

# 2300AD

BOOK 3  
VEHICLES & SPACECRAFT



# 2300AD

HUMANITY DISCOVERS THE STARS

## BOOK 3: VEHICLES & SPACECRAFT

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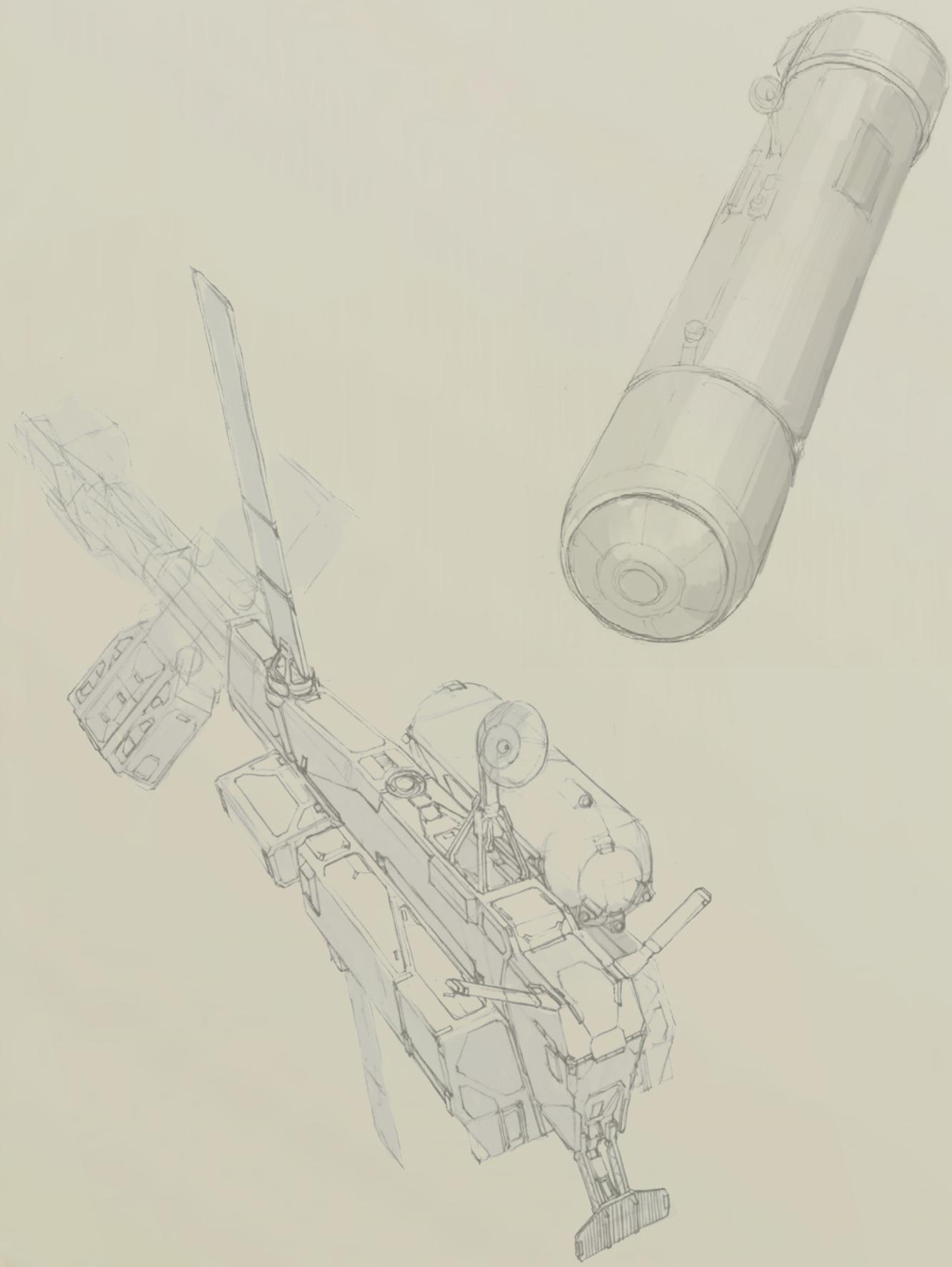
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2300AD





Broadly speaking, vehicles fall into three categories: land, air and sea. On Frontier worlds, wheeled off-road vehicles are dominant, although hovercraft are widely used in a variety of roles. Small motorcycles and ATVs are a common way to get around. Tracked vehicles are usually used in exceptionally rough terrain; walkers are also used for rough terrain but their complexity and relatively low speed makes them uncommon.

# M I L I T A R Y A N D C I V I L I A N V E H I C L E S

In the air, Frontier worlds often see large lifting-body airships carrying mostly freight. Only the most advanced worlds will have rail and ocean transport systems that can compete effectively with the airships. Tilt-rotor aircraft, tuned to the vagaries of each world, make up the bulk of short-range air travel, combining the speed of conventional aircraft with the versatility of helicopters.



In the waters of the seas and oceans across settled space, conventional-hulled boats and ships vie with hydrofoils and huge wing-in-ground effect vessels. Submarines cruise under the waters, a mix of research vessels, cargo ships and the sinister, although thankfully rare, sub-frigates and arsenal subs.

Most vehicles are electrically-driven, although the power source can be from batteries, fuel cells or a generator run from a gas turbine or Stirling engine.

# CIVILIAN GROUND VEHICLES

On the Frontier, civilian vehicles need to be rugged and robust as the marketing trends and planned obsolescence that drive vehicle design in the Core do not apply on the Frontier.

Few in the Core own their own vehicles, instead accessing a fleet of self-driving vehicles that prowl the streets of most Core cities, on the alert for a Link hail. On the Frontier, however, personal vehicle ownership can mean the difference between life and death in an emergency. While heavy equipment may be communal, booked as needed, everyone has access to some form of personal transportation. Motorcycles and range trucks are the most common choices outside cities.

## TrafCon

On Earth and Tirane, all vehicles sold come equipped with TrafCon (Traffic Control) links, allowing them to be driven autonomously. These vehicles are also tied into the global satellite network, for both navigation and tracking purposes.



### BUSHI 27 OFF-ROAD MOTORCYCLE

This small vehicle from Japan is a common sight on many Frontier worlds. Fast, and with good cross-country mobility, these bikes are in high demand across the Frontier. Variations on this design are often manufactured locally with fabricated parts and local materials.

<b>TL</b>	10
<b>Skill</b>	Drive (wheel)
<b>Agility</b>	+2
<b>Speed (cruise)</b>	Fast (High)
<b>Range (cruise)</b>	500 (750)
<b>Crew</b>	1
<b>Passengers</b>	—
<b>Cargo</b>	—
<b>Hull</b>	2
<b>Shipping</b>	0.5 tons
<b>Cost</b>	Lv7850

#### Armour

<b>Front</b>	3
<b>Sides</b>	3
<b>Rear</b>	3

<b>Traits</b>	Open Frame, Off-Road,
<b>Equipment</b>	Control System (improved), Navigation System (basic)
<b>Weapons</b>	—

#### Equipment

Autopilot (skill level)	—
Communications (range)	—
Navigation (Navigation DMw)	+1
Sensors (Electronics (sensors) DM)	—
Camouflage (Recon DM)	—
Stealth (Electronics (sensors) DM)	—

## BRIDGEPORT-SWIFT PIPER PERSONAL ATV

The Piper ATV is a small two-seat open-topped ATV, seeing wide use as a recreational vehicle but also used as a utility vehicle and for exploration. The compact fuel cell gives it a very long range in a multitude of environments. There are even variants designed for use in vacuum, with an oxygen tank added to the fuel cell.

<b>TL</b>	10
<b>Skill</b>	Drive (wheel)
<b>Agility</b>	+0
<b>Speed (cruise)</b>	Medium (Slow)
<b>Range (cruise)</b>	500 (750)
<b>Crew</b>	1
<b>Passengers</b>	1
<b>Cargo</b>	500kg
<b>Hull</b>	8
<b>Shipping</b>	2 tons
<b>Cost</b>	Lv8000

Armour	
<b>Front</b>	3
<b>Sides</b>	3
<b>Rear</b>	3

<b>Traits</b>	ATV
<b>Equipment</b>	Aquatic Drive, Navigation System (basic), Winch (light)
<b>Weapons</b>	—

### Equipment

Autopilot (skill level)	—
Communications (range)	—
Navigation (Navigation DM)	+1
Sensors (Electronics (sensors) DM)	—
Camouflage (Recon DM)	—
Stealth (Electronics (sensors) DM)	—



## SUMATRO FABRIQUE S750 COMPACT CAR

This represents a typical ground car of the type in use on most worlds. These cars feature independent motors in each wheel powered by the onboard fuel cell or fed from a high-density battery. Front and back wheels can steer independently, allowing great manoeuvrability and ease of parking.

<b>TL</b>	10
<b>Skill</b>	Drive (wheel)
<b>Agility</b>	+0
<b>Speed (cruise)</b>	High (Medium)
<b>Range (cruise)</b>	500 (750)
<b>Crew</b>	1
<b>Passengers</b>	3
<b>Cargo</b>	250kg
<b>Hull</b>	10
<b>Shipping</b>	2.5 tons
<b>Cost</b>	Lv14000

Armour	
<b>Front</b>	3
<b>Sides</b>	3
<b>Rear</b>	3

<b>Traits</b>	—
<b>Equipment</b>	Autopilot (improved), Entertainment System, Navigation System (basic)
<b>Weapons</b>	—

### Equipment

Autopilot (skill level)	1
Communications (range)	—
Navigation (Navigation DM)	+1
Sensors (Electronics (sensors) DM)	—
Camouflage (Recon DM)	—
Stealth (Electronics (sensors) DM)	—



## HOUSTON MOTORS RANGESTAR RANGE TRUCK

This vehicle, similar in concept to 21st Century L-ATVs and jeeps, is a crosscountry vehicle designed to carry passengers and light cargo. On the Core worlds, these vehicles are luxury vehicles, equipped with TrafCon and navigation/tracking modules. On the Frontier, vehicles like this are quite common, in personal, corporate, government and military use, and widely manufactured under a variety of brands and models.

<b>TL</b>	11
<b>Skill</b>	Drive (wheel)
<b>Agility</b>	+0
<b>Speed (cruise)</b>	Medium (Slow)
<b>Range (cruise)</b>	600 (900)
<b>Crew</b>	1
<b>Passengers</b>	5
<b>Cargo</b>	525kg
<b>Hull</b>	18
<b>Shipping</b>	4.5 tons
<b>Cost</b>	Lv14300

### Armour

<b>Front</b>	13
<b>Sides</b>	13
<b>Rear</b>	13

### Traits

ATV

**Equipment** Autopilot (basic), Communications System (improved), Entertainment System, Fire Extinguishers, Navigation System (basic)

**Weapons** —

### Equipment

Autopilot (skill level)	0
Communications (range)	500km
Navigation (Navigation DM)	+1
Sensors (Electronics (sensors) DM)	—
Camouflage (Recon DM)	—
Stealth (Electronics (sensors) DM)	—



## RAVEN G50 UTILITY VAN

This British-made general purpose van is used for light loads on prepared roads. The basic frame for this vehicle is modular and can accept several different bodies depending on requirements. These modules can typically be swapped out in less than a day and include a minibus, ambulance, utility vehicle, tow truck (with extra fuel cell) and pickup truck. These vehicles are a common sight throughout the Core and any urbanised area in the Frontier.

<b>TL</b>	10
<b>Skill</b>	Drive (wheel)
<b>Agility</b>	+0
<b>Speed (cruise)</b>	Medium (Slow)
<b>Range (cruise)</b>	500 (750)
<b>Crew</b>	1
<b>Passengers</b>	1
<b>Cargo</b>	2.5 tons
<b>Hull</b>	24
<b>Shipping</b>	6 tons
<b>Cost</b>	Lv22500

### Armour

<b>Front</b>	3
<b>Sides</b>	3
<b>Rear</b>	3

### Traits

Reduced Speed. Modular

**Equipment** Autopilot (improved), Entertainment System, Fire Extinguishers, Navigation System (basic)

**Weapons** —

### Equipment

Autopilot (skill level)	1
Communications (range)	—
Navigation (Navigation DM)	+1
Sensors (Electronics (sensors) DM)	—
Camouflage (Recon DM)	—
Stealth (Electronics (sensors) DM)	—



## TIRANEFABRIK GEOS 6X6 HEAVY TRUCK

The Freihafen GEOS 6x6 heavy truck is a specialised cargo hauler for use on Frontier worlds. While at its best on road, its large tires, high ground clearance and allwheel drive give it a reasonable offroad capability. In military service the vehicle is often equipped with a heavy ring mount on the left side of the cab for a machinegun or autocannon. Similar versions exist in the Core but are much less capable off-road, and only Tier Five or Six nations use them as military vehicles.

<b>TL</b>	11
<b>Skill</b>	Drive (Wheel)
<b>Agility</b>	-2
<b>Speed (cruise)</b>	Medium (Slow)
<b>Range (cruise)</b>	600 (900)
<b>Crew</b>	1
<b>Passengers</b>	1
<b>Cargo</b>	10.5 tons
<b>Hull</b>	150
<b>Shipping</b>	25 tons
<b>Cost</b>	Lv172700

<b>Armour</b>	
<b>Front</b>	13
<b>Sides</b>	13
<b>Rear</b>	13

<b>Traits</b>	Off-road
<b>Equipment</b>	Autopilot (basic), Communications System (improved), Entertainment System, Fire Extinguishers, Navigation System (basic), Winch (Heavy)
<b>Weapons</b>	—

<b>Equipment</b>	
Autopilot (skill level)	0
Communications (range)	500km
Navigation (Navigation DM)	+1
Sensors (Electronics (sensors) DM)	—
Camouflage (Recon DM)	—
Stealth (Electronics (sensors) DM)	—



## MULECORP EXPLORER-X ATV

This American-made heavy tracked wilderness vehicle is popular with scientific parties and resource surveyors. It can double as living quarters in hostile environments and negotiate most types of terrain. It is designed to float and a built-in set of water jets can propel it across water. Accommodations are provided for four and most feature an inflatable, attached shelter that can be used in almost any environment to provide roomier quarters or shelter for an additional four personnel. This model includes a fuel station, to further extend its range.

<b>TL</b>	11
<b>Skill</b>	Drive (track)
<b>Agility</b>	+0
<b>Speed (cruise)</b>	Medium (Slow)
<b>Range (cruise)</b>	600 (900)
<b>Crew</b>	1
<b>Passengers</b>	3
<b>Cargo</b>	2.9 tons
<b>Hull</b>	120
<b>Shipping</b>	20 tons
<b>Cost</b>	Lv400000

<b>Armour</b>	
<b>Front</b>	27
<b>Sides</b>	27
<b>Rear</b>	27

<b>Traits</b>	Aquatic Drive, Tracked
<b>Equipment</b>	Airlock, Autopilot (basic), Bunks x 4, Communications System (advanced, satellite uplink), Computer/5, Control System (enhanced), Entertainment System, Fire Extinguishers, Fuel Processor, Fresher, Galley (mini), Inflatable Shelter (small), Laboratory, Life Support (long term), Navigation Sensors (Advanced), System (advanced), Vacuum Protection, Winch (heavy)
<b>Weapons</b>	—

<b>Equipment</b>	
Autopilot (skill level)	0
Communications (range)	1,000km
Navigation (Navigation DM)	+1
Sensors (Electronics (sensors) DM)	+2
Camouflage (Recon DM)	—
Stealth (Electronics (sensors) DM)	—

## BRIDGEPORT-SWIFT SONGBIRD

The Bridgeport-Swift Songbird is a typical small hovercraft found throughout human space. Although open-topped, it comes equipped with a tarpaulin for inclement weather. The Warbird, the military version, sports a pintle mount and features jump-jets for added terrain-crossing capability.

<b>TL</b>	11
<b>Skill</b>	Drive (hovercraft)
<b>Agility</b>	+2
<b>Speed (cruise)</b>	High (Medium)
<b>Range (cruise)</b>	600 (900)
<b>Crew</b>	1
<b>Passengers</b>	3
<b>Cargo</b>	540kg
<b>Hull</b>	14
<b>Shipping</b>	3.5 tons
<b>Cost</b>	Lv20300

### Armour

<b>Front</b>	15
<b>Sides</b>	15
<b>Rear</b>	15



MuleCorp  
Explorer-X ATV

<b>Traits</b>	—
<b>Equipment</b>	Autopilot (basic), Communications System (improved), Control System (improved), Navigation System (basic)
<b>Weapons</b>	—

### Equipment

Autopilot (skill level)	0
Communications (range)	500km
Navigation (Navigation DM)	+1
Sensors (Electronics (sensors) DM)	—
Camouflage (Recon DM)	—
Stealth (Electronics (sensors) DM)	—

## Bridgeport-Swift Warbird

The Warbird adds jump jets and a pintle mount to the basic Songbird frame. The jump jets can propel the Warbird up to 10 metres into the air and the pintle can accept a light or medium machinegun.

**Cost:** Lv27000

**Jump:** 10m

**Change:** Auxiliary Thrusters (10m) and Medium Machinegun on Pintle Mount (front), and remove 250kg of Cargo Capacity.



Bridgeport-Swift Songbird

# CIVILIAN AIRCRAFT

Aircraft are very common on most colony worlds. The wide expanses of undeveloped territory make ground travel difficult at best and dangerous at worst. Light aircraft and airships are thus the dominant form of travel across the wilderness.

## Operational Environments

All aircraft are designed to operate in a specific regime of world Size and Atmosphere. Most aircraft use Earth as their default environment, at Size 8 and Atmosphere 6. An aircraft can operate within +/-1 of either its Size or Atmosphere but not both.

Aircraft can be designed to fly in multiple environments, operating on worlds that vary by as much as +/-2 in Size and/or Atmosphere. This adds 100% to its Base Price and subtracts -1 from its Agility.

### RUFFIN AUTONAUTICS ZX-5000 AIRCAR

The ducted fan aircar is largely the province of the very wealthy. This French-made model uses a small MHD turbine to generate power for four electric lift fans, carrying the pilot and three passengers anywhere in its three-hour flight envelope. On Earth and Tirane, aircars are only permitted to operate under TrafCon control; only an experienced pilot can properly handle them without the computer assistance.



<b>TL</b>	12
<b>Skill</b>	Flyer (aerodyne)
<b>Agility</b>	+3
<b>Speed (cruise)</b>	Fast (High)
<b>Range (cruise)</b>	1,400 (2,100)
<b>Crew</b>	1
<b>Passengers</b>	3
<b>Cargo</b>	500kg
<b>Hull</b>	6
<b>Shipping</b>	3 tons
<b>Cost</b>	Lv269200

Armour	
<b>Front</b>	3
<b>Sides</b>	3
<b>Rear</b>	3

<b>Traits</b>	—
<b>Equipment</b>	Autopilot (advanced), Communications System (improved), Control System (improved), Entertainment System, Navigation System (basic), Neural Interface, Sensors (improved)
<b>Weapons</b>	—

### Equipment

Autopilot (skill level)	3
Communications (range)	500km
Navigation (Navigation DM)	+1
Sensors (Electronics (sensors) DM)	+1
Camouflage (Recon DM)	—
Stealth (Electronics (sensors) DM)	—

## HOUSTON AEROSPACE UV-7 'HOWEY' LIGHT TRANSPORT

This aircraft combines a vertical take-off and landing capability with efficient level flight by means of two propfans, which rotate on an axis through the centreline of the wings. When horizontal, they provide sufficient thrust to lift the aircraft off the ground. They are then rotated 90° to provide forward thrust, with the conventional wing surfaces providing lift.

<b>TL</b>	11
<b>Skill</b>	Flyer (wing)
<b>Agility</b>	+3
<b>Speed (cruise)</b>	Fast (High)
<b>Range (cruise)</b>	4,800 (7,200)
<b>Crew</b>	1
<b>Passengers</b>	4
<b>Cargo</b>	750kg
<b>Hull</b>	4
<b>Shipping</b>	8 tons
<b>Cost</b>	Lv350075

Armour	
<b>Front</b>	3
<b>Sides</b>	3
<b>Rear</b>	3

<b>Traits</b>	—
<b>Equipment</b>	Autopilot (enhanced), Communications System (improved), Control System (enhanced), Navigation (improved), Sensors (basic), Tilt Rotors
<b>Weapons</b>	—

### Equipment

Autopilot (skill level)	2
Communications (range)	500km
Navigation (Navigation DM)	+1
Sensors (Electronics (sensors) DM)	—
Camouflage (Recon DM)	—
Stealth (Electronics (sensors) DM)	—

## AERO-NORDIQUE WSP-50 'WASP' DYNAMIC HELICOPTER

The WSP-50 looks like a conventional helicopter at first glance, although the two rotor blades are unusually wide and thick. It lacks a tail rotor as well, using exhaust gas from the twin turbines ducted to a directional vent in the tail boom, providing a counter to the torque of the rotor. The WSP-50 can take-off and land vertically like a normal helicopter but, once in the air, the unusual rotors come into play. The two wide blades can be locked back in a V-shape, forming a pair of short, swept back wings. The two turbines then provide forward thrust at fast subsonic speeds, far faster than a conventional helicopter.

<b>TL</b>	11
<b>Skill</b>	Flyer (rotor)
<b>Agility</b>	+2
<b>Speed (cruise)</b>	Fast (High)
<b>Range (cruise)</b>	1,000 (1,500)
<b>Crew</b>	1
<b>Passengers</b>	3
<b>Cargo</b>	250kg
<b>Hull</b>	2.5
<b>Shipping</b>	3.75 tons
<b>Cost</b>	Lv802875

Armour	
<b>Front</b>	3
<b>Sides</b>	3
<b>Rear</b>	3

<b>Traits</b>	—
<b>Equipment</b>	Autopilot (improved), Communications System (improved), Control System (improved), Entertainment System, Fire Extinguisher, Folding Rotors, Navigation (improved), Neural Interface, Sensors (basic)
<b>Weapons</b>	—

### Equipment

Autopilot (skill level)	0
Communications (range)	500km
Navigation (Navigation DM)	+1
Sensors (Electronics (sensors) DM)	—
Camouflage (Recon DM)	—
Stealth (Electronics (sensors) DM)	—

Speed is limited to medium (slow) in rotor-powered flight

**Base Environment:** 86

**Note:** Speed in helicopter mode is High (Medium)

**Clearance:** 30m radius

## PANAVIA CL-800 LOADMASTER

Capable of carrying either passengers or freight, this type of heavy-lift aircraft is very useful for quick transfers of large cargo loads. The engines are mounted above and ahead of the wings, increasing lift at low speeds and giving the Loadmaster a shorter take-off distance than would be expected from an aircraft of this size.

If used as a passenger aircraft, the most common configuration of the Loadmaster carries 150 passengers and 58 tons of freight. It also adds three additional freshers to the design, giving a total of four.

<b>TL</b>	11
<b>Skill</b>	Flyer (wing)
<b>Agility</b>	0
<b>Speed (cruise)</b>	Very Fast (Fast)
<b>Range (cruise)</b>	7,000 (10,500)
<b>Crew</b>	4
<b>Passengers</b>	8
<b>Cargo</b>	95.5 tons
<b>Hull</b>	400
<b>Shipping</b>	600 tons
<b>Cost</b>	MLv43.07

Armour	
<b>Front</b>	3
<b>Sides</b>	3
<b>Rear</b>	3

<b>Traits</b>	—
<b>Equipment</b>	Autopilot (advanced), Bunks x4, Communications System (improved), Enhanced Controls, Entertainment System, Fire Extinguishers, Folding Wings, Fresher, Mini-galley, Navigation System (improved), Sensors (improved), STOL
<b>Weapons</b>	—

### Equipment

Autopilot (skill level)	3
Communications (range)	500km
Navigation (Navigation DM)	+2
Sensors (Electronics (sensors) DM)	+1
Camouflage (Recon DM)	—
Stealth (Electronics (sensors) DM)	—

**Take-off Roll:** 1,750m

**Landing Roll:** 1,000m

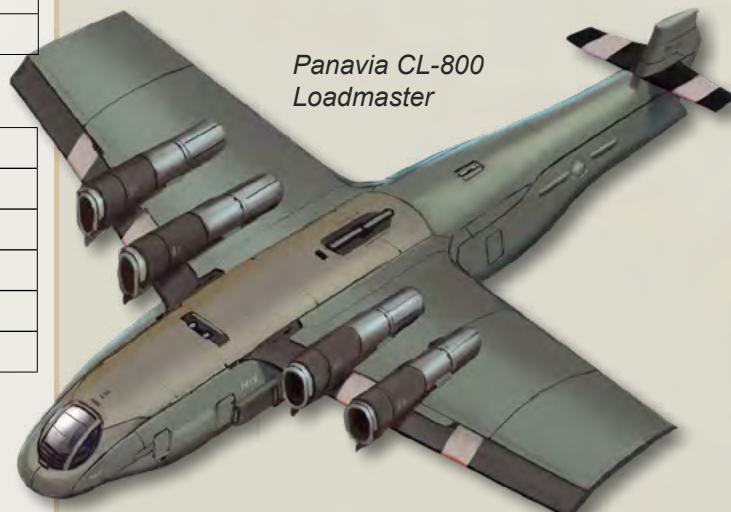
*Houston Aerospace UV-7  
'Howey' Light Transport*



*Aero-Nordique WSP-50 'Wasp'  
Dynamic Helicopter*



*Panavia CL-800  
Loadmaster*



## GWA'WINA AEROSPACE L-20

## LIGHT DUTY AIRSHIPS

The L20 is a capable little airship that is ideal for use in remote regions, like Canada's northern wilderness. It features a spherical, semi-rigid gasbag which, in flight, rotates around a central axis giving the vessel additional lift. The spherical gasbag also eliminates the tendency that larger cigarshaped airships have of 'weathervaning' in high winds (pointing their noses into the wind). This added stability gives it a much better allweather flight capability.

<b>TL</b>	11
<b>Skill</b>	Flyer (airship)
<b>Agility</b>	-3
<b>Speed (cruise)</b>	Medium (Slow)
<b>Range (cruise)</b>	10,000 (15,000)
<b>Crew</b>	2
<b>Passengers</b>	4
<b>Cargo</b>	11.5 tons
<b>Hull</b>	120
<b>Shipping</b>	60 tons
<b>Cost</b>	Lv202000

## Armour

<b>Front</b>	3
<b>Sides</b>	3
<b>Rear</b>	3

<b>Traits</b>	Magnus effect
<b>Equipment</b>	Autopilot (improved), Communications System (basic), Crane (medium), Entertainment System, Fresher, Mini-galley, Navigation System (basic), Sensors (basic)
<b>Weapons</b>	—

## Equipment

Autopilot (skill level)	+1
Communications (range)	50km
Navigation (Navigation DM)	+1
Sensors (Electronics (sensors) DM)	0
Camouflage (Recon DM)	—
Stealth (Electronics (sensors) DM)	—



# CIVILIAN WATERCRAFT

While small watercraft are common on the Frontier, larger watercraft are very rare except in the most developed regions and worlds. The infrastructure required to support large surface vessels is expensive and more flexible heavy hovercraft and airships tend to be used instead.

<b>TL</b>	10
<b>Skill</b>	Seafarer (personal)
<b>Agility</b>	-2
<b>Speed (cruise)</b>	Slow (Very Slow)
<b>Range (cruise)</b>	800 (1,200)
<b>Crew</b>	2
<b>Passengers</b>	4
<b>Cargo</b>	1.5 tons
<b>Hull</b>	24
<b>Shipping</b>	6 tons
<b>Cost</b>	Lv28075

Armour	
Front	3
Sides	3
Rear	3

## WAVERIDER RUNABOUT

The Waverider is a small, basic boat used for a variety of purposes, from sport fishing to fish-farming and even as a light pleasure craft, although its speed is far from extraordinary. The rigid hull inflatable design can still maintain buoyancy even when completely swamped.

<b>Traits</b>	—
<b>Equipment</b>	Autopilot (basic), Communications System (improved), Navigation System (basic)
<b>Weapons</b>	—

### Equipment

Autopilot (skill level)	0
Communications (range)	500km
Navigation (Navigation DM)	+1
Sensors (Electronics (sensors) DM)	—
Camouflage (Recon DM)	—
Stealth (Electronics (sensors) DM)	—

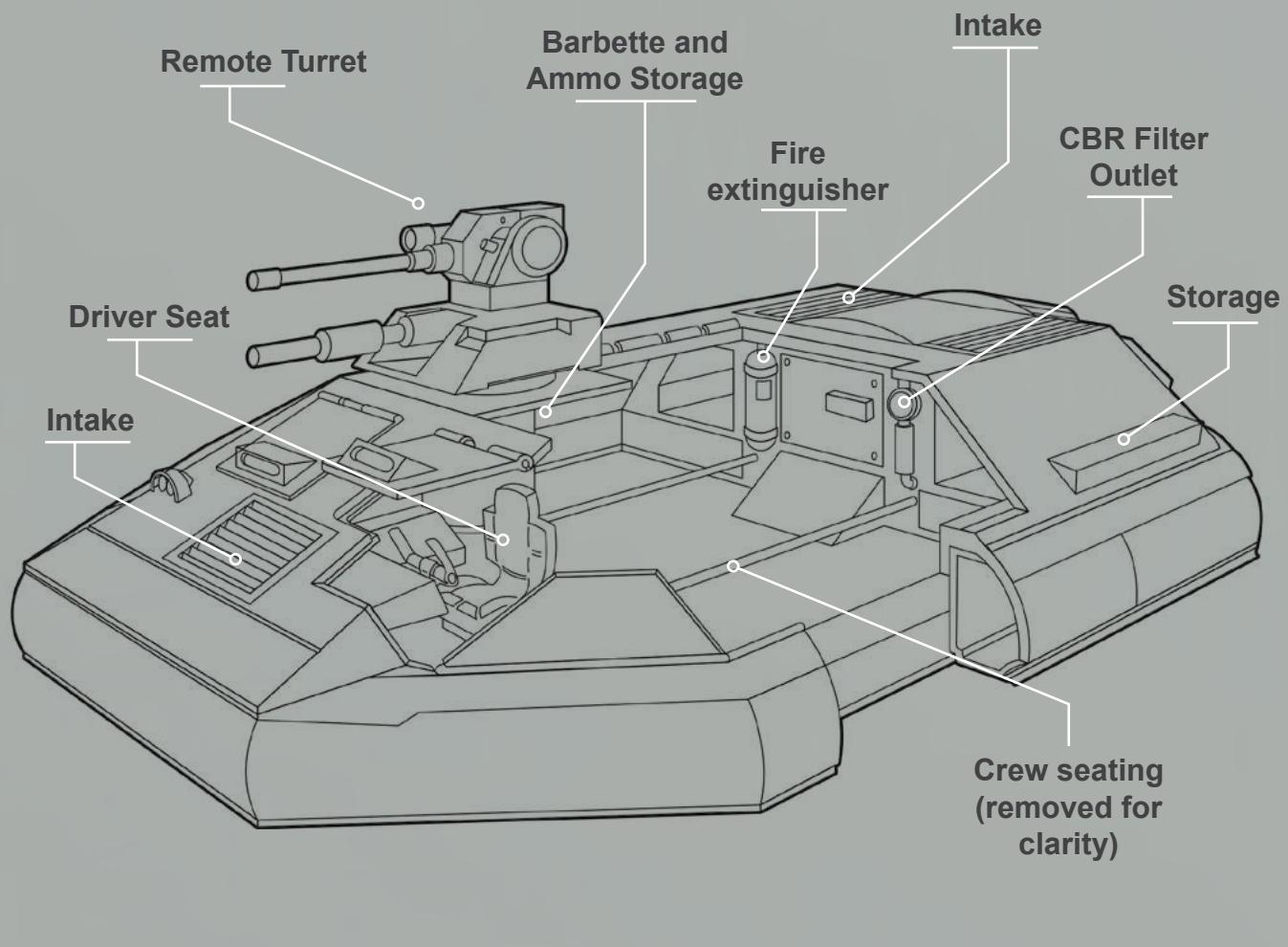


# MILITARY GROUND VEHICLES

This section includes a few samples of the many different types and classes of military vehicles available.

## KANGAROO IV ACV-APC

### CUTOUT VIEW



## KANGAROO IV ACV-APC

A typical aircushion, armoured personnel carrier, the mass of the vehicle is carried at high speed by jetassisted vectored thrusters. These also give the vehicle a limited jumpjet capability, enabling it to negotiate cliffs and similar obstructions. In addition to the main weapons, the Kangaroo also has four firing ports for infantry weapons. In the Tanstaafl Free Legion, crews tend to use automatic shotguns in the weapon ports.

While the stock Kangaroo has hostile environment protection, only about half of the vehicles in service with the TFL still have this system.

<b>TL</b>	11
<b>Skill</b>	Drive (hovercraft)
<b>Agility</b>	+2
<b>Speed (cruise)</b>	High (Medium)
<b>Range (cruise)</b>	600 (900)
<b>Crew</b>	3
<b>Passengers</b>	6
<b>Cargo</b>	37.5 kg
<b>Hull</b>	66
<b>Shipping</b>	16.5 tons
<b>Cost</b>	Lv530135

Armour	
<b>Front</b>	68
<b>Sides</b>	45
<b>Rear</b>	34

<b>Traits</b>	AFV
<b>Equipment</b>	Auxiliary Thrusters (20m), Camouflage (improved), Communications System (improved), Computer/3, Control System (enhanced), Decoy Dispenser, Explosive Belt Anti-Missile System, Fire Extinguishers, Hostile Environment Protection, Navigation System (basic), Prismatic Aerosol Dispenser, Sensors (improved)
<b>Weapons</b>	<ul style="list-style-type: none"> <li>Anti-Missile System (explosive belt), Small Turret (CLP-1A plasma gun, improved fire control)</li> <li>Small Turret (25mm autocannon, improved fire control)</li> <li>Ball Mount (12mm heavy machinegun, left)</li> <li>Ball Mount (12mm heavy machinegun, right)</li> <li>Gun Ports (left) x 2</li> <li>Gun Ports (right) x 2</li> </ul>

### Equipment

Autopilot (skill level)	—
Communications (range)	500km
Navigation (Navigation DM)	+1
Sensors (Electronics (sensors) DM)	+1
Camouflage (Recon DM)	-2
Stealth (Electronics (sensors) DM)	—



Weapon	TL	Range	Damage	Magazine	Magazine Cost	Traits	Fire Control
Heavy Plasma Gun (CLP1A)	12	2	1DD	20	Lv3000	AP 15, Blast 5	+2
25mm Autocannon	8	1	6D	500	Lv5000	Auto 5	+2
Heavy Machinegun	8	2	4D	500	Lv1600	Auto 5	—
Explosive Belt AMS	10	0.5	2D	40	Lv500	Blast 5	—

## LYNX ARMoured SCOUT VEHICLE

This light wheeled vehicle is often deployed as an air-mobile or star-mobile vehicle, similar in role to light hovercraft yet far less expensive. It sports an advanced sensor suite, including a pair of drones and a sensor mast that allows it to use its sensors from behind cover.

In addition to the sensor suite, it is also equipped with a 25mm autocannon, a pair of anti-armour missiles and a medium machine gun. Defensively, it mounts an explosive-belt anti-missile system but otherwise armour is relatively light.

<b>TL</b>	12
<b>Skill</b>	Drive (wheel)
<b>Agility</b>	+2
<b>Speed (cruise)</b>	High (Medium)
<b>Range (cruise)</b>	600 (900)
<b>Crew</b>	3
<b>Passengers</b>	3
<b>Cargo</b>	100kg
<b>Hull</b>	32
<b>Shipping</b>	8 tons
<b>Cost</b>	Lv323000

<b>Armour</b>	
<b>Front</b>	60
<b>Sides</b>	30
<b>Rear</b>	30



<b>Traits</b>	Aquatic Drive, ATV
<b>Equipment</b>	Anti-Missile System (explosive belt), Camouflage (basic), Communications System (advanced, with encryption), Computer/3, Control System (enhanced), Drone Racks (4 micro-drones), ECM (improved), Fire Extinguishers, Hostile Environment Protection, Navigation System (advanced), Neural Interface, Sensors (advanced), Sensor Mast
<b>Weapons</b>	<ul style="list-style-type: none"> <li>Small Turret (Luchs Anti-armour Missiles (2), Improved Fire Control)</li> <li>Small Turret (25mm Autocannon, Improved Fire Control)</li> <li>Small Turret (7.5mm Medium Machinegun, Improved Fire Control)</li> </ul>

### Equipment

Autopilot (skill level)	0
Communications (range)	1,000km
Navigation (Navigation DM)	+4
Sensors (Electronics (sensors) DM)	+3
Camouflage (Recon DM)	-1
Stealth (Electronics (sensors) DM)	—

<b>Weapon</b>	<b>TL</b>	<b>Range</b>	<b>Damage</b>	<b>Magazine</b>	<b>Magazine Cost</b>	<b>Traits</b>	<b>Fire Control</b>
Luchs Missile	12	5	1DD	2	Lv20000	AP 15, Seeking, Smart	+2
25mm AC	8	1	6D	500	Lv5000	Auto 5	+2
Medium Machinegun	8	0.5	4D	500	Lv1600	Auto 10	+2
Explosive Belt AMS	10	0.5	2D	40	Lv500/charge	Blast 5	—

# MILITARY AIRCRAFT

Military aircraft on the Frontier tend to be tilt-rotor or dynamic rotor aircraft, able to transition easily from forward to VTOL flight. This allows use of unprepared landing areas, yet aircraft can still attain high speeds.

## WESTSTAR AEROSPACE CV-160

### TIlt Rotor Transport

The CV-160 is a large tiltrotor transport available in a heavy gunship role. This aircraft, and similar designs, are very common as heavy military transports across human space. The CV-160 is notable for its heavy load, environmental flexibility and enormous range, able to travel a quarter of the way around an average planet without refuelling. The normal configuration seats up to 40 troops, with a further 8 tons set aside for personal equipment, weapons and ammunition. As a pure cargo-carrier, however, it can carry 18 tons.

<b>TL</b>	12
<b>Skill</b>	Flyer (wing)
<b>Agility</b>	+1
<b>Speed (cruise)</b>	Fast (High)
<b>Range (cruise)</b>	7,500 (11,250)
<b>Crew</b>	4
<b>Passengers</b>	40
<b>Cargo</b>	7.75 tons
<b>Hull</b>	50
<b>Shipping</b>	150 tons
<b>Cost</b>	MLv5.68

### Armour

<b>Front</b>	14
<b>Sides</b>	14
<b>Rear</b>	14

### Traits

#### Equipment

Autopilot (enhanced), Communications System (advanced, encrypted), Control System (improved), Computer/3, Fire Extinguishers, Folding Wings/Rotors, Fresher, Hostile Environment Protection, Navigation System (improved), Neural Interface, Sensors (improved), Tilt-Rotor

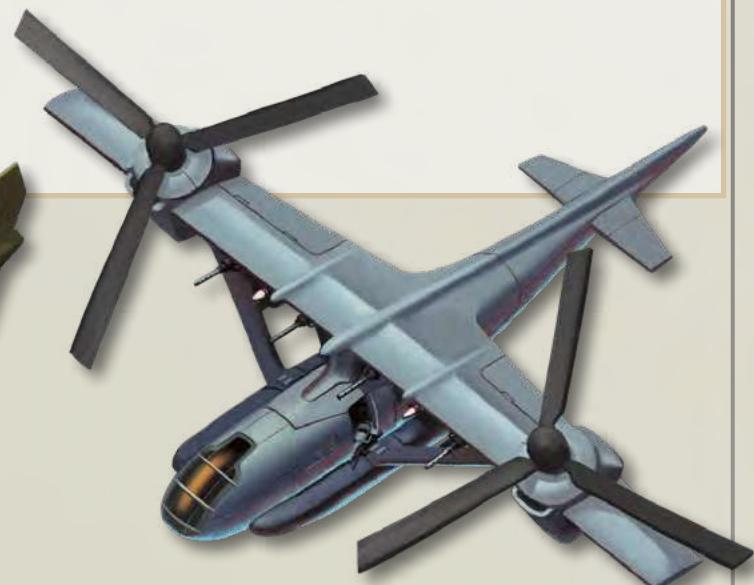
#### Weapons

### Equipment

Autopilot (skill level)	+2
Communications (range)	1,000km
Navigation (Navigation DM)	+2
Sensors (Electronics (sensors) DM)	+1
Camouflage (Recon DM)	—
Stealth (Electronics (sensors) DM)	—



CV-160  
Tilt Rotor Transport



UV-45 'Skua' Light  
Transport

## NORTHGATE MANUFACTURING, INC. UV-45 'SKUA' LIGHT TRANSPORT

The Skua is a tilt-rotor aircraft with two large-radius conventional propellers. These give the aircraft excellent hover characteristics and lift capability, while its characteristically high wing ensures propeller clearance when landed. This particular model is capable of water landings and is often used aboard ships as both a transport aircraft and anti-submarine hunter. The dipping sonar allows it to listen for submarine activity while remaining 100 metres above the sea's surface. As part of its mission, it can be equipped with a variety of weapons, including mini-torpedoes and depth charges. Side-mounted pylons can be used to carry rocket or gun pods, in case the aircraft must operate in support of troops ashore.

The forward-facing weapons on the hull pylons cannot fire when the rotors are in forward flight mode, although the aircraft can still drop depth charges and torpedoes. The door-mounted machine guns have stops that prevent them from firing into the rotors.

<b>TL</b>	12
<b>Skill</b>	Flyer (wing)
<b>Agility</b>	+1
<b>Speed (cruise)</b>	Fast (High)
<b>Range (cruise)</b>	5,000 (7,500)
<b>Crew</b>	2
<b>Passengers</b>	3
<b>Cargo</b>	266kg
<b>Hull</b>	10.5
<b>Shipping</b>	15.75 tons
<b>Cost</b>	MLv1.95

### Armour

<b>Front</b>	11
<b>Sides</b>	11
<b>Rear</b>	11

<b>Traits</b>	Aquatic Drive
<b>Equipment</b>	Autopilot (enhanced), Camouflage (basic), Communications System (advanced, encrypted), Computer/3, Crane (light), Drone Rack (2 undersea drones), Fire Extinguishers, Folding Wings/Rotors, Hostile Environment Protection, Navigation System (improved), Neural Interface, Sensors (improved), Sensors (underwater, advanced), Sensor Mast, Tilt-Rotor
<b>Weapons</b>	<ul style="list-style-type: none"> <li>• Weapons Bay (depth charges x 4, front, improved fire control)</li> <li>• Weapons Bay (mini-torpedoes x 6, front, improved fire control)</li> <li>• Pintle Mount (medium machine gun, right)</li> <li>  Pintle Mount (medium machine gun, left)</li> <li>• Hardpoints (rocket pod, front, improved fire control) x 2</li> <li>• Hardpoints (heavy machineguns, front, improved fire control) x 4</li> </ul>

### Equipment

Autopilot (skill level)	+2
Communications (range)	1,000km
Navigation (Navigation DM)	+2
Sensors (Electronics (sensors) DM)	+2
Camouflage (Recon DM)	+1
Stealth (Electronics (sensors) DM)	—

Weapon	TL	Range	Damage	Magazine	Magazine Cost	Traits	Fire Control
Depth Charges	8	—	1DD	4	Lv40000	AP 20, Blast 20, Smart	+2
Mini-torpedoes	12	1	6D	4	Lv200000	AP10, Blast 10, Seeking, Smart	+2
Rocket Pods	8	1.5	4D	16	Lv16000	Auto 3, Blast 5	+2
Medium Machinegun	8	0.5	4D	500	Lv2250	Auto 10	—
Heavy Machinegun	7	2	4D	500	Lv1600	Auto 5	+2

**Gull:** There is a civilian version of the Skua called the Gull. It lacks the armament and advanced sensors but otherwise has the same performance.

**Cost** MLv1.49.

**Cargo:** 3.1 tons

## ZEPHYR X-WING GUNSHIP

The French-made Zephyr is a small, fast battlefield support aircraft, able to travel at high-speed to the frontlines by virtue of the locking 'x-wing' rotor, which then spins up to provide rotary flight. It combines the best of both worlds and can even be used in a high-speed ground support role, releasing bombs and rockets and then flying out of harm's way.

The craft features a large, x-shaped main rotor, with very wide blades. The rotor can be stopped in flight, functioning as a more conventional wing. This is an extension of the technique used in the WSP-50 aircraft.

<b>TL</b>	11
<b>Skill</b>	Flyer (rotor)
<b>Agility</b>	+3
<b>Speed (cruise)</b>	Very Fast (Fast)
<b>Range (cruise)</b>	1,000 (1,500)
<b>Crew</b>	1
<b>Passengers</b>	0
<b>Cargo</b>	—
<b>Hull</b>	4.5
<b>Shipping</b>	6.75 tons
<b>Cost</b>	MLv2.1

Armour	
<b>Front</b>	15
<b>Sides</b>	15
<b>Rear</b>	15

<b>Traits</b>	—
<b>Equipment</b>	Autopilot (improved), Camouflage (improved), Communications System (basic, encrypted), Computer/4, Controls (improved), Decoy Dispensers, Fire Extinguishers, Folding Rotors, Hostile Environment Protection, Navigation System (basic), Neural Interface, Sensors (improved), Stealth (improved)
<b>Weapons</b>	<ul style="list-style-type: none"> <li>Small Turret (25mm autocannon, improved fire control)</li> <li>Hardpoints (rocket pods, front, improved fire control) x 2</li> <li>Hardpoints (aero-12 missiles, front, improved fire control) x 2</li> </ul>

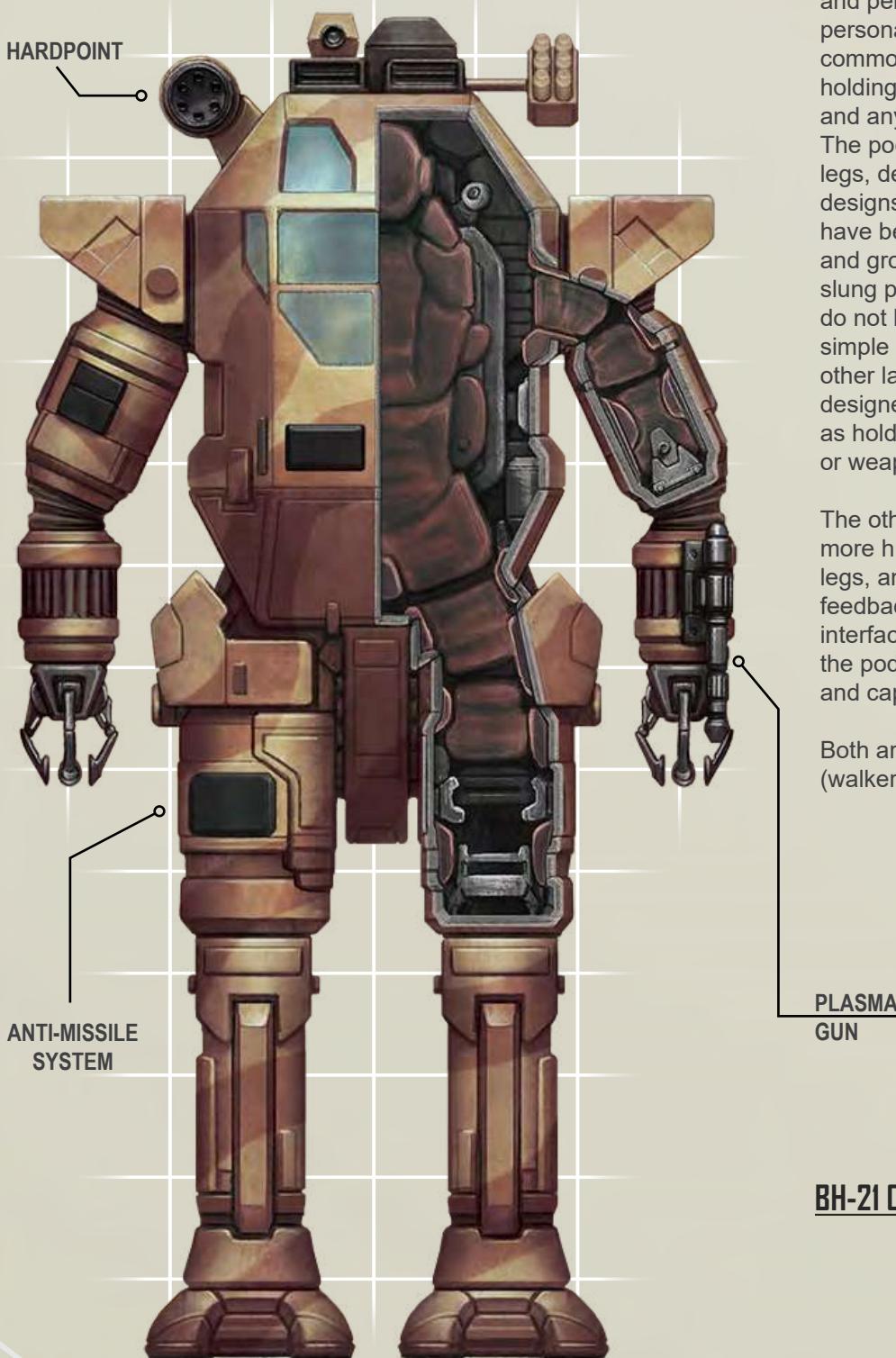
Equipment	
Autopilot (skill level)	+1
Communications (range)	50km
Navigation (Navigation DM)	+1
Sensors (Electronics (sensors) DM)	+1
Camouflage (Recon DM)	-2
Stealth (Electronics (sensors) DM)	-2

Weapon	TL	Range	Damage	Magazine	Magazine Cost	Traits	Fire Control
Aero-12 Missile	12	5	1DD	2	Lv20000	AP 11, Smart	+2
25mm Autocannon	8	1	6D	500	Lv5000	Auto 5	+2
Rocket Pod	8	1.5	4D	8	Lv4000	Auto 3, Blast 5	+2

In rotor mode the Zephyr has a Speed of High (Medium)



# COMBAT WALKERS



Combat walkers come in two varieties, both of which are designed and perform as vehicles rather than personal armour. The first, more common type, consists of a pod holding the pilot, power systems and any weapons, on a pair of legs. The pod sits on, or between, the legs, depending on the design. Taller designs, with the pod on the legs, have better cross-country mobility and ground clearance, while lower slung pods are more stable. Many do not have arms or, if they do, are simple arms for moving debris or other large objects. They are not designed for fine manipulation, such as holding and operating equipment or weapons.

The other class of combat walker is a more humanoid design with arms and legs, and controlled by either a force-feedback exo-skeleton or neural interface. While more expensive than the pod-type, they are more flexible and capable.

Both are operated with the Drive (walker) skill.

PLASMA  
GUN

**BH-21 COMBAT WALKER**

## BH-21 COMBAT WALKER

The BH21 Combat Walker from France first debuted during the Central Asian War. France was the first nation to field walkers in large numbers as infantry units, rather than a support role.

The BH-21 has powerful motors in the limbs that are slaved to the pilot's movements, an internal monitor that can expand to a 360° view of the surrounding area, heavy NBC filters and a comprehensive electronics suite. There is one fixed hard-point on the right shoulder and a plasma gun in the left arm rounds out the suit's weaponry.

Defensively, the suit mounts a set of smoke launchers, although these six tubes can be loaded with anti-personnel charges. Most suits are also fitted with an explosive belt anti-missile system, effective in close terrain where a point-defence turret may not be able to engage multiple targets in time. The explosive belt can engage multiple targets from multiple angles but is not a precise system and can cause significant damage to soft infantry, bystanders and nearby structures.

<b>TL</b>	11
<b>Skill</b>	Drive (walker)
<b>Agility</b>	+2
<b>Speed (cruise)</b>	Medium (Slow)
<b>Range (cruise)</b>	50 (75)
<b>Crew</b>	1
<b>Passengers</b>	0
<b>Cargo</b>	—
<b>Hull</b>	1
<b>Shipping</b>	0.5 tons
<b>Cost</b>	Lv111215

### Armour

<b>Front</b>	29
<b>Sides</b>	25
<b>Rear</b>	21

<b>Traits</b>	—
<b>Equipment</b>	Anti-Missile System (explosive belt), Camouflage (improved), Communications System (improved, encrypted), Computer/3, Control System (enhanced), Fire Extinguishers, Force-feedback Arms (fine), Grenade Tubes w/Smoke x6, Hostile Environment Protection, Navigation System (basic), Sensors (improved)
<b>Weapons</b>	<ul style="list-style-type: none"> <li>Hardpoint (PGHP Mk 2A2, front, improved fire control)</li> <li>Hardpoint (0.5 Spaces, front, improved fire control)</li> </ul>



### Equipment

Autopilot (skill level)	—
Communications (range)	25km
Navigation (Navigation DM)	+1
Sensors (Electronics (sensors) DM)	+1
Camouflage (Recon DM)	-2
Stealth (Electronics (sensors) DM)	—

Weapon	TL	Range	Damage	Magazine	Magazine Cost	Traits	Fire Control
PGHP Mk 2A2	12	0.5	6D	20	Lv2000	AP 10, Blast 1	+2
Explosive Belt AMS	10	0.4	2D	24	Lv200	Blast 5	—

## Kz-7 COMBAT WALKER

The Kz-7 is a next-generation combat walker, designed and built in the wake of the War of German Reunification. The older Kz-5 suits in use by the German military at the time were clearly inferior to the French-made BH-21 walkers they were facing and the few actual battles were decisively in favour of the French armours and their more experienced operators.

The Kz-7 is constructed of advanced composite materials and features a neural interface for improved feedback and control. These improvements enable this new German battlesuit to be the fastest and most flexible powered infantry in service, superior even to the latest Japanese models.

In addition to the shoulder-mounted plasma gun and integral laser rifle, the Kz-7 has provision to mount a weapon on the other shoulder and includes the ability to carry a weapon in the right hand, locked in and linked to the suit's targeting and fire control. The most common weapon used is the SK-19-auf V, a modified SK-19 with a greatly enlarged magazine for both the assault rifle and grenade launcher. The weapon carries 400 rounds of assault rifle ammo, along with the requisite propellant bottles, and forty 30mm grenades in two separate magazines.

<b>TL</b>	12
<b>Skill</b>	Drive (walker)
<b>Agility</b>	+3
<b>Speed (cruise)</b>	Medium (Slow)
<b>Range (cruise)</b>	75 (112.5)
<b>Crew</b>	1
<b>Passengers</b>	0
<b>Cargo</b>	125kg
<b>Hull</b>	1.5
<b>Shipping</b>	0.75 tons
<b>Cost</b>	Lv219595

<b>Armour</b>	
<b>Front</b>	41
<b>Sides</b>	34
<b>Rear</b>	31

### Equipment

Autopilot (skill level)	—
Communications (range)	100km
Navigation (Navigation DM)	+1
Sensors (Electronics (sensors) DM)	+2
Camouflage (Recon DM)	-3
Stealth (Electronics (sensors) DM)	-1

<b>Traits</b>	—
<b>Equipment</b>	Anti-Missile System (guardian), Automed, Camouflage (advanced), Communications (improved, encrypted), Computer/3, Control System (enhanced), Force-feedback Arms (fine), Hostile Environment Protection, Navigation System (improved), Neural Interface, Sensors (advanced), Smoke Discharger, Stealth (basic)
<b>Weapons</b>	<ul style="list-style-type: none"> <li>Hardpoint (A-4 plasma gun, front, advanced fire control)</li> <li>Hardpoint (35-01 laser rifle, front, advanced fire control)</li> <li>Hardpoint (0.5 Spaces, front, advanced fire control)</li> </ul>



Weapon	TL	Range	Damage	Magazine	Magazine Cost	Traits	Fire Control
A-4 Plasma Gun	12	0.5	6D	20	Lv1000	AP 12, Blast 2	+2
35-01 Laser Rifle	11	0.5	3D	50	—	Scope	+2

## WU-BEIJING TYPE-A6 COMBAT WALKER

Having used combat walkers during the latter part of the Central Asian War, Manchuria was convinced of their utility but early walkers were unable to stand up to the French BH-21 and German Kz-5. Deciding that a new walker design was needed, Manchuria commissioned Wu-Beijing, one of its leading arms manufacturers, to create it. The result was the Wu-Beijing Type-A6, commonly called the 'Clamshell' by service members of other nations.

The Type-A6 is airtight, allowing it to operate in hazardous atmospheres, and it floats, allowing it to swim small, inland bodies of water. A turret-mounted Type-17 high energy plasma gun completes the system.

<b>TL</b>	12
<b>Skill</b>	Drive (walker)
<b>Agility</b>	+1
<b>Speed (cruise)</b>	Medium (Slow)
<b>Range (cruise)</b>	337 (506)
<b>Crew</b>	1
<b>Passengers</b>	0
<b>Cargo</b>	0kg
<b>Hull</b>	6
<b>Shipping</b>	1.5 tons
<b>Cost</b>	Lv149435

<b>Armour</b>	
<b>Front</b>	45
<b>Sides</b>	38
<b>Rear</b>	35

<b>Traits</b>	Hostile Environment Protection
<b>Equipment</b>	Aquatic Drive, Anti-Missile System (explosive belt), Autopilot (improved), Camouflage (improved), Communications System (improved), Control System (improved), Drone Rack (2 attack drones), Fire Extinguisher, Manipulator Arms (basic), Navigation System (basic), Smoke Discharger, Winch (light)
<b>Weapons</b>	<ul style="list-style-type: none"> <li>Small Turret (type-17 plasma gun, basic fire control)</li> </ul>



### Equipment

Autopilot (skill level)	+1
Communications (range)	500km
Navigation (Navigation DM)	+1
Sensors (Electronics (sensors) DM)	—
Camouflage (Recon DM)	—
Stealth (Electronics (sensors) DM)	—

Weapon	TL	Range	Damage	Magazine	Magazine Cost	Traits	Fire Control
Type 17 Plasma Gun	12	0.5	8D	30	Lv2000	AP 14, Blast 3	+1
Explosive Belt AMS	10	0.5	2D	24	Lv200	Blast 5	—

# VEHICLE OPTIONS

## HOVERCRAFT

### Light Hovercraft

Cost per Space: Lv1500 (instead of 10000)

Hull: 2 per space

### Heavy Hovercraft

Cost per Space: Lv6000 (instead of 20000)

Hull: 2 per Space

## COMBAT WALKER OPTIONS

### Grenade Tubes

A combat walker can mount up to three single-shot grenade launcher per Space of walker. These accept any 30mm grenade, though they are almost impossible to aim. They are normally used to launch obscurement (smoke) rounds. Cost: Lv200 per tube.

## ULTRALIGHT WALKERS

Use of these rules requires the *Vehicle Handbook*.

Walker vehicles are very common in the universe of 2300AD and see use across a variety of terrain and environments. Due to the importance and variety of these machines, a new chassis type and other options have been added.

### Ultralight Walker

The ultralight walker serves as the basis for most combat and civilian walker vehicles. They sacrifice range and some performance for a much smaller size.

Tech Level	10
Skill	Drive (walker)
Agility	+1
Spaces Min	1
Space Max	3
Cost Per Space	Lv5000
Hull	0.5 per Space
Shipping	0.25 tons per Space
Traits	ATV

## Walker Hardpoints

Standard hardpoints used on walkers can mount any weapon up to half a Space in size. However, other items can also be mounted on empty hardpoints.

**Evil-Eye Sensor Pod:** The Evil-Eye is typical of many similar hardpoint-mounted systems. It provides the equivalent of Sensors (improved).

Item	TL	Kg	Cost
Evil-Eye Sensor Pod	10	100	Lv15000

**Spotter Drone Cradle:** Spotter drones are self-powered flying disks that remain attached to their controller by a 200m fibre-optic cable. This renders them immune to hacking, jamming and EM detection. The drone has the equivalent of Sensors (basic) and includes a laser rangefinder/designator. The power pack can keep the drone airborne for up to two hours before it must return to the charging cradle.

Item	TL	Kg	Cost
Spotter Drone Cradle	12	20	Lv18500

## Tech Table

TL	Speed	Range
10	Slow	50
11	Slow	75
12	Medium	100

## Electronics

Sensors and communications systems in walkers have half the normal range of their vehicular counterparts, although the cost remains the same. All walkers with sensors of Enhanced quality or better provide 10x zoom, thermal imaging, low-light imaging, heads-up display and a searchlight (100m range).

## Force-Feedback Arms

Force-feedback arms use an exoskeletal rig for control; the arms are not so much 'operated' as 'worn'.

Item	Spaces	Cost	STR	Max. DEX
Force-Feedback Arms (fine)	0	Lv20000	x2	11
Force-Feedback Arms (strong)	0	Lv15000	x4	7

## VEHICLE OPTIONS

Vehicles of 2300AD have additional and different options available to them beyond those shown in the *Vehicle Handbook*. In particular, power generation changes, as the universe of 2300AD lacks high-density power sources.

### Control Options

**Neural Interface:** A neural interface allows a vehicle to be controlled by direct mind-machine interface, improving reaction times and agility.

The neural interface adds +1 to Agility and costs +50% of the Base Price of the vehicle, including the required cabling and servos. Aircraft and spacecraft, being largely wired already, only cost +10% of the Base Price to be equipped with a neural interface.

### Power Plants

Fission power is not available for any vehicle under 500 Spaces in size and fusion is not available for anything under 1,000 Spaces.

### Power Storage

Lasers and electromagnetic weapons like mass drivers require power storage for their weapons. Each weapon is equipped with storage banks for five consecutive shots and can recharge the storage banks from their power plants at the rate of one shot per minute. There are upgrades available to increase both power storage and recharge rates.

**Storage Banks:** Storage banks can be added to a vehicle, with an efficiency based on Tech Level. Each storage bank requires half a Space.

Tech Level	Storage (Shots)	Cost
10	3	MLv0.05
11	5	MLv0.1
12	7	MLv0.2

**Supercharger:** The supercharger charges the storage banks faster than the power plant alone. Using a supercharger lowers the maximum speed of a vehicle by one speed band while it is in operation.

Tech Level	Charges/Minute	Cost
10	2	MLv0.5
11	4	MLv1.0
12	8	MLv1.5

### Miscellaneous Options

These are additional utility add-ons for vehicles and can be found across the Frontier worlds.

**Drone Rack:** A drone rack is a dispenser and recharging cradle for drones. A rack can carry four microdrones, two attack or recon drones or one ROUV underwater drone.

Item	Spaces	Cost
Drone Rack	1	Lv5000

**Winch:** Winches are rated by the mass they can pull straight up in Normal gravity.

Winch	Spaces	Cost	Capacity (tons)
Light	0	Lv500	2
Medium	0.5	Lv1500	6
Heavy	1	Lv5000	20

### Weapon Mounts

In addition to the weapon mounts found in the *Vehicle Handbook*, 2300AD also has the following.

**Ball Mount:** The ball-mount is similar to a firing port but designed to accommodate fixed weapons, typically medium and large calibre machineguns. The weapon's barrel protrudes from the ball that rotates freely within its socket, allowing a wide arc of fire. There is typically a remote sighting mechanism on the weapon to allow accurate fire, although in some cases a simple armoured window is provided (DM-2 to attack rolls).

Ball mounts cost Lv1000. A weapon of up to 500kg may be attached to them.

## NEW WEAPON TRAITS

Two new traits are used in 2300AD: **Fire** and **Overhead**.

### Fire

This weapon sets a target on fire, causing damage every round after the initial attack. A target can only be set on fire by one Fire weapon at a time – use the highest damage Fire weapon. Left to its own

devices, a fire will extinguish itself on a 2D roll of 8+, rolled for at the start of every round. However, the referee may rule it continues to burn so long as flammable material is present. A Traveller may use a Significant Action to extinguish, requiring an Average (8+) DEX check. The Traveller gains DM+2 if they are using firefighting equipment.

## Hyperkinetic

A Hyperkinetic weapon has an extremely high velocity with no actual warhead, doing damage through kinetic energy alone. As with gun systems, anti-missiles systems are unable to target Hyperkinetic weapons.

## Overhead

A missile with the Overhead trait can ‘pop-up’ as it nears the target in order to attack from above, where armour is typically weaker. Unless the vehicle description says otherwise, top armour is equal to the Protection of the side armour. Overhead weapons can also be set to directly attack the facing they are fired at. A missile that ‘pops-up’ in this way grants DM+1 to anti-missile systems used against it.

# ANTI-MISSILE SYSTEMS

In addition to the anti-missile systems found in the *Vehicle Handbook*, 2300AD introduces some new systems.

## Explosive Belt Anti-Missile System

The explosive belt anti-missile system is an array of small shaped explosive charges fixed to the hull of a vehicle. The charges are designed to explode outward like a giant shotgun, spraying the area with hundreds of 2mm ceramic shot pellets. Each charge is connected to a tracking system that monitors space for 200 metres around the vehicle. If a fast-moving object (faster than 50 kilometres per hour) enters this zone without a proper transponder, the system will trigger the nearest charge once it has approached to within 10 metres, destroying the incoming object. The system can target grenades, rockets and missiles but cannot engage fast-moving cannon or mass driver rounds.

The system is available for both vehicles and walkers, with the difference being the number of targets that can be engaged and the number of charges available.

The vehicle system has 10 charges on each face of the vehicle. Each time the system is used to intercept a projectile, whether successful or not, one charge is used from the targeted facing. Charges can be moved or replaced, taking five minutes per charge, but this is not advisable during combat.

The walker system is similar but has only five charges on the front, rear and each side of the walker.

The vehicle system can target up to eight incoming projectiles per round, while the walker system is only capable of targeting up to four. Closely-spaced targets can be taken out by a single blast and unprotected troops within the blast zone will also be attacked by the blast of pellets.

## Guardian Anti-Missile System

This is a miniature version of the minigun anti-missile system on page 49 of the Vehicle Handbook. The 4mm 5-barrelled rotary machinegun has an automatic tracking system that will engage any incoming projectile larger than 15mm in diameter.



Weapon	TL	Range	Damage	Magazine	Space	Cost	Magazine Cost	Traits	Defence Roll DM
Explosive Belt AMS	10	0.5	2D	40	0	Lv20000	Lv500/charge	Blast 5	-1
Explosive Belt AMS (walker)	10	0.2	1D	20	0	Lv15000	Lv200/charge	Blast 3	-1
Guardian AMS	12	0.2	1D	200	0.5	Lv50000	Lv100	Auto 5	-1

## SMALL CALIBRE WEAPONS

These are vehicle-mounted versions of common man-portable projectile weapons.

### Machineguns

Machineguns are light automatic weapons that typically fire small-arms ammunition. The heavy machinegun is an exception, somewhere between the lighter machineguns and autocannons in its firepower.

Weapon	TL	Range	Damage	Spaces	Cost	Magazine	Magazine Cost	Traits
9mm Rotary Gun	11	1	4D	0.25	Lv5000	1000	Lv500	AP 2, Auto 20
Heavy Machinegun	6	2	6D	0.5	Lv80000	500	Lv400	Auto 5
Light Gauss Machinegun	12	0.8	4D	0.25	Lv10000	2000	Lv1000	AP 3, Auto 15
Light Machinegun	8	0.2	3D	0.25	Lv500	1000	Lv250	Auto 10
Medium Machinegun	7	0.5	4D	0.25	Lv800	500	Lv125	Auto 10

## AUTOCANNONS

These rapid-fire projectile weapons are common in aircraft and some light armoured vehicles.

### 25mm Autocannon

The 25mm autocannon is a common weapon in light vehicles and aircraft, and even sees use as a carried weapon for combat walkers. It is sometimes used in place of heavy machineguns in emplaced support roles for use against tough or armoured opponents.

### 25mm Rotary Autocannon

The 25mm rotary autocannon is commonly found on aircraft and in anti-aircraft roles. It is a prodigious consumer of ammo and can chew up aircraft or armoured vehicles with equal ease.

### 75mm Autocannon

The 75mm autocannon fires the heaviest chemically-propelled round in common use. The high rate of fire and destructive potential of the 75mm round sees it widely used by Tier 3 and lower militaries as a light tank weapon.

### MASS DRIVER CANNONS

Mass driver cannons store enough power in their capacitors to fire 20 shots and typically recharge the capacitors at a rate of one shot per combat round. Additional capacitors can be added, with half a Space holding enough power for an additional five shots costing MLv0.5.

### CMK-75 (Conducteur de Masse Hyperkinétique 75mm)

The CMK-75 is a last-generation weapon in common use in the hovertanks of France and many allied nations. Many older vehicles have been upgraded over the years to use this weapon system. It was the first of the true hyperkinetic mass drivers, relying solely on a hypervelocity penetrator for their effectiveness.

Weapon	TL	Range	Damage	Space	Cost	Magazine	Magazine Cost	Traits
25mm Autocannon	6	1	6D	1	Lv100000	500	Lv500	AP10, Auto 5
25mm Rotary Autocannon	7	1	6D	2	Lv250000	2000	Lv2000	AP10, Auto 20
75mm Autocannon	7	3	8D	4	Lv500000	100	Lv400	AP 15, Auto 3, Blast 3

Weapon	TL	Range	Damage	Spaces	Cost	Magazine	Magazine Cost	Traits
CMK-75	11	3	3DD	10	MLv10	40	Lv4000	AP 25, Auto 2

## DunArmCo AMD-50 (Advanced Mass Driver 50mm)

The AMD-50 is a next-generation coilgun design with improved cooling and a higher rate of fire than older designs. Like most mass drivers, it uses a hyperkinetic round without any payload.

## Hyde Dynamics LGS-85 (Linear Gun System 85mm)

While the LGS-85 is capable of firing hyperkinetic rounds, it must use a discarding sabot to do so. It is otherwise capable of firing a multitude of rounds not

commonly available to smaller calibre mass drivers, even lobbing shells in an indirect fire arc, something no other current mass driver can do. It is this flexibility that has kept the weapon in American inventories long after other nations moved to dedicated hyperkinetic platforms.

## Rheinmetall EMK-65 (Elektromagnetisches Kanone 65mm)

The EMK-65 premiered on the LkPz-IX hovertank and was subsequently used in the Raumwaffe's new Werwolf heavy combat lander. It is a compact and powerful weapon, firing hyperkinetic rounds as is typical of small-calibre mass drivers.

Weapon	TL	Range	Damage	Spaces	Cost	Magazine	Magazine Cost	Traits
AMD-50	12	3	1DD	6	MLv8	50	Lv5000	AP 25, Auto 3
LGS-85	10	3	2DD	12	MLv8	30	Lv3000	AP 20, Auto 2
EMK-65	12	4	3DD	8	MLv12	60	Lv6000	AP 30, Auto 2

## LASER WEAPONS

Laser weapons designed for vehicles do not resemble the large focal arrays required for space-based laser systems. These smaller weapons are enclosed with the hull and use mirrors and optical guides to redirect and aim the weapon. The internal capacitors on laser cannons hold enough power to fire 10 shots and recharge at the rate of one shot per combat round. As with mass drivers on page 27, additional capacitors can be added to the system.

### Blue-Green Laser Cannon

Blue-green laser cannons are designed to be able to fire at longer ranges while underwater. Conventional laser weapons have barely a tenth of the range underwater they have on the surface, while the listed range for a blue-green laser range is while underwater. In the air, its range is reduced by 50%.

### Gatling Laser

Gatling lasers cycle rapidly through multiple emitters to improve cooling, reliability and rate of fire. They do not actually spin, like their projectile-based rotary equivalents.

### Heavy Laser Cannon

This high-powered laser cannon is an effective anti-armour and anti-aircraft weapon; it can even be used to attack spacecraft on re-entry. Its heavy weight and high power requirements restrict its use to the largest of vehicles and stationary emplacements.

### Laser Cannon

Laser cannons have a slow rate of fire but compensate by channelling considerably more power into their shots than a gatling laser.

Weapon	TL	Range	Damage	Spaces	Cost	Magazine	Magazine Cost	Traits
Blue-Green Laser Cannon	10	3	5D	5	MLv8	30	—	AP 20, Auto 2
Gatling Laser	10	3	w6D	7	MLv1.25	200	—	AP 20, Auto 4
Heavy Laser Cannon	11	3	2DD	28	MLv10	40	—	AP 25, Auto 2
Laser Cannon	12	4	1DD	8	MLv12	60	—	AP 30

# PLASMA WEAPONS

There are a variety of plasma guns used as secondary, or even primary, weapons on military vehicles. All use the same plaser-cell technology as man-portable varieties.

## PGVM

The PGVM (Plasma Gun, Vehicle-Mounted), is the Mk2A2 PGHP converted for use in a vehicular mount and provided with more-effective cooling to increase the rate of fire.



## A-4 Sturmgewher

The A-4 Sturmgewher is the vehicle-mounted version of the A-4T standalone plasma gun. It is a heavy design that often forms the primary armament for small vehicles.

## CLP-1A

The CLP-1A (Canon Leger Pyrotechnique-1A) is one of the heaviest plasma guns produced but is long out of production. Originally designed as a field gun, engineers later modified it for use in vehicles. There are rumours that the Tanstaaf colony has started unauthorised production of the weapon and its ammunition,

Weapon	TL	Range	Damage	Spaces	Cost	Magazine	Magazine Cost	Traits
PGVM	12	0.25	5D	0.5	Lv10000	32	Lv175	AP 10, Auto 4
A-4	12	0.5	8D	1	Lv20000	20	Lv1120	AP 10, Blast 5
CLP-1A	11	1	1DD	2	Lv35000	10	Lv1500	AP 10, Blast 10

# MISSILES

There are a number of vehicle-mounted missile systems available, each capable of destroying or seriously damaging their intended targets.

## Giscard Aero-12

The Aero-12 is an advanced silhouette-seeking missile that homes in on vehicle profiles. The heavy HEAP warhead is capable of punching most modern armour.

## Giscard Aero-27

The Aero-27 is a fast anti-aircraft interceptor missile, using a conventional explosive warhead.

## Guiscard Manta-1

The Manta-1 was one of the first generation of hyperkinetic anti-tank missiles, using a solid-fuel, air-breathing motor to achieve Mach 5 shortly after launch.

Weapon	TL	Range	Damage	Spaces	Cost	Magazine	Magazine Cost	Traits
Aero-12	12	4	8D	0.5	Lv14600	1	—	AP 16, One Use, Overhead, Smart
Aero-27	11	20	3D	1	Lv50000	1	—	One Use, Smart
Manta-1	11	2	8D	0.5	Lv12000	1	—	AP 20, Hyperkinetic, One Use, Smart

## Luchs

The Luchs is a hyperkinetic missile that launches at Mach 7, and damages its target solely through kinetic energy.

## Ohu

The Ohu is a large, vehicle-mounted missile. The heavy warhead consists of three hyperkinetic submunitions that separate from the main body of the weapon when it is within one kilometre of the target, suddenly creating three targets for any anti-missile system.

Weapon	TL	Range	Damage	Spaces	Cost	Magazine	Magazine Cost	Traits
						Magazine	Cost	Traits
Luchs	12	4	8D	0.5	Lv10000	1	—	AP 20, Hyperkinetic, One Use, Smart
Ohu	12	40	4D	1	Lv40000	1	—	Hyperkinetic, One Use, Smart

## BOMBS

Aside from the basic high-explosive bomb, there are a number of warheads available for the 200kg and 400kg bombs. Most of these weapons are guided and have the Smart Trait.

### 200kg High Explosive Bomb

This is a typical high-explosive bomb, designed to cause concussion and fragmentation damage to its targets.

### 200kg Incendiary Bomb

The incendiary bomb is loaded with jellied petrochemical fuel that sticks to anything it hits, burning intensely.

### 200kg WASP

The WASP (Wide-Angle Scatterable Projectiles) is an area-denial cluster bomb, throwing out large numbers of bomblets over its area of effect. The Blast trait is for the warhead as a whole; each individual bomblet has the Blast 2 trait.

### 400kg FAE Bomb

The fuel-area explosive, or thermobaric explosive, is the most powerful non-nuclear warhead available. It releases gaseous fuel over a large area and then ignites it to produce an exceptionally powerful explosion with a massive shockwave.

### 400kg WASP

A larger variant of the standard 200kg model, with a larger area of effect. Each bomblet has the Blast 2 trait.

### Depth Charge

The depth charge is designed to be dropped from ships or aircraft to attack submarines and subsea installations.

Weapon	TL	Range	Damage	Spaces	Cost	Magazine	Magazine Cost	Traits
200kg HE Bomb	10	2	1DD	0.5	Lv1500	1	—	Blast 10
200kg Incendiary Bomb	10	2	8D	0.5	Lv2000	1	—	Blast 30, Fire
200kg WASP	10	2	4D	0.5	Lv2500	1	—	Blast 30
400kg FAE Bomb	10	4	2DD	0.5	Lv10000	1	—	Blast 50
400kg WASP	10	4	4D	1	Lv10000	1	—	Blast 50
Depth Charge	10	2	2DD	0.5	Lv3500	1	—	Blast 20



# STARSHIPS: OPERATIONS, COMBAT, SHIPS & SMALL CRAFT

# STARSHIP OPERATIONS

Spacecraft and starships are extremely complicated works of engineering and vital in maintaining the worlds of the Frontier and the Core. Estimates run as high as 20,000 ships currently engaged in commercial operations throughout human space, although close to 90% of those are non-stutterwarp craft. There are a number of tasks and operations associated with spacecraft, which are detailed in this chapter.

## SPACECRAFT DEFINITIONS

The following are commonly used terms involved in spacecraft operations.

### INTERFACE CRAFT

Interface craft, or interface-capable craft, are spacecraft equipped to travel to orbit and return to a planet's surface. This is often the costliest part of spacecraft operations. This category includes spaceplanes, ballistic landers, combat landers and aerospace fighters.

### ORBITAL TRANSFER VEHICLE (OTV)

An OTV is a small craft, typically not equipped with a stutterwarp drive, nor capable of interface operations. It is primarily used to shuttle between spacecraft and space stations, or transfer passengers and cargo from Low Orbit to the Wall. Travel beyond the Wall, to geosynchronous orbit and beyond, is most effectively done with stutterwarp craft.

### SMALL CRAFT

Any vessel under 100-tons displacement is a small craft, whether or not it is equipped with a stutterwarp drive. Such vessels have a variety of names, such as lighters, shuttles, cutters, pinnaces and fighters.

### LARGE CRAFT

Any vessel of 100-tons or more is classified as a large craft, whether or not it has a stutterwarp.

### STARSHIP

A starship is a stutterwarp-capable vessel with the endurance and navigational capability to travel between stars.

### SYSTEM SHIP

A system ship is a stutterwarp-capable vessel equipped with a slow drive and limited navigational capabilities. This typically confines it to within a system. Although slow compared to a starship, system ships are still hundreds of times faster than any reaction-drive vessel. Many occupy common supply or trade routes and spend their entire working life travelling between the same few destinations hundreds or thousands of times.

### STUTTERWARP DRIVE

The Jerome Effect stutterwarp drive is capable of faster-than-light travel, allowing access to the stars in days or weeks, rather than decades. Stutterwarp vessels are effective from the Wall of a planet, all the way to interstellar space. Within a solar system, most worlds are only hours, or at most a day or two, away.

### REACTION DRIVE

Reaction drives are a variety of technologies that use expanding gas or accelerated particles (or both) to produce thrust. The simplest of these is the rocket, refined and advanced for a new era but the most common is the accelerated magneto-plasma rocket, or thruster, that uses the hot exhaust and power from an MHD turbine to magnetically accelerate the ship to high relative speeds. While more efficient than a rocket, it is

## Long Term Reaction Drives

Long-term reaction drive technologies include nuclear-thermal rockets, either fission or fusion, ion drives and variable impulse plasma drives. Light sails and magsails are possible but not used by any human group. They are, however, extensively used by the Sung and were used by the Pentapods for long-term interstellar world-builder missions.

still not efficient enough for long-term space travel. There are other reaction drive technologies but few are in general use due to the efficiency of the stutterwarp drive.

### REMOTE OBJECT

Any remotely-controlled craft is classified as a remote object, including missiles, drones and planetary probes.

## INTERFACE OPERATIONS

Interface travel is the process of getting to and from orbit and is one of the most expensive parts of space travel. On Earth, and the colony world of Beta Canum Venaticorum, there are Beanstalks, orbital elevators that greatly reduce the costs associated with getting to and from orbit. However, these elevators often have long waiting times and the time to orbit via these constructs can be upwards of five days. Local bureaucracy, politics and complex administration processes often mean that the Beanstalks are block-booked months ahead by large corporate or government-backed shippers, leaving smaller and independent operators to seek other routes to orbit.

Other worlds must make do with alternative technologies, primarily thruster-powered craft but also rockets, electro-magnetic catapults and laser-lift systems. Most interface systems are designed to take a ship to the Wall, where a stutterwarp drive can be used, although Low Orbit is also a common target.

## ORBITAL OPERATIONS

Manoeuvring between the Wall and Low Orbit requires fuel and time. Most interface craft are built to reach the Wall but some only attain Low Orbit, requiring a larger vessel to transit to the Wall.

Low Orbit is the home of space stations and, for most starship crews, is regarded as a zone to pass through before the stutterwarp can be engaged.

## Terminology

The Stutterwarp Threshold is the zone around a planet or star where a stutterwarp-powered starship drops below faster than light speeds. The Wall is the zone around a planet or star where the stutterwarp drive no longer works at all, necessitating the use of reaction drives. Further details on these terms are provided on page 41.

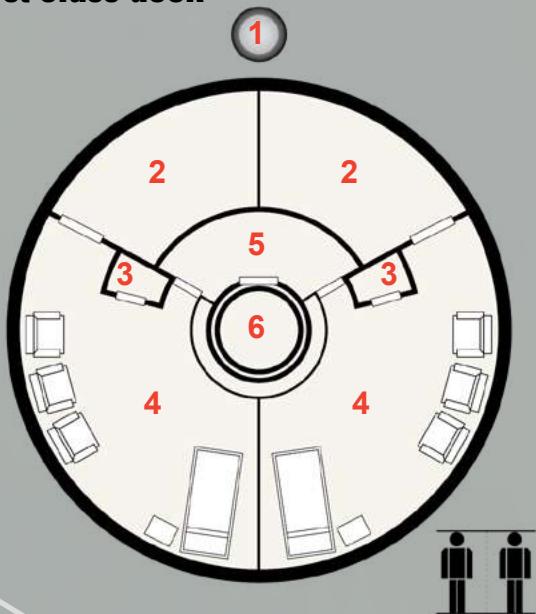
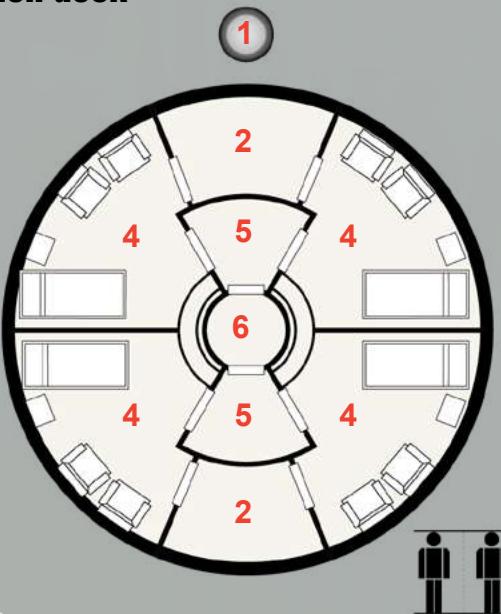
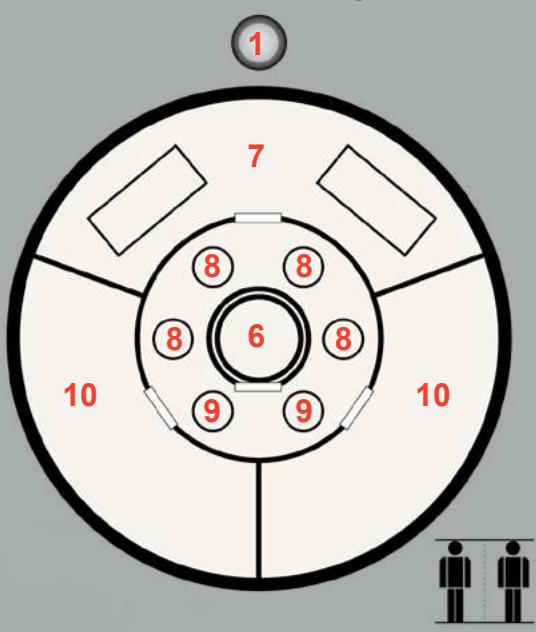
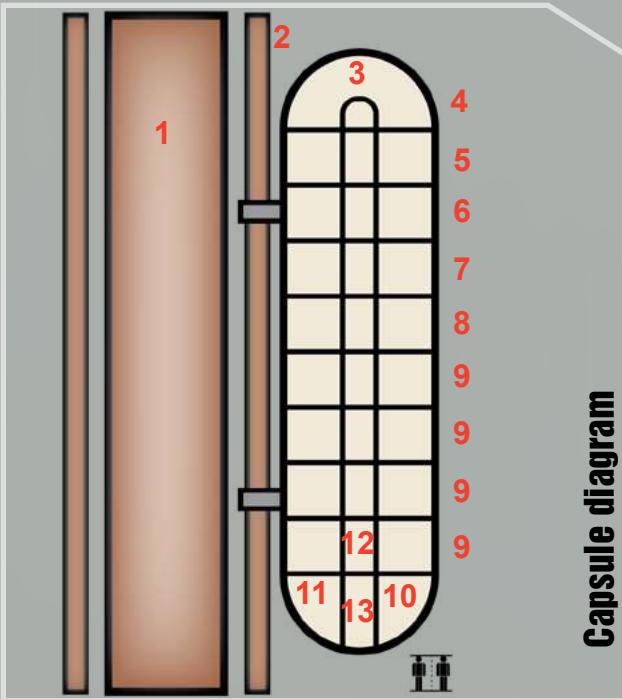


## THE BEANSTALK

The most advanced, most comfortable and cheapest method of getting into orbit is the space elevator, or Beanstalk as it is often known. It is also the slowest, taking around five days to reach the geosynchronous orbital terminal. Beanstalk travel is accomplished via elevator cars that travel along the cable, propelling themselves using a series of redundant linear-induction motors. Only two worlds in human space have Beanstalks, Earth and Beta Canum, with another being planned for Tirane.

A typical passenger car carries 24 passengers and between two and four crew. During the trip to orbit, the passengers will experience a drop in gravity. By the end of the first day of travel, gravity in the capsule is just 0.2G, but does not reach 0G until the end of the fifth day, when the capsule reaches geosynchronous orbit.

Travel on a Beanstalk carriage is usually quite luxurious, with many carriages designed around the theme of a 19th Century rail car or ocean-going liner (ironically, due to data losses during Twilight, there is more information about the late 19th Century than the early 21st Century). Typical fares to orbit on Earth

**First class deck****Coach deck****Observation deck and cargo hold****Capsule diagram****TOP VIEW**

- 1. Rail
- 2. Bathroom/Fresher
- 3. Storage Area
- 4. Stateroom
- 5. Foyer
- 6. Elevator
- 7. Engine Room
- 8. Observation Ports
- 9. Entry Ports
- 10. Cargo hold

**SIDE VIEW**

- 1. Magnetic Grapple
- 2. Rail
- 3. Observation Dome
- 4. Recreation Level
- 5. Dining Area
- 6. Food Preparation/Storage
- 7. Life support Deck
- 8. First Class Staterooms
- 9. Coach Class Staterooms
- 10. Cargo Hold
- 11. Observation Deck
- 12. Elevator
- 13. Entry ports

or Beta Canum by Beanstalk would be around Lv800, although luxury accommodation costs four to eight times that amount.

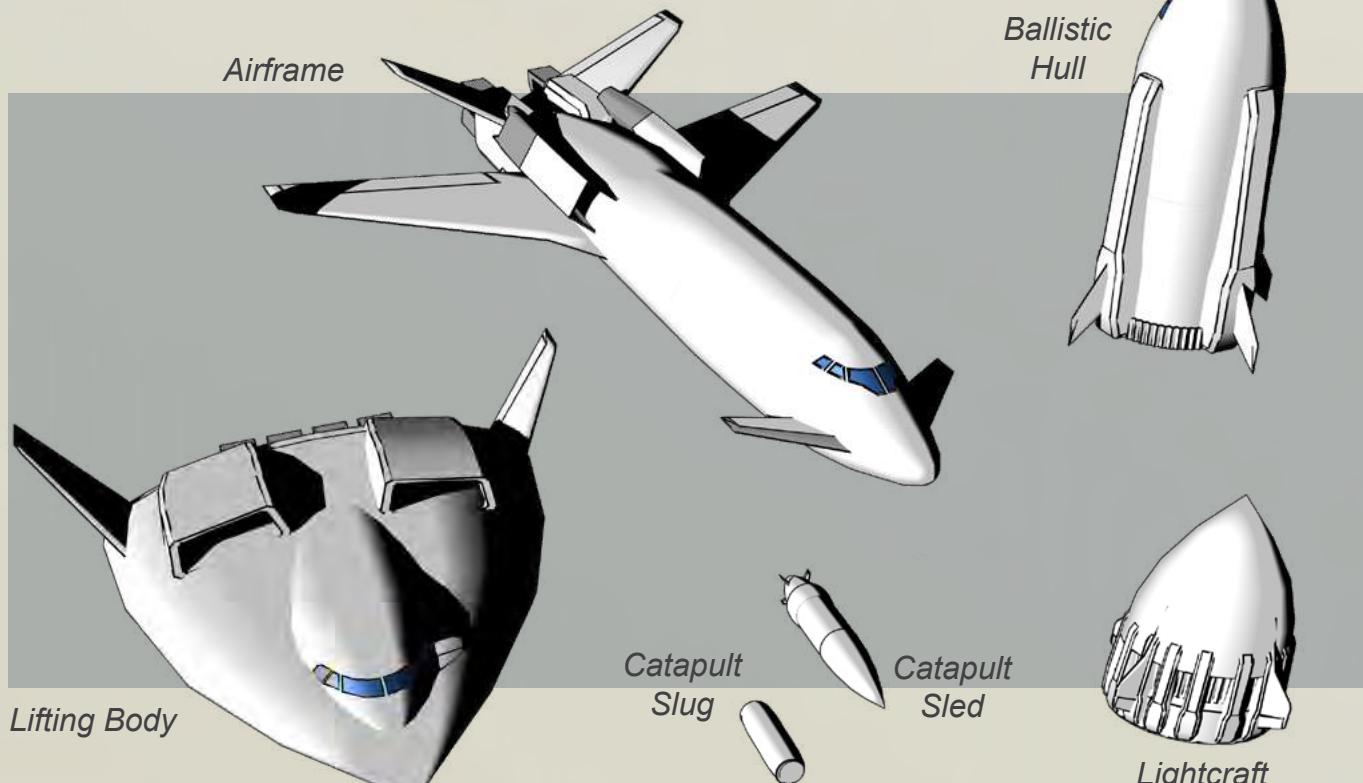
## COMMON INTERFACE CRAFT

On most worlds, interface operations use a variety of craft. Passengers may use spaceplanes, while bulk cargo rides on electromagnetic sleds. Other worlds may have laser-launchers, especially worlds with noxious atmospheres where air-breathing thrusters cannot typically operate.

### Spaceplane

The most common type of orbital transport is the spaceplane, typically powered by a hybrid air-breathing thruster or rocket. They are the most versatile design and some rough-field versions require little more than a prepared airstrip and fuel. Commercial spaceplanes, however, require more support to handle passengers and cargo, in a similar manner to a commercial airliner.

When overloaded, or on higher gravity worlds, spaceplanes may need ballistic launches and use external fuel and/or boosters to achieve orbit. Operating this way, they resemble the space shuttle of the pre-Twilight era. These operations require extensive support infrastructure and are common only on the most advanced colonies.



### Lander

Any Single-Stage-to-Orbit (SSO) ballistic craft that relies on thrust alone for lift and control, rather than aerodynamic surfaces, are known as landers. They are less common than spaceplanes but require less infrastructure. Many landers use air-breathing engines, like spaceplanes, to lower requirements for stored fuel and many are equipped with aerodyne-style vectored thrusters for control during their landing phase. Landers are more common as interface transports for exploratory vessels, since they do not need anything in terms of landing site preparation, but have otherwise been superseded by the more versatile spaceplane for military and commercial passenger transport.

### Rockets

Disposable multi-stage rockets are still occasionally used, typically for cargo and satellite launches on less-developed worlds. They require more infrastructure than spaceplanes or landers and while a single rocket is relatively inexpensive, their disposable nature makes them costlier in the long run. They also lack the flexibility of a spaceplane or even a lander. Most rockets are automated but some manned versions are still used.

## Catapult

A typical catapult is a magnetic-induction track, many kilometres long, usually starting level and then travelling partway up a mountain. The catapult sled is a wingless, highly-streamlined lifting body shell, heavily reinforced. This shell and its cargo are accelerated down the track at nearly 300G, reaching orbital insertion velocity within a few seconds, leaving the track on a pre-planned course to place it into a stable orbit. The sled reaches Low Orbit within a minute, the leading edges glowing white-hot from rapid passage through the atmosphere. Catapults are not suitable for passengers or delicate cargo as the enormous acceleration would liquefy most organic material in moments. A catapult launch often produces spectacular pyrotechnics, as the repaid acceleration and interactions between the catapult rails and sled cause both ionisation and vaporisation of material.

Materials launched by catapult will usually require an orbital transfer vehicle to make the next leg of the journey to the Wall, or a starship to make the perilous descent to Low Orbit.

A sled will reach Low Orbit in the world's Size x 10 seconds.

## High Energy Laser Array

The High Energy Laser Array (HELA) uses a high-powered battery of lasers to superheat the atmosphere under the lift capsule or lightcraft. Once the atmosphere starts to thin out, an ablative plastic heatshield on the base of the lightcraft is instead vaporised by the laser as reaction mass. HELAs can be used to lift passengers and cargo into orbit but require extensive ground support, almost as much as a catapult. Lightcraft are not piloted in any real sense and so do not require crew. Drone operators monitor the ascent from the ground, ready to assist if the launch runs into problems. HELA systems tend to be used on worlds with dense atmospheres with little or no atmospheric oxygen to support air-breathing thrusters.

A lightcraft will reach Low Orbit in the world's Size x 3 minutes.

## ORBITAL ZONE

The orbital zone extends from Low Orbit to the Wall, with geosynchronous orbit being a special case. Manoeuvring within the orbital zone requires Burn Points (see Planetary Capture page 42).

## Low Orbit

Low Orbit is the zone used by surveillance satellites, auto-factories and surveillance and navigation satellites. It is also the altitude normally used for releasing drop pods and combat landers.

Low Orbit altitude is equal to the world's Size x 30 kilometres.

## The Wall

The Wall is the point where a stutterwarp craft can attain system speeds. Below this altitude, stutterwarp drives do not function and a reaction drive is required for orbital operations. It is not typically home to any orbital infrastructure, although wealthy worlds may sometimes place shielded transfer stations here.

The Wall's altitude is equal to the world's Size x 1,500 kilometres.

## Geosynchronous Orbit

Above the orbital zone is geosynchronous orbit, where an object in an equatorial orbit appears to be stationary above a fixed point on the ground. Geosynchronous

## Distances

**Light Second:** A light second is the distance light travels in one second and is equal to 299,792 kilometres. This is usually rounded to 300,000 kilometres.

**Astronomical Unit (AU):** An astronomical unit is the mean distance from the centre of the earth to the centre of the sun, equal to 149.6 million kilometres. The AU is the basis for distance measurement within a star system.

**Light Hour:** Similar to a light second, a light hour is the distance light travels in an hour. It is equal to about 1.1 billion kilometres (about 7.3 AU).

**Light Year:** The light year is the base unit of measure for interstellar travel, equal to the distance that light travels in a year or about nine trillion kilometres. Warp efficiency for a starship is measured in light years per day.

**Parsec:** A parsec is an astronomical unit sometimes used to measure very large distances, equal to 3.26 light years or about 31 trillion kilometres.

orbit is the home of communications and solar power satellites, and Beanstalk transfer stations. Some worlds will have larger habitats in this zone but it is not considered stable enough for massive habitats.

Geosynchronous orbit is a difficult region, defensively speaking, as ships can approach at high system speeds with exceptionally short reaction times for defenders.

For most worlds, geosynchronous orbit is equal to the world's Size x 4,000 kilometres. However, for worlds with very slow rotations, like Beowulf, this may be much higher. Tidally locked worlds, such as Nyotekundu, do not have geosynchronous orbits at all.

## ATMOSPHERIC OPERATIONS

Airframe and lifting body vessels, or vessels with VTOL modifications, can manoeuvre in atmosphere, whether or not they are air-breathing. Air-breathing vessels have a greatly increased range, however.

Fuel consumption for atmospheric operations is equal to 1 Burn per 20 minutes of flight. If the thruster or rocket is air-breathing, then this becomes 1 Burn per hour. This only applies to airframe and lifting body interface craft. Normally, landers cannot manoeuvre effectively within an atmosphere, although advanced versions with vectored thrust do have limited flight capability, at a tremendous cost in fuel.

### Atmospheric Performance

Hull Type	Speed Band
Airframe	Hypersonic
Lifting Body	Transonic

- Performance shifts up one Speed Band in very thin (Atmosphere code 3-) atmospheres and down one Speed Band in dense and greater atmospheres (Atmosphere code 8+).
- An STOL or Hydrodynamic hull lowers atmospheric performance by one Speed Band. Hydrodynamic and STOL hulls cannot normally fly at higher than Transonic speed in atmospheric operations but if they also have the Advanced hull type, this restriction no longer applies.
- An Advanced engine will increase performance to the next Speed Band, while a Crude engine will lower it by one Speed Band. These engines also alter fuel consumption, as noted on page 38.
- An Advanced hull will likewise increase performance by one Speed Band. An Advanced hull coupled with an Advanced engine will therefore boost performance by two Speed Bands.

## INTERFACE OPERATIONS

Interface operations are no more risky than commercial airline operation in the early 21st Century. Flights to and from orbit are routine matters and there are seldom problems or accidents. In combat and other crises, although, the capabilities of pilot and crew come into play.

Fuel use during atmospheric operation and orbital interface is abstracted and uses Burns to reflect capacity and usage. The quantity of fuel a vessel will use for each Burn is dependent upon its size and the number of Burns used to attain orbit is based on world size. This way, each vessel will always use the same number of Burns to enter orbit and the amount of fuel each Burn represents will vary depending on the size of the vessel.

A spacecraft uses a number of Burns to reach the Wall equal to the world's UPP the world's Size. Low Orbit requires less fuel, with a number of Burns equal to the world's Size -1.

The time required to reach orbit is shown in the Time to Orbit table.

### Time to Orbit

Vehicle Type	The Wall	Low Orbit
Ballistic	World Size x 3 in minutes	World Size in minutes
Airframe or Lifting Body	World Size x 5 in minutes	World Size x 3 minutes

For example, Earth is Size 8 so an interface vessel, either ballistic or spaceplane, would use 8 Burns to reach the Wall. A ballistic craft would take 24 (8 x 3) minutes to get there, while a spaceplane would take

## Aborting Launch or Re-entry

Sometimes, a pilot may decide to abort a launch or re-entry. This requires a Difficult (10+) Pilot check (DEX). Success results in the interface craft either in a position to land normally if the abort was on launch, or back in Low Orbit, if it was attempting re-entry. In either case, it will have consumed Burns equal to the world's Size -4.

On failure, the craft takes 1D x Effect in damage and end up either ready to land, or back in orbit.

40 (8 x 5) minutes. Getting to Low Orbit would require 7 Burns and take 8 minutes for the ballistic craft and 24 minutes for the airframe vessel.

## Fuel Consumption

Fuel consumption can be affected by ship traits and conditions. These modifiers alter the effective world Size code for purposes of determining fuel burned and time to orbit (except for the Air-Breathing trait, which affects just Burns consumed).

Trait/Condition	Effective World Size	Notes
Air-breathing	-1	Does not affect time to orbit
Lightweight	-1	—
Advanced Drive	-1	—
Advanced Hull	-1	Removes atmospheric speed restrictions
Crude Drive	+1	—

**Air-Breathing:** An air-breathing vessel can use atmospheric oxygen as the oxidiser for its fuel during the trip, reducing the fuel requirement accordingly. This does not affect time to orbit.

**Lightweight:** Lightweight is a design feature, a craft that because of its material or construction masses less than most vessels of the same size.

**Advanced Drive:** At the TL11, Advanced Drives (both thrusters and rockets) become available. They are more efficient than earlier designs, requiring less fuel.

**Advanced Hull:** Advanced Hulls use a variety of technologies to alter their aerodynamic profile based on operational requirements. This includes variable geometry wings and hulls, enhanced plasma flow and other technologies. The net effect is a faster, more efficient hull design.

**Crude Drive:** Crude Drives are built with heavier and rougher materials, creating a less efficient system. Both rockets and thrusters can be Crude Drives.

## Reducing Time to Orbit

Each additional Burn spent to reduce time to orbit effectively reduces the world's Size by -1 for purposes of calculating time to orbit. This is the only occasion that time to orbit is affected by reducing the effective world Size. Time to orbit cannot be reduced below

half the normal time. Each Burn increases the effective acceleration at launch by 2G, so the 1 Burn spent to reduce time to orbit would increase the experienced acceleration to 5G. Note that this Burn requirement is on top of the normal amount required to reach orbit. Increasing acceleration requires more fuel, not less.

*For example, a ballistic craft with an Advanced Drive on Earth takes 8 minutes to reach Low Orbit, spending 7 Burns (-1 for the Advanced Drive). If the craft has the additional fuel, it can spend 1 Burn to reduce the time to orbit by lowering the Earth's effective Size for the purpose of determining time to orbit. In this case, it will take 7 minutes to reach Low Orbit and require an additional Burn, for a total of 8.*

## Return Times

Return time is the time required to apply braking manoeuvres to leave orbit, re-enter the atmosphere (where present) and align for landing. These times are also based on world Size, along with Atmosphere type (see the Atmosphere table). Time to return from a standard orbit is the effective world Size in minutes for ballistic craft and five times that for airframe and lifting body hulls.

## Lucky Cats

Many merchant vessels carry a ship's cat. The Japanese will tell you this is because it has long been a tradition on Japanese vessels to carry a tortoiseshell cat for luck and how, at the end of the Twilight War, the Japanese had the world's only major merchant fleet. Other nations, the Japanese say, picked up on the idea and spacers being a superstitious lot, continued it themselves.

The tradition of a ship's cat, however (tortoiseshell or otherwise), was common on surface ships of all nations long before Twilight and it is inevitable that the custom continued on space ships. Cats take longer than humans to adapt to free fall but suffer fewer long-term adverse effects and eventually grow to enjoy life without gravity.

Engineered cats adapted for low and zero-gravity are a common sight on Libertine craft and in belter settlements.

## Atmosphere

Atmosphere	Modifier to effective Size
Trace	+1
Very Thin	+2
Thin	+3
Standard	+4
Dense	+5
Very Dense	+6

## ORBITAL OPERATIONS

Once in orbit, there are a few manoeuvres that a spacecraft can take. Docking with another craft or station is common but the most frequently performed manoeuvre is to climb up orbital zones until a stutterwarp drive can be engaged or, conversely, transiting down orbital zones from the Wall to allow interface operations.

### Docking

Docking is a very common orbital manoeuvre. Most of the time, the process is automatic, handled by the on-board computer in tandem with the computer on the other ship or a station. However, under some circumstances, the docking procedure must be done manually. This is covered on page 143 of the *Traveller Core Rulebook*.

## Pilot Certification

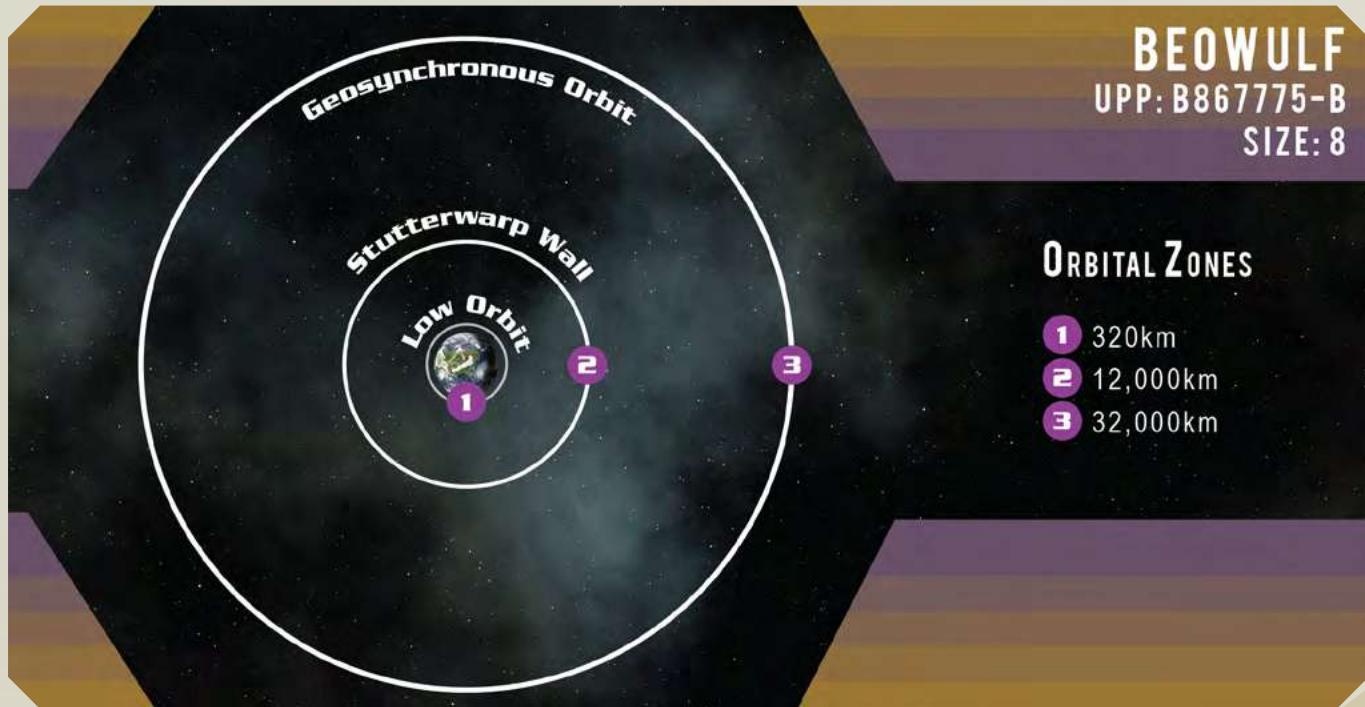
Most nations have rigorous requirements for commercial flight certification. Colonies tend to have lower requirements. To become certified to pilot commercial vessels, a person must have at least Pilot 2 for a second-class certification and Pilot 3 for a first class certification. On many colony worlds, although, the requirements are one skill level less. Tier 4 and lower nations in the Core can also have relaxed qualifications for certification but they risk not being recognised by major powers.

### Orbital Manoeuvring

Between Low Orbit and the Wall is the Orbital Zone. Any manoeuvring in this Zone requires a Burn. To move from Low Orbit to the Wall or vice versa requires 1 Burn. To move from Low Orbit to a space station at higher altitude also requires 1 Burn. The time required for any of these manoeuvres is equal to twice the world's Size, in minutes.

A ship can use additional Burns to shorten the time required. Each additional Burn consumed effectively lowers the world's Size by one, with a maximum reduction of no more than half the effective world's Size (rounding down).

*For example, a craft is in Low Orbit around a Size 8 world. To travel to the Wall would require 16 minutes. If an additional Burn is used, it would take 14 minutes.*



# STUTTERWARP

The stutterwarp drive is one of the more complex technologies created by humanity and few profess to completely understand it. It enables faster-than-light travel, giving access to the stars. It stands out as the only watershed theoretical breakthrough that took place between the beginning of the global recovery from Twilight and the present. This discovery was made in 2105 at the large French synchrocyclotron facility at Grenoble. On August 18<sup>th</sup> of that year, a team led by Dr. Emile Jerome induced a microscopic quantum jump on a complete hydrogen molecule. Within two years the experiment had been replicated at the rebuilt C.E.R.N. facility in Switzerland and a small group of theoretical physicists realised that mankind had finally discovered the key to the stars. However, scaling up the Jerome effect from moving a single hydrogen molecule to moving a large fabricated spacecraft was a long, complex and extremely expensive proposition. It was not until 2136 that the first unmanned stellar probe was launched and eight more years before manned survey ships were travelling to the stars. These early designs were slow compared to modern vessels but actually had the same range: 7.7 light years.

## The Basics

Stutterwarp drives operate on the same principles as the tunnelling phenomenon that can occasionally be observed in sub-atomic particles. The tunnelling effect

*Ever seen a stutterwarp ship in flight? At system speeds, it just looks like a blur. Even to radar and highscan, its position is indeterminate. The faster it goes, the more indeterminate it gets. Once it passes by you, although, then things get interesting. The ship is almost invisible as it passes but the images of it as it stuttered along have, in a way, ‘solidified’. You can actually see images moving away in both directions. The image moving in the direction the vessel came from is the termination image, or chaser. This effect is part of what feeds highscan, if you have enough drones and buoys in-system to make it work.*

*From the inside, you don’t see much, really. Stars and planets become fuzzy, and at FTL speeds stars become rings, more and more diffuse as the craft goes faster. The fun comes when you stop. That termination image catches up with you. The kicker? It looks like it is moving away at the speed of light! You have to be watching for it to see it. Some liners have ‘chaser’ parties, so everyone can get a look.*

allows a physical mass to be moved from one location in space to another, instantaneously, without passing through the intervening space.

The distance a stutterwarp vessel travels is relatively short, and depends on local gravity conditions, but in interstellar space each jump is typically several hundred metres. Stutterwarp drives cycle several hundred thousand times per second, depending on the rotational rate of the core, thus moving the vessel very quickly.

Objects travelling via stutterwarp do not gain any additional velocity, despite appearances. If the stutterwarp drive is stopped, the vessel stops as well. While under stutterwarp, a vessel actually retains the velocity it had prior to engagement of the drive and will continue moving at that velocity when the drive stops. Upon entering a new system, a stutterwarp vessel will typically use a combination of gravity assists to either speed up or slow down its effective real-space speed to the proper orbital velocity for the world it is approaching.

The most important part of the stutterwarp drive is the stutterwarp core, an intricate helix of superconducting ceramic doped with crystalline tantalum. This core is magnetically suspended in a high-quality vacuum chamber and induced to spin at hundreds of thousands of rpm. As it spins, the core is energised and the tantalum isotope interacts with the surrounding quantum ‘foam’, which induces the tunnelling effect and displacement of the vessel.

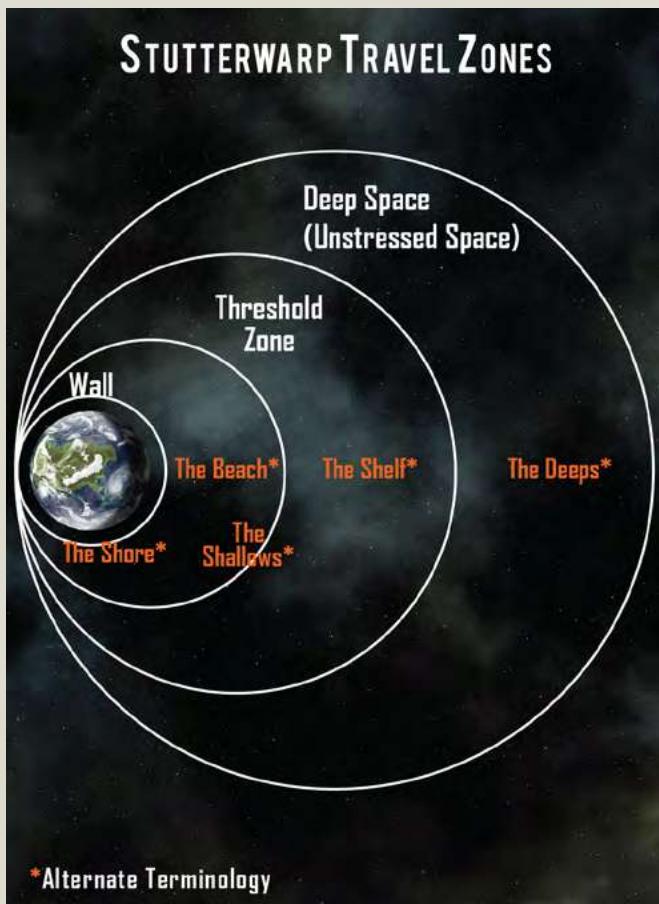
## Stutterwarp Travel

There is a structure to stutterwarp travel. In the spaces between the stars, ships travel hundreds, or even thousands, of times faster than light. However, within systems, and near planets, this speed drops off enormously.

There are three different zones that affect the speed of stutterwarp travel. **Deep Space**, or unstressed space, allows a starship to travel at maximum speed. Once close to a star, within the **Threshold Zone**, this speed drops by several orders of magnitude. Finally, once the ship hits the **Wall**, the stutterwarp ceases to function in a meaningful way and reaction drives need to be engaged.

## Interstellar Travel

Travelling from star-to-star is relatively straightforward. There are tales of master astrogators who have plotted courses by dead-reckoning, using little more than a ship’s telescope and many deep space stops to calibrate and adjust course. Few believe these stories, however. Successfully navigating between stars in this way is more a matter of luck than design.



At the start of the voyage, the ship's crew calculate the most efficient course to the target star. This is a task chain, with each crew member having a part to play.

The following task chain is used for interstellar navigation and travel:

1. Analyse for latest navigational data on current and target systems: Average (8+) Electronics (computers) check (2D minutes, EDU). DM-2 if either system is unknown.
2. Scan for local risks and threats: Difficult (10+), Electronics (sensors) check (1D hours, INT). Sensors will provide a DM (Basic +0, Enhanced +1, Advanced +2).
3. Determine the proper course: Average (8+) Astrogation check (1D x 10 minutes, INT).
4. Calibrate the drive: Routine (+6) Engineer (stutterwarp) check (1D hours, EDU).
5. Lay in course and engage drives: Routine (6+) Pilot check (1D hours, INT). Success will subtract the Effect x 1D hours from travel time, while failure will add Effect x 1D hours.

All of these checks can be done faster or slower, with the appropriate change in difficulty. Most will be carried out on the outbound journey to the Threshold, which

may take several days. They cannot be done concurrently, however; they must be carried out in sequence.

## The Threshold

Stutterwarp drives exhibit a severe drop-off in efficiency when within a gravity well of 0.0001G or greater, falling by an order of magnitude and reducing the vessel to sub-FTL speeds. The Stutterwarp Threshold is a reference to the distance from a system's star that stutterwarp performance degrades to the point where the ship drops below FTL speeds.

### Stutterwarp Threshold

Stellar Type	Stutterwarp Threshold
M	1.23 AU
K	2.05 AU
G	2.45 AU
F	2.68 AU
A	3.37 AU
B	7.35 AU
O	13.42 AU
Arcturus (red giant)	2.5 AU

To determine the Stutterwarp Threshold for a planet, use the following formula:

**World Size x 5,000km = altitude of Stutterwarp Threshold in Kilometres**

Gas giants are a special case. A small gas giant has a Stutterwarp Threshold of 1D x 50,000km, while a large gas giant has a Stutterwarp Threshold of 2D x 100,000km.

The Stutterwarp Threshold would occur at roughly 40,000km above an Earth-sized world. Most, although not all, habitable worlds are inside the Stutterwarp Threshold of their parent star and do not require a determination of this distance. Worlds outside of the stellar threshold, like Saturn in the Sol system, or Tithonus in Aurore, would need have their Stutterwarp Thresholds determined.

## The Wall

The Wall is the point at which stutterwarp efficiencies drop effectively off to zero and reaction drives must be employed. Some ships use carried vessels to approach closer to a planet than the Wall, although most will descend to Low Orbit. The largest bulk carriers use transfer stations above the Wall to off-load cargo, free from the need to use reaction drives for anything save planetary capture and station-keeping.

# Alternate Terminology

Although the terms Unstressed Space, Threshold and Wall are in common use, some organisations, like the Libertines and the British Royal Navy, prefer a different set of terms.

## THE DEEPS

This refers to unstressed space, the gulfs between stars.

## THE SHELF

The point at which a ship's speed drops to system speeds.

## THE SHALLOWS

System space, the region between the Shelf and the Beach.

## THE BEACH

The Wall, past which ships cannot venture on stutterwarp drive. They must use reaction drives, a condition that their crews call Beached, being forced to crawl along via Newtonian mechanics.

### Stutterwarp Wall

Stellar Type	Stutterwarp Wall
M	0.039 AU
K	0.063 AU
G	0.078 AU
F	0.085 AU
A	0.11 AU
B	0.23 AU
O	0.43 AU
Arcturus (red giant)	0.080 AU (within the star's radius of 0.12 AU)

To determine the Wall for a planet, use the following formula:

**World Size x 1,500km = altitude of the Wall in kilometres**

The Wall is approximately 12,000km above Earth.

## Planetary Capture

The stutterwarp drive does not impart any actual velocity to a vessel, merely displacing it with each cycle of the drive. Vessels will retain whatever real space velocity

they had when they engaged their stutterwarp drive. Once in a new system, the ship must match real space velocities with the system through careful navigation, using gravitational captures and gravity assists. The crew will use planets to decelerate or accelerate the ship to appropriate velocities and vectors.

When trying to match orbital vectors with planet, a successful Difficult (10+) Astrogation check (1D hours, EDU) is required. Using a number of Burn Points equal to the world's Size grants DM+2. If failed, the Effect becomes a negative DM that is applied to subsequent checks to match vectors. This can be offset by expending Burn Points equal to the Effect, effectively cancelling out the bad vector and allowing another attempt. This can continue until the ship runs out of Burn Points.

## Speeds

A stutterwarp operates at different speeds, listed in each ship's description. Each ship description includes:

- Stutterwarp Efficiency (its base speed, in light years per day)
- System Speed (Stutterwarp Efficiency x 0.5, in Astronomical Units per day)
- Tactical Speed (Stutterwarp Efficiency rounded to the nearest whole number)

Regardless of the rated Stutterwarp Efficiency of the ship, the maximum Stutterwarp Efficiency attainable is dependent on the stutterwarp control program run by the ship's computer (see page 44).

## Boosting Stutterwarp

A skilled pilot can get more from the drive but there are limits. The maximum speed boost can be no higher than the maximum allowed by the stutterwarp control program.

This requires a Very Difficult (12+) Pilot check (1D hours, INT). Stutterwarp Efficiency increases by Effect x 10% for 1D hours.

## Range

Quantum interactions as the drive moves through space build up what some have dubbed a 'gravistatic' charge on the rotating tantalum coils of a ship's drive. This is compounded by real space intersections with hydrogen atoms and other matter as the ship moves, interposing itself on each part of space it jumps into. As the coils build up the charge, it starts to distort the crystal shape of the atoms in the drive coil. After a critical level of

charge is reached, after 7.7 light years, the tantalum drive core undergoes a spontaneous relaxation event, decaying into hafnium and releasing an intense, lethal burst of heat and gamma radiation. The radiation exposure is of 2D x100 rads and the discharge usually destroys the drive, along with the drive room.

## Overdrive

It is possible for a very skilled engineer to push a drive past the 7.7 light-year range. This is a hazardous task and failure can result in the destruction of the ship. Once a ship is near the 7.7 light year range, the ship's engineering crew can attempt the following task chain.

1. Reconfigure the sensors on the stutterwarp drive: Difficult (10+) Electronics (sensors) check (1D minutes, EDU).
2. Disengage the safety protocols on the drive computer and recalibrate it for a longer-range displacement: Difficult (10+), Electronics (computers) check (1D minutes, INT).
3. Extend the ship's range: Very Difficult (12+) Engineer (stutterwarp) check (1D hours, INT). This check is made as the ship crosses the 7.7 light year maximum range.

Success extends the range by Effect x 5%. It also starts a slow emission of dangerous radiation from the drive (1D rads to all crew in the first hour, 2D rads in the second hour and so on until it reaches 6D rads per hour). This radiation emission will continue until the drive can discharge.

An Effect of -6 destroys the drive, doing 1D x 1D damage to the ship (ignoring armour) and bathing the crew in 2D x 100 rads. Any other result inflicts Effect x 2 critical hits upon the ship.

## Discharging

Once a ship arrives in a gravity well of at least 0.1G, the ships can discharge the stutterwarp drive. The effect of the gravity well causes the gravistatic charge on the drive coils to diminish over the course of several hours, allowing the atomic structure of the coil to return to normal. The full process by which the charge accumulates on the coils during travel and discharges in a gravity well is not fully understood.

Discharge time is a function of the distance travelled and takes around six hours per light year travelled. Thus a full 7.7 light year voyage would take 44.2 hours to discharge. Partial discharges are possible, retaining the remaining charge on the drive.

## Brown Dwarfs and Rogue Planets

Brown dwarfs are type Y, T, L or M 6.5 or later stars, often described as failed stars as they straddle the line between large planets and the smallest stars. Many times more massive than Jupiter, yet considerably less massive than the sun, brown dwarfs are another method to break the 7.7 light year barrier on stutterwarp travel. They serve as a convenient discharge point in deep space and although difficult, are not impossible to detect remotely.

## Stellar Classifications

Stars are classified by their size and spectral type. Spectral is related to surface temperature and star colour. Arranged from hottest to coolest, the spectral types are O, B, A, F, G, K, M. O and B class stars are rare and there are none found within human space. Within each spectral class, stars are arranged from 0 (hottest) to 9 (coolest). Although stars are classified by colour, to the human eye they appear much lighter than their colour classification would suggest.

Spectral Type	Effective Temperature	Colour
O	≥ 30,000 K	Blue
B	10,000–30,000 K	Blue-White
A	7,500–10,000 K	White
F	6,000–7,500 K	Yellow-White
G	5,200–6,000 K	Yellow
K	3,700–5,200 K	Orange
M	2,400–3,700 K	Red

Size classifications, from largest to smallest, are I, II, III, IV, V, VI and VII. Types I through IV are giant and sub-giant stars, while type V are main sequence stars. VI are sub-dwarfs and VII are white dwarfs. White dwarfs are the degenerate cores of former stars that sloughed off their outer layers, leaving behind only the slowly-cooling core.

Spectral types Y, T and M 6.5 are brown dwarfs, planets much larger than Jupiter, but too small to be true stars. Some of the more massive examples are undergoing fusion reaction in their core, but not on the scale or energy output of a true star. They often radiate heat but very little light.

Sol is classified as G2 V, a main sequence star G-type, slightly hotter than the median for its type.

Detecting a brown dwarf is a Formidable (14+), Science (Astronomy), EDU, 2D days check. It requires access to at least a standard two metre shipboard telescope and a computer with Bandwidth/10 available. If neither of these are available, it is not possible to conduct this check. Lack of one or the other, but not both, imparts a Bane on the check and makes the time increment 2D weeks.

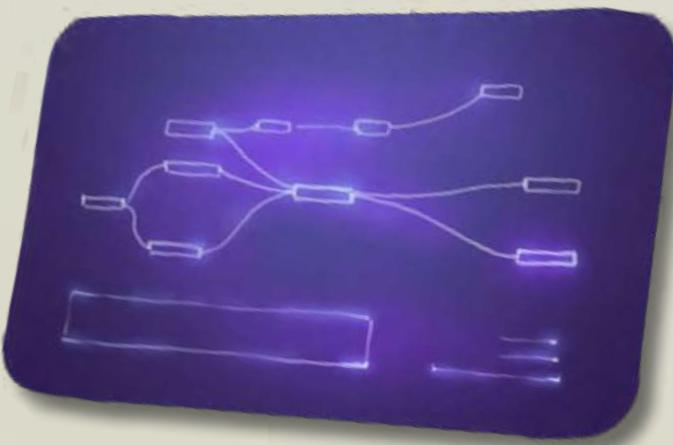
Rogue planets are bodies either ejected from their original solar system or, in rare cases, formed in the void between stars. Most rogue planets are gas giants or failed cores but some may be frozen, rocky bodies. Rogue planets, being far smaller and colder than brown dwarfs, are far harder to detect. The skill check is the same, except for the time increment, which is 2D months. This check has the same equipment requirements and consequences as the check for brown dwarfs. If the equipment is lacking, the time increment would be 1D years.

Both brown dwarfs and rogue planets can be found in interstellar space and are sometimes ideally placed to provide a bridge to stars that would otherwise be out of range of a stutterwarp drive vessel. One of the goals of the long baseline arrays is to chart the locations of all such interstellar objects.

## THE SHIP'S COMPUTER

The following software is available for most vessels, although fire control software will require extraordinary circumstances for non-military customers to attain. This software can, in theory, be run on a personal comp but must be recompiled for its operating system, which is different from the distributed cluster computers that control spacecraft.

The ship's computer is capable of simultaneously running a total Bandwidth of software equal to its Rating.



### Ship's Computer Software

Software	TL	Bandwidth	Cost (MLv)	Effect
Manoeuvre	10	0	Included	Allows basic control of ship.
Intellect	10	10	1	Allows a ship to understand and obey properly-phrased verbal commands.
Stutterwarp Control	As drive	2 x Warp Efficiency	Bandwidth/5	Allows stutterwarp travel.
Fire Control/1	10	5	2	Fire Control allows the computer to assist targeting. It adds DM+1 for each level of Fire Control.
Fire Control/2	11	10	4	
Fire Control/3	12	15	6	
Auto-Repair/1	10	10	5	Allows the computer to make a number of repair attempts per round equal to the listed number. Alternatively, it can give a DM to a repair attempt equal to the software's level or any combination of the two. Requires the ship to carry repair drones.
Auto-Repair/2	11	20	10	
Archive	10	0	Included	Contains a wealth of data on numerous subjects.

## POWER

Power plants produce an amount of Power, which is then allocated to run ship systems. Available Power is listed in each ship's description.

Many ships do not produce enough power to run all systems simultaneously; this is very common in interface-capable craft that are also equipped with stutterwarp drives. Since thrusters and stutterwarp drives are almost never operated together, most ships are only designed to produce enough power to operate one of these systems at a time.

**Basic Ship Systems:** The amount of Power required for basic operations and life support is equal to 5% of the total tonnage of the hull.

**Reaction Drive:** While rockets do not require Power, thrusters do. The Power required is dependent on the ship and world's size.

**Stutterwarp Drives:** The stutterwarp drive consumes Power dependant on the size of the ship and rating of it drive, as noted in the ship's description.

**Weapons:** The Weapons table summarises the Power required for various weapons.

Weapon	Power
Beam Laser	10
Pulse Laser	10
Particle Beam	20
Heavy Laser	50
Heavy Particle Beam	50
Rail Gun	60
Submunition Dispenser (any)	5

**Sensors and Communications:** Active sensors and fire controllers require Power. The Sensors table summarises some common power requirements.

Sensors	System	Power
Basic Military Sensors	5	
Advanced Military Sensors	10	
Very Advanced Military Sensors	15	
TTA	5	
Light TTA	2	
UTES	5	

## Power Plants

There are four common types of power plants, along with solar panels. All large ships also have emergency power available and some ships are also equipped with power storage (batteries and related technologies).

**Fuel Cells:** Fuel cells combine hydrogen and oxygen in a chemical reaction that produces electricity, water and a small amount of heat. Using solar panels or a different power supply, this 'waste' water can be cracked back into fuel, effectively running the fuel cell in reverse. While there are losses over time, a closed-cycle fuel cell can run for six months without requiring fresh fuel.

Fuel cells cannot be modified for use as thrusters. Fuel cell-powered vessels require rockets or a secondary MHD turbine and attached thruster.

**MHD Turbine:** The MHD (magnetohydrodynamic) turbine is not literally a turbine. It burns hydrogen-oxygen fuel at a high temperature to create a charged plasma, which then flows through a series of magnetic coils (the 'turbine').

The interaction of the charged plasma on the magnetic field generates electricity. The MHD turbine is compact and effective but consumes significantly more fuel than a fuel cell; the radiated signature of an MHD turbine is also much higher than other systems, due to the high temperature of the exhaust. However, the turbine produces less heat within the vessel itself since the waste heat is vented through the exhaust rather than through radiators. The MHD turbine is very common in both commercial and military service and can be modified so the turbine plasma is directed to a re-combustion chamber for use as a reaction drive.

**Fission Reactor:** Powerful and compact, the fission plant requires a larger operating and monitoring crew than any other power plant type. Most commercial fission power plants use thorium for fuel, while most military plants use uranium. The advantage of using uranium in military vessels is that waste from these reactors can be used in the manufacture of nuclear weapons, which are vital for modern space forces. Fission reactors can be modified to act as thrusters, although this is normally only done in vacuum environments where there is little possibility of contamination.

The fuel core of a fission reactor needs to be replaced every five years, at which time extensive maintenance is required. This requires the services of a Class B starport or better.

**Fusion Reactor:** The fusion reactor is a relatively compact design that uses a high-efficiency fusion reaction, with a fuel mix of deuterium and tritium. While this fuel mix results in neutron bombardment of the reactor vessel, the lifespan of a typical reactor is rated at 25 years. At this point, most of the fuel is exhausted and the reactor vessel is slightly, although not dangerously, radioactive. This lifespan can be increased to 30 years through careful control and monitoring but by then the fuel will be exhausted and the reactor on the verge of being dangerously radioactive (expelling one rad every hour into the drive room). It is not economically feasible to refuel a starship's fusion reactor but in theory it could be done.

Fusion reactors can also be modified to be used as thrusters. Due to their mass and bulk, they are almost never used for interface vessels but are common in starships.

**Solar Panels:** Solar panels are rarely used as a primary power supply for spacecraft and starships as they are useless in interstellar space. However, they are often the primary power source for small bases and transfer stations. Spacecraft may use them as a backup system, especially on vessels powered by fuel cells. The solar panels can be deployed to sue the fuel cells to crack waste water back into fuel, and run the ship's systems in the meantime.

Deployed solar panels, while not massive, do add a great deal to the reflected signature of a spacecraft, adding +1 per 50 Power generated by the solar power array (see Sensor Operations on page 46 and Starship Combat on page 52).

**Power Storage Modules:** Many ships carry batteries to supply power for emergency systems, or to provide a power boost when required. Batteries use a variety of technologies, from advanced graphene batteries at TL 10 to super-conducting storage rings at TL12. The duration of batteries is determined by their size and tech level, and can easily be reconfigured by an engineer. The description will list the Power and Duration for the battery bank. This can be reconfigured to produce more Power for a shorter period of time, or less Power over a longer period of time. Multiply Power by Duration to get the total power available, and divide that by the new time period.

*For example, the Martinique has a battery system that can provide 5 Power for two days, or 10 Power/days in total. That same bank could be used to provide 10 Power for one day, or 1 Power for 10 days, or some other combination.*

## Heat

Every component in a ship generates heat, from the power plant to the electronics, weapons and even the crew. This heat must be disposed of. Heat is a major limiting factor for military starships in 2300AD, although it rarely has an appreciable impact on civilian craft, save in combat situations.

The vacuum of space is neither hot nor cold. Rather, it is a near-perfect insulator. The heat generated by a spacecraft's systems can only escape the ship using radiators, typically large, wing-like panels on a ship's engineering section and habitation areas. Heat from the ship's systems is transferred to the radiators, where it slowly bleeds out into space.

Further information on heat can be found in the *Aerospace Engineer's Handbook*, in the Advanced Combat Rules chapter.

Reconfiguring a battery requires a Routine (6+) Engineer (power) check (1D minutes, EDU). Boosting cell output requires a Difficult (10+) Engineer (power) check (1D minutes, EDU). An Effect of -6 on permanently lowers the cell duration to two hours until replaced and reconditioned.

**Emergency Power:** Many ships have an emergency power system that uses batteries to provide power for life support for a limited amount of time. Emergency power available is noted in the ship description. This power can be used for other purposes but is very risky. Diverted this way, emergency power provides Power equal to the normal life support requirement ( $5\% \times \text{hull tonnage}$ ).

Rerouting emergency power requires an Average (8+) Engineer (power) check (1D minutes, INT).

## SENSOR OPERATIONS

Sensors in 2300AD use the sensor rules from page 150 of the *Traveller Core Rulebook*, although there are some differences. At anything beyond Close range, time-lag begins to be an issue for sensors. This results in a range-based DM for all sensors as shown on the Sensor Time-lag table.

Note there are no NAS or densitometer sensors in 2300AD and that range bands reflect different distances (see page 36).

## Sensor Time-lag

Range	Range DM
Adjacent	+1
Close	+0
Short	-1
Medium	-2
Long	-3
Very Long	-4
Distant	-5

Ships will have sensor suites that combine many different sensors and can include astronomical and ground-observing optical or radar telescopes, LIDAR mappers, radar mappers, ground-penetrating radar, gravity scans, IR and thermal imaging, and various emission and absorption spectrographic sensors. Signal processing and image analysis can be added to further enhance the capabilities, depending on the type of sensor.

## Telescopes

Some ships will mount multi-spectral telescopes operating from the high infrared range to the low ultraviolet range. These telescopes are used for a variety of purposes, from deep-space astronomy to ground survey and surveillance work. The typical shipborne telescope is a three metre folding reflector, similar in size to the 21st Century Hubble Space Telescope, although it is usually used to examine planetary features. From Low Orbit, they can resolve Full detail on surface objects (see page 150 of the *Traveller Core Rulebook*).

They can also be used for astronomical purposes. Some research projects purchase time on shipborne telescopes, asking them to take observations of specific regions of space. Combined with the timestamp from the ship's computers, these are combined with similar observations across a wide region of space and integrated by computer. The resulting images can be very highly detailed.

## Highscan

Highscan refers to the use of sensor networks, buoys, drones, ships and stations to create high-resolution scans of an entire star system. The main limitation to these systems is the speed of communication from portions of the network to receiving craft. Highscan is usually reserved for military and security forces, although it relies on data from all linked craft in the system. Foundations and TransNats can sometimes access highscan data but only for very specific purposes.

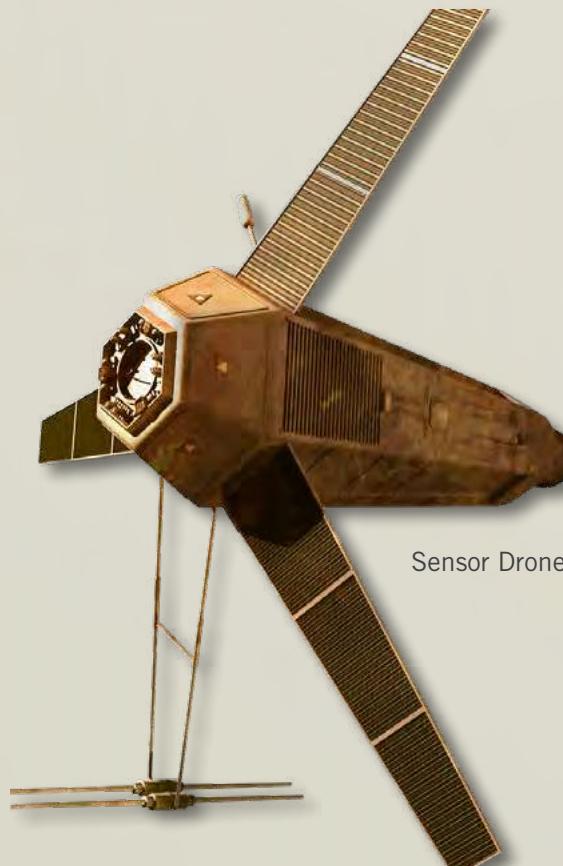
Highscan allows any object in system to be treated as if it were at Very Long range but the information observed will be several hours old.

Highscan is not always available: For any system, roll 2D, applying DM+2 if there is a French, American or Manchurian colony in the system. On a roll of 10+, highscan is currently available. Note that Travellers would have to convince local authorities to allow them access to the highscan network.

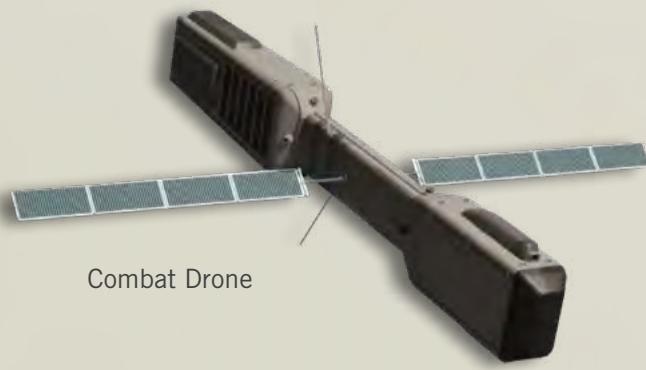
## REMOTE OBJECTS

Remote objects include sensor drones, combat drones and buoys but can also include other ships that are being externally-controlled. The drones on page 149 of the *Traveller Core Rulebook* are available, although probe drones (inspection drones) cannot be used on planets. Specialised landers are required for that.

**Sensor Drones:** There are other drones in use but the most common is a sensor drone. These unmanned vessels are small and fast, and equipped with effective sensors. They are often used in number, using swarm logic to generate higher-resolution scans.



Sensor Drone



**Batteries:** Batteries use a variety of technologies, from advanced graphene batteries at TL 10 to superconducting storage rings at TL12. The duration of batteries is determined by their size and tech level, and can easily be reconfigured by an engineer..

**Buoys:** Buoys are non-mobile and are typically navigational beacons, sensors and comm relays. Some buoys, known as Sentinels or Watchdogs are armed 'space mines' used to guard discharge points, stations and other important areas. Sensor buoy networks are a critical part of highscan networks.

## OPERATING COSTS

Starships and spacecraft cost a great deal to operate. Fuel costs, especially for interface craft, can be extremely high; nine tons of fuel carried by a small lander will cost Lv18000 on a typical Frontier world.

### Operating Costs

Service	Starport Class	Core Cost	Frontier Cost
Apron Fees	A-E	Lv5 per ton per week	Free
Docking Fees, Orbital	A, B	Lv50 per ton per week	Lv75 per ton per week
Berthing Fees, Surface	A-C	Lv20 per ton per week	Lv10 per ton per week
Berth-side Power and Life Support	A-C	Lv5 per ton per week	Lv5 per ton per week
Pressurised Berth	A, B	Lv50 per ton per week	Lv200 per ton per week
Spacedock	A, B	Lv50 per ton per week	Lv100 per ton per week
Certification (Commercial)	A-C	Lv25 per ton per year	Lv10 per ton per year
Certification (Non-Commercial)	A-D	Lv20 per ton per year	Lv5 per ton per year
Insurance (Commercial)	A-C	Lv200 per ton per year	Lv100 per ton per year
Insurance (Non-Commercial)	A-D	Lv75 per ton per year	Lv25 per ton per year
OQC Inspection	A-C	Lv3000	N/A
Fuel, per ton	A-D	Lv2000	Lv2000
ReMass, per ton	A-C	Lv800	
Nuclear Reactor Core	A	40% of reactor cost	60% of reactor cost

Other costs include life support, maintenance, inspections, insurance, certifications, various berthing fees and crew salaries. Maintenance and life support costs are listed with the spacecraft description.

**Apron:** Apron parking is out in the open, either in an area off the runway or some other prepared area. It offers no support services of any kind.

**Berth:** Berths have umbilical connections to allow life support flushes, refuelling and the ability to run off local power. Berths also allow cargo and passengers to be loaded and unloaded under cover, with protection from the elements. Ships must be in a berth to be serviced by starport technicians.

**Orbital Dock:** The ship is attached by docking tube, allowing connections for power and life support, and the loading and unloading of passengers and small cargo in a pressurised environment. Only routine maintenance can be made while docked in this way.

**Pressurised Berth:** A pressurised berth on a space station allows a shirt-sleeve environment for the loading and off-loading of heavy cargo and standard maintenance.

**Spacedock:** Spacedocks are used for building ships and repairing significant damage.

**Certification:** Ships must have commercial certification to pick up passengers at Class A through C starports and non-commercial certification to use any starport facilities at starports from Class A to D.

**Insurance:** Commercial insurance is required for any craft carrying passengers or freight from a Class A through C starport. Non-commercial insurance is not required but advised. Most Class A starports will not allow uninsured ships to dock or land.

**OQC Inspection:** Any ship that visits Earth has to pass through OQC inspection before it docks with a station or lands. The fee is paid before inspection and is non-refundable.

**Fuel:** This is the cost for the typical cryogenic fuel mix required by spacecraft that use MHD turbines or fuel cells. It is also the same fuel required for interface operations

**Remass:** Reaction mass (remass) is the working fluid for orbital thrusters on nuclear-powered spacecraft. It is typically hydrogen or ammonia, although even water will work. Remass cannot be used in thrusters for interface operations.

**Nuclear Reactor Core:** The core of nuclear fission reactors needs to be replaced every five years.

## Crew Salaries

For crew positions not filled by Travellers, salaries can become a significant part of a vessel's operating costs. Commercial vessels must run with the crew listed in their description to maintain insurance and certification. Non-commercial craft, including most Libertines, do not have to do so.

## Crew Salaries

Crew Position	Standard Rate	Expert Rate (Skill 3+)
Pilot	Lv4000	Lv6000
Navigator	Lv3000	Lv4500
Sensor Operations	Lv3000	Lv4000
Engineer	Lv4000	Lv5500
Gunner	Lv2000	Lv3000
Small Craft Pilot	Lv3000	Lv4500
Remote Pilot	Lv3000	Lv4000
Steward	Lv2000	Lv4000
Cargo Handler	Lv1000	Lv1500
Medical	Lv4000	Lv6000

Passage Type	High Passage	Middle Passage	Colony Passage	Cryo-berth	Freight (per ton)
Cost per Light Year	Lv500	Lv100	Lv50	Lv25	Lv100
Earth to Tirane	Lv1000	Lv200	—	Lv50	Lv200

Pay rates are per month. Crewmembers on commercial vessels sometimes elect to take cargo space in lieu of pay, at the rate of Lv500 per quarter ton of cargo space. This space is often used for personal storage, recreation or, most often, as freelance cargo space.

## TRADE

The Trade chapter in the *Traveller Core Rulebook* (pages 206–213) can be used with 2300AD. However, costs do not include interface charges, which are much more expensive in 2300AD. The Trade chapter would be applicable for goods and commodities produced in space, including from orbital factories and asteroid mines. Any others must include the costs of getting material into orbit.

Commercial lift costs to orbit are a function of world Size and the type of interface craft used. The Interface Costs table has the base cost per ton (or passenger) per world Size code. Landing is significantly easier and cheaper, at a fraction of the lift cost.

## Interface Costs

Interface Type	Cost to Orbit	Return Cost
Beanstalk	Lv100 x Size	Lv10 x Size
Tether	Lv150 x Size	Lv15 x Size
Catapult	Lv200 x Size	—
HELA Lightcraft	Lv300 x Size	—
Spaceplane	Lv500 x Size	Lv15 x Size
Lander	Lv400 x Size	Lv20 x Size
Semi-disposable rocket	Lv600 x Size	—
Drop Pod	—	Lv10 x Size
Drop Glider	—	Lv15-x Size

These interface costs must be considered along with the actual costs of speculative cargo. They are added over and above the costs of the cargo itself.

## Interstellar Passage and Freight

Passage and Freight Costs are from Planetary Wall to Planetary Wall and the cost depends on the distance travelled. These costs do not include interface travel

costs. Due to the sheer volume of traffic between Earth and Tirane, travel costs between these two systems is less expensive than normal.

**High Passage:** Ships offering High Passage must have spin gravity capability of at least 0.2G. In all other respects, the rules are as the *Traveller Core Rulebook*: Single stateroom, one ton of baggage and one steward required for every 10 High passengers.

**Middle Passage:** Standard single or double occupancy. The ship does not require spin capability.

**Colony Passage:** Four people or one family per stateroom, bunks in cargo are also possible.

**Cryo-berth:** Passage in cryo-berth is similar to Low Passage in the Traveller Core Rulebook, but safer. A Medic check is not required if four hours are allowed for the thaw cycle. Otherwise, at three hours a Routine (6+) Medic check is required, with DM-2 for every hour less allowed for the thaw (down to DM-6 for zero hours, known as a crash thaw). The cryo-passengers apply their END DM on these checks.

## Seeking Passengers

In addition to the modifiers on page 207 of the *Traveller Core Rulebook*, the following modifiers also apply to the check to find passengers.

Feature or Liability	DM
Integral Interface Capability (carried lander or landing-capable)	+1
Nuclear Fission powered (Core only)	-1
Non-Certified	-2
Uninsured	-3

**Integral Interface Capability:** While this results in a higher ticket price for the passenger, not having to go through commercially-available interface transport is considered a bonus, especially for High passengers.

**Nuclear Fission Powered:** There is still a distrust of nuclear fission power in the Core. This is a legacy of Twilight and some memetic fear-mongering by solar and fusion power advocates.

**Non-Certified:** While a non-certified ship may offer lower rates, it will have more trouble attracting passengers and will not attract High Passage fares at all.

**Uninsured:** Desperate Travellers may book passage on an uninsured vessel. Only Middle and Colony Passage can be booked.

## Freight

In addition to the modifiers on page 208 of the *Traveller Core Rulebook*, the following also apply to the check to find freight.

Feature or Liability	DM
Integral Interface Capability (carried lander or landing-capable)	+1
Non-Certified	-2
Uninsured	-3

## Mail

Official mail cannot be carried on Non-Certified or Uninsured vessels, although they can still accept private courier work.

# SPACE ENCOUNTERS

The table on page 146 of the *Traveller Core Rulebook* can be used, with the following changes to the rolled encounters.

## ENCOUNTER

roll	Encounter	Change
01	Alien Derelict	Roll 1D. On a 6, there is a derelict. Otherwise, no encounter.
05 and 31	Alien Vessel	Only on French Arm. Otherwise, re-roll.
46	X-Boat Courier	Courier Drone.
61	Unusually Daring Pirate	Roll 1D. On 1–3 the encounter occurs. Otherwise, no encounter.

**Alien Derelict:** Alien derelicts can come from several possible species, depending on the arm of space the Travellers find themselves in. Roll a dice and consult the appropriate table.

## FRENCH ARM

1D	Encounter
1–3	Pentapod
4	Kaefer
5	Unknown Type 1
6	Unknown Type 4

## MANCHURIAN ARM

1D	Encounter
1–3	Ancient Eber
4–5	Unknown Type 1
6	Unknown Type 4

## AMERICAN ARM

1D	Encounter
1–2	Unknown Type 1
3–4	Unknown Type 2
5	Unknown Type 3
6	Unknown Type 4

## THE CORE

1D	Encounter
1–2	Unknown Type 1
3–6	Unknown Type 4

**Unknown Type 1:** Generally spherical in configuration and in the range of 100–400 tons. Somewhat fragile in construction.

**Unknown Type 2:** Large, flattened spheres with ventral reaction drives and heavily armoured. Appears to have exploded from within, possibly deliberately.

**Unknown Type 3:** Biotech husk but not like Pentapod designs.

**Unknown Type 4:** Wildly variable, does not meet any other configuration.

## Mystery Ships

There have been several sightings of so-called mystery ships across human space. The spherical Kobold sighted on the French Arm, the similar Foo on the American Arm and the spiny, crab-like Caliban sighted, apparently, on all three Arms.

# STARSHIP COMBAT

Starships in 2300AD are fast and weapons are relatively short-ranged compared to the speed of ships. Ships in stutterwarp are difficult to hit, not just because of their speed but because of the nature of stutterwarp itself. Ships move hundreds of metres in hops, only present in real space for fractions of a second each time.

Detecting ships is relatively easy due to their heat and radiation signatures but generating an accurate firing solution is much more difficult. Combat, then, is chiefly about getting close enough to an opponent to burn them out of the sky.

There are only a few ways to do this. The first is with a ship, including gunships and fighters. The vessel's crew must use their resources to get close enough and obtain a firing solution. Along the way, they have to marshal their ship's power and signature, all the while trying to avoid becoming a target themselves. The other way is with a missile, effectively a remote-piloted fighter.

Ships must manoeuvre themselves or their missiles close enough to generate an accurate firing solution and then fire their weapons. Doing this is a combination of the skill of the ship's pilot, the speed of the ship and the quality of the rest of the crew.

## Range Bands

Range Band	Distance (km)	Example	Travel Time at Warp Efficiency 1
Adjacent	<100	Ships docking, low-orbit	<1 minute
Close	<=150,000	Maximum range for most weapons	<3 minutes
Short	150,001 – 300,000	Maximum Range for Extended Range weapons (300,000 km = 1 light second)	~3 minutes
Medium	301,000 – 450,000	Distance from Earth to the Moon	~6 Minutes
Long	450,001 – 600,000	—	~9 Minutes
Very Long	600,001 – 750,000	(600,000 km = 2 light seconds)	~12 Minutes
Distant	750,001 +	—	~15 Minutes

**Scale:** Combat occurs across range bands, each of which is  $\frac{1}{2}$  a light second or 150,000 kilometres. Note that this is five times Distant range in the *Traveller Core Rulebook*. Combat typically begins with ships or groups of ships at Long range from each other, although firing weapons takes place at much shorter ranges. Ships in 2300AD are extremely fast when compared to those of other *Traveller* settings. Each combat round is six minutes long.

**Power:** Ships have a limited allocation of Power to run all the ship's systems. A skilled engineer can temporarily increase the amount of power produced or reallocate it from another system.

**Signature:** a ship's signature is a combination of its radiated and reflected signatures. The radiated signature is the mix of heat and electromagnetic energy emitted by all ships, while the reflected signature is how easy the ship is to spot and track with active sensors, like radar and lidar.

**Stealth:** While the heat signature of a ship is impossible to completely mask, various technologies, here grouped under stealth, can make it harder to pinpoint a ship well enough to generate a firing solution. Other technologies absorb or redirect active sensors, reducing the overall signature of the ship.

**Weapons:** Starships can be equipped with a range of weapons.

Lasers are the most common, with the delicate focal arrays commonly protected in retractable mounts until combat is joined. The large focal arrays of laser weapons limit them to one weapon per hardpoint. A typical focal array is three to five metres in diameter once fully unfolded. Arrays require a minute to deploy and so can be fired on the round they are deployed, although with DM-2 to Gunner checks for that round only.

Particle beam weapons, though much bulkier than lasers, are commonly used for their increased firepower, heat damage and, under some circumstances, electromagnetic damage as well. They do not require the large focal arrays of lasers and are generally more durable.

Submunition Dispensers use small gas rockets to deploy their submunitions, then the carrying vessel moves to a safe distance before they are fired. Submunitions are low-yield detonation lasers that bathe the target in a wash of X-ray laser beams when they explode. In addition to physical damage, these warheads can douse the target in radiation.

Remote Objects, commonly called drones, is a category that encompasses all remotely-controlled craft operated from a ship. This includes sensor drones, inspection drones, repair drones, remote fighters and missiles.

Missiles are remote-operated vehicles that close with their target and then attempt to damage it using on-board weapons, carried submunitions or their own integral detonation laser warhead. The warhead of

a missile is typically more powerful than a submunition but usually destroys the carrying missile. Detonation lasers can also cause radiation damage to the target ship and crew. On occasion, missiles will carry other warheads, either a large nuclear demolition charge or a fragmenting warhead designed to disable stations and reaction drive craft without losing the entire missile.

## COMBAT ROUND

### The Travellers

**Actions:** Within each combat round, Travellers can take a number of actions on their turn equal to their skill level in the primary skill for their role. The captain can also use orders to increase the number of these actions by +1 but that makes use of one of their own orders (equal to their Leadership skill level).

Travellers act in turn in their roles as determined by their Captain's orders. They can elect to act out of turn but are then considered to have disobeyed an order and suffer DM-1 to their actions.

Some skills can be used multiple times in a combat round, while others cannot. Pilot, for example, can be used multiple times for multiple actions but Gunnery cannot.

There are a number of things a ship can do in combat but the most important is catching, and killing, the opposing force. Conversely, if this is not possible, then getting away and escaping become key.

Each Traveller has a role to play in combat, as shown on the Crew Actions table.

### Crew Actions

Role	Skill Required	
Captain	Leadership, Tactics (naval)	Determines initiative, gives orders
Sensor Operator	Electronics (sensors)	Scanning, developing Firing Solution
Gunner	Gunner (turret)	Fires weapons
Pilot (including Fighter Pilot)	Pilot	Pilots ship or fighter
Remote Pilot	Electronics (remote ops)	Pilots and fights drones
Engineer	Engineering (power and/or stutterwarp)	Boosts system outputs
Damage Control	Mechanic	Repairs critical hits and damage to hull
Ship's Troops	Vacc Suit, Gun Combat (energy)	Assists damage control, boards enemy ships, repel boarders

## Captain Actions

The captain always acts first among the crew.

**Initiative:** The captain or lead tactician of each vessel makes an opposed Tactics (naval) check (1D minutes, INT). The winning vessel moves and fires first, with all damage affecting targets immediately.

- **Commands:** The captain can then issue commands to the crew. A captain can issue one command per combat round per level of their Leadership skill. Issuing an order requires a Routine (8+) Leadership check (1D minutes, INT or SOC). On Effect 1–4, the recipient of the order gains DM+1 to their actions for that combat round. On Effect 5–6, they receive DM+2. Crew members who disobey the order suffer DM-1 to their actions for that combat round.
- **Tactics:** As part of a Firing Solution, the captain can make a Tactics (naval) check to add a DM to the final Gunner check. See page 56 for more details.

## Sensor Operator Actions

- **Initiate Firing Solution:** The sensor operator develops the firing solution that is downloaded to the gunnery stations. All gunnery stations use the same targeting information. See page 56 for more details.
- **Scan Target:** The sensor operator scans a target to get information. This is a Routine (8+) Electronics (sensors) check (1D minutes, INT). There is a penalty of DM-1 per range band between the ships. Effect 1–3 gives the base information available at the current range (see page 150 of the *Traveller Core Rulebook*). Effect 4–5 grants information as if the target was one range band closer and Effect 6 provides information as if the target was two range bands closer.
- **Improve Critical:** The sensor operator makes a Very Difficult (12+) Electronics (sensors) check (1D minutes, INT), with DM-1 per range band. If successful, the sensors operator has found a weakness and a critical hit occurs if there is Effect 5+ on the next shot this round using a Firing Solution. If the Electronics (sensor) check itself has Effect 6+, the attack roll only requires Effect 4+ for a Critical hit.
- **Electronic Warfare:** This can disrupt enemy target locks, jam communications or confuse sensor scans. Disrupting enemy target locks requires a Difficult (10+) Electronics (comms) check (1D

minutes, EDU). If successfully, the enemy's Gunner checks suffer DM-1, and Effect 5–6 imparts DM-2. On failure, Effect -5–6 grants the enemy ship DM+1 on Gunner checks as it locks onto the electronic emissions of the jammer. Other Electronic Warfare checks require a Difficult (10+) Electronics (sensors) check (1D minutes, EDU). Note that Electronic Warfare increases the Signature of the jamming vessel by two.

## Pilot Actions

- **Position Vessel:** The pilot plays a key role in creating a Firing Solution, using the output from sensors to position the ship and its batteries for an optimal shot. See page 56 for more details.
- **Open:** A pilot can attempt to escape pursuit. This requires an opposed Pilot check (1D minutes, DEX), adding the Tac Speed of the ship. Upon success, the Effect is the number of Range Bands the Travellers increase their distance from the enemy ship. On failure, the Effect is the number of Range Bands the enemy ship can close on the Travellers, if desired. Combat ends one round after the range becomes Distant, if the pursuing ship cannot successfully close.
- **Close:** The pilot works to close distance to the target. This requires an opposed Pilot check (1D minutes, DEX), adding the Tac Speed of the ship. Upon success, the Effect is the number of Range Bands the Travellers gain on the enemy ship. On failure, the range opens by the Effect, should the enemy ship so choose.
- **Evade:** The pilot can attempt evasive manoeuvres that make the Firing Solution more difficult for the enemy. This requires an opposed Pilot check (1D minutes, DEX). With Effect 1–4, there is DM-1 for all enemy Electronics (sensors) and Gunner checks. On Effect 5+, this becomes DM-2. With Effect -5 or worse enemies receive DM+1 to all Electronics (sensors) and Gunner checks.

## Engineer Actions

- **Re-route Power:** Some ships do not have sufficient power to run all systems simultaneously. They may also take damage that affects the output of the power plant. In either case, a ship's engineer can re-route power as required. Re-routing power requires an Average (8+) Engineer (power) check (1D minutes, EDU).

- **Boost Power Output:** Engineers can boost the output from power systems if needed. Boosting Power is a Difficult (10+) Engineer (power) check (1D minutes, EDU). On Success, the Effect is the percentage increase in available Power. This check must be repeated every round. With Effect -5 or worse, the ship suffers a critical hit to the power plant from the stress.
- **Boost Tac Speed:** Engineers can temporarily increase a ship's Tac Speed, providing a higher DM for Pilot checks, including the pilot's stage of the Firing Solution. Boosting Tac Speed requires a Very Difficult (10+) Engineer (stutterwarp) check (1D minutes, INT). On success, Effect 1–4 grants +1 to the ship's Tac Speed, while Effect 5–6 grants +2.

## Gunner Actions

- **Deploy or Recharge Screens:** Some ships have screens, which are controlled by a gunner station. With this action, a gunner can either deploy the screen or recharge it using carried reloads. No check is required but it does require an action.
- **Fire Weapon:** The primary duty of a gunner is to destroy enemy ships using a Firing Solution. See page 56 for more details.
- **Operate UTES Array:** If a weapon mount is equipped with UTES, the gunner can develop a Firing Solution independent of a sensor operator. If the gunner only has one action, they take two combat rounds to fire; one to develop the Firing Solution and another to fire. Developing a Firing Solution using a UTES array is a Very Difficult (12+) Gunner check (1D minutes, EDU). On success, Effect 1–4 grants DM+1 to the following Gunner check, while Effect 5–6 grants DM+2.
- **Point Defence:** A conventional weapon mount can also be used in the point defence role, although it is not as effective as a dedicated Point Defence Cluster. Point defence requires a Difficult (10+) Gunner check (1D minutes, DEX), with DM-2 for missiles and drones under 10 tons. If a PDC is used, it receives DM+4 instead of DM-2, although PDCs are typically operated by the ship's computer.

## Fighter and Remote Pilot Actions

Fighters and drones are very similar in usage, enough so that armed drones are often called remote fighters. Drones are subject to communications lag and jamming but are smaller and less expensive than manned fighters. They are also expendable.

Some functions, like using sensors, can be 'handed off' to another vessel. Drones at Long range have a DM-1 to all actions due to lightspeed lag.

Pilot actions for fighters and drones are the same as for pilots of larger vessels. Drones use the Electronics (remote ops) skill in place of Pilot, however. Drones have DM+2 to all Pilot checks (subject to communication lag) while manned fighter under 100 tons have DM+1.

Fighters, both piloted and remote, use the Firing Solution (page 56). Often times, fighters and drones do not have access to sophisticated sensors to develop proper target locks. They either have to rely on onboard sensors and computers, or else a relay from a sensor drone or ship. These relays can sometimes impart communications time lags due to the distances involved.

## Firing Solution for a Fighter or Drone

A fighter can either attempt to develop its own Firing Solution or accept a 'hand-off' from a sensor drone or nearby starship. Some fighters have another crew member, who can handle electronics, including sensors, electronic warfare and drones.

Fighters without a second crew member can still use a Pilot action to obtain a Firing Solution but it degrades their effectiveness. Alternatively, a fighter can accept a firing solution from a sensor drone or another vessel. Drone missiles usually use primary targeting information relayed from a ship, although some have their own built-in sensor suites.

Fighters and drones use the same Firing Solution process, with a few key differences. Generating the Firing Solution, the first step, has the biggest changes. A fighter with an electronics officer can use this step as normal. Otherwise a fighter or drone pilot can use a Piloting action to develop a Firing Solution, as per normal, but with DM-2 to the check. The Pilot must have an available Piloting action to do so.

If the craft is able to accept a sensor lock from another vessel, it can do so without a penalty. In this case, the sensor operator for the other vessel or drone makes the sensor check. This requires

one action from the sensor or drone operator but this one sensor check can provide the firing solution for multiples attackers. However, if the sensor platform is at Long range or greater, there is DM-1 due to lightspeed lag. Electronic Warfare can affect this check, depending on the Effect of the enemy's Electronics (comms) check (see page 59).

Once the firing solution is developed, the Effect is handed off to the next stage, the Pilot. This proceeds as normal. Drone operators use their Electronics (remote ops) skill for all Pilot checks.

The Pilot action of Position Vessel is the key component of the fighter Firing Solution and is handled the same way as Position Vessel in any other Firing Solution.

### Ship's Computer

The ship's computer uses most of its processing power to simply keeping the ship going and maintaining internal systems. Fire control programs can assist the Gunner check, giving their rating as a DM to the Gunner Check.

The Ship's Computer can also use the Fire Control program to run dedicated point-defence systems, although they can also be managed by a human gunner.

Each incoming fighter or drone can be engaged by a Point Defence Cluster (PDC), up to a maximum number of targets equal to TL-4. This requires a Difficult (10+) Gunner check (1D minutes), adding the Fire Control score. Note that there is an additional DM+4 for a PDC.

## THE FIRING SOLUTION

The Firing Solution is key to starship combat in 2300AD once fighting vessels are in range of one another. While the captain's orders normally determine when Travellers act in a combat round, once declared, the Firing solution takes precedence.

Due to the effects of the stutterwarp drive, determining the position of a ship accurately enough to generate a Firing Solution is difficult. The crew must work together to make a shot. This is represented by a task chain (see page 60 of the *Traveller Core Rulebook*), with each success or failure influencing the final outcome.

## Non-Stutterwarp and Stationary Targets

Spacecraft using reaction drives, stationary vessels and stations are treated in the same way. Weapon systems are optimised for use against stutterwarp craft, whether or not the attacker is using stutterwarp. Against vessels either not moving or moving under reaction drive, the Firing Solution becomes trivial. All such attacks gain DM+2 and inflict double damage.

For ship's with multiple batteries, a sensor operator can provide the firing solution for a number of targets equal to their Electronics (sensors) skill level. If there is more than one sensor operator, they can direct multiple batteries.

- The sensor operator begins the task chain. Generating a Firing Solution requires a Very Difficult (12+) Electronics (sensors) check (1D minutes, INT), adding the Signature of the enemy ship. Improved Military Sensors add DM+1, while Advanced add DM+2.
- The engineer can assist by routing power to the sensors with a Routine (8+) Engineer (power) check (1D minutes, INT).
- This data goes to the pilot, who then aligns the ship for an effective shot. This requires a Difficult (10+) Pilot check (1D minutes, DEX), adding the ship's Tac Speed.
- The engineer can assist the pilot by routing power to the drives. This requires a Routine (8+) Engineer (power) check (1D minutes, INT), which can increase the Tac Speed (see page 54).
- Finally, the combined data goes to the gunnery crew who fire their weapons. This requires a Difficult (10+) Gunner check (1D minutes, INT). A gunner can fire at one target per action and all weapons in an action must be at the same target.
- The captain can assist the gunner with this check by making a Difficult (10+) Tactics (naval) check (1D minutes, INT).

## RANGE MODIFIERS

Given the high speeds of stutterwarp ships and resulting tremendous ranges, most weapons are only effective within Close range. Targets on planets are also more difficult to target due to atmospheric interference and terrain scattering. These effects can be found on the Range Modifiers table.

## Range Modifiers

Range	Attack roll DM
Adjacent	+2
Close	+0
Short	-6
Target on Planetary Surface (with atmosphere)	-6
Target on Planetary Surface (no atmosphere)	-4
Target in Flight in Atmosphere	-2

## DAMAGE CONTROL

Travellers who are not otherwise engaged in combat actions can join Damage Control teams. While Mechanic is the normal requirement, any sort of technical skill will help. A damage control team is normally made up of four people, although only one Mechanic Check is made by the person with the highest skill rating. If there is anyone else (no matter how many) in the damage control team with any technical skill, they add a DM+1 to damage control checks. This modifier is applied only once, regardless of the number of other qualified people on the team. For every person less than four on the damage control team, there is an additional DM-1 to the Mechanic check. With only one person, the Damage Control checks would have DM-3.

Each round, every damage control team can make a Difficult (10+), Mechanic check (1D minutes, INT). Success repairs a single critical hit or five points of Hull damage. Hull damage repairs are effectively permanent, although true repairs should be undertaken at some point. Repaired critical hits will last for 1D rounds. With Effect 5+ the critical repair that will last the remainder of the combat. It will fail with 1D hours after that unless permanent repairs are made.

## SHIP'S TROOPS

Ship's Troops are often considered supernumerary by a ship's regular crew, although in the circumstances when they are needed they spell the difference between winning and losing. Unless boarding actions are expected, however, most ship's troops have little to do in a ship-to-ship conflict. More often than not, they find themselves drafted to assist damage control teams, where their experience in zero-gravity and hostile conditions is often an asset.

**Assist with damage control:** If any Ship's Troops are on a Damage Control team, they will add a collective DM+1 to all repair checks.

**Boarding Party:** If a ship is disabled to the point where it can be boarded, the ship's troops are the first, and often only, line of defence. While this can be played out as an encounter, if a more abstract resolution is desired, make the following check until either the boarders or defenders are defeated. These rules apply whether the ship's troops are defending or attacking a ship.

## SIGNATURE

All ships have a base Signature, based on their size and power plant output. This is listed in the ship description. During combat, actions can influence this Signature. Signature is used as a modifier when the ship is the target of sensors.

A ship's base Signature is always a positive number and is used as a DM for Electronics (sensors) checks against the ship. This includes the check to develop a Firing Solution. Signature can change based on what happens in a combat round and should be recalculated at the end of the round. The new Signature is used for the following combat round.

The following actions or conditions can affect a ship's Signature.

Action or Condition	Effect
Damage over 50% of Hull value	+1
Electronic Warfare	+2
Heat Sink (limited duration)	-4
Power Plant Critical	+1
Radiators Retracted	-1
Reaction Drive	+4 for rockets, +6 for thrusters, +8 for nuclear thrusters
Sensor Use (active sensors, targeting systems)	+1
Solar Panels extended	+2
Spin Habitat retracted	-1
Stealth	-4

**Damage:** If a ship has lost 50% or more of its Hull, Signature is increased by +1.

**Electronic Warfare:** Using electronic warfare (jamming) increases Signature by +2.

**Heat Sink:** These tubs of phase-change salts absorb tremendous quantities of heat and store them away effectively. They have a critical threshold, however, after which they will start radiating heat again. All heat sinks have a duration, typically in combat rounds.

After this, the heat has to be bled off through the ship's radiators. If the radiators are retracted at this point, then the ship will take double the critical hits.

**Power Plants Critical:** If the ship's power plant takes a critical hit, Signature is increased by +1.

**Radiators:** If the radiators are retracted, then the Signature is reduced by -1. However, the internal heat build-up can potentially cause damage to the ship and crew. For every round after the first that the radiators are retracted, roll on the critical hit table.

**Reaction Drives:** While in use, reaction drives add to a vessel's Signature. Rockets add +4 to Signature, while thrusters add +6. Nuclear thrusters add +8.

**Sensor Use:** If active sensors, including TTAs and UTES, are used, increase Signature by +1.

**Solar Panels:** If solar panels are deployed, they add +2 to the ship's Signature.

**Spin Hab:** If a spin hab is retracted, the Signature is reduced by -1.

**Stealth:** While a ship's heat cannot be completely masked, save temporarily with heat sinks, stealth technology can reduce Signature to such an extent that it can make a ship very difficult to pinpoint and target. Stealth reduces Signature by -4.

All systems except radiators are destroyed on the third hit. Checks that require a system that has been destroyed are not possible.

### Radiators:

Radiators are robust and can take considerable damage. Eventually, however, they will lose their ability to dissipate the heat generated by the spacecraft. The first two hits on a radiator have no effect. The third increases Signature by 2, while with the fourth, they start to fail. Power must be reduced by 50% or the ship will start to suffer an internal every combat round. After the fifth hit to the radiators, power must be shut down completely or else the ship will suffer 1D damage per round, along with one internal critical every round.

The *Aerospace Engineer's Handbook* includes additional effects for radiator damage.

### Internal Critical Hits

Ships in 2300AD use the Critical Hit tables on pages 158–159 of the *Traveller Core Rulebook*, with a few modifications.

Replace J-Drive with Stutterwarp Drive and M-Drive with Reaction Drive.

Critical Hits to the Stutterwarp Drive have effects similar to M-Drive hits. Instead of reducing Thrust, however, Tac Speed is reduced by -1 per point of Thrust lost.

Critical hits to the reaction drive are handled a bit differently. Reaction drives are very susceptible to damage. The first hit renders the reaction drive inoperable until repaired, while the second effectively destroys it.

## CRITICAL HITS

Ships can suffer both external and internal critical hits. Since many external fixtures are not protected by armour when deployed, they can be damaged even by non-penetrating fire. 'Scrubbing' sensors and weapons from a ship is an effective 'mission kill'.

### Surface Fixture Damage

Any hit on a spacecraft, whether it penetrates the hull or not, can damage unarmoured external fixtures. If an attack hits with an Effect of 3 or more, roll on the Surface Fixture table.

### Surface Fixture

2D	System	1 <sup>st</sup> Hit	2 <sup>nd</sup> Hit
2	Fire Control	DM-2 to attack rolls	—
3–4	Weapon	-1D Damage, DM-2 to attack rolls	Disabled
5	Sensors	DM-2 to Electronics (sensors) checks	—
6–8	Radiator	See below	—
9	Sensors	DM-2 to Electronics (sensors) checks	—
10–11	Discharge Vanes (if present, otherwise no effect)	Disabled	Destroyed
12	Other System	Disabled	Destroyed

# ENEMY ACTIONS

Combat in space is a storytelling element, a way to further the plot. Central to the plot are the Travellers. The opposing force, in general, does not need the level of detail that Travellers do.

## Enemy Combat Actions

These are the primary actions that enemy ships generally take. Actions available to the Travellers are possible and the referee should use them as appropriate.

**Manoeuvring:** Open, Close and Evade are covered on page 54.

**Firing Solution:** Unless the referee wants more detailed results, the enemy Firing Solution is more basic. To attack another ship requires a Formidable (14+) Gunner check (1D minutes), adding the Electronics (sensors) of the sensor operator on the ship and the target's Signature. Other modifiers may include electronic warfare, performed by the Travellers and range.

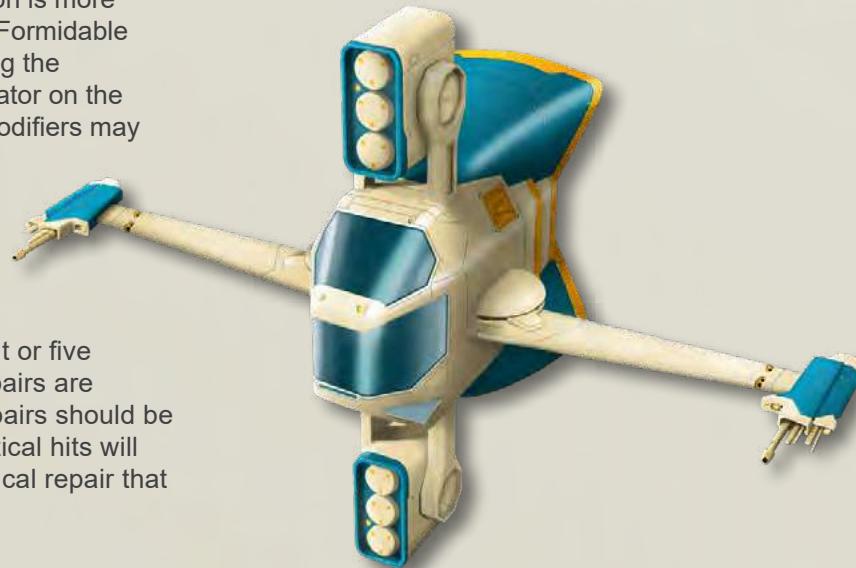
**Damage Control:** Each round, the enemy ship can make a Difficult (10+) Mechanic check (1D minutes, INT). Success repairs a single critical hit or five points of Hull damage. Hull damage repairs are effectively permanent, although true repairs should be undertaken at some point. Repaired critical hits will last for 1D rounds. On Effect 5+ the critical repair that will last the remainder of the combat.

## Weapon Traits

Trait	Effect
Accurate	DM+1 to attack rolls.
Advanced	+1 damage per dice.
AP X	Ignores an amount of Protection equal to the AP score.
Auto	As described on page 75 of the <i>Traveller Core Rulebook</i> .
Blast X	Similar to the effects of the Blast Trait from page 75 of the <i>Traveller Core Rulebook</i> , although in this case represents the maximum number of additional targets that can be engaged.
EM	The electromagnetic effects of this weapon grant an additional roll on the critical hit table whenever a critical hit is made.
Hardened	Ignores first critical hit the weapon suffers.
Inefficient	Double the normal power and heat requirement.
Obsolete	-1 damage per die.
Point Defence	DM+2 against missiles, drones and fighters. It can only be used at Close range.
Ortillery	DM+4 when attacking targets on a planetary surface.
Radiation	Inflicts rads equal to the Effect of the attack roll x 10.
Slow	DM-2 to attack rolls.

**Electronic Warfare:** An enemy vessel can attempt to jam communications, including the channels and frequencies used for drone controllers and sensor feeds. This is an opposed Electronics (comms) check, (1D minutes, EDU). Encrypted comms provide DM+2 to the target of the check. If successful, the enemy's Gunner checks suffer DM-1, or DM-2 with Effect 5+. Effect -5 or less grants the enemy ship DM+1 on Gunner checks as it locks onto the electronic emissions of the jammer. Other electronic warfare tasks require a Difficult (10+) Electronics (sensors) check (1D minutes, EDU).

Using Electronic Warfare increases the Signature of the jamming ship by +2.



# WEAPONS AND TARGETING SYSTEMS

The weapons and targeting systems used by spacecraft are listed on their own status pages. The systems themselves are detailed here.

## Weapon Traits

Spacecraft weapons in 2300AD have a number of traits that affect weapon performance. These are explored in the Weapon Traits table.

# WEAPONS

These are some of the most common weapons found in human space.

## Detonation Lasers

A detonation laser uses a low-yield nuclear weapon to ‘pump’ a crystal lattice to produce dozens of beams of coherent x-rays, fired into the forward arc of the warhead. Detonation lasers can be found on missiles and are used in submunitions and sentinel mines.

X-ray lasers, while destructive, are also very short-ranged weapons. Detonation lasers must be fired at Close range and even then will suffer DM-2 to hit. Due to the distances involved and the construction of the crystal lattice, each pulse in a burst must target a different ship.

Detonation lasers all feature the Blast trait, which allows them to affect a number of targets at Close Range to the warhead. The Blast score of a warhead is the maximum number of additional targets that can reliably be engaged.

The damage rating listed for each detonation laser applies to all shots in a Blast.

## Laser Weapons

Weapon	Type	Range	Damage	Power	Cost	Traits
Darlan G2	Beam Laser	Adjacent	1D-1	10	MLv0.075	Obsolete, Slow
Darlan LL-88	Beam Laser	Close	1D-1	10	MLv0.25	Accurate, Obsolete
Darlan LL-98	Beam Laser	Close	1D	10	MLv0.5	Accurate
Type 17 PDC	Beam Laser	Adjacent	1D	10	MLv0.9	Point Defence, Rapid Fire
‘Grumbler’	Pulse Laser	Short	2D+2	20	—	Advanced, Inefficient

## Particle Beam Weapons

Weapon	TL	Range	Power	Damage	Cost	Traits
Allen BMZ-50	11	Close	30	3D	MLv4	AP 4, EM, Inefficient, Slow

## Laser Weapons

Laser weapons are powerful and have the range required for effective starship combat. They are the most common primary weapon on any starship.

The examples below include the two most common military designs found on the French Arm, along with the most common civilian models, the mining laser and point defence cluster. The last entry is a Kaefer weapon, found on almost all of their ships.

### Darlan G2

The old G2 is a common industrial laser, found across the entire French Arm. It is of little use as a weapon unless the target gets very close.

### Darlan LL-88

An older design, this weapon has been declared surplus by the French high command and is readily available on the international arms market for qualified purchasers. In many cases, the ‘qualification’ is little more than a substantial bribe, especially on Frontier worlds.

### Darlan LL-98

This weapon is current in the arsenals of France and many other nations. While neither the most advanced nor the most powerful, it is very common.

### Quinn Optronics

#### Point Defence Cluster (PDC) Type 17

The PDC is the most common weapon found on civilian ships, though it has only been permitted since the Kaefer attack on Aurore in 2298. The three clustered emitters share a common array, allowing rapid fire and precise targeting. The weapons themselves do minimal damage, as they are designed to engage missiles rather than ships but nonetheless may be dangerous to fighters and other small craft.

## Kaefer 'Grumbler' High Power Laser Array

Code-named 'Grumbler', this laser array packs the punch of a pulse laser with extended range capabilities. No intact example of this weapon has ever been examined, despite companies like Darlan, Quinn and Hyde Dynamics posting large bounties for one.

## Particle Beam Weapons

These weapons fire a stream of accelerated subatomic particles. They are not only more powerful than the average ship-mounted laser but can cause electromagnetic cascades that damage internal fittings even if the beam does not penetrate the hull.

### Allen BMZ-50

The Allen BMZ-50 is an older particle beam weapon design, with high power consumption. It has been phased out of Tier 1 and 2 military forces.

## Submunitions

Submunitions are a class of ordnance, nuclear bomb-pumped laser warheads dropped by a carrying ship and then fired once the vessel is at a safe distance. Submunitions are carried and launched from a dispenser, which also includes the equipment required to maintain contact with the device and direct its attack. Firing solutions must come from a Target Tracking Array. Like all detonation lasers, submunitions can attack multiple targets.

### Mitraille (Grapeshot)

The French-made Mitraille launcher (commonly called the Grapeshot) is capable of rapidly dispensing submunitions, although each submunition is relatively low-powered. All are guided by a TTA or UTES mount on the firing vessel, although it is possible to hand off fire control of the submunitions to another vessel.

## Submunitions

Weapon	TL	Damage	Magazine	Magazine Cost	Tons	Dispenser Cost	Traits
Grape Shot	11	2D	24	MLv3.6	6	MLv1.61	Auto 4, Blast 4, Radiation

## Combat Drones

Weapon	TL	Magazine	Damage	Tons	Tac Speed	Endurance	Cost	Traits
Ritage-1	11	5	1D	2	3	6 hours	MLv1.61	—
Ritage-2	12	—	5D	2	4	4 hours	MLv3.1	Blast 6, Radiation
Whiskey	12	3 (battery laser)	1D laser (3D detonation laser)	2	4	2 hours	—	Blast 3, Radiation (detonation laser)

## Combat drones

These drones include the two most commonly-used on the French Arm, along with a standard Kaefer design. Like other drones, these are stutterwarp-powered vehicles, designed to close with a target without endangering a human pilot.

Combat drones are either nuclear bomb-pumped detonation lasers or battery lasers, the equivalent of a limited-shot beam laser array. Missiles with laser arrays are often called remote fighters or drone fighters.

### Ritage-1

The French-made Ritage-1 combat drone is the classic remote fighter. Equipped with a folding laser array and a power cell capable of providing five shots, the Ritage-1 is designed to close and engage with a target, and then return to its carrier. Ritage-1 drones are also often deployed in a point-defence role, protecting a ship from a distance.

### Ritage-2

The French Ritage-2 is a powerful and modern drone system equipped with a 144kt nuclear warhead powering a single-shot x-ray laser. Using the warhead results in the destruction of the drone, although a recent variant deploys the warhead and then moves away. The effectiveness of this approach has yet to be tested in battle.

### 'Whiskey'

The ESA has designated this light drone as the 'Whiskey', which combines both a battery laser and small detonation laser warhead. The tactical doctrine around its use is uncertain. Reports from battles around Aurore indicate the weapon was always used in the detonation role. One theory is that the battery laser is used as self-defence for the missile until it can close to its target.

## FIRE CONTROL

With ranges of up to a light second or more, starship weapons require powerful sensor arrays to develop the firing solutions and direct the ship's weapons. These targeting arrays receive information from the other sensors on a ship to assist in developing the Firing Solution.

### Target Tracking Arrays (TTAs)

Most ships use Target Tracking Arrays (TTAs), centralised fire control systems that direct banks of weapons at the same target. Each TTA can control up to 10 weapons, although all weapons under one TTA must engage the same target. Light TTAs are similar but can only control up to four weapons. Until recently, it was not practical for each weapon to have its own fire director.

Targeting System	TL	Number of Weapons	Fire Control DM
Light TTA	11	4	0
TTA	10	10	-1

### UTES

The Unified Tracking and Engagement System (UTES) is new and only available to France, the UK and the United States. Each weapon mount equipped with UTES can engage targets independently of other weapons. In theory, a UTES could control up to four weapons like a light TTA but this is rare. The Kaefer KUTS (Kaefer Unified Tracking System) is virtually identical, although it consumes more power and is physically larger. All Kaefer vessels encountered thus far as equipped with KUTS rather than centralised fire control.

Targeting System	TL	Number of Weapons	Fire Control DM
UTES	12	1 (4)	+1

### Drone Controller

While not exactly a targeting system, a drone controller allows a human operator to control drones and other remote devices. Their primary limitation is signal lag caused by distance from a controlling vessel. Each controller unit can operate two drones, although for combat effectiveness, there should be one remote pilot per drone.

Fire control systems provide a modifier to attack rolls as shown on the Targeting Systems table. Note that a weapon without fire control suffers DM-8 on all attack rolls, including point defence.

Targeting System	TL	Number of Weapons	Fire Control DM
Drone Controller	10	2	0

## SCREENS

Defensive screens help blunt incoming laser fire. Electromagnetic fields hold a cloud of ablative composite and foil strips around a ship, absorbing laser fire, although also being depleted by it. Reloads can be carried to increase the duration of the screen. Reloads each consume 0.25 tons and cost Lv5000.

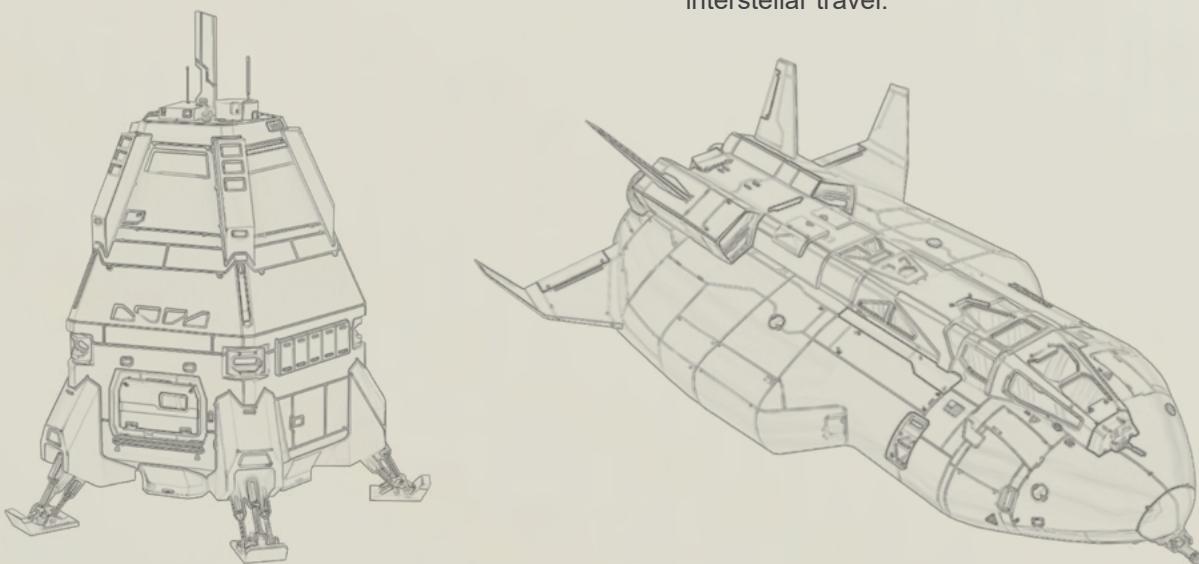
Screens provide a negative DM on attack rolls made against screened craft equal to the Rating of the screen. Each hit, regardless of damage, reduces the Rating of the screen by one. It requires a single Gunner action to replenish the screen with a reload.

### Defensive Screens

Rating	TL	Modifier
1	11	-1
2	11	-2
3	12	-3

# SPACECRAFT: SMALL CRAFT

Starships and their support structures, including interface vessels and space stations, are the lifeblood of the human economy and a literal lifeline for most colonies, which could not exist without interstellar travel. This chapter describes and details some of the ships in operation in human space.



## SMALL CRAFT

Small craft cover a range of vessels up to 100 tons. Many are interface-capable and some are equipped with stutterwarp drives for in-system travel. However, most do not have the fuel or life support endurance for interstellar travel.

- Chair
- Acceleration Chair
- Bunk
- Lift
- Iris Valve
- Iris Valve Floor
- Iris Valve Ceiling
- Iris Valve Both

- Machinery
- Cold Berth Unit
- Access Panel
- Hatch
- Hatch Floor
- Hatch Ceiling
- Hatch Both
- Fresher Unit

## SAUVETAGE-5 LIFEBOAT

The Sauvetage-5 is a squat cone protected by a blunt ablative heat shield, supporting 10 people in relative comfort, with 80 man-days of supplies and life-support. Included are eight survival kits, two medkits, and a pair of survival rifles. The medkits contain enough Metabolix to place eight people in chemically-induced hibernation for two weeks. If rescue is still not forthcoming, there are sufficient doses of Mercy-7 for all embarked passengers as a final resort.

**NATION:** FRANCE

**FIRST EXAMPLE LAID DOWN:** 2255

**MANUFACTURER:** L'ÉTAGE AEROSPACE

**PRODUCTION STATUS:** IN PRODUCTION

**CONSTRUCTION TIME:** 1 DAY

**SERVICE STATUS:** IN SERVICE

**FLEETS OF SERVICE:** FRANCE, GERMANY, UNITED KINGDOM, UNITED STATES, OTHERS

**DIAMETER:** 10M

**HEIGHT:** 2.8M

**TAKE-OFF MASS (FULLY FUELLED):** 15 TONS

**POWER PLANT:** DARLAN AK-11BIS

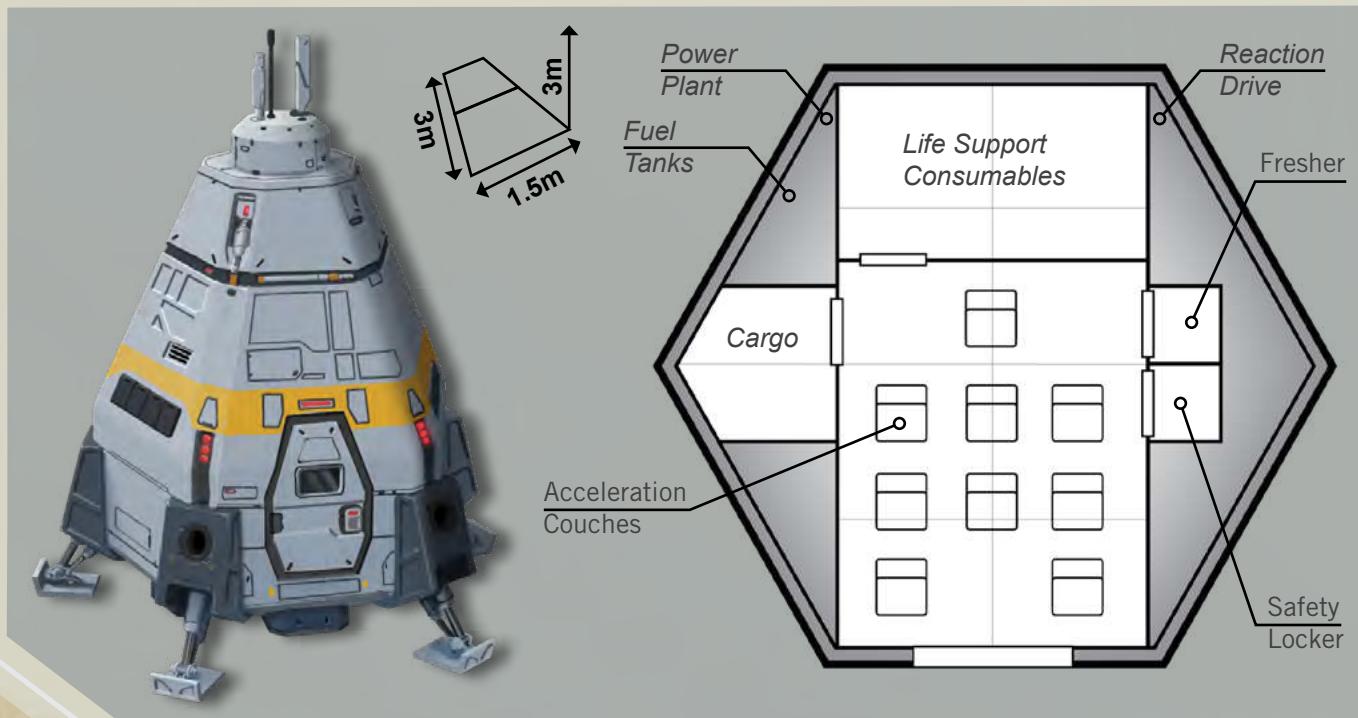
0.11 MW FUEL CELL

**REACTION DRIVE:** L'ÉTAGE B20 OPEN CYCLE OMS ROCKET 50 TONS THRUST

TL10		Tons	Cost (MLv)
Hull	5-ton Synthetic Ballistic	—	0.12
Hull Features	Disposable, Heat Shield, Parachute System	0.25	0.075
Reaction Drive	OMS Rocket (Disposable)	0.1	0.0225
Power Plant	Fuel Cell (Power 1.1)	0.11	0.22
Fuel Tanks	OMS Rocket (1 Burn)	0.175	—
Radiators	Conventional, Capacity 1.1	0.11	0.0055
Bridge	Autopilot	—	0.05
Computer	Primary: Computer/5	—	0.015
Sensors	Minimal	—	—
Systems	Safety Locker, Simple Fresher	0.25	0.055
Accommodations	Acceleration Couches x9	2.25	0.27
Software	Archive, Robotic Control: (Improved, Skill 1, Voice/Speech Recognition, Interactive)	—	0.0125
Life Support Consumables	60 days for 9 people	1.08	—
Cargo		0.35	—
<b>Total:</b> MLv0.72			

Crew	Passengers	Hull Points	Signature: 1
Autopilot: Pilot Skill 1	9	0	Base Reflected: 1 Base Radiated: 1

Running Costs	Power Requirements	Power
Maintenance Cost: Lv60/month Purchase Cost: MLv0.72	Basic Ship Systems	0.05
	Sensors	1



# SABOURIN SYSTEMS NÉCESSITÉ 10-TON DROP POD

Most cargo pods are 50 tons or larger, designed to carry heavy equipment and mass supplies for a colony. The 10-ton pod is for smaller, high-value cargoes. Sabourin maintains that these pods are for shipping medicine and data loads, vital electronic spares or any small, valuable cargo that a colony might need. Thus the name, *Nécessité*.

However, these pods are more commonly known as ‘smuggler pods’ and are used to smuggle things like weapons, bootleg fabricators and drugs to the surface of colony worlds. A thruster-equipped vessel will enter low-orbit, drop its pods and escape. Payment for such deals is arranged in advance through a broker and the smugglers usually have no idea who they are working for, nor what they are carrying. They prefer it that way.

**NATION:** FRANCE

**FIRST EXAMPLE LAID DOWN:** 2209

**MANUFACTURER:** SABOURIN CARGO SYSTEMS

**PRODUCTION STATUS:** IN PRODUCTION

**CONSTRUCTION TIME:** 3 DAYS

**SERVICE STATUS:** IN SERVICE

**FLEETS OF SERVICE:** COMMERCIAL FLEETS

**NUMBER IN SERVICE:** 1,000+

**LENGTH:** 14.18M

**WIDTH:** 5.32M

**TAKE-OFF MASS (FULLY FUELLED):** 75 TONS

**POWER PLANT:** GISCARD POWER SYSTEMS

EC44 0.44 MW BATTERY

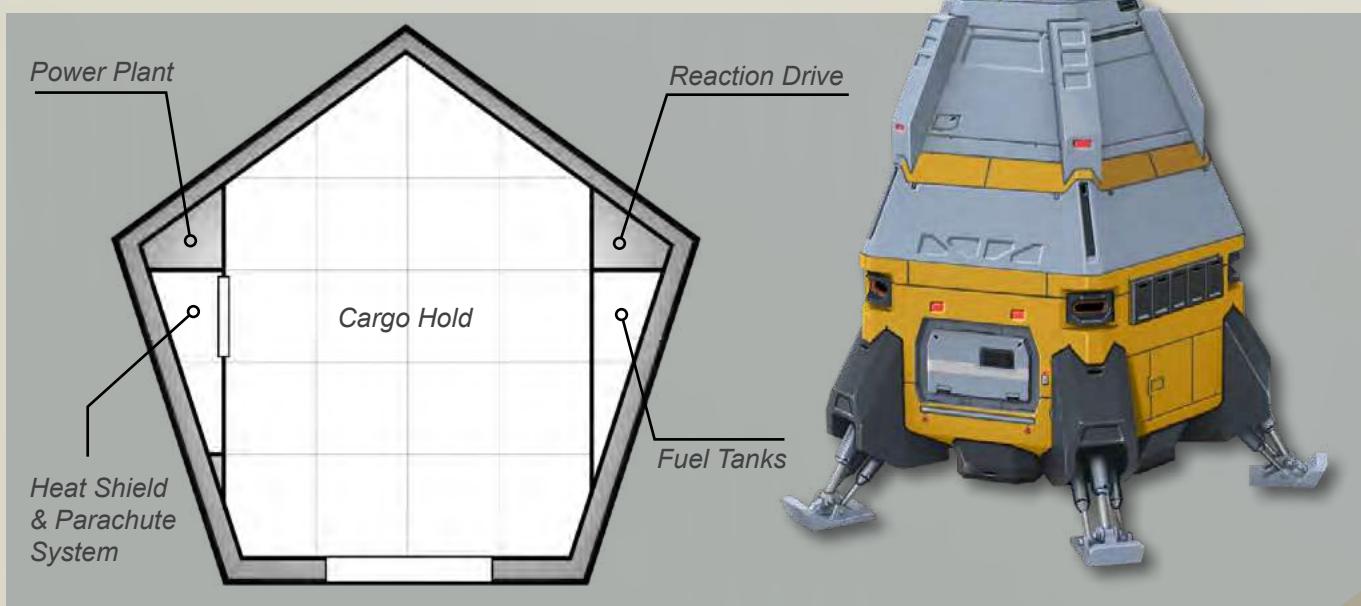
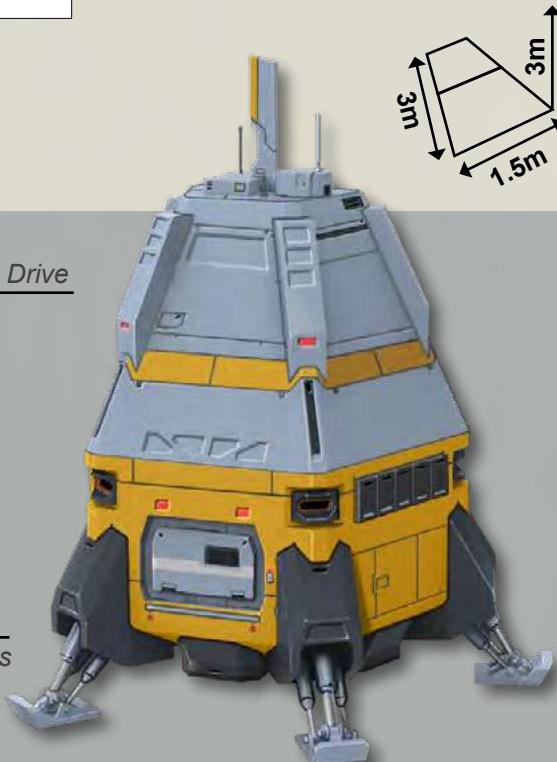
**REACTION DRIVE:** L'TAGE B4 OPEN

CYCLE OMS ROCKET, 100 TONS THRUST

TL10		Tons	Cost (MLv)
Hull	10-ton Synthetic Ballistic	—	0.24
Hull Features	Heat Shield, Parachute System	0.5	0.2
Reaction Drive	OMS Rocket (Disposable)	0.2	0.045
Power Plant	Battery (4.4 Power-hours) (Power 1.1 – 4 Hours)	0.044	0.044
Fuel Tanks	OMS Rocket (1 Burn)	0.35	—
Radiators	Conventional, Capacity 1.1	0.11	0.0055
Bridge	Autopilot,	0	0.1
Computer	Primary: Computer/5	—	0.015
Sensors	Minimal	0	0
Software	Robotic Control: (Basic, Skill 0, Voice/Speech Recognition)	—	0.01
Cargo		8.8	0
<b>Total:</b> MLv0.59			

Crew	Hull Points	Signature: 1
Autopilot: Pilot Skill 0	1	Base Reflected: 1 Base Radiated: 0

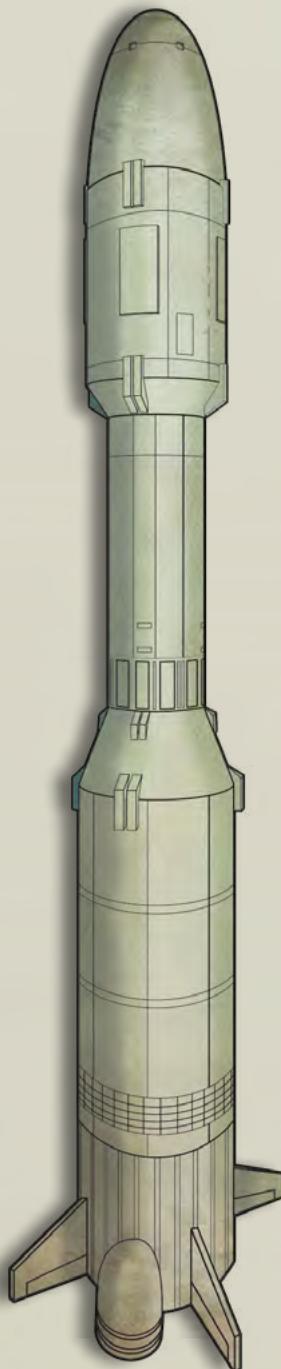
Running Costs	Power Requirements	Power
Maintenance Cost: Lv49/month	Basic Ship Systems	0.05
Purchase Cost: MLv0.59	Sensors	1



# MANCHURIAN AEROSPACE SCIENCE AND INDUSTRY CORPORATION

## STAR CARRIER 50-TON CARGO ROCKET

The Star Carrier is an unmanned heavy cargo rocket capable of putting nearly 415 tons of mass into low orbit. An individual Star Carrier is cheaper than a reusable vehicle but over multiple launches the cost soon adds up. On worlds with surface gravity higher than 1G, or for heavy cargoes, solid boosters are required to maintain the same performance and lift capability.



TL10	Tons	Cost(MLv)
Hull	50-ton Aligned Crystal Steel Ballistic	— 1
Hull	Disposable	— -0.25
<b>Features</b>		
Reaction Drive	Rocket (Disposable, Low Orbit, UPP Size 8, Effective UPP Size: -2)	3 1.125
Power Plant	Battery (5 Power-hour) (1.25 Power) – 4 Hours	0.05 0.05
Fuel Tanks	Rocket (6 Burns)	12 —
Radiators	Conventional, Capacity 1.25	0.125 0.00625
Bridge	Autopilot	— 0.5
Computer	Primary: Computer/5	— 0.015
Sensors	Minimal	— —
Software	Robotic Control: (Minimal, Skill 0, 0)	0.025
Cargo		34.83 —
<b>Total: MLv2.22</b>		

Crew	Hull Points	Signature:1
Autopilot: Pilot Skill 1	3	Base Reflected: 1 Base Radiated: 0

Running Costs	Power Requirements	Power
Maintenance Cost: Lv185/month Purchase Cost: MLv2.22	Basic Ship Systems	0.25
	Sensors	1

NATION: MANCHURIA

FIRST EXAMPLE LAID DOWN: 2227

MANUFACTURER: MANCHURIAN AEROSPACE SCIENCE AND INDUSTRY CORPORATION (MASIC)

PRODUCTION STATUS: IN PRODUCTION

CONSTRUCTION TIME: 5 DAYS

SERVICE STATUS: IN SERVICE

FLEETS OF SERVICE: ARGENTINA, CANADA, CANTON, MANCHURIA, MEXICO

NUMBER IN SERVICE: UNKNOWN

GROUND CREW: 7

HEIGHT: 55M

DIAMETER: 4M

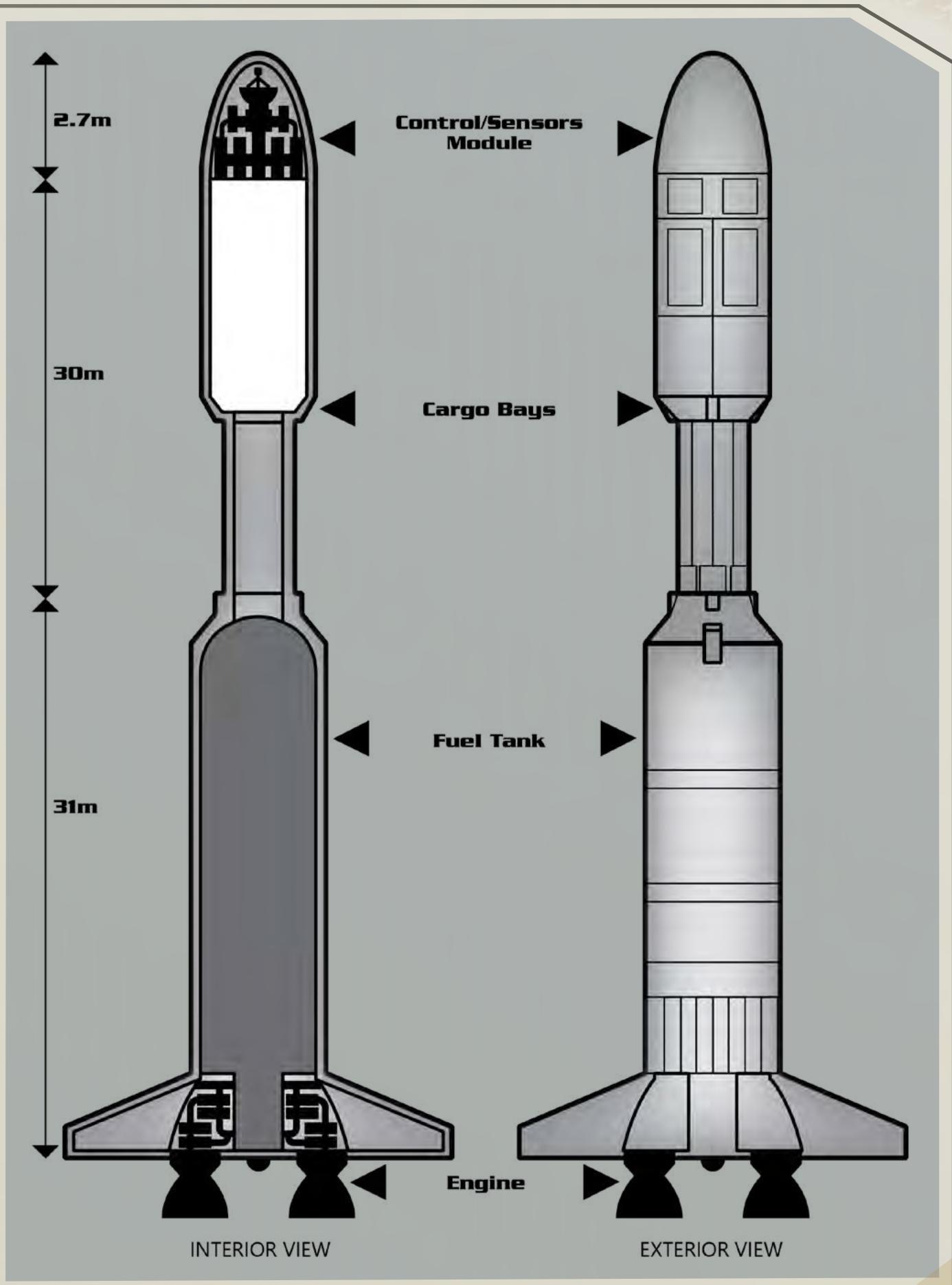
TAKE-OFF MASS (FULLY-FUELLED): 500 TONS

PAYOUT MASS: 415 TONS

POWER PLANT: MANCHURIAN SPACE POWER SYSTEMS K10 5 MW BATTERY

REACTION DRIVE: 5 X MASIC P9 FULL FLOW ROCKET MOTORS; 1,500 TONS THRUST TOTAL

## SPACECRAFT: SMALL CRAFT



## DC30 COMMERCIAL LANDER

Ballistic landers were once the most common form of non-military lander, used in everything from scouting expeditions to colony transporters. Their relative fragility compared to other landers made them less popular and as spaceplanes improved and prices decreased, most landers went out of production. Libertine families use them as their preferred small craft, however, citing their ability to be used in any environment from an asteroid to a planet. The L'Étage DC-30 is a smaller design with minimal cargo capacity but it is easy to maintain, with fabricator metabases available for most of the parts. They are popular with small merchant lines, outposts and poorer colonies, with many having been shipped up the Manchurian Arm after they became obsolescent on the French Arm and in the Core.

For survey teams, the cargo space can house a small vehicle, and it is equipped with a light crane for moving cargo.

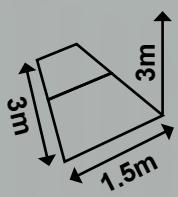


TL10	Tons	Cost (MLv)
Hull	30-ton Synthetic Ballistic	— 0.72
Hull Features	Heat Shield, Frontier Operations	— 0.45
Reaction Drive	Rocket (UPP Size 8, Effective UPP Size: -0)	2.4 1.2
Power Plant	Fuel Cell (Power 3)	0.3 0.6
Fuel Tanks	Rocket (8 Burns)	9.6 —
	Power Plant (6 Hours)	0.0162 —
Radiators	Conventional, Capacity 3	0.3 0.015
Bridge	Flight Deck	3 0.25
Computer	Primary: Computer/5	— 0.015
Sensors	Minimal	— —
Systems	Safety Locker, Ship's Locker, Simple Fresher	0.75 0.155
Accommodations	Acceleration Couch x6	1.5 0.18
Software	Manoeuvre	— 0.015
Cargo		12.43 —
<b>Total:</b> MLv3		

Crew	Passengers	Hull Points	Signature: 1
Pilot, Co-Pilot	6	3	Base Reflected: 1 Base Radiated: 1

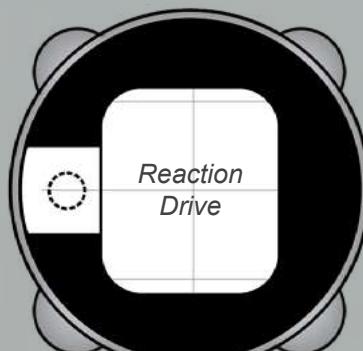
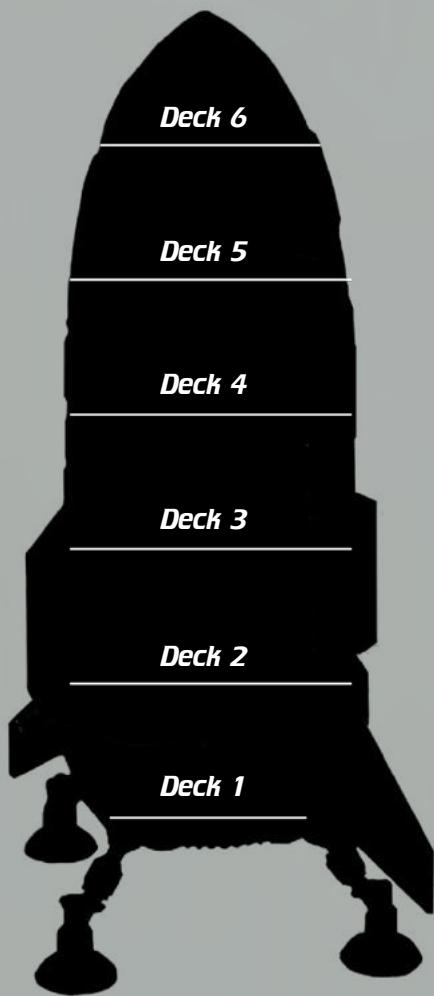
Running Costs	Power Requirements	Power
Maintenance Cost: Lv250/month	Basic Ship Systems	0.15
Purchase Cost: MLv3	Sensors	1

NATION: FRANCE  
 FIRST EXAMPLE LAID DOWN: 2243  
 MANUFACTURER: L'ÉTAGE AEROSPACE  
 PRODUCTION STATUS: OUT OF PRODUCTION  
 CONSTRUCTION TIME: 6 DAYS  
 SERVICE STATUS: IN SERVICE  
 FLEETS OF SERVICE:  
 VARIOUS PRIVATE INTERESTS  
 NUMBER IN SERVICE: ~100  
 HEIGHT: 15M  
 DIAMETER: 6M  
 LAUNCH MASS (FULLY-FUELLED): 300 TONS  
 POWER PLANT: DARLAN L-4 0.3 MW FUEL CELL  
 REACTION DRIVE: L'ÉTAGE ROLAND-2 FULL-FLOW ROCKET MOTOR 900 TONS THRUST

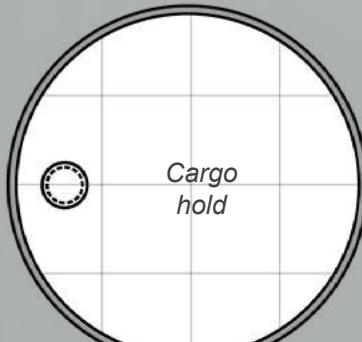


*LEGEND*

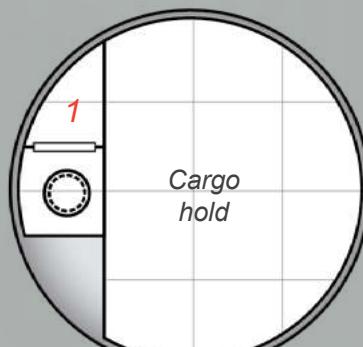
1. Power plant
2. Acceleration couches
3. Fresher
4. Airlock
5. Safety Locker
6. Ship's locker
7. Flight deck



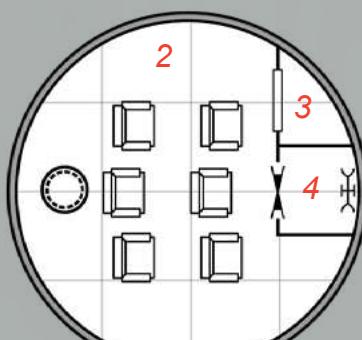
*Deck 1*



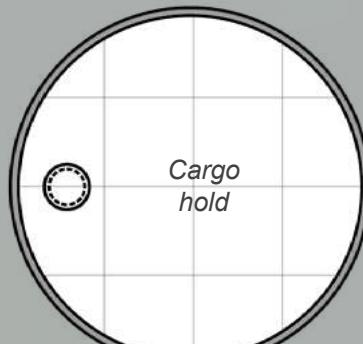
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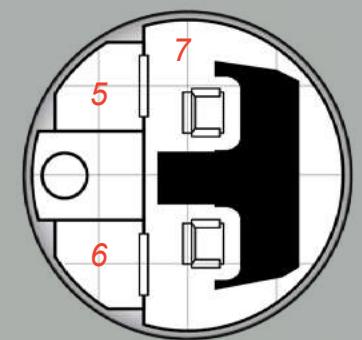
*Deck 2*



*Deck 5*



*Deck 3*



*Deck 6*

## CA-120 YUP'IK COMBAT LANDER

The American CA-120 combat lander carries a mechanised squad and their vehicle from orbit to a planetary surface. Powered by an air-breathing thruster, the Yup'ik has significant atmospheric manoeuvrability and is capable of VTOL operations, although it is only capable of attaining low-orbit and requires support vessels to ferry it in from or to the Wall.

Combat landers were considered too valuable for use in ground support and in theory only armed for self-defence. To meet the demands of the modern battlefield,

however, they are often pressed into service as ground support craft. As part of its defensive suite, the CA-120 carries 10 Aero-12 missiles in an internal bay, along with a 25mm rotary cannon in a deployable nose turret. It also carries a full suite of countermeasures, including flares, chaff and an anti-missile laser in a retractable ball mount. This system alone makes it a valuable addition to any battlefield operation, as it can engage and disable up to 12 targets at a time, a step up from the more basic systems installed in some vehicles and combat walkers.

The turrets and missile bays must remain closed for re-entry manoeuvres and hypersonic flight.

TL12		Tons	Cost (MLv)
<b>Hull</b>	30-ton Composite Lifting Body	—	1.02
<b>Hull Features</b>	Advanced, Heat Shield, Frontier Operations, VTOL	0.6	1.2525
<b>Armour</b>	5	0.75	0.45
<b>Reaction Drive</b>	Thruster (Advanced, Air-Breathing, Low Orbit, UPP Size 8, Effective UPP Size: -4)	1.2	1.35
<b>Power Plant</b>	MHD Turbine (10 Power),	0.83	0.46
<b>Fuel Tanks</b>	Thruster (4 Burns), (0.75 tons per Burn) Power Plant (24 Hours)	3 0.36	— —
<b>Radiators</b>	Conventional, 3 Capacity	0.3	0.015
<b>Bridge</b>	Flight Deck, with Neural Link	3	0.375
<b>Computer</b>	Primary: Computer/10fib	—	0.12
<b>Sensors</b>	Basic Military	2	4
<b>Weapons</b>	25mm rotary AC in Retractable Mount, 10x Aero-12 Anti-Vehicle Missile in Retractable Mount, Anti-Missile Laser in Retractable Mount, Decoy Dispenser in Retractable Mount	3.2	0.681
<b>Targeting</b>	Improved Fire Control (+2) for Installed Weapons	—	—
<b>Systems</b>	Safety Locker, Ship's Locker, Simple Fresher	0.75	0.155
<b>Sub-Craft</b>	M24 Hover IFV in Berth	8.25	1.241
<b>Accommodations</b>	Acceleration Couch x10	2.5	0.3
<b>Software</b>	Archive, Intellect, Manoeuvre, Neural Interface	—	2
<b>Cargo</b>		3.26	—
<b>Total:</b> MLv12.08			

**NATION:** UNITED STATES

**FIRST EXAMPLE LAID DOWN:** 2284

**MANUFACTURER:** TRILON AEROSPACE

**PRODUCTION STATUS:** IN PRODUCTION

**CONSTRUCTION TIME:** 24 DAYS

**SERVICE STATUS:** IN SERVICE

**FLEETS OF SERVICE:** AUSTRALIA, UNITED STATES, TEXAS

**NUMBER IN SERVICE:** ~300

**LENGTH:** 22M

**HULLSPAN:** 12M

**POWER PLANT:** HYDE POWER SYSTEMS JACKALOPE

D-5 1 MW MHD TURBINE

**REACTION DRIVE:** AMERICAN LINEAR REACTION MOTORS P900 'OVERTHRUSTER' WITH THRUST VECTORING, 900 TONS THRUST

**ATMOSPHERIC FLIGHT SPEED (STANDARD)**

**DENSITY/PRESSURE:** 6,000 KM/H

**TAKE-OFF ROLL:** 240M

**LANDING ROLL, UNPOWERED:** 405M

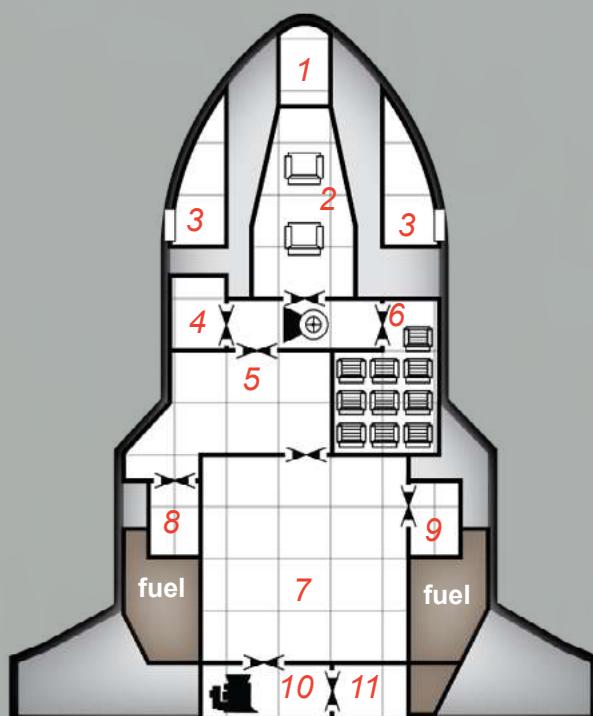
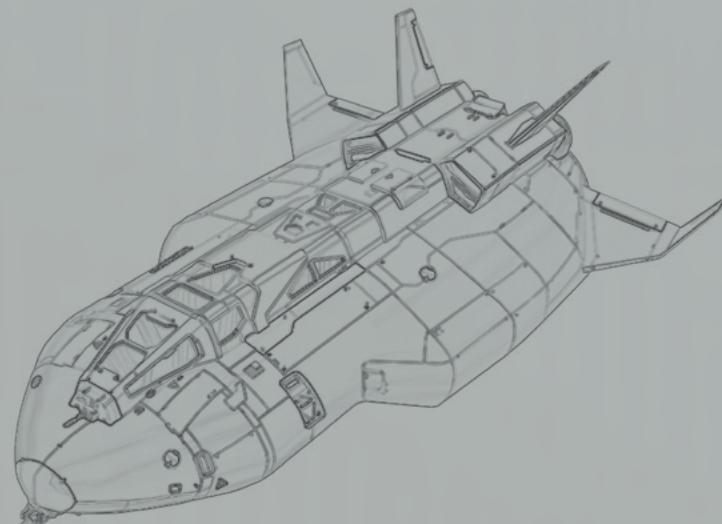
**LANDING ROLL, POWERED:** 135M

**TAKE-OFF MASS (FULLY-FUELLED):** 275 TONS

Maximum Airspeed	Hypersonic
Cruising Airspeed	Supersonic
Endurance	1 Hour per Burn

**LEGEND**

1. 25mm rotary AC
2. Bridge
3. Sensors
4. Systems
5. Cargo hold
6. Accommodations
7. Hover berth
8. Anti-vehicle missiles
9. Decoy dispenser
10. Reaction drive
11. Power plant
12. Anti-missile laser



3m  
3m  
1.5m

Crew	Passengers	Hull Points	Signature: 0
Pilot, Weapons Officer	10	3	Base Reflected: 0 - Base Radiated: 0
Running Costs		Power Requirements	
Maintenance Cost: Lv1007/month		Basic Ship Systems	0.25
Purchase Cost: MLv12.08		Reaction Drive	3
Power Requirements		Power Requirements	
		Sensors	5
		Weapons	1

# TURMFALKE COMMERCIAL LIGHT SPACEPLANE

The Turmfalke (Kestrel) spaceplane is a light rocket-powered landing craft used in a variety of roles. It is capable of STOL operations on both land and water, with the latter being more common for frontier and exploratory operations. With variable-geometry wings, the Turmfalke can land in as little as 180 metres and on take-off accelerate to supersonic speeds for atmospheric operations.

**NATION:** GERMANY

**FIRST EXAMPLE LAID DOWN:** 2276

**MANUFACTURER:** BRW AG (BAVARIISCHE RAUMFAHRZEUG WERKE)

**PRODUCTION STATUS:** OUT OF PRODUCTION

**CONSTRUCTION TIME:** 8 DAYS

**SERVICE STATUS:** IN SERVICE

**FLEETS OF SERVICE:** AZANIA, FREIHAFEN, GERMANY

**NUMBER IN SERVICE:** ~120

**LENGTH:** 17.5M

**WIDTH:** 2.5M

**WINGSPAN:** 14M (7M FOLDED)

**TAKE-OFF MASS (FULLY-FUELLED):** 150 TONS

**POWER PLANT:** DELAMBE VK-3 0.3

MW FUEL CELL

**REACTION DRIVE:** ROYCE 'GRIFFON' AIR-BREATHING ROCKET, 600 TONS THRUST

**ATMOSPHERIC FLIGHT SPEED (STANDARD DENSITY/PRESSURE):** 1,200 KM/H

**TAKE-OFF ROLL:** 80M

**LANDING ROLL, UNPOWERED:** 180M

**LANDING ROLL, POWERED:** 60M

TL12		Tons	Cost (MLv)
Hull	20-ton Synthetic Airframe	—	0.52
Hull Features	Heat Shield, STOL, Hydrodynamic, Frontier Operations, Folding Wings	1.2	0.65
Reaction Drive	Rocket (Air-Breathing, Low Orbit, UPP Size 8, Effective UPP Size: -3)	1.1	0.75
Power Plant	Fuel Cell (Power 3),	0.21	1.29
Fuel Tanks	Rocket (5 Burns)	4	—
	Power Plant (24 Hours)	0.0648	—
Radiators	Conventional, Capacity 3	0.3	0.015
Bridge	Flight Deck	3	0.25
Computer	Computer/5	—	0.015
Sensors	Basic Nav Array	1	0.1
Systems	Safety Locker Ship's Locker, Simple Fresher	0.75	0.155
Accommodations	Acceleration Couches x6	1.5	0.18
Software	Archive, Intellect, Manoeuvre	—	1
Cargo		6.87	—
<b>Total:</b> MLv4.43			

Crew	Passengers	Hull Points	Signature:n 1
Pilot, Co-Pilot	6	2	Base Reflected: 1 Base Radiated: 1

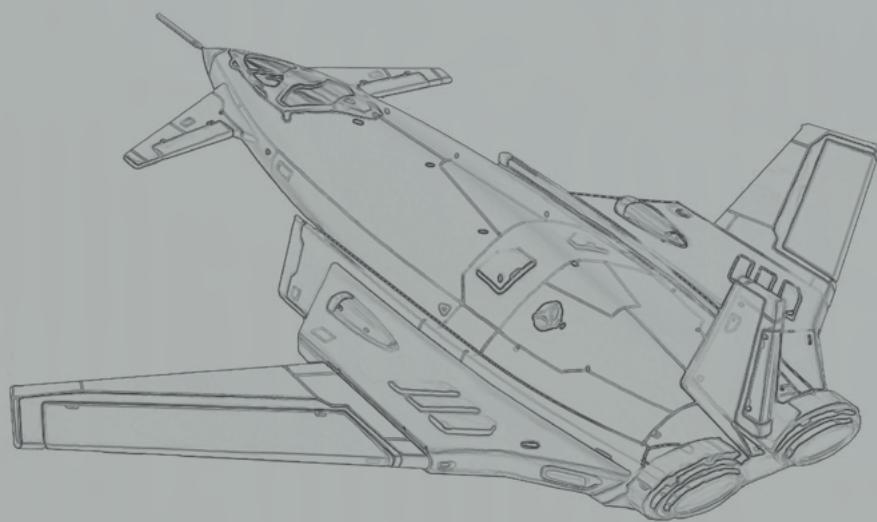
Running Costs	Power Requirements	Power
Maintenance Cost: Lv369/month	Basic Ship Systems	0.2
Purchase Cost: MLv4.43	Sensors	2



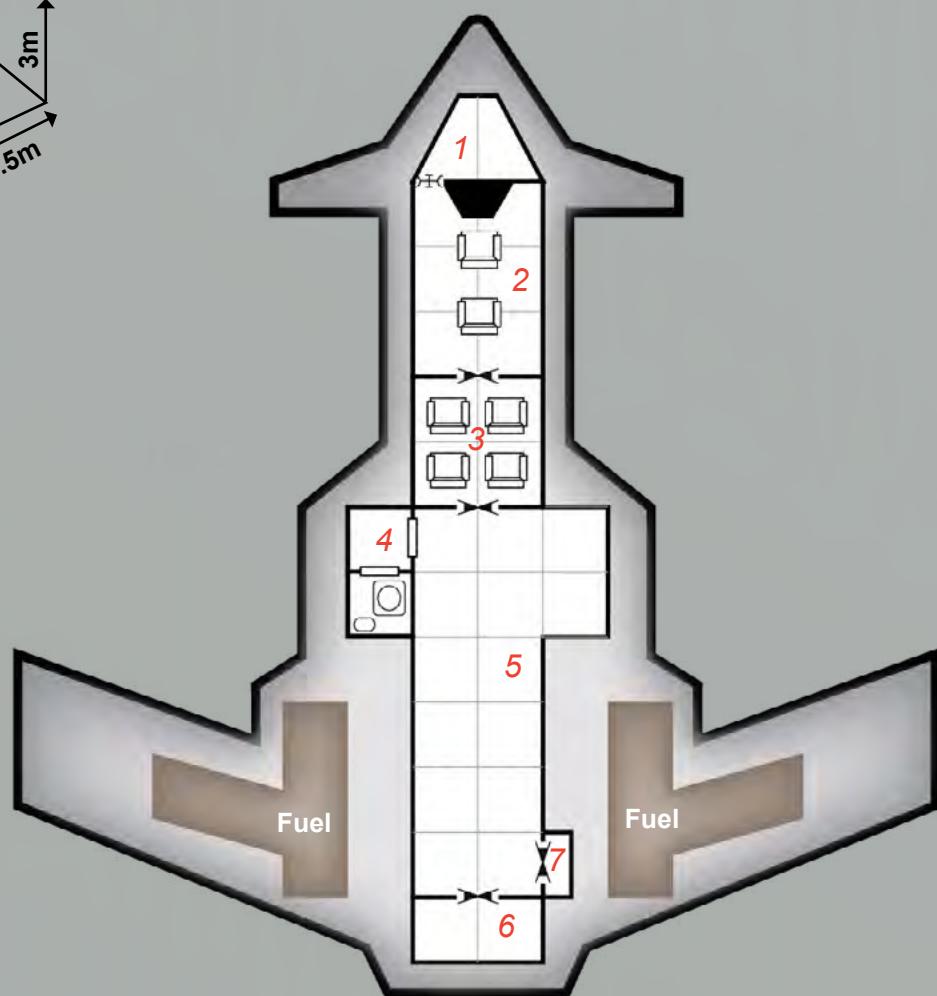
Maximum Airspeed	Transonic
Cruising Airspeed	Subsonic
Endurance	1 Hour per Burn

**LEGEND**

1. Sensors
2. Bridge
3. Accommodations
4. Systems
5. Cargo hold
6. Reaction drive
7. Fuel cell



3m  
3m  
1.5m



# BRITISH EXOSPACE R40 COMMERCIAL PINNACE

The pinnace is a small, stutterwarp-capable vessel designed to ferry personnel and small cargo between ships and space stations. Like the long boat, it is also equipped with a reaction drive for manoeuvring and matching orbits with spacecraft and stations. It is not a combat vessel and is completely unarmed, although some patrol services have armed them on an ad hoc basis with light weapons like plasma guns.

Capable of carrying up to 18 people and almost 8 tons of cargo, the pinnace is a common vessel in use around many worlds and stations. It is a very forgiving craft and often used for pilot training.

**NATION:** UNITED KINGDOM

**FIRST EXAMPLE LAID DOWN:** 2265

**MANUFACTURER:** BRITISH EXOSPACE

**CONSTRUCTION TIME:** 13 DAYS

**PRODUCTION STATUS:** IN PRODUCTION

**SERVICE STATUS:** IN SERVICE

**FLEETS OF SERVICE:** AZANIA,  
FREIHAFEN, GERMANY, UNITED  
KINGDOM, WELLON

**NUMBER IN SERVICE:** ~160

**LENGTH:** 32 M

**DIAMETER:** 5 M

**NOMINAL MASS (FULLY-FUELLED):**  
400 TONS

**POWER PLANT:** ROYCE PEGASUS  
1.1 MW MAGNETOHYDRODYNAMIC  
TURBINE

**REACTION DRIVE:** BRITISH EXOSPACE  
R11 1.1 MW MAGNETO-PLASMA  
THRUSTER, 400 TONS THRUST

**STUTTERWARP:** BRITISH EXOSPACE  
J40 0.4 MW GEN II JEROME-EFFECT  
STUTTERWARP

TL11		Tons	Cost (MLv)
<b>Hull</b>	40-ton Aligned Crystal Steel Spaceframe	—	0.8
<b>Reaction Drive</b>	OMS Thruster	1.2	0.48
<b>Stutterwarp</b>	1.7 ly/day, Tac Speed: 2, System Speed: 1.10 AU per day	1	2
<b>Power Plant</b>	MHD Turbine (Power 11)	1.1	0.44
<b>Fuel Tanks</b>	OMS Thruster (8 Burns) Power Plant (1 Week)	9.6 2.75	— —
<b>Radiators</b>	Conventional, Capacity 11	1.1	0.055
<b>Bridge</b>	Flight Deck, with Neural Link	3	0.375
<b>Computer</b>	Primary: Computer/10 Secondary: Computer/05	—	0.095
<b>Sensors</b>	Basic Nav Array	1	0.1
<b>Systems</b>	Safety Locker, Ship's Locker, Simple Fresher	0.75	0.155
<b>Accommodations</b>	Acceleration Couches x18	4.5	0.54
<b>Software</b>	Archive, Intellect, Manoeuvre, Neural Interface	—	2
<b>Cargo</b>		11.6	—
<b>Total:</b> MLv7.13			

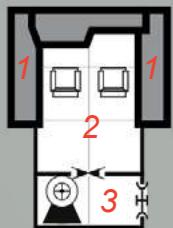
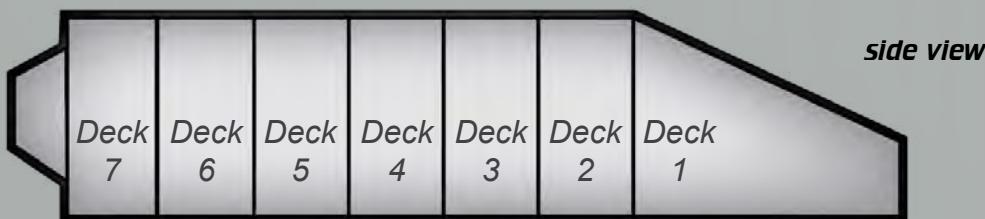
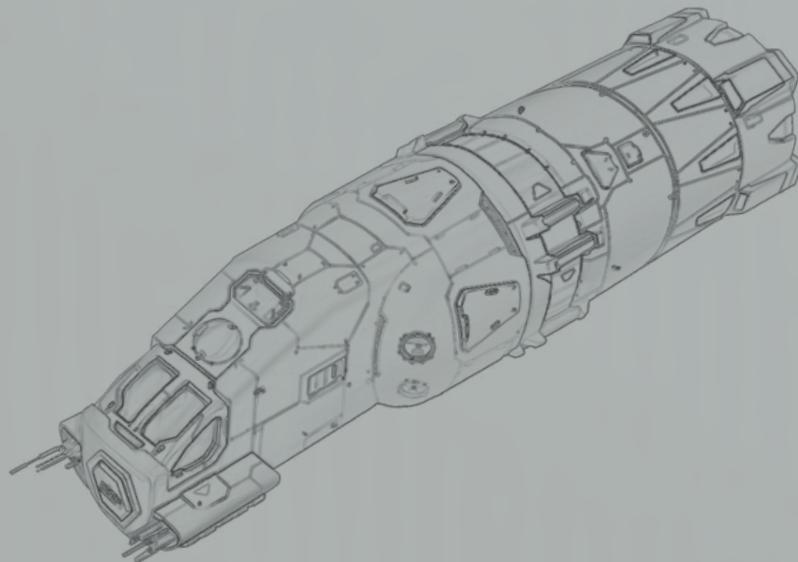
Crew	Passengers	Hull Points	Signature: 2
Pilot, Co-Pilot	16	4	Base Reflected: 1 Base Radiated: 2

Running Costs	Power Requirements	Power
Maintenance Cost: Lv594/month Purchase Cost: MLv7.13	Basic Ship Systems	0.4
	Sensors	2
	Reaction Drive	4
	Stutterwarp	4

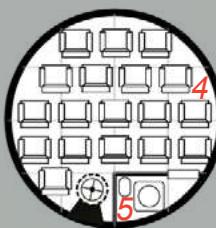


## LEGEND

1. Sensors
2. Bridge
3. Airlock
4. Accommodations
5. Systems
6. Cargo hold
7. Reaction drive
8. Power plant
9. Stutterwarp



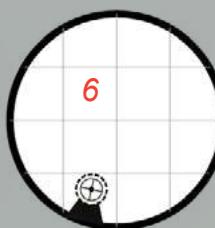
Deck 1



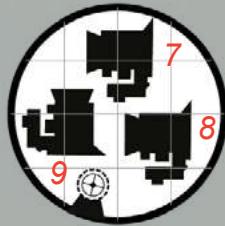
Deck 2



Deck 3



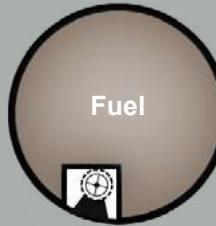
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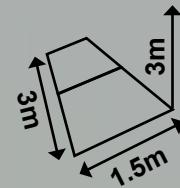
Deck 7



Deck 6



Deck 5



## SLV-55 CUTTER

The SLV-55 (Scout Landing Vessel, 55 tons) is a popular and well-regarded lander for exploration and surveys. Built on a 55-ton lifting-body hull with VTOL capability, it is designed with a 25-ton interchangeable mission module that can be swapped out in a matter of hours. The SLV-55 can carry a significant amount of equipment to support exploration efforts; a typical load would be a heavy ATV in a vehicle bay, along with an expanding base, fuel station and stores for a ground party in its cargo bay. Many use part of the cargo capacity to carry a small multi-environment gyrocopter.

The SLV-55 itself carries a basic array of survey sensors and can be used to extend the ground party's survey range 100-fold.

**NATION:** UNITED STATES

**FIRST EXAMPLE LAID DOWN:** 2273

**MANUFACTURER:** TRILON AEROSPACE

**PRODUCTION STATUS:** IN PRODUCTION

**CONSTRUCTION TIME:** 36 DAYS

**SERVICE STATUS:** IN SERVICE

**FLEETS OF SERVICE:** AUSTRALIA,

LIFE FOUNDATION, REBCO SAR,

UNITED STATES, TEXAS

**NUMBER IN SERVICE:** ~420

**LENGTH:** 24M

**HULLSPAN:** 15M

**TAKE-OFF MASS (FULLY-FUELLED):**

412.5 TONS

**POWER PLANT:** HYDE POWER SYSTEMS

PB-130 1.3 MW MHD TURBINE

**REACTION DRIVE:** TRILON REACTION

ENGINES SYSTEMS J-16 AIR-BREATHING THRUSTER WITH THRUST

VECTORING, 1,650 TONS THRUST

**ATMOSPHERIC FLIGHT SPEED (STANDARD)**

DENSITY/PRESSURE): 1,800 KM/H

**TAKE-OFF ROLL:** 440M

**LANDING ROLL, UNPOWERED:** 743M

**LANDING ROLL, POWERED:** 248M

TL12	Tons	Cost (MLv)
<b>Hull</b>	55-ton Synthetic Lifting Body	— 1.54
<b>Hull Features</b>	Advanced, Frontier Operations, Heat Shield, Modular, VTOL	1.1 7.09
<b>Reaction Drive</b>	Thruster (Air-Breathing, Advanced, UPP Size 8, Effective UPP Size: -4)	2.2 2.75
<b>Power Plant</b>	MHD Turbine (Power 13)	1.08 0.6
<b>Emergency Power</b>	Power 0.55, for 24 hours	0.0132 0.0132
<b>Fuel Tanks</b>	Thruster (6 Burns) Power Plant (1 Week)	8.25 3.25 — —
<b>Radiators</b>	Conventional, Capacity 13	1.3 0.065
<b>Bridge</b>	Flight Deck, with Neural Link	3 0.375
<b>Computer</b>	Primary: Computer/10 Secondary: Computer/5	— 0.095
<b>Sensors</b>	Basic Military, Basic Survey	5 4.5
<b>Systems</b>	Safety Locker, Ship's Locker, Simple Fresher, Automed 25-ton Multi-Mission Module	1 0.405 25 —
<b>Airlocks</b>	Standard Airlocks x1	— —
<b>Accommodations</b>	Acceleration Couch x8, Cryo Berth	2.5 0.74
<b>Software</b>	Archive, Intellect, Manoeuvre, Neural Interface	— 2
<b>Life Support Consumables</b>	7 days for 10 people	0.14 —
<b>Cargo</b>		1.16 0
<b>Total:</b> MLv18.15		

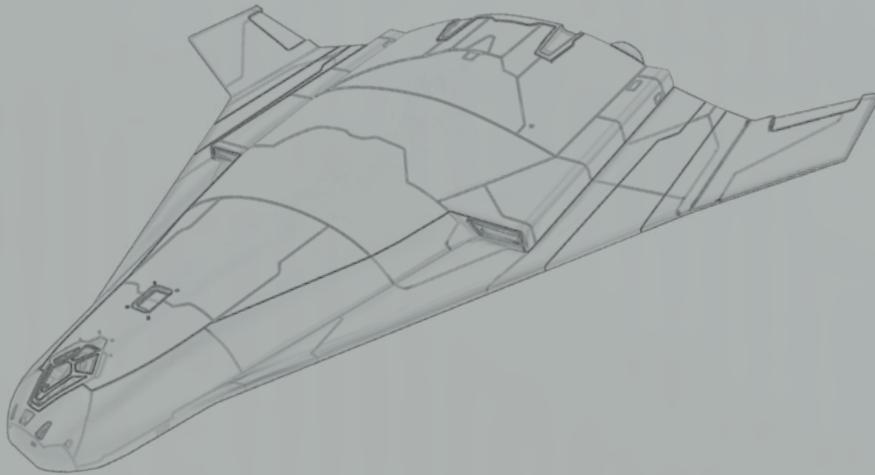
Crew	Passengers	Hull Points	Signature: 2
Pilot, Co-Pilot	8	5	Base Reflected: 0 Base Radiated: 2

Running Costs	Power Requirements	Power
Maintenance Cost: Lv1513/month	Basic Ship Systems	0.55
Purchase Cost: MLv18.15	Sensors	6
	Reaction Drive	5.5

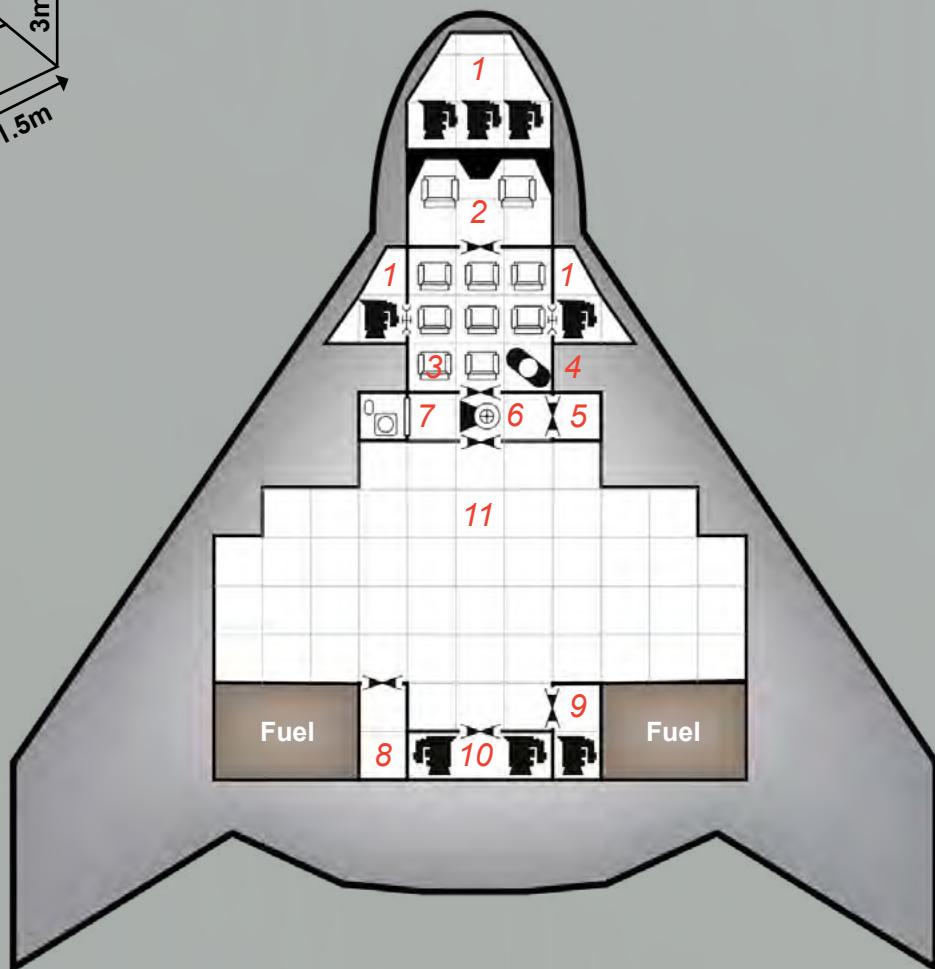


**LEGEND**

1. Sensors
2. Bridge
3. Accommodations
4. Cryo berth
5. Systems
6. Airlock
7. Fresher
8. Cargo hold
9. Power plant
10. Reaction drive
11. Mission module



3m  
1.5m



# MARTEL 60-TON FIGHTER

The sturdy Martel is widely regarded as one of the best fighters in space. It is aggressively marketed as well and examples and variants can be found in the hands of France, Britain and Canada (as the *Harrier*), Texas (as the *Longhorn*), and Freihafen (as the *Jaeger*). The heavily armed and armoured *Martel* is often employed as a ship-killer and has racked up impressive kill ratios versus capital ships in training exercises. Results against real combatants during the invasion of the Eta Bootis system were somewhat mixed, however.

**NATION:** FRANCE

**FIRST EXAMPLE LAID DOWN:** 2288

**MANUFACTURER:** GISCARD

AEROSPACE DIVISION

**PRODUCTION STATUS:** IN PRODUCTION

**CONSTRUCTION TIME:** 105 DAYS

**SERVICE STATUS:** IN SERVICE

**FLEETS OF SERVICE:** CANADA, FRANCE, TEXAS, UNITED KINGDOM, FREIHAFEN

**NUMBER IN SERVICE:** ~160

**LENGTH:** 25.5M

**WIDTH:** 12M

**TAKE-OFF MASS (FULLY-FUELLED):**

561.6 TONS

**POWER PLANT:** L'ÉTAGE RG90 9 MW

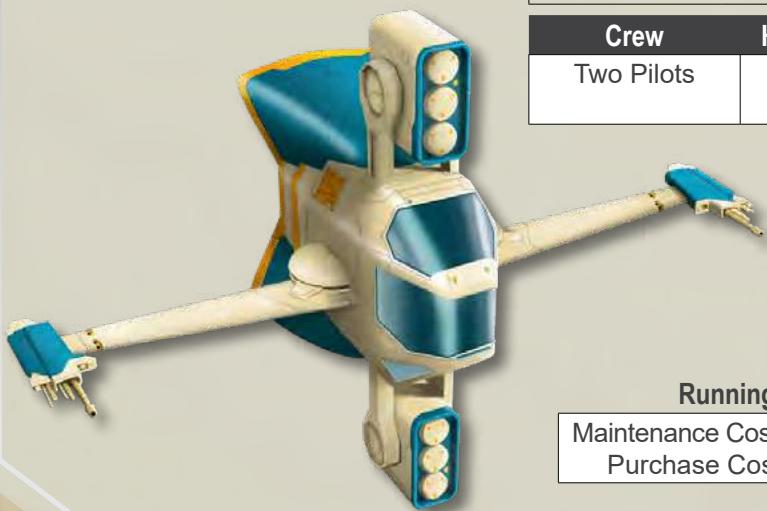
MHD TURBINE

**REACTION DRIVE:** L'ÉTAGE ML-50 MAGNETO-PLASMA THRUSTER, 600 TONS THRUST

**STUTTERWARP DRIVE:** GISCARD D70

1.5 MW GEN II JEROME-EFFECT

STUTTERWARP DRIVE



TL12		Tons	Cost (MLv)
<b>Hull</b>	60-ton Composite Spaceframe	—	1.8
<b>Hull Features</b>	Advanced, Radiation Shield	—	1.5
<b>Armour</b>	8	2.4	1.44
<b>Reaction Drive</b>	OMS Thruster (Advanced)	1.62	1.44
<b>Stutterwarp</b>	3.29 ly/day, Tac Speed: 3, System Speed: 2.12 AU per day (Discharge Vanes)	2.205	9.88
<b>Power Plant</b>	MHD Turbine (Power 90)	7.5	4.13
<b>Emergency Power</b>	Power 0.6, for 24 hours	0.0144	0.0144
<b>Fuel Tanks</b>	OMS Thruster (6 Burns) Power Plant (24 Hours)	9.72 3.24	— —
<b>Radiators</b>	AHDR, Capacity 90	4.5	2.25
<b>Bridge</b>	Dual Cockpit, with Neural Link	2.5	0.225
<b>Computer</b>	Primary: Computer/30fib Secondary: Computer/20 fib	— —	18.75
<b>Sensors</b>	Advanced Military, Basic Military	5	6
<b>Weapons</b>	EA1000 x2 (fixed mount, retractable) w/ UTES	4	7.1
<b>Targeting</b>	UTES (+1)	—	—
<b>Ordnance</b>	Combat Drones: Ritage-2 x2 Submunitions: Grape-Shot x2	15.2	10.244
<b>Drone Controllers</b>	1	0.25	0.5
<b>Systems</b>	Safety Locker	—	—
<b>Remotes</b>	Inspection Remotes x2, Repair Remotes x2	0.77	0.577
<b>Airlocks</b>	Standard Airlocks x1	—	—
<b>Software</b>	Archive, Auto-Repair/1, Fire Control/1, Intellect, Manoeuvre, Neural Interface	10.316	
<b>Cargo</b>		1.08	—
<b>Total:</b> MLv68.59			

Crew	Hull Points	Signature: 2
Two Pilots	7	Base Reflected: 1, Base Radiated: 2, Discharge Vanes Extended: +1

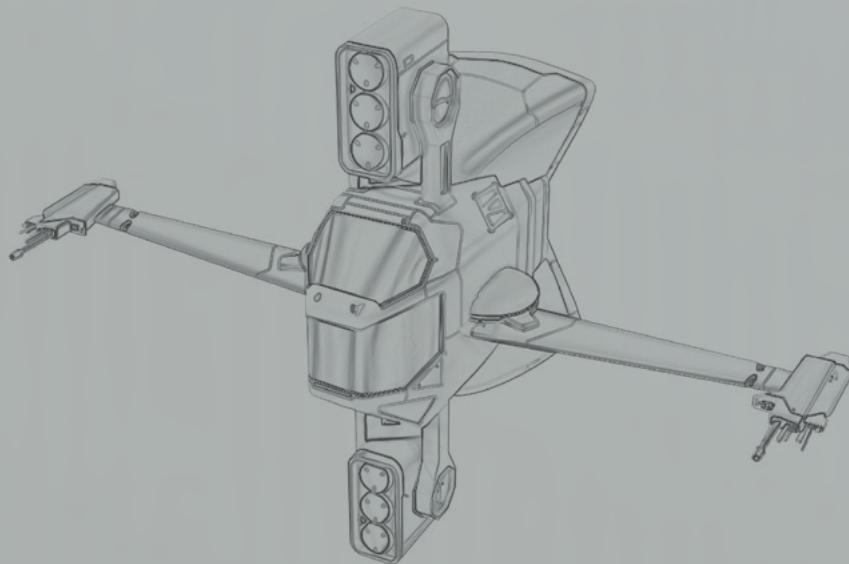
## Running Costs

Maintenance Cost: Lv5716/month  
Purchase Cost: MLv68.69

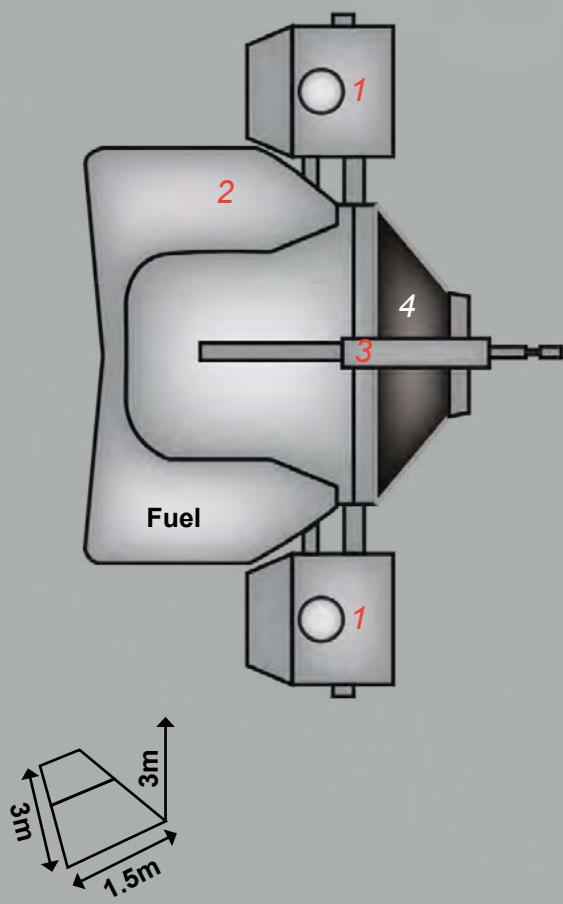
Power Requirements	Power
Basic Ship Systems	0.6
Sensors	16
Reaction Drive	6
Stutterwarp	15
Discharge Vanes	3.75
Drone Controllers	2
Weapons	50

**LEGEND**

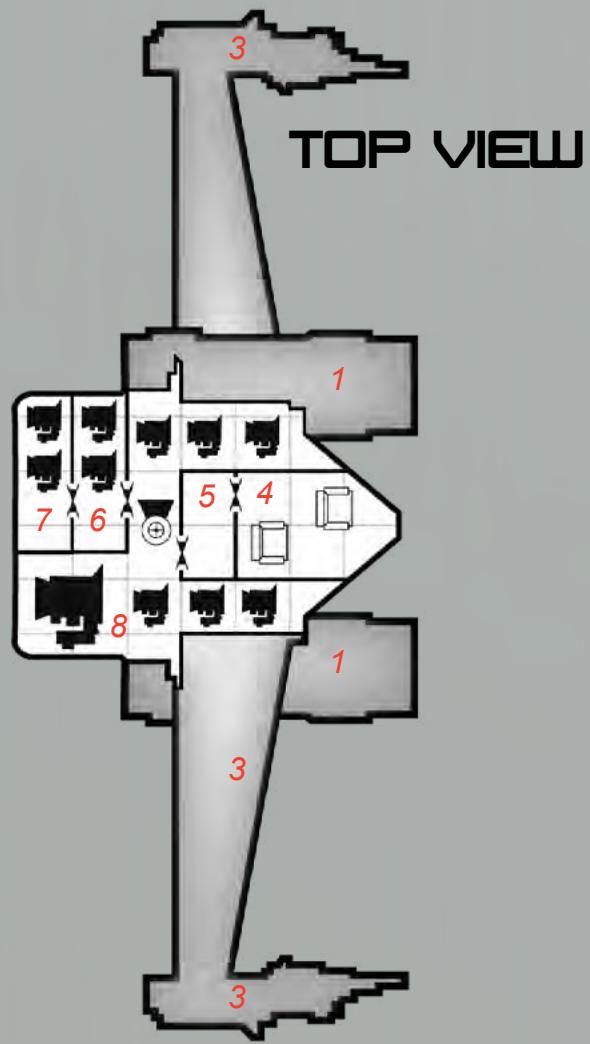
1. Ritage-2 and Grape-Shot
2. Sensors
3. EA 1000 w/ UTES
4. Cockpit
5. Cargo hold
6. Power plant
7. Reaction drive
8. Stutterwarp



SIDE VIEW



TOP VIEW



# UOC70 LONG BOAT

Used as a general-purpose small craft, the long boat is equipped with a thruster for orbital operations but is not designed for interface use. The stutterwarp drive allows the craft to undertake short in-system journeys. Much of the time, although, the main roles of the longboat include ship-to-ship transfers, orbital operations and customs duties. Although relatively fast for such a small vessel, it lacks endurance and is not suitable for long interstellar journeys. Many smaller colonies will use the UOC70 in a combination of customs duties and system defence, although it is ill-suited as a dedicated combat craft.

**NATION:** UNITED KINGDOM

**FIRST EXAMPLE LAID DOWN:** 2281

**MANUFACTURER:** BRITISH EXOSPACE

**PRODUCTION STATUS:** IN PRODUCTION

**CONSTRUCTION TIME:** 54 DAYS

**SERVICE STATUS:** IN SERVICE

**FLEETS OF SERVICE:** AZANIA, RUSSIA  
(ORBITAL QUARANTINE COMMAND), UNITED KINGDOM, WELLON

**NUMBER IN SERVICE:** ~75

**LENGTH:** 27M

**WIDTH:** 13M

**LAUNCH MASS (FULLY-FUELLED):** 645 TONS

**POWER PLANT:** ANGUS MILLS POWER SYSTEMS G40 4 MW MHD TURBINE

**REACTION DRIVE:** ROYCE D70 'JAVELIN'

OMS THRUSTER, 700 TONS THRUST

**STUTTERWARP DRIVE:** BRITISH EXOSPACE 'ALBION'-CLASS 0.7 MW GEN II JEROME-EFFECT STUTTERWARP DRIVE



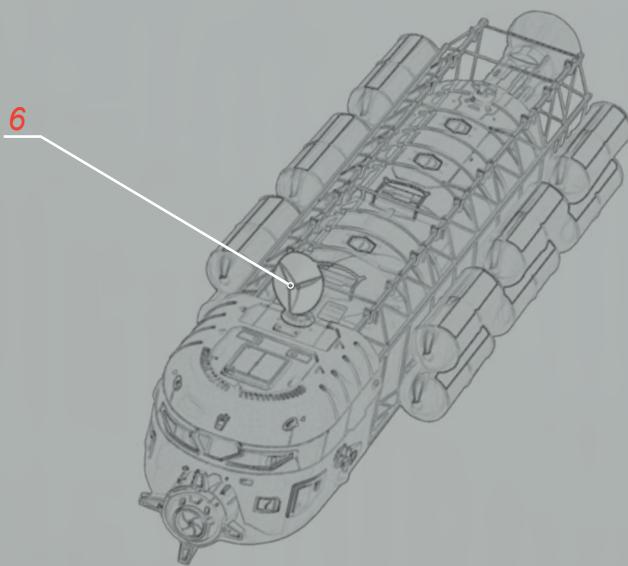
TL12		Tons	Cost (MLv)
<b>Hull</b>	70-ton Composite Spaceframe	—	2.1
<b>Hull Features</b>	Radiation Shield	—	0.35
<b>Armour</b>	4	1.4	0.84
<b>Reaction Drive</b>	OMS Thruster	2.1	0.84
<b>Stutterwarp</b>	1.98 ly/day, Tac Speed: 2, System Speed: 1.28 AU per day	1.25	6.24
<b>Power Plant</b>	MHD Turbine (Power 40)	3.33	1.83
<b>Emergency Power</b>	Power 0.7, for 24 hours	0.0168	0.0168
<b>Fuel Tanks</b>	OMS Thruster (8 Burns) Power Plant (1 Week)	16.8 10	— —
<b>Radiators</b>	AHDR, Capacity 40	2	1
<b>Bridge</b>	Flight Deck, with Neural Link, Encrypted Comms	3	1.375
<b>Computer</b>	Primary: Computer/15fib Secondary: Computer/10 fib	—	1.62
<b>Sensors</b>	Basic Military, DSS, GADS	4.13	6.22
<b>Weapons</b>	LL98, (surface mount) w/UTES Light Plasma Gun (PGHP) in Fixed Mount	3 0.025	1.4 —
<b>Targeting</b>	UTES (+1)	—	—
<b>Systems</b>	Safety Locker, Fresher, Ship's Lockers x2, Automed, Brig Breaching Tube, Grapple arm	5 4	0.435 2.1
<b>Remotes</b>	Inspection Remotes x2	0.55	0.155
<b>Airlocks</b>	Standard Airlock	—	—
<b>Accommodations</b>	Acceleration Couches x18	4.5	0.54
<b>Software</b>	Archive, Intellect, Manoeuvre, Neural Interface	—	2.792
<b>Life Support</b>	3 days for 18 people	0.11	—
<b>Consumables</b>	—	—	—
<b>Cargo</b>		8.79	—
Total: MLv26.88			

Crew	Passengers	Hull Points	Signature: 2
Pilots x2, Ship's Troops x6, Customs Officers x2	6	8	Base Reflected: 1 Base Radiated: 2

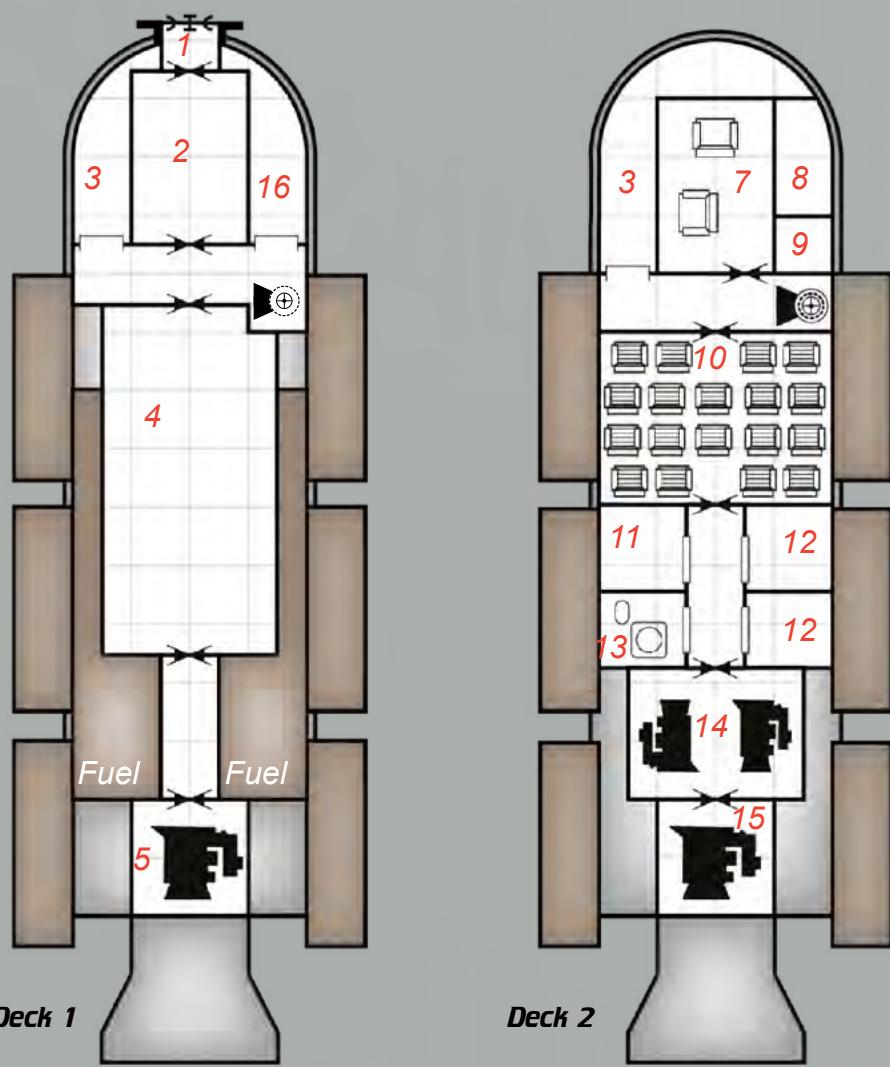
Running Costs	Power Requirements	Power
Maintenance Cost: Lv2240/month Purchase Cost: MLv26.88	Basic Ship Systems	0.7
	Sensors	10
	Reaction Drive	7
	Stutterwarp	7
	Weapons	15

**LEGEND**

1. Airlock
2. Breaching tube
3. Sensors
4. Cargo hold
5. Reaction drive
6. LL98 w/UTES
7. Bridge
8. Grappling arm
9. PGHP
10. Accomodations
11. Security locker
12. Ship's locker
13. Fresher
14. Power plant
15. Stutterwarp drive
16. Grapple arm



3m  
3m  
1.5m



# AB.400 COMMERCIAL PASSENGER SPACEPLANE

The AB.400 is typical of the mid-sized scramjet spaceplanes used for commercial interface transport all over human space. Although designed primarily to carry passengers, the AB.400 can also carry a considerable amount of cargo in the bay under the passenger section. The basic luggage allowance per person is 1m<sup>3</sup> per person, including crew. The rest of the cargo capacity is for freight or additional baggage carried for an extra fee.

**NATION:** FRANCE

**FIRST EXAMPLE LAID DOWN:** 2273

**MANUFACTURER:** L'ÉTAGE AEROSPACE

**PRODUCTION STATUS:** IN PRODUCTION

**CONSTRUCTION TIME:** 34 DAYS

**SERVICE STATUS:** IN SERVICE

**FLEETS OF SERVICE:** AUSTRALIA, UNITED STATES, TEXAS

**NUMBER IN SERVICE:** ~600

**LENGTH:** 38M

**HULLSPAN:** 20M

**TAKE-OFF MASS (FULLY-FUELLED):** 712 TONS

**POWER PLANT:** GUICARD POWER SYSTEMS EC-3 0.3 MW FUEL CELL

**REACTION DRIVE:** L'ÉTAGE M300

'MAGNUS' SCRAMJET, 2,850 TONS

**THRUST**

**ATMOSPHERIC FLIGHT SPEED (STANDARD DENSITY/PRESSURE):** 1,200KM/H

**TAKE-OFF ROLL:** 760M

**LANDING ROLL, UNPOWERED:** 1283M

**LANDING ROLL, POWERED:** 428M

TL11		Tons	Cost (MLv)
<b>Hull</b>	95-ton Synthetic Lifting Body	—	2.66
<b>Hull Features</b>	Heat Shield	0	0.95
<b>Reaction Drive</b>	Rocket (Air-Breathing, Advanced, UPP Size 8, Effective UPP Size: -3)	4.75	5.9375
<b>Power Plant</b>	Fuel Cell (Power 3)	0.25	1
<b>Emergency Power</b>	Power 0.95, for 24 hours	0.114	0.114
<b>Fuel Tanks</b>	Rocket (6 Burns)	22.8	—
	Power Plant (24 Hours)	0.0648	—
<b>Radiators</b>	Conventional, Capacity 3	0.3	0.015
<b>Bridge</b>	Flight Deck, with Neural Link, Encrypted Comms	3	1.375
<b>Computer</b>	Primary: Computer/10 Secondary: Computer/5	—	0.095
<b>Sensors</b>	Basic Nav Array	1	0.1
<b>Systems</b>	Safety Locker, Simple Fresher x2, Ship's Locker	1	0.16
<b>Airlocks</b>	Standard Airlock	—	—
<b>Accommodations</b>	Acceleration Couch x152	38	4.56
<b>Software</b>	Archive, Intellect, Manoeuvre, Neural Interface	—	2
<b>Life Support Consumables</b>	1 day for 154 people	0.31	—
<b>Cargo</b>		23.41	—
<b>Total:</b> MLv17.07			

Crew	Passengers	Hull Points	Signature: 1
Pilots x2, Stewards x2	150	9	Base Reflected: 0 Base Radiated: 1

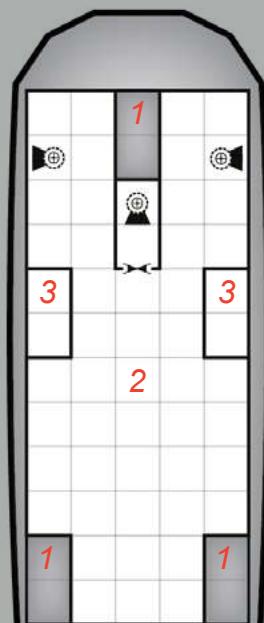
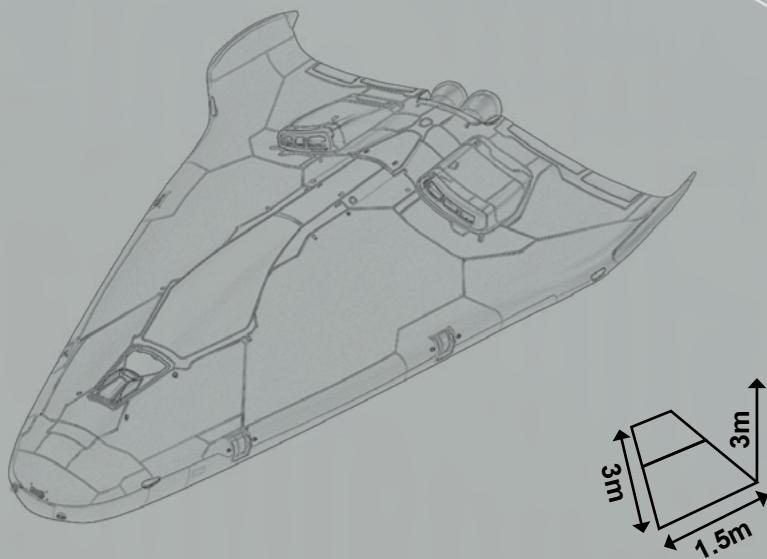
Running Costs	Power Requirements	Power
Maintenance Cost: Lv1423/month Purchase Cost: MLv17.07	Basic Ship Systems	0.95
	Sensors	2

Maximum Airspeed	Transonic
Cruising Airspeed	Subsonic
Endurance	1 Hour per Burn

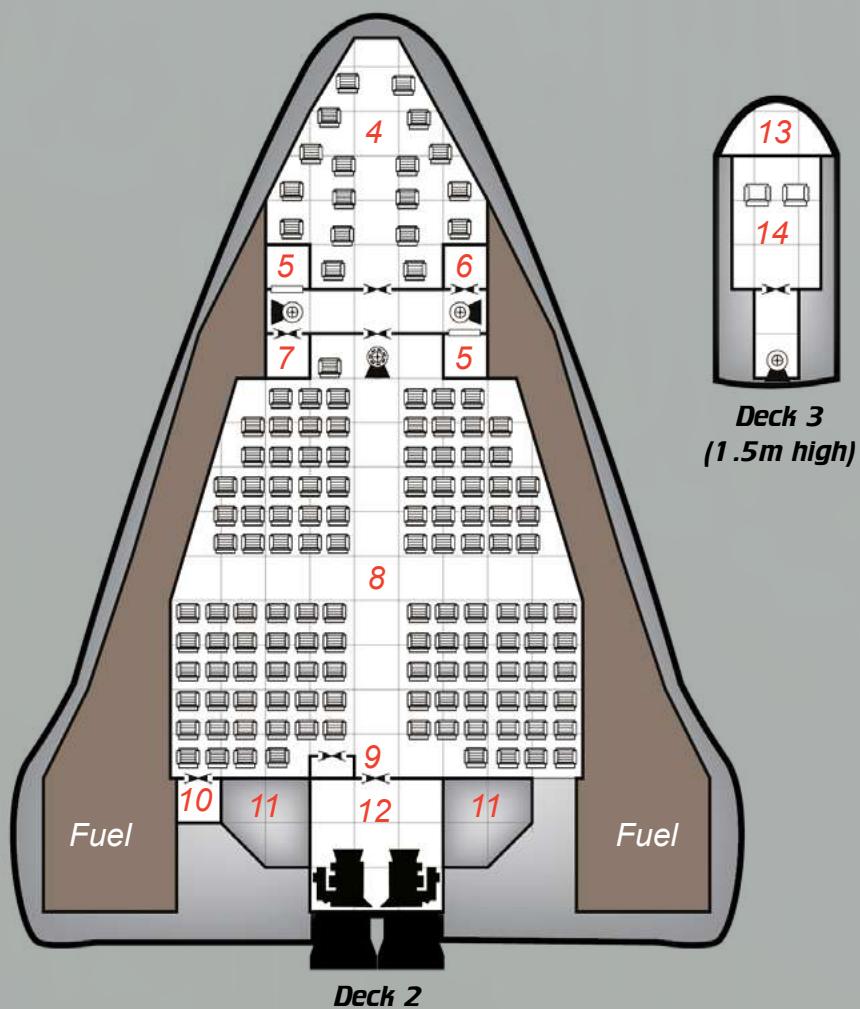


**LEGEND**

1. Landing gear
2. Cargo hold
3. Cargo bay doors
4. Accommodations (first class)
5. Fresher
6. Safety locker
7. Ship's locker
8. Accommodations
9. Fuel cell
10. Life support supplies
11. Air intake
12. Reaction drive
13. Sensors
14. Bridge



Deck 1  
(1.5m high)



Deck 3  
(1.5m high)

## BEANSTALK CLIMBER

The Beanstalk Climber, often called a 'Jack', is a passenger version of the standard 110-ton module used for the Beanstalks on both Earth and Beta Canum. The Mars Beanstalk uses a smaller car, designed for much shorter trips. The normal passenger load for a Jack is 16 passengers and two crew, although up to 60 passengers can be carried in military-grade conditions.

The Jack is fitted with a dining room to enhance the experience, with the two crew preparing and serving the meals. The quality and character of the meals depends on where the climber is at in its journey. For the day spent approaching or leaving the orbital terminal, perceived gravity is very low, necessitating zero-ggee-type foods. The nearer the climber is to the surface of the planet, the higher the perceived gravity. When the perceived gravity is above 0.2G, the staff can prepare real meals.

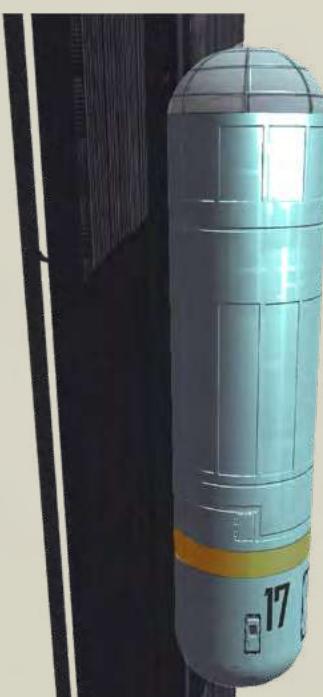
Power for the climber is usually provided by induction from the Beanstalk itself, although all cars have three days of emergency life support power as a safety precaution. This on-board power supply is insufficient to power the climber itself.

TL11		Tons	Cost (MLv)
<b>Hull</b>	110-ton Synthetic Ballistic	—	2.64
<b>Reaction Drive</b>	Climber (500km/h, 3.5 days to geosynchronous terminal)	3.85	1.925
<b>Power Plant</b>	External (40 Power), Indefinite	2	2
<b>Emergency Power</b>	1.1 Power, for 72 hours	0.396	0.396
<b>Radiators</b>	Conventional, 40 Capacity	4	0.2
<b>Bridge</b>	Autopilot, with Neural Link	—	1.65
<b>Computer</b>	Primary: Computer/10 Secondary: Computer/5	—	0.095
<b>Sensors</b>	Minimal	—	—
<b>Systems</b>	Safety Locker, Simple Fresher x2, Common Areas (12 tons), Exercise Equipment for 6, Galley for 18	36.5	3.66
<b>Airlocks</b>	Standard Airlock	—	—
<b>Accommodations</b>	Small Stateroom x16, Stateroom x2	40	2.6
<b>Software</b>	Archive, Manoeuvre, Neural Interface Robotic Control: (Advanced, Skill 2, Voice/Speech Recognition, Interactive, Personality)	—	1.55
<b>Life Support</b>	5 days for 20 people	0.2	—
<b>Consumables</b>			
<b>Cargo</b>		23.05	—
Total: MLv15.04			

Crew	Passengers	Hull Points	Signature: 2
Autopilot: Pilot Skill 2, Stewards x2	16 Comfort +1	11	Base Reflected: 2 Base Radiated: 2

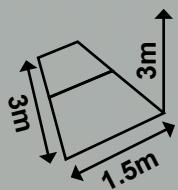
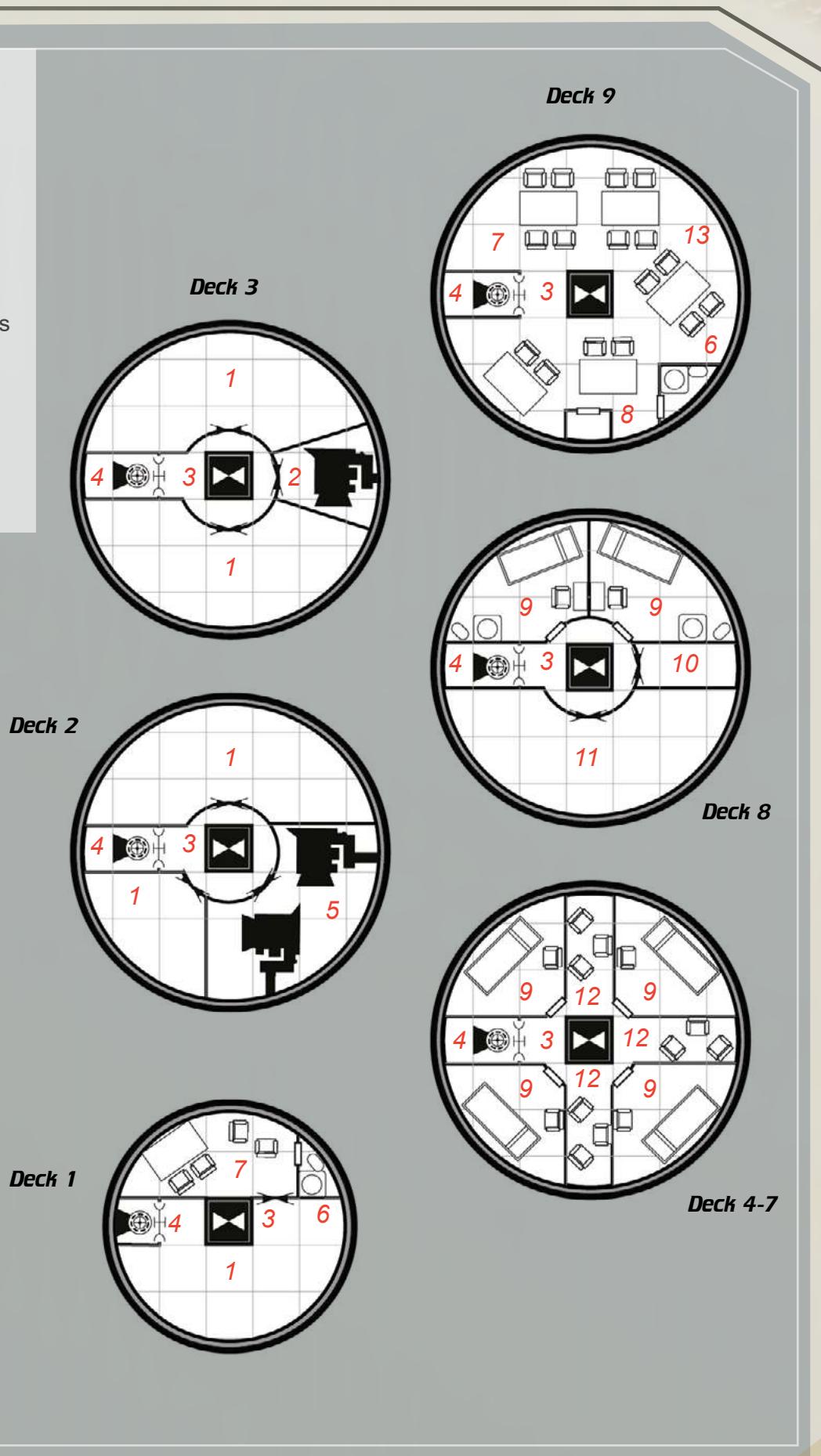
Running Costs	Power Requirements	Power
Maintenance Cost: Lv1253/month	Basic Ship Systems	1.1
Purchase Cost: MLv15.04	Sensors	1
	Climber System	38.5

NATION: FRANCE	HULLSPAN: 9M
FIRST EXAMPLE LAID DOWN: 2280	TAKE-OFF MASS (FULLY-FUELLED):
MANUFACTURER: L'ÉTAGE	825 TONS
AEROSPACE	POWER PLANT: EXTERNAL
PRODUCTION STATUS: IN	INDUCTION SYSTEM (EMERGENCY
PRODUCTION	SUPPLY GUICARD POWER
CONSTRUCTION TIME: 31 DAYS	SYSTEMS EC-80 8 MW/HR BATTERY)
SERVICE STATUS: IN SERVICE	REACTION DRIVE: VANNOCIO
FLEETS OF SERVICE: FRANCE	'BRUCO' 0.385 MW LINEAR
NUMBER IN SERVICE: ~1,000	INDUCTION CLIMBER
LENGTH: 25M	



**LEGEND**

1. Cargo
2. Power plant
3. Lift
4. Emergency through deck access
5. Reaction drive
6. Fresher
7. Galley
8. Life support supplies
9. Fuel cell
10. Ship's locker
11. Exercise room
12. Common area
13. Observation deck



# SPACECRAFT: STARSHIPS

Starships are spacecraft with the range and endurance required to cross interstellar space. While many spacecraft use stutterwarp drives for in-system travel, true starships are best suited for the long gulfs

between stars. A smaller spacecraft could do this but the crossing would be uncomfortable and dangerous. Starships make these crossings almost routine and usually safer than the short trip to escape a planet's gravity well.

## INITIAL SURVEY VESSEL-2 (ISV-2) INDEPENDENT SCOUT

TL10		Tons	Cost (MLv)
Hull	100-ton Aligned Crystal Steel Spaceframe	—	2
Hull Features	Radiation Shield	—	0.5
Reaction Drive	OMS Thruster	3	1.2
Stutterwarp	1.41 ly/day, Tac Speed: 1, System Speed: 0.91 AU per day	1.69	2.11
Power Plant	MHD Turbine (Power 22)	2.75	0.69
Emergency Power	Power 1, for 24 hours	0.24	0.24
Fuel Tanks	OMS Thruster (6 Burns) Power Plant (2 Weeks)	18 11	— —
Radiators	Conventional, Capacity 22	2.2	0.11
Bridge	Small	5	0.5
Computer	Primary: Computer/10 Secondary: Computer/5	—	0.095
Sensors	Basic Military, Basic Survey, DSS, GADS, Telescope	9.17	11.31
Weapons	1 Hardpoint	—	0.1
Systems	Safety Locker, Simple Freshers x2, Ship's Locker, Exercise Equipment for 3, General Lab Space x2 Sling (20 tons)	12 1	2.91 0.2
Remotes	Planetary Probe x2, Survey Satellite x6	11.33	5.933
Airlocks	Standard Airlock	—	—
Accommodations	Small Staterooms x10	20	1
Software	Archive, Intellect, Manoeuvre, Stutterwarp Control		1.564
Life Support	28 days for 10 people	0.56	—
Consumables			—
Cargo		2.06	—
Total: MLv27.41			

Crew	Passengers	Hull Points	Signature: 2
Captain, Astrogator, Flight Engineer, Pilot, Sensor Tech, Reaction Drive Engineer, Stutterwarp Engineer, Power Engineer, Life support Tech, Electronics Tech	16 Comfort -1	10	Base Reflected: 2 Base Radiated: 2

Running Costs	Power Requirements	Power	Power Requirements	Power
Maintenance Cost: Lv2284/month Purchase Cost: MLv27.41	Basic Ship Systems	1.1	Reaction Drive	10
	Sensors	1	Stutterwarp	38.5

The ISV-2 is a surplus survey vessel developed by Trilon in the early 2230s as an inexpensive exploration vessel for smaller nations and foundations. Built on a basic 100-ton cylindrical spaceframe, the ISV-2, or 'Tin Can', is a very elementary craft. The sensor suite is barely adequate for the task, accommodations are cramped and spartan, and it lacks provision for artificial gravity.

It does have a few notable features, including a launch bay for a pair of surface probes, which can conveniently fit a single 10 ton 'smuggler' pod. While most starships include a thruster for limited orbital operations, the ISV-2 carries more fuel than typical small starships. However, it operates on a power deficit and cannot operate the thruster and the stutterwarp at the same time.

This craft is used as an asteroid miner, a smuggling vessel and even still, as a survey ship. While it is cramped and uncomfortable, it is also easy to maintain and modify. Modifications are so common that not one of the over 30 of these craft still in operation is in the same configuration as when it was built.

Later models of the ISV-2 built for Canada and Mexico include a sling capable of holding a craft up to 20 tons in size, typically a small surface lander or aeroshell science package. This feature can be retrofitted to extant hulls for Lv400000 and it consumes 0.5 tons.

**NATION:** TRILON (UNITED STATES)

**FIRST EXAMPLE LAID DOWN:** 2235

**MANUFACTURER:** TRILON AEROSPACE DIVISION

**PRODUCTION STATUS:** OUT OF PRODUCTION

**CONSTRUCTION TIME:** 55 DAYS

**SERVICE STATUS:** IN SERVICE

**FLEETS OF SERVICE:** BELTERS, CANADA, LIBERTINES, LIFE FOUNDATION, MEXICO

**NUMBER IN SERVICE:** ~30

**LENGTH:** 40M

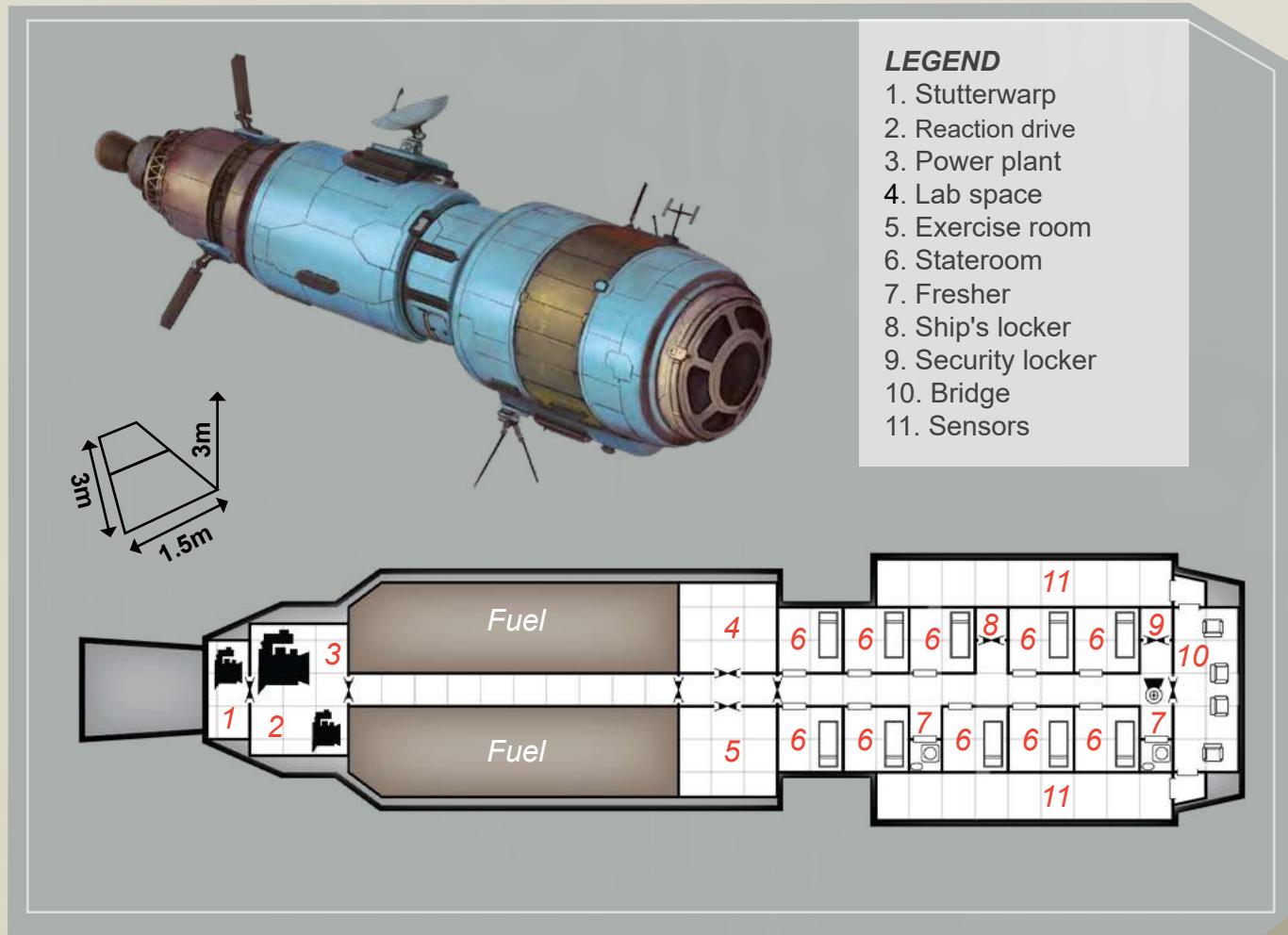
**WIDTH:** 12M

**MASS (FULLY-FUELLED):** 1,000 TONS

**POWER PLANT:** HYDE DYNAMICS VORTECH R22 2.2 MW MAGNETOHYDRODYNAMIC TURBINE

**REACTION DRIVE:** TRILON 'STRIDER' S900 MAGNETO-PLASMA THRUSTER, 1,000 TONS THRUST

**STUTTERWARP DRIVE:** TRILON 'HOPPER' R1B 1 MW GEN II JEROME-EFFECT STUTTERWARP DRIVE



## THOREZ-CLASS COURIER

The Thorez-class courier was originally designed for short-duration courier missions. The hull has proved extremely flexible, however, and variants of this design are spread all over charted space, serving as small tramp cargo vessels, couriers and even privateers. Powered by air-breathing thrusters, the Thorez can manage an unassisted take-off from most worlds with normal gravity but often requires the use of boosters on high-gravity planets or with unusually heavy cargoes. The Thorez can be flown with a very small crew in non-commercial service.

While the cargo bay of the Thorez is relatively small, it can operate from just about anywhere with a prepared landing strip. This makes it useful for delivering small cargoes to distant worlds, including items like medicine, vitamin supplements, fabricators and fabricator refill kits, seeds and genestock.

TL10		Tons	Cost (MLv)
<b>Hull</b>	200-ton Synthetic Lifting Body	—	5.6
<b>Hull Features</b>	Heat Shield, Radiation Shield, STOL, Frontier Operations	2	5.2
<b>Reaction Drive</b>	Thruster (Air-Breathing, UPP Size 8, Effective UPP Size: -2)	8.8	6
<b>Stutterwarp</b>	1.29 ly/day, Tac Speed: 1, System Speed: 0.83 AU per day	2.07	2.59
<b>Power Plant</b>	MHD Turbine (Power 25)	3.13	0.78
<b>Emergency Power</b>	Power 2, for 24 hours	0.48	0.48
<b>Fuel Tanks</b>	Thruster (7 Burns)	35	—
	Power Plant (2 Weeks)	12.5	—
<b>Radiators</b>	Conventional, Capacity 22	2.2	0.11
<b>Bridge</b>	Small	5	1
<b>Computer</b>	Primary: Computer/10 Secondary: Computer/5	—	0.095
<b>Sensors</b>	Basic Nav Array, DSS	3	1.6
<b>Systems</b>	Safety Locker, Simple Fresher, Ship's Locker, Exercise Equipment for 5	5.75	1.405
<b>Airlocks</b>	Standard Airlocks x2	0	0
<b>Accommodations</b>	Small Staterooms x28	56	2.8
<b>Software</b>	Archive, Intellect, Manoeuvre, Stutterwarp Control	—	1.516
<b>Life Support Consumables</b>	28 days for 28 people	1.57	—
<b>Cargo</b>		62.21	0
<b>Total: MLv26.27</b>			

**NATION:** FRANCE

**FIRST EXAMPLE LAID DOWN:** 2269

**MANUFACTURER:** DARLAN AEROSPATIALE

**PRODUCTION STATUS:** OUT OF PRODUCTION

**CONSTRUCTION TIME:** 53 DAYS

**SERVICE STATUS:** IN SERVICE

**FLEETS OF SERVICE:** FRANCE, FRENCH EMPIRE, LIBERTINES, MULTI-NAT FLEETS, UNITED KINGDOM

**NUMBER IN SERVICE:** ~120

**LENGTH:** 29M

**HULLSPAN:** 12M

**TAKE-OFF MASS (FULLY-FUELLED):**

1,500 TONS

**POWER PLANT:** L'ÉTAGE B25 2.5 MW

MAGNETOHYDRODYNAMIC TURBINE

**REACTION DRIVE:** L'ÉTAGE TGT10

MAGNETO-PLASMA THRUSTER 6,000 TONS

THRUST

**STUTTERWARP DRIVE:**

L'ÉTAGE J-4 1.5 MW GEN II JEROME-EFFECT

STUTTERWARP DRIVE

**ATMOSPHERIC FLIGHT SPEED**

**(STANDARD DENSITY/PRESSURE):** 800KM/H

**TAKE-OFF ROLL:** 800m

**LANDING ROLL, UNPOWERED:** 1,350M

**Crew**

Captain, Bridge Officer, Astrogators x2, Flight Engineers x2, Pilots x2, Sensor Techs x2, Reaction Drive Engineers x2, Stutterwarp Engineers x2, Power Engineers x2, Life support Techs x2, Electronics Techs x2

<b>Passengers</b>	<b>Hull Points</b>	<b>Signature: 2</b>
6 Comfort +1	20	Base Reflected: 1 Base Radiated: 2

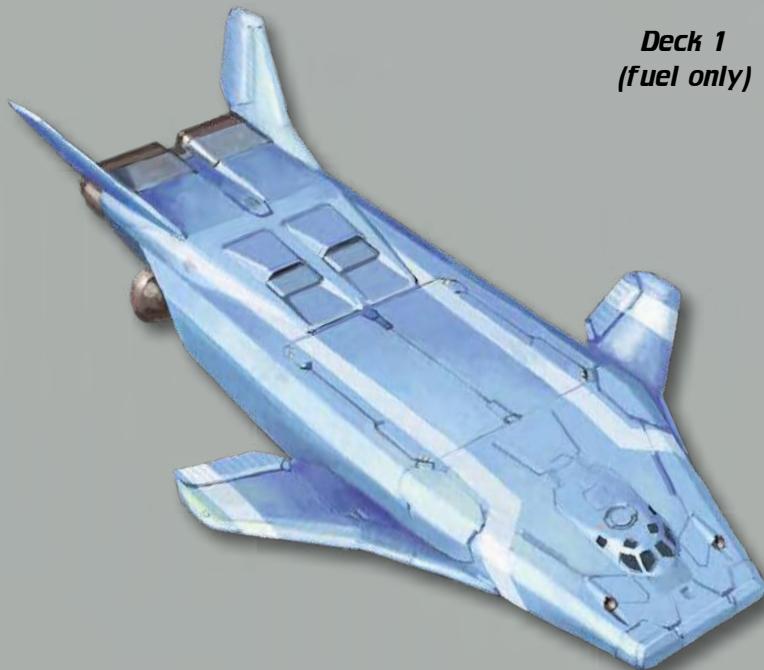
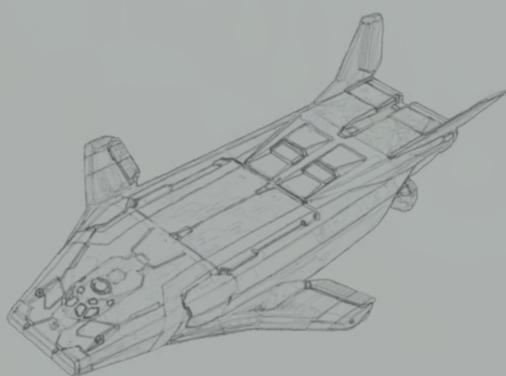
**Running Costs**

Maintenance Cost: Lv2189/month  
Purchase Cost: 26.27

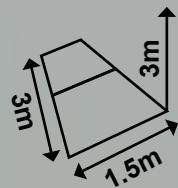
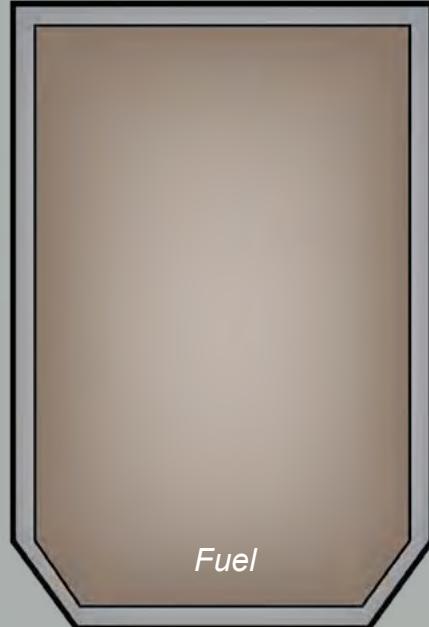
Maximum Airspeed	Subsonic
Cruising Airspeed	Very Fast
Endurance	1 Hour per Burn

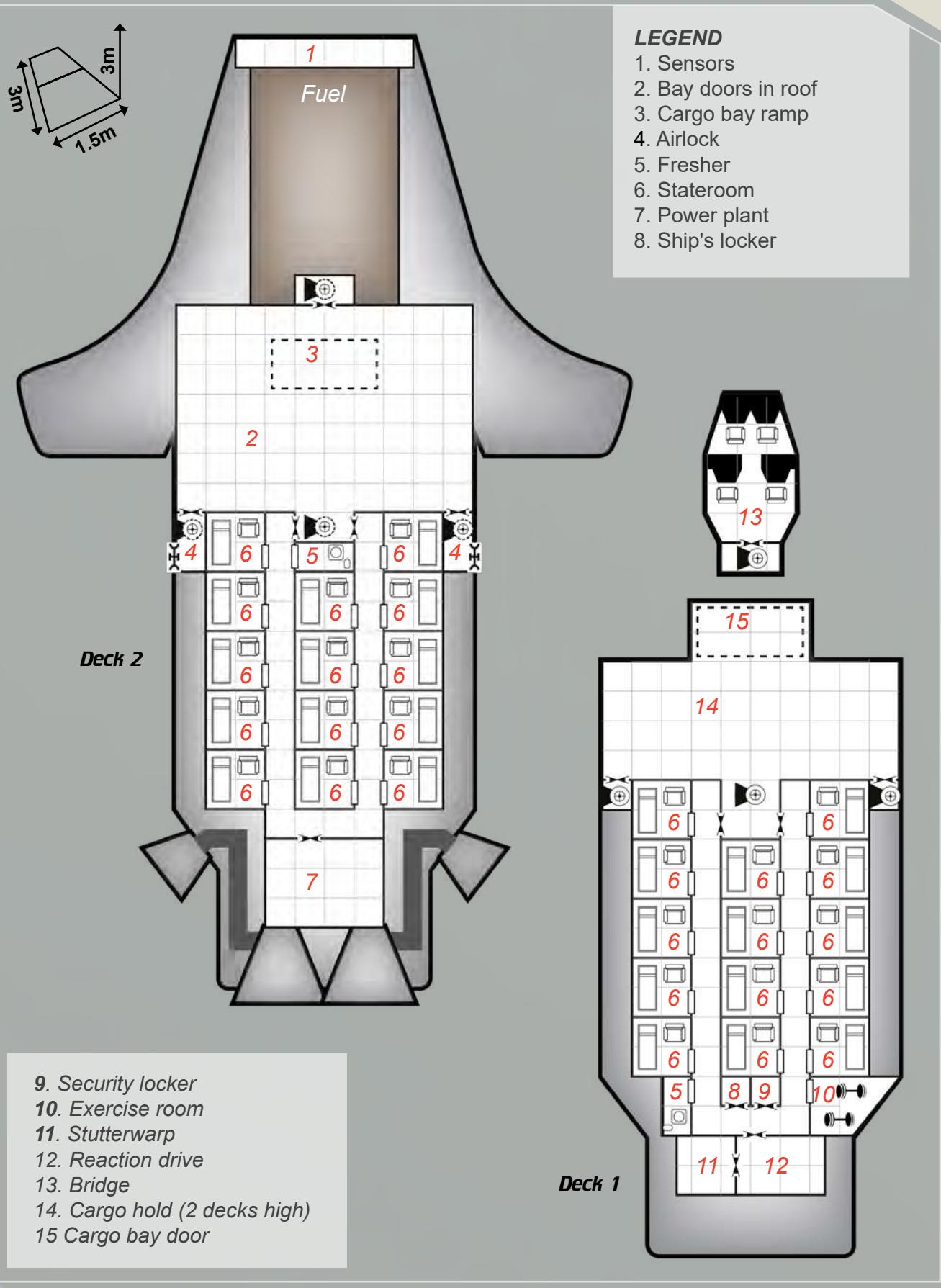
**Power Requirements**

Basic Ship Systems	2
Sensors	2
Reaction Drive	20
Stutterwarp	15



*Deck 1  
(fuel only)*





# MARTINIQUE-CLASS YACHT

While personal ownership of starships is rare, it is nonetheless possible. The ultra-rich of the Core and very wealthy worlds like Nibelungen or Beowulf have access to such vessels, either wholly-owned or owned in partnership with other families. The Martinique is on the higher end of the scale for private starships and includes spin gravity capability and an interface craft for planetary excursions. While most starships, especially non-streamlined craft, are strictly functional in appearance, the Martinique manages to look sleek and luxurious. The two spin habs are separated into accommodations for owner and guests, while the other is for crew. As a non-commercial craft, the crew requirements are relatively small but even at that it requires 13 crew, including stewards and pilots for the interface craft.

The solar array that gives the Martinique its ‘winged’ look allows it to refine waste water from the fuel cell and crack it back into fuel. This frees the vessel to traverse uninhabited systems or stick to the outer edges of inhabited systems. This capability is unusual in civilian craft and makes the Martinique of interest to smugglers and wealthy explorers alike. It is also the reason for the vessel’s exorbitant price tag; the fuel cell that makes this possible is very expensive. The vessel carries sufficient fuel to refuel the lander twice.

TL12		Tons	Cost (MLv)
<b>Hull</b>	200-ton Synthetic Spaceframe	—	4.8
<b>Hull Features</b>	Advanced, Radiation Shield	—	5
<b>Reaction Drive</b>	OMS Rocket (Advanced)	3.6	2.4
<b>Stutterwarp</b>	1.32 ly/day, Tac Speed: 1, System Speed: 0.8514 AU per day	1.58	7.91
<b>Power Plant</b>	Fuel Cell (15 Power), Solar Panels (40 Power)	5.07	10.43
<b>Emergency Power</b>	2 Power, for 24 hours	0.048	0.048
<b>Fuel Tanks</b>	OMS Rocket (6 Burns), (6.3 tons per Burn) Power Plant (2 Weeks) Subcraft Fuel 2 refills	37.8 4.5 13.4	— — —
<b>Fuel Processing</b>	8 tons per day	0.8	1.6
<b>Radiators</b>	Conventional, 40 Capacity	4	0.2
<b>Bridge</b>	Small, with Neural Link, Encrypted Comms	5	2.5
<b>Computer</b>	Primary: Computer/20 Secondary: Computer/15	—	3.5
<b>Sensors</b>	Basic Nav Array, DSS, GADS, Telescope	5.16	7.49
<b>Systems</b>	Under Spin: Safety Locker, Simple Fresher, Ship's Locker, Exercise Equipment for 5, Full Galley, Automed, Common Areas 15 tons	24	3.405
<b>Remotes</b>	Repair Remote x2	0.22	0.422
<b>Sub-Craft</b>	Turmfalke Spaceplane in Berth	22	6.32
<b>Airlocks</b>	Standard Airlocks x2	—	—
<b>Accommodations</b>	Under Spin: Small Staterooms x14, Staterooms x5, Luxury Suite	56	4.9
<b>Artificial Gravity</b>	Type: Spin Capsules (81.12 tons Under Spin) Radius: 15m, 3 RPM, Gravity: 0.15G, Spin Up/Down: 9 minutes	8.11	4.06
<b>Software</b>	Archive, Intellect, Manoeuvre, Stutterwarp Control, Auto-Repair/1, Neural Interface	—	7.528
<b>Life Support Consumables</b>	28 days for 20 people	1.12	—
<b>Cargo</b>		7.59	—
<b>Total: MLv65.26</b>			

NATION: FRANCE

FIRST EXAMPLE LAID DOWN: 2294

MANUFACTURER: L'ÉTAGE

AEROSPACE DIVISION X

PRODUCTION STATUS:

IN LIMITED PRODUCTION

CONSTRUCTION TIME: 116 DAYS

SERVICE STATUS: IN SERVICE

FLEETS OF SERVICE: VARIOUS PRIVATE INDIVIDUALS AND MULTINATIONAL FLEETS

NUMBER IN SERVICE: ~20

LENGTH: 56M

WIDTH: 8M (30M DIAMETER SPIN HABS)

LAUNCH MASS (FULLY-FUELLED): 400 TONS

POWER PLANT: ROYCE 'DURANDAL'

1.5 MW FUEL CELL

REACTION DRIVE: L'ÉTAGE TGT20

MAGNETO-PLASMA 2,000 TONS THRUST

STUTTERWARP DRIVE: L'ÉTAGE J-90 1 MW

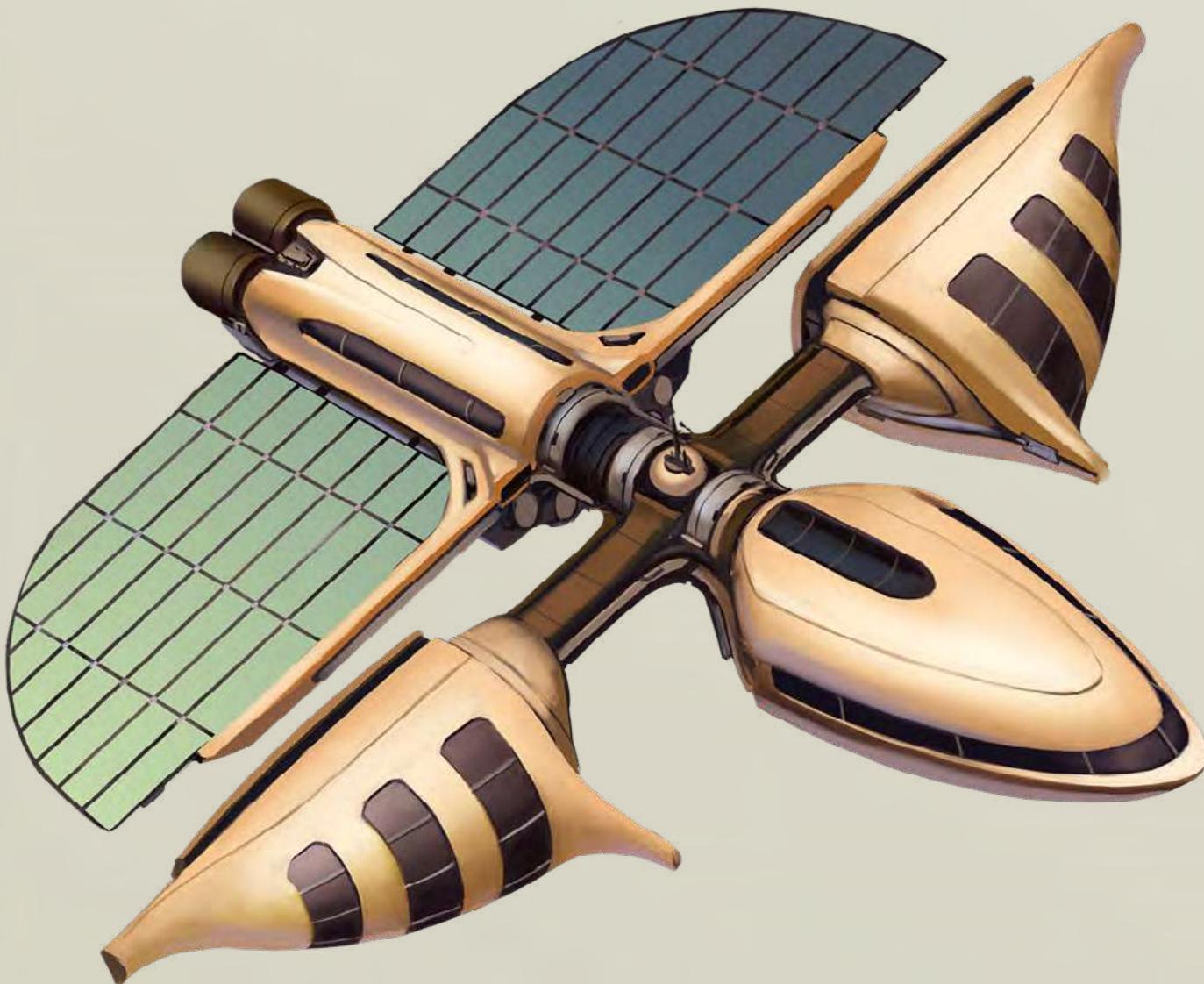
GEN II JEROME-EFFECT STUTTERWARP DRIVE

## Crew

Captain, Astrogator, Flight Engineer, Pilot, Sensor Tech, Reaction Drive Engineer, Stutterwarp Engineer, Power Engineer, Small Craft Tech, Life support Tech, Electronics Tech, Small Craft Pilots x2, Stewards x2

Passengers	Hull Points	Signature: 3
6 Comfort +2	22	Base Reflected: 3 Base Radiated: 2

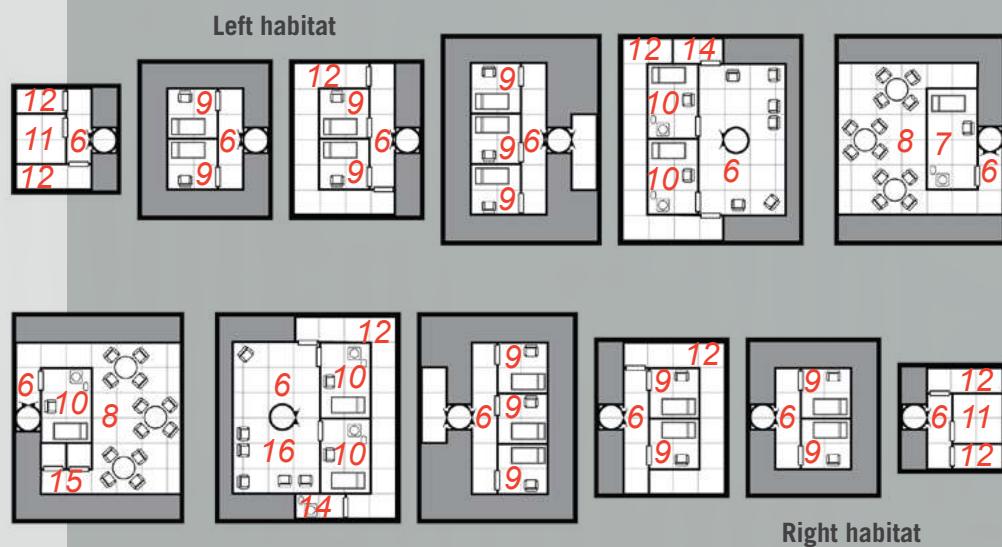
Running Costs	Power Requirements	Power
Maintenance Cost: Lv5438/month	Basic Ship Systems	2
Purchase Cost: 65.26	Sensors	7
	Fuel Processor	40
	Stutterwarp	10



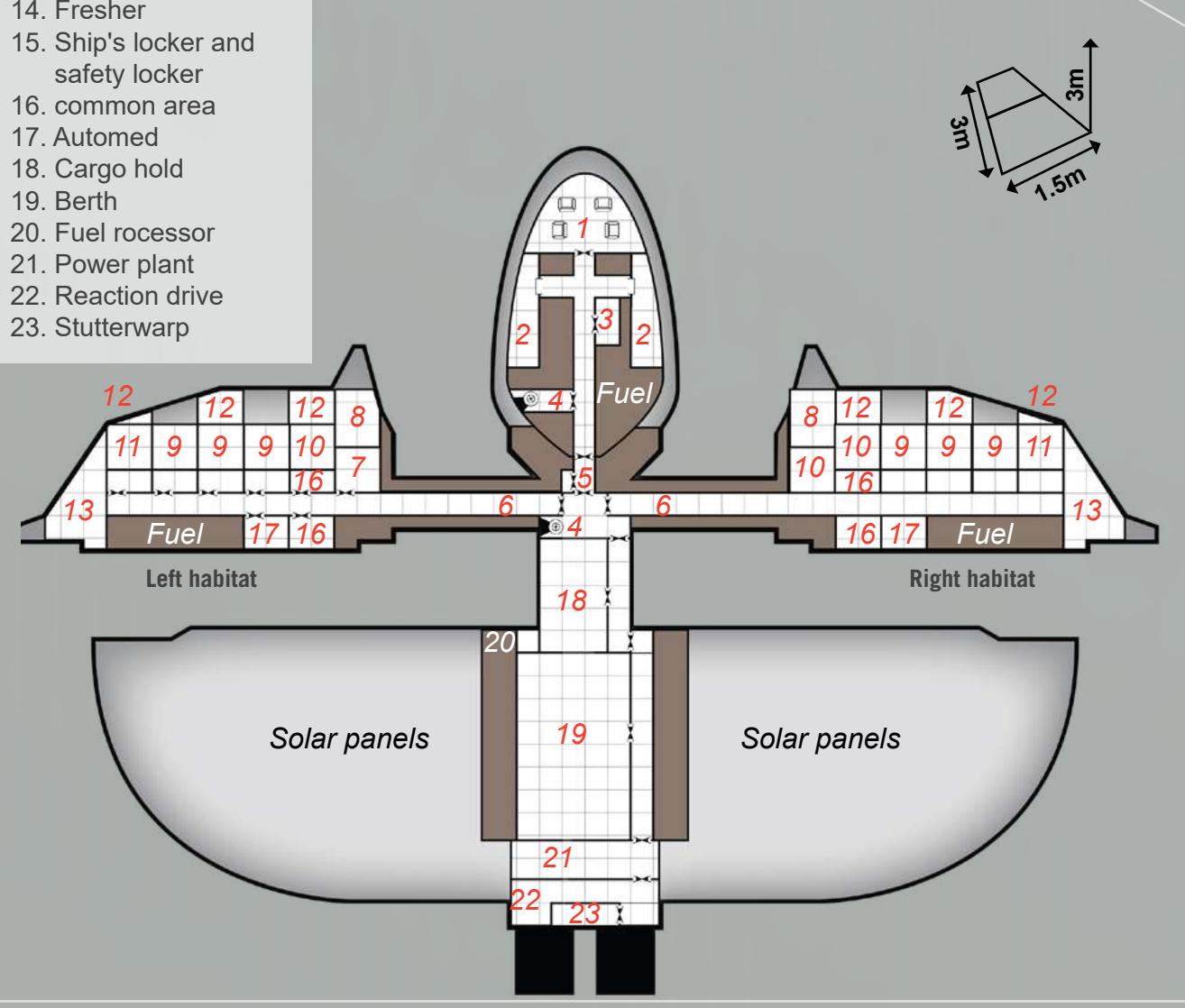
# MARTINIQUE-CLASS YACHT

## LEGEND

1. Bridge
2. Sensors
3. Life support supplies
4. Exit hatch
5. Repair remote
6. Lift
7. Luxury stateroom
8. Galley
9. Small stateroom
10. Stateroom
11. Exercise room
12. Observation deck
13. Spinal caps



14. Fresher
15. Ship's locker and safety locker
16. common area
17. Automed
18. Cargo hold
19. Berth
20. Fuel rocessor
21. Power plant
22. Reaction drive
23. Stutterwarp



## ANJOU

The Anjou is a basic cargo vessel of a simple, straightforward design. Equipped with a small rotating ring for crew comfort, the Anjou also sees use as a basic passenger liner. This cylindrical design is manufactured all over human space, in licensed-built models and out-and-out pirated copies. It is a favourite vessel of the Libertine traders and makes up roughly half of all

their trading vessels. Many of these vessels are heavily subsidised by national and colonial governments to move goods and resources to and from distant colony worlds. Despite its simplicity and relative low cost, the Anjou is bigger than most vessels, with only battleships and big bulk carriers being larger.

TL10		Tons	Cost (MLv)
<b>Hull</b>	1,000-ton Aligned Crystal Steel Spaceframe	—	20
<b>Hull Features</b>	Radiation Shield	—	5
<b>Reaction Drive</b>	OMS Thruster	30	12
<b>Stutterwarp</b>	1.1 ly/day, Tac Speed: 1, System Speed: 0.71 AU per day	4.14	5.18
<b>Power Plant</b>	MHD Turbine (Power 120), Solar Panels (Power 40)	23	5.75
<b>Emergency Power</b>	Power 10, for 24 hours	2.4	2.4
<b>Fuel Tanks</b>	OMS Thruster (6 Burns) Power Plant (2 Weeks)	180 60	— —
<b>Radiators</b>	Conventional, Capacity 120	12	0.6
<b>Bridge</b>	Standard	20	5
<b>Computer</b>	Primary: Computer/15 Secondary: Computer/10	—	1.08
<b>Sensors</b>	Basic Nav Array, DSS	3	1.6
<b>Weapons</b>	4 Hardpoints	—	0.4
<b>Systems</b>	Under Spin: Automed, Common Areas (20 ton), Exercise Equipment for 8, Safety Locker, Ship's Locker, Simple Freshers x4 Loading Arm (retractable)	29.75 4	4.42 0.375
<b>Remotes</b>	Repair Remotes x4	0.44	0.844
<b>Life Boats</b>	Sauvage-5 Lifeboat x2, (In Spin Hab), Mayday Lifeboat, (In Spin Hab)	11	1.2
<b>Airlocks</b>	Standard Airlocks x10, Small Cargo Airlock x2, Large Cargo Airlock	20	0.16
<b>Accommodations</b>	Under Spin: Small Staterooms x40, Staterooms x2	88	5
<b>Artificial Gravity</b>	Type: Double Hull (129.82 tons Under Spin) Radius: 15m, 3 RPM, Gravity: 0.15G, Spin Up/Down: 9 minutes	6.49 —	1.3 —
<b>Software</b>	Archive, Intellect, Manoeuvre, Stutterwarp Control, Auto-Repair/1	—	6.44
<b>Life Support</b>	28 days for 37 people	2.07	—
<b>Consumables</b>			
<b>Cargo</b>		503.71	—
Total: MLv 70.87			

NATION: FRANCE

FIRST EXAMPLE LAID DOWN: 2245

MANUFACTURER: L'ÉTAGE HEAVY SPACE SYSTEMS

PRODUCTION STATUS: OUT OF PRODUCTION

CONSTRUCTION TIME: 161 DAYS

SERVICE STATUS: IN SERVICE

FLEETS OF SERVICE: FRANCE, LIBERTINES,

VARIOUS OTHERS

NUMBER IN SERVICE: ~120

LENGTH: 90M

WIDTH: 15M

LAUNCH MASS (FULLY-FUELLED): 10,000 TONS

POWER PLANT: ROYCE EXCALIBUR 12 MW

MAGNETOHYDRODYNAMIC TURBINE

REACTION DRIVE: L'ÉTAGE B70 MAGNETO-PLASMA OMS

THRUSTER, 10,000 TONS THRUST

STUTTERWARP DRIVE: L'ÉTAGE J-60 6 MW GEN II JEROME-

EFFECT STUTTERWARP DRIVE

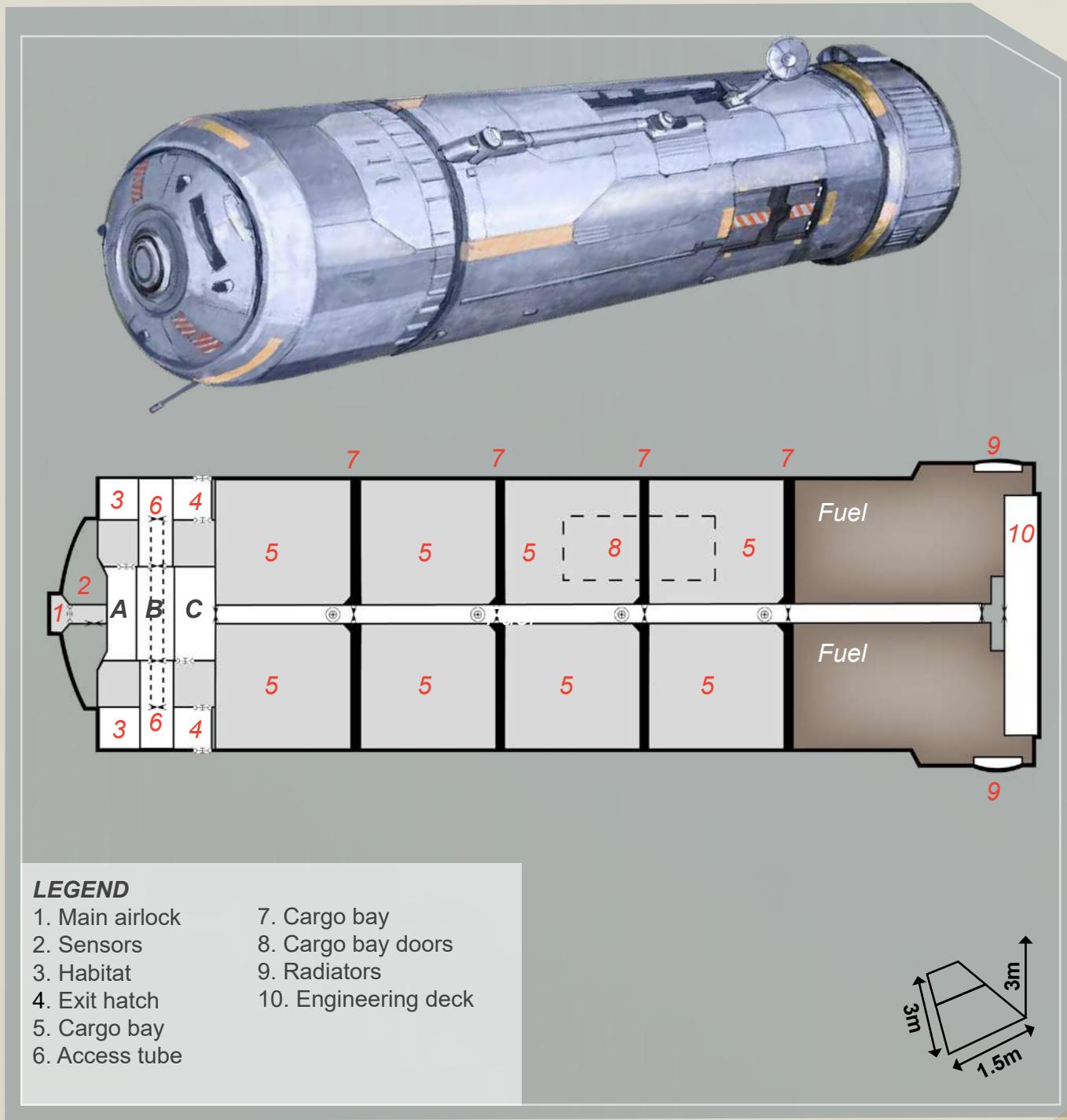
## Crew

Captain, Bridge Officer, Astrogator x2, Flight Engineer x2, Pilot x2, Sensor Tech x2,  
 Reaction Drive Engineer x2, Stutterwarp Engineer x2, Power Engineer x2, Life support Tech x2,  
 Electronics Tech x2, Administrator x2, Cargo Handlers x3

Passengers	Hull Points	Signature: 5
10 Comfort +1	100	Base Reflected: 5 Base Radiated: 3

Running Costs
Maintenance Cost: Lv59.06/month
Purchase Cost: 70.87

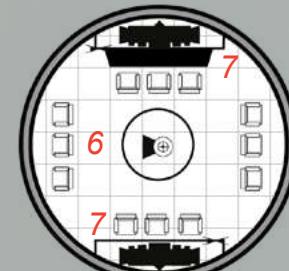
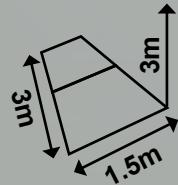
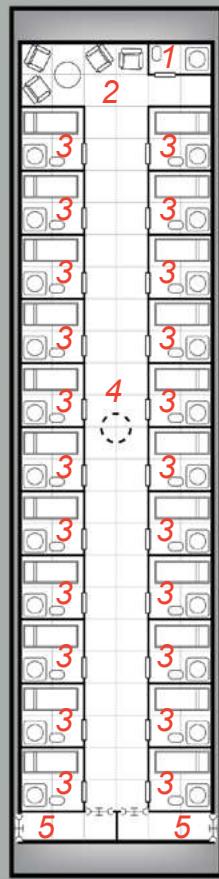
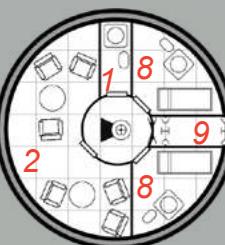
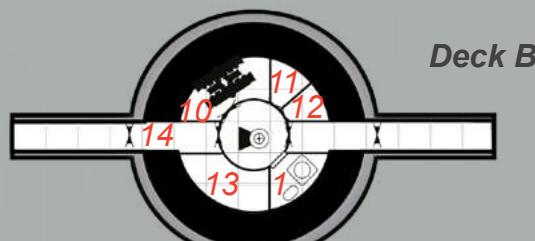
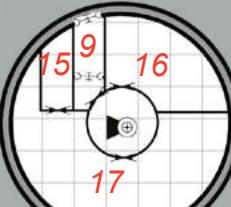
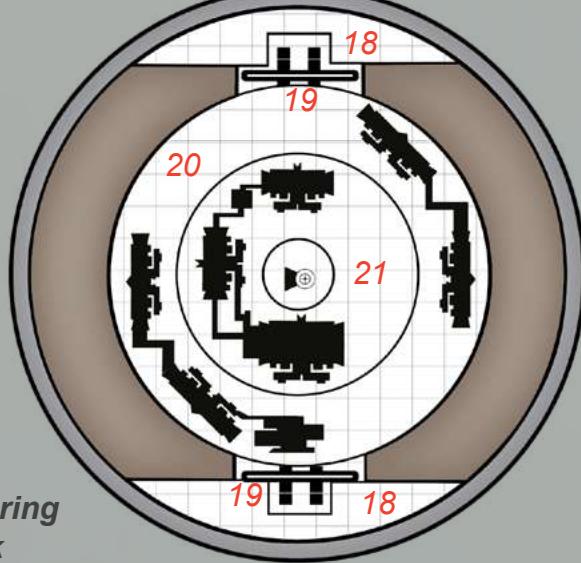
Power Requirements	Power
Basic Ship Systems	10
Sensors	2
Reaction Drive	100
Stutterwarp	60



**LEGEND**

- |                     |                           |
|---------------------|---------------------------|
| 1. Fresher          | 11. Safety locker         |
| 2. Common area      | 12. Ship locker           |
| 3. Small stateroom  | 13. Life support supplies |
| 4. Access tube      | 14. Access tube           |
| 5. Exit hatch       | 15. Repair remotes        |
| 6. Bridge           | 16. Exercise room         |
| 7. Sensors          | 17. Lifeboats             |
| 8. Stateroom        | 18. Radiators             |
| 9. Airlock          | 19. Stutterwarp           |
| 10. Emergency power | 20. Reaction drive        |
|                     | 21. Power plant           |

X 2

*Habitat ring**Bridge**Deck A**Deck B**Deck C**Engineering deck*

# TRILON C-SYSTEM SPECIAL SERVICES VESSEL, SSV-21

The SSV-21 is a fast, sophisticated vessel used for long-term survey missions. While Trilon is not legally authorised for first contact missions, the vessel does come equipped with a powerful computer and language cracking programs as part of the survey laboratory, one of three dedicated laboratory spaces on the ship. The other two laboratories are dedicated to geophysical and biological studies. The geophysical laboratory is twice the size of the others, a clear indicator of Trilon's priorities.

The SSV-21 relies on a closed-cycle fuel cell power plant. Although fuel cells are normally used in small military vessels for their lower radiated signature, high cost typically keeps them out of civilian vessels. A closed-cycle plant like the one found on the SSV-21 retains its fuel supply after use and can simply deploy a solar array to crack the water exhaust back into hydrogen and oxygen. This way, it does not need to rely on bases and need not spend time searching for water or ice to crack into fuel. Using a closed system greatly extends the vessel's operating time but some loss does happen with each cycle.

Along with the fuel cell, the SSV-21 is equipped with an extensive solar panel array that can provide enough power to supply all ship systems except the stutterwarp. This greatly extends the crew's ability to stay on-station for extended periods, limited only by life support consumables.

**NATION:** TRILON (UNITED STATES)

**FIRST EXAMPLE LAID DOWN:** 2281

**MANUFACTURER:** TRILON

**PRODUCTION STATUS:** IN LIMITED PRODUCTION

**CONSTRUCTION TIME:** 327 DAYS

**SERVICE STATUS:** IN SERVICE

**FLEETS OF SERVICE:** TRILON

**NUMBER IN SERVICE:** ~18

**LENGTH:** 80M

**WIDTH:** 6M (15M DIAMETER SPIN HAB)

**LAUNCH MASS (FULLY-FUELLED):** 3,750 TONS

**POWER PLANT:** NORTON-THALES VB-70 7 MW FUEL CELL

**REACTION DRIVE:** HYDE DYNAMICS

P2000 OMS ROCKET, 5,000 TONS THRUST

**STUTTERWARP DRIVE:** TRILON SYSTEM-2 2 MW GEN II

JEROME-EFFECT STUTTERWARP DRIVE

The SSV-21 carries a pair of SLV-55 landers in an internal hangar and the design is notable for the four spin capsules, arranged in contra-rotating pairs.

## Variants:

The Arun-class Lifeship is based on the SSV-21 spaceframe. It substitutes hospital and recovery wards for the laboratory spaces and carries a complement of medical professionals and search and rescue technicians in place of the SSV-21's scientists. The two SLV-55s carried are configured for search and rescue and stocked with the vehicles and equipment necessary for the role, including a pair of HMMPHT walkers with rough terrain modifications.



TL12		Tons	Cost (MLv)
Hull	500-ton Synthetic Spaceframe	—	12
Hull Features	Advanced, Radiation Shield	—	12.5
Reaction Drive	OMS Rocket (Advanced)	9	6
Stutterwarp	1.38 ly/day, Tac Speed: 1, System Speed: 0.8901 AU per day	2.11	10.54
Power Plant	Fuel Cell (Power 70), Solar Panels (Power 60)	11	36
Emergency Power	Power 5, for 24 hours	0.12	0.12
Fuel Tanks	OMS Rocket (4 Burns)	63	—
	Power Plant (2 Weeks)	21	—
	Subcraft Fuel 2 refills	45.5	—
Fuel Processing	4 tons per day	0.4	0.8
Radiators	Conventional, Capacity 60	6	0.3
Bridge	Standard, with Neural Link, Encryption	20	3.75
Computer	Primary: Computer/20 Secondary: Computer/15	—	3.5
Sensors	Advanced Military, Advanced Survey, Standard Survey, DSS, GADS, Telescope	22.21	12.65
Weapons	2 Hardpoints	0	0.2
Systems	Under Spin: Automated, Exercise Equipment for 7, General Lab Spaces x3, Library, Medbay, Safety Locker, Ship's Locker, Simple Freshers x2, Studios x2 Zero-Gee: General Lab Spaces x2, Safety Locker, Workshop Loading Arm (Retractable)	54.5	15.795
Remotes	Communications Satellite x5, Planetary Probe x3, Repair Remote x5, Survey Satellite x10, Inspection Remote x4	18.975	12.7275
Sub-Craft	2 SLV-55 Scout Landers in Berth	121	24.32
Airlocks	Standard Airlocks x5	0	0
Accommodations	Under Spin: Small Staterooms x40	80	4
Artificial Gravity	Type: Spin Capsules (123.05 tons Under Spin) Radius: 15m, 3 RPM, Gravity: 0.15G, Spin Up/Down: 9 minutes	12.31	6.15
Software	Archive, Intellect, Manoeuvre, Stutterwarp Control, Auto-Repair/1	—	6.552
Life Support	60 days for 40 people	4.8	—
Consumables		4.08	0
Cargo			
<b>Total: MLv151.46</b>			

**Crew**

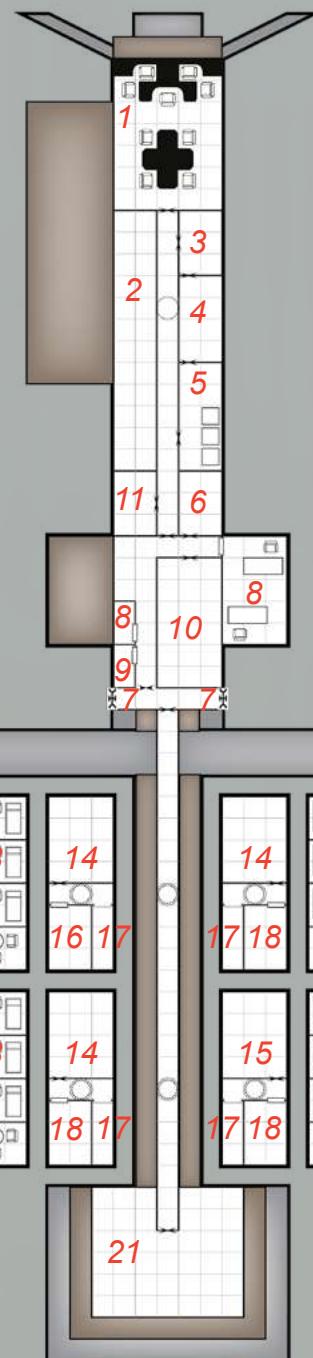
Captain, Bridge Officer, Astrogators x2, Flight Engineers x2, Pilots x2, Sensor Techs x2, Reaction Drive Engineers x2, Stutterwarp Engineers x2, Power Engineers x2, Small Craft Techs x2, Life support Techs x2, Electronics Techs x2, Administrator, Small Craft Pilots x4, Scientists x10

Passengers	Hull Points	Signature: 3	Running Costs	Power Requirements	Power
?? Comfort +1	55	Base Reflected: 3 Base Radiated: 2	Maintenance Cost: Lv12622/month Purchase Cost: 51.46	Basic Ship Systems Sensors Fuel Processor Stutterwarp	5 22 20 20

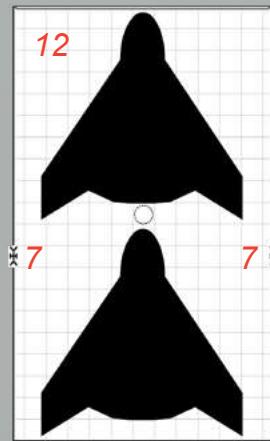
# TRILON C-SYSTEM SPECIAL SERVICES VESSEL, SSV-21

## LEGEND

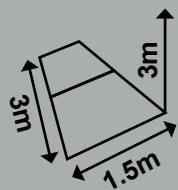
1. Bridge
2. Remotes
3. Grappling arm
4. Cargo hold
5. Workshop
6. Stutterwarp
7. Exit hatch
8. Lab spaces
9. Fresher
10. Reaction drive
11. Life support supplies
12. SLV hangar
13. Small stateroom
14. Lab space
15. Exercise room
16. Library
17. spin caps
18. Studio
19. Medical bay
20. Storage space
21. Power plant
22. Sensor array



*Lower deck  
deck*



22



# AMERICAN LINEAR REACTION PRODUCTS 'LIBERTY' COLONIAL TRANSPORT

The Liberty was an attempt by the now-defunct firm of American Linear Reaction Products to produce an American-made vessel for the colonial market. ALRP was known for the manufacture of reaction drives, especially nuclear drives, before the production of the Liberty.

True to form for ALRP, the Liberty is powered by a 15-MW fission reactor, using thorium as fuel. This makes the Liberty relatively faster than most transports but the real delay in interstellar travel is the discharge time, at which the Liberty is no better than any other vessel.

With a basic 600-ton spaceframe and large rotating hull for gravity, the Liberty can transport up to 200 colonists and their equipment at once. The nuclear power

plant leaves a great deal of room for passengers and cargo. At its destination, the colonial transport requires local interface transport to offload its passengers and cargo, although the last few models were equipped with a single SLV-50 lander connected via cargolock to the transport's cargo bay. It is worth noting that this vessel does not conform to most European safety requirements in that there is not sufficient lifeboat capacity for all passengers. There is, however, enough for the crew.

ALRP banked heavily on the success of this vessel and when sales failed to meet expectations, the company folded and was acquired by Trilon. The basic frame of the Liberty was subsequently used by Trilon for the successful Clipper series of vessels.

TL11		Tons	Cost (MLv)
Hull	600-ton Aligned Crystal Steel Spaceframe	—	12
Hull Features	Radiation Shield	—	3
Reaction Drive	Nuclear OMS Thruster (Advanced)	16.2	36
Stutterwarp	2.5 ly/day, Tac Speed: 3, System Speed: 1.61 AU per day	5.7	11.4
Power Plant	Fission Reactor (Power 150)	18.75	7.5
Emergency Power	Power 6, for 24 hours	0.72	0.72
Fuel Tanks	Nuclear OMS Thruster (6 Burns)	32.4	—
Radiators	Conventional, Capacity 150	15	0.75
Bridge	Standard	20	3
Computer	Primary: Computer/20 Secondary: Computer/15	—	3.5
Sensors	Basic Nav Array, DSS, GADS, Basic Survey	6.57	3.34
Weapons	1 Hardpoint	—	0.1
Systems	Under Spin: Automeds x3, Exercise Equipment for 10, Library x2, Safety Lockers x6, Ship's Lockers x2, Simple Freshers x10 Zero-Gee: Workshop Sling (55 ton capacity)	30.25	8.8 5.5 0.825
Remotes	Repair Remotes x2	0.22	0.422
Life Boats	Sauvantage-10 Lifeboats x3, (In Spin Hab)	30	4.5
Airlocks	Standard Airlocks x6	—	—
Accommodations	Under Spin: Small Staterooms x100, Staterooms x30	320	25
Artificial Gravity	Type: Double Hull (401.05 tons Under Spin) Radius: 30m, 3 RPM, Gravity: 0.3G, Spin Up/Down: 18 minutes	22.06	4.41
Software	Archive, Intellect, Manoeuvre, Stutterwarp Control, Auto-Repair/1	—	6.68
Life Support	60 days for 240 people	28.8	—
Consumables			
Cargo		49.85	—
<b>Total:</b> MLv119.14			

# AMERICAN LINEAR REACTION PRODUCTS 'LIBERTY' COLONIAL TRANSPORT

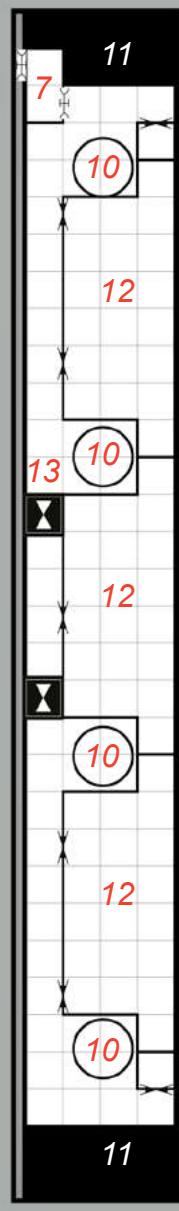
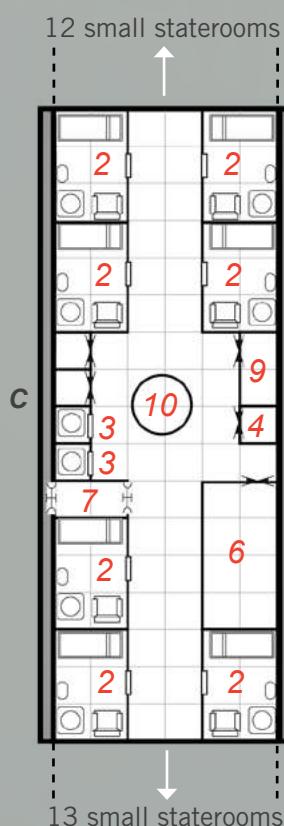
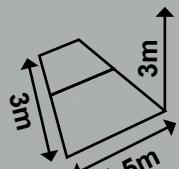
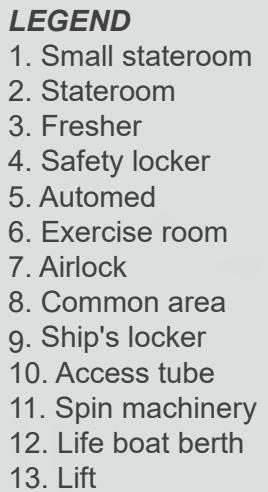
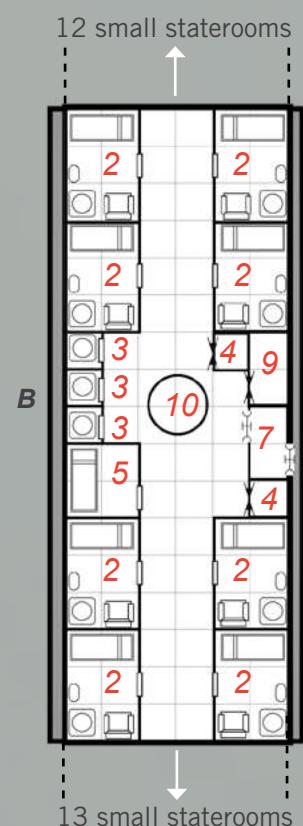
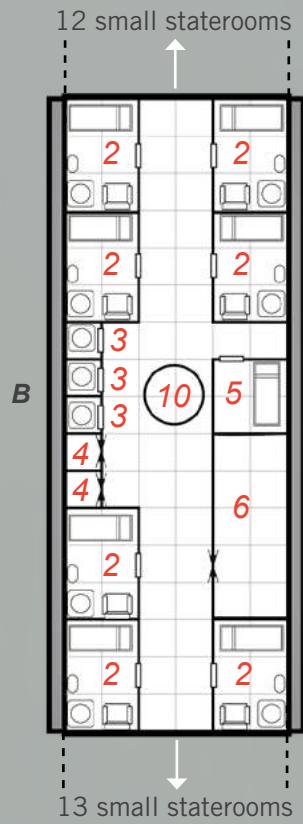
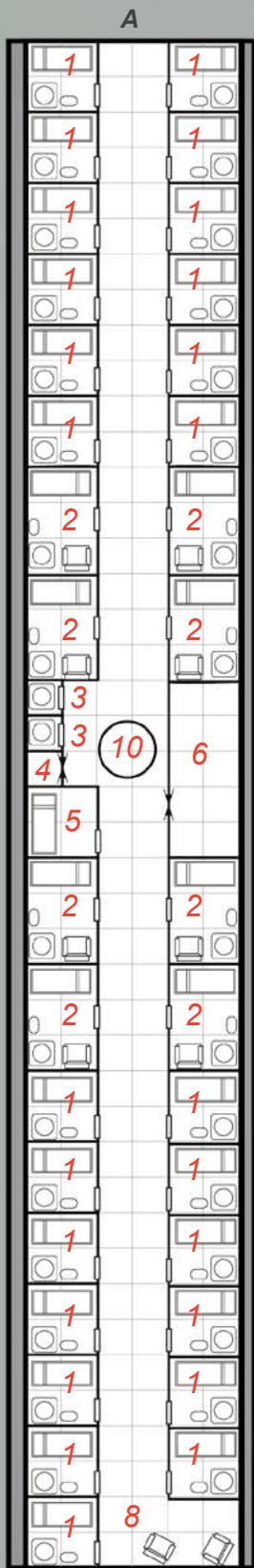
**NATION:** UNITED STATES  
**FIRST EXAMPLE LAID DOWN:** 2281  
**MANUFACTURER:** AMERICAN  
 LINEAR REACTION PRODUCTS  
**PRODUCTION STATUS:** OUT OF PRODUCTION  
**CONSTRUCTION TIME:** 227 DAYS  
**SERVICE STATUS:** IN SERVICE  
**FLEETS OF SERVICE:** UNITED STATES  
**NUMBER IN SERVICE:** ~30  
**CREW:** 35  
**LENGTH:** 53M  
**WIDTH:** 13M (60M DIAMETER  
 LIFE SUPPORT RING)  
**LAUNCH MASS (FULLY-FUELLED):** 1,320 TONS  
**POWER PLANT:** ALRP TY-15 'TINY'  
 15MW THORIUM-CYCLE FISSION PLANT  
**REACTION DRIVE:** ALRP 'BIG MAN'  
 BH90 EM-PUMPED FISSION OMS ROCKET,  
 6,000 TONS THRUST  
**STUTTERWARP DRIVE:** TRILON P20 6 MW  
 GEN II JEROME-EFFECT STUTTERWARP DRIVE

Crew
Captain, Bridge Officer, Astrogators x2, Flight Engineers x2, Pilots x2, Sensor Techs x2, Reaction Drive Engineers x2, Stutterwarp Engineers x2, Power Engineers x2, Small Craft Techs x2, Life support Techs x2, Electronics Techs x2, Administrator, Small Craft Pilots x4, Scientists x10

Passengers	Hull Points	Signature: 4
200 Comfort -1	60	Base Reflected: 4 Base Radiated: 3
Running Costs	Power Requirements	Power
Maintenance Cost: Lv9920/month Purchase Cost: 119.04	Basic Ship Systems Sensors Reaction Drive Stutterwarp	6 8 60 130



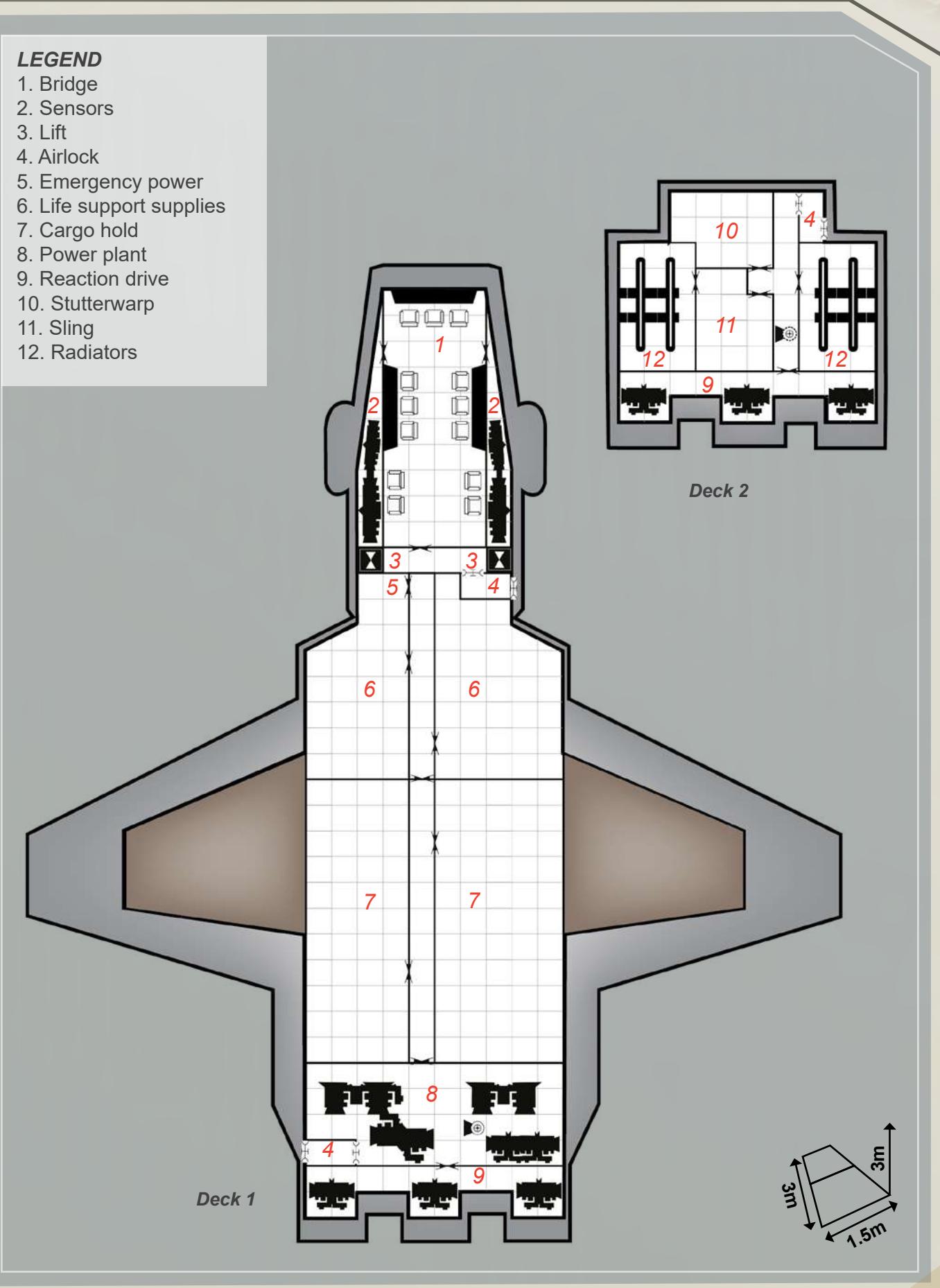
## *Spin Habitat*



# AMERICAN LINEAR REACTION PRODUCTS 'LIBERTY' COLONIAL TRANSPORT

## LEGEND

1. Bridge
2. Sensors
3. Lift
4. Airlock
5. Emergency power
6. Life support supplies
7. Cargo hold
8. Power plant
9. Reaction drive
10. Stutterwarp
11. Sling
12. Radiators



## ACONIT-CLASS FRIGATE

The Aconit-class warship is probably the most commonly encountered military design in colonial space, a general-purpose warship that can be operated from any frontier colony or outpost. It is not a fast ship, nor is it regarded a well-armed or armoured vessel. Rather, its strength lies primarily in its basic, flexible and relatively inexpensive design.

The ship has an operating endurance of two weeks, after which it must refuel. This is enough to allow the ship to travel between any two star systems within the 7.7ly limit but as with the bulk of MHD powered vessels, the two-week endurance limits the ship to patrol or combat duty among populated systems where refuelling facilities are available or within tanker-equipped battle groups.

One aspect that makes the vessel particularly flexible is its interface capability. The ship's streamlining and thrusters allow the Aconit to land on a world's surface, alleviating the need for carrying landers or relying on local facilities for getting personnel and equipment to and from the surface. While a full-length landing strip is strongly recommended, the vessel's use of vectored thrusters allows the ship to set down on short runways or even vertically when necessary. Care must be taken with vertical landings and take-offs, however, as the blast from the thrusters can damage even hardened surfaces.

Maximum Airspeed	Subsonic
Cruising Airspeed	Very Fast
Endurance	1 Hour per Burn

TL11		Tons	Cost (MLv)
Hull	300-ton Synthetic Lifting Body	—	8.4
Hull Features	Efficient, Radiation Shield, STOL, VTOL, Frontier Operations	9	5.88
Armour	4	9.6	1.92
Reaction Drive	Thruster (Air-Breathing, UPP Size 8, Effective UPP Size: -3)	13.2	9
Stutterwarp	2.65 ly/day, Tac Speed: 3, System Speed: 1.71 AU per day	3.87	7.75
Power Plant	MHD Turbine (Power 110)	11	4.4
Emergency Power	Power 3, for 24 hours	0.36	0.36
Fuel Tanks	Thruster (6 Burns) Power Plant (2 Weeks) Subcraft Fuel 2 refills	45 55 —	— — —
Radiators	Conventional, Capacity 150	15	0.75
Bridge	Standard	20	1.5
Computer	Primary: Computer/20 Secondary: Computer/15	—	3.5
Sensors	Basic Military, DSS, GADS, Basic Survey	7.39	6.88
Weapons	LL98 x2 (retractable surface mount) w/UTES 2x 25mm rotary AC in Retractable Mount, 10x Aero-12 Anti-Vehicle Missile in Retractable Mount, Anti-Missile Laser in Retractable Mount, Decoy Dispenser in Retractable Mount	8 3.4	3.3 0.741
Targeting	UTES (+1), (vehicle weapons Improved Fire Control +1)	—	—
Ordnance	Combat Drones: Ritage-1 x2	4.4	3.264
Drone Controllers	1	0.25	0.5
Tactical Action Centre	7 Personnel (command, gunner x3, remote operator, sensor operator x2)	7	0.7
Systems	Automed x2, Exercise Equipment for 10, Fresher x4, Safety Locker, Ship's Locker, Workshop Loading Arm (retractable)	20 4	7.19 0.375
Remotes	Repair Remote x5	0.55	1.055
Sub-Craft	2 Range Truck in Berth	11	1.115
Airlocks	Standard Airlocks x3	—	—
Accommodations	Small Stateroom x3, Rack Capsules (for 2) x24	30	6.3
Software	Archive, Intellect, Manoeuvre, Stutterwarp Control, Auto-Repair/1		7.06
Life Support	60 days for 50 people	6	—
Consumables			15.98
Cargo			—
<b>Total: MLv73.74</b>			

# ACONIT-CLASS FRIGATE

NATION: FRANCE

FIRST EXAMPLE LAID DOWN: 2265

MANUFACTURER: DARLAN AEROSPATIALE

PRODUCTION STATUS: OUT OF PRODUCTION

CONSTRUCTION TIME: 155 DAYS

SERVICE STATUS: IN SERVICE

FLEETS OF SERVICE: AZANIA, FRANCE, CANADA,  
TEXAS, UKRAINE

NUMBER IN SERVICE: ~24

CREW: 31

LENGTH: 80M

WIDTH: 64M

TAKE-OFF MASS (FULLY-FUELLED): 600 TONS

POWER PLANT: NORTON-THALES NT1100

11MW MAGNETOHYDRODYNAMIC TURBINE

REACTION DRIVE: L'ÉTAGE TGT255 MAGNETO-  
PLASMA THRUSTER WITH THRUST VECTORING,  
9,000 TONS THRUST

STUTTERWARP DRIVE: L'ÉTAGE J-60 6 MW GEN II  
JEROME-EFFECT STUTTERWARP DRIVE

ATMOSPHERIC FLIGHT SPEED (STANDARD

DENSITY/PRESSURE): 900KM/H

TAKE-OFF ROLL: 1,200M

LANDING ROLL, UNPOWERED: 2,025M

LANDING ROLL, POWERED: 675M

## Crew

Captain, Bridge Officers x2, Astrogators x3, Flight Engineers x3, Pilots x3, Sensor Techs x3, Reaction Drive Engineers x3, Stutterwarp Engineers x3, Power Engineers x3, Life support Techs x3, Electronics Techs x3, Gunners x6, Drone Pilots x2, Security Officers x2, Ship's Troops x6, Medics x2, Steward

## Passenbgers Hull Points Signature: 3

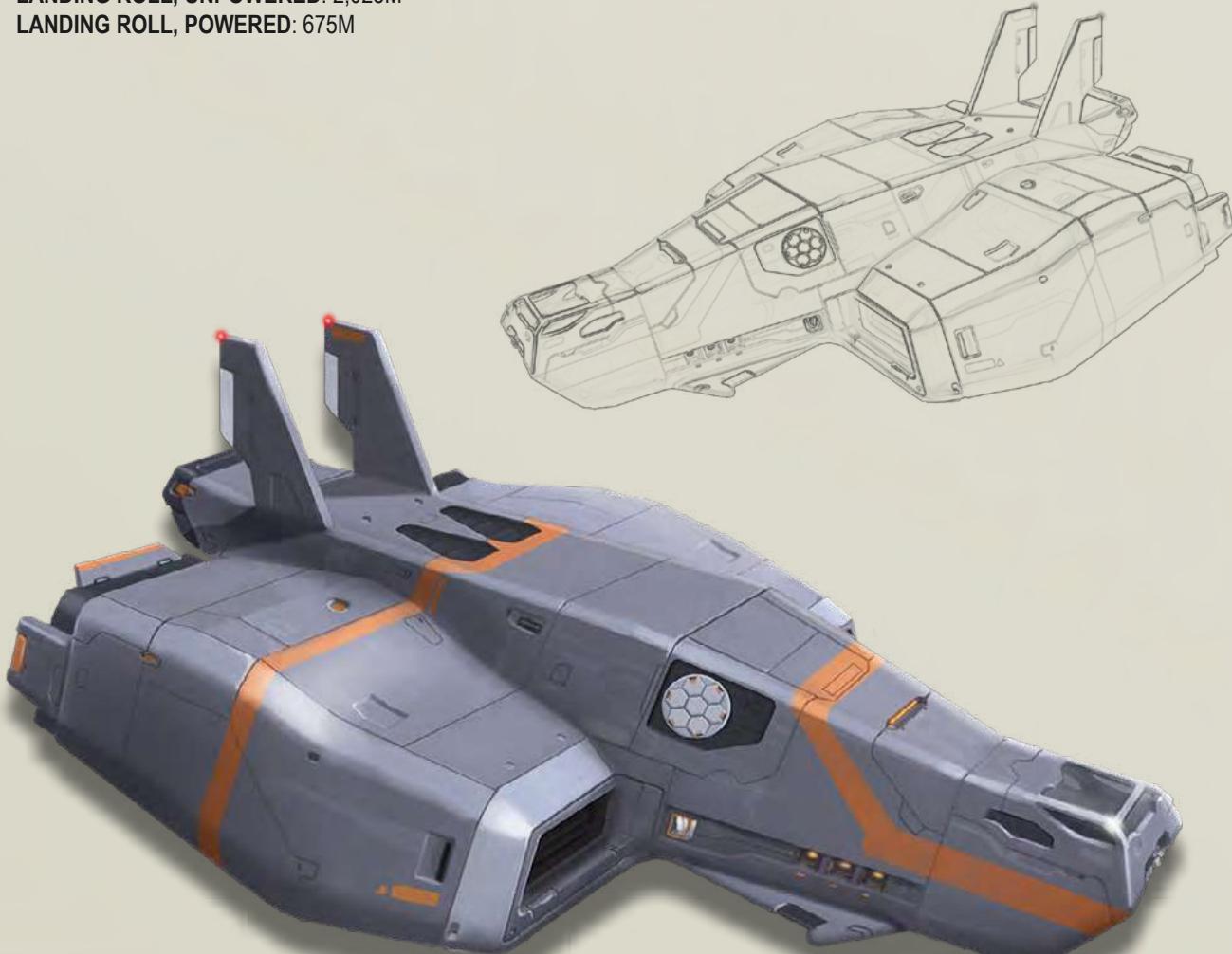
Comfort -1	30	Base Reflected: 1 Base Radiated: 3
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## Running Costs

Maintenance Cost: Lv6145/month  
Purchase Cost: MLv73.74

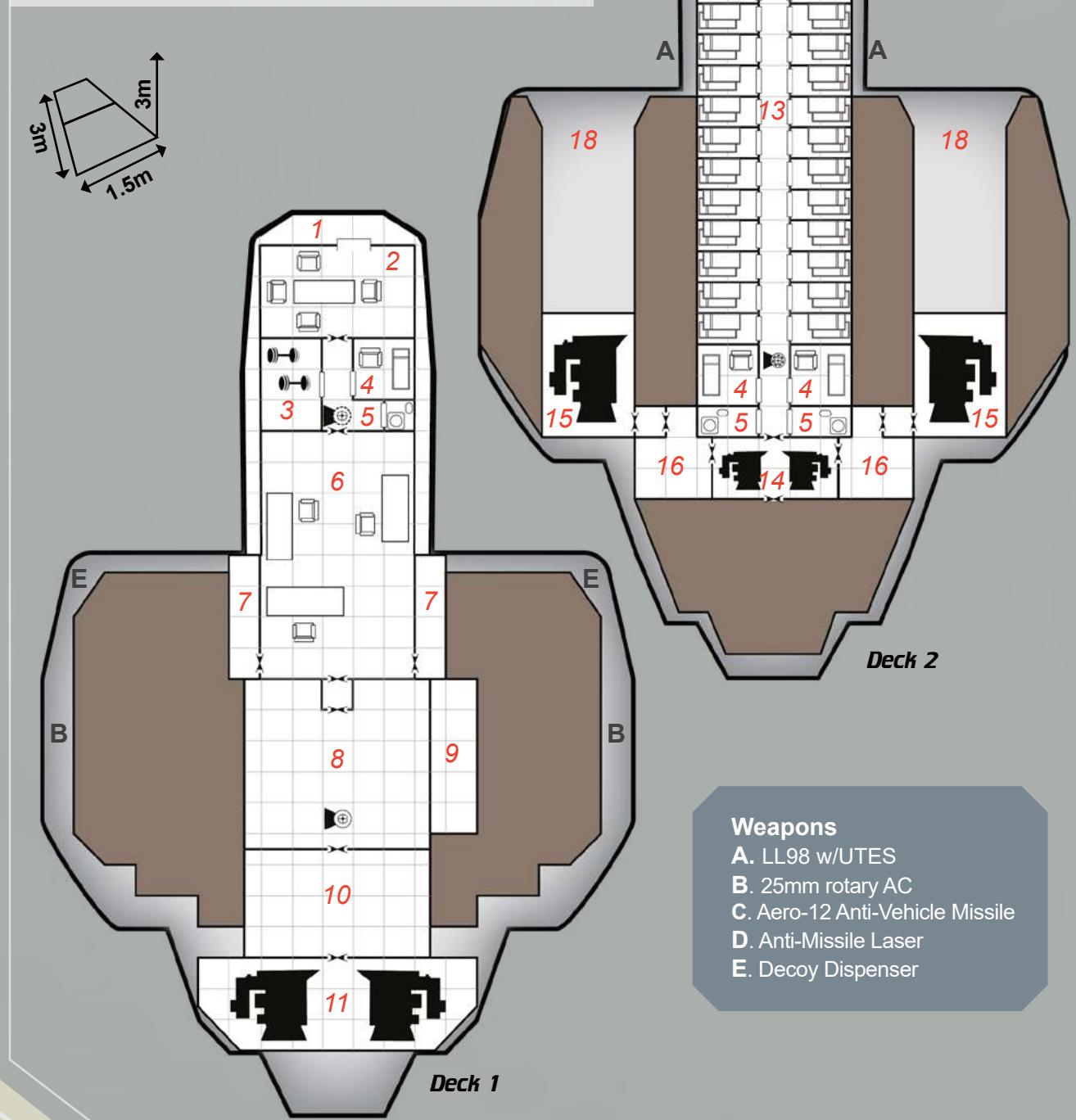
## Power Requirements Power

Basic Ship Systems	3
Sensors	11
Reaction Drive	30
Stutterwarp	60
Drone Controllers	2
Weapons	31



**LEGEND**

- 1. Sensors
- 2. Tactical action centre
- 3. Exercise room
- 4. Small stateroom
- 5. Fresher
- 6. Workshop
- 7. Drones
- 8. Cargo hold
- 9. Retractable arm
- 10. Vehicle berth
- 11. Power plant
- 12. Bridge
- 13. Rack capsules
- 14. Stutterwarp
- 15. Reaction drive
- 16. Life support supplies
- 17. Ship's locker and safety locker
- 18. Air intake



## KAEFER 'GEIST'

Very little is known about the alien Kaefers, aside from their abject hostility and xenophobia. Despite several space actions, no Kaefer design has been recovered even remotely intact. Major systems appear to have been actively destroyed after a given ship was crippled, drastically limiting any technical intelligence.

Equipped with both stealth technology and heat sinks to mask its signature for a time, the Geist is an effective spy craft. The Kaefer stealth system is unusually good, compared to most Kaefer materials and electronics, and is effectively a TL13 system.

This is based on observations of a single vessel discovered on the ground on Joi in late 2299. While subsequent action saw the destruction of the ship, its crew and the Elysian Rangers squad who had discovered it, valuable information was gained. The ranger team had been able to gain access to the ship and recorded a large amount of video, stills and technical information before the aliens returned to the ship. In the course of the fight for the ship, the ship's crew detonated the warhead of the carried 'Whiskey' class missile. The ensuing nuclear blast levelled the immediate area and vaporised the ship but fortunately the ranger team had been able to transmit the information they had gathered.

A few interesting things were discovered during the brief time the Elysian rangers had access to the ship, The reaction drive, while similar to human designs, uses a methane-oxygen fuel mix, rather than the standard hydrogen-oxygen mix for Terran craft.

Thruster and power plant fuel is therefore not interchangeable. However, their thrusters appear to be more efficient than human designs. At the same time, electronics examined at the site, both before and after the blast that destroyed the ship, appear to be larger and more robust but less efficient than human-made computers in similar roles. Weapons as well seemed to be more powerful although less efficient.

**NATION:** KAEFERS

**FIRST EXAMPLE LAID DOWN:** UNKNOWN

**MANUFACTURER:** UNKNOWN

**PRODUCTION STATUS:** UNKNOWN

**CONSTRUCTION TIME:** UNKNOWN

**SERVICE STATUS:** UNKNOWN

**FLEETS OF SERVICE:** KAEFERS

**NUMBER IN SERVICE:** UNKNOWN

**LENGTH:** 24M

**HULLSPAN:** 15M

**TAKE-OFF MASS (FULLY-FUELLED):** 400 TONS (ESTIMATED)

**POWER PLANT:** KAEFER 'MOTHER' MHD TURBINE, ~5 MW (ESTIMATED)

**REACTION DRIVE:** KAEFER 'TYRANT' AIR-BREATHING

THRUSTER, WITH THRUST VECTORING, 3,800 TONS THRUST (ESTIMATED)

**STUTTERWARP DRIVE:** KAEFER 'SATAN' 1 MW (ESTIMATED) STUTTERWARP DRIVE.

**ATMOSPHERIC FLIGHT SPEED (STANDARD DENSITY/PRESSURE):** 1,500KM/H

**TAKE-OFF ROLL:** UNKNOWN

**LANDING ROLL, UNPOWERED:** UNKNOWN

**LANDING ROLL, POWERED:** UNKNOWN

**MAXIMUM AIRSPEED:** TRANSONIC

**CRUISING AIRSPEED:** SUBSONIC

**ENDURANCE:** 1 HOUR PER BURN

### Crew Estimates

Captain, Bridge Officer, Astrogator x2, Flight Engineer x2, Pilot x2, Sensor Tech x2, Reaction Drive Engineer x2, Stutterwarp Engineer x2, Power Engineer x2, Life support Tech x2, Electronics Tech x2, Damage Control x6

Passenbgers	Hull Points	Signature: 2
Comfort -1	12	Base Reflected: 1 Base Radiated: 2

### Running Costs

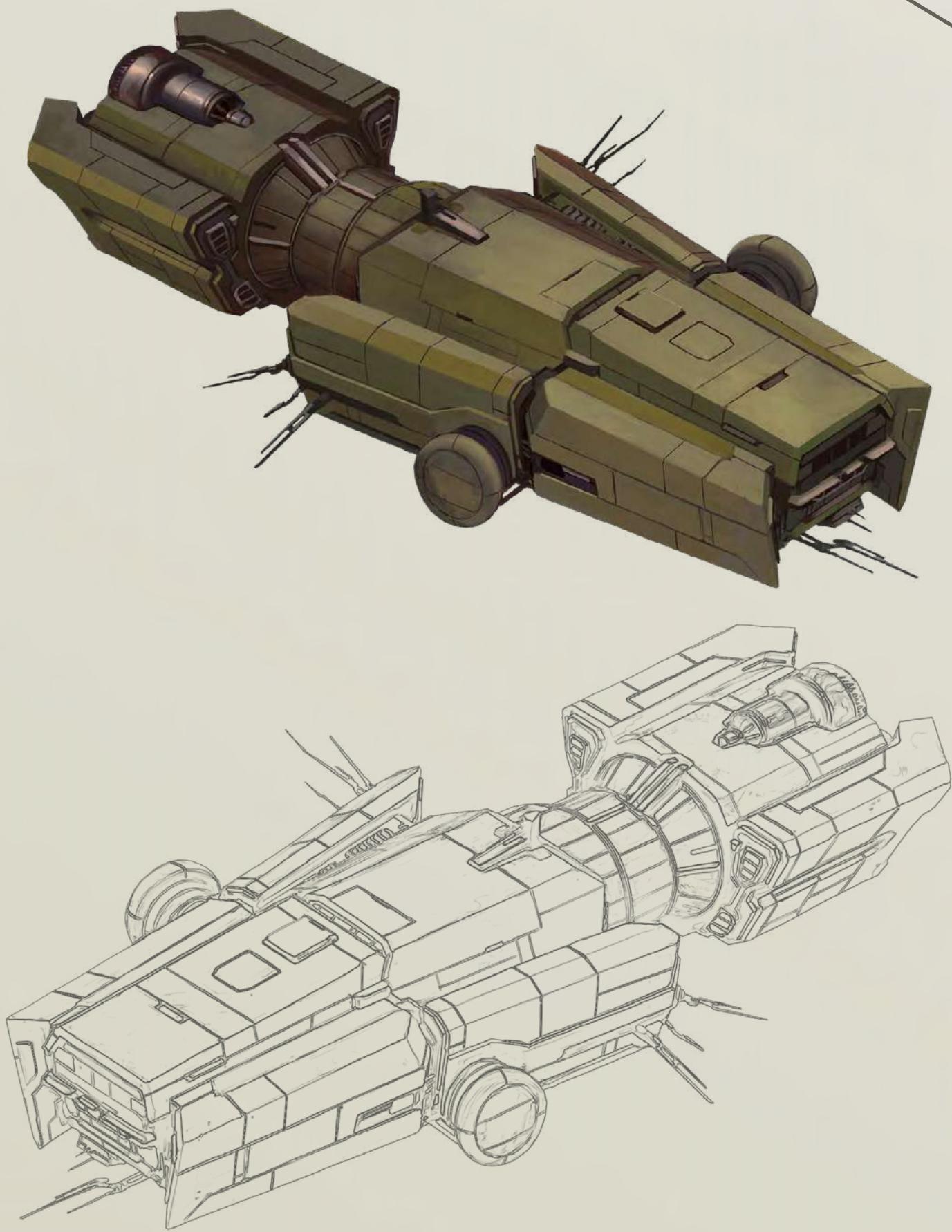
Maintenance Cost: Lv6039/month  
Purchase Cost: MLv72.47

### Power Requirements

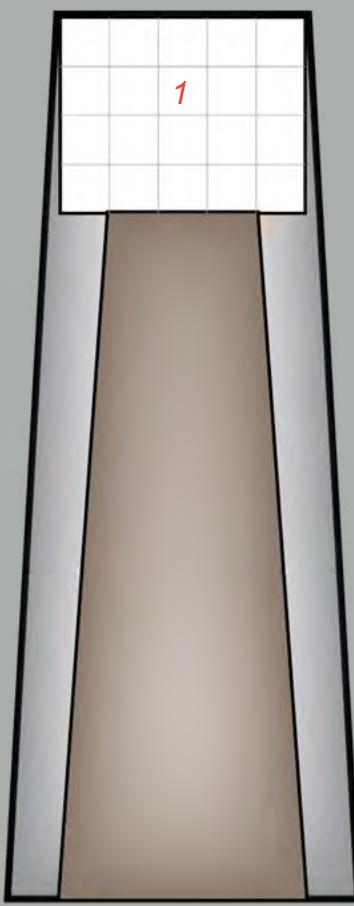
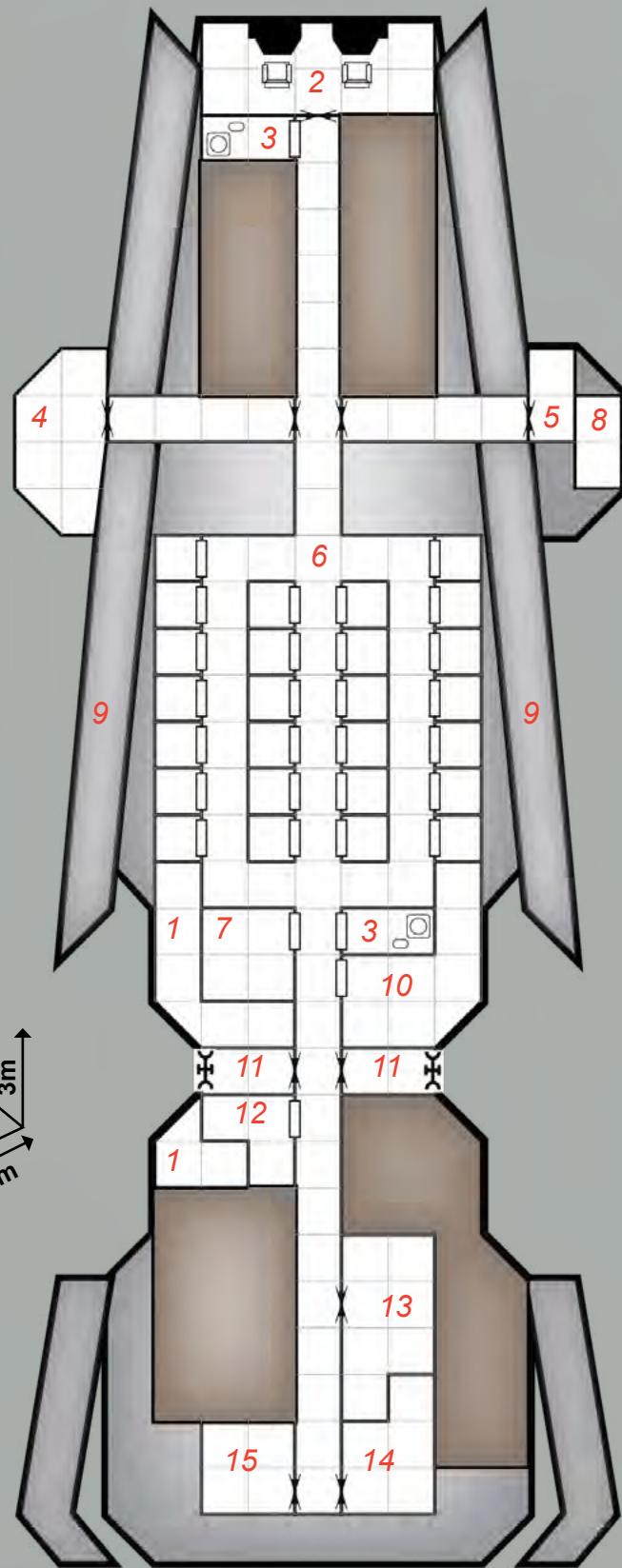
Power
Basic Ship Systems
Sensors
Reaction Drive
Stutterwarp
Drone Controllers
Weapons

TL13		Tons	Cost (MLv)
<b>Hull</b>	125-ton Synthetic Lifting Body	—	3.5
<b>Hull Features</b>	Heat Shield, Radiation Shield, Stealth, Frontier Operations, VTOL	5.25	15.95
<b>Armour</b>	4	4	0.8
<b>Reaction Drive</b>	Thruster (Air-Breathing, Advanced, Advanced, UPP Size 8, Effective UPP Size: -5)	1.6875	3.28
<b>Stutterwarp</b>	1.67 ly/day, Tac Speed: 2 System Speed: 1.08 AU/day	2.37	11.86
<b>Power Plant</b>	MHD Turbine (Power 50)	3.57	1.96
<b>Emergency Power</b>	1.25 Power, for 24 hours	0.03	0.03
<b>Fuel Tanks</b>	Thruster (6 Burns) Power Plant (2 Weeks)	16.875 25	— —
<b>Radiators</b>	AHDR Capacity 50	2.5	1.25
<b>Heat Sinks</b>	Capacity 50 for 4 hours	20	10
<b>Bridge</b>	Small, Encrypted Comms	5	1.03
<b>Computer</b>	Primary: Computer/15 Secondary: Computer/10	—	11.6
<b>Sensors</b>	Kaefer 'Steel Yard' sensor system (combines Basic Military sensors and Basic Survey sensors), DSS	10	6
<b>Weapons</b>	Grumbler 1 (surface mount, retractable), w/KUTS 10x Kingfisher Missile in Retractable Mount, Tri-Beamer in Retractable Mount	4 1.1	3.1 0.11
<b>Targeting</b>	KUTS (UTES) (+1) Computer: (+1), Improved Fire Control (vehicle weapons)	—	—
<b>Ordnance</b>	Combat Drones: Whiskey x2	4.4	6.044
<b>Drone Controllers</b>	2	0.5	1
<b>Systems</b>	Zero-Gee: Shrine, Simple Freshers x2, Ship's Locker	2.5	0.16
<b>Airlocks</b>	Standard Airlocks x2	—	—
<b>Accommodations</b>	Burrow x1, Nests x26	15	0.046
<b>Software</b>	Fire Control/1, Manoeuvre, Stutterwarp Control	—	2.725
<b>Life Support</b>	40 days for 30 people	3.6	—
<b>Consumables</b>			
<b>Cargo</b>		1.12	—
<b>Total: MLv72.47</b>			

## KAEFER 'GEIST'



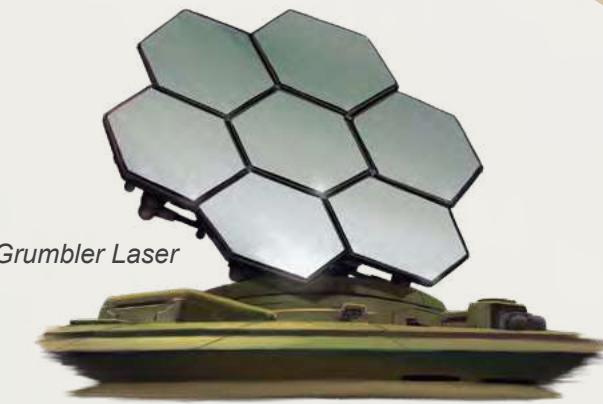
- LEGEND**
1. Sensors
  2. Brdge
  3. Fresher
  4. Grumbler
  5. Missiles
  6. Nests
  7. Burrow
  8. Tri-beamer
  9. Heaqt sinks
  10. Drones
  11. Airlock
  12. Cargo hold
  13. Power plant
  14. Stutterwarp
  15. Reaction Drive

*Deck 1**Deck 2*

## KAEFER TECHNOLOGY

### 'Grumbler' Laser

This ship-based laser array packs the punch of a pulse laser with extended range capabilities. It, or weapons with very similar performance, seem to be standard on most Kaefer vessels.



*Grumbler Laser*

Weapon	Range	Damage	Power	Size	Cost	Traits
'Grumbler'	Short	2D+2	20	1	—	Extended Range, Inefficient

### Kingfisher Missile

Details on this missile system are very limited, although it seems to be similar in performance to the French-made Aero-12.

Type	TL	Range	Damage	Spaces	Magazine	Magazine Cost	Traits
Kingfisher	10	4	8D	0.5	1	—	AP16, One Use, Smart

### KUTS

### (Kaefer Unified Targeting System)

Virtually identical to human UTES tracking systems, although a little bulkier.

### Nests

As far as can be determined, Kaefers do not have rooms or beds, preferring nest-like structures to huddle in close. Kaefer sleeping quarters are almost like a warren, with the aliens almost on top of one another.

### Shrine

The purpose of this object cannot be determined, although it seems to take a central place in the Geist.

### Tri-Beamer

This rapid-fire weapon has a justifiably fearsome reputation on Aurore, where many light Kaefer vehicles are armed with it.



*Kingfisher missile*



*Tri-Beamer*

Weapon	TL	Range	Damage	Spaces	Cost	Mag	Mag Cost	Traits
Tri-Beamer	12	0.33	5D	0.5	—	55	—	AP 12, Auto 3

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