characters travel through the universe, they already know their basic physical and mental parameters: their basic education and physical development have already occurred, and further improvement can happen only through dedicated endeavor. The experience which is gained as the individual character travels and adventures is, in a very real sense, an increased ability to play the role which he or she has assumed.

## **SELF-IMPROVEMENT**

Limited personal development and experience is possible in the sense of increasing abilities and skills. Such potential for increases is possible in four specific areas, only one of which may be attempted at one time: education, weapon expertise, other skills, and physical fitness.

In each field, the character selects a four-year program of self-improvement, dedicating his or her endeavors in something like obsession, with the general goal of self-improvement. Because individuals do not always have the will to continue with such a program, there is the chance that the program will be planned, but never actually carried out. After the general field has been chosen, the character must make a dedication die roll. Throw 8+; no DMs apply except when throwing to enter a physical fitness program, in which case allow a DM of +2 if intelligence is 8-, +4 if intelligence 5-. Failure to achieve this throw indicates that the self-improvement program is not carried out, and a new one may not be attempted for at least one year. Success in the throw indicates that the program is undertaken.

**Education:** A character with an education characteristic lower than his or her intelligence characteristic may improve education level through the use of correspondence courses and tutoring. In general such courses (or tutors) have a base price of CR 50 per week. Generally one session per week is taken, though 2 per week are possible. After 50 sessions are completed the character's education level is increased by one. In one four year period, it is possible to increase the education characteristic a maximum of 6 levels.

Education increases gained are permanent.

In addition, any character may, once during his or her life, take a sabbatical (for 4 years) for the purpose of specifically gaining a skill through education. Such activity is the equivalent of a technical school or college education, and allows the acquisition of one specific non-weapon skill with a level of 2. Cost of this education is CR 70,000.

**Weapon Expertise:** The skill which a character has in weaponry indicates a native trained ability; through dedication (through training and practice) to specific weapons, skill may be honed to better levels on a temporary basis. Highly skilled marksmen achieve their best work when at the peak of their training. One gun and one blade weapon may be chosen; skill level in each is increased by 1 for the duration of the program. If a weapon is chosen in which the character has a skill level of zero, skill level is increased for that weapon to 1, permanently. At the end of this program, skill increases are lost unless the program is extended or continued

formally for another four years. After a second four year program, the improved skill level becomes permanent. This permanent level may then itself be temporarily improved by further programs of training. Any weapons may be chosen for this type of program, and one or both weapons may be dropped for new ones in the succeeding program.

For example, Johnson has skills of foil-0 and revolver-3, and chooses to practice in these weapons. After successfully making his throw of 8+ for dedication to purpose, his skill levels for these weapons become foil-1 and revolver-4 for the duration of the program, reverting to foil-1 and revolver-3 at the end of the program. Johnson successfully makes his dedication throw of 8+ again, and continues in these two weapons. His skill level becomes foil-2 and revolver-4. At the end of that 4 year program, he elects to abandon this self-improvement for another program, and his weapons skills revert to foil-1 and (because he has spent a second 4 year program on revolver) revolver-4.

When new or exotic weapons become available (especially those not described in Book 1), it is possible to acquire skill in them through this training program.

**Skill Improvement:** In a fashion similar to that of weapon expertise, a character may temporarily improve his skill in another field by dedicating himself to it for a program of 4 years duration. Only two skills may be chosen, and the individual must already have a level of at least 1 in each skill. Skill level reverts to the original level at the end of the program. If the program is continued for a second four year period, the new skill level becomes permanent at the end of that period.

**Physical Fitness:** Because many individuals find a regimen of physical conditioning unrewarding intellectually, a dedication throw of 8+ is required (DMs of +2 if intelligence 8-, and 4 if intelligence 5-). If the throw is achieved, the character increases his three physical characteristics (strength, endurance, and dexterity) each by 1. This increase remains in effect for the duration of the physical fitness program. Physical characteristics may never be increased to more than 15.

The pursuit of a program envisions that the required materials will be available on a regular basis. Weapons training requires the weapons specified; tutoring requires a tutor. If the required materials are not available, the program is suspended temporarily, but the benefits are not lost if the suspension is of less than 3 months duration.

## ALTERNATIVES

The above is the only ordinary method of self-improvement available to characters. Highly scientific or esoteric methods of improving personal skills and characteristics are logically available, provided the individuals search hard enough for them. Such methods could include RNA intelligence or education implants, surgical alteration, military or mercenary training, and other systems. Alternatives to the above methods must be administered by the referee.

# Drugs

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A variety of pharmacological means are commonly (or uncommonly) available to travellers for medicinal (and other) purposes. Each drug has its own advantages and disadvantages; users should be aware of these effects.

## SPECIFIC DRUG TYPES

Drugs, for the sake of uniformity and for ease of use, are usually available in consistent, one-dose pill form. The six classes of drug described below are generally well known throughout the civilized universe. Psi drugs are described in the section dealing with psionics. Other drugs are possible, but their use and availability must be prescribed by the referee.

**Slow drug** is named because it makes the universe (from the viewpoint of the user) appear to move more slowly. This effect is achieved by accelerating the user's metabolism. In effect, the user lives at a much faster rate, approximately twice as fast as normal.

When taken, slow drug takes effect after three firing rounds (45 seconds), and continuing to function for 40 (real time) firing rounds. At the end of its effect, the user receives 1D in hit points as part of the drug's effects. In addition, the person is extremely fatigued; he or she is treated as if all available combat swings (determined from endurance characteristic) have been taken, and must recover from that fatigue. A person under the influence of slow drug, because he or she is living at twice the normal rate, is allowed two combat rounds to each one available to normal individuals. The person can fire a weapon twice, or make two combat swings or blows, or move twice as far as normally.

A medical slow drug is also available, being used to hasten recovery from wounds or illness. One dose causes unconsciousness, and the passage of 30 days equivalent time in one day. During this period, ordinary healing takes place. No wounds or hits are received from the use of medical slow drug. Be certain to note the passage of time at the increased rate during period of drug use.

Fast drug is named because it makes the universe (to its user) appear to move much more quickly; the drug slows down personal metabolism at a ratio of approximately 60 to 1. Users are extremely vulnerable because they are living at such a slow rate; but physical aging is also slowed, and the need for consumable supplies is reduced, thus allowing conservation of air and food.

**Fast drug** takes effect immediately upon ingestion; one dose lasts for 60 days, making that time appear to be only one day. An antidote exists which cancels the effect remaining when taken.

**Combat drug** is taken by fighters (usually military personnel) prior to combat. It increases personal strength and endurance each by two. The effect begins two combat rounds after being taken, and lasts for 30 combat rounds. When the effect wears off, the user receives 1D in wounds.

**Medical drug** is a general term describing the set of drugs used by medical personnel in the treatment of illness or injury. Generally, medical drug must be

administered by a person with medical expertise, and the drug serves as medical treatment. Medical drug is often used in conjunction with medical slow drug.

**Anagathics** are drugs which counteract the aging process. A regimen of regular monthly doses enables an individual to ignore the aging die throws and their potential for debilitation. Because of the rarity and demand for anagathics, they are quite expensive, and are often unavailable at any price.

**Truth drug** is used to compel individuals to answer interrogation truthfully. One dose is sufficient to assure truthful answers for approximately 2 minutes, after which the user experiences one hour of unconsciousness, and 2D in wounds.

## DRUG AVAILABILITY

The drug table indicates the name, gross effect, base price, technological level (see Book 3) of the world on which it is generally available in pill form, and a throw for availability.

Availability indicates the chance that, after determined search, a band of adventurers will find an individual with some of the drug available for sale. Subtract the technological level shown on the table from that of the current world; that number is a DM on the availability throw. For example, slow drug is available at tech level 8, and the adventurers are on a world with tech level 12. The DM is +4 (12-8=4). On a world with tech level 4, the DM would be -4 (4-8=-4). DMs may also be allowed for bribery, streetwise, or medical skill.

**Synergy:** If more than one drug is taken (except medical drug), the combination may have an adverse effect, called synergy. In addition to all other effects of drugs, throw one die for each drug taken, and multiply the results together. This indicates the number of hits or wounds received as a result of synergy. Such hits are inflicted at the end of the period of drug use.

**Legality:** The local law level of a world may restrict the use or possession of certain drugs. Book 3 indicates law levels for worlds. Throw law level or greater for a specific drug to be legal and unrestricted on any specific world. DMs may be allowed for starship crews, medical personnel, or other specifically authorized individuals.

## DRUGS

<i>Drug Type</i>	<i>Effect</i>	<i>Price (in Cr)</i>	<i>Tech Level</i>	<i>Avail- able</i>
Slow	2:1 slower than normal	5,000	8	9+
Medical Slow	30:1 slower than normal	100	7	7+
Slow Antidote	counteracts slow drug	600	10	10+
Fast	60:1 faster than normal	2,000	9	8+
Fast Antidote	counteracts fast drug	900	12	9+
Anagathic	voids aging throws	200,000	15	10+
Truth	compels two minutes of truth	5,000	8	7+
Combat	provides +2 stren and endur	750	9	6+
Medical	aids recovery	100	6	9+
Psi-Booster	see Psionics	1,000	see Psionics	
Psi-Double	see Psionics	4,000	see Psionics	
Psi-Special	see Psionics	10,000	see Psionics	

# Trade and Commerce

Although most commercial starships routinely carry cargos as common carriers, charging a flat rate of Cr1,000 per ton for the service, many also engage in speculation by buying goods at low prices, transporting them in spare cargo space, and then selling them for higher prices in markets anxious for them.

A reasonably comprehensive listing of trade goods and speculation items is presented in the trade and speculation table. Some of the trade goods may provide a smaller return than Cr1,000 per ton, but still enough to relieve the burden of shipping empty hold space.

All listed trade goods have a specified base price which indicates the absolute value of the goods on a constant scale. The actual value table indicates the price such goods may be purchased for, by showing a percentage modification to the base price. Upon arriving at a potential market, the selling price may also be determined as a percentage of the base price (not actual purchase price).

## PROCEDURE

A trader with cargo space available and free capital with which to speculate may seek out suitable goods to buy and sell. The referee throws two dice, noting their results consecutively, to create a number between 11 and 66; apply a DM of +1 on the first digit if the current world's population is 9+, and a DM of -1 if the world's population is 5-. A modified throw of less than 1 is 1, and a modified throw of greater than 6 is 6. This throw indicates that a search by the characters has determined that this type of trade good is the best item available for the purpose. A throw may be made once per week.

The quantity of goods available is then determined. Throw the number of dice and multiply as shown (3Dx5 indicates the result of three dice multiplied by 5).

ACTUAL VALUE		TRADE AND SPECULATION DMs	
<i>Dice</i>	<i>Percentage</i>	Brokers. Four types of brokers are available:	
<i>Roll</i>	<i>Value</i>	DM	+1 5% commission.
2	40%	DM	+2 10% commission
3	50%	DM	+3 15% commission
4	70%	DM	+4 20% commission
5	80%	Character Skills: Bribery skill and admin skill may	
6	90%	be used as a DM at the level of the skill.	
7	100%	World Types: Trade classifications for worlds as	
8	110%	indicated in Book 3 may be used to influence trans-	
9	120%	actions as indicated on the trade and speculation table.	
10	130%	Agricultural: atmos 4-9, hydro 4-8, popul 5-7.	
11	150%	Non-Agricultural: atmos 3-, popul 6+.	
12	170%	Industrial: atmos 0-2, 4, 7, or 9, popul 9+.	
13	200%	Non-Industrial: popul 6-.	
14	300%	Rich: atmos 6 or 8, popul 6-8, govt 4-9.	
15	400%	Poor: atmos 2-5, hydro 3-.	

## TRADE AND SPECULATION

<i>Die</i>	<i>Trade Goods</i>	<i>Base Price</i>	<i>Purchase DMs</i>	<i>Resale DMs</i>	<i>Quantity</i>
11	Textiles	3,000	A-7, NA-5, NI-3	A-6, NA+1, R+3	3Dx5
12	Polymers	7,000	I-2, R-3, P+2	I-2, R+3	4Dx5
13	Liquor	10,000	A-4	A-3, I+1, R+2	1Dx5
14	Wood	1,000	A-6	A-6, I+1, R+2	2Dx10
15	Crystals	20,000	NA-3, I+4	NA-3, I+3, R+3	1D
16	Radioactives	1,000,000	I+7, NI-3, R+5	I+6, NI-3, R-4	1D
21	Steel	500	I-2, R-1, P+1	I-2, R-1, P+3	4Dx10
22	Copper	2,000	I-3, R-2, P+1	I-3, R-1	2Dx10
23	Aluminum	1,000	I-3, R-2, P+1	I-3, NI+4, R-1	5Dx10
24	Tin	9,000	I-3, R-2, P+1	I-3, R-1	3Dx10
25	Silver	70,000	I+5, R-1, P+2	I+5, R-1	1Dx5
26	Special Alloys	200,000	I-3, NI+5, R-2	I-3, NI+4, R-1	1D
31	Petrochemicals	10,000	NA-4, I+1, NI-5	NA-4, I+3, NI-5	1D
32	Grain	300	A-2, NA+1, I+2	A-2	8Dx5
33	Meat	1,500	A-2, NA+2, I+3	A-2, I+2, P+1	4Dx5
34	Spices	6,000	A-2, NA+3, I+2	A-2, R+2, P+3	1Dx5
35	Fruit	1,000	A-3, NA+1, I+2	A-2, I+3, P+2	2Dx5
36	Pharmaceuticals	100,000	NA-3, I+4, P+3	NA-3, I+5, R+4	1D
41	Gems	1,000,000	I+4, NI-8, P-3	I+4, NI-2, R+8	1D
42	Firearms	30,000	I-3, R-2, P+3	I-2, R-1, P+3	2D
43	Ammunition	30,000	I-3, R-2, P+3	I-2, R-1, P+3	2D
44	Blades	10,000	I-3, R-2, P+3	I-2, R-1, P+3	2D
45	Tools	10,000	I-3, R-2, P+3	I-2, R-1, P+3	2D
46	Body Armor	50,000	I-1, R-3, P+3	I-2, R+1, P+4	2D
51	Aircraft	1,000,000	I-4, R-3	NI+2, P+1	1D
52	Air/raft	6,000,000	I-3, R-2	NI+2, P+1	1D
53	Computers	10,000,000	I-2, R-2	NI+2, P+1, A-3	1D
54	All Terrain Vehicles	3,000,000	I-2, R-2	NI+2, P+1, A+1	1D
55	Armored Vehicles	7,000,000	I-5, R-2, P+4	NA-2, A+2, R+1	1D
56	Farm Machinery	150,000	I-5, R-2	A+5, NA-8, P+1	1D
61	Electronics Parts	100,000	I-4, R-3	NI+2, P+1	1Dx5
62	Mechanical Parts	70,000	I-5, R-3	NI+3, A+2	1Dx5
63	Cybernetic Parts	250,000	I-4, R-1	NI+4, A+1, NA+2	1Dx5
64	Computer Parts	150,000	I-5, R-3	NI+3, A+1, NA+2	1Dx5
65	Machine Tools	750,000	I-5, R-4	NI+3, A+1, NA+2	1Dx5
66	Vacc Suits	400,000	NA-5, I-3, R-1	NA-1, NI+2, P+1	1Dx5

Use this table to determine goods and prices for goods available for interstellar trade and speculation. Die indicates the result of two consecutive die rolls. Base price is the unaltered value of the goods. Purchase DMs alter this value based on the world where purchased. Resale DMs alter this value based on the world where offered for resale. Quantity is the amount of goods in the lot which is available. Items 11 through 46 and 61 through 66 are expressed in tons; items 51 through 56 are expressed per each single item.

Abbreviations: A= Agricultural World, NA= Non-agricultural World, P= Poor World, R= Rich World, I= Industrial World, NI= Non-industrial World.



by 5) This is the quantity of goods available in the lot, expressed in tons except in the case of items 51 through 56, which are expressed per each item (the referee must determine the exact tonnage of these items). Goods are available up to the quantity encountered. A lot may be split or partial purchases may be made if the characters desire; such partial purchases do entail a handling fee of 1% if made.

The price of goods is determined by consulting the actual value table; a two dice throw determines the percentage of the base price to be paid for the goods. This value multiplied by the quantity of goods in the lot gives the net cost of the items to the characters.

The actual value table is subject to DMs from three sources: character's skills, brokers' services, and world characteristics.

**Broker's DMs:** Four types of brokers are available to assist in the sale of goods once delivered to a world. Each must be paid his fee even if the seller decides not to sell his goods. Broker's fees are related to their general worth; 5% of sale price for each +1 to the resale die throw. Thus, a +4 broker receives a 20% commission for determining the best resale price around. A broker DM may never be higher than +4. Only one broker may assist with a sale.

**Character Skills:** If characters are skilled in bribery or admin, they may apply these as DMs for the sale of goods. In any given transaction, such DMs may be used by only one person.

**World Types:** The trade and speculation table indicates purchase and resale DMs based on world types. Book 3 indicates the meaning of various world characteristics for other aspects of **Traveller**, and defines trade classifications. There are six classifications of interest: agricultural and non-agricultural, industrial and nonindustrial, rich and poor worlds. A world may meet the criteria for more than one label (and be poor, non-industrial, for example). Those meeting criteria for more than one label are subject to the DMs for each such label when using the trade goods table.

The trade goods table lists many types of goods, often of general classes which may be of interest to characters for various uses. The goods labels are abstractions, such that a cargo of firearms could potentially be any form from muzzleloading replicas to laser carbines. Should characters wish to divert some part of the cargo to personal use (through payment or pilferage), the exact type of cargo must be determined by the referee.

When determining the contents of a cargo, the players and referee must be certain to correlate the established price of goods with the cost per ton. For example, the base price of a shotgun is Cr150, while a ton of firearms as trade goods has a base price of Cr30,000. A strict weight extension of the shotgun (3.75 kg per shotgun) would indicate 266 shotguns. Extension should be instead based on price, with weight as a limiting factor. Thus one ton of shotguns would contain 200 guns, at Cr150 each. The extra weight can be considered packing and crates. Similar calculations should be made to keep prices in line on other trade goods.

Some goods (those results 51 - 56, and 66 on the table) are sold individually instead of by the ton. Quantity is expressed in single units; tonnage and base prices must be determined by the players or referee in accordance with established prices and equipment.