TRAVELLER

Supplement 5: Civilian Vehicles

My other car's an air/raft

Traveller

Civilian Vehicles

Credits

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Introduction

Vehicles are an important part of any *Traveller* game, whether to explore a new planet, deliver cargo or simply to get from one destination to another. Different vehicles are required for different tasks and this book presents you with almost 100 vehicles, from aircraft to watercraft and everything in between.

If you cannot find a vehicle here to suit your needs, you can use the vehicle design rules to create your own. A blank vehicle sheet is included at the back of the book that you can use to design and record the vehicles you create. Although few civilian vehicles are armed, a weapons section is included but for specific weapon details you will need the *Central Supply Catalogue*.

Please note that some of the civilian vehicles listed in the *Traveller Core Rulebook* have been included here, but using the new design rules there are some minor differences between them. You can of course still use the original vehicles but we recommend that you use the versions listed here if you want full compatibility with this and future books.

The vehicles detailed within this book cover a wide range of Technology Levels and have been designed for specific uses and tasks. The vehicles are divided into the following sections:

Aircraft
The aircraft section details conventional flying vehicles including gliders, helicopters and planes. Most aircraft have a co–pilot who can operate sensors, communications and weapons as required. Aircraft listed here cover TL 2–8. Later flying vehicles use grav technology and are given their own section.

Grav Vehicles
Grav technology becomes available at TL 8. Worlds with this technology quickly start to adapt most vehicles to use grav drives for the versatility and speed they provide.

Hybrid Vehicles
Hybrid vehicles are those that have been designed to operate over multiple types of terrain such as amphibious ATVs and sea planes. Vehicles listed here cover TL 4–8.

Land Vehicles
This section includes all tracked and wheeled vehicles that drive along the ground. Vehicles are listed here for a wide range of applications from TL 1–9.

Walkers
Walkers are land vehicles that move on legs, rather than wheels or tracks. Civilian walkers are utility vehicles and range from TL 8–10.

Watercraft
Boats and ships are used throughout the history of most worlds. A number of vessels for travelling over and underwater are listed here coving TL 1–9.

Vehicle Design

Concepts & Definitions

By definition, a vehicle needs some kind of motive power (termed a **Power Plant**) and a means to deliver this power (termed a **Drive System**) so the vehicle can move. Some kind of control system is also necessary for the vehicle to be able to function. This may or may not include a human operator.

A vehicle must have a **Hull**. This is the body of the vehicle and includes the hull, axles, wings and other structural features as well as the vehicle's outer skin. Other **Components** are fitted into the hull as required, which can include weapons, sensors, communications equipment, crew facilities and cargo space.

Each component built into a vehicle takes up a certain amount of space. The unit used in this design system is the cubic metre (M^3). A vehicle cannot carry more than its internal volume allows, unless it is an open structure with items piled up on top or hanging out of the sides such as motorcycles, air/rafts and flatbed trucks.

A vehicle's hull will have a **Configuration,** which is often determined by its intended function. For example, a cargo van will have a different configuration to an aircraft or submarine.

A vehicle's hull will be constructed from whatever **Material** the designer deems to be most suitable. Generally, higher–tech materials will be stronger than lower–tech ones, allowing either a tougher or cheaper vehicle to be built on the same general configuration. The material a hull is built from also determines the vehicle's mass and Base Armour.

Further design decisions are represented by additional **Qualities**, which can modify vehicle attributes such as armour and speed as well as providing seals and coatings.

The size, construction, configuration and qualities determine the mass of a vehicle. Most components will also add to a vehicle's mass. Mass is used when calculating the speed of a vehicle.

Facings

All vehicles have six facings as follows:

- **Front:** The normal direction of travel.
- **Rear:** The opposite direction to the front. Most vehicles can also travel in this direction.
- **Dorsal:** The top surface when the vehicle is the right way up in a gravity field.
- **Ventral:** The bottom surface when the vehicle is the right way up under gravity.
- **Right:** The right hand side relative to a person inside the vehicle facing forward.
- **Left:** The left hand side relative to a person inside the vehicle facing forward.

Agility

A vehicle's Agility is used as a DM to Drive and Pilot checks when performing difficult manoeuvres as described on page 67 of the *Traveller Core Rulebook*. Agility can also be applied as a –DM to enemy attempts to hit the vehicle if it is attempting to dodge. A vehicle doing so is treated as moving at maximum speed for purposes of its own chance to hit an enemy. The vehicle's drive system will determine the Base Agility (see page 8) which can be increased with accessories and design options.

Agility modifications add Agility Potential which is converted into Agility during the final step of the vehicle design (see the table on page 26 for details). Some vehicle types and design choices can result in a negative Agility Potential which will give a negative Agility score; a vehicle with negative Agility can be given a zero or positive Agility with the right components.

Speed

All vehicles have a Cruising Speed and a Top Speed (see page 26 for calculations). Cruising Speed is reasonably fuel–efficient and comfortable. Top Speed is the maximum the vehicle can manage under ideal conditions. Fuel consumption is doubled when a vehicle is travelling faster than its Cruising Speed.

Ground vehicles also have an Offroad Speed (see page 26 for calculations), which is the best speed they can achieve over rough ground where there is no road. If the ground is very rough, most vehicles can only crawl along or might not be able to move at all.

Tech Level

Most design options and components have a listed Technology Level, which is the lowest TL that the component is available. The overall TL of a vehicle is usually determined by the highest TL component used in the design. However, if a vehicle only has a minimal amount of high–tech components you can give the vehicle a lower TL if imported parts are available.

Rounding

When designing vehicles some of the calculations can result in fractional numbers. Where whole numbers are required, always round up fractions unless otherwise stated. Also note that M^3 remains as a fractional number so no rounding is required.

DESIGN CHECKLIST

1. Technology Level
   a. Determine maximum Tech Level of the vehicle.
2. Capacity
   a. Determine hull capacity in M³.
   b. Calculate base Hull and Structure values.
3. Hull
   a. Choose the construction material.
   b. Select a vehicle configuration.
   c. Pick any required qualities.
   d. Calculate hull cost and Total M³.
   e. Apply modifiers.
4. Propulsion
   a. Choose the drive system.
   b. Select a power plant.
   c. Allocate fuel.
5. Armour and Weapons
   a. Choose armour.
   b. Select weapons.
   c. Allocate ammunition space.
   d. Add additional weapon options.
6. Optional Components
   a. Select sensors.
   b. Choose communications.
   c. Add environmental systems.
   d. Add any other equipment and upgrades.
7. Crew Facilities
   a. Allocate operating stations.
   b. Add passenger seats.
   c. Allocate sleeping areas.
   d. Allocate utility areas.
8. Final Calculations
   a. Allocate cargo space.
   b. Calculate mass.
   c. Calculate Agility.
   d. Calculate Speed.

STEP ONE: CAPACITY

Capacity is measured in cubic metres (abbreviated M³ hereafter). The shape taken by this volume is not relevant here. For large components, the shape will be dictated by the shape of the object. Smaller components or systems made up of many small components, such as wiring or life support, can be any shape and are usually dispersed throughout the vehicle.

Capacity refers to the internal volume of the vehicle. 1 M³ translates to 2/27 of a displacement ton (dTon) in the spacecraft design system. However, the thickness of a vehicle's hull and external components, such as wheels, mean that a vehicle will take up more space than its internal capacity. If it is necessary to determine the overall displacement of a vehicle, calculate displacement as 1 dTon for every 10 M³ of internal volume the vehicle has.

This base value for capacity is termed Base M³ and is used to determine the cost of many components. Some vehicle configurations can modify the capacity of the vehicle; this modified value is termed Total M³. Components that derive their M³ cost from the vehicle's capacity always use the vehicle's Base M³ value.

The Example Vehicles Table indicates the typical size, configuration and qualities of standard vehicles. These examples are just guidelines and there is no reason why a vehicle cannot be larger or smaller than those listed, or have different qualities.

Example Vehicle	Base M³	Configuration	Qualities
Air/Raft	8	Open	—
Airliner	480	Airframe	—
Cargo Plane	110	Airframe	—
Helicopter	28	Airframe	—
Motorcycle	2	Cycle	—
Removal Truck	40	Box	—
Saloon Car	9	Standard	—
Small Car	6	Standard	—
Small Van	20	Box	—
Submarine	55	Streamlined	Sealed
Yacht	100	Streamlined	Waterproof

Hull and Structure

Once you have determined the vehicle's Base M³ you can calculate the base Hull and Structure values. Hull and Structure points are described on page 67 of the *Traveller Core Rulebook* under 'Vehicle Damage'.

To calculate the Hull and Structure points simply divide the vehicle's Base M³ by four. Round the result down for the Hull points and round up for the Structure points. These values can be further modified by the material, configuration and qualities (as detailed in Step Two). The minimum base amount for either of these values is one.

CAPACITY EXAMPLE

For our example, we will build a small armed van. Using the example vehicles listed in the table we can see a van of this size has a Base M³ of 20 but let us make ours a little bigger with 26 M³. We can now calculate the Hull and Structure by dividing the M³ by 4 as follows:

Base M³:	*26*
Base Hull:	*26 ÷ 4 = 6.5 round down to 6*
Base Structure:	*26 ÷ 4 = 6.5 round up to 7*

STEP TWO: HULL

The vehicle's hull is broken down into three design options, which are the construction material configuration, and optional qualities.

Material

The construction material sets the base mass and cost of the vehicle based on its size. High technology materials give bonuses to the vehicle's base Hull and Structure points, whilst less advanced materials will reduce the Hull and Structure. Modifiers to Hull and Structure are applied as multipliers to the base values calculated in Step One.

The construction material also determines the vehicle's Base Armour. Further armour can be added as detailed in Step Four.

Material	TL	Hull & Structure Multiplier	Mass per M^3 (kg)	Cost per M^3 (Cr.)	Base Armour
Wood/Organic Materials	1	0.5	85	100	1
Iron	3	0.8	110	150	2
Steel	5	1	100	200	3
Light Alloys	6	1.1	80	250	2
Advanced Composites	7	1.25	90	500	4
Crystaliron	10	1.5	125	1,000	6
Superdense	12	2	150	5,000	7
Bonded Superdense	14	3	200	10,000	8

Configuration

The configuration determines the basic shape and function of the vehicle. It modifies the mass, cost and other attributes of the vehicle as detailed in the Configuration Table.

If you are designing an aircraft then you must choose either the Airframe or Super Airframe configuration. This does not apply to grav vehicles.

Configuration	TL	Mass Multiplier	Hull Cost Multiplier	Effects
Airframe	4	0.9	1.5	Flight. Maximum Speed 1,200 kph.
Box	1	1	0.8	Armour x 0.8. Total M^3 x 1.2.
Open	1	0.9	1	M^3 for crew stations and passenger seats x 0.5.
Cycle	4	0.75	0.5	M^3 for crew stations and passenger seats x 0.25, Hull and Structure x 0.5, Agility Potential +2. Vehicle cannot have extra armour.
Sloped	5	1	1.2	Armour x 1.1. Total M^3 x 0.9.
Standard	1	1	1	—
Streamlined	1	1	1.3	Top Speed x 1.1.
Super Airframe	6	0.7	2.5	Flight. Top Speed x 1.1.
Super Sloped	6	1	1.5	Armour x 1.2. Total M^3 x 0.8.
Super Streamlined	7	1	2	Top Speed x 1.25.

Qualities

You can now choose any qualities from the Quality Table as required. You can pick as many qualities as you like, or none at all. Each quality can only be selected once and you can only have one of a given type. For example, Very Rugged can not be combined with Rugged.

A vehicle of Dispersed Construction is essentially made up of fairly loosely connected blocks of components, such as a watercraft comprising several rafts, or a very lightly–built grav craft which is not designed to be subject to serious stress. A 'moon buggy' or similar vehicle could be built this way.

Type	TL	Quality	Mass Multiplier	Hull Cost Multiplier	Effects
Construction	1	Dispersed	0.8	0.8	Hull and Structure x0.4.
Construction	1	Lightweight	0.8	1.5	Hull and Structure x 0.7. Vehicle cannot have extra armour.
Construction	1	Rugged	1.15	1.75	Hull x 1.1, Structure x 1.2.
Construction	5	Very Rugged	1.4	3	Hull x 1.2, Structure x 1.3.
Sealing	1	Waterproof	1	1.2	Capable of floating in liquid.
Sealing	4	Sealed	1	1.5	Sealed against vacuum and water.
Sealing	7	Advanced Sealed	1.1	3	Sealed against extreme environments.
Coating	10	Reflec Coating	1	1.25	Armour +5 against lasers.
Coating	7	Stealth Coating	1	1.25	–4 DM for sensor locks on vehicle.

Calculate Hull Cost

The hull cost is determined by taking the vehicle's Base M^3 and multiplying it by the cost per M^3 of the construction material. Multiply the result by the cost multipliers for the hull configuration and any qualities you have added. Cost multipliers can be applied in any order as the result will be the same.

Calculate Total M^3

If the vehicle's configuration modifies the vehicle's M^3, multiply the Base M^3 by the M^3 multiplier listed in the Configuration Table to get the Total M^3. If the configuration does not affect the M^3, the Total M^3 is the same as the Base M^3.

It is important to distinguish between Base M^3 and Total M^3 because all calculations that use a percentage of the vehicle's M^3 use the Base M^3 value.

Apply Modifiers

Apply any Hull and Structure modifiers to the base values calculated in Step One. These modifiers can be applied in any order (the outcome will be the same). Once all multipliers have been applied, round up the total. Make a note of any other modifiers as they will be used later in the design process.

You now have the basic shape and size of your vehicle. Now you need to give it some propulsion, a crew and add in weapons and components as required.

HULL EXAMPLE

Continuing on from the example in Step One, we will build our van from advanced composites to give it additional Hull and Structure. We will use the box configuration to give us our basic van shape and we will add the Rugged add Reflec Coating qualities. The van has a Base M^3 of 26 used to calculate the hull cost as follows:

Advanced Composites:	*500 x 26 = 13,000*
Box configuration:	*13,000 x 0.8 = 10,400*
Reflec Coating	*10,400 x 1.25 = 13,000*
Rugged:	*13,000 x 1.75 = 22,750*
Cost:	*Cr. 22,750*

Next we determine the Total M^3:

Total M^3:	*26 x 1.2 = 31.2*
Round up:	*32*

The Hull and Structure are modified as follows:

Base Hull:	*6*
Advanced Composites:	*6 x 1.25 = 7.5*
Rugged:	*7.5 x 1.1 = 8.25*
Round up:	*9*

Base Structure:	*7*
Advanced Composites:	*7 x 1.25 = 8.75*
Rugged:	*8.75 x 1.2 = 10.5*
Round up:	*11*

Finally, we make a note of the Base Armour (4) value from the Advanced Composites and the armour modifiers from the Box configuration (0.8) and Reflec Coating (+5 against lasers). This information will be used in Step Four.

STEP THREE: PROPULSION

Drive System

A vehicle needs a suitable drive system for the environment it is intended to operate in. A drive system is assumed to be a complete system containing everything necessary to make the vehicle move, such as transmission, suspension, steering, and control surfaces.

- Ground vehicles require a fairly hard surface to drive on, with the exception of hover vehicles that can also travel on water and similar surfaces.
- Watercraft need a dense fluid medium (usually water) to float on or move through.
- Flyers require a gas medium (a thin or denser atmosphere) to generate lift.
- Grav vehicles do not need an atmosphere of any kind.
- Lifters are a special type of grav drive. They provide hover capability, allowing the vehicle to move up or down only. Additional flyer drive systems can be used with Lifters to provide motive power. Lifters are most commonly used for static platforms or grav trailers.
- Gasbags are a special case. They provide hover capability, allowing the vehicle to move up or down only. Additional flyer drive systems can be used with a gasbag to provide motive power. The capacity of a gasbag craft is based on the capacity of its gondola or other containers suitable for carrying people and cargo. The gasbag itself has a much greater volume and is filled with light gas; it cannot be used for cargo, personnel or components.

Type	Drive	TL	% of Base M^3	Mass per M^3 (kg)	Cost per M^3 (Cr.)	Base Speed	Maximum Speed	Base Agility
Gravitic	Lifter	8	1	100	100,000	0 kph	50 kph	0
Gravitic	Grav	8	5	150	500,000	200 kph	10,000 kph	0
Gasbag	Gasbag	4	10	25	100	0 kph	100 kph	–1
Ground	Hover	6	15	75	200,000	125 kph	150 kph	–1
Ground	Wheels	4	10	100	1,000	100 kph	500 kph	0
Ground	Tracks	5	20	500	5,000	60 kph	120 kph	1
Ground	Walker	8	5	1,000	50,000	25 kph	80 kph	1
Flyer	Rotors	5	20	80	25,000	75 kph	400 kph	1
Flyer	Propeller	4	5	60	15,000	150 kph	850 kph	1
Flyer	Jet	5	15	100	35,000	250 kph	6,000 kph	1
Flyer	Glider	2	5	0	500	50 kph	400 kph	0
Watercraft	Submarine	5	10	150	5,000	35 kph	100 kph	–2
Watercraft	Water–Based*	0	2	25	100	45 kph	45 kph	–2
Watercraft	Water–Driven	4	10	150	5,000	45 kph	200 kph	–2

* The Water-Based drive system is only suitable for Manual, Animal or Wind powered craft.

The '% of Base M^3 column' represents the amount of internal space taken up by a drive system and its associated components. Use this value to calculate the M^3 of the drive system as a percentage of the vehicle's Base M^3. For example, Tracks on a vehicle with a Base M^3 of 50 would use up 10 M^3 of the vehicle's capacity (20% of 50 M^3).

The 'Mass per M^3' column is used to determine the mass of the drive system and is calculated from the M^3 it occupies within the vehicle. The mass of the drive system is calculated by multiplying this value by the M^3 of the drive system.

'Cost per M^3' is the cost in Credits for the drive system based on the volume it occupies. The cost of the drive system is calculated by multiplying this value by the M^3 of the drive system. Following on from the previous example, the Tracks would cost Cr. 50,000 (Cr. 5,000 x 10 M^3).

The vehicle's Base Speed and Base Agility are used in the final step of the vehicle design and are detailed in Step Seven. For now, just make a note of these values.

Aircraft are assumed to have a set of wheels or skids to allow them to land and taxi. A floatplane replaces wheels with floats at no extra cost but a true 'flying boat' (see page 91) needs to have the Waterproof quality.

A Walker can have two or more legs as appropriate to its function. Legs take up little room as they are mainly external to the vehicle's hull. Only the attachments and control points take up M^3 within the vehicle.

All watercraft powered by engines must have the Water–Driven or Submarine option. The Water–Based drive system should be used for any watercraft that uses alternate forms of power (such as oars or sails).

Power Plant

A drive system requires something to power it. This design system does not make a distinction between electrical and mechanical power. It is assumed that generators and electric motors can swap power back and forth as required, and that a suitable means for power transmission is available as part of the drive system.

Most power plants can be of any size unless otherwise stated, and are allocated in units of M^3 or parts thereof. The more M^3 allocated to the power plant, the greater its power output. The power output is used in Step Seven when calculating the vehicle's speed but for now just note the value.

Power Plant	TL	Power Output per M³	Mass per M³ (kg)	Fuel per M³ (litres)	Cost per M³ (Cr.)	Notes
Manual Power	0	2	0	—	0	The cost and mass is included in the Drive System and crew costs. The power output is per operator (such as oarsmen). Assume 1 M³ per crewman.
Pack Animal	1	1	1	—	25	The cost is for the harnessing equipment. Animals must be purchased separately.
Wind Power–1	1	5	20	—	50	See page 11 for details.
Wind Power–6	6	5	10	—	100	
Steam–3	3	4	200	5	100	—
Steam–4	4	6	150	5	250	
Steam–5	5	7	150	4	400	
Steam–6	6	8	100	4	450	
Steam–7	7	9	100	3	500	
Internal Combustion–4	4	10	90	5	800	—
Internal Combustion–5	5	12	80	4	1,000	
Internal Combustion–6	6	14	75	3	1,200	
Internal Combustion–7	7	16	75	2.5	1,350	
Internal Combustion–8	8	18	70	2	1,500	
Turbine–5	5	20	100	10	3,000	Turbine systems include advanced high–altitude hybrid engines used for space planes.
Turbine–6	6	22	90	10	3,500	
Turbine–7	7	24	90	9	4,000	
Turbine–8	8	26	90	9	4,250	
Turbine–9	9	28	80	8	4,500	
Turbine–10	10	30	80	8	5,000	
Solar–7	7	3	20	—	1,000	Excess energy is stored in batteries and can power the vehicle for up to two hours if no sunlight is available.
Solar–8	8	4	20	—	1,200	
Solar–9	9	5	20	—	1,350	
Solar–10	10	6	20	—	1,500	
Hydrogen Fuel Cell–7	7	16	150	1	1,500	—
Hydrogen Fuel Cell–8	8	18	150	1	1,800	
Hydrogen Fuel Cell–9	9	20	125	1	2,100	
Hydrogen Fuel Cell–10	10	22	125	1	2,400	
Nuclear Fission–6	6	16	200	—	6,000	Needs refuelling once every 2–3 years. Fuel storage is included in the cost of the plant. A fission plant has a minimum size of 15 M³.
Nuclear Fission–7	7	17	200	—	7,000	
Nuclear Fission–8	8	18	200	—	8,000	
Nuclear Fission–9	9	19	150	—	9,000	
Nuclear Fusion–8	8	20	200	1	10,000	Minimum fusion plant size at TL 8 is 50 M³ and 25 M³ at TL 9.
Nuclear Fusion–9	9	22	200	1	12,500	
Nuclear Fusion–12	12	24	150	1	15,000	
Nuclear Fusion–15	15	28	110	1	17,500	
Antimatter–17	17	45	100	—	60,000	Needs refuelling once every 10–12 years. Fuel storage is included in the cost of the plant. Antimatter plants have a minimum size of 5 M³.
Antimatter–18	18	60	100	—	75,000	
Antimatter–19	19	75	100	—	100,000	

The fuel, power output, mass and cost columns all refer to the M^3 of the power system unless otherwise stated. The fuel column lists the fuel consumption in litres per hour when the vehicle is travelling at Cruising Speed (see page 26 for details).

Power and Fuel Scale Efficiency

Larger engines are more efficient in their use of fuel and in providing power. One large engine will provide more power and use less fuel than two engines half its size combined. To reflect this the tables at the bottom of the page help calculate the efficiency to be had as engine size increases.

Wind Power

Wind power usually takes the form of sails and works differently to other types of power plant. The speeds achieved from wind power will vary depending on the actual wind speed and other conditions, so the power output is simply an average speed in regular conditions.

The apparent wind speed (the relative velocity of the wind relative to the vehicle's motion) is also an important factor. For example if a sailing boat is travelling with a direct tail wind at the same speed as the wind, there will be no power to drive the vehicle. Likewise, if the ocean current is moving at the same speed and direction as the wind, the apparent wind speed will be 0 kph and the vehicle is essentially drifting on the water.

When travelling in a direction against the wind or directly with the wind, sailing vessels must 'tack' in a zig–zag fashion to ensure that the sails can harness the wind power. This means that although a sailing vessel might be travelling at a fast speed, it is not necessarily heading directly towards it destination.

For gaming purposes, you can assume that the above factors have been taken into consideration and the vehicle's speed reflects changes in the wind and the indirect course the vehicle must travel. A wind powered vehicle's Cruising Speed represents the average speed it can travel at in normal conditions.

Multiple Drives & Power Plants

Some vehicles utilise more than one drive system or power plant. These vehicles are usually designed to operate on different terrains or provide alternative power. Some examples of multi–terrain vehicles include amphibious cars and submergible planes as detailed in the Hybrid Vehicles chapter. Multi–powered vehicles might have a separate power plant for each drive system or carry a backup power plant (such as a modern sailing boat with a motor).

Hybrid vehicles are designed as normal, calculating the cost of additional drive systems and power plants as required. For multiple drive systems, calculate Agility and speed statistics and then take the average, highest, or list all values as appropriate to the design. For example, a dirigible (see page 68) uses the Top Speed of the propeller since the gasbag only provides lift, whereas a half track (see page 34) would take the average of the tracked and wheeled speeds. A submergible plane (see page 94) would list agility and speed values separately as each drive system operates independently depending on the terrain.

Power Efficiencies of Scale

Power Plant Size (M^3)	Steam	Internal Combustion	Turbine	Hydrogen Fuel Cell	Solar	Nuclear Fission	Nuclear Fusion	Anti-Matter
10-99.9	1.25	1.25	1.5	1.5	—	—	—	—
100-999.9	1.5	1.5	2	2	1.25	1.5	1.5	1.5
1,000+	2	2	2.5	2.5	1.5	2	2	2

Multiply the power output generated by the power plant by the relevant number in the above table to calculate the new power output figure.

Fuel Efficiencies of Scale

Power Plant Size (M^3)	Steam	Internal Combustion	Turbine	Hydrogen Fuel Cell	Solar	Nuclear Fission	Nuclear Fusion	Anti-Matter
10-99.9	1.5	1.5	2	2	—	—	—	—
100-999.9	2	2	3	3	—	—	1.5	—
1,000+	3	3	5	5	—	—	2	—

Divide the fuel consumption of the power plant by the relevant number in the above table to calculate the new fuel consumption figure.

You can also reduce the cost and M^3 of the drive system if appropriate. For example, a half track vehicle might halve the cost and M^3 usage of either its tracks or wheels.

If a vehicle has multiple power plants then the vehicle's speed must be calculated separately for each one. If the vehicle uses the combined power then simply total the power output and fuel consumption.

Trailers

Trailers are vehicles designed to be pulled by another vehicle. They are designed as normal but have no power plant; they will usually have a Lifter or Wheels drive system.

When a vehicle is pulling a trailer you will need to recalculate the vehicle's speed by adding the trailer's mass to the mass of the vehicle. Trailers also have an agility penalty that is applied to the vehicle pulling it, equal to the trailer's Base M^3 divided by 50.

Fuel

Fuel is measured in litres. One litre of fuel occupies 0.001 of a M^3, therefore 1,000 litres of fuel takes up 1 M^3. Fuel is stored in a suitable tank or container, with feed systems and other related components included in the overall cost of the hull and power plant. The mass of fuel tankage is 1 kg per litre.

There is no minimum amount of fuel that can be carried but practicalities suggest that a reasonable amount is needed if the vehicle is to go anywhere. Fuel consumption assumes that the drive system is travelling at Cruising Speed (see page 26). Fuel consumption is doubled when travelling faster than the vehicle's Cruising Speed.

Propulsion Example

Installing wheels on our van will use up 2.6 M^3 (10% of 26 M^3), have a mass of 260 kg (2.6 x 100) and cost Cr. 2,600 (Cr. 1,000 x 2.6 M3).

We will allocate 4 M^3 for an Internal Combustion–7 power plant. This provides a power output of 64 (4 x 16), has a mass of 300 kg (4 x 75 kg) and costs Cr. 5,400 (4 x Cr. 1,350). The fuel consumption of the power plant is 10 litres per hour (4 x 2.5), so a 70 litre fuel tank will give a running time of 7 hours, weighs 70 kg and will use 0.07 M^3 (70 ÷ 1000).

Step Four: Armour and Weapons

Armour

All vehicles have a Base Armour value determined by the construction material used for the hull (see page 5). Additional armour can be added and is normally made of the same material, but this is not mandatory. Armour protection is abstracted; a high armour value might indicate very thick armour or it could indicate spaced layers with reactive panels, for example, the effect is the same in game terms.

Armour uses up available M^3 and adds to the mass of the vehicle. The Armour Material Table indicates how much Armour is added for each 1% of the vehicle's Base M^3 given over to armour. Any modifiers from other design options are applied to the new total. Partial armour points are rounded down if less than 0.5 or rounded up if equal to or greater than 0.5.

Adding armour requires strengthening the vehicle's chassis, suspension and other components, making the addition of armour much more than just bolting on some plates. For this reason the mass cost is more expensive than the hull costs.

Armour Facing

The armour rating of a vehicle applies to all of its facings, except for open configuration vehicles that do not have any armour on the dorsal facing. If you wish to create a vehicle with more armour on some faces than it does on others, you can 'move' armour points from one facing to another. Only additional armour points can be moved in this way, Base Armour points cannot be moved as they represent the intrinsic armour value of the construction material.

Where armour varies on different facings the values will be listed in the following order: front, left, right, rear, dorsal and ventral.

For example, we have a vehicle with a Base Armour of 7 and 2% of its M^3 allocated to armour made from Advanced Composites. This gives a total of 17 armour points on each facing (7 base + 10 additional). We will now take all 10 points of additional armour from the ventral facing and 6 points from the dorsal facing. We now have 16 points that can be evenly distributed over the other four facings, adding 4 points to each. This results in the vehicle having 21 points on the front, rear, left and right facings (7 base + 10 additional + 4 moved), 11 points on the dorsal facing (7 base + 4 additional) , and just the base value of 7 points on the ventral facing.

Armour Example

Following on from the previous example, our van (made from advanced composites) has a Base Armour of 4 and a Base M^3 of 26. We will allocate 2% of the van's M^3 to additional armour made from Light Alloys. This will use up 0.52 M^3 (2% of 26 M^3), has a mass of 832 kg (0.52 x 1,600), costs Cr. 1,300 (0.52 M^3 x 2,500), and gives our vehicle a further 8 points of armour (2 x 4).

The van now has 12 armour (4 + 8), but because we chose the Box configuration in Step Two we get an armour multiplier of 0.8. This gives a total of 9.6 armour points, which rounds up to 10. We also added Reflec Coating which gives a +5 armour bonus against lasers for a total of 15.

Armour Material	TL	Armour Points per 1% of M³	Mass per M³ of Armour (kg)	Cost per M³ of Armour (Cr.)
Wood/Organic Materials	1	2	5,100	1,000
Iron	3	4	6,600	1,500
Steel	5	6	6,000	2,000
Light Alloys	6	6	4,800	2,500
Advanced Composites	7	8	5,400	5,000
Crystaliron	10	12	7,500	10,000
Superdense	12	14	9,000	50,000
Bonded Superdense	14	16	12,000	100,000

Weapons

Weapons use up an amount of M³ and add mass depending on their design. A full list of weapons is detailed in the *Central Supply Catalogue*, which lists the damage, mass and cost. A selection of these weapons are listed in the Weapon Table. Support and artillery weapons in the *Central Supply Catalogue* include carriage, gun shields and other components that are not needed for vehicle mounting, so you can reduce the mass of these types of weapons by 75% (not including bombs, grenades, missiles and rockets).

Weapon	TL	Cost (Cr.)	Damage	M³	Mass (kg)
Light Machinegun	5	3,000	3d6 SAP	0.25	7
Advanced Support Weapon	10	2,750	4d6 SAP	0.25	5
Improved Flamethrower	6	1,400	4d6 Flame	0.5	12
Advanced Flamethrower	8	2,500	3d6+6 Flame	0.5	12
Light Autocannon	6	7,500	6d6 SAP	1.5	50
VRF Gauss Gun	10	200,000	5d6 AP	2	1,500
60mm Antitank Gun	6	56,000	7d6 Super–AP	3	863
9lb Cannon	3	2,600	9d6	2	113
75mm Cannon	7	160,000	8d6 Super–AP	4	1,125
Heavy Autocannon	6	95,000	8d6 SAP	2.5	450
120mm Cannon	8	400,000	10d6 Super–AP	4	1,875
35mm Rail Gun	9	1,000,000	12d6 Super–AP	7	5,250
12mm Light Gauss Cannon	12	3,000,000	10d6 Mega–AP	3	750
15mm Heavy Hypervelocity Cannon	13	26,000,000	18d6 Ultimate–AP	8	13,500
Gatling Laser	8	750,000	6d6	4	5,250
Laser Cannon	9	1,000,000	8d6	6	3,750
Plasma A Gun	10	1,000,000	14d6	6	3,000
Fusion Z Gun	14	8,000,000	28d6	6	3,000
Meson Accelerator	14	20,000,000	18d6	12	45,000
Heavy Torpedo	6	2,200	14d6	4	1,500
Smart Torpedo	8	2,800	12d6	2.5	200
70mm Strafing Rocket Pod (7 pack)	6	4,000	8d6	0.5	16
Medium Missile	7	2,000	8d6+4 AP	0.5	24
Light Tac Missile (Anti–Air)	9	3,000	9d6	0.25	14
Light Tac Missile (Anti–Armour)	9	4,000	9d6 Super–AP	0.25	16
Light Tac Missile (Anti–Personnel)	9	1,800	9d6	0.25	10
Plasma Missile	12	3,200	8d6 Mega–AP	0.5	8
Medium Bomb	4	1,200	12d6	2	450
Heavy Bomb	5	4,000	14d6 AP	4	1,200
Super Heavy Bomb	6	10,000	16d6 Super–AP	6	4,500

The M^3 of a weapon will largely depend on its weight and can be determined by using the Weapon Mass Table as a guideline.

Weapon Mass (kg)	Weapon M^3
0 – 9	0.25
10 – 24	0.5
25 – 49	1
50 – 99	1.5
100 – 199	2
200 – 499	2.5
500 – 999	3
1,000 – 1,999	4
2,000 – 2,999	5
3,000 – 4,999	6
5,000 – 9,999	7
10,000 – 14,999	8
15,000 – 19,999	9
20,000 – 29,999	10
30,000 – 39,999	11
40,000 – 49,999	12
50,000+	13

Armour–Piercing Rounds

Some artillery weapons perform better against armour than others. Area effects such as fragmentation from a shell burst usually have no intrinsic armour–piercing capability. There are a number of different armour piercing rounds available:

Semi Armour–Piercing (SAP): This effect is uncommon with artillery weapons. The round ignores a number of points of armour equal to half the number of damage dice, rounding down. For example, a weapon doing 9d6 SAP damage ignores 4 points of armour. If the target has less armour than this value, the excess is wasted.

Armour–Piercing (AP): Ignores a number of points of armour equal to the number of damage dice. Example: a weapon doing 9d6 AP damage ignores 9 points of armour. If the target has less armour than this value, the excess is wasted.

Super Armour–Piercing (Super–AP): Ignores a number of points of armour equal to twice the number of damage dice. Example: a weapon doing 9d6 AP damage ignores 18 points of armour. If the target has less armour than this value, the excess is wasted.

Ultra Armour–Piercing (Ultra–AP): Ignores a number of points of armour equal to three times the number of damage dice. Example: a weapon doing 9d6 AP damage ignores 27 points of armour. If the target has less armour than this value, the excess is wasted.

Mega Armour–Piercing (Mega–AP): Ignores a number of points of armour equal to four times the number of damage dice. Example: a weapon doing 9d6 AP damage ignores 36 points of armour. If the target has less armour than this value, the excess is wasted.

Ultimate Armour–Piercing (Ultimate–AP): Ignores a number of points of armour equal to five times the number of damage dice. Example: a weapon doing 9d6 AP damage ignores 45 points of armour. If the target has less armour than this value, the excess is wasted.

Weapon Mounts

A vehicle can carry weapons either inside its armour (termed internal weapons) or outside it (external weapons). A tank gun mounted in an armoured turret is considered to be an internal weapon as a significant part of the weapon (and most importantly, the operator and any sighting equipment he is using) is behind armour.

All weapons must be carried on a mount, which can be one of three types: fixed traversing, or pop–up. Each weapon mount must specify the facing it is carried on.

Fixed weapons can only be aimed by pointing the whole craft and are usually controlled by the driver or pilot. There is no reason why a guided missile cannot be fired from a fixed mount; what the weapon does after being fired does not define the mounting.

Traversing weapons can elevate and traverse to engage targets in various directions. They can be mounted in a powered turret, on the arm of a combat walker, or on a manually operated swivel mount; the principle is much the same in each case. Traversing mounts can be powered or unpowered as required at no additional cost.

Pop–up weapons are concealed or protected by armour, but cannot fire until they are deployed. Once deployed, the weapon can engage and will be obvious to any observer. Pop–up mounts are available for almost any weapon type. For example, an aircraft might carry its missiles in an internal bay, deploying them to the ready position when combat begins. Pop–up weapons can be internal or external depending on their firing position – if the weapon is still protected by armour in the firing position, it is an internal weapon. If it moves outside the armour, it is an external weapon.

Example Weapon	Mount Type
Aircraft cannon	Fixed, Internal
Aircraft bomb/missile rail	Fixed, External
Tank Destroyer with fixed plasma gun on hull mounting	Fixed, Internal
Tank gun in turret	Traversing, Internal
Secret agent's car with concealed machineguns	Fixed, Pop–up
Tank commander's machinegun	Traversing, External
Helicopter rocket pod	Fixed, External
Unprotected missile launcher on the deck of a nautical warship	Traversing, External
Vertical launch tube for missiles on a nautical warship	Fixed, Internal
Concealed turret containing a VRF Gauss Gun on a Grav Sled	Pop–Up, Traversing, Internal
Laser mounted on the arm of a combat walker or Warmek	Traversing, Internal
Submarine Torpedo Tube	Fixed, Internal

Most weapons can be carried on any sort of mount. The type of mount used for a weapon will modify the weapon M^3, mass and cost as indicated in the Mount Type Table. The multiplier for each type of mounting that applies is used, and can be calculated in any order (the result will be the same). For example, a weapon with a volume of 4 M^3, carried on an internal pop–up traversing mount takes up 7.2 M^3 (4 x 1 x 1.2 x 1.5).

A vehicle can also carry one antipersonnel weapon on an unpowered traversing mount for every 20 M^3 (or part thereof) of the vehicle's Base M^3. Weapons added in this manner do not use up any of the vehicle's M^3 capacity, but do add to the vehicle's mass as normal. The cost is just the price of the weapon. Weapons added in this manner require a crew member to operate the weapon, who is exposed outside the vehicle's armour while doing so.

Mount Type	Weapon M^3 Multiplier	Weapon Mass Multiplier	Weapon Cost Multiplier
Fixed	1	1	1
Traversing	1.5	1.25	1.5
Internal	1	1	1.2
External	0.2	1	1
Pop–Up	1.2	1.1	1.5

Ammunition

The volume required for a projectile weapon includes enough ammunition for 10 attacks (shots, bursts and so on). Missiles, rockets and torpedoes only include space for 1 attack. Energy weapons do not need ammunition.

Additional ammunition stowage requires 20% of the weapon's base M^3 and mass per additional 5 attacks or 90% per single missile, rocket or torpedo. The cost of the ammunition space is negligible but the ammunition itself must be paid for. It is assumed that additional ammunition space includes feed systems and other related components where appropriate.

Weapon Stabilisation

Stabilisation gear enables a vehicle to fire its weapons whilst moving. Any projectile or energy weapon can be stabilised. Missiles, rockets and torpedoes do not need stabilisation. The gear is located on the mount, except for open mounts where the gear is located in the hull. Stabilisation reduces the penalty for firing on the move; it does not provide any positive bonus.

The effects of movement on fire are dependent on the stabilisation system in use and are listed in the Stabilisation Table. Apply the appropriate DM to rolls to hit depending on the stabilisation system in place, the vehicle's speed and whether or not it is evading. Stabilisation gear modifies the cost and M^3 usage of the weapon it is applied to as indicated in the table.

WEAPON STABILISATION

TL	Move at Half Speed or Less: DM to Firing	Move at More than Half Speed or Evading: DM to Firing	Weapon Cost Multiplier	Weapon M^3 & Mass Multiplier
None	–6	–6	–	–
6	–4	–6	1.25	1.3
7	–2	–4	1.25	1.25
8	No DM	–3	1.25	1.2
9	No DM	–2	1.25	1.15
10+	No DM	No DM	1.25	1.1

Weapons Example

We will mount a Light Autocannon on the roof of our van. We will use an external traversing mount, TL 7 stabilisation and add ammunition space for 10 additional attacks. This will modify the M^3, mass and cost as follows:

Weapon M^3:	*1.5*
Traversing mount:	*1.5 x 1.5 = 2.25*
External mount:	*2.25 x 0.2 = 0.45*
Stabilisation:	*0.45 x 1.25 = 0.56*
Ammunition:	*1.5 x 0.4 = 0.6*
Total:	*1.16 M^3*

Weapon mass:	*50*
Traversing mount:	*50 x 1.25 = 62.5*
External mount:	*62.5 x 1 = 62.5*
Stabilisation:	*62.5 x 1.25 = 78.13*
Ammunition:	*50 x 0.4 = 20*
Total:	*98.13 kg*

Weapon cost:	*7,500*
Traversing mount:	*7,500 x 1.5 = 11,250*
External mount:	*11,250 x 1 = 11,250*
Stabilisation:	*11,250 x 1.25 = 14,063*
Total:	*Cr. 14,063*

Decoy Devices

Smoke, decoy and aerosol dischargers can be mounted on any part of a vehicle. Decoys are used to break a sensor lock or distract an incoming guided or smart weapon. Chaff must be deployed as a reaction to self–guided missiles and applies a –2 penalty to the weapon hit roll (not the main attack roll), rules for other devices can be found in the *Central Supply Catalogue*.

Decoy Device	TL	M^3	Cost (Cr.)
Smoke Discharger (single/triple)	5	0.2/0.5	75/150
Flare Launcher (6 uses)	5	0.25	400
Chaff Dispenser (6 uses)	6	0.25	600
Thermal Smoke Discharger (6 uses)	6	0.5	1,000
Multispectral Smoke Discharger (6 uses)	7	0.5	2,000
Anti–Laser Aerosol (6 uses)	8	0.5	500

Laser Sensors

Laser sensors can be installed in any part of a vehicle. Their characteristics at various tech levels are listed in the table. The DM to detect incoming laser fire (roll 8+) is listed in the Detection DM column.

TL	M^3	Cost (Cr.)	Detection DM
8	0.5	1,000	+1
9	0.25	1,500	+2
10	0.2	2,000	+3
11	0.15	2,500	+4
12	0.1	3,000	+5
13	0.1	3,500	+6

Step Five: Optional Components

Optional components include sophisticated electronics, specialist atmospheric gear and anything that is not necessary to the basic vehicle control but enhances the functionality in some way.

Sensor Equipment

A sensor system is needed if a vehicle is to be used at high speeds, otherwise there is a risk of collision or other disaster. Sensors provide a DM to skill checks in the relevant area. For example, a character making a navigation check would receive a bonus if his vehicle had good sensors, as would a pilot trying to thread his way though misty hills. Sensor DMs also apply to attempts to detect hostile vehicles and other targets.

Sensors can be used up to double their range but anything outside the Base Range should not be relied upon for accurate information. Obviously, a crew member may be able to see with the naked eye further than his sensors can provide him with useful information. For example, a driver looking out of the windscreen of his TL 5 ground car with minimal sensors can see more than 250m in good light, but in the dark he will be limited to the range of his sensor system (such as the headlights). The sensor packages are detailed as follows:

None: The vehicle has windows or vision slits but no sensor equipment or visual assistance; not even lights.

Minimal: The vehicle has a minimal set of visual aids or sensors appropriate to its function such as lights and wipers. This is enough for a ground car or primitive aircraft but is not sufficient for most high–speed craft.

Basic: The vehicle has a basic sensor fit including radar and thermal imaging/infrared sensors appropriate to the vehicle's function. Grav craft and similar high–speed vehicles need at least a basic sensor fit if they are to be operated at speed.

Comprehensive: A comprehensive sensor fit includes driver/pilot aids such as terrain–following radar, inertial navigation and automatic piloting/route finding using an external frame of reference such as satellites. Sensors are more powerful and better integrated than the basic version.

Advanced: Advanced sensors include updated and improved versions of earlier sensor packages. All data is linked into a processing unit that presents relevant data in the most efficient manner possible to avoid overloading the crew with information, whilst ensuring that they do not miss anything important.

Excellent: Excellent sensors are another step forward in terms of information gathering, processing and presentation. The system can 'learn' the preferences of a given crew member and cooperate with them in an active manner. The sensors themselves are highly advanced with good resolution and penetrative power. Cooperative data–sharing between vehicles and ground stations allows a composite viewpoint to be created, assisting vehicle crews to see 'behind' obstructions.

Sensor Upgrades

Most sensor packages can use one or more of the following upgrades that modify the range, M^3, mass and cost. Any given sensor package can have only one option that affects range. Minimal sensors cannot be modified. Range assumes no obstacles; a 5,000 km strategic radar can 'see' 5,000 km in a straight line or with the aid of satellites, but cannot see through mountains and planetary curvature.

Hardened sensors are effectively immune to electromagnetic pulses and some jamming. Any attempt to jam hardened sensors is subject to a –2 DM. Hardened sensors are used by exploration vehicles in high–radiation environments as well as military craft.

Compact sensors represent the miniaturisation of technology on more advanced worlds. The Compact upgrade reduces the size and mass of the sensors but increases the cost. This upgrade can be combined with any combination of sensor package and upgrades.

Sensor Package	TL	DM	Base Range (km)	M^3	Mass (kg)	Cost (Cr.)
None	–	0	–	–	–	–
Minimal	4	0	0.25	0.25	0.5	100
Basic	5	+1	1	0.5	1	500
Comprehensive	7	+2	3	1	2	1,000
Advanced	9	+3	5	3	2.5	2,000
Excellent	11	+4	10	5	3	4,000

SENSOR EXAMPLE

We will fit our van with Extended Range Comprehensive sensors. This is calculated as follows:

Sensor range:	*3*
Extended Range:	*3 x 3 = 9*
Total Range:	*9 km*

Sensor M³:	*1*
Extended Range:	*1 x 2 = 2*
Total M³:	*2*

Sensor mass:	*2*
Extended Range:	*2 x 1.5 = 3*
Total mass:	*3 kg*

Sensor cost:	*1,000*
Extended Range:	*1,000 x 2 = 2,000*
Total cost:	*Cr. 2,000*

Sensor Upgrade	TL	Sensor Range Multiplier	Sensor M³ Multiplier	Sensor Mass Multiplier	Sensor Cost Multiplier
Extended Range	5	3	2	1.5	2
Long Range	6	10	3	2	5
Very Long Range	7	50	6	4	20
Extreme Range	8	100	12	6	100
Hardened	6	–	1.5	2	4
Compact	7	–	0.5	0.5	2

Communications Devices

A variety of communication devices are available, with their type and capability based on tech level. Communications equipment is relatively small, but antennae, dishes and other components for larger communications arrays do take up a fair amount of room.

Communications Device	TL	Range (km)	M³	Mass (kg)	Cost (Cr.)
Radio–5	4	5	0	0.25	100
Radio–10	4	10	0	0.5	250
Radio–20	4	20	0.1	1	500
Radio–50	4	50	0.25	2.5	750
Radio–100	4	100	1	10	1,000
Radio–1,000	4	1,000	3	30	5,000
Radio–5	7	5	0	0.1	100
Radio–10	7	10	0	0.25	250
Radio–20	7	20	0.1	0.5	500
Radio–50	7	50	0.25	1	750
Radio–100	7	100	0.5	5	1,000
Radio–1,000	7	1,000	2	15	5,000
Maser–5	7	5	0.5	4	600
Maser–10	7	10	0.75	8	1,500
Maser–20	7	20	1	12	3,000
Maser–50	7	50	2	16	15,000
Maser–100	7	100	5	20	36,000
Maser–1,000	7	1,000	15	40	75,000
Laser–5	8	5	0.5	2	200
Laser –10	8	10	0.75	4	500
Laser –20	8	20	1	6	1,000
Laser –50	8	50	2	8	5,000
Laser –100	8	100	5	10	12,000
Laser –1,000	9	1,000	15	20	25,000
Meson–100	15	100	4	500	1,000,000
Meson–1,000	15	1,000	8	1,500	2,000,000
Meson–10,000	15	10,000	16	3,000	6,000,000
Meson–100,000	15	100,000	24	5,000	15,000,000

COMMUNICATION DEVICE EXAMPLE

We will add a TL 7 Radio–100 communications device. This will use up a further 0.5 M³, add 5 kg, and costs Cr. 1,000.

Underwater Communication

Conventional methods of communication do not work underwater, so alternative means must be employed depending on the technology being used. At TL 4 submarines must be at periscope depth with raised antennae to communicate by radio. At TL 7, communication buoys connected via a cable allows communication from greater depths but the vessel's speed and manoeuvrability is limited.

With the introduction of lasers, submarines are able to communicate with the surface via satellites but this can only be achieved at shallow depths. Further advances at TL 9 allow direct two–way underwater communication over short distances.

Environmental Control Systems

Environmental control becomes possible from TL 6 onwards. Air conditioning can be considered standard and included in the cost of the hull for TL 6+ vehicles. Dedicated environmental control systems, essential for working in adverse atmospheric conditions or underwater, must be purchased separately.

A vehicle that does not have a Sealed hull cannot normally have any environmental controls other than suits or masks worn by the riders. However, it is possible to provide a piped air supply to riders' helmets. This costs half the M^3 and Credit cost but requires that the occupants wear suits and helmets at all times. These must be obtained separately. Notable exceptions to this rule are overpressure and compressor systems.

Environmental integrity is lost for most vehicles when doors, canopies and so forth are opened. This applies to sealed vehicles as well. Most vehicles are too small to carry an airlock. If airlocks are desired they must be bought as additional equipment (see page 21).

Overpressure: This system allows the vehicle's interior to be held at a slightly higher level than outside air pressure. This can only be done in a thin or standard atmosphere. The vehicle's doors and other openings are semi–sealed to keep the pressure differential from causing leaks. An overpressure system will keep atmospheric taints, chemical warfare agents and the like out of the vehicle so long as the doors are not opened. Air is provided from bottles or drawn in and scrubbed before being compressed and used. An overpressure system allows a vehicle to operate in a non–breathable atmosphere such as carbon dioxide. High (dense atmosphere, or liquids outside) or low (very thin or trace atmosphere, or vacuum) external pressures will quickly cause the system to fail.

Basic Life Support: Basic life support provides breathable air and comfortable temperature conditions for the crew. However, conditions are not ideal; After 1 day (24 hours), people living under these conditions begin to become fatigued and a cumulative DM of –1 is applied to all Skill checks each day after the first.

Improved Life Support: Improved life support allows much more comfortable conditions within the vehicle. After 3 days, a –1 DM is applied to all Skill checks every 3 full days.

Advanced Life Support: Advanced life support allows a comfortable environment to be maintained indefinitely.

Hostile Environment Life Support: Allows a vehicle to support its occupants in hostile environments such as high–radiation regions and insidious atmospheres. Other systems will break down quickly under such conditions. Requires a hostile environment adapted (Advanced Sealed) vehicle.

Intake Compressor: This device allows an internal combustion engine to operate in a thin, very thin or even trace atmosphere. In the latter case it requires several hours of compressing gas to allow one hour of operation. The air must contain oxygen for an engine to work. Unlike other systems the volume of the intake compressor is calculated from the power plant M^3, not base M^3.

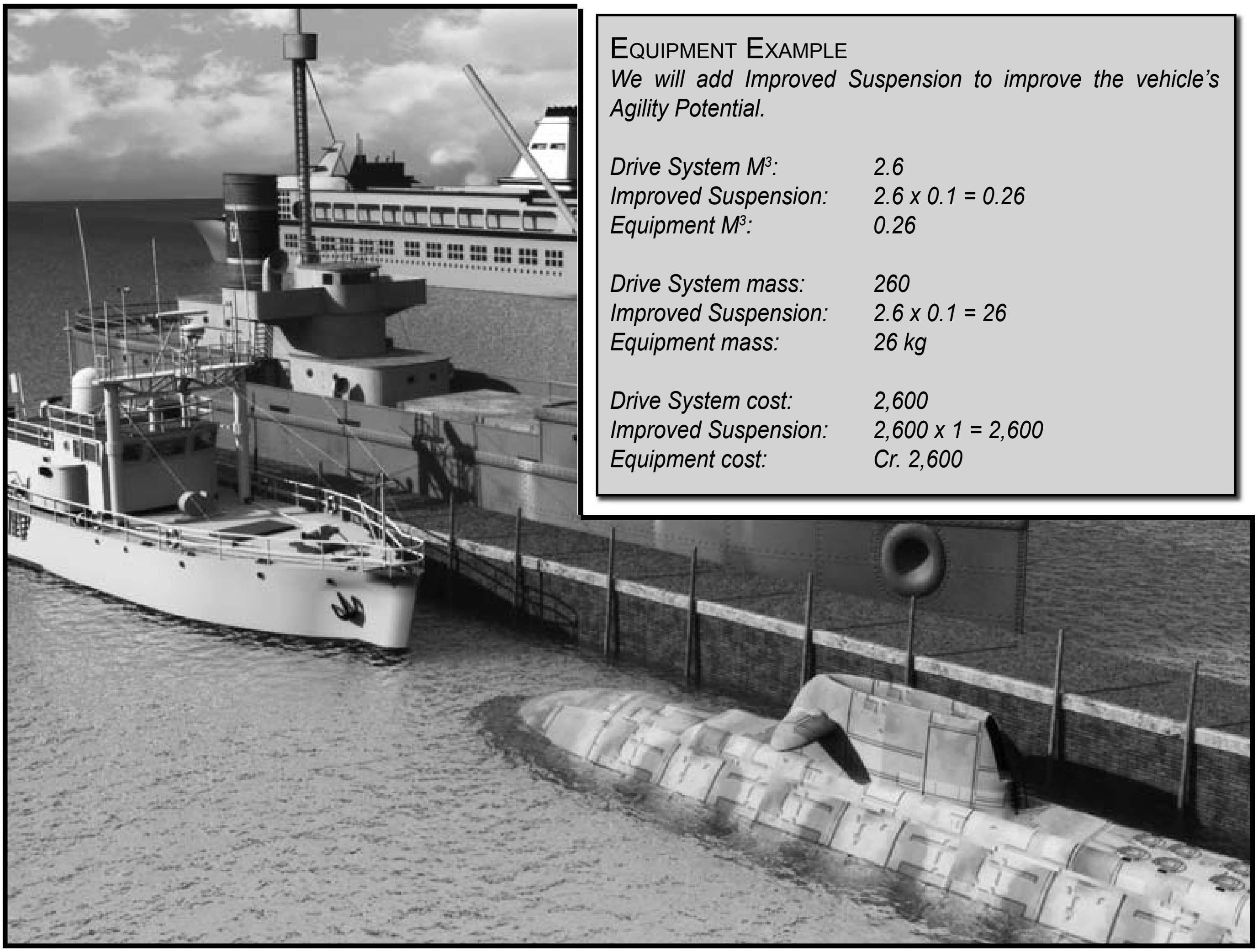
Environmental System	TL	% of Base M^3	Mass per M^3 (kg)	Cost per M^3 (Cr.)
Overpressure	6	1	300	10,000
Life Support, Basic	7	1	200	50,000
Life Support, Improved	8	2	250	125,000
Life Support, Advanced	9	3	350	250,000
Life Support, Hostile Environment	10	5	400	500,000
Intake Compressor	6	5[1]	100	1,500

[1] The intake compressor M^3 is calculated from the power plant M^3, not base M^3.

Miscellaneous Equipment and Upgrades

Additional equipment and upgrades are available as follows:

Equipment	TL	M^3	Mass (kg)	Cost (Cr.)	Details
Airflow Devices	4	0	0.5% of hull mass	100 per Base M^3	Spoilers, wing slats and other airflow devices add 1 Agility Potential for vehicles capable of 100 kph or more.
Airlock	6	6	300	25,000	A simple two person airlock.
Airlock, Decontamination	6	12	500	75,000	A two person airlock that can remove contamination from NBC weapons and atmospheric taint effects.
Controls, Improved	5	0	0	250 per Base M^3	Adds +1 Agility potential
Controls, Excellent	6	1% of Base M^3	1% of hull mass	1,000 per Base M^3	Adds +3 Agility Potential.
Custom Components	Varies	Varies	Varies	Varies	You can add any other components as required. M^3, mass and cost will vary according to the equipment being added.
Drive Wheels	4	25% of drive system M^3	25% of drive system mass	50% of drive system.	Additional drive wheels most commonly used for 4x4 vehicles. For each set added, Multiply Offroad Speed by 1.1.
Drive, Precision	4	25% of drive system M^3	25% of drive system mass	200% of drive system.	All–wheel steering, vectored thrust or similar concepts to increase precision in handling. Adds +3 Agility potential.
Ejector Seat	4	0.5	10	5,000	A single person ejector seat with parachute. It is unsealed and requires a suit or mask.
Ejection Cocoon	7	0.75	65	50,000	A sealed ejection unit with parachute. M^3, mass and cost is per occupant.
Fuel Efficient Engine	—	—	—	Double power plant cost	Power plant uses half of the normal amount of fuel.
Fuel Efficient Engine, Improved	—	—	—	Quadruple power plant cost	Power plant uses a quarter of the normal amount of fuel.
Hydrofoils	6	0	1% of hull mass	1,000 per Base M^3	Foils fitted below the hull multiply Top Speed by 1.25, but only work if vehicle is capable of 30 kph or more.
Performance Tuning	6	0	0	50% of drive system and power plant per 5% speed.	A range of modifications to the engine and drive system. Multiply Top Speed by 1.25
Suspension, Improved	5	10% of drive system M^3	10% of drive system mass	100% of drive system.	Adds +1 Agility Potential.
Suspension, Offroad	6	25% of drive system M^3	25% of drive system mass	200% of drive system.	Available for wheeled and tracked vehicles only. Multiply Top Speed and Cruise Speed by 0.8 and Offroad Speed by 1.2, after all other calculations have been completed. Gives +2 Agility Potential when offroad and –1 in normal conditions.



Equipment Example

We will add Improved Suspension to improve the vehicle's Agility Potential.

Drive System M^3:	*2.6*
Improved Suspension:	*2.6 x 0.1 = 0.26*
Equipment M^3:	*0.26*
Drive System mass:	*260*
Improved Suspension:	*2.6 x 0.1 = 26*
Equipment mass:	*26 kg*
Drive System cost:	*2,600*
Improved Suspension:	*2,600 x 1 = 2,600*
Equipment cost:	*Cr. 2,600*

Step Six: Crew Facilities

A minimum of one operator is needed for any vehicle. Large vehicles usually require additional operators for critical systems (drive system, power plant, weapons, sensors and communications). Operators are not required for systems that are not fundamental to the functioning of the vehicle, such as airlocks, sleeping space, cargo and fuel.

Each operator requires an operator station, which includes seating if applicable. Larger crews can have fewer operating stations with additional work stations as detailed in the Crew Component Table. Work stations use up less M^3 and mass than operating stations, representing the economy of scale for large crews. The mass includes the weight of the operator or passenger.

Operator functions should be assigned using common sense. It can be assumed that some operators have a main task but can handle other odd jobs as necessary. For example, a vehicle with a big power plant that carries a driver and a gunner. We can assume that the crew consists of a driver and a gunner, and that most drive system and power plant functions are controlled by the driver. Either of them can handle the radio. Larger vehicles will often have engineers and technicians, either as dedicated crew or as multifunctional personnel.

Sleeping quarters are not normally required for vehicles capable of travelling for only a short period of less than 24 hours duration. Vehicles with the ability to travel for longer will normally be equipped with sleeping facilities.

Calculating Crew Numbers

The number of crew assigned to a vehicle depends upon its type and the role of the vehicle. The crew numbers are listed for each vehicle type, with different numbers being required if a vehicle is a relatively short ranged aircraft or a long range airliner, for example.

There is an optimum level of crew, the number required for the vehicle to operate successfully. However it is possible to reduce or increase the numbers of crew for each section, although this will give penalty or bonus to any relevant Skill checks a crewmember may have to make. Military crews tend to have larger than normal crews to allow for casualties or so equipment can be more easily manned around the clock with no detriment to performance. Civilian vehicles, on the other hand, tend to have reduced crew numbers, often in an effort to reduce costs.

The optimum number of crew is calculated using the following tables. In the case of hybrid vehicles the crew figure is taken from the worst of the available options (an amphibious land vehicle, for example, might choose crew from either the watercraft or land tables, always taking the worst figure for any given role).

In most cases small, personal ships, aircraft and other vehicles only require a single crew member, a pilot. Other functions (such as maintenance/engineering for a motor car) are done when the vehicle is not underway, most often at a specialist facility (a garage in the case of the car above, for example). this does not forbid additional crew in roles normally filled only in long haul craft, but they are not a requirement.

Military vehicles are slightly different, with a commander required for any vehicle expected to be involved in combat (tanks, armoured cars, APCs and so on).

Skeletal levels of crew can operate machinery and do the required tasks but are considered to fail any skill checks they would be required to make. A skeletal crew level is considered to be one half the number of crew required to achieve a –2 DM to skill checks.

Land Vehicles

		Long Haul (6+ hours)				
Role	**Short Haul**	**+2 DM**	**+1 DM**	**Optimum**	**–1 DM**	**–2 DM**
Drivers	1	2	—	1	—	—
Engineers	0	1 per 50 M^3	1 per 100 M^3	1 per 200 M^3	1 per 400 M^3	1 per 600 M^3
Stokers	1 per 100 M3	1 per 50 M^3	1 per 75 M^3	1 per 100 M^3	1 per 200 M^3	1 per 300 M^3
Communications	0	2	—	1	—	0 (Driver)
Stewards	1 per 200	1 per 50	1 per 75	1 per 100	1 per 250	1 per 500
Sensors	1 per 3 M^3	2 per 3 M^3	—	1 per 3 M^3	—	0 (Driver)

Walkers

		Long Haul (6+ hours)				
Role	**Short Haul**	**+2 DM**	**+1 DM**	**Optimum**	**–1 DM**	**–2 DM**
Drivers	1	1				
Engineers	0	1 per 50 M^3	1 per 100 M^3	1 per 200 M^3	1 per 400 M^3	1 per 600 M^3
Stokers	1 per 100 M3t	1 per 50 M^3	1 per 75 M^3	1 per 100 M^3	1 per 200 M^3	1 per 300 M^3
Communications	0	0		1	2	3
Stewards	1 per 200	1 per 50	1 per 75	1 per 100	1 per 250	1 per 500
Sensors	1 per 3 M^3	2 per 3 M^3	—	1 per 3 M^3	—	0 (Driver)

Grav Vehicles

		Long Haul (6+ hours)				
Role	**Short Haul**	**+2 DM**	**+1 DM**	**Optimum**	**–1 DM**	**–2 DM**
Drivers	1	3	—	2	—	1
Engineers	0	1 per 100 M^3	—	1 per 200 M^3	1 per 400 M^3	1 per 600 M^3
Communications	0	2	—	1	—	0 (Driver)
Stewards	1 per 100	5 per 100	1 per 75	1 per 100	1 per 250	1 per 500
Sensors	1 per 3 M^3	2 per 3 M^3	—	1 per 3 M^3	—	0 (Driver)

AIRCRAFT

		Long Haul (6+ hours)				
Role	**Short Haul**	**+2 DM**	**+1 DM**	**Optimum**	**–1 DM**	**–2 DM**
Pilots	1	2	—	2	—	1
Engineers	0	1 per 100 M^3		1 per 200 M^3	1 per 400 M^3	1 per 600 M^3
Stokers	—	—	1 per 75 M^3	1 per 100 M^3	1 per 200 M3	1 per 300 M^3
Communications	0			1		0 (Driver)
Stewards	1 per 100	3 per 100	1 per 75	1 per 100	1 per 250	1 per 500
Sensors	1 per 3 M^3	2 per 3 M^3	—	1 per 3 M^3	—	0 (Driver)

Aircraft carrying more than eight passengers will require a co-pilot. For commercial aircraft flights at least one steward will be required if there are this many passengers or more.
For bomber aircraft a bombadier/navigator will be required for all vehicles up to TL 7.
A gunner will be required for all turret anti-personnel weapons.

WATERCRAFT

		Long Haul (8+ hours)				
Role	**Short Haul**	**+2 DM**	**+1 DM**	**Optimum**	**–1 DM**	**–2 DM**
Helmsmen	1	—	—	2	—	1
Engineers	0	1 per 100 M^3	—	1 per 200 M^3	1 per 400 M^3	1 per 600 M^3
Stokers	1 per 100 M^3	1 per 50 M^3	1 per 75 M3	1 per 100 M^3	1 per 200 M^3	1 per 300 M^3
Communications	0	—	—	1		0 (Driver)
Stewards	1 per 100	5 per 100	1 per 75	1 per 100	1 per 250	1 per 500
Sensors	1 per 3 M^3	2 per 3 M^3	—	1 per 3 M^3	—	0 (Driver)

Support Crew will be required for long haul ships, with one extra crew per 10 crew members performing other dutires.
Command crew will be required on all vessels, with one extra crew per 10 crew members performing other dutires (round down).
For small vessels the command crew (captain) will normally also be the helmsman. The number of command crew is calculated after any service crew have been added.

WEAPONS

Role	+2 DM	+1 DM	+0 DM	–1 DM	–2 DM
Anti-Personnel Weapon	—	2	1	0*	—
Main Projectile Weapon	—	3	2	1	0*
Main Energy Weapon	—	2	1	0*	—

* Assumes a crew member with a different role will take this position with the corresponding penalty (the commander or radio operator, for example).

Engineers: How many crew are required for the amount of M3 of the Power Plant and Drive System.
Stokers: How many crew are required for the amount of M3 of the Steam Power Plant.
Communications: If no communications are carried then there will be no crew assigned to this role.
Sensors: If no sensors, other than basic level sensors, are carried then there wil be no crew assigned to this role.
Stewards: How many crew are required for the number of passengers.

Fixed weapons in aircraft do not require any extra crewmembers but they receive a –1DM to all skill checks.

For vehicles which have a range of twenty four hours or more the number of crew should be doubled to allow the vessel to be crewed in multiple shifts.

For short haul journeys it is possible to reduce required crew by half but this will incur a –1 DM to all skill checks. Reducing crew to below this level incurs a –2 DM.

Crew Component	M^3 Cost	Mass (kg)	Cost per M^3 (Cr.)	Details
Operator Station	1.25	125	—	One normally needed per person with a job (gunner, pilot, radio operator).
Work Station (large crews)	1.15	115	—	Vehicles with a crew of 10 people or more only require two main operator stations plus one work station for each additional crew member.
Work Station (very large crews)	1.1	110	—	Vehicles with a crew of 50 people or more require 10 operator stations plus one work station for each additional crew member.
Passenger Seat	1	100/20	—	One needed per occupant without a job. Weight of the seat is 20kg, with the passenger it is 100kg.
Sleeping Area (simple)	2 + 1 per occupant	20 per M^3	250	Simple sleeping bunks, most often used for large crews or cheap berths.
Sleeping Area (standard)	3 + 2 per occupant	30 per M^3	500	Larger quarters often used by smaller crews or command staff.
Sleeping Area (luxurious)	50 per occupant	50 per M^3	1,000	Luxurious sleeping facilities are usually available to high paying passengers and select officers on large vehicles.
Utility Area	3 + 2 per occupant	75 per M^3	1,250	Utility areas include galleys, laboratories and workshops. The cost includes basic furniture and equipment as appropriate, but specialist items must be purchased separately.

CREW EXAMPLE

Our van needs two crewmembers, one driver and one gunner using a total of 2.5 M^3 (2 x 1.25 M^3), and adding 300 kg (2 x 150). There is no cost for the operator stations and no other facilities are required.

STEP SEVEN: FINAL CALCULATIONS

Once all the components and equipment have been added to the vehicle, any space remaining of the Total M^3 can be converted to cargo space. There is no cost for cargo space, and the price of racks, shelves and compartments are included in the hull price. One displacement ton (dTon) is equal to 13.5 M^3, so a vehicle with 13.5 M^3 devoted to cargo can carry 1 dTon. Mass is assumed to be 100kg for each M^3 of cargo.

CARGO SPACE EXAMPLE

With our design complete the total M^3 used by the vehicle's components is 13.54, which leaves 18.46 M^3 remaining from the Total M^3 of 32. We will allocate all of this to cargo space, which gives us 1.37 dTons of storage (18.46 ÷ 13.5).

Calculate Agility

Agility is determined by the vehicle's Base Agility (listed in the Drive System Table on page 8), which is modified by its Agility Potential. Total up all Agility Potential points including modifiers from the vehicle's configuration and other design options. The Agility Potential Table gives the modifier to be applied to Base Agility.

Agility Potential	Agility Modifier
–2 or less	–2
–1	–1
0	0
1	+1
2–3	+2
4–6	+3
7–10	+4
11+	+5

AGILITY EXAMPLE

Wheels have a Base Agility of 0 and Improved Suspension gives the van +1 Agility Potential. This gives an Agility bonus of +1, which we add to the Base Agility for a total of 1.

Calculate Mass

Multiply the vehicle's Base M^3 by the Mass per M^3 of the construction material (as listed in the Material Table on page 5). Apply any modifiers from the configuration and qualities, and then add the mass of all other components. The result is the Base Mass of the vehicle in kilograms (kg) and is used to determine the vehicle's speed.

MASS EXAMPLE

The vehicle's mass is calculated as follows:

Base M^3:	*26*
Advanced Composites:	*26 x 90 = 2,340*
Boxed configuration:	*2,340 x 1 = 2,340*
Rugged:	*2,340 x 1.15 = 2,691*
Components:	*2,691 + 3,740 = 6,374*
Total (round up):	*6,431 kg*

Calculate Speed

Multiply the total power output (see page 9) by the Base Speed (listed in the Drive System Table on page 8). This value is then divided by the Total Mass to get the vehicle's power to weight ratio. The power to weight ratio is then multiplied by the Base Speed. Now apply any speed modifiers from the vehicle's configuration and components to get the Top Speed. Partial speed values are rounded down if less than 0.5 or rounded up if equal or greater than 0.5.

Once the Top Speed has been determined, the derived speeds can be calculated as follows:

- Cruising Speed is 75% of the vehicle's top speed.
- The Offroad Speed of a wheeled vehicle is 15% of its top speed, assuming reasonably even ground. Moving more slowly may be advisable however. Some design choices and accessories will alter this value
- Tracked and walker vehicles have an Offroad Speed equal to 50% of their Top Speed, though lower speeds are usually advisable in rough terrain.
- With the right modifications, it is possible to create a vehicle that is faster offroad than on. In this case, take the fastest speed as both its Top Speed and Offroad Speed.
- If the vehicle floats and has a propulsion that will work on water, it may have an amphibious speed. Calculate the amphibious speed as if the vehicle has the Water–Based or Water–Driven drive system, with a Base Speed of 25 kph. Some examples of this can be found in the Hybrid Vehicles chapter.
- Aircraft takeoff speeds vary considerably according to design. Assume a base takeoff speed of 100 kph plus 1 kph per 500 kg of the Total Mass, to a maximum of 300 kph. For vehicles with a Super Streamlined configuration, lower this speed by 10%.
- The Drive System table on page 8 indicated the maximum top speeds allowable for different propulsion methods.

SPEED EXAMPLE

The total power output of the power plant is 64, and the vehicle has a total mass of 6,374 kg. Wheels have a Base Speed of 100 kph, so we can use all these values to calculate our speed as follows:

Power:	*64 x 100 = 6,400*
Power to weight ratio:	*6,400 ÷ 6,431 = 0.995*
Speed:	*0.995 x 100 = 98.86*
Top Speed:	*100 kph*
75% of Top Speed:	*100 x 0.75 = 75*
Cruising Speed:	*75 kph*
15% of Top Speed:	*100 x 0.15 = 15*
Offroad Speed:	*15 kph*

Calculate Ground Pressure

For walkers and land vehicles calculate ground pressure by dividing the weight of the vehicle by the volume in litres (1,000 litres per M^3) of the drive system.

If the total is greater than 2.5 then multiply the speeds for the vehicle by 0.8. If greater than 3 multiply the speeds by 0.6. If greater than 4 then the vehicle will not be able to move across country and its speeds will be multiplied by 0.5. If greater than 5 the vehicle is unable to move except on specially prepared, strengthened ground/roads.

For the purpose of calculating the ground pressure of vehicles using a walker propulsion system double the volume of the drive system.

EXAMPLE VEHICLE

If you have been following the examples, the van we have created has the following statistics:

Armed Van (TL 7)		**M^3**	**Mass (kg)**	**Cost (Cr.)**
Hull	32 M^3 (base 26) Box configuration, Advanced Composites, Rugged, Reflec Coating	—	2,691	22,750
—	Hull: 9 Structure: 11	—	—	—
Drive System	Wheels	2.6	260	2,600
Power Plant	Internal Combustion–7 Power output: 64 Fuel Consumption: 10 per hour	4	300	5,400
Fuel	70 litres (7 hours operation)	0. 07	70	—
Armour	Light Alloys 10 (15 vs. lasers)	0.52	832	1,300
Weapons	Light Autocannon (external dorsal turret, TL7 stabilisation) Ammunition: 20 attacks	1.16	98.13	14,063
Sensors	Comprehensive Extended Range (9 km +2 DM)	2	3	2,000
Communications	Radio 100 km	0.5	5	1,000
Equipment	Improved Suspension	0.26	26	2,600
Crew	2	—	—	—
Operating Stations	2	2.5	300	—
Cargo	1.37 dTons	18.46	1,846	—
Agility	+1 DM	—	—	—
Speed	Cruise: 75 kph Top: 100 kph Offroad: 15 kph	—	—	—
Total	—	32	6,431	51,713
Ground Pressure	2.49	—	—	—

Land Vehicles

Armoured Van

This is an armoured version of the vans commonly used by traders and companies for moderate cargo haulage. The model listed here has additional passenger seats in the rear. These armoured vans are the vehicle of choice for traders and travellers who need require cheap, reliable transport with a little protection.

Armoured Van (TL 7)		M^3	Mass (kg)	Cost (Cr.)
Hull	34 M^3 (base 28), Box configuration, Advanced Composites, Rugged	—	2,898	19,600
—	Hull: 10 Structure: 11	—	—	—
Drive System	Wheels	2.8	280	2,800
Power Plant	Internal Combustion–7 Power output: 64 Fuel Consumption: 10 per hour	4	300	5,400
Fuel	80 litres (8 hours operation)	0.08	80	—
Armour	Advanced Composites 7	0.28	504	1,400
Sensors	Comprehensive Extended Range (9 km +2 DM)	2	3	2,000
Communications	Radio 100 km (TL 7)	0.5	5	1,000
Equipment	Improved Suspension	0.28	28	2,800
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	5	5	500	—
Cargo	1.319 dTons	17.81	1,781	—
Agility	+1 DM	—	—	—
Speed	Cruise: 74 kph Top: 98 kph Offroad: 15 kph	—	—	—
Total	—	34	6,504	35,000
Ground Pressure	2.32	—	—	—

ARTICULATED TRUCK

Articulated trucks are used for large scale cargo haulage. The separate cab and trailer allows for greater turning than a similar sized fixed vehicle.

Articulated Truck (TL 7)		M^3	Mass (kg)	Cost (Cr.)
Hull	108 M^3 (base 90), Box configuration, Advanced Composites	—	8,100	36,000
—	Hull: 28 Structure: 29	—	—	—
Drive System	Wheels	9	900	9,000
Power Plant	Internal Combustion–7 Power output: 200 Fuel Consumption: 16.7 per hour	10	750	13,500
Fuel	400 litres (24 hours operation)	0.4	400	—
Armour	3	0	0	0
Sensors	Basic (1 km +1 DM)	0.5	1	500
Communications	Radio 50 km (TL 7)	0.25	1	750
Equipment	Improved Controls	0	0	22,500
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	1	1	100	—
Cargo	6.341 dTons	85.60	8,560	—
Agility	+1 DM	—	—	—
Speed	Cruise: 79 kph Top: 106 kph Offroad: 16 kph	—	—	—
Total	—	108	18,937	82,250
Ground Pressure	2.10	—	—	—

CHASE CAR

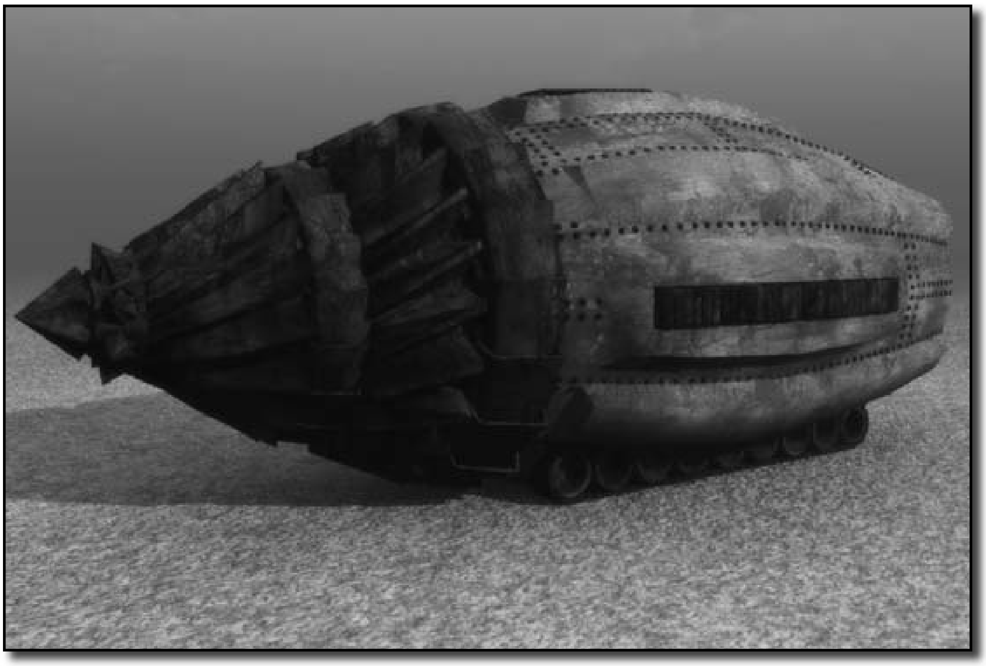
The chase car is used by many law enforcement divisions. Its speed and handling make it ideal for high speed chases and the surveillance equipment ensures that the driver never loses sight of their target.

Chase Car (TL 8)		M^3	Mass (kg)	Cost (Cr.)
Hull	8 M^3, Streamlined configuration, Advanced Composites, Lightweight	—	576	7,800
—	Hull: 2 Structure: 2	—	—	—
Drive System	Wheels	0.8	80	800
Power Plant	Internal Combustion–8 Power output: 27 Fuel Consumption: 3 per hour	1.5	105	2,250
Fuel	30 litres (10 hours operation)	0.03	30	—
Armour	4	0.08	0	0
Sensors	Comprehensive Extended Range (9 km +2 DM)	2	3	2,000
Communications	Radio 100 km (TL 7)	0.5	5	1,000
Equipment	Improved Controls	0	0	2,000
—	Improved Suspension	0.08	8	800
Crew	2 (driver, sensor operator)	—	—	—
Operating Stations	2	2.5	250	—
Cargo	0.038 dTons	0.51	51	—
Agility	+2 DM	—	—	—
Speed	Cruise: 183 kph Top: 244 kph Offroad: 37 kph	—	—	—
Total	—	8	1,108	16,650
Ground Pressure	1.475	—	—	—

DRILLER

This large vehicle is used by colonists to excavate large areas for underground settlements and mining facilities. The drill direction can be independently turned up to 90 degrees in any direction (left, right, up and down) making the driller a versatile tool for excavating tunnel networks as well as large caverns.

Driller (TL 9)		M³	Mass (kg)	Cost (Cr.)
Hull	100 M³, Standard configuration, Advanced Composites, Rugged, Sealed	—	10,350	131,250
—	Hull: 35 Structure: 38	—	—	—
Drive System	Tracks	20	10,000	100,000
Power Plant	Hydrogen Fuel Cell–9 Power output: 750 Fuel Consumption: 12.5 per hour	25	3,125	52,500
Fuel	200 litres (16 hours operation)	0.2	200	—
Armour	4	0	0	0
Sensors	Advanced Long Range (50 km +3 DM)	9	5	10,000
Communications	Laser 50 km	2	8	5,000
Environmental	Life Support, Basic	1	200	50,000
—	Drill (custom)	40	8,000	50,000
Crew	2 (driver, sensor operator)	—	—	—
Operating Stations	2	2.5	250	—
Cargo	0.022 dTons	0.3	30	—
Agility	+1 DM	—	—	—
Speed	Cruise: 63 kph Top: 84 kph Offroad: 42 kph Drilling: 1 kph	—	—	—
Total	—	100	32,168	398,750
Ground Pressure	1.61	—	—	—



DUNE BUGGY

The dune buggy is a lightweight offroad vehicle. Its small size makes it a popular choice with travellers as it provides fast transport for two people and does not take up too much space in the spacecraft. In addition to reconnaissance and exploration, dune buggies are commonly used for recreational purposes as well.

Dune Buggy (TL 5)		M^3	Mass (kg)	Cost (Cr.)
Hull	6 M^3, Standard configuration, Steel, Lightweight	—	480	1,800
—	Hull: 1 Structure: 1	—	—	—
Drive System	Wheels	0.6	60	600
Power Plant	Internal Combustion–5 Power output: 18 Fuel Consumption: 6 per hour	1.5	120	1,500
Fuel	45 litres (8 hours operation)	0.05	45	—
Armour	3	0	0	0
Sensors	Minimal (0.25 km +0 DM)	0.25	0.5	100
Communications	Radio 10 km (TL 5)	0	0.5	250
Equipment	Offroad Suspension	0.15	15	1,200
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	1	1	100	—
Cargo	0.044 dTons	1.2	120	—
Agility	–1 DM (+2 DM offroad)	—	—	—
Speed	Cruise: 101 kph Top: 135 kph Offroad: 30 kph	—	—	—
Total	—	6	1,066	5,450
Ground Pressure	1.78	—	—	—

ELECTRIC TRAIN

The electric train is a common sight on most worlds with a Technology Level of five to eight. Not only is the train a good method of public transport between cities and settlements but trains are an economical and efficient means of transporting cargo. The train detailed below has two stats for passengers and cargo representing a passenger train and a freight train respectively.

Electric Train (TL 7)		M³	Mass (kg)	Cost (Cr.)
Hull	600 M³ (base 500), Box configuration, Light Alloys	—	40,000	100,000
—	Hull: 138 Structure: 138	—	—	—
Drive System	Wheels	50	5,000	50,000
Power Plant	Internal Combustion–7 Power output: 2,880 Fuel Consumption: 150 per hour	120	9,000	162,000
Fuel	2,400 litres (16 hours operation)	2.4	2,400	—
Armour	2	0	0	0
Sensors	Minimal (0.25 km +0 DM)	0.25	0.5	100
Communications	Radio 50 km (TL 7)	0.25	1	750
Crew	2 (driver, steward)	—	—	—
Operating Stations	2	2.5	250	—
Passengers (Passenger)	405	405	40,500	—
Passengers (Freight)	0	0	0	—
Cargo (Passenger)	1.452 dTons	19.6	1,960	—
Cargo (Freight)	31.452 dTons	424.6	42,460	—
Agility	+0 DM	—	—	—
Speed	Cruise: 218 kph Top: 291 kph	—	—	—
Total	—	600	99,112	312,850
Ground Pressure	1.98	—	—	—

GROUND CAR

Once the internal combustion engine becomes a viable power source, cars become a common sight on most worlds. Early versions of the car are slow and unwieldy but speed and handling improves greatly with later technologies. Three variations are presented here for TL 5, 6 and 7.

Ground Car (TL 5)		M³	Mass (kg)	Cost (Cr.)
Hull	9 M³, Standard configuration, Steel	—	900	1,800
—	Hull: 2 Structure: 3	—	—	—
Drive System	Wheels	0.9	90	900
Power Plant	Internal Combustion–5 Power output: 24 Fuel Consumption: 8 per hour	2	160	2,000
Fuel	48 litres (6 hours operation)	0.05	48	—
Armour	3	0	0	0
Sensors	Minimal (0.25 km +0 DM)	0.25	0.5	100
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	3	3	300	—
Cargo	0.115 dTons	1.55	155	—
Agility	+0 DM	—	—	—
Speed	Cruise: 101 kph Top: 135 kph Offroad: 20 kph	—	—	—
Total	—	9	1,779	4,800
Ground Pressure	1.98	—	—	—

Ground Car (TL 6)		M³	Mass (kg)	Cost (Cr.)
Hull	8 M³, Standard configuration, Light Alloys	—	640	2,000
—	Hull: 3 Structure: 3	—	—	—
Drive System	Wheels	0.8	80	800
Power Plant	Internal Combustion–6 Power output: 21 Fuel Consumption: 4.5 per hour	1.5	112.5	1,800
Fuel	36 litres (8 hours operation)	0.04	36	—
Armour	2	0	0	0
Sensors	Minimal (0.25 km +0 DM)	0.25	0.5	100
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	3	3	300	—
Cargo	0.086 dTons	1.16	116	—
Agility	+0 DM	—	—	—
Speed	Cruise: 112 kph Top: 149 kph Offroad: 22 kph	—	—	—
Total	—	8	1,410	4,700
Ground Pressure	1.76	—	—	—

Ground Car (TL 7)		M³	Mass (kg)	Cost (Cr.)
Hull	9 M³, Standard configuration, Advanced Composites	—	810	4,500
—	Hull: 3 Structure: 4	—	—	—
Drive System	Wheels	0.9	90	900
Power Plant	Internal Combustion–7 Power output: 32 Fuel Consumption: 5 per hour	2	150	2,700
Fuel	40 litres (8 hours operation)	0.04	40	—
Armour	4	0	0	0
Sensors	Minimal (0.25 km +0 DM)	0.25	0.5	100
Equipment	Improved Controls	0	0	2,250
—	Drive Wheels (4x4)	0.23	22.5	450
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	3	3	300	—
Cargo	0.985 dTons	1.33	133	—
Agility	+1 DM	—	—	—
Speed	Cruise: 144 kph Top: 192 kph Offroad: 32 kph	—	—	—
Total	—	9	1,671	10,900
Ground Pressure	1.86	—	—	—

HALF TRACK ATV

This vehicle has two wheels at the front and half length tracks at the rear; the combination of drive systems provides the advantages of both. The half track is used by explorers and travellers alike with space for passengers and cargo.

Half Track ATV (TL 7)		M³	Mass (kg)	Cost (Cr.)
Hull	14 M³, Standard configuration, Advanced Composites, Rugged	—	1,449	12,250
—	Hull: 5 Structure: 6	—	—	—
Drive System	Tracks	2.8	1,400	14,000
Equipment	Wheels	0.7	70	700
Power Plant	Internal Combustion–7 Power output: 40 Fuel Consumption: 6.25 per hour	2.5	187.5	3,375
Fuel	50 litres (8 hours operation)	0.05	50	—
Armour	4	0	0	0
Sensors	Basic (1 km +1 DM)	0.5	1	500
Communications	Radio 50 km (TL 7)	0.25	1	750
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	4	4	400	—
Cargo	0.144 dTons	1.95	195	—
Agility	+1 DM	—	—	—
Speed	Cruise: 53 kph Top: 70 kph Offroad: 35 kph	—	—	—
Total	—	14	3,879	31,575
Ground Pressure	1.11	—	—	—

JET CAR

The jet car is not as common as other road vehicles and is usually found on worlds where the internal combustion engine is not used. Jet cars are incredibly fast but are more expensive to run than those powered by more conventional means.

Jet Car (TL 8)		M³	Mass (kg)	Cost (Cr.)
Hull	7 M³, Streamlined configuration, Advanced Composites	—	630	3,500
—	Hull: 2 Structure: 3	—	—	—
Drive System	Wheels	0.7	70	700
Power Plant	Turbine–8 Power output: 39 Fuel Consumption: 13.5 per hour	1.5	135	6,375
Fuel	81 litres (6 hours operation)	0.08	81	—
Armour	4	0	0	0
Sensors	Comprehensive (3 km +2 DM)	1	2	1,000
Equipment	Airflow Device: Spoiler	0	3.15	700
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	1	1	100	—
Cargo	0.109 dTons	1.47	147	—
Agility	+1 DM	—	—	—
Speed	Cruise: 226 kph Top: 302 kph Offroad: 45 kph	—	—	—
Total	—	7	1,293	12,275
Ground Pressure	1.85	—	—	—

LAND YACHT

The land yacht is one of the earliest wheeled vehicles that uses wind power to provide propulsion. Comprising a lightweight frame and a single mast, the land yacht uses the same principles as sailing ships. Although land yachts can achieve reasonable speeds, their dependence on the wind means that they are usually only found in regions with consistent weather conditions, such as coastal areas.

Land Yacht (TL 1)		M³	Mass (kg)	Cost (Cr.)
Hull	4 M³, Open configuration, Wood/Organic Materials	—	306	400
—	Hull: 1 Structure: 1	—	—	—
Drive System	Wheels	0.4	40	400
Power Plant	Wind Power Power output: 4 Fuel Consumption: N/A	1	20	50
Armour	1	0	0	0
Crew	1	—	—	—
Operating Stations	1	0.63	125	—
Cargo	0.146 dTons	1.97	197	—
Agility	+0 DM	—	—	—
Speed	Cruise: 44 kph Top: 58 kph Offroad: 9 kph	—	—	—
Total	—	4	688	850
Ground Pressure	1.72	—	—	—

MOTORCYCLE

The motorcycle is popular on many worlds for its speed and versatility compared to larger vehicles. Some travellers carry motorcycles as a quick means of planetary transport since they use up little storage space onboard the ship.

Motorcycle (TL 5)		M^3	Mass (kg)	Cost (Cr.)
Hull	2 M^3, Cycle configuration, Steel	—	150	200
—	Hull: 1 Structure: 1	—	—	—
Drive System	Wheels	0.2	20	200
Power Plant	Internal Combustion–5 Power output: 6 Fuel Consumption: 2 per hour	0.5	40	500
Fuel	14 litres (7 hours operation)	0.01	14	—
Armour	3	0	0	0
Sensors	Minimal (0.25 km +0 DM)	0.25	0.5	100
Crew	1	—	—	—
Operating Stations	1	0.31	125	—
Passengers	1	0.25	100	—
Agility	+2 DM	—	—	—
Speed	Cruise: 100 kph Top: 133 kph Offroad: 20 kph	—	—	—
Total	—	1.52	450	1,000
Ground Pressure	2.25	—	—	—

Motorcycle (TL 7)		M³	Mass (kg)	Cost (Cr.)
Hull	2 M³, Cycle configuration, Light Alloys	—	120	250
—	Hull: 1 Structure: 1	—	—	—
Drive System	Wheels	0.2	20	200
Power Plant	Internal Combustion–7 Power output: 12 Fuel Consumption: 1.875 per hour	0.75	56.25	1,013
Fuel	15 litres (8 hours operation)	0.02	15	—
Armour	2	0	0	0
Sensors	Minimal (0.25 km +0 DM)	0.25	0.5	100
Crew	1	—	—	—
Operating Stations	1	0.31	125	—
Passengers	1	0.25	100	—
Agility	+2 DM	—	—	—
Speed	Cruise: 206 kph Top: 275 kph Offroad: 41kph	—	—	—
Total	—	1.78	437	1,563
Ground Pressure	2.19	—	—	—

MPV

The Multi Purpose Vehicle (MPV) is a workhorse vehicle that is popular on many worlds where grav technology is not available. Used by farmers, explorers and even traders, the MPV is designed for both offroad use and on. These vehicles are similar in size to a van but the rear compartment is able to accommodate six passengers in addition to the two passenger seats in the front. The rear seats are of simple design and the space can easily be used for cargo if required.

MPV (TL 6)		M³	Mass (kg)	Cost (Cr.)
Hull	17 M³ (base 14), Box configuration, Light Alloys, Rugged	—	1,288	4,900
—	Hull: 4 Structure: 6	—	—	—
Drive System	Wheels	1.4	140	1,400
Power Plant	Internal Combustion–6 Power output: 42 Fuel Consumption: 9 per hour	3	225	3,600
Fuel	81 litres (9 hours operation)	0.08	81	—
Armour	2	0	0	0
Sensors	Basic (1 km +1 DM)	0.5	1	500
Communications	Radio 50 km (TL 4)	0.25	2.5	750
Equipment	Drive Wheels (4x4)	0.35	35	700
—	Improved Suspension	0.14	14	1,400
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	8	8	800	—
Cargo	0.124 dTons	2.03	203	—
Agility	+1 DM	—	—	—
Speed	Cruise: 108 kph Top: 144 kph Offroad: 22 kph	—	—	—
Total	—	17	2,915	13,250
Ground Pressure	2.08	—	—	—

OFFROAD TRUCK

Offroad trucks are robust and designed exclusively for offroad conditions, making them more difficult to control when on smoother driving surfaces. These vehicles have a small cab and an open–topped rear cargo area (called the 'bed'). Although the bed is not designed for passengers, up to six people can ride in the back but the ride will be rather uncomfortable.

Offroad Truck (TL 7)		M³	Mass (kg)	Cost (Cr.)
Hull	17 M³ (base 14), Box configuration, Advanced Composites, Rugged	—	1,449	9,800
—	Hull: 5 Structure: 6	—	—	—
Drive System	Wheels	1.4	140	1,400
Power Plant	Internal Combustion–7 Power output: 32 Fuel Consumption: 5 per hour	2	150	2,700
Fuel	50 litres (10 hours operation)	0.05	50	—
Armour	3	0	0	0
Sensors	Basic (1 km +1 DM)	0.5	1	500
Equipment	Improved Controls	0	0	3,500
—	Drive Wheels (4x4)	0.35	35	700
—	Offroad Suspension	0.35	35	2,800
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	2	2	200	—
Cargo	0.674 dTons	9.1	910	—
Agility	0 DM (+2 DM offroad)	—	—	—
Speed	Cruise: 67 kph Top: 83 kph Offroad: 20 kph	—	—	—
Total	—	17	3,095	21,400
Ground Pressure	2.21	—	—	—

OFFROADER

The offroader is a robust vehicle which, as its name suggests, is designed for offroad use. With four seats and a small cargo area at the back, the offroader is commonly used by colonists to transport and explore over rough terrain.

Offroader (TL 7)		**M³**	**Mass (kg)**	**Cost (Cr.)**
Hull	8 M³, Open configuration, Light Alloys, Rugged	—	662.4	3,500
—	Hull: 3 Structure: 3	—	—	—
Drive System	Wheels	0.8	80	800
Power Plant	Internal Combustion–7 Power output: 24 Fuel Consumption: 3.75 per hour	1.5	112.5	2,025
Fuel	15 litres (4 hours operation)	0.02	15	—
Armour	2	0	0	0
Sensors	Comprehensive Extended Range (9 km +2 DM)	2	3	2,000
Equipment	Improved Controls	0	0	2,000
—	Drive Wheels (4x4)	0.2	20	400
—	Offroad Suspension	0.2	20	1,600
Crew	1	—	—	—
Operating Stations	1	0.63	125	—
Passengers	3	1.5	300	—
Cargo	0.085 dTons	1.15	115	—
Agility	0 DM (+2 DM offroad)	—	—	—
Speed	Cruise: 99 kph Top: 132 kph Offroad: 33 kph	—	—	—
Total	—	8	1,453	12,325
Ground Pressure	1.82	—	—	—

PICKUP TRUCK

Pickup trucks have a small cab and an open–topped rear cargo area (often called the 'bed') for easy access. Pickup trucks may not be as versatile as an MPV or offroad truck, but they are much faster on the road making them popular for carrying tools and equipment where offroad capabilities are not required. Although the bed is not designed for passengers, up to six passengers can ride in the back.

Pickup Truck (TL 6)		M^3	Mass (kg)	Cost (Cr.)
Hull	12 M^3 (base 10), Box configuration, Light Alloys	—	800	2,000
—	Hull: 3 Structure: 4	—	—	—
Drive System	Wheels	1	100	1,000
Power Plant	Internal Combustion–6 Power output: 21 Fuel Consumption: 4.5 per hour	1.5	112.5	1,800
Fuel	32 litres (7 hours operation)	0.03	32	—
Armour	2	0	0	0
Sensors	Minimal (0.25 km +0 DM)	0.25	0.5	100
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	2	2	200	—
Cargo	0.442 dTons	5.97	597	—
Agility	+0 DM	—	—	—
Speed	Cruise: 80 kph Top: 107 kph Offroad: 16 kph	—	—	—
Total	—	12	1,967	4,900
Ground Pressure	1.97	—	—	—

PRISONER TRANSPORT

The prisoner transport is a large armoured van used by law enforcement for transporting groups of prisoners. The wide cab has room for two passengers who can monitor the prisoners in the rear compartment.

Prisoner Transport (TL 6)		M^3	Mass (kg)	Cost (Cr.)
Hull	20 M^3 (base 16), Box configuration, Light Alloys, Rugged	—	1,472	5,600
—	Hull: 4 Structure: 5	—	—	—
Drive System	Wheels	1.6	160	1,600
Power Plant	Internal Combustion–6 Power output: 56 Fuel Consumption: 12 per hour	4	300	4,800
Fuel	96 litres (8 hours operation)	0.1	96	—
Armour	Light Alloys 8	0.32	512	800
Sensors	Minimum (0.25 km +0 DM)	0.25	0.5	100
Communications	Radio 50 km (TL 4)	0.25	2.5	750
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	12 (2 in cab, 10 secured in the rear compartment)	12	1,200	—
Cargo	0.017 dTons	0.23	23	—
Agility	+0 DM	—	—	—
Speed	Cruise: 108 kph Top: 144 kph Offroad: 22 kph	—	—	—
Total	—	20	3,891	13,650
Ground Pressure	2.43	—	—	—

QUAD BIKE

The quad bike is another common choice for travellers who require a small but versatile land vehicle. The quad bike is open–topped with room for a small amount of cargo and one passenger who sits directly behind the driver.

Quad Bike (TL 6)		M³	Mass (kg)	Cost (Cr.)
Hull	3 M³, Cycle configuration, Light Alloys	—	180	375
—	Hull: 2 Structure: 2	—	—	—
Drive System	Wheels	0.3	30	300
Power Plant	Internal Combustion–6 Power output: 7 Fuel Consumption: 1.5 per hour	0.5	37.5	600
Fuel	12 litres (8 hours operation)	0.01	12	—
Armour	2	0	0	0
Sensors	Minimum (0.25 km +0 DM)	0.25	0.5	100
Communications	Radio 50 km (TL 4)	0.25	2.5	750
Equipment	Drive Wheels (4x4)	0.08	7.5	150
—	Offroad Suspension	0.08	7.5	600
Crew	1	—	—	—
Operating Stations	1	0.31	125	—
Passengers	1	0.25	100	—
Cargo	0.072 dTons	0.97	97	—
Agility	+2 DM	—	—	—
Speed	Cruise: 70 kph Top: 93 kph Offroad: 23 kph	—	—	—
Total	—	3	600	2,875
Ground Pressure	2	—	—	—

RIOT TANK

The riot tank is used by law enforcement to control unruly crowds and doubles as an Armoured Personnel Carrier (APC) to safely transport police and armed units into dangerous situations. The water cannon does not deal any damage and will hit 1 + Effect people; anyone hit by it must make an Endurance check to avoid being knocked over.

Riot Tank (TL 7)		M³	Mass (kg)	Cost (Cr.)
Hull	22 M³ (base 18), Box configuration, Advanced Composites	—	1,620	7,200
—	Hull: 5 Structure: 7	—	—	—
Drive System	Wheels	1.8	180	1,800
Power Plant	Internal Combustion–7 Power output: 64 Fuel Consumption: 10 per hour	4	300	5,400
Fuel	100 litres (10 hours operation)	0.1	100	—
Armour	Advanced Composites 11	0.36	648	1,800
Weapons	Water Cannon (external dorsal turret) Ammunition: 20 attacks	0.21	25.2	2,100
Sensors	Basic (1 km +1 DM)	0.5	1	500
Communications	Radio 10 km (TL 7)	0	0.25	250
Crew	2 (driver, gunner)	—	—	—
Operating Stations	2	2.5	250	—
Passengers	12	12	1,200	—
Cargo	0.04 dTons	0.53	53	—
Agility	+0 DM	—	—	—
Speed	Cruise: 110 kph Top: 146 kph Offroad: 22 kph	—	—	—
Total	—	18	4,377	19,050
Ground Pressure	2.43	—	—	—

SNOWCAT

The snowcat is a tracked vehicle designed for use in cold and snowy conditions. Snowcats can carry up to six people and provides life support for cold and thin atmospheres.

Snowcat (TL 7)		M^3	Mass (kg)	Cost (Cr.)
Hull	36 M^3 (base 30), Box configuration, Advanced Composites, Rugged, Sealed	—	3,105	31,500
—	Hull: 10 Structure: 13	—	—	—
Drive System	Tracks	6	3,000	30,000
Power Plant	Internal Combustion–7 Power output: 200 Fuel Consumption: 16.7 per hour	10	750	13,500
Fuel	150 litres (9 hours operation)	0.15	150	—
Armour	2	0	0	0
Sensors	Comprehensive (3 km +2 DM)	1	2	1,000
Communications	Radio 1,000 km (TL 7)	2	15	5,000
Environmental	Life Support, Basic	0	60	15,000
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	6	6	600	—
Cargo	0.711 dTons	9.6	960	—
Agility	+1 DM	—	—	—
Speed	Cruise: 62 kph Top: 82 kph Offroad: 41 kph	—	—	—
Total	—	36	8,767	96,000
Ground Pressure	1.46	—	—	—

SNOWMOBILE

A snowmobile is a small open–topped vehicle designed to operate on the snow. The vehicle is driven by tracks and has a single or double ski at the front for steering.

Snowmobile (TL 7)		M^3	Mass (kg)	Cost (Cr.)
Hull	3 M^3, Cycle configuration, Light Alloys	—	180	375
—	Hull: 1 Structure: 1	—	—	—
Drive System	Tracks	0.6	300	3,000
Power Plant	Internal Combustion–7 Power output: 24 Fuel Consumption: 3.75 per hour	1.5	112.5	2,025
Fuel	30 litres (8 hours operation)	0.03	30	—
Armour	2	0	0	0
Sensors	Minimal (0.25 km +0 DM)	0.25	0.5	100
Crew	1	—	—	—
Operating Stations	1	0.31	125	—
Passengers	1	0.25	100	—
Agility	+1 DM	—	—	—
Speed	Cruise: 76 kph Top: 102 kph Offroad: 51 kph	—	—	—
Total	—	2.94	848	5,500
Ground Pressure	1.41	—	—	—

SOLAR CAR

Although a solar powered car has obvious limitations, they can be found on worlds with high solar exposure or fuel limitations due to supply or environmental considerations. Solar cars are not as fast as vehicles that use conventional power plants but they are a good alternative, especially for city driving and short range travel.

Solar Car (TL 8)		M³	Mass (kg)	Cost (Cr.)
Hull	8 M³, Standard configuration, Light Alloys, Lightweight	—	512	3,000
—	Hull: 2 Structure: 2	—	—	—
Drive System	Wheels	0.8	80	800
Power Plant	Solar–8 Power output: 10 Fuel Consumption: N/A	2.5	50	3,000
Armour	2	0	0	0
Sensors	Minimal (0.25 km +0 DM)	0.25	0.5	100
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	3	3	300	—
Cargo	0.015 dTons	0.2	20	—
Agility	+0 DM	—	—	—
Speed	Cruise: 69 kph Top: 92 kph Offroad: 14 kph	—	—	—
Total	—	7	1,088	6,900
Ground Pressure	1.36	—	—	—

SPORTS CAR

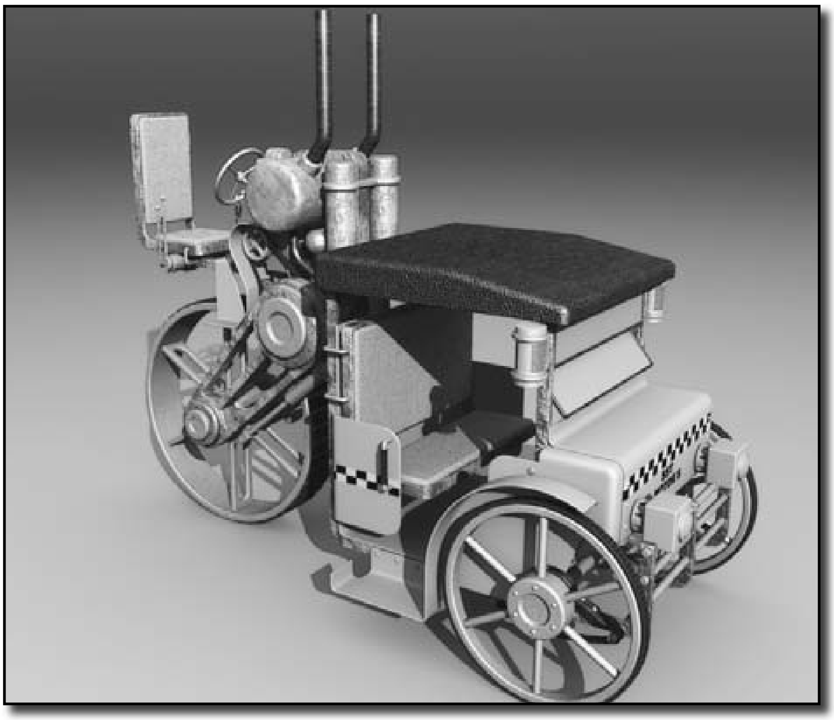
Sports cars are designed to look good and drive fast. On many worlds the sports car is little more than a status symbol for the wealthy, but lower social classes often find a way to purchase these vehicles to race or simply for the thrill of driving fast.

Sports Car (TL 8)		M³	Mass (kg)	Cost (Cr.)
Hull	5 M³, Streamlined configuration, Advanced Composites	—	400	3,250
—	Hull: 2 Structure: 3	—	—	—
Drive System	Wheels	0.5	50	500
Power Plant	Internal Combustion–8 Power output: 18 Fuel Consumption: 2 per hour	1	70	1,500
Fuel	20 litres (10 hours operation)	0.02	20	—
Armour	4	0	0	0
Sensors	Basic (1 km +1 DM)	0. 5	1	500
Equipment	Airflow Device: Spoiler	0	2	500
—	Improved Controls	0	0	1,250
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	1	1	100	—
Cargo	0.054 dTons	0.73	73	—
Agility	+2 DM	—	—	—
Speed	Cruise: 161 kph Top: 214 kph Offroad: 32 kph	—	—	—
Total	—	5	841	7,500
Ground Pressure	1.68	—	—	—

STEAM CAR

Steam cars are not commonly seen except on some low–tech worlds them where other forms of transport are not available or practical. These vehicles are slow and noisy, making them less than ideal.

Steam Car (TL 3)		M³	Mass (kg)	Cost (Cr.)
Hull	8 M³, Standard configuration, Iron	—	880	1,200
—	Hull: 2 Structure: 2	—	—	—
Drive System	Wheels	0.8	80	800
Power Plant	Steam–3 Power output: 8 Fuel Consumption: 10 per hour	2	400	200
Fuel	50 litres (5 hours operation)	0.05	50	—
Armour	2	0	0	0
Sensors	None (0 km +0 DM)	0	0	0
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	2	2	200	—
Cargo	0.147 dTons	1.90	190	—
Agility	+0 DM	—	—	—
Speed	Cruise: 31 kph Top: 42 kph Offroad: 6 kph	—	—	—
Total	—	8	1,925	2,200
Ground Pressure	2.41	—	—	—



STEAM TRAIN

On low–tech worlds, the steam train is often a widely used method of transport for both passengers and cargo. On worlds with this level of technology, trains are usually the only means of travelling long distances over land. The train detailed below has two stats for passengers and cargo representing a passenger train and a freight train respectively.

Steam Train (TL 4)		**M³**	**Mass (kg)**	**Cost (Cr.)**
Hull	312 M³ (base 260), Box configuration, Iron	—	28,600	31,200
—	Hull: 52 Structure: 52	—	—	—
Drive System	Wheels	26	2,600	26,000
Power Plant	Steam–4 Power output: 600 Fuel Consumption: 266.7 per hour	80	12,000	20,000
Fuel	2,000 litres (7.5 hours operation)	2	2,000	—
Armour	2	0	0	0
Sensors	Minimal (0.25 km +0 DM)	0.25	0.5	100
Crew	3 (driver, stoker, steward)	—	—	—
Operating Stations	3	3.75	370	—
Passengers (Passenger)	180	180	18,000	—
Passengers (Freight)	0	0	0	—
Cargo (Passenger)	1.482 dTons	20	2,000	—
Cargo (Freight)	14.815 dTons	200	20,000	—
Agility	+0 DM	—	—	—
Speed	Cruise: 55 kph Top: 74 kph	—	—	—
Total	—	312	65,571	77,300
Ground Pressure	2.56	—	—	—

SUV

The Sports Utility Vehicle (SUV) is a large four wheeled drive car that can seat eight people in comfort. The offroad capability and passenger capacity makes the SUV a popular choice for traveller and mercenary groups.

SUV (TL 8)		M^3	Mass (kg)	Cost (Cr.)
Hull	14 M^3 (base 11), Box configuration, Light Alloys	—	880	2,200
—	Hull: 3 Structure: 4	—	—	—
Drive System	Wheels	1.1	110	1,100
Power Plant	Hydrogen Fuel Cell–8 Power output: 36 Fuel Consumption: 2 per hour	2	300	3,600
Fuel	40 litres (20 hours operation)	0.04	40	—
Armour	2	0	0	0
Sensors	Basic Compact (1 km +1 DM)	0.25	0.5	1,000
Equipment	Drive Wheels (4x4)	0.28	27.5	550
—	Improved Suspension	0.11	11	1,100
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	7	7	700	—
Cargo	0.146 dTons	1.97	197	—
Agility	+1 DM	—	—	—
Speed	Cruise: 113 kph Top: 151 kph Offroad: 23 kph	—	—	—
Total	—	14	2,391	9,550
Ground Pressure	2.17	—	—	—

TRAILER

Trailers are universally designed to be towed by most small vehicles (such as cars, quads, MUVs, SUVs, and vans) for carrying small amounts of cargo. Please refer to page 12 for details on using trailers.

Trailer (TL 5)		M^3	Mass (kg)	Cost (Cr.)
Hull	3 M^3, Open configuration, Steel	—	270	600
—	Hull: 1 Structure: 1	—	—	—
Drive System	Wheels	0.3	30	300
Armour	3	0	0	0
Cargo	0.2 dTons	2.70	270	—
Agility	–1 DM to vehicle	—	—	—
Total	—	3	570	900
Ground Pressure	1.9	—	—	—

TEV

The Tracked Exploration Vehicle (TEV) can house up to eight people and the life support systems can maintain a comfortable environment indefinitely. Although expensive, this vehicle is often the best choice for scouts and explorers who can travel great distances without the need for additional support.

TEV (TL 8)		M^3	Mass (kg)	Cost (Cr.)
Hull	60 M^3 (base 50), Box configuration, Advanced Composites, Rugged, Sealed	—	5,175	52,500
—	Hull: 17 Structure: 20	—	—	—
Drive System	Tracks	10	5,000	50,000
Power Plant	Nuclear Fission–8 Power output: 200 Fuel Consumption: N/A	10	2,000	80,000
Armour	3	0	0	0
Sensors	Comprehensive Long Range (30 km +2 DM)	3	4	5,000
Communications	Radio 100 km (TL 7)	0.5	5	1,000
Environmental	Life Support, Improved	0	150	125,000
Crew	2 (driver, sensor operator)	—	—	—
Operating Stations	2	2.5	250	—
Passengers	6	6	600	—
Sleeping Areas	Simple (8 occupants)	10	200	2,500
Utility Areas	1 (4 occupants)	11	825	13,750
Cargo	0.519 dTons	7	700	—
Agility	+1 DM	—	—	—
Speed (full load)	Cruise: 36 kph Top: 48 kph Offroad: 24 kph	—	—	—
Total	—	60	14,909	329,750
Ground Pressure	1.49	—	—	—

VAN

The vehicle of choice for many businesses and merchants, the van can travel at moderate speeds and provides a good amount of enclosed cargo space. Variants are also available that sacrifice cargo space for additional seats.

Van (TL 5)		M³	Mass (kg)	Cost (Cr.)
Hull	24 M³ (base 20), Box configuration, Steel	—	2,000	3,200
—	Hull: 5 Structure: 5	—	—	—
Drive System	Wheels	2	200	2,000
Power Plant	Internal Combustion–5 Power output: 36 Fuel Consumption: 12 per hour	3	240	3,000
Fuel	60 litres (5 hours operation)	0.06	60	—
Armour	2	0	0	0
Sensors	Minimal (0.25 km +0 DM)	0.25	0.5	100
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	1	1	100	—
Cargo	1.218 dTons	16.44	1,644	—
Agility	+0 DM	—	—	—
Speed (full load)	Cruise: 62 kph Top: 82 kph Offroad: 12 kph	—	—	—
Total	—	24	4,370	8,300
Ground Pressure	2.19	—	—	—

Van (TL 7)		M³	Mass (kg)	Cost (Cr.)
Hull	24 M³ (base 20), Box configuration, Advanced Composites	—	1,800	8,000
—	Hull: 5 Structure: 5	—	—	—
Drive System	Wheels	2	200	2,000
Power Plant	Internal Combustion–7 Power output: 48 Fuel Consumption: 7.5 per hour	3	225	4,050
Fuel	60 litres (8 hours operation)	0.06	60	—
Armour	3	0	0	0
Sensors	Basic (1 km +1 DM)	0.5	1	500
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	6	6	600	—
Cargo	0.829 dTons	11.19	1,119	—
Agility	+0 DM	—	—	—
Speed	Cruise: 87 kph Top: 116 kph Offroad: 17 kph	—	—	—
Total	—	24	4,130	14,550
Ground Pressure	2.07	—	—	—

WAGON

One of the very first wheeled vehicles, the wagon is a common sight on many primitive worlds. Wagons are drawn by pack animals (such as horses and oxen) with an open space at the front for the driver and up to two passengers. Most of the vehicle is covered and used for cargo space but it is not uncommon for wagons to have living and passenger space inside.

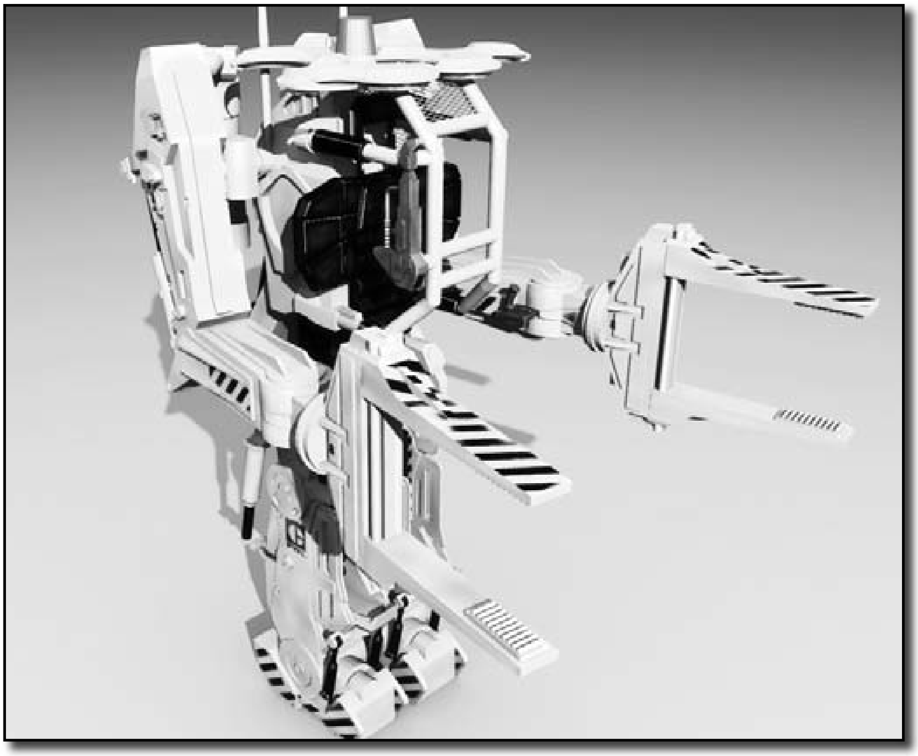
Wagon (TL 1)		M^3	Mass (kg)	Cost (Cr.)
Hull	17 M^3 (base 14), Box configuration, Wood	—	1,190	1,120
—	Hull: 1 Structure: 2	—	—	—
Drive System	Wheels	1.4	140	1,400
Power Plant	Pack Animal Power output: 3 Fuel Consumption: N/A	3	3	75
Armour	1	0	0	0
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	2	2	200	—
Cargo	0.667 dTons	9.35	935	—
Agility	+0 DM	—	—	—
Speed (full load)	Cruise: 9 kph Top: 12 kph Offroad: 2 kph	—	—	—
Total	—	17	2,593	2,595
Ground Pressure	1.85	—	—	—

WALKERS

CARGO LIFTER

Cargo lifters are commonly seen at spaceports and loading bays. These walkers stand roughly eight feet high that allow the operator to lift and move heavy cargo by means of large pincers. Unlike most walkers, the standard cargo lifter does not completely enclose the operator allowing for easier communication and visibility. However, a fully enclosed version is also available for conditions where life support is required.

Open Cargo Lifter (TL 8)		M^3	Mass (kg)	Cost (Cr.)
Hull	2 M^3, Open configuration, Advanced Composites	—	162	1,000
—	Hull: 2 Structure: 2	—	—	—
Drive System	Walker	0.1	100	5,000
Power Plant	Hydrogen Fuel Cell–7 Power output: 16 Fuel Consumption: 1 per hour	1	150	1,500
Fuel	5 litres (5 hours operation)	0.01	5	—
Armour	4	0	0	0
Sensors	None (0 km +0 DM)	0	0	0
Crew	1	—	—	—
Operating Stations	1	0.63	125	—
Agility	+1 DM	—	—	—
Speed	Cruise: 11 kph Top: 14 kph Offroad: 7 kph	—	—	—
Total	—	1.33	542	7,500
Ground Pressure	2.71	—	—	—



Sealed Cargo Lifter (TL 10)		M^3	Mass (kg)	Cost (Cr.)
Hull	3 M^3, Standard configuration, Advanced Composites, Sealed	—	270	2,250
—	Hull: 2 Structure: 2	—	—	—
Drive System	Walker	0.15	150	7,500
Power Plant	Hydrogen Fuel Cell–10 Power output: 22 Fuel Consumption: 1 per hour	1	125	2,400
Fuel	10 litres (10 hours operation)	0.01	10	—
Armour	4	0	0	0
Sensors	Basic (1 km +1 DM)	0.5	1	500
Communications	Radio 5km (TL 7)	0	0.1	100
Environmental	Life Support, Basic	0.03	6	1,500
Equipment	Improved Controls	0	0	750
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Agility	+2 DM	—	—	—
Speed	Cruise: 15 kph Top: 20 kph Offroad: 10 kph	—	—	—
Total	—	2.32	687	15,000
Ground Pressure	2.29	—	—	—

Explorer

The explorer is sealed against all hostile environments and has an advanced life support system. This walker is also equipped with long range sensors and communications making it an ideal vehicle for exploring, reconnaissance and surveying.

Explorer (TL 10)		M^3	Mass (kg)	Cost (Cr.)
Hull	9 M^3, Standard configuration, Light Alloys, Lightweight, Advanced Sealed	—	634	10,125
—	Hull: 2 Structure: 3	—	—	—
Drive System	Walker	0.45	450	22,500
Power Plant	Hydrogen Fuel Cell–10 Power output: 77 Fuel Consumption: 3.5 per hour	3.5	500	9,600
Fuel	35 litres (10 hours operation)	0.04	40	—
Armour	2	0	0	0
Sensors	Comprehensive Long Range (30 km +2 DM)	3	4	5,000
Communications	Radio 50km (TL 7)	0.25	1	750
Environmental	Life Support, Hostile Environment	0.45	180	225,000
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Agility	+1 DM	—	—	—
Speed	Cruise: 19 kph Top: 25 kph Offroad: 12 kph	—	—	—
Total	—	8.94	1,934	272,975
Ground Pressure	2.15	—	—	—

Sub–Walker

The sub–walker is an enclosed walker vehicle that allows workers to perform technical work underwater. The walker can be fitted with a variety of tools and equipment that are remotely operated from inside the vehicle. All Engineer and Mechanic skill checks made when using the sub–walker have a –1 DM.

Sub–Walker (TL 8)		**M³**	**Mass (kg)**	Cost (Cr.)
Hull	6 M³, Standard configuration, Light Alloys, Sealed	—	480	2,250
—	Hull: 2 Structure: 3	—	—	—
Drive System	Walker	0.3	300	15,000
Power Plant	Hydrogen Fuel Cell–8 Power output: 72 Fuel Consumption: 4 per hour	4	600	7,200
Fuel	20 litres (5 hours operation)	0.02	20	—
Armour	2	0	0	0
Sensors	Minimal (0.25 km +0 DM)	0.25	0.5	100
Communications	Radio 10km (TL 7)	0	0.25	250
Environmental	Life Support, Basic	0.06	12	3,000
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Cargo	0.013 dTons	0.12	12	—
Agility	+1 DM	—	—	—
Speed	Cruise: 18 kph Top: 23 kph Offroad: 12 kph Underwater: 3 kph	—	—	—
Total	—	6	1,550	27,800
Ground Pressure	2.58	—	—	—

TECH—WALKER

The tech–walker is an enclosed walker vehicle that allows workers to perform technical work in hostile conditions. The walker can be fitted with a variety of tools and equipment remotely operated from inside the vehicle. All Engineer and Mechanic skill checks made when using the tech–walker have a –1 DM.

Tech–Walker (TL 10)		M^3	Mass (kg)	Cost (Cr.)
Hull	4 M^3, Standard configuration, Crystaliron, Advanced Sealed	—	550	12,000
—	Hull: 2 Structure: 2	—	—	—
Drive System	Walker	0.2	200	10,000
Power Plant	Hydrogen Fuel Cell–10 Power output: 22 Fuel Consumption: 1 per hour	1	125	2,400
Fuel	10 litres (10 hours operation)	0.01	10	—
Armour	6	0	0	0
Sensors	Basic (1 km +1 DM)	0.5	1	500
Communications	Laser 5km	0.5	2	200
Environmental	Life Support, Hostile Environment	0.2	80	100,000
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Cargo	0.03 dTons	0.34	34	—
Agility	+1 DM	—	—	—
Speed	Cruise: 8 kph Top: 10 kph Offroad: 5 kph	—	—	—
Total	—	4	1,127	125,100
Ground Pressure	2.81	—	—	—

Grav Vehicles

Air/Raft

An open–topped vehicle supported by anti–gravity technology. Air/rafts can even reach orbit, but passengers must wear vacc suits. They are remarkably reliable and flexible vehicles.

Air/Raft (TL 8)		M³	Mass (kg)	Cost (Cr.)
Hull	8 M³, Open configuration, Advanced Composites	—	648	4,000
—	Hull: 3 Structure: 3	—	—	—
Drive System	Grav	0.4	60	200,000
Power Plant	Hydrogen Fuel Cell–8 Power output: 18 Fuel Consumption: 1 per hour	1	150	1,800
Fuel	20 litres (20 hours operation)	0.02	20	—
Armour	4	0	0	0
Sensors	Comprehensive Extended Range, Compact (9 km +2 DM)	1	1.5	4,000
Communications	Radio 50 km (TL 7)	0.25	1	750
Crew	1	—	—	—
Operating Stations	1	0.63	125	—
Passengers	3	1.5	300	—
Cargo	0.219 dTons	3.2	320	—
Agility	+0 DM	—	—	—
Speed	Cruise: 332 kph Top: 442 kph	—	—	—
Total	—	8	1,626	210,550

Cargo Flyer

The haulage solution for high technology worlds, cargo flyers are a common sight around spaceports and cities.

Cargo Flyer (TL 12)		M³	Mass (kg)	Cost (Cr.)
Hull	120 M³ (base 100), Box configuration, Crystaliron, Sealed	—	12,500	120,000
—	Hull: 38 Structure: 38	—	—	—
Drive System	Grav	5	750	2,500,000
Power Plant	Nuclear Fusion–12 Power output: 240 Fuel Consumption: 10 per hour	10	1,500	150,000
Fuel	1,000 litres (100 hours)	1	1,000	
Armour	5	0	0	0
Sensors	Advanced Extended Range, Compact (15 km +3 DM)	3	1.9	8,000
Communications	Laser 20 km	1	6	1,000
Environmental	Life Support, Basic	1	200	50,000
Crew	2 (driver, engineer)	—	—	—
Operating Stations	2	2.5	250	—
Cargo	7.296 dTons	96.5	9,650	—
Agility	+0 DM	—	—	—
Speed	Cruise: 278 kph Top: 371 kph	—	—	—
Total	—	120	25,858	2,829,000

CARGO LOADER

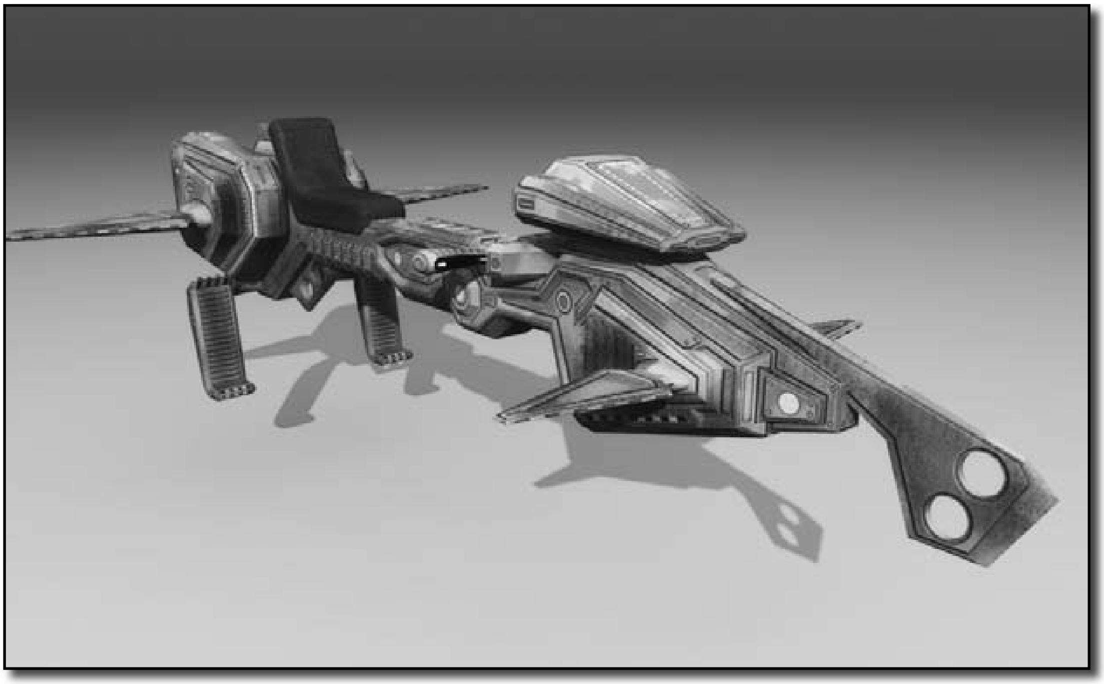
This is a small, one–man, vehicle is used to carry, tow or push cargo. Cargo loaders are used in low gravity environments where cargo lifters (see page 48) are not practical, such as ship to ship transfers. The cargo loader is technically capable of much faster speeds, but it is capped for safety reasons and can move up to 10 tons of cargo without affecting this speed.

Cargo Loader (TL 9)		M^3	Mass (kg)	Cost (Cr.)
Hull	5 M^3, Standard configuration, Advanced Composites, Sealed	—	450	3,750
—	Hull: 2 Structure: 3	—	—	—
Drive System	Grav	0.25	37.5	125,000
Power Plant	Hydrogen Fuel Cell–7 Power output: 16 Fuel Consumption: 1 per hour	1	150	1,500
Fuel	10 litres (10 hours operation)	0.01	10	—
Armour	4	0	0	0
Sensors	Basic Extended Range, Compact (3 km +1 DM)	0.5	0.75	2,000
Communications	Laser 5km	0.5	2	200
Environmental	Life Support, Basic	0.05	10	2,500
Equipment	Improved Controls	0	0	1,250
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Cargo	0.11 dTons	1.44	144	—
Agility	+1 DM	—	—	—
Speed	Cruise: 44 kph Top: 59 kph	—	—	—
Total	—	5	929	136,200

G/Bike

The g/bike is much like a standard motorcycle (see page 34) but its grav drive makes it much more versatile. Additionally, its high speed and small size makes it a great vehicle to have onboard any spacecraft, for quick and convenient transport out of the spaceport. G/bikes are also popular recreational vehicles and are the focus of many subcultures and gangs.

G/Bike (TL 9)		M^3	Mass (kg)	Cost (Cr.)
Hull	2 M^3, Cycle configuration, Advanced Composites	—	135	500
—	Hull: 2 Structure: 2	—	—	—
Drive System	Grav	0.1	15	50,000
Power Plant	Hydrogen Fuel Cell–8 Power output: 9 Fuel Consumption: 0.5 per hour	0.5	75	900
Fuel	10 litres (20 hours operation)	0.01	10	—
Armour	4	0	0	0
Sensors	Basic Extended Range, Compact (3 km +1 DM)	0.5	0.75	2,000
Equipment	Airflow Device: Wing Slats	0	1	200
—	Improved Controls	—	—	500
Crew	1	—	—	—
Operating Stations	1	0.31	125	—
Passengers	1	0.25	100	—
Cargo	0.024 dTons	0.33	33	—
Agility	+3 DM	—	—	—
Speed	Cruise: 545 kph Top: 727 kph	—	—	—
Total	—	2	495	54,100



G/RUNNER

The g/runner is a smaller and cheaper version of the grav car that seats two people. It is a common alternative to the g/bike for many commuters and travellers.

G/Runner (TL 10)		M³	Mass (kg)	Cost (Cr.)
Hull	4 M³, Standard configuration, Light Alloys	—	320	1,000
—	Hull: 2 Structure: 2	—	—	—
Drive System	Grav	0.2	30	100,000
Power Plant	Hydrogen Fuel Cell–8 Power output: 9 Fuel Consumption: 0.5 per hour	0.5	75	900
Fuel	10 litres (20 hours operation)	0.01	10	—
Armour	2	0	0	0
Sensors	Basic Extended Range, Compact (3 km +1 DM)	0.5	0.75	2,000
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	1	1	100	—
Cargo	0.04 dTons	0.54	54	—
Agility	+0 DM	—	—	—
Speed	Cruise: 378 kph Top: 503 kph	—	—	—
Total	—	4	715	103,900

GRAV CAR

Grav cars are the vehicle of choice on most worlds with grav technology. Some are designed to look like their ground car predecessors, but newer designs are more common. With their ability to reach orbit, grav cars have basic life support as standard to prevent foolish or reckless drivers from driving too high and suffocating.

Grav Car (TL 9)		M^3	Mass (kg)	Cost (Cr.)
Hull	8 M^3, Standard configuration, Advanced Composites, Sealed	—	720	6,000
—	Hull: 3 Structure: 3	—	—	—
Drive System	Grav	0.4	60	200,000
Power Plant	Hydrogen Fuel Cell–9 Power output: 30 Fuel Consumption:1.5 per hour	1.5	188	3,150
Fuel	12 litres (8 hours operation)	0.01	12	—
Armour	4	0	0	0
Sensors	Basic Extended Range, Compact (3 km +1 DM)	0.5	0.75	2,000
Communications	Radio 10 km (TL 7)	0	0.25	250
Environmental	Life Support, Basic	0.08	16	4,000
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	3	3	300	—
Cargo	0.099 dTons	1.26	126	—
Agility	+0 DM	—	—	—
Speed	Cruise: 581 kph Top: 775 kph	—	—	—
Total	—	6	1,548	215,400

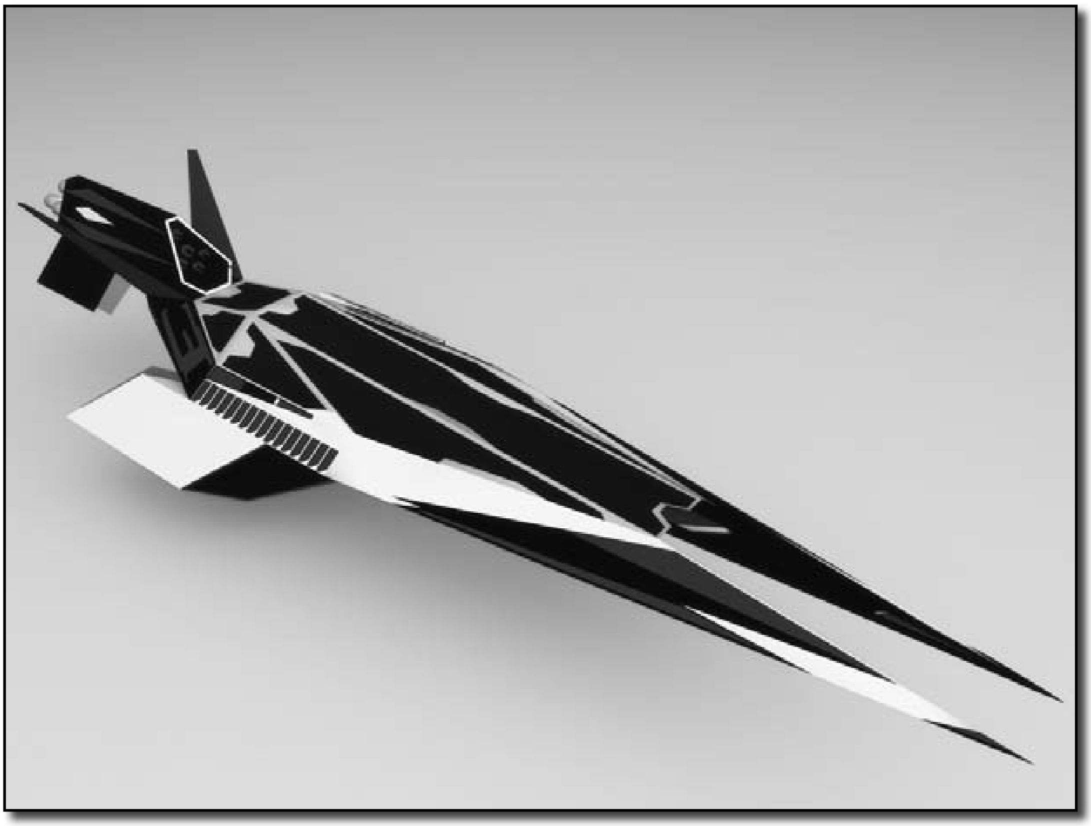
Grav Car (TL 12)		M^3	Mass (kg)	Cost (Cr.)
Hull	8 M^3, Streamlined configuration, Crystaliron, Lightweight, Sealed	—	800	23,400
—	Hull: 3 Structure: 3	—	—	—
Drive System	Grav	0.4	60	200,000
Power Plant	Nuclear Fusion–12 Power output: 36 Fuel Consumption: 1.5 per hour	1.5	225	22,500
Fuel	45 litres (30 hours operation)	0.045	45	—
Armour	6	0	0	0
Sensors	Comprehensive Extended Range, Compact (9 km +2 DM)	1	1.5	4,000
Communications	Radio 10 km (TL 7)	0	0.25	250
Environmental	Life Support, Basic	0.08	16	4,000
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	3	3	300	—
Cargo	0.054 dTons	0.725	72.5	—
Agility	+0 DM	—	—	—
Speed	Cruise: 657 kph Top: 875 kph	—	—	—
Total	—	8	1,645	254,150

GRAV RACER

Grav racers are small, lightweight and streamlined vehicles designed for optimum speed. With no cargo space and barely enough room for the driver, grav racers are primarily recreation vehicles. Grav racing is a fast paced sport that is popular on many worlds but due to the dangers of high speed racing some governments have outlawed such activities.

Racers do not include Performance Tuning as standard but this can be added as detailed on page 21.

Grav Racer (TL 10)		**M^3**	**Mass (kg|)**	**Cost (Cr.)**
Hull	3 M^3, Super Streamlined configuration, Light Alloys	—	240	3,000
—	Hull: 1 Structure: 1	—	—	—
Drive System	Grav	0.1	22.5	75,000
Power Plant	Hydrogen Fuel Cell–10 Power output: 22 Fuel Consumption: 1 per hour	1	125	2,400
Fuel	10 litres (10 hours operation)	0.01	10	—
Armour	2	0	0	0
Sensors	Basic Extended Range, Compact (3 km +1 DM)	0.5	0.75	2,000
Equipment	Excellent Controls	0.03	2.4	3,000
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Agility	+2 DM	—	—	—
Speed	Cruise: 1,568 kph Top: 2,091 kph	—	—	—
Total	—	2.89	526	85,400



GRAV TRAIN

An advanced version of the electric train (see page 30) that uses grav technology and a specially designed grav track. Grav trains can achieve incredibly high speeds and unlike their mechanical predecessors, the grav technology makes it virtually impossible for the train to derail.

Grav Train (TL 9)		M³	Mass (kg)	Cost (Cr.)
Hull	800 M³, Streamlined configuration, Light Alloys, Sealed	—	64,000	390,000
—	Hull: 220 Structure: 220	—	—	—
Drive System	Grav	40	6,000	20,000,000
Power Plant	Nuclear Fusion–9 Power output: 3,300 Fuel Consumption: 100 per hour	100	20,000	1,250,000
Fuel	2,500 litres (25 hours operation)	2.5	2,500	—
Armour	2	0	0	0
Sensors	Comprehensive, Extended Range, Compact (9 km +2 DM)	1	1.5	4,000
Communications	Laser 100 km	5	10	12,000
Environmental	Life Support, Basic	8	1,600	400,000
Crew	4 (driver, engineer, 2 stewards)	—	—	—
Operating Stations	4	5	500	—
Passengers	560	560	56,000	—
Utility Areas	1 buffet (20 occupants)	43	3,225	53,750
Cargo	2.81 dTons	35.5	3,550	—
Agility	+0 DM	—	—	—
Speed (full load)	Cruise: 629 kph Top: 839 kph	—	—	—
Total	—	800	157,387	22,109,750

GRAVLINER

The gravliner is the successor to the airliner, designed to transport large numbers of passengers over long distances. A number of onboard passenger facilities are available for recreational purposes.

Gravliner (TL 10)		M³	Mass (kg)	Cost (Cr.)
Hull	420 M³, Airframe configuration, Light Alloys, Lightweight, Sealed	—	24,192	354,375
—	Hull: 81 Structure: 81	—	—	—
Drive System	Grav	21	3,150	10,500,000
Power Plant	Turbine–10 Power output: 1,800 Fuel Consumption: 480 per hour	60	4,800	300,000
Fuel	4,800 litres (10 hours operation)	4.8	4,800	—
Armour	2	0	0	0
Sensors	Advanced Extended Range (15 km +3 DM)	6	3.75	4,000
Communications	Laser 1,000 km	15	20	25,000
Environmental	Life Support, Basic	4.2	840	210,000
Crew	6 (driver, co–driver, 4 stewards)	—	—	—
Operating Stations	6	7.5	750	—
Passengers	270	270	27,000	—
Utility Areas	Bar/buffet (10 occupants)	13	975	16,250
Cargo	1.37 dTons	18.5	1,850	—
Agility	+0 DM	—	—	—
Speed	Cruise: 790 kph Top: 1,053 kph	—	—	—
Total	—	420	68,381	11,409,625

GUV

The Grav Utility Vehicle (GUV) can carry eight people including the driver. For those who can afford it, the GUV is ideal for traveller and mercenary groups who need fast planetary transport.

GUV (TL 10)		M³	Mass (kg)	Cost (Cr.)
Hull	12 M³, Standard configuration, Crystaliron, Sealed	—	1,500	18,000
—	Hull: 5 Structure: 5	—	—	—
Drive System	Grav	0.6	90	300,000
Power Plant	Hydrogen Fuel Cell–10 Power output: 33 Fuel Consumption: 1.5 per hour	1.5	187.5	3,600
Fuel	30 litres (20 hours operation)	0.03	30	—
Armour	6	0	0	0
Sensors	Basic Extended Range, Compact (3 km +1 DM)	0.5	0.75	2,000
Communications	Radio 10 km (TL 7)	0	0.25	250
Environmental	Life Support, Basic	0.12	24	6,000
Equipment	Improved Controls	0	0	3,000
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	7	7	700	—
Cargo	0.084 dTons	1	100	—
Agility	+1 DM	—	—	—
Speed	Cruise: 359 kph Top: 479 kph	—	—	—
Total	—	12	2,758	332,850

HOVERCART

These small platforms use a contragrav drive to hover several feet above the ground and are designed to carry heavy loads. Hovercarts have no motive power so they must either be pushed by hand or used as a trailer (see page 12). The platform is 6ft x 2ft but can be extended up to 8ft x 4ft.

Hovercart (TL 8)		M^3	Mass (kg)	Cost (Cr.)
Hull	1 M^3, Open configuration, Light Alloys	—	72	250
—	Hull: 1 Structure: 2	—	—	—
Drive System	Lifter	0.01	1	1,000
Armour	2	0	—	0
Cargo	0.073 dTons	0.99	99	—
Total	—	1	172	1,250

REFUELLING PLATFORM

These immense platforms serve as fuelling and maintenance stations for other grav vehicles and aircraft. They are usually stationed above cities where a ground based facility is not practical. Refuelling platforms are primarily designed to remain stationary, but they are able to move at low speeds if required.

Refuelling Platform (TL 12)		M^3	Mass (kg)	Cost (Cr.)
Hull	480 M^3 (base 400), Box configuration, Superdense, Sealed	—	60,000	2,400,000
—	Hull: 200 Structure: 200	—	—	—
Drive System	Grav	20	3,000	10,000,000
Power Plant	Nuclear Fusion–12 Power output: 48 Fuel Consumption: 2 per hour	2	300	30,000
Fuel	336 litres (1 week operation)	0.336	336	—
Armour	Superdense 16	4.8	14,400	240,000
Sensors	Advanced, Extended Range, Compact (15 km +3 DM)	3	1.9	8,000
Communications	Laser 100 km	5	10	12,000
Environmental	Life Support, Advanced	12	4,200	3,000,000
Crew	4 (operators and engineers)	—	—	—
Operating Stations	4	5	500	—
Utility Areas	1 workshop (4 occupants)	11	825	13,750
Cargo	31.793 dTons	416.8	41,680	—
Agility	+0 DM	—	—	—
Speed	Cruise: 11 kph Top: 15 kph	—	—	—
Total	—	479.94	125,253	15,703,750

SEV

The very best in survey vehicles, the Survey and Exploration Vehicle (SEV) boasts excellent sensors within a sealed environment that can sustain its crew and passengers indefinitely. Normally an SEV will land to allow its small crew to rest priot to continuing any lengthy journey.

SEV (TL 12)		M^3	Mass (kg)	Cost (Cr.)
Hull	60 M^3, Standard configuration, Superdense, Rugged, Advanced Sealed	—	11,385	1,575,000
—	Hull: 33 Structure: 36	—	—	—
Drive System	Grav	3	450	1,500,000
Power Plant	Nuclear Fusion–12 Power output: 192 Fuel Consumption: 8 per hour	8	1,200	120,000
Fuel	1,920 litres (10 days operation)	1.920	1,920	—
Armour	7	0	0	0
Sensors	Excellent Long Range (100 km +4 DM)	15	6	20,000
Communications	Laser 100 km	5	10	12,000
Environmental	Life Support, Hostile Environment	3	1,200	1,500,000
Crew	3 (driver, sensor operator, engineer)	—	—	—
Operating Stations	3	3.75	375	—
Passengers	3	3	300	—
Sleeping Areas	1 simple (6 occupants)	8	160	4,000
Utility Areas	Laboratory (2 occupants)	7	525	8,750
—	2 x Computer/3	0	1	2,000
Cargo	0.538 dTons	2.33	233	—
Agility	+0 DM	—	—	—
Speed	Cruise: 324 kph Top: 432 kph	—	—	—
Total	—	60	17,765	4,741,750

AIRCRAFT

AIRLINER

A large jet aircraft used to transport people and cargo. Airliners are designed to carry passengers in comfort, so a variety of onboard facilities are provided to entertain them during long flights.

Airliner (TL 7)		M^3	Mass (kg)	Cost (Cr.)
Hull	480 M^3, Airframe configuration, Light Alloys, Sealed	—	34,560	270,000
—	Hull: 132 Structure: 132	—	—	—
Drive System	Jet	72	7,200	2,520,000
Power Plant	Turbine–7 Power output: 1,620 Fuel Consumption: 202.5 per hour	45	4,050	180,000
Fuel	4,050 litres (20 hours operation)	4.1	4,050	—
Armour	2	0	0	0
Sensors	Comprehensive Long Range (30 km +2 DM)	3	4	5,000
Communications	Radio 100 km (TL 7)	0.5	5	1,000
Environmental	Life Support, Basic	4.8	960	240,000
Crew	6 (pilot, co–pilot, stewards)	—	—	—
Operating Stations	6	7.5	750	—
Passengers	285	285	28,500	—
Utility Areas	Galley (4 occupants)	11	825	13,750
Cargo	3.919 dTons	47.1	4,710	—
Agility	+1 DM	—	—	—
Speed	Cruise: 887 kph Top: 1,183 kph	—	—	—
Total	—	480	85,614	3,229,750

AIRPLANE

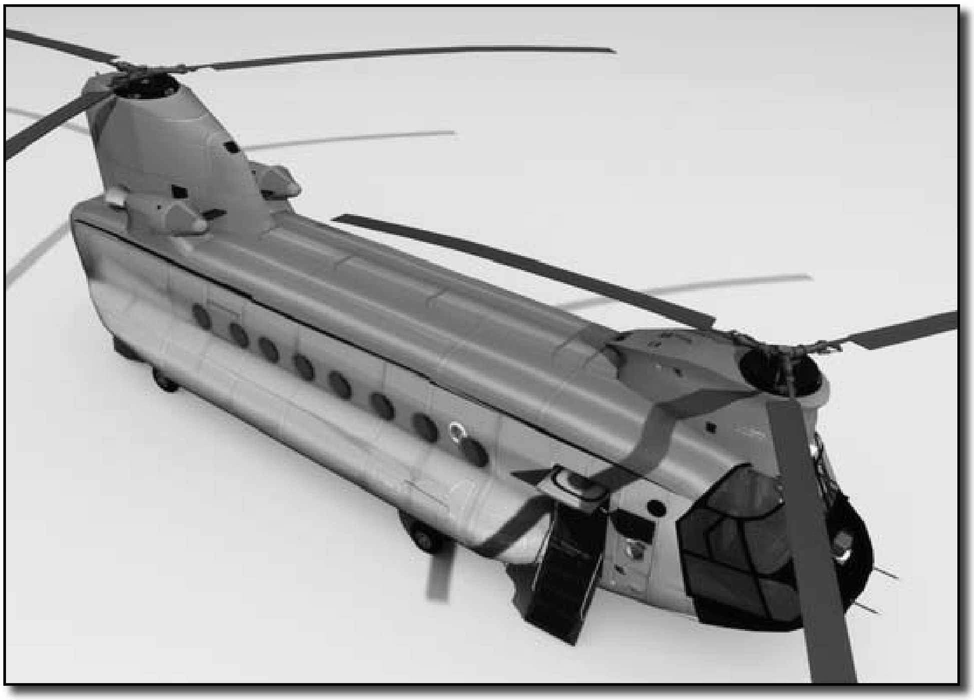
The first aircraft to be used on most worlds are small single winged vehicles powered by a propeller. For the purposes of game mechanics, there is no difference between monoplanes and biplanes; early designs tend to favour biplanes to increase the vehicle's structure, but as technology improves the additional wing is unnecessary and monoplanes become commonplace.

Airplane (TL 4)		M^3	Mass (kg)	Cost (Cr.)
Hull	10 M^3, Airframe configuration, Iron	—	990	2,250
—	Hull: 2 Structure: 3	—	—	—
Drive System	Propeller	0.5	30	7,500
Power Plant	Internal Combustion–4 Power output: 30 Fuel Consumption: 15 per hour	3	270	2,400
Fuel	60 litres (4 hours operation)	0.06	60	—
Armour	2	0	0	0
Sensors	None (0 km +0 DM)	0	0	0
Communications	Radio 100 km (TL 4)	1	10	1,000
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	2	2	200	—
Cargo	0.161 dTons	2.19	219	—
Agility	+1 DM	—	—	—
Speed	Cruise: 266 kph Top: 355 kph	—	—	—
Total	—	10	1,904	13,150

BEHEMOTH HELICOPTER

These large helicopters have two rotors to increase the lifting capacity of the vehicle. Behemoths are used to transport heavy or large amounts of cargo where vertical takeoff and landing are required. A loading ramp at the rear provides easy access for small vehicles. The behemoth helicopter is also used by some rescue services where large numbers of passengers need to be transported from areas with limited access. The helicopter detailed below has two stats for passengers and cargo, representing the passenger and freight variants respectively.

Behemoth Helicopter (TL 8)		**M³**	**Mass (kg)**	**Cost (Cr.)**
Hull	60 M³, Airframe configuration, Light Alloys	—	4,320	22,500
—	Hull: 17 Structure: 17	—	—	—
Drive System	Rotors	12	960	300,000
Power Plant	Turbine–8 Power output: 585 Fuel Consumption: 67.5 per hour	15	1,350	63,750
Fuel	1,080 litres (16 hours operation)	1.08	1,080	—
Armour	2	0	0	0
Sensors	Comprehensive (3 km +2 DM)	1	2	1,000
Communications	Radio 100 km (TL 7)	0.5	5	1,000
Crew	2 (pilot, co–pilot)	—	—	—
Operating Stations	2	2.5	250	—
Passengers (Passenger)	25	25	2,500	—
Passengers (Freight)		0	0	—
Cargo (Passenger)	0.213 dTons	2.92	292	—
Cargo (Freight)	2.065 dTons	27.92	2,792	—
Agility	+1 DM	—	—	—
Speed	Cruise: 229 kph Top: 306 kph	—	—	—
Total	—	52	10,759	388,250



CARGO PLANE

The cargo plane is designed to carry large amounts of cargo over great distances. Four propellers are required to power these immense aircraft, but the top speed is much less than smaller planes built with the same technology. Most of the plane is given over to cargo space which is accessed by a large ramp at the rear of the vehicle.

Cargo Plane (TL 6)		M³	Mass (kg)	Cost (Cr.)
Hull	110 M³, Airframe configuration, Light Alloys, Lightweight	—	6,336	61,875
—	Hull: 21 Structure: 22	—	—	—
Drive System	Jet	16.5	1,650	577,500
Power Plant	Turbine–6 Power output: 176 Fuel Consumption: 80 per hour	8	720	28,000
Fuel	960 litres (12 hours operation)	0.96	960	—
Armour	2	0	0	0
Sensors	Basic Extended Range (3 km +1 DM)	1	3	1,000
Communications	Radio 100 km	1	10	1,000
Crew	2 (pilot, co–pilot)	—	—	—
Operating Stations	2	2.5	300	—
Passengers	8	8	800	—
Cargo	5.336 dTons	72.04	7,204	—
Agility	+1 DM	—	—	—
Speed	Cruise: 459 kph Top: 612 kph	—	—	—
Total	—	110	17,983	669,375

HELICOPTER

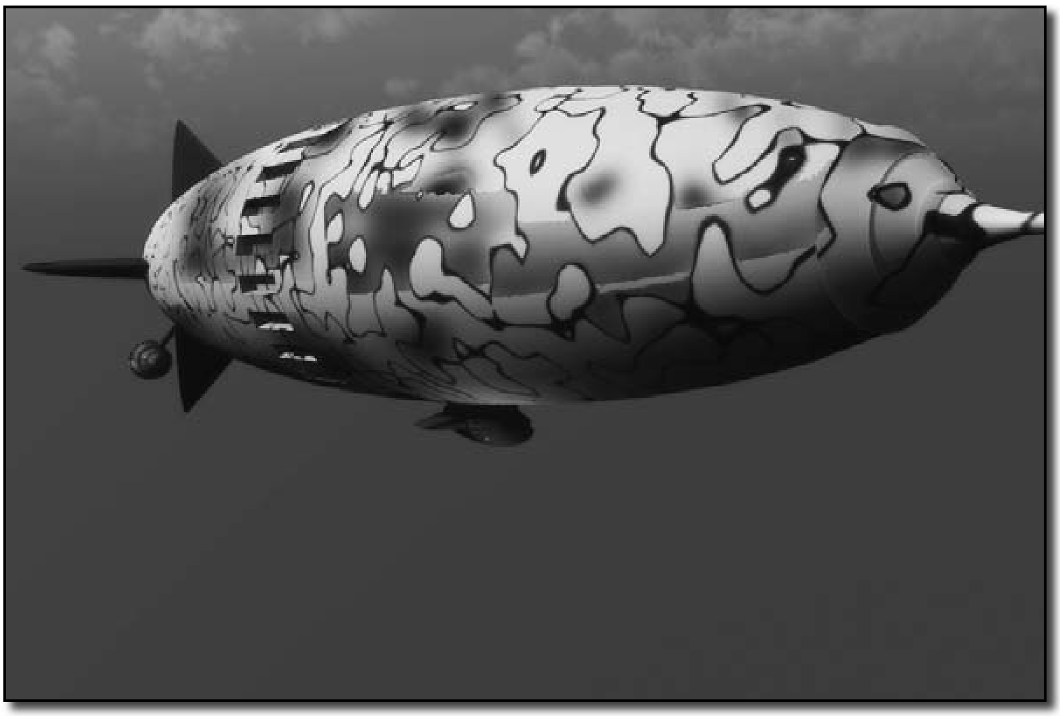
These are the most common types of helicopter in use on most worlds and are capable of carrying up to six passengers. Although not as fast as fixed wing aircraft, the ability for Vertical Landing and Takeoff (VTOL) makes helicopters much more versatile than fixed wing aircraft.

Helicopter (TL 6)		M³	Mass (kg)	Cost (Cr.)
Hull	28 M³, Airframe configuration, Light Alloys, Lightweight	—	1,612.8	15,750
—	Hull: 6 Structure: 6	—	—	—
Drive System	Rotors	5.6	448	140,000
Power Plant	Turbine–6 Power output: 330 Fuel Consumption: 50 per hour	10	900	35,000
Fuel	500 litres (10 hours operation)	0.5	500	—
Armour	2	0	0	0
Sensors	Basic (1 km +1 DM)	0.5	1	500
Communications	Radio 100 km	1	10	1,000
Crew	1	—	—	—
Operating Stations	1	1.25	150	—
Passengers	6	6	600	—
Cargo	0.707 dTons	3.15	315	—
Agility	+1 DM	—	—	—
Speed	Cruise: 307 kph Top: 409 kph	—	—	—
Total	—	28	4,537	192,250

Dirigible

Dirigibles (sometimes called zeppelins) employ a large reinforced balloon to provide lift and a number of vectored propellers to power and turn the vehicle. The lift provided by the gasbag doubles the effectiveness of the propellers. Space for crew, passengers and cargo is either built inside the vehicle or suspended beneath the balloon. The dirigible detailed below has two stats for passengers and cargo, representing the passenger and cargo variants respectively.

Dirigible (TL 4)		**M^3**	**Mass (kg)**	**Cost (Cr.)**
Hull	25 M^3, Airframe configuration, Iron, Lightweight	—	1,980	8,438
—	Hull: 4 Structure: 4	—	—	—
Drive System	Propeller	1.25	75	18,750
—	Gasbag	2.5	62.5	250
Power Plant	Internal Combustion–4 Power output: 10 Fuel Consumption: 5 per hour	1	90	800
Fuel	70 litres (14 hours operation)	0.07	70	—
Armour	2	0	0	0
Sensors	Minimal (0.25 km +0 DM)	0.25	0.5	100
Communications	Radio 50 km (TL 4)	0.25	2.5	750
Equipment	Precision Drive	0.31	18.75	37,500
Crew	2 (pilot, co–pilot)	—	—	—
Operating Stations	2	2.5	250	—
Passengers (Passenger)	15	15	1,500	—
Passengers (Freight)	0	0	0	—
Cargo (Passenger)	0.115 dTons	1.87	155	—
Cargo (Freight)	1.226 dTons	16.87	1,687	—
Agility	+2 DM	—	—	—
Speed	Cruise: 40 kph Top: 54 kph	—	—	—
Total	—	25	4,204	66,588



HANG GLIDER

Hang gliders are solo aircraft that suspend the pilot from a lightweight frame and need to be launched from high altitude. On low technology worlds, hang gliders are usually used for surveillance. High technology gliders are made from composites, making them more portable and are often used for recreational purposes.

Hang Glider (TL 2)		M^3	Mass (kg)	Cost (Cr.)
Hull	3 M^3, Airframe configuration, Wood	—	230	450
—	Hull: 1 Structure: 1	—	—	—
Drive System	Glider	0.15	0	75
Power Plant	Wind Power–1 Power output: 6 Fuel Consumption: N/A	1.5	30	75
Armour	1	0	0	0
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Agility	+0 DM	—	—	—
Speed	Cruise: 29 kph Top: 39 kph	—	—	—
Total	—	2.9	385	600

Hang Glider (TL 6)		M^3	Mass (kg)	Cost (Cr.)
Hull	3 M^3, Airframe configuration, Light Alloys, Lightweight	—	173	1,688
—	Hull: 1 Structure: 1	—	—	—
Drive System	Glider	0.15	0	75
Power Plant	Wind Power–6 Power output: 7.5 Fuel Consumption: N/A	1.5	15	150
Armour	2	0	0	0
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Agility	+2 DM	—	—	—
Speed	Cruise: 45 kph Top: 60 kph	—	—	—
Total	—	2.9	313	1,913

Jet Plane

These small jet propelled aircraft are most commonly used by wealthy individuals and business executives. Jet planes are utilised as much for status as they are for speed.

Jet Plane (TL 7)		**M³**	**Mass (kg)**	**Cost (Cr.)**
Hull	40 M³, Airframe configuration, Advanced Composites, Sealed	—	3,240	45,000
—	Hull: 13 Structure: 13	—	—	—
Drive System	Jet	6	600	210,000
Power Plant	Turbine–7 Power output: 96 Fuel Consumption: 36 per hour	4	360	16,000
Fuel	360 litres (10 hours operation)	0.36	360	—
Armour	4	0	0	0
Sensors	Comprehensive (3 km +2 DM)	1	2	1,000
Communications	Radio 100 km (TL 7)	0.5	5	1,000
Environmental	Life Support, Basic	0.4	80	20,000
Crew	2 (pilot, co–pilot)	—	—	—
Operating Stations	2	2.5	250	—
Passengers	8	8	800	—
Utility Areas	Lounge (6 occupants)	15	1,125	18,750
Cargo	0.194 dTons	2.24	224	—
Agility	+1 DM	—	—	—
Speed	Cruise: 639 kph Top: 852 kph	—	—	—
Total	—	40	7,046	311,750

Police Helicopter

Police helicopters are used by various law enforcement agencies for surveillance and pursuit, often aiding ground chases by locating a target for ground forces to intercept. A co–pilot is needed to operate the advanced surveillance and communications equipment and the helicopter can carry two additional passengers.

Police Helicopter (TL 8)		M³	Mass (kg)	Cost (Cr.)
Hull	24 M³, Airframe configuration, Advanced Composites	—	1,944	18,000
—	Hull: 8 Structure: 8	—	—	—
Drive System	Rotors	4.8	384	120,000
Power Plant	Turbine–8 Power output: 390 Fuel Consumption: 45 per hour	10	900	42,500
Fuel	540 litres (12 hours operation)	0.54	540	—
Armour	4	0	0	0
Sensors	Comprehensive Long Range Compact (30 km +2 DM)	1.5	2	10,000
Communications	Laser 50 km	2	8	5,000
Equipment	Improved Controls	0	0	6,000
Crew	2 (pilot, sensor/comms operator)	—	—	—
Operating Stations	2	2.5	250	—
Passengers	2	2	200	—
Cargo	0.049 dTons	0.66	66	—
Agility	+2 DM	—	—	—
Speed	Cruise: 383 kph Top: 511 kph	—	—	—
Total	—	24	4,294	201,500

Skycar

The skycar is a small plane similar in size to a car with short wings and four vectored propellers giving it VTOL capability. There is only room for one passenger who can also serve as a co–pilot if necessary, either to pilot the vehicle or operate the sensor and communication equipment. The vehicle can fly with just two engines making it a safe choice for people who like the convenience of flying but without the risk.

Skycar (TL 8)		M³	Mass (kg)	Cost (Cr.)
Hull	9 M³, Airframe configuration, Advanced Composites, Sealed	—	729	10,125
—	Hull: 3 Structure: 4	—	—	—
Drive System	Propeller	0.45	27	6,750
Power Plant	Turbine–8 Power output: 26 Fuel Consumption: 9 per hour	1	90	4,250
Fuel	108 litres (12 hours operation)	0.11	108	—
Armour	4	0	0	0
Sensors	Comprehensive Long Range (30 km +2 DM)	3	4	5,000
Communications	Radio 100 km (TL 7)	0.5	5	1,000
Environmental	Life Support, Basic	0.09	18	4,500
Equipment	Precision Drive	0.1125	6.75	13,500
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	1	1	100	—
Cargo	0.116 dTons	1.48	148	—
Agility	+3 DM	—	—	—
Speed	Cruise: 322 kph Top: 430 kph	—	—	—
Total	—	8.99	1,361	45,125

Solar Plane

The solar plane is a light aircraft primarily used for short flights. The limitations of solar power plants make solar planes a poor choice for long flights on most worlds. However, as a safety feature, the solar plane is designed to glide allowing it to travel a respectable distance and land safely, even if there is no power.

Solar Plane (TL 8)		**M³**	**Mass (kg)**	**Cost (Cr.)**
Hull	36 M³, Airframe configuration, Light Alloys	—	2,592	13,500
—	Hull: 10 Structure: 10	—	—	—
Drive System	Propeller	1.8	108	27,000
Power Plant	Solar–8 Power output: 60 Fuel Consumption: N/A	15	300	18,000
Armour	2	0	0	0
Sensors	Comprehensive Long Range (30 km +2 DM)	3	4	5,000
Communications	Radio 100 km (TL 7)	0.5	5	1,000
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	8	8	800	—
Cargo	0.478 dTons	6.45	645	—
Agility	+1 DM	—	—	—
Speed (full load)	Cruise: 221 kph Top: 295 kph	—	—	—
Total	—	36	4,579	64,500

Survey Plane

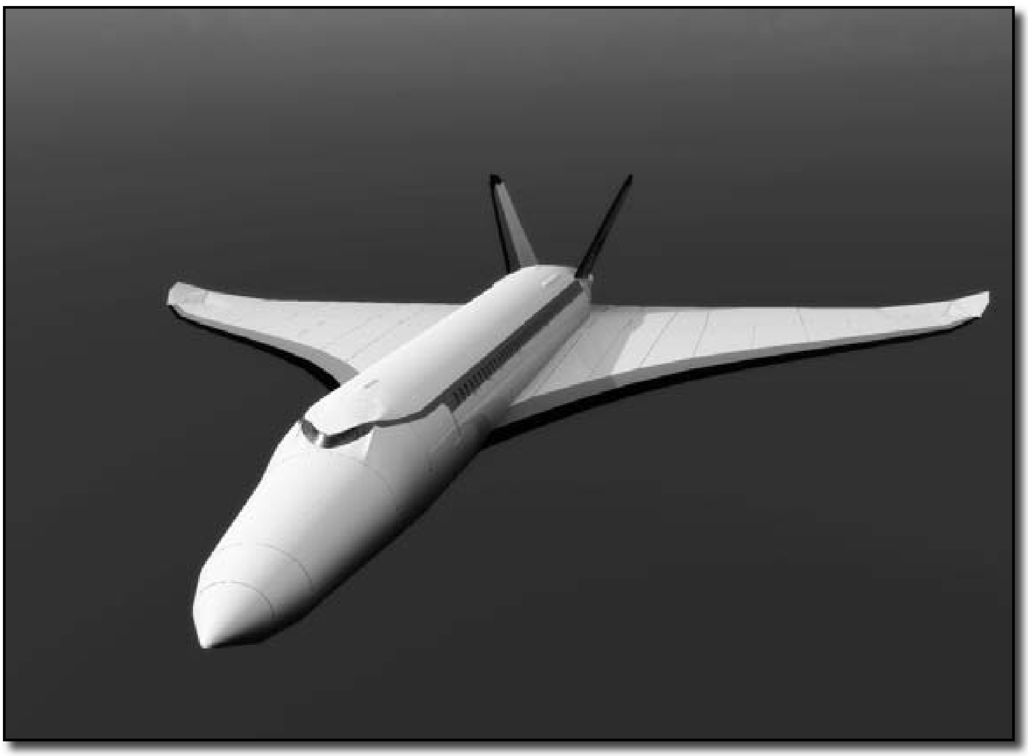
Survey planes are used by scientists for a variety of tasks including mapping, weather reporting and climate monitoring. Some law enforcement agencies also use these planes to patrol the skies and monitor air traffic.

Survey Plane (TL 8)		**M³**	**Mass (kg)**	**Cost (Cr.)**
Hull	60 M³, Airframe configuration, Light Alloys, Sealed	—	4,320	33,750
—	Hull: 17 Structure: 17	—	—	—
Drive System	Jet	9	900	315,000
Power Plant	Turbine–8 Power output: 104 Fuel Consumption: 36 per hour	4	360	17,000
Fuel	720 litres (20 hours operation)	0.72	720	—
Armour	2	0	0	0
Sensors	Comprehensive Extreme Range (300 km +2 DM)	12	12	100,000
Communications	Radio 1,000 km (TL 7)	2	15	5,000
Environmental	Life Support, Basic	0.6	120	30,000
Crew	2	—	—	—
Operating Stations	2	2.5	250	—
Passengers	6	6	600	—
Utility Areas	Laboratory (6 occupants)	15	1,125	18,750
—	2 x Computer/1	0	10	200
Cargo	0.65 dTons	8.18	818	—
Agility	+1 DM	—	—	—
Speed	Cruise: 527 kph Top: 703 kph	—	—	—
Total	—	60	9,250	519,700

SUPERSONIC AIRLINER

Supersonic airliners provide an extremely fast method of transport and are usually reserved for the higher classes of society, lower class citizens can rarely afford to travel in such luxury. Although travelling on a supersonic aircraft is expensive, the cost usually includes a high level of service with quality food and drink.

Supersonic Airliner (TL 8)		M³	Mass (kg)	Cost (Cr.)
Hull	300 M³, Super Airframe configuration, Light Alloys, Lightweight, Sealed	—	13,440	421,875
—	Hull: 58 Structure: 58	—	—	—
Drive System	Jet	45	4,500	1,575,000
Power Plant	Turbine–8 Power output: 1,560 Fuel Consumption: 180 per hour	40	3,600	170,000
Fuel	2160 litres (12 hours operation)	2.16	2,160	—
Armour	2	0	0	0
Sensors	Comprehensive Very Long Range Compact (300 km +2 DM)	3	4	40,000
Communications	Radio 1,000 km (TL 7)	2	15	5,000
Environmental	Life Support, Basic	3	600	150,000
Equipment	Performance Tuning 10%	0	0	1,745,000
Crew	4 (pilot, co–pilot, stewards)	—	—	—
Operating Stations	4	5	500	—
Passengers	160	160	16,000	—
Utility Areas	Galley (2 occupants)	7	525	8,750
Cargo	2.655 dTons	32.84	3,284	—
Agility	+1 DM	—	—	—
Speed	Cruise: 1,639 kph Top: 2,184 kph	—	—	—
Total	—	300	44,628	4,115,625



VTOL JET

Vertical Landing and Takeoff (VTOL) planes are more expensive than helicopters but can achieve much greater speeds. VTOL jets have limited cargo space and are usually used to transport urgent supplies or personnel to places where landing strips are not available.

VTOL Jet (TL 8)		M³	Mass (kg)	Cost (Cr.)
Hull	40 M³, Airframe configuration, Advanced Composites	—	3,240	30,000
—	Hull: 13 Structure: 13	—	—	—
Drive System	Jet	6	600	210,000
Power Plant	Turbine–8 Power output: 78 Fuel Consumption: 27 per hour	3	270	12,750
Fuel	270 litres (10 hours operation)	0.27	270	—
Armour	4	0	0	0
Sensors	Comprehensive Long Range (30 km +2 DM)	3	4	5,000
Communications	Radio 100 km (TL 7)	0.5	5	1,000
Equipment	Precision Drive	1.5	150	420,000
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	12	12	1,200	—
Cargo	0.924 dTons	12.48	1,248	—
Agility	+3 DM	—	—	—
Speed	Cruise: 514 kph Top: 685 kph	—	—	—
Total	—	40	7,112	678,750

Watercraft

Airboat

This flat bottomed boat has a large propeller above the waterline and is most commonly used to travel over swampland and similar terrain where conventional water propulsion is not practical.

Airboat (TL 6)		**M³**	**Mass (kg)**	**Cost (Cr.)**
Hull	7 M³, Open configuration, Light Alloys, Waterproof	—	504	2,100
—	Hull: 2 Structure: 3	—	—	—
Drive System	Water–Driven	0.7	105	3,500
Power Plant	Internal Combustion–6 Power output: 49 Fuel Consumption: 10.5 per hour	3.5	263	4,200
Fuel	58 litres (5.5 hours operation)	0.06	58	—
Armour	2	0	—	0
Crew	1	—	—	—
Operating Stations	1	0.625	125	—
Passengers	2	1	200	—
Cargo	0.015 dTons	1.1	110	—
Agility	–2 DM	—	—	—
Speed	Cruise: 55 kph Top: 73 kph	—	—	—
Total	—	6.985	1,365	9,800

BARGE

A barge is a narrow, flat bottomed, boat primarily designed to transport cargo on canals but they can also be used on rivers. Earlier Technology Levels use pack animals to pull the boat along canals.

Barge (TL 1)		M^3	Mass (kg)	Cost (Cr.)
Hull	20 M^3, Open configuration, Wood/Organic Materials, Waterproof	—	1530	2,400
—	Hull: 3 Structure: 3	—	—	—
Drive System	Water–Based	0.4	10	39
Power Plant	Pack Animal Power output: 9 Fuel Consumption: N/A	9	9	225
Armour	1	0	0	0
Sensors	None (0 km +0 DM)	0	0	0
Crew	2	—	—	—
Operating Stations	2	1.25	250	—
Passengers	0	0	0	—
Cargo	0.753 dTons	9.35	935	—
Agility	–2 DM	—	—	—
Speed	Cruise: 5 kph Top: 7 kph	—	—	—
Total	—	20	2,734	2,664

CARAVEL

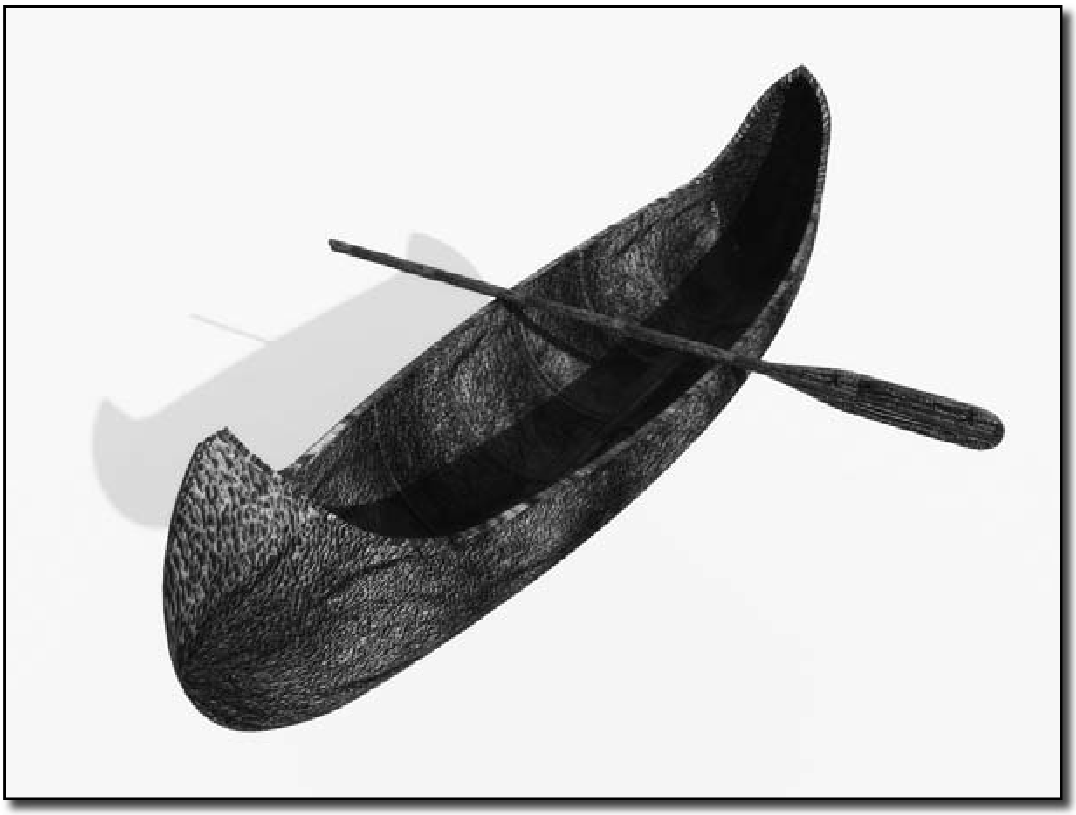
Caravels have three masts and typically carry around 70 people. These ships are capable of long journeys and are often used for exploration or trading by low technology civilisations.

Caravel (TL 1)		M^3	Mass (kg)	Cost (Cr.)
Hull	68 M^3, Open configuration, Wood/Organic Materials, Lightweight, Waterproof	—	4162	12,240
—	Hull: 9 Structure: 9	—	—	—
Drive System	Water–Based	1.36	34	136
Power Plant	Wind Power Power output: 140 Fuel Consumption: N/A	28	560	1,400
Armour	1	0	0	0
Crew	8	—	—	—
Operating Stations	2 + 6 workstations	9.1	910	—
Passengers	6	3	600	—
Cargo	2.532 dTons	26.54	2,654	—
Agility	–2 DM	—	—	—
Speed	Cruise: 24 kph Top: 32 kph	—	—	—
Total	—	68	8,920	13,776

CANOE

A small, narrow, water vehicle that is powered by up to four oarsmen. Canoes are commonly used on primitive worlds for hunting and fishing. Some cultures use canoes to transport goods for trade, but wagons (see page 47) and similar vehicles are more commonly used for this task.

Canoe (TL 1)		M^3	Mass (kg)	Cost (Cr.)
Hull	2 M^3, Open configuration, Lightweight, Wood/ Organic Materials, Waterproof	—	122	245
—	Hull: 1 Structure: 1	—	—	—
Drive System	Water–Based	0.04	1	4
Power Plant	Manual Power Power output: 2 Fuel Consumption: N/A	(1)	0	0
Armour	1	0	0	0
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	0	0	0	—
Cargo	0.053 dTons	0.71	71	—
Agility	–2 DM	—	—	—
Speed (per oarsman)	Cruise: 10 kph Top: 13 kph	—	—	—
Total	—	2	319	249



CATAMARAN

These small double–hulled boats have a single mast and sail. In low technology cultures they are used for fishing and transporting small amounts of cargo. High technology versions are usually used for recreational purposes but are also used for other applications.

Catamaran (TL 1)		M^3	Mass (kg)	Cost (Cr.)
Hull	7 M^3 Open configuration, Wood/Organic Materials, Lightweight, Waterproof	—	428	1,260
—	Hull: 1 Structure: 1	—	—	—
Drive System	Water–Based	0.14	4	13
Power Plant	Wind Power Power output: 20 Fuel Consumption: N/A	4	80	200
Armour	1	0	0	0
Crew	1	—	—	—
Operating Stations	1	0.625	125	—
Passengers	2	1	200	—
Cargo	0.178 dTons	1.23	123	—
Agility	–2 DM	—	—	—
Speed	Cruise: 32 kph Top: 42 kph	—	—	—
Total	—	7	960	1,473

Catamaran (TL 6)		M^3	Mass (kg)	Cost (Cr.)
Hull	8 M^3, Open configuration, Light Alloys, Lightweight, Waterproof	—	461	3,600
—	Hull: 2 Structure: 2	—	—	—
Drive System	Water–Based	0.16	4	15
Power Plant	Wind Power Power output: 25 Fuel Consumption: N/A	5	50	500
Armour	2	0	0	0
Crew	1	—	—	—
Operating Stations	1	0.625	125	—
Passengers	2	1	200	—
Cargo	0.08 dTons	1.21	121	—
Agility	–2 DM	—	—	—
Speed	Cruise: 40 kph Top: 53 kph	—	—	—
Total	—	8	961	4,115

DEEPWATER SUB

These high technology vessels are capable of reaching much deeper depths than earlier submarines. Deepwater subs are most often used for transporting ore from deep underwater mining facilities, standard submarines (see page 86) are usually used for most other underwater transportation.

Deepwater Sub (TL 8)		M³	Mass (kg)	Cost (Cr.)
Hull	28 M³, Streamlined configuration, Advanced Composites, Rugged, Sealed	—	2,898	47,775
—	Hull: 10 Structure: 11	—	—	—
Drive System	Submarine	2.8	420	14,000
Power Plant	Hydrogen Fuel Cell–8 Power output: 270 Fuel Consumption: 5 per hour	10	1,500	18,000
Fuel	70 litres (14 hours operation)	0.07	70	—
Armour	4	0	—	0
Sensors	Comprehensive (3 km +2 DM)	1	2	1,000
Communications	Laser 5km	0.5	2	200
Environmental	Life Support, Basic	0.28	56	14,000
Crew	2	—	—	—
Operating Stations	2	2.5	250	—
Passengers	6	6	600	—
Cargo	0.36 dTons	4.85	485	—
Agility	–2 DM	—	—	—
Speed	Cruise: 39 kph Top: 53 kph	—	—	—
Total	—	28	6,283	94,975

RIVER FERRY

These vessels are capable of transporting a large number of passengers, cargo or other vehicles across rivers or narrow sea straits. Larger ferries are used for longer sea crossings and have a number of facilities that are available to passengers during the journey.

River Ferry (TL 7)		M³	Mass (kg)	Cost (Cr.)
Hull	525 M³, Standard configuration, Light Alloys, Waterproof	—	42,000	157,500
—	Hull: 101 Structure: 102	—	—	—
Drive System	Water–Driven	52.5	7,875	262,500
Power Plant	Internal Combustion–7 Power output: 1,650 Fuel Consumption: 125 per hour	100	7,500	135,000
Fuel	2,500 litres (20 hours operation)	2.5	2,500	—
Armour	2	0	—	0
Sensors	Basic (1 km +1 DM)	0.5	1	500
Communications	Radio 100km	1	5	1,000
Crew	10 (includes pilots, engineers and stewards)	—	—	—
Operating Stations	10	12.5	1,250	—
Passengers	221	221	2,210	—
Cargo	10 dTons	135	13,500	—
Agility	–2 DM	—	—	—
Speed	Cruise: 33 kph Top: 43 kph	—	—	—
Total	—	525	76,841	556,500

HYDROFOIL

These boats have foils mounted under the hull that are designed to lift the vessel at high speeds. Once this lift has been achieved, the reduced drag greatly increases the top speed but reduces the manoeuvrability.

Hydrofoil (TL 7)		M^3	Mass (kg)	Cost (Cr.)
Hull	26 M^3, Super Streamlined configuration, Light Alloys, Lightweight, Waterproof	—	1,664	23,400
—	Hull: 5 Structure: 6	—	—	—
Drive System	Water–Driven	2.6	390	13,000
Power Plant	Internal Combustion–7 Power output: 84 Fuel Consumption: 15 per hour	6	450	8,100
Fuel	120 litres (8 hours operation)	0.12	120	—
Armour	2	0	—	0
Sensors	Basic (1 km +1 DM)	0.5	1	500
Communications	Radio 10km	0	0.25	250
Equipment	Hydrofoils	—	16.64	26,000
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	15	15	1,500	—
Cargo	0.78 dTons	0.53	53	—
Agility	–2 DM	—	—	—
Speed	Cruise: 46 kph Top: 62 kph	—	—	—
Total	—	26	4,320	71,250

LUXURY YACHT

Luxury yachts are most commonly used by the rich and famous for recreation and entertaining friends or clients. Yachts often serve as a status of wealth on many worlds, the example below is an extreme example of one of the larger vessels which might be encountered sailing the ocean.

Luxury Yacht (TL 8)		M^3	Mass (kg)	Cost (Cr.)
Hull	33,750 M^3, Standard configuration, Advanced Composites, Waterproof	—	3,037,500	20,250,000
—	Hull: 10,546 Structure: 10,548	—	—	—
Drive System	Water–Driven	3,375	506,250	16,875,000
Power Plant	Turbine–8 (Improved Fuel Efficient Engine) Power output: 97,500 Fuel Consumption: 675 per hour	1,500	135,000	25,500,000
Fuel	307,800 litres (19 days operation)	307.8	307,800	—
Armour	4	0	0	0
Sensors	Comprehensive (3 km +2 DM)	1	2	1,000
Communications	Laser 100km	5	10	12,000
Crew	40	20	2,000	—
Operating Stations	20	25	2,500	—
Passengers	10	10	1,000	—
Sleeping Areas (Crew)	40 Standard (individual cabins)	200	6,000	100,000
Sleeping Areas (Passengers)	20 Luxury	1,000	50,000	1,000,000
Utility Areas	Bar, Disco, Lounge, 2 Helicopter Pads, Swimming pool, 2 x Galley, Banquet Hall, Crew's Mess, Tennis Court, Minisubmarine, 2 Motor Boats, Hangar, Sauna, Cinema, Multimedia Centre, Library, Crew's Mess	25,306	1,897,950	31,632,500
Cargo	148.148 dTons	2,000	200,000	—
Agility	–2 DM	—	—	—
Speed	Cruise: 24 kph Top: 32 kph	—	—	—
Total	—	33,749.8	6,146,012	95,370,500

MOTOR BOAT

Motor boats are propeller driven vessels with a small cabin and deck. They have many applications but they are most often used for fishing and recreational purposes.

Motor Boat (TL 5)		M³	Mass (kg)	Cost (Cr.)
Hull	20 M³, Streamlined configuration, Wood, Open, Lightweight, Waterproof	—	1,224	4,680
—	Hull: 5 Structure: 5	—	—	—
Drive System	Water–Driven	2	300	10,000
Power Plant	Internal Combustion–5 Power output: 60 Fuel Consumption: 24 per hour	6	480	4,000
Fuel	144 litres (6 hours operation)	0.144	144	—
Armour	1	0	0	0
Sensors	Basic (1 km +1 DM)	0.5	1	100
Communications	Radio 100km	1	10	1,000
Crew	1	—	—	—
Operating Stations	1	0.63	125	—
Passengers	6	3	600	—
Sleeping Areas	1 simple (2 occupants)	4	80	600
Cargo	0.201 dTons	2.726	272.6	—
Agility	–2 DM	—	—	—
Speed	Cruise: 30 kph Top: 40 kph	—	—	—
Total	—	20	3,337	20,380

POLICE CUTTER

These small boats are designed to be fast and manoeuvrable and are used to patrol the waters and pursue other water vessels when required. Police cutters are fitted with sensors operated by a second crewman.

Police Cutter (TL 7)		M³	Mass (kg)	Cost (Cr.)
Hull	12 M³, Standard, Light Alloys, Lightweight, Waterproof	—	768	5,400
—	Hull: 3 Structure: 3	—	—	—
Drive System	Water–Driven	1.2	180	6,000
Power Plant	Turbine–7 Power output: 96 Fuel Consumption: 36 per hour	4	360	16,000
Fuel	216 litres (6 hours operation)	0.22	216	—
Armour	2	0	0	0
Sensors	Comprehensive (3 km +2 DM)	1	2	1,000
Communications	Radio 100km	0.5	5	1,000
Equipment	Excellent Controls	0.12	7.68	12,000
Crew	2 (pilot, sensor operator)	—	—	—
Operating Stations	2	2.5	250	—
Passengers	2	2	200	—
Cargo	0.021 dTons	0.46	46	—
Agility	+1 DM	—	—	—
Speed	Cruise: 72 kph Top: 96 kph	—	—	—
Total	—	12	2,035	41,400

POWER BOAT

Powerboats are small and lightweight to achieve high speeds. Their open topped design makes them ideal for recreational use, but the high speed also makes them popular for running contraband and other illegal activities.

Power Boat (TL 7)		M^3	Mass (kg)	Cost (Cr.)
Hull	14 M^3, Standard configuration, Open, Light Alloys, Lightweight, Waterproof	—	806.4	6,300
—	Hull: 3 Structure: 4	—	—	—
Drive System	Water–Driven	1.4	210	7,000
Power Plant	Internal Combustion–7 Power output: 144 Fuel Consumption: 22.5 per hour	9	675	12,150
Fuel	135 litres (6 hours operation)	0.14	135	—
Armour	2	0	0	0
Sensors	Minimal (0.25 km +0 DM)	0.25	0.5	100
Communications	Radio 50km	0.25	1	750
Equipment	Improved Controls	—	—	3,500
Crew	1	—	—	—
Operating Stations	1	0.63	125	—
Passengers	4	2	400	—
Cargo	0.025 dTons	0.33	33	—
Agility	–1 DM	—	—	—
Speed	Cruise: 92 kph Top: 122 kph	—	—	—
Total	—	14	2,386	29,800

RESCUE BOAT

These medium sized boats are used to rescue people from sea disasters. Rescue boats are designed for easy access to other vessels and victims who are stranded in the water. They are fast, stable and include basic medical facilities to treat any injuries.

Rescue Boat (TL 6)		M³	Mass (kg)	Cost (Cr.)
Hull	42 M³, Standard configuration, Light Alloys, Lightweight, Waterproof	—	2,688	18,900
—	Hull: 8 Structure: 9	—	—	—
Drive System	Water–Driven	4.2	630	21,000
Power Plant	Internal Combustion–6 Power output: 245 Fuel Consumption: 28 per hour	14	1,050	16,800
	336 litres (12 hours operation)	0.34	336	—
Armour	2	0	0	0
Sensors	Basic Long Range (10 km +1 DM)	1.5	2	2,500
Communications	Radio 100km	1	10	1,000
Equipment	Improved Controls	0	—	10,500
Crew	4	—	—	—
Operating Stations	4	5	500	—
Passengers	12	12	1,200	—
Cargo	0.313 dTons	3.96	396	—
Agility	–1 DM	—	—	—
Speed	Cruise: 55 kph Top: 73 kph	—	—	—
Total	—	42	6,812	70,700

RESEARCH SUB

Research subs are primarily used to study marine life and underwater features. Passenger facilities and environmental systems are provided for long journeys. Communications, sensor equipment, and laboratories are also included, but specific tools and equipment (such as computers) must be purchased separately as required.

Research Sub (TL 9)		M³	Mass (kg)	Cost (Cr.)
Hull	102 M³, Streamlined configuration, Advanced Composites, Sealed	—	9,180	99,450
—	Hull: 32 Structure: 33	—	—	—
Drive System	Submarine	10.2	1,530	51,000
Power Plant	Nuclear Fusion–9 Power output: 306 Fuel Consumption: 34 per hour	34	5,100	306,000
Fuel	3,264 litres (4 days operation)	3.264	3,264	—
Armour	4	0	0	0
Sensors	Advanced Long Range (50 km +3 DM)	9	5	10,000
Communications	Laser 50km	2	8	5,000
Environmental	Life Support, Advanced	3.06	1,071	765,000
Crew	3 (pilot, engineer, sensor operator)	—	—	—
Operating Stations	3	3.75	375	—
Passengers	7	7	700	—
Sleeping Areas	1 (6 occupants)	15	510	8,500
Utility Areas	Laboratory, galley (8 occupants)	14	1,050	17,500
—	2 x Computer/1	0	0	200
Cargo	0.314 dTons	0.72	72	—
Agility	–2 DM	—	—	—
Speed	Cruise: 12 kph Top: 16 kph	—	—	—
Total	—	101.99	22,865	1,262,650

RESEARCH SHIP

Research ships are used for a wide variety of scientific applications. The vessel provides passenger facilities for long journeys and has environmental systems that can cope with most conditions. Communications, sensor equipment, and laboratories are also included, but specific tools and equipment (such as computers) must be purchased separately as required.

Research Ship (TL 7)		M^3	Mass (kg)	Cost (Cr.)
Hull	118 M^3, Standard configuration, Light Alloys, Lightweight, Waterproof	—	7,552	53,100
—	Hull: 23 Structure: 24	—	—	—
Drive System	Water–Driven	11.8	1,770	59,000
Power Plant	Internal Combustion–7 Power output: 400 Fuel Consumption: 33.3 per hour	20	1,500	27,000
Fuel	18,000 litres (22.5 days operation)	18	18,000	—
Armour	2	0	0	0
Sensors	Comprehensive Long Range (30 km +2 DM)	3	4	5,000
Communications	Maser 50km	2	16	15,000
Crew	10 (captain, helmsman, engineers, sensor operators, scientists)	—	—	—
Operating Stations	10	12.5	1,250	—
Passengers	0	0	0	—
Sleeping Areas	Standard (10 occupants)	23	690	11,500
Utility Areas	Laboratory, galley (10 occupants)	16	1,200	20,000
—	3 x Computer/0	—	—	150
Cargo	0.929 dTons	11.7	1,170	—
Agility	–2 DM	—	—	—
Speed	Cruise: 18 kph Top: 24 kph	—	—	—
Total	—	118	33,152	190,750

RIVER STEAMBOAT

Plying major rivers these craft are important vessels and are capable of operating over short distances in coastal regions.

Steamboat (TL 4)		M^3	Mass (kg)	Cost (Cr.)
Hull	325 M^3, Streamlined configuration, Iron, Lightweight, Waterproof	—	28,600	114,075
—	Hull: 46 Structure: 46	—	—	—
Drive System	Water–Driven	32.5	4,875	162,500
Power Plant	Steam–4 Power output: 1,440 Fuel Consumption: 400 per hour	160	24,000	40,000
Fuel	4,800 litres (12 hours operation)	4.8	4,800	—
Armour	2	0	0	0
Crew	5 (pilots and engineers)	—	—	—
Operating Stations	5	6.25	625	—
Passengers	50	50	5,000	—
Utility Areas	1 (25 occupants)	53	3,975	35,000
Cargo	1.366 dTons	18.45	1,845	—
Agility	–2 DM	—	—	—
Speed	Cruise: 30 kph Top: 40 kph	—	—	—
Total	—	325	73,720	351,575

SLOOP

Sloops are small sailboats that have a fore and aft rig on a single mast. On low technology worlds, these boats are commonly used for fishing but the lack of cargo space restricts their use for trade purposes. On more advanced worlds, sloops are less common except for recreational purposes.

Sloop (TL 1)		M^3	Mass (kg)	Cost (Cr.)
Hull	16 M^3, Open configuration, Wood/Organic Materials, Lightweight, Waterproof	—	979	2,880
—	Hull: 2 Structure: 2	—	—	—
Drive System	Water–Based	0.32	8	31
Power Plant	Wind Power Power output: 40 Fuel Consumption: N/A	8	160	400
Armour	1	0	0	0
Crew	1	—	—	—
Operating Stations	1	0.625	125	—
Passengers	2	1	200	—
Cargo	0.552 dTons	6.05	605	—
Agility	–2 DM	—	—	—
Speed	Cruise: 29 kph Top: 39 kph	—	—	—
Total	—	16	2,077	3,311

Sloop (TL 6)		M^3	Mass (kg)	Cost (Cr.)
Hull	16 M^3, Open configuration, Light Alloys, Lightweight, Waterproof	—	922	7,200
—	Hull: 4 Structure: 4	—	—	—
Drive System	Water–Based	0.32	8	31
Power Plant	Wind Power Power output: 50 Fuel Consumption: N/A	10	100	500
Armour	2	0	0	0
Crew	1	—	—	—
Operating Stations	1	0.625	125	—
Passengers	2	1	200	—
Cargo	0.387 dTons	4.05	405	—
Agility	–2 DM	—	—	—
Speed	Cruise: 43 kph Top: 58 kph	—	—	—
Total	—	16	1,760	7,731

SUBMARINE

Civilian submarines are most often used on ocean worlds for transporting passengers and goods between underwater settlements, but are also used for salvage, exploration and maintenance of underwater facilities.

Submarine (TL 8)		M^3	Mass (kg)	Cost (Cr.)
Hull	55 M^3, Streamlined configuration, Advanced Composites, Sealed	—	4,950	53,625
—	Hull: 17 Structure: 18	—	—	—
Drive System	Submarine	5.5	825	27,500
Power Plant	Nuclear Fission–7 Power output: 390 Fuel Consumption: N/A	30	6,000	210,000
Armour	4	0	0	0
Sensors	Comprehensive Extended Range (9 km +2 DM)	2	3	2,000
Communications	Laser 20km	1	6	1,000
Environmental	Life Support, Improved	1.1	275	137,500
Crew	2 (pilot, engineer)	—	—	—
Operating Stations	2	2.5	250	—
Passengers	4	4	400	—
Cargo	0.741 dTons	8.9	890	—
Agility	–2 DM	—	—	—
Speed	Cruise: 26 kph Top: 35 kph	—	—	—
Total	—	55	13,599	431,625

SUBMERSIBLE

A submersible is a small underwater vehicle with limited range. They are usually carried onboard research ships, submarines and underwater facilities.

Submersible (TL 7)		M^3	Mass (kg)	Cost (Cr.)
Hull	8 M^3, Streamlined configuration, Light Alloys, Lightweight, Sealed	—	512	5,850
—	Hull: 2 Structure: 2	—	—	—
Drive System	Submarine	0.8	120	4,000
Power Plant	Hydrogen Fuel Cell–7 Power output: 64 Fuel Consumption: 4 per hour	4	600	6,000
Fuel	20 litres (5 hours operation)	0.02	20	—
Armour	2	0	0	0
Sensors	Basic (1 km +1 DM)	0.5	1	500
Communications	Radio 5km	0	0	100
Environmental	Life Support, Basic	0.08	16	4,000
Equipment	Improved Controls	—	—	2,000
Crew	2	—	—	—
Operating Stations	2	2.5	250	—
Passengers	0	0	0	—
Cargo	0.12 dTons	0.10	10	—
Agility	–1 DM	—	—	—
Speed	Cruise: 42 kph Top: 56 kph	—	—	—
Total	—	8	1,529	22,450

TENDER

Most large seagoing vessels have a number of tenders which are used to transport people and cargo between the ship and the dock or shore. Tenders often double as lifeboats in case of emergency.

Tender (TL 5)		M³	Mass (kg)	Cost (Cr.)
Hull	8 M³, Open configuration, Steel, Lightweight, Waterproof	—	576	2,880
—	Hull: 2 Structure: 2	—	—	—
Drive System	Water–Driven	0.8	120	4,000
Power Plant	Internal Combustion–5 Power output: 12 Fuel Consumption: 4 per hour	1	80	1,000
Fuel	5 litres (1.25 hours operation)	0.01	5	—
Armour	3	0	0	0
Crew	1	—	—	—
Operating Stations	1	0.625	125	—
Passengers	8	4	800	—
Cargo	0.381 dTons	1.565	157	—
Agility	–2 DM	—	—	—
Speed	Cruise: 10 kph Top: 13 kph	—	—	—
Total	—	8	1,863	7,880

TUGBOAT

Tugboats are slow, high powered vessels that are designed to tow or push much larger ships and water based platforms.

Tugboat (TL 6)		M³	Mass (kg)	Cost (Cr.)
Hull	60 M³, Streamlined configuration, Light Alloys, Lightweight, Waterproof	—	3,840	35,100
—	Hull: 12 Structure: 12	—	—	—
Drive System	Water–Driven	6	900	30,000
Power Plant	Internal Combustion–6 Power output: 625 Fuel Consumption: 100 per hour	50	3,750	60,000
Fuel	400 litres (4 hours operation)	0.4	400	—
Armour	2	0	0	0
Sensors	Minimal (0.25 km +0 DM)	0.25	0.5	100
Crew	2	–	—	—
Operating Stations	2	2.5	250	—
Cargo	0.229 dTons	0.85	85	—
Agility	–2 DM	—	—	—
Speed	Cruise: 9 kph Top: 12 kph Can pull larger vessels at this speed.	—	—	—
Total	—	60	9,226	125,200

Hybrid Vehicles

AATV

The Amphibious All Terrain Vehicle is designed to operate on both land and water. This versatile vehicle has an open topped chassis and eight large wheels that provide propulsion stability over rough terrain and in water. The AATV is often used by colonists, explorers and travellers.

AATV (TL 6)		M³	Mass (kg)	Cost (Cr.)
Hull	11 M³, Open configuration, Light Alloys, Waterproof	—	792	3,300
—	Hull: 3 Structure: 4	—	—	—
Drive System	Wheels	1.1	110	1,100
Power Plant	Internal Combustion–6 Power output: 35 Fuel Consumption: 7.5 per hour	2.5	187.5	3,000
Fuel	60 litres (8 hours operation)	0.06	60	—
Armour	2	0	0	0
Sensors	Minimal (0.25 km +0 DM)	0.25	0.5	100
Equipment	Improved Controls	0	0	2,750
—	Drive Wheels (8x8)	0.83	82.5	1,650
—	Offroad Suspension	0.28	27.5	2,200
Crew	1	—	—	—
Operating Stations	1	0.63	125	—
Passengers	7	3.5	700	—
Cargo	0.137 dTons	1.85	185	—
Agility	–1 DM (+2 DM offroad)	—	—	—
Speed (land)	Cruise: 93 kph Top: 123 kph Offroad: 37 kph	—	—	—
Speed (water)	Cruise: 23 kph Top: 31 kph	—	—	—
Total	—	11	2,270	14,100
Ground Pressure	2.06	—	—	—

Amphibious Aircraft

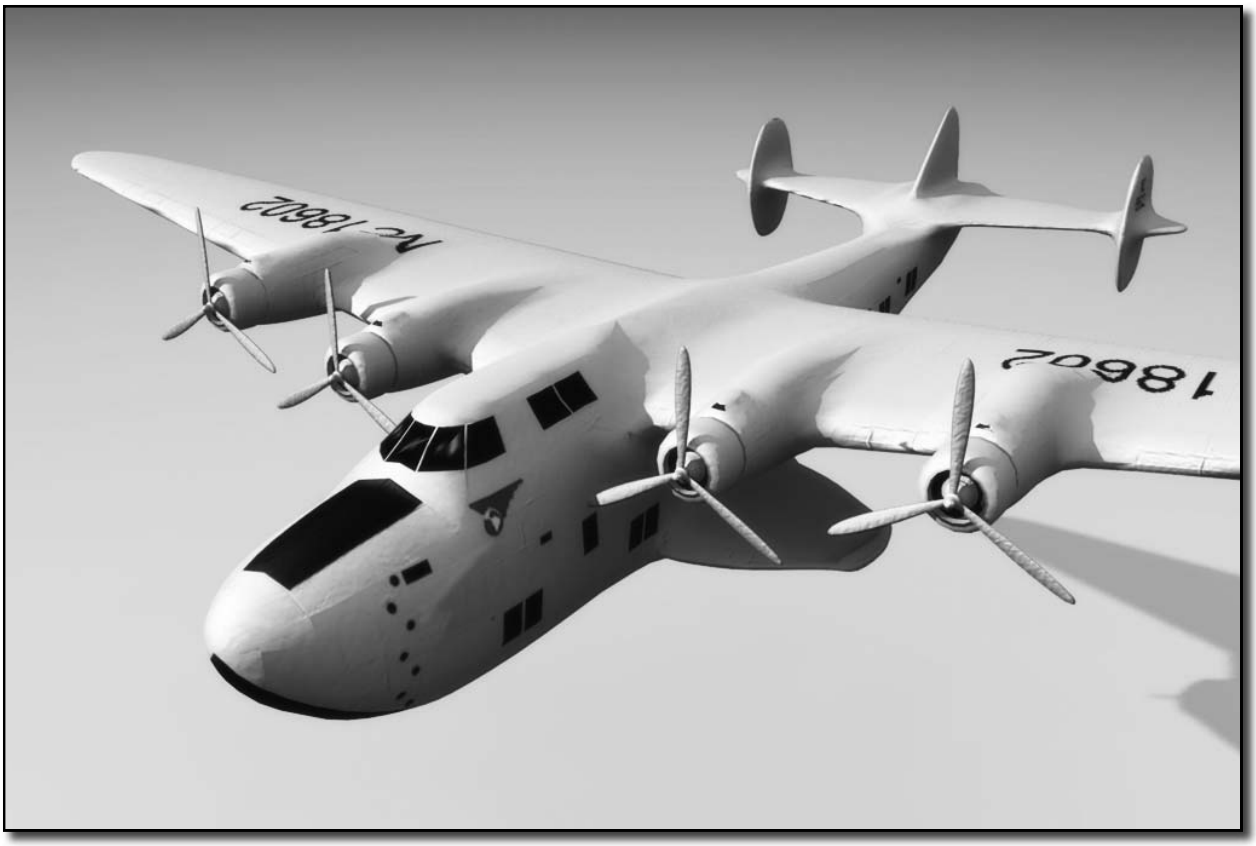
This medium sized plane has landing wheels and floats that allow it to land on the ground or on water. Many low technology worlds use Amphibious Aircraft as standard runways are not available due to economical or topographical considerations.

Amphibious Aircraft (TL 6)		M³	Mass (kg)	Cost (Cr.)
Hull	58 M³, Airframe configuration, Light Alloys, Lightweight, Waterproof	—	3340.8	39,150
—	Hull: 11 Structure: 12	—	—	—
Drive System	Propeller	2.9	174	43,500
Power Plant	Internal Combustion–6 Power output: 175 Fuel Consumption: 20 per hour	10	750	12,000
Fuel	300 litres (15 hours operation)	0.3	300	—
Armour	2	0	0	0
Sensors	Basic Extended Range (3 km +1 DM)	1	1.5	1,000
Communications	Radio 100km	1	10	1,000
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	14	14	1,400	—
Cargo	2.041 dTons	27.55	2,755	—
Agility	+1 DM	—	—	—
Speed	Cruise: 333 kph Top: 445 kph	—	—	—
Total	—	58	8,856	96,650

Flying Boat

The flying boat has a fuselage that acts like a boat's hull, enabling it to land on the water. Flying boats can travel on the water, but their speed and manouverability is limited. These large planes have space for both passengers and cargo but due to the design they are restricted to water landings only.

Flying Boat (TL 6)		M^3	Mass (kg)	Cost (Cr.)
Hull	120 M^3, Airframe configuration, Light Alloys, Lightweight, Waterproof	—	6,912	81,000
—	Hull: 24 Structure: 24	—	—	—
Drive System	Propeller	6	360	90,000
Power Plant	Internal Combustion–6 Power output: 315 Fuel Consumption: 36 per hour	18	1,350	21,600
Fuel	648 litres (18 hours operation)	0.65	648	—
Armour	2	0	0	0
Sensors	Basic Long Range (10 km +1 DM)	1.5	2	2,500
Communications	Radio 100km	1	10	1,000
Crew	2 (pilot, co–pilot)	—	—	—
Operating Stations	2	2.5	250	—
Passengers	16	16	1,600	—
Cargo	5.968 dTons	74.35	7,435	—
Agility	+1 DM	—	—	—
Speed (flight)	Cruise: 282 kph Top: 382 kph	—	—	—
Speed (water)	Cruise: 26 kph Top: 34 kph	—	—	—
Total	—	120	18,567	196,100



HOVERCRAFT

Hovercraft create a cushion of air that allows the vehicle to travel over land and water without the usual penalties for rough terrain. This model is a small open topped vehicle that can carry a reasonable amount of cargo or passengers. Like many vehicles of this size and versatility, they are popular choices for colonists, traders and travellers.

Hovercraft (TL 7)		M³	Mass (kg)	Cost (Cr.)
Hull	10 M³, Open configuration, Advanced Composites	—	810	5,000
—	Hull: 2 Structure: 3	—	—	—
Drive System	Hover	1.5	112.5	300,000
Power Plant	Internal Combustion–7 Power output: 16 Fuel Consumption: 2.5 per hour	1	75	1,350
Fuel	25 litres (10 hours operation)	0.03	25	—
Armour	4	0	0	0
Sensors	Basic (1 km +1 DM)	0.5	1	500
Equipment	Improved Controls	0	0	2,500
Crew	1	—	—	—
Operating Stations	1	0.63	125	—
Passengers	6	3	600	—
Cargo	0.247 dTons	3.34	334	—
Agility	+0 DM	—	—	—
Speed	Cruise: 91 kph Top: 121 kph	—	—	—
Total	—	10	2,083	309,350

LANDSHIP

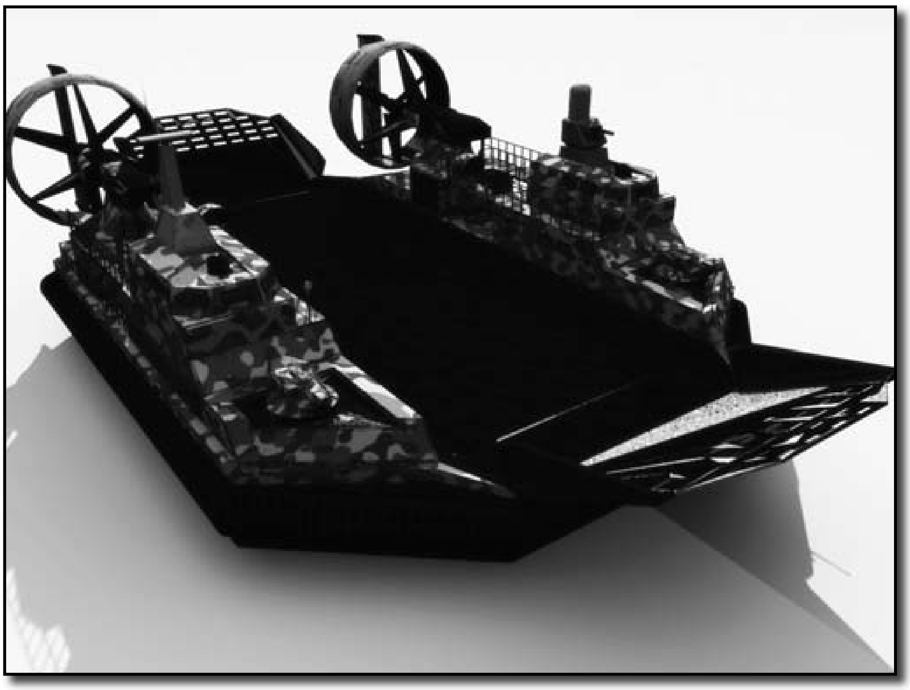
These unusual vessels look much like a conventional sailing ship, but they also have wheels attached to the hull that enables the vehicle to effortlessly move between land and sea. These unusual vessels are not seen on many worlds as their usefulness is limited by the weather conditions and terrain. Due their limited manouverability on land, landships are usually restricted it to large open areas such as plains and deserts.

Landship (TL 4)		M³	Mass (kg)	Cost (Cr.)
Hull	88 M³, Open configuration, Wood, Waterproof	—	6,732	10,560
—	Hull: 11 Structure: 11	—	—	—
Drive System	Wheels	8.8	880	8,800
Power Plant	Wind Power–1 Power output: 112 Fuel Consumption: N/A	28	560	1,400
Armour	1	0	0	0
Crew	10	—	—	—
Operating Stations	2 + 8 workstations	5.85	1,170	—
Cargo	3.359 dTons	45.35	4,535	—
Agility	–2 DM	—	—	—
Speed (land)	Cruise: 61 kph Top: 81 kph Offroad: 12 kph	—	—	—
Speed (water)	Cruise: 12 kph Top: 16 kph	—	—	—
Total	—	88	13,877	20,935
Ground Pressure	1.58	—	—	—

Hover Ferry

These large hover vehicles are primarily designed to transport passengers and vehicles but a reasonable amount of cargo space is also available. Hover ferries are often used for short sea journeys between islands and because they are not restricted to the sea, they can dock at land based facilities making it easier and safer for passengers to disembark.

Hover Ferry (TL 6)		M^3	Mass (kg)	Cost (Cr.)
Hull	120 M^3 (base 100), Box configuration, Light Alloys	—	8,000	20,000
—	Hull: 28 Structure: 28	—	—	—
Drive System	Hover	15	1,125	3,000,000
Power Plant	Internal Combustion–6 Power output: 175 Fuel Consumption: 20 per hour	10	750	12,000
Fuel	210 litres (10.5 hours operation)	0.21	210	—
Armour	2	0	0	0
Sensors	Basic Extended Range (3 km +1 DM)	1	1.5	1,000
Communications	Radio 100km	1	10	1,000
Equipment	Improved Controls	0	0	25,000
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	40	40	4,000	—
Cargo	3.818 dTons	51.54	5,154	—
Agility	+0 DM	—	—	—
Speed	Cruise: 106 kph Top: 141 kph	—	—	—
Total	—	120	19,376	3,059,000



SEA PLANE

The sea plane is a small plane with floats that allow it to land on water instead of conventional runways. Sea planes are common on low technology worlds where standard runways are not commonly available.

Sea Plane (TL 4)		M³	Mass (kg)	Cost (Cr.)
Hull	24 M³, Airframe configuration, Iron, Lightweight, Waterproof	—	1,900.8	9,720
—	Hull: 3 Structure: 4	—	—	—
Drive System	Propeller	1.2	72	18,000
Power Plant	Internal Combustion–4 Power output: 50 Fuel Consumption: 25 per hour	5	450	4,000
Fuel	200 litres (8 hours operation)	0.2	200	—
Armour	2	0	0	0
Sensors	Minimal (0.25 km +0 DM)	0.25	0.5	100
Communications	Radio 50km (TL 4)	0.25	2.5	750
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	6	6	600	—
Cargo	0.73 dTons	9.85	985	—
Agility	+1 DM	—	—	—
Speed	Cruise: 195 kph Top: 259 kph	—	—	—
Total	—	24	4,336	32,570

SUBMERGIBLE PLANE

This medium sized aircraft is capable of travelling underwater. These vehicles are usually found on worlds with underwater settlements and facilities; the submergible plane provides fast transport between locations by travelling most of the distance by air.

Submergible Plane (TL 8)		M³	Mass (kg)	Cost (Cr.)
Hull	80 M³, Airframe configuration, Light Alloys, Sealed	—	5,760	45,000
—	Hull: 22 Structure: 23	—	—	—
Drive System	Jet	12	1,200	420,000
Power Plant	Turbine–8 Power output: 156 Fuel Consumption: 54 per hour	6	540	25,500
Fuel	432 litres (8 hours operation)	0.43	432	—
Armour	4	0	0	0
Sensors	Comprehensive Long Range (30 km +2 DM)	3	4	5,000
Communications	Radio 50km (TL 7)	0.25	1	750
Environmental	Life Support, Basic	0.8	160	40,000
Crew	1	—	—	—
Operating Stations	1	1.25	125	—
Passengers	30	30	3,000	—
Cargo	2.01 dTons	26.27	2,627	—
Agility	+1 DM (–2 DM water)	—	—	—
Speed (flight)	Cruise: 528 kph Top: 704 kph	—	—	—
Speed (water)	Cruise: 10 kph Top: 14 kph	—	—	—
Total	—	80	13,849	536,250

Civilian Vehicles

TRAVELLER

Hull

	M3	Mass (kg)	Cost (Cr)

Hull Points	
Structure Points	
Agility	
Top Speed	
Cruising Speed	
Offroad Speed	
Total Mass	
Total Cost	
Ground Pressure	

Drive System

	M3	Mass (kg)	Cost (Cr)

	M3	Mass (kg)	Cost (Cr)
Fuel			
Armour			
Cargo			

Power Plant

	M3	Mass	Cost (Cr)

Power Output	
Fuel Consumption	

Armour Facing Value

	Value
Dorsal	
Ventral	
Front	
Rear	
Left/Port	
Right/Starboard	

Weapons

	Ammo	M3	Mass (kg)	Cost (Cr)

Additional Equipment

	M3	Mass (kg)	Cost (Cr)

Personnel

	M3	Mass (kg)	Cost (Cr)
Crew			
Operating Stations			
Workstations			
Passengers			
Utility Areas			

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Supplement 5: Civilian Vehicles

In the universe there are countless planets to explore and the best way to do so is by using a vehicle. Within this book there are rules for creating your own designs, from primitive chariots and galleys to high technology grav cars and trains. The variety possible is endless.

Besides rules for designing your own unique models there are over ninety different vehicles provided within, split into vaious categories. Aircraft, land vehicles, watercraft, grav vehicles and walkers are all represented and able to complete any journey a traveller needs to make.

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