

*Supplement STP-002:
Starports!*

TRAVELLER[®]
*Science-Fiction Adventure
in Unknown Space*

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Starports!*

TRAVELLER®

*Science-Fiction Adventure
in Unknown Space*

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A starports book needs to excite the player. The material needs to be interesting, fun, and useful.

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- Planetary interdiction and smuggling
- Ship encounters and ships in port
- Vehicles: shuttles, tugs, rescue craft, security/patrol craft
- Installations: ship tender, small orbital dock, interdiction satellite

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The Port Authority Handbook

The Compleat Starport (Judges' Guild)

Miscellaneous JTAS articles

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Marc Miller on Starports

Attached is what I know about starports.

- Marc Miller

THE SITUATION INSYSTEM

A star system is composed of a primary star and one or more stellar companions. Orbiting these stars are a variety of planets, planetoid belts, and gas giants. Orbiting planets and gas giants are a variety of satellites. But the focus is one world... the mainworld... which is the overall best planet or satellite in the system.

The mainworld has a starport which, for all practical purposes, is the destination of interstellar traffic entering the system. Starports vary in their capabilities and facilities, depending on the details of the world itself.

CLASSIFICATION OF STARPORTS

Starports are classified by their location and by their capabilities.

LOCATION

A starport may be located on a world surface, or it may be in orbit above the world.

Down. A starport may be located on a world surface. If so, the starport is most frequently referred to by the world name followed by the word Down. Thus, Sylea Down is the main world surface starport for the world of Sylea.

Why a surface port? Landing close to the market is convenient for all concerned. If the environment is at all tolerable, then life support and labor costs are minimized.

Highport. A starport may be located in orbit above a world. If so, it is most frequently referred to by the world name followed by Highport. Thus, Sylea Highport is the main orbital starport for Sylea. A highport maintains scheduled links by shuttle with the world surface (if there is no surface starport, then with an air transport hub).

Why a highport? Many very large ships never land on a world surface; the cargo they carry is off-loaded in orbit and shuttled down. Some worlds are naturally inhospitable (bad surface weather, a water world, fluid oceans, or perhaps government type D or E) and ship owners prefer not to risk their equipment venturing down to the surface. Class A and B starports for worlds with Atmosphere 2+ generally have a Highport. Class A, B, or C starports at worlds with Atmosphere B+, or Hydrographics A, or Government D or E can be expected to have a Highport.

Spaceports. There is typically one major starport in a star system. Other facilities, especially those on smaller, less important worlds in a system, are called spaceports. They are established primarily to foster in-system travel.

Good spaceports are often established in support of farming projects, mining projects, or small colonies.

STARPORT TYPE

Starport type is based on a simple letter classification system (ranging from A to E) which details their basic facilities.

A. Excellent quality facility with refined and unrefined fuel available on site. Facilities include capability to perform annual overhaul and new starship construction (TNAS certified designs). A naval base may be present. A scout base is usually not present. A surface installation is present. A highport may be present (generally if the world atmosphere is 2+).

B. Good quality starport with refined and unrefined fuel available on site. Facilities include capability to perform annual overhaul and new spacecraft construction (TNAS certified designs). A naval base may be present. A scout base may be present. A surface installation is present. A highport may be present (generally if the world atmosphere is 2+).

C. Routine quality starport with unrefined fuel available on site. Facilities include some capability for repair (primarily replacement of TNAS-certified parts). A naval base is usually not present. A scout base may be present. A surface installation is present. A highport is usually not present.

D. Poor quality starport with unrefined fuel available on site or closeby. It has no repair or construction facilities. A naval base is not present. A scout base may be present. A surface installation is present. A highport is not present.

E. Frontier starport. With no facilities, the installation is little more than a flat expanse of bedrock and a sign. This designation effectively means there is no starport, but there have been previous landings and that location is indicated in records.

X. No spaceport or starport. The world has no indigenous space access capability.

SPACEPORTS

Worlds other than the mainworld in a system may also have spaceports.

F. Routine quality spaceport with unrefined fuel available on site and minor repair facilities. A system defense field may be present. A military base may be present. A surface installation is present. There is no highport. This designation is a poor cousin to starport type B.

G. Poor quality installation with unrefined fuel available nearby. No repair facilities are available. A system defense field may be present. A military base may be present. A surface installation is present. There is no highport. This designation is a poor cousin to starport type C.

H. Primitive quality installation with no facilities beyond a beacon identifying the location. Unrefined fuel may be available nearby. This is a surface installation; there is no highport. A system defense field may be present. A military base may be present. This designation is a poor cousin to starport type D.

Y. No spaceport or starport. The world has no indigenous space access capability.

THE ELEMENTS OF THE STARPORT

A starport at its simplest is a bare spot of bedrock capable of supporting a ship which wants to land. The remaining elements of a starport are added later to support and maintain the traffic that passes through the port.

Each starport is characterized by a few basic elements. Without them, the starport is not really a starport.

The Beacon. The location of the starport is broadcast throughout the system from a central beacon. At its simplest, the beacon puts out a continuous tone which allows ships to home on its position. In more complex systems, the beacon provides range and position information for ships in the system, traffic control information on sister frequencies.

The Landing Pad. Starships approach from beyond the atmosphere. When starships set down, most make use of their lifters in order to make a smooth, relatively slow approach along designated approach corridors. To deal with ships with disabled lifters, or for ships which use lifting surfaces, the landing pad includes long, broad runways.

For highports, this a designated holding area.

Traffic Control Facility. Space traffic controllers provide basic information to ships within the system, vectoring them safely in their approaches or departures. The traffic control facilities are located at the starport. In some systems, an auxiliary control facility is located in an outer orbit.

THE TERMINAL

The starport terminal houses the basic services for passengers and freight.

The Concourse. Passenger services are handled at the concourse. Ticketing, baggage check, and final boarding all take place at this facility.

Freight Docks. Freight (materials carried by ships for a fee) is loaded and unloaded at the freight docks. Speculative cargoes are held until sold at the exchange.

Customs and Immigration. Applicable laws concerning the people and goods moving to the world are enforced by Customs and Immigration.

The Exchange. Speculative cargo is bought and sold at the Exchange. A variety of brokers handle the transactions and make the process.

Accommodations. Passengers passing through the starport can stay overnight at the starport hotel, buy meals at a variety of restaurants, purchase basic goods and souvenirs at the shops, and pass time at theaters or entertainment complexes. The level of accommodation available varies widely.

Data Terminals. Information is available about the world, its products and services, and recreation at a variety of data terminals. On some worlds, the data terminal may be a computer; on others, they may be staff people with prodigious memories; on yet others, they may be librarians).

Message Center. Access to communications, including physical mail, electronic mail, telephone, and video is generally available at the message center.

Emergency Medical. Suitable facilities are provided for emergency medical treatment. The medical staff has the training and experience to deal with a wide variety of medical emergencies.

PERIPHERAL FACILITIES

Situated around the edges of the starport are a variety of associated activities and facilities.

Starport Defense Establishment (SDE). In addition to security personnel (who function as police), a starport may have an SDE (with a military function).

The SDE is established to defend the starport against organized assault, and its equipment may include troops, fighter craft, missile defenses, and artillery. The SDE, to maintain its independence from the local world, is often a mercenary force specifically created for the job.

Since an SDE is rarely larger than absolutely necessary, it is possible to gauge the local perceived threats to a starport by observing the size and equipment of the LDE.

Scout Base. The scout service (whether of the Imperium or of some other interstellar community) may maintain a port facility for the support and maintenance of its vessels (including those vessels which it may have out on loan to detached duty scouts). It is possible that the world on which a scout base is located is not a member of the interstellar community which the scout service serves.

Many scout bases make the information they have accumulated available outside of their service (including maps, charts, and world surveys).

Naval Base. The Navy (whether of the Imperium or of some other interstellar community) may maintain a port facility for the support and maintenance of its vessels. The base includes administration sections, warehouse for provisions and resupply, and some security personnel.

The continuing interest of naval personnel in their career area makes naval bases favorite stopovers for veterans (even of other navies).

Sometimes a specific naval base may be considerably more extensive than the typical installation. Their facilities and equipment come to dominate the starport rather than complement it.

System Defense Field. The interplanetary defense forces of a system may maintain a facility for the support of their vessels (system defense boats) as they rotate off station from the outer reaches of the systems. The field has a minimum of facilities (provisions are trucked in when needed; repair trucks call as required).

Shipyards. Ships are built at shipyards. For ships of moderate size which will be streamlined and capable of landing on worlds, construction often takes place on world surfaces at starport shipyards.

Most shipyards specialize in the construction of a specific assembly (which local industry has shown itself capable of producing) such as jump drives, avionics, detectors, or even stateroom modules. Other components are purchased from other shipyards and imported as part of the TNAS-certified parts system. Warehouses on-site store components until they are ready for assembly. Ships themselves are constructed in open-air bays (or in enclosed assembly structures if the local environment requires).

Repair Facility. Minor repairs to ships are often accomplished on the landing pad. More complex or extensive repairs require that the ships be moved to the repair bays at the edge of the starport. Support installations near the bays house the instrumentation and equipment necessary for repairs.

Transport Hub. The starport is usually integrated into the global transportation net, and arriving passengers transfer from the terminal to the transport hubs. Depending on the world, the hubs may support sea or undersea transport, air transport, or ground rail transport. In addition, personal vehicle rental may be available.

Industry. Many industrial processes are best carried out in zero-G and/or vacuum. What better place for such operations than adjacent to a major orbital

transportation center? Industrial modules attached to the Highport create products or commodities which benefit from immediate access to the ships calling at the port. Some factories have long-term supply contracts with the highport itself.

ORGANIZATION

A starport has an organizational structure which includes a leader and a mission; the details of each starport are different, although they are generally variations on a basic theme.

The Port Authority. Regardless of the local government in power at the starport, the governing authority for the facility is the Port Authority. Financed by a variety of charges and levies on passengers, cargo, and ships, the Authority uses its money to build and maintain its facilities, and to provide variety of services. Like starports, Port Authorities vary widely in structure and approach to their responsibilities. Some are strong corporate organizations devoted to the pursuit of profit; others are non-profit organizations which view their responsibilities more as services to the citizenry; yet others consider themselves a quasi-official arm of local government.

The Port Warden. The person in complete charge of the starport is the Port Warden. Appointed by the Port Authority, the Warden is the chief executive officer for the facility, and wields great, but not unlimited power.

The Mission of the Starport. The starport, as an organization, is committed to a mission (although that mission may not be clearly or publicly stated).

Typical missions are:

- To efficiently provide facilities and services necessary to accommodate interplanetary and interstellar traffic for this world.

- To produce a maximum of income for the organization which operates this starport.

- To insulate this world, to the maximum extent possible, from outside influences.

- To meet the minimum requirements for maintaining interstellar trade.

Regulation Enforcement. The police and security arm of the Port Authority has the responsibility of protecting the orderly operation of the starport and of enforcing its regulations. It consists of enforcers and emergency technicians.

The typical enforcer carries out the role of helpful police officer, often assisting passengers in mundane tasks. Behind the scenes, however, a stronger, better armed force stands ready to back them up if necessary.

Emergency technicians provide basic services such as paramedical response, rescue operations, and fire fighting. Emergency tech stations are situated throughout the starport, providing the ability to make a quick response anywhere within the starport's boundaries.

EACH STARPORT IS UNIQUE

Starports vary widely due to the circumstances and environment in which they exist. When the differences in world size, atmosphere, and hydrographics are

coupled with population and technological levels, government, and trade classifications, it becomes clear that each starport is an individual facility.

UNOFFICIAL FACILITIES

Not all facilities at a starport come under the jurisdiction of the Port Authority.

The Scout Lounge. Those who conduct surveys of star systems and who continually venture out into unexplored or under-explored space are a special type of people. After long periods of time alone or with their fellow crew, they naturally gravitate to others of their kind... to share stories and experiences which may help them survive. The typical starport has a Scout Lounge for this type of people.

The Scout Lounge is usually operates as a semi-private club; theoretically anyone can use its services, but in practice it is only patronized comfortably by scouts (and those with an affinity for scouts).

The Hiring Hall. Crew members looking for work gather at the hiring hall.

Ships calling at the starport look first to the hiring hall when they need new or replacement crew. Because of ship schedules which must be met, it is possible for a crew person to be hired and off world within a few hours notice.

The Lone Star. Many starports have a recreation facility which welcomes and serves all comers. At its tables, people meet and enjoy light music or video, conversation, and meals. To many the Lone Star is an opportunity to meet others on a casual basis, to develop acquaintances, and even grow them into friendships.

The Traveller's Aid Society. Some individuals make travel their primary vocation. If they are able, they join the Traveller's Aid Society which provides facilities to its members. The Traveller's Aid Society s a joint operation of several large hotel chains, which provide the facilities within or adjacent to their own hotels and restaurants. Members join by depositing a large sum of money as annuity, with the proceeds paying for the benefits they receive.

Startown. Although starports are often established near large cities, the community which springs up at the gates to the starport has come to be called (generically) Startown. This community is the home of many of the starport employees and houses many stores, restaurants, and meeting places that serve those who want to wander outside of the starport boundaries.

EXTERNAL CONTROLS

Starports and spaceports exist to participate in interplanetary or interstellar trade. They belong to a network of similar installations, and each depends on the other to provide the traffic that gives meaning and purpose to the installation.

Starports and spaceports must be responsive to four distinct external controls or powers.

Local World or System Government. Local government exercises considerable power over a starport (or spaceport). Through taxation and law, the starport is dependent on the goodwill of local government. This influence is primarily felt in the statement of the mission of the starport.

Interstellar Government. Interstellar government has a vested interest in creating and maintaining viable starports on worlds where trade produces economic benefits. Interstellar Government influences starports through pressure on local government, and by establishing bases (naval or scout) which increase the viability of the local starport.

The Ship Owners and Operators. Ship owners and operators serve starports which allow them to make profits. Even high service fees, taxes, and assessments do not deter them if there are profits to be made.

The Passengers and Freight Shippers. Passengers and Freight Shippers are

rarely organized, but their power is felt if they do not patronize a starport. The organization representing the passengers is the Travellers' Aid Society which works with starports to improve facilities and services as is economically feasible.

TRAVEL ZONES

A Travel Zone is a notification that a specific world may be dangerous to travellers.

Amber Travel Zones. An Amber Travel Zone label is cautionary: the location may present some level of hazard to travellers. That hazard may be natural (disease, local predators or parasites), sociological (uncommon or strange social practices), or governmental (repressive, intolerant, or xenophobic policies). Travellers are warned to be aware of these hazards and guard against them. The Amber Travel Zone label is applied by the Travellers' Aid Society.

Red Travel Zones. A Red Travel Zone label is interdictive: the location presents such a level of danger that travel to the location is prohibited. The Red Travel Zone label may be applied by the Travellers' Aid Society, or by an interstellar government (for the worlds within a system), or by local government (for a world within a system).

UNDERSTANDING STARPORTS

The key to understanding a starport is a continuing awareness of its purpose.

Starports exist to foster traffic, and thus trade, between the stars. Governments may attempt to control or suppress the activities of starports, but when they do, they naturally suppress the benefits of trade and commerce for their worlds. The natural state of starports is to flourish; if the starport's world has resource which can be profitably marketed to other worlds, the starport generate economic benefit.

Extra-Territoriality. In order to foster interstellar traffic, starports are extra-territorial. Just as embassies are treated as if they are the territory of their owning nations, starports are treated like they are off-world space. Passengers and crew alike are allowed to leave their starships and wander freely (subject to security and safety restrictions) throughout a starport. Goods are not subject to customs or taxes until they leave a starport. The laws of the world do not apply to until a traveller leaves the starport.

Law and Order. There must be some law and order within a starport, and the means of achieving that order is the local Starport Regulations. Established by the Port Authority, these regulations define in detail what behaviors are permitted and prohibited. For most people, ordinary behavior is sufficient to stay within the regulations. Strange requirements are typically posted clearly.

Ship Construction and Repair. Starships and spacecraft require an extensive system of construction and repair sites, and the overhead of designing and maintaining the many parts which go into ships can be overwhelming. Consequently, many starports subscribe to the TNAS (Quality Ship Design Scheme): a set of standard component specifications which are manufactured on worlds with the appropriate tech level and industrial capacity, but which can be assembled and maintained at any starport of the appropriate type, regardless of local tech level or industrial capacity.

Money. Ultimately, every starport must make money if it is to remain in operation. Starports cannot give their services away, but most find a way to hide

those charges away from the consuming public. Restaurant charges include a surcharge; starship lines pay a portion of their ticket price and freight charges to the starport. Since all of this is concealed from the typical passenger, the impression is that the starport is a free facility.

STARPORT AMBIENCE

The ambience of the starport is of prime importance. When travellers arrive at a starport the atmosphere and the condition of the facilities create an impression that will stay with them for a long time. This impression (and the elaboration of this impression) develops over time.

The appearance of a starport may range from modern or new to old and decayed. The staff of a starport may be respectful and attentive, or rude and obnoxious. Officials may be straightforward and honest, or they may be corrupt and self-serving.

MANY DIFFERENT STARPORTS

Starports vary in the way they provide their services. Major influences on them include the world trade classifications, the elements of the UWP, and other less clear factors.

Water World. With land at a premium, starships land in the water (perhaps sheltered by natural or artificial islands) and are serviced by boats.

Asteroid Belt. Ships dock in the microgravity of an asteroid.

Storms. If a world has an exceptionally turbulent atmosphere, most traffic may choose to call at the highport and shuttle down on craft specifically engineered for local conditions.

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A Look Around the Starport

DEPARTMENTS

The Starport Authority

Typically abbreviated to the SpA, the Starport Authority is a non-profit executive agency of the Imperium, which holds treaties with most of the Imperium's member worlds to operate the local starport or starports, and maintain the extrality zone so crucial to free trade. At the same time, the SpA upholds Imperial and local safety and customs regulations, and is responsible for certifying starports operated by non-SpA authorities. On many worlds, particularly those run by private companies or oppressive governments, the starport is operated by a non-SpA agency, but the standards of such agencies are still policed by the SpA. Alongside the I.I.S.S., the Imperial Navy, and the Ministry of the Commerce Convention, the SpA is able to certify the competency of ship crews, and check the ability of a given vessel to fulfill the requirements of each type of passage.

Freight Handling

This division of the SpA operates the warehousing in each starport, and is responsible for loading and unloading of vessels in port. In addition, the Freight Handlers must keep track of all freight passing through their hands. Freight Handling personnel seconded to Customs & Security are responsible for ensuring smuggling in the legitimate freight is prevented, freight is handled in a safe and secure manner, and any relevant health and safety regulations are observed.

Passenger Services

This division of the SpA operates the Passenger Terminal, and is responsible for getting passengers and their luggage to and from the vessels in port. At the same time, they liaise with the transport companies over ticketing arrangements, and with the High Passage agency over the generic tickets sold on a standby basis. Passenger complaints are also in the purview of this division, although only local regulations generally have any bearing on most problems. Finally, Passenger Services personnel are seconded to Customs & Security to ensure smuggling does not take place in passenger baggage, passports and visas of travellers are in order, and to attempt to thwart the efforts of hijackers. These Customs officials are also responsible for policing the extrality line in the Passenger Terminal, as this is recognised as the most vulnerable part of starport security.

Ship Services

This division handles all routine maintenance required by vessels in port, such as life support and instrument calibration, reprovisioning, and refuelling. Ship Services personnel also maintain the starport's own equipment, and are often responsible for major repairs and maintenance, and occasionally ship-building. Ship Services personnel working for Customs & Security guard against sabotage of vessels in port, and have a duty to carry out safety checks and warn of any contraventions.

Administration

The Administration division both operates the starports on a day-to-day basis, and carries out the majority of the SpA's interstellar duties. The latter include

inspections for quality and safety, certification of non-SpA facilities, liaison with subsector and Imperial government, other interstellar agencies, and large corporations, and administration of the SpA budget at the interstellar level. In border regions, the SpA also interacts with similar agencies of other interstellar states.

At an individual port, the traffic control personnel are considered part of the Administration division, and those seconded to Customs & Security handle the most sensitive and important cases of smuggling, etc., and also investigate violations by SpA personnel.

THE TRAVELLER STARPORT

The following ideas of the Traveller Starport are based on discussions on the xboat mailing list, and the form of starports as suggested by illustrations, particularly those in Starter Traveller, the Traveller Book, the Traveller Adventure, and in several DGP MegaTraveller publications.

Starports are divided into the orbital facility (Upport, Shiny Side, High Port, etc.), and the surface facility (Downport, Dirtside, Low Port, etc.). Most ports have a surface facility, and many have an orbital component. Occasionally, a starport may only have an orbital part.

The Downport

The basic view of the Downport is of a large, open area, with the starport facilities placed in a number of monolithic buildings. Landings and take offs are performed from landing pads, with most vessels lifting off by gravitic VTOL. In many places, runways are also installed, to allow aerodynamic landings by appropriately equipped vessels, and to receive transworld ballistic transport services.

In the standard Starport Authority (SpA) model, a Downport is designed on a concentric semi-circle basis. At the centre are the port administration, customs & security HQ, and passenger terminals. Many offworld companies, brokerage firms, and freight factors, will have offices in this building. In the next layer of the semi-circles will be placed the warehousing, where exporters store their goods. Beyond that are the freight terminals and parking areas. These are often combined in a single unit, allowing the routine maintenance and fuelling of a vessel to be carried out alongside loading and unloading. Finally, beyond that lie the landing grounds, with pads and runways set out according to the requirements of local traffic and weather conditions. Where shipyards are present, a wedge of the semi-circle is taken over by the Docks, with Dock administration attached to the central buildings, stores and smaller workshops in the warehousing sector, and the construction yards adjoining the parking bays, and opening out onto dedicated landing grounds. The schematic in figure illustrates these design concepts. These basic ideas are subject to tremendous variation according to local conditions. For example, the starport at Leedor on Aramis has semi-circular landing grounds which lead directly to vast ship-lifts which are used to bring vessels out of the corrosive atmosphere into sealed parking bays where loading and maintenance can be carried out in relative comfort. The Naasirka docks have completely separate landing pads, and vast caverns dedicated to construction and maintenance. In addition, the mines to the south of the city have a loading facility completely separate from the starport, and made necessary by the difficulty of transporting bulk ore through the city.

The Orbital Port

The design of orbital port varies tremendously with local technology and requirements. Typically, there is a large zero-g warehousing area, garvitted areas provided for passengers, staff, and ship crews, and dock facilities of a range of capacities, which can accept vessels from small launches to large freighters. When not loading, vessels are placed in parking orbits, often maintained by robotic ship-shepherds. Refuelling and routine maintenance is carried out by fuel lighters and mechanic tugs, or occasionally at a dedicated facility separated from the bulk of the port for reasons of safety. Where shipyards are present, they will be almost exclusively zero-g, and often capable of handling far larger vessels than the ground facilities.

The extrality status of the orbital facility varies with the local conditions. In some places, the enitire facility is extra-territorial, with customs checks done on the dock. In other cases, local governments or companies occupy a large part of the facility, and the starport authorities have limited powers. In any cases, most orbital facilities have extensive R & R areas, equivalent to the ground side startown.

The starport of Aramanx in the Aramis subsector is an example of an exclusively orbital port. Aramanx is heavily balkanised, and to site an extrality zone anywhere on the surface would present tremendous political and diplomatic problems. As a result, all the freight and ship handling is concentrated in orbit, with regular shuttle services to the spaceports of trading nations onworld. The facility is divided into four distinct parts. Closest to the worlds is a large rotating habitat, called Aramanx Station. This provide garvitted accomodation at a low technology level, with the added bonus of providing a range of gravity regimes to cater for visitors from several surrounding worlds who could never survive a visit to the surface. This station is home to offices of all the major onworld and offworld companies involved in interstellar trade, and to the starport administration offices. There are many hotels, bars, eateries, and other facilities for the entertainment of visiting crews and passengers in transit, as well as the indiginous staff of the station. All the possible services available in most downport startowns are available, and strict customs controls with regard to visas, and so forth, are not applied within the station. Most Aramanx governments maintain offices on the station.

Tethered in a higher orbit is the working part of the starport; a large zero-g warehouse complex, and an attached passenger terminal which can handle both starships and surface-to-orbit shuttles. Port control is also sited in this region, one of the few places that artificial gravity is employed. Security levels in this part of the starport are highest, as the bottle-neck between the shuttle docks and the starship docks allows for the easy monitoring of illegal emmigrants or immigrants. Most passengers booked on scheduled vessels arrive directly at the shuttle dock from the world surface, but many other travellers only book passage after arriving at Aramanx Station. This is especially true of travellers from nations where the major transport companies do not maintain offices.

In a trailing orbit from the docking complex, and tethered to it, is the fuel depot, an array of liquid hydrogen tanks and fuel probes which are used to refuel visiting vessels. A fleet of fuel lighters are able to supply vessels while they remain in their parking orbits.

Finally, far to trailing of the main starport are the shipyards, which are capable of building non-starships, and providing most types of maintenance and major repairs. The only permanent facilities in this area are a small rotating habitat providing gravitted accommodation for the work crews in their off-duty hours, and several modular workshops. When construction or repair takes place, a framework of protective girders is assembled around the vessel in question, and

the workshops attached for ease of access.

STARPORT CAPABILITIES

Based on suggestions by Jeff Zeitlin jeff.zeitlin@execnet.com made on the xboat mailing list on Mon, 07 Nov 94 19:40:00.

The basic starport classes (A, B, C, D, E & X) were originally defined on the basis of their ability to provide fuel and maintenance, and the abilities of the shipyards. This has been refined by Jeff Zeitlin, as shown in table .

<i>Class</i>	<i>Fuel</i>	<i>Customs</i>	<i>Graving Dock</i>	<i>Dry Dock</i>	<i>Tourist Service</i>	<i>Cargo Service</i>	<i>Landing Fees</i>
A	ref	yes	yes	yes	yes	yes	1,000
B	ref	yes	yes	light	yes	yes	700
C	unref	yes	light	no	yes	light	300
D	unref	yes	no	no	light	light	200
E	none	yes	no	no	no	no	100
F	ref	no	light	no	yes	light	150
G	ref	no	no	no	no	no	75
H	none	no	no	no	no	no	50
X/Y	none	no	no	no	no	no	-

Fuel: ref= refined; unref= unrefined; none= no fueling services.

Customs: yes= Customs, Health, Immigration facilities, outworld passenger equipped; no= no offworld processing, passengers must enter through CHI-equipped starport.

Graving Dock: yes= capable of major repairs and retrofits, short of building new ship from ground up; light= no retrofits, hull punctures, or drive replacements; no= no major repair facilities.

Dry Dock: yes= can build new ship from ground up, any size; light= can build new ships other than line combat ships; no= cannot build ships.

Tourist Service: yes= Hotels, shops, guides, duty-free, restaurants, etc.;light= Hotels, shops, duty-free, cafes, no guides or full restaurants; no= Transportation to town only.

Cargo Service: yes= Can do anything up to and including load a starship into the hold of another, larger starship; light= can handle anything that doesn't require anchored machinery to load; no= load your own damn cargo.

Landing Fees: First payment typically covers first 144 hours (6 standard days) in port, and then a charge is made again for every subsequent 24 hours or part thereof. Charges are reduced by approximately 20 % for the secondary ports in a system. These costs include traffic control and basic security, provision of loading and unloading where available, and cover port maintenance. The rates given are SpA standards; privately run starports may vary costs.

Often, the quality of a world's Starport is heavily influenced by local culture and politics. The local economy could stand to benefit tremendously by having many of the necessary services provided by companies from outside the Starport. In most well populated systems, all services can be had, but at a cost over and above that of the landing fee. Life Support etc.

CALCULATING “LIFE SUPPORT” COSTS

The CT/MT “Life Support” payments cover a multitude of items, such as food, air supplies, recycling components, and recalibration of environmental equipment, including gravity and inertial compensators. This last aspect means that the costs include the hire of technicians with specialist equipment to carry out this routine maintenance. The basic rules require a payment of Cr. 2000 per week per living being aboard the vessel, plus Cr. 100 per week per operating low berth. Life support costs vary with the demands of different metabolisms. In addition, in reality life support provision would be big business, and many starports will be served by competing companies. Finding the best deal from these companies is a task.

To assemble the requirements for “Life Support”:

Routine, Service, Admin or Streetwise, 1 hour, (safe)

Referee: This task is Simple at A or B type starports, Difficult at E type starports, and Formidable at X type starports. Increase difficulty one level if the world population is less than 100. Failure indicates the steward should keep looking (no Determination necessary); on success all needs are filled.

Roll once for each different sort of living being carried, and once for low berths. Living beings from similar environments may share the same requirements; for example, Vargr and Human requirements are compatible. The final cost for life support of a typical living being is Cr. 1600 + 1D per week per person, divided by 20 for low berths. On exceptional success the cost cannot exceed Cr. 2000 (or Cr. 100 for low berths) per person per week. Vessels may “stock up”, but beyond 4 weeks supplies for the full complement, extra storage space must be set aside. In addition, the environmental systems should be recalibrated regularly by an appropriately qualified individual. SpA regulations require that SpA certified staff carry out this recalibration where possible. In all cases except for type X starports, and for type E starports where the population is below 100, all life support requirements can be filled by paying twice the required cost. This assumes that all possible supplies and all possible maintenance is carried out, without regard for what is already in an acceptable state.

COMPONENTS OF A TYPICAL STARPORT.

While the design of a Starport and its buildings varies tremendously with technology, environment, politics, and capabilities, the functions of the facilities are dictated by the needs of visiting vessels.

Freight Terminal

A large part of most starports is set aside for warehousing of imports and exports, and often transshipments are stored here as well. The Freight Terminal acts as a clearing station for all the cargo and freight which passes through, directing loading crews to newly arrived vessels, cataloguing the location of various stored cargoes, and ensuring the security of their clients wares. In most cases, the parking areas for the vessels include loading facilities. Although dedicated systems exist for special cargoes such as petrochemicals and grain, most freight is loaded and unloaded in standard 54 klitre containers, using small ground or grav vehicles to haul them around. For smaller freights, cargo robots are often employed, and on lower technology worlds, large gangs of human (or other sophont) stevedores are the only way to carry out loading. Members of the SpA Freight Handling division are seconded to Customs & Security, using their

special knowledge to enforce the regulations concerning freight and cargo. As the parking bays often incorporate loading facilities, Freight Handling works closely with Ship Services.

Passenger Terminal

Usually located near the entrance to the Starport, the Passenger Terminal provides booking offices, luggage loading facilities, waiting rooms, and various restaurant and shopping facilities for passengers leaving and arriving at the world. The Starport hotel, and a TAS Hostel, where present, are often closely linked to the Passenger Terminal. In addition, the local transit system, whether rail, monorail, subsurface shuttle, road, or air, generally has an interface with the Passenger Terminal. The part of the Starport is unusual in that portions of the building often lie outside the extrality line, allowing passengers to book tickets and so on without passing through customs. As the Passenger Terminal is generally the best appointed part of the Starport, and the most closely involved with the world beyond, Port control & Administration is generally co-located here.

Customs & Security

Customs & Security is carried out by units seconded from the other SpA divisions (Ship Services, Freight Handling, Passenger Services, and Administration), and equipped to deal with acts of violence and to investigate and prevent contravention of customs and safety regulations. In order to facilitate these duties, dedicated offices are present in the buildings of the other divisions, and Customs are often headquartered separately from the Port Control & Administration.

Landing Grounds

While flight in a modern starship is extremely safe, when accidents or malicious acts do cause crashes, the results can be devastating. As a result, the landing grounds of many starports are located far from any buildings, and in most cases an approach over the sea or wilderness is preferred. However, as technology advances, it becomes possible to ensure safe landings in all but the most dire cases, as starports are often equipped with repulsor systems which guide vessels down to the ground. Thus, on many advanced worlds, the starport is surrounded by the local city, which has expanded to surround the extrality zone. The landing grounds are the responsibility of Ship Services, which maintains emergency teams.

The Harbour

The Harbour is a generic term referring to the parts of a starport set aside for the parking and routine maintenance of starships. This area is dotted with Parking Bays, which in addition to protecting the surroundings from the effects of explosions, incorporate freight handling equipment, refuelling lines, passenger loading areas, and workshops for routine maintenance. In many cases, these services are provided by mobile teams in vehicles, and the Parking Bay is no more than a blast shield. The nature of the Harbour zone is such that the various divisions must interact closely to ensure smooth operations.

The Docks

The domain of Ship Services, the Docks incorporate the starport's Shipyard, and so are capable of major repairs. In most Ay and Bee type starports, the activities of the Docks are subcontracted to a shipbuilding company, as the SpA

has little interest or capacity for such activities. However, the See and Dee type starport Docks are run entirely by Ship Services.

Port Control & Administration

A starport is a complex facility to operate, and often the most sensitive part of a world, in terms of economic and strategic importance. As a result, the administration section is often large, and certainly very important. In addition, the Administration division incorporates the starport's traffic control, which depending on the local political situation can extend to control of the entire system's traffic. In addition, the complex interaction of Passenger Services, Freight Handling, Ship Services, and Customs & Security requires constant supervision. Finally, the Administration division is responsible for liaison with local and Imperial authorities.

Private Facilities

Many large companies build or hire their own facilities, sometimes within the starport extrajurisdiction zone, and sometimes elsewhere on the planet. The facilities often provide better service than the standard starport, but of course this is restricted to the company's own vessels. Such private facilities provide a more secure environment to carry out company business, which often makes them a point of suspicion amongst local law enforcers. However, where access to better maintenance or fuel is crucial, a company may find it worth their while to run their own facility.

Getting Around the Starport

Space is mostly cold, tiny bits of debris floating in a vacuum. Occasionally, however, an Imperial system will see a brilliant flash of light, out of which emerges a starship looking for a starport to berth at.

The Rylos II precipitated into normal space with a lurch. Happily, she has arrived in the target system undamaged. Her sensor operator scans the system -- since this system is supposed to have an A-class port, there should be no problem with pirates, so the liner needs not be discreet.

A starport's interstellar trade is at the mercy of the closest and largest starports. Since this world is on an X-Boat route, jump-4 freighters will dominate the port, and worlds as far as 4 parsecs away will dominate this world's trade. Often, a world on the X-Boat route will have a critical product that sectors of worlds depend on; this also can boost a system's trade levels and effect their starport's structure.

A far trader, the Marliiner, operates off the X-Boat routes, servicing minor worlds and feeder routes. A typical non-X-Boat world usually sees jump-1 and jump-2 vessels; their sphere of trade is dominated by the worlds close by. Their starports are general-purpose affairs, rounded enough to handle any general situation, or a small number of guests, or the occasional load of cargo.

So then, starports are custom-built to accomodate the particular types of traffic passing through them. In general, traffic is of two kinds: passengers and freight. Freight can be broken down into categories, such as agricultural, industrial, critical, or luxury products.

To determine what starport the Rylos II is approaching, consider the current system against the two or three most important worlds along the X-Boat route here, and tally them up using a point system. Points are given to broad categories based on starport quality, population size, technological level, etc. To see how I implement this method, visit my link on [Interstellar Trade](#). The output of this system is an average number of passengers and dtons of freight moving through the starport per week.

To determine the type of freight moving through the system, consider the source (Note: some of these categories are not exclusive):

**FREIGHT TYPE ENCOUNTERED
(BY WORLD TYPE)**

	<i>Freight Bound Out-System</i>	<i>Freight Bound In-System</i>	<i>Freight Passing Through System</i>
Agricultural World	Major and minor lots - Agricultural goods and raw materials	Major lots - Industrial goods Minor lots - Luxuries	depends on location
Industrial world	Major and minor lots - Industrial goods	Major lots - Agricultural goods and raw materials	depends on location
Rich world	Minor (or major) lots - Luxury products and finished goods	Major and minor lots - All kinds	All size lots - Various kinds
Subsector capital	A few 100-dton lots - Critical products	Major and minor lots - All kinds	All size lots - All kinds of cargo
Poor or desert world	Major and/or minor lots - Raw materials	Incidental lots only - Agricultural products and industrial goods	Incidental lots only - Various kinds
World on the X-Boat route	depends on world type	depends on world type	All size lots - All kinds of cargo

To determine the facilities a starport has, map the freight index and the passenger index in the tables below:

TABLE OF AVAILABLE STARPORT FACILITIES

	<i>Passenger Index # 1</i>	2	3	4	5
Fr. # 1	facilities for 5 scouts or yachts	facilities for 10 traders + hostel	25 berths, a hotel and convention center	200 berths, several hotels, restaurants, and tourist svcs	multiple downports with 200+ berths each
2	facilities for 5 subsidized merchants	facilities for 10 merchants + hostel	facilities for 25 liners + hotel + convention ctr	200 berths, hotels, restaurants, tourist svc, cargo svc.	as above, with cargo svc.
3	facilities for 20 merchants and freighters	facilities for 20 freighters + a hotel	as above	as above	as above
4	facilities for 10 freighters	facilities for 20 freighters + a hotel	as above + 10 orbital berths	as above + 10 orbital berths	as above
5	facilities for 100 freighters	facilities for 100 freighters + hotel	facilities for 100 freighters + hotel + convention ctr	as above + 100 orbital berths	as above + 100 orbital berths
6	multiple orbital ports as above	multiple orbital ports as above	multiple orbital ports as above	multiple orbital ports as above	multiple orbital ports as above
7	major in- system cargo transfer points at various orbits around the primary.	major in- system cargo transfer points + hostel on mainworld	major in- system cargo xfer points + hotel + convention ctr on mainworld	as above + major in- system cargo xfer points	as above + major in-system cargo xfer points

Scouts: 100-dton exploratory ships

Yachts: 200-dton touring ships for the rich

Traders: 200-dton free traders, far traders, or secure traders

Subsidized merchants: 400-dton merchant ships

Liners: 600-dton passenger and freight ships

Freighters: 1000 to 75,000-dton bulk freight carriers

Cargo Transfer (Xfer) Points: major freight dropoff and pickup points that are not orbiting the mainworld.

LOCAL SHIP ENCOUNTER TABLE

These ships are part of in-system traffic, and include system defense elements as well as commercial ships.

<i>Roll</i>	<i>Ship type</i>	<i>Number</i>	<i>Volume</i>	<i>Contents</i>
2	In-system freighter	d6	25,000	cargo
3	Grav fighter (near a planet only)	2d6	4	n/a
4	Smuggler	1	200	cargo
5	Boat	1	10 * d6	cargo/passengers
6	SDB	d6	400	power
7	Shuttle	1	100	cargo/passengers
8	Patrol ship	1	400	power
9	Yacht	1	200	cargo/passengers
10	Pirate	1	400	power/cargo
11	Fighter	d6	10 n/a	
12	In-system liner	d6	10,000	passengers

BERTHED-SHIP ENCOUNTER TABLE

These ships can be found berthed in orbit or at the downport.

<i>Roll</i>	<i>Ship type</i>	<i>Number</i>	<i>Volume</i>	<i>Contents</i>
2	Cruiser	d6	30,000	power
3	Liner	d6	600	cargo/passengers
4	Trader	d6/2	400	power
5	Shuttle	1	100	cargo/passengers
6	Scout	1	100	equipment
7	Trader	d6/2	200	cargo/passengers
8	Ship's boat	1	10 * d6 equipment	passengers/
9	Patrol ship	1	400	power
10	Corsair	1	400	power/equipment
11	Merc Cruiser	d6	800	power/equipment
12	Freighter	d6	30,000	cargo

SHIP CONTENTS

"Power" units are related to the drive, weapons, and sensor systems of a starship.

Cargo. Roll a random cargo for the ship, or pick a cargo from a resource such as 101 Cargos.

Passengers. Roll up random passengers for the ship.

Equipment. Select a shipment or two of equipment, perhaps from a resource such as the Central Supply Catalog.

STARPORT ENCOUNTER TABLE

<i>Roll</i>	<i>Encounter type</i>	<i>Number</i>	<i>Possessions</i>
2	Scientists	d6	?
3	Scout	1	cash
4	Marines	2d6	blades
5	Pickpocket	1	knife
6	Police	d6	pistols
7	Starmen	d6	cash, weapons
8	Local workers	2d6	?
9	Mercenaries	d6	blades
10	Thugs	2d6	knives
11	Explorers	d6	knives
12	Aliens	d6	blades

STARPORT EVENTS TABLE

<i>Roll</i>	<i>Event</i>	<i>Description</i>
2	Solar flare	Space: Treat as a single hit by a nuclear weapon. Ships must land, immediately jump, use a planet to block the flare, or ride it out.
3	Illness	A contagion has been brought to the starport, from the surface or a ship. Use biological warfare rules.
4	Meteorite storm	Treat as a missile attack (2d6 missiles).
5	Malfunction	An inbound or outbound ship has lost maneuver, fuel intake, comms, or landing gear functionality, through system or pilot error.
6	Mayday	An inbound ship has lost maneuver capacity and is hurtling toward a valuable target.
7	Bump priority	An inbound or outbound priority override has been requested. All ships in that category must be notified and reassigned time slots.
8	Routine message	Arriving ship crew wait for 2d6 hours, then proceed to go through the inspection routine (customs, health, immigration, technical).
9	Await Inspection	A ship qualifies for an inspection, either due to paperwork mismatches or random selection.
10	Port quarantine	A ship and/or a berth is placed under quarantine for d6 weeks.
11	Weather	Poor visibility, high winds, and/or electrical storms dictate restricted access to the downport.
12	Port sensors	Collision alert or ground emergency. Policy is to abort approach until the port can determine if the problem is with a ship malfunction or a traffic control tower malfunction.

Interstellar Transport

FREIGHT

Freight (as distinct from Cargo) encompasses in this context all items transported according to volume displaced and charged at a flat rate of Cr. 74 per kilolitre, regardless of the value of the Freight. Thus, this explicitly excludes items purchased by the carrier's operators with the intention of later sale for profit (referred to throughout as Cargo), and the transportation of sophonts under one of the three standard passage tariffs, or as part of a charter arrangement (referred to throughout as Passengers).

The Ministry of the Commerce Convention (MCC) divides Freight into three categories, according to their relative size and frequency. Major lots are between 108 and 648 kilolitres displacement, and generally consist of one of the world's Primary Exports (see Cargoes below). Minor lots are 54 to 324 kilolitres displacement, and are generally composed of the world's less important exports, and transshipments from other worlds. Minor lots are on average more abundant than Major lots, as there is a greater variety of Freight available to fill smaller lots. A third class of Freight is referred to as Incidental, and often consists of small one-off shipments which cannot wait, or shipments by small operators. The flat rate per kilolitre is in part designed to allow even small exporters to operate, and the Incidental lot size of 9 to 54 kilolitres was introduced with this in mind. However, as most exporters attempt to minimise other costs by making up larger lots, the Incidental is the least likely Freight size to be available.

Add the world population to the starport weighting (table 3.1), and find the relevant row on table 3.3. Roll for each each Freight size; the referee determines if the world is on a trade route. A major lot is 108xD6 klitres, a minor lot 54xD6 klitres, and an incidental lot 9xD6 klitres.

Finding Freight

When a vessel arrives at a world, the crew generally links into the local commercial networks, and attempt to find what Freightings are available. This involves carrying out the tasks listed in section 3.1. As most exporters stick with scheduled services, these tasks represent the crew's efforts both to find exports, and to persuade the exporters to use their vessel. As a result, finding the available Freightings is easier where there is less population. In addition, the tasks are quicker on worlds with higher technology, as the information networks are more sophisticated. The search for Freight is generally more efficient if the crew already have a destination in mind.

PASSENGERS

Imperial Commerce Convention (ICC) regulations regarding the commercial carriage of Passengers are exceptionally strict where officially certified High, Middle, or Low Passages are offered. In addition, where passage is offered under different payment arrangements, it is considered good and proper practise to observe the requirements laid down by the ICC. These are enforced by the MCC, usually via the Imperial agencies of the Imperial Navy, the IISS, and the Starport Authority. The number of passengers available depends on the local population, as dictated by table 3.2.

Standard Passage -- Tariffs and Conditions of Carriage

The following conditions are stipulated under the ICC for the commercial transport of passengers using standard passage tickets. All passengers carried conscious must be provided with: A private stateroom; full provision of food and water, including means to prepare the former; a proper and sanitary environment; and access to adequate medical care. These requirements must be varied according to the biological and social requirements of the passenger. All passengers carried unconscious must receive all care and attention necessary to maintain their metabolic function without injury. A qualified medic must be available throughout the passenger's stay on the vessel.

A vessel carrying passengers in commercial service must avoid any gas giant refuelling where other means are available. Those carried as working passage, or as part of a charter, must give proper consent to such wilderness refuelling where alternatives exist.

A passenger travelling on a High Passage ticket is entitled to the services of a qualified Steward, shared with no more than seven other passengers. In addition, provision for adequate entertainment should be made, and as many meals as the passenger ordinarily consumes should be prepared by the Steward. These last two points are subject to variation with the agreement of the passenger.

A High Passenger is entitled to usurp the place of a Middle Passenger if there are not sufficient conscious berths. A Low Passenger is secure in their position, with Low Berths being assigned on a first come first serve basis.

The holder of a Working Passage is entitled to passage for three jumps in return for service as a crew member, subject to proper discharge of duty. After that time, the individual must either be offered a permanent contract or be asked to leave. If a Working Passage is terminated in Deep Space, passage to the vessel's next destination must be provided free of charge.

The standard tariffs are: Cr. 10,000 for a High Passage, Cr. 8,000 for a Middle Passage, and Cr. 1000 for a Low Passage. A Passage is defined as transport between the vessel's current location and its next port-of-call. These tariffs apply to interstellar travel only. Standard passage tickets are issued by a non-profit executive agency of the MCC, called High Passage (although they issue all types of ticket). These tickets are accepted by all carriers, being cashed with High Passage when received. In addition, many of the larger transport firms issue their own tickets, and these are generally honoured by other carriers.

For vessels under charter, rates are subject to negotiation. However, the going rate is equivalent to paying for 90 % of the vessel's cargo capacity, plus Cr. 9000 for every conscious passenger berth, and Cr. 900 for every unconscious passenger berth, per jump or two week period, whichever comes first. The chartering individual is then able to utilise the full capacity of the vessel, and direct the vessel's movements within the dictates of safety and the law. Individuals are free to negotiate different terms to suit their condition.

Finding Passengers

This process is similar to that for finding Freight, and involves tasks in section 3.1. High Passengers require the presence of a trained Steward, and Low Passengers will usually need to be convinced of the credentials of the Ship's Doctor. The mainstay of vessels operating on irregular schedules are the Middle and Low Passengers. As with Freight, finding passengers is generally more efficient if the crew already have a destination in mind.

Interstellar Trade and Commerce

INTERSTELLAR TRADE

The bulk of interstellar trade is carried out by producers on one world paying merchants to haul their goods as freight to purchasers on another world, with the entire transaction already agreed before hand. Equally, the bulk of interstellar haulage is carried out by the large transportation firms, who also fill there remaining hold space with whatever speculative. Thus, the "small fry" take the left-overs, whether that be freight or speculative cargo. Despite this, in an empire containing 11 000 star systems and an estimated 20 million million sophonts, the left-overs are enough to make shrewd independent merchants rich several times over.

Trade Classifications

The Imperium is said to have been created on the basis of commerce, and in many ways is thought to be sustained by continued commerce; some would claim that it exists only for commerce. Regardless of the truth of these claims, the Imperial Interstellar Scout Service, in consultation with the Ministry of the Commerce Convention, has developed several general trade classifications to aid merchants in their decisions regarding markets.

Agricultural worlds have a combination of physical conditions and size of population which enables the production of a surplus of foodstuffs and other agriproducts. Thus, Agricultural worlds are good markets for other Agricultural worlds, and for Barren, Industrial, or Rich worlds. They are good sources of cargo for export to Agricultural, Asteroid, Desert, High Population, Industrial, Low Population, Non-agricultural, and/or Rich worlds.

Asteroid worlds have their main population centres located in or around a major asteroid belt. They produce raw materials, and are often the source of equipment suited to the asteroid environment. Thus, Asteroid worlds are good markets for other Asteroid worlds, and for Agricultural, Industrial, Non-agricultural, and/or Vacuum worlds. They are good sources of cargo for export to Asteroid, Industrial, Non-agricultural, Rich and/or Vacuum worlds.

Barren worlds have virtually no population (a small survey team at most) and no form of government. Raw materials, novelty items, and survey information may occasionally be available. In addition, visiting merchants may be able to gather trade goods for themselves. Barren worlds are not good markets. When available, trade items originating on Barren worlds may be worthwhile exporting to Agricultural or Industrial worlds, depending on the nature of the goods.

Desert worlds have little or no free standing water. As a result, they have few trade goods which are sought after elsewhere, unless local characteristics allow for additional trade classifications. Desert worlds are good markets for other Desert worlds, and for Agricultural, Industrial, Non-agricultural, and/or Rich worlds. They are good sources of cargo for export to Desert worlds and/or Non-agricultural worlds (which often have similar environmental survival problems).

Fluid Oceans indicate a world where the hydrographics consist of a substance other than water. The unique conditions provided by large quantities of whatever exotic fluid make up the seas means that Fluid Ocean worlds may be sources of raw materials for industry. Thus, Fluid Ocean worlds are good markets for Industrial worlds, and for other Fluid Ocean worlds (which may have similar

environmental survival problems). They are also good sources of cargo for export to Industrial and/or Fluid Ocean worlds.

High Population worlds have at least 1 000 million inhabitants, leading to economy of scale production, and a wide range of goods for domestic markets. Thus, the products of these worlds sell well on other High Population worlds, and also on Low Population and Rich worlds. They are good markets for goods from Agricultural, Industrial, High Population, and/or Rich worlds.

Ice-capped worlds have their hydrographics locked into permanent ice caps. Goods from such worlds sell well on Industrial worlds, but they are indifferent markets.

Industrial worlds are High Population worlds with significant industrial development, to the point that other activities are of minor importance to the local economy. Goods from Industrial worlds sell well on most other worlds, and are markets for goods from most other worlds.

Low Population worlds have less than 10 000 inhabitants. Goods from such worlds sell well on Industrial and Rich worlds. As such worlds are rarely self-supporting, they are excellent markets for goods originating on High Population and Agricultural worlds.

Non-Agricultural worlds are unable to produce enough food agriculturally to feed its population; synthetic food production generally provides basic subsistence. Thus, Non-Agricultural are receptive markets for goods from Agricultural, Asteroid, Desert, and/or Rich worlds. They are good sources for exports to Asteroid, Desert, and/or Rich worlds.

Non-Industrial worlds have insufficient population (less than 10 million) to support significant industrial development. Thus, they are rarely self-sufficient in terms of industrial products, and generally rely on natural resources to support an export economy. They are sources of goods for export to Industrial worlds, but they sell poorly on other Non-Industrial worlds.

Poor worlds have environments which result in low grade living conditions. They are markets for goods from Industrial worlds, and are bad sources of exports. Goods from Poor worlds rarely sell well on other Poor worlds.

Rich worlds have the environment, population, and society which result in high grade living conditions. Rich worlds are good markets for goods from Agricultural, Asteroid, High Population, Industrial, Low Population, and/or Water worlds, and other Rich worlds. Goods originating on Rich worlds sell well on Agricultural, Desert, High Population, Industrial, Non-Agricultural, and/or other Rich worlds.

Vacuum worlds have no atmosphere. This environment results in goods which sell well on Asteroid, Industrial, and/or other Vacuum worlds. They make good markets for exports from Asteroid, Industrial, Non-Agricultural, and/or other Vacuum worlds.

Water worlds have over 95 % of their surface covered in water (or another fluid if the world is also Fluid Oceans). These worlds are good markets for Industrial worlds and other Water worlds. They are good sources of exports to Industrial, Rich, and/or Water worlds.

BUYING

Primary Exports

Each world description has one or more exports listed; these are that world's

Primary Exports. The numbers of lots of such exports available for purchase at any one time depends on the world's population, and the world's starport.

Population 6+: Number of major cargo lots is starportweighting+1D6-4 (see table 3.1), determining which sort are available randomly from those listed for the world.

Population 5-: Population -1D6+1; if zero, no cargo, if less than zero, wait that number of additional days before rolling again. Note that population 0 worlds will only have cargoes at the referee's discretion.

These Primary Cargo lots are available immediately, with the size being determined according to the type, from the lists below. If these cargo lots are not satisfactory, reroll in 3D6-population days (minimum 2 days), plus any extra for population 5- worlds; DM +3 if nearest world more than 2 pc distant.

Secondary Cargoes

Secondary Exports may be sought, if the available Primary Exports are not acceptable. Roll 1D6 for the number of lots available in a given week; DM -1 for B type starports, -2 for C type starports, -3 for D type starports, -1 for population 5-, +2 for population 9+. E type starports have a single Secondary Export available every 1D6-1 Weeks (DM -2 if population 9+) plus 1D6-1 days. The nature of Secondary Exports are randomly determined by the referee according to the world's trade classifications. A new set of Secondary Exports will become available in the same time as Primary Exports.

FINDING CARGO

Cargo is often sitting in warehouses, waiting for a buyer to come along. Many starport Brokers have lists of available cargo, but much of this is already earmarked for their regular customers. The crew of a vessel need to dig up those cargo lots that are available for purchase, and this involves tasks listed in section 3.1. They then need to assess the cargo value, and negotiate a good price.

Lot Size

Each cargo type has a lot size, as determined from the cargo listings. Major lots are 108 klitres to 648 klitres; minor lots are 54 to 324 klitres; and incidental lots are 9 to 54 klitres.

Lot Quality

Each lot has a quality which is represented by a number ranging from 0.5 to 5.0. The possible range for this quality depends on the cargo type, as given in the cargo listings. The quality of a given lot is determined by the referee, but a PC can estimate that quality (see section 3.1). While the quality does in part differentiate between different quality lots of the same product, it also allows the fairly broad export categories to include a range of different types of product. For example 'Meat' could include high and low quality pork, but in addition includes veal, which generally commands a higher price.

Market Fluctuations

Fluctuations in the local market for a given cargo price are represented by the Market Modifier, which usually ranges between 0.25 and 2.0. In special cases, the referee may decide to set an unusually high or low modifier. Normally modifiers are rolled by the referee on the table below:

Market Modifiers.

2D6 Modifier

0-1	0.25
2-3	0.50
4-5	0.75
6-7	1.00
8-9	1.25
10	1.50
11	1.75
12	2.00

Roll 2D6 to determine what the seller believes they can get for their cargo. Subtract 1D4 from this roll to determine from the table the minimum acceptable; this is at least 0.25 lower than the maximum, but never lower than 0.25. Add 1D6-1D6 to the roll to determine the actual local Market Modifier; typically this remains stable for 2D6 weeks. Roll 2D6 for the Market on possible destination worlds.

Asking Price

Multiply the Base Cargo Cost by the quality value and the Market Multiplier, and multiply this by the size of the lot. This is the Asking Price for the cargo lot in question. The minimum price the seller will accept is determined using the second modifier rolled. The inclusion of two modifiers (quality and market) introduces some uncertainty into the buyer's knowledge of the cargo's real value.

Buying the Cargo

Once a cargo is located, and the Asking Price determined, the buyer may attempt to negotiate for a good price. However, prior to this, they may wish to determine the state of the market both locally, and at the intended selling point, using the task in section 3.1. Once the PCs are happy with the market, they may attempt to negotiate a good price (see section 3.1).

SELLING

At the destination, the PCs may attempt to sell their cargo. The Base Cargo Price depends on the cargo's source and on the current market. The following table shows the effects of the trade classifications of the cargo's source world, and the interaction with those of the market world.

<i>Source Code</i>	<i>Destination Code</i>													
	<i>Ag</i>	<i>As</i>	<i>Ba</i>	<i>De</i>	<i>Fl</i>	<i>Hi</i>	<i>In</i>	<i>Lo</i>	<i>Na</i>	<i>Ni</i>	<i>Po</i>	<i>Ri</i>	<i>Va</i>	<i>Wa</i>
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag	-	+1	+1	-	+1	-	+1	+1	+1	-	-	+1	-	-
As	-	-	+1	-	-	-	+1	-	+1	-	-	-	-	-
Ba	-	+1	-	-	-	-	+1	-	-	-	-	-	-	-
De	-	-	-	-	+1	-	-	-	+1	-	-	-	-	-
Fl	-	-	-	-	-	+1	-	+1	-	-	-	-	-	-
Hi	-	-	-	-	-	-	+1	-	+1	-	-	+1	-	-
Ic	-	-	-	-	-	-	-	+1	-	-	-	-	-	-
In	-	+1	+1	-	+1	+1	+1	-	-	+1	+1	+1	+1	+1
Lo	-	-	-	-	-	-	+1	-	-	-	-	+1	-	-
Na	-	-	+1	-	+1	-	-	-	-	-	-	-	+1	-
Ni	-	-	-	-	-	-	+1	-	-	-1	-	-	-	-
Po	-	-	-	-	-	-	-	-	-	-	-1	-	-	-
Ri	-	+1	-	-	+1	-	+1	-	+1	-	-	+1	-	-
Va	-	-	+1	-	-	-	+1	-	+1	-	-	-	+1	-
Wa	-	-	-	-	-	-	+1	-	-	-	-	+1	-	+1

Add up the modifiers for each intersection of the source trade classifications and the destination trade classifications, and multiply by Cr. 74. Add this to Cr. 370. For manufactured goods, take the magnitude of the difference in TL between origin and destination, multiply by Cr. 74, and subtract that from the price so far (technology incompatibility). For processed goods, subtract the destination TL from the source TL, multiply by Cr. 74, and add to the price so far (better/worse quality processing). Finally, add 10 times the starport weight, and multiply this total by the lot size, and whatever the seller believes the lot quality and local market to be. This is the Asking Price. The range of quality and market give the seller an idea of the upper and lower ranges of this price. The seller now needs to find a buyer, using the task in section 3.1.

Brokers

For both buying and selling, the PCs may elect to employ a Broker. This is an individual or company with Bargain, Marketing and Admin skills, who hire out to buy and sell cargoes, and find Freights. In selling, the Broker takes 5% of the final price per level of skill applied. In buying, the Broker charges a flat rate of Cr. 500 for every cargo found, and Cr. 10 per skill level per klitre for each cargo purchased at a reduced price. When finding Freights, the Broker takes 2.5% of the payment for carrying the Freight, per skill level applied. The quality of Broker available depends on the Starport type, as shown in table 3.18.

Trade Tasks

An individual can only search for one type of Freight, Passenger or Cargo at a time. More than one individual may search at once.

PASSENGERS

To find/attract passengers:

(varies),(skill), EDU or CHA, (varies) (uncertain)

Referee: This task is Simple on Lo pop. worlds, Difficult on Hi pop. worlds, and Routine elsewhere. The skill is Service for High Passengers, Admin for Middle Passengers, and Streetwise or Liaison for Low Passengers; roll separately for each type. See below for time increments and results.

FREIGHT

To find major or minor Freight:

(varies), Liaison or Admin, EDU or CHA, (varies) (uncertain)

Referee: This task is Simple on Lo pop. worlds, Difficult on Hi pop. worlds, and Routine elsewhere. See below for time increments and results.

To find incidental Freight:

(varies), Streetwise or Liaison, EDU or CHA, (varies) (uncertain)

Referee: This task is Simple on Lo pop. worlds, Difficult on Hi pop. worlds, and Routine elsewhere. See below for time increments and results.

The above tasks assume the individual is looking for Freight or passengers to a single destination. If they look for several destinations simultaneously, roll the percentage found for each destination separately, and divide each by the number of destinations being considered. Alternatively, different people can look for freight to different places.

TIME INCREMENTS

These indicate working hours required.

TL Time

0-5	1 hr
6-9	1 hr
10-12	45 min
13+	30 min

Results:

No Truth	(1D4-1) 10% of that available
Some Truth	(1D4+3) 10% of that available
Total Truth	(1D4+6) 10% of that available
Mishap	Vessel is 'blackballed' for that type of passenger or Freight.

Increase subsequent task difficulty by one for every level of severity.

If none are found, roll Determination task to continue search.

CARGO

To find a Primary Export:

(varies), Admin, EDU or CHA, (varies) (uncertain)

Referee: This task is Simple on Lo pop. worlds, Difficult on Hi pop. worlds, and Routine elsewhere. Use the time increments and results above.

To find a Secondary Export:

(varies), Streetwise or Admin, EDU or CHA, (varies) (uncertain)

Referee: This task is Simple on Lo pop. worlds, Difficult on Hi pop. worlds, and Routine elsewhere. Use the time increments and results above.

QUALITY

To estimate a lot's quality:

Routine, Marketing, (skill), (varies) (uncertain)

Referee: The second skill is one relevant to the cargo type. On No Truth, misrepresent the cargo quality by D3-1D3); on Some Truth misrepresent the cargo quality by 1D3-2. In all cases, give the result with a error. The time increment depends on the cargo type. Increase difficulty one level for insufficient samples, and one level for insufficient equipment.

Often, cargo quality is already certified, and the above task represents the buyer's attempt to verify the validity of this certification. In this case, the time increment is 1 min at TL 10+, 5 min at TL 5-9, and 10 min at TL 0-4.

MARKETS

To estimate the state of the market:

Routine, Marketing, (skill), (varies) (uncertain)

Referee: The second skill depends on the setting. Special DM -1 for each parsec or X-boat link to the market location. The time increment is 15 min at TL 10+, 30 minutes at TL 5 to 9, and 2 hours at TL 4 or less. On No Truth, misrepresent the cargo quality by D3-1D3); on Some Truth misrepresent the cargo quality by 1D3-2. In all cases, give the result with a error.

BUYING

To negotiate a buying price on a cargo lot:

Routine, Bargain, (skill), 1 min (confrontation)

Referee: The second skill depends on the setting. This is an interpersonal task. On Active Cooperation, the seller drops to their minimum price. On Passive Cooperation, the seller drops to a price mid way between the maximum and minimum. A Neutral result gives no change, while an uncooperative result indicates no deal. Active Uncooperative makes any subsequent attempts to buy the same cargo type Difficult for 1DD6 days. Initial offers excessively above or below the lot's real value may allow the application of extra DMs.

FINDING BUYERS

To find a buyer for the cargo:

(varies), Marketing, (skill), 2 hours

Referee: The difficulty is Simple on Hi population worlds, Difficult on Lo population worlds, and Routine elsewhere. Allow 3 attempts on Hi population worlds, 1 attempt on Lo population worlds, and 2 attempts elsewhere. For manufactured goods, increase difficulty one level for each difference in TL range (0-3, 4-5, 6-8, 9-10, 11-13, 14+).

Additional attempts may be made following a successful Determination task. Once a buyer is located, a price is negotiated using the task below. The buyer will generally offer below the local market initially.

SELLING

To negotiate a selling price on a cargo lot:

Routine, Bargain, (skill), 1 min (confrontation)

Referee: The second skill depends on the setting. This is an interpersonal task. On Active Cooperation, the buyer accepts the asking price. On Passive Cooperation, the buyer agrees to the maximum he wishes to pay. A Neutral result gives no change in the offered price, while an uncooperative result indicates no deal. Active Uncooperative makes any subsequent attempts to buy or sell the same cargo type Difficult for 1DD6 days. Initial asking price excessively above or below the lot's real value may allow the application of extra DMs.

Trade Tables

PRIMARY CARGO

Population 6+: Number of major cargo lots is starportweighting+1D6-4 (see table 3.1), determining which sort are available randomly from those listed for the world.

Population 5-: Population -1D6+1; if zero, no cargo, if less than zero, wait that number of additional days before rolling again. Note that population 0 worlds will only have cargoes at the referee's discretion.

Roll in 3D6-population days (minimum 2), plus any extra for population 5-worlds; DM +3 if nearest world more than 2 pc distant, round fractions up.

SECONDARY CARGO

Roll 1D6 for the number of lots available in a given week; DM -1 for B type starports, -2 for C type starports, -3 for D type starports, -1 for population 5-, +2 for population 9+. E type starports have a single Secondary Export available every 1D6-1 Weeks plus 1D6-1 days. A new set of Secondary Exports will become available in the same time as Primary Exports.

Market Modifiers.

2D6	Modifier
0-1	0.25
2-3	0.50
4-5	0.75
6-7	1.00
8-9	1.25
10	1.50
11	1.75
12	2.00

Roll 2D6 to determine what the seller believes they can get for their cargo. Subtract 1D4 from this roll to determine from the table the minimum acceptable; this is at least 0.25 lower than the maximum, but never lower than 0.25. Add 1D6-1D6 to the roll to determine the actual local Market Modifier; typically this remains stable for 2D6 weeks. Roll 2D6 for the Market on possible destination worlds.

TABLE 3.1: STARPORT WEIGHTINGS

Table 3.2: Number of Passengers. DM -3 for destination population 0-4, DM +1 for destination population 8+, +source world TL, -destination world TL, DM -12 if destination is a Red Zone, and no Middle or Low Passengers. DM -6 if destination is an Amber Zone.

Table 3.3: Freight Availability. DMs are -3 if the destination population is 0-4, +1 if the destination population is 8+, +origin TL, -destination TL. No major lots for Amber Zone destinations, no Freight for Red Zone destinations.

Table 3.4: Ag Worlds. DM +1 if Govt 9+, +1 if Law 9+

Table 3.5: Ri and Wa Worlds. DM +1 if Govt 9+, +1 if Law 9+, +1 if Wa and Hi.

Table 3.6: Ni Worlds. DM +1 if Govt 9+, +1 if Law 9+

Table 3.7: In Worlds. DM +1 if Govt 9+, +1 if Law 9+, +1 if Wa and Hi

Table 3.8: As, Va, De, and Na Worlds. DM +1 if Govt 9+, +1 if Law 9+, -5 if Ba.

Table 3.9: Ba, Fl, Ic, Po, Hi and Lo Worlds. DM +1 if Govt 9+, +1 if Law 9+, +1 if Wa and Hi, -7 if Ba.

Table 3.10: Type of Raw Material available. *Ferrous Metal Ore if no native life.

Table 3.11: Raw material trade categories.

*Roll 1D6 where numbers appear.

Table 3.12: Type of Agricultural Goods available.

Table 3.13: Agricultural goods trade categories. *Roll 1D6 where numbers appear.

Table 3.14: Type of Processed Material available. DM +3 if Ag.

Table 3.15: Processed material trade categories. *Roll 1D6 where numbers appear.

Table 3.16: Type of Manufactured Goods available. 2D6-1 for TL 0-8, 3D6-2 for TL 9+.

Table 3.17: Manufactured goods trade categories. *Roll 1D6 where numbers appear.

Table 3.18: Quality of broker available at a starport of given quality.

Starport Operations

You've come to the right place to build or upgrade a starport! First, let's go through the very basics in starport design.

Normally, a starport's facilities determine its class. In the table below, a 'y' means the facility is required, an 'o' means the facility is optional, and a '-' means the facility is not present.

STARPORT FACILITIES AVAILABILITY TABLE

	A	B	C	D	E/H	F	G
Landing area	y	y	y	y	y	y	y
Parking area	y	y	y	y	o	y	o
Beacon	y	y	y	y	o	y	y
Fuel depot	y	y	y	o	-	o	o
Warehousing	y	y	o	o	-	o	-
Ship maintenance	y	y	y	-	-	o	-
Ship construction	y	y	o	-	-	o	-
Facility maintenance	y	y	y	o	-	o	o
Concourse	y	y	o	o	-	o	o

HOW BIG SHOULD I BUILD MY STARPORT?

Your starport should match the world's interstellar needs as closely as possible. Please refer to the section on determining freight and passenger numbers to decide what to outfit your starport with.

SHOULD I CLAIM EXTRALITY FOR MY STARPORT?

Most starports are granted extrality; that is, the world's jurisdiction ends where the starport grounds begin. Laws, regulations, and government are conducted in accordance with the customs of interstellar authority. In these cases, the law level is roughly equivalent to the starport's rating (A=5, B=4, C/F=3, D/G=2, E/H=1), and is also influenced by the world population.

Small or primitive starports, however, are often under local government jurisdiction.

Please note that starports that are under local jurisdiction will be under the influence of local authorities, and will also be taxed. However, under local jurisdiction your starport will never have to harbor those that break the law on planet.

WHAT FEES SHOULD I CHARGE FOR THE USE OF MY STARPORT?

Berthing fees. These depend on the port size, social conditions on the world, the nature and quality of facilities, and the world's trade codes.

Drydock fees. These depend on ship tonnage, time spent in dock, workers' salaries, and equipment purchased.

Transaction fees. This is a percentage of all transactions made by parties using the starport. Usually only a fraction of a percent of the freights' value, these fees can really add up to serious cash.

World subsidy. This can make or break a starport. If the world is willing to subsidize a starport, then life can be good indeed. If not, then the mortgage holders might decide to downgrade the facilities, which further restricts trade... which can be a vicious downward spiral for the otherwise hopeful starport prime.

SUGGESTED PRICING SCHEDULE

	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
Berthing fee	Cr100	Cr80	Cr60	Cr40	-
Drydock fee per dton, per day	Cr100	Cr80	Cr60	Cr40	-
Tax per Passenger	Cr100	Cr100	Cr100	Cr100	-
Tax per dton Freight	Cr100	Cr100	Cr100	Cr100	-
Facility tax (restaurants, etc)	4%	3%	2%	1%	-
World Subsidy per capita (Yearly)	Cr10	Cr8	Cr6	Cr4	-

STARPORT COMPONENTS

1. a landing area/volume
2. a parking bay/orbit
3. a beacon
4. a tower
5. warehouses
6. a plant maintenance center
7. a concourse
8. a fuel depot, with fuel shuttles or a refinery (or both)
9. a ship maintenance/construction yard
10. people

In addition, starports will have available a standard port authority checklist against which they measure ships' spaceworthiness.

Starport abilities derive from these components. Based on your need, you will want to customize your starport to fit your needs. As you browse this catalog, you will find various options that will significantly flesh out your starport installation.

Enjoy!

PACKAGE DEALS

With our handy-dandy component packages, starport design has never been easier! Components have been paired together based on compatability. Buy the package, purchase any remaining needed components, and you're ready to go!

Downport Freight Package: MCr250

- Two parkbays (upgrade to six parkbays for only MCr400)

- One 5km landing strip with 1km-diameter landing pad
- B-0 orbital telemeter
- B-2 surface laser transceiver
- SB-8 Freight Shuttle (upgrade to a SB-9 for only MCr300)
- F-11 100kt fuel tank
- M-3 maintenance building
- W-9 warehouse (upgrade to a W-10 for only MCr 9)
- Parkbays, landing strip, and buildings all attached by maglev

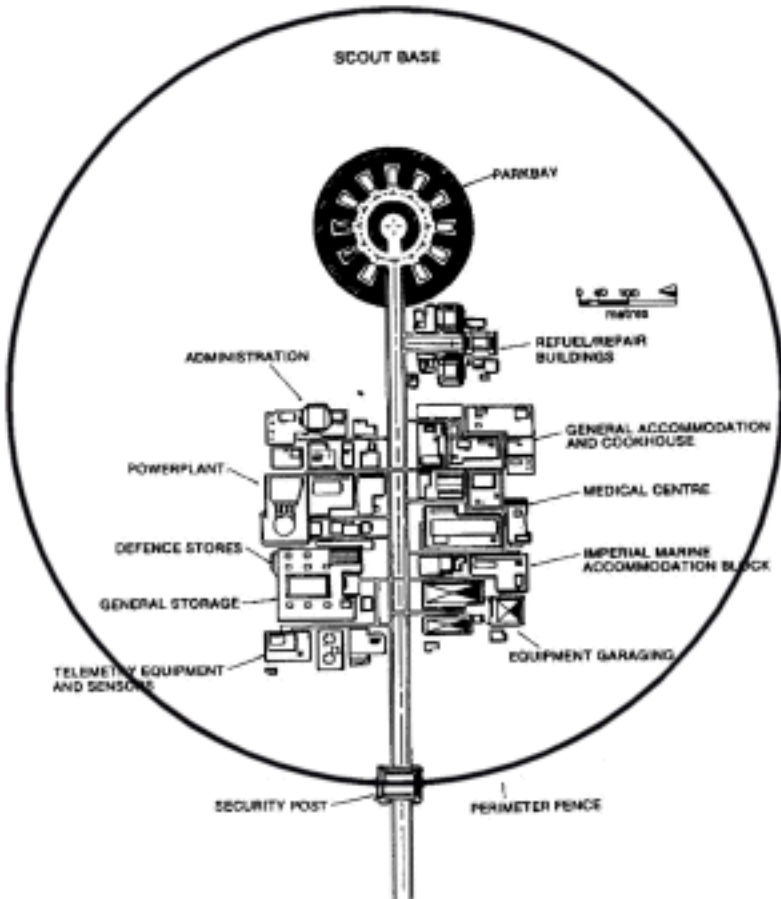
Orbital Fuel Outpost: MCr250

- One dedicated landing strip on the world surface for shuttles
- Three SB-8 fuel shuttles (upgrade to SB-9s for MCr300 each)
- B-0 orbital telemeter
- T-7 4-person orbital control station
- 10 O-1 orbital parking-orbit transponders
- F-10 10kt orbital fuel tank
- R-8 surface fuel refinery

“Class D” Starport Package: MCr250

Except for defense, this package is nearly a complete starport.

- One 5km landing strip
- 20 1km-diameter landing pads
- B-0 orbital telemeter
- B-2 surface laser transceiver
- T-7 4-person surface control station
- Three SB-8 multipurpose shuttles (upgrade to SB-9s for MCr300 each)
- F-11 100kt fuel tank (or 10 F-10's)
- M-3 maintenance building
- 10 W-9 warehouses (upgrade to W-10s for MCr 9 each)
- DD-8 100t drydock & S-2 minor repair station (1 ship capacity)
- C-8 concourse complex
- LS-9 up to 100-worker station support
- H-7 10 dton secure installation.
- Orbital option: one orbital F-11 and one orbital W-10 (MCr200)



(shown with outbuildings)

LAND SHIPS SAFELY

Ships have to land! There are two ways to land a starship: some are airframe, which means they can use a runway, while the rest must stick to vertical thrust to slowly set themselves down onto pads. VTOL ships land from orbit in a number of hours equal to the size code of the world. Airframe ships may land from orbit in one hour, regardless of world size.

Most Imperial-standard landing strips have both built-in: a 5km long strip for airframe landings, ending in a 1km diameter circular landing pad. These strips are also used for airframe take-off.

When building a decent facility (for instance, one with a parkbay), don't bother adding in the cost of landing strips.

Landing facilities may also have an attached beacon, perhaps placed midway along the strip or near other outbuildings. A beacon may include sensors and

comm equipment, and may have its own power plant.

The control tower contains the main body of comm equipment and traffic control logic, as well as the administrative offices.

STARPORT COMPONENT TABLE 1

<i>Component</i>	<i>Price (MCr)</i>	
Module L: Landing Facilities (all tech levels)		
L-0 1km radius landing pad	0.03	
L-1 2km radius landing pad	0.06	
L-2 4km radius landing pad	0.12	
L-3 3km x 500m landing strip	0.03	
L-4 4km x 500m landing strip	0.04	
L-5 5km x 500m landing strip	0.05	
L-6 6km x 500m landing strip	0.06	
L-7 7km x 500m landing strip	0.07	
L-8 8km x 500m landing strip	0.08	

Module B: Beacons	<i>Down</i>	<i>Orbital</i>
B-0 telemeter	1	2
B-1 standalone transponder	5	10
B-2 radio transceiver (TL5)	0.05	0.1
B-3 laser transceiver (TL9)	0.5	1
B-4 maser transceiver (TLE)	5	10
B-5 multichannel maser xcvr (TLF)	50	100

The B-5 is a large relay station with room for 1 operations or maintenance personnel. Larger installations are considered Control Towers:

Module T: Traffic Control Towers	<i>Down</i>	<i>Orbital</i>
T-6 small control outbuilding	1	10
T-7 4-person control station	5	50
T-8 8-person control tower (TL9)	25	250
T-9 16-person control tower(TLC)	100	1000

Tower sensors: for best results, place two PEMS and two AEMS in orbit.

PEMS: Passive sensors (TL B-F)

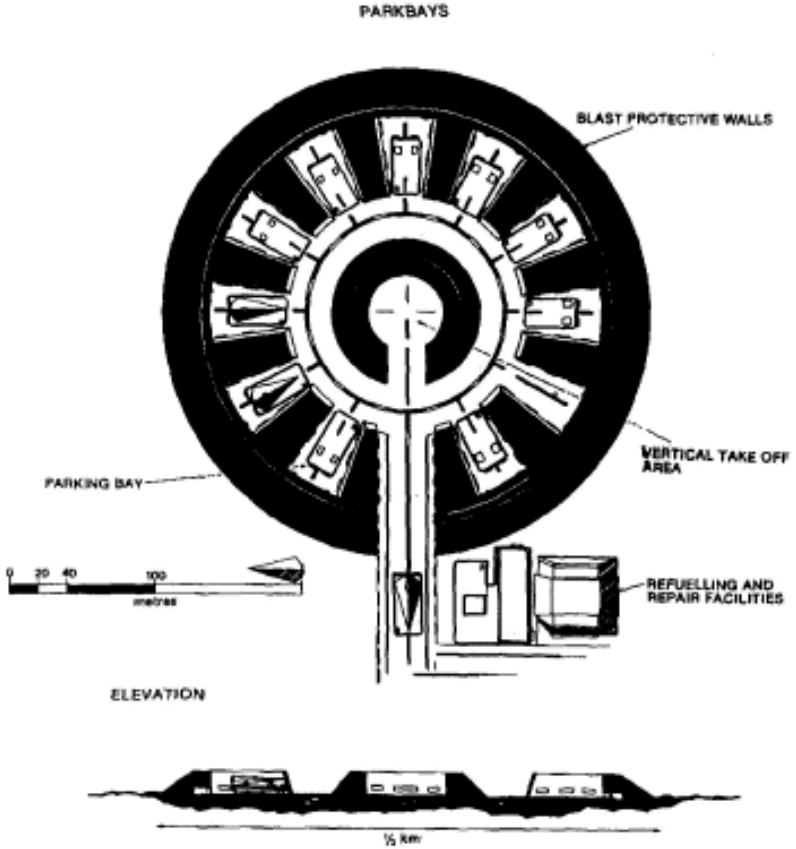
TP-11: standard 100d sensor	10	20
TP-13: high-res 100d sensor	100	200
TP-14: inner system sensor	1000	2000
TP-15: inner + GG sensor	10,000	20,000

AEMS: Active sensors (TL B-D)

TA-11: local orbit control	50	100
TA-12: general system sensor	500	1000
TA-13: deluxe system sensor	5000	10,000

PARKBAYS

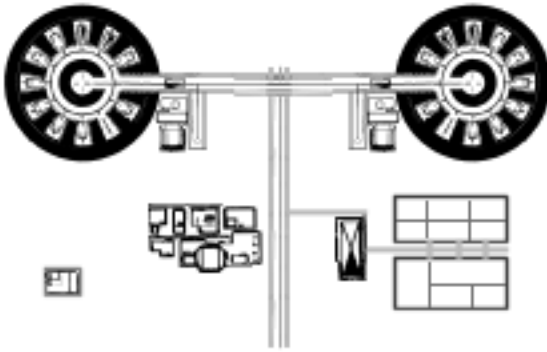
Single Parkbay (close up)



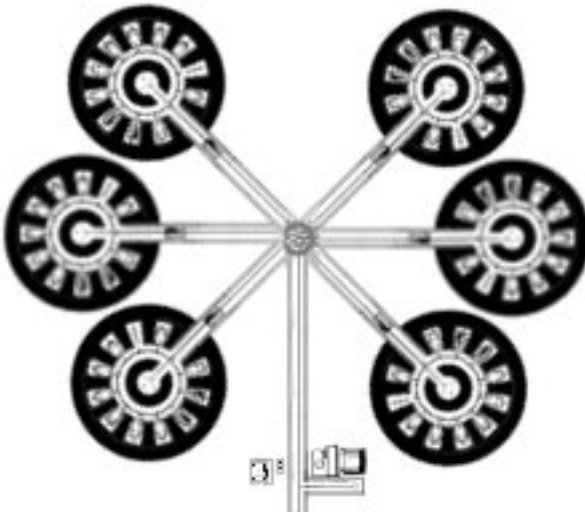
Single Parkbay (with outbuildings)



Double Parkbay (with outbuildings)



6x11 Parkbay Complex



Ships are moved via maglev rail to parkbays, which are circular platforms with 11 bays, each of which can hold a ship of up to 1000 tons. Maglev rail enters the parkbay and runs in a circle around the inside, with a branch into each bay. In the center is a single shielded vertical liftoff platform (also connected to the maglev system).

All parkbays are available at TL 10.

<i>Component</i>	<i>Price (MCr)</i>
Module P: Parkbays (up to 1000 ton ships)	
P-0 custom parkbay	-
P-1 single 11-ship parkbay	100
P-2 double 11-ship parkbay	200
P-3 triple 11-ship parkbay	300
P-4 quad 11-ship parkbay	400
P-6 6x11 parkbay	600
P-8 8x11 parkbay	800

PARKING ORBIT TRANSPONDERS

Think of them as being like the deep water mooring bouys at some shallow water ports. The ship is assigned a parking spot, which is marked by the transponder. It matches orbit with it and is then parked.

<i>Component</i>	<i>Price (MCr)</i>
Module O: Parking Orbit Transponders (TL 7)	
O-0 custom orbit transponder	-
O-1 standard telemeter transponder	4
O-2 programmable transponder	8

*Note: To hold ten thousand ships, you only need 40 orbits with 250 slots each or 50 with 200 slots each. Assume the radii are set every 100 km or so, that has the ships spread out in an annulus 5000 km “across”. There’s still plenty of space for traffic.

Module H: Hangars

H-0 custom hangar	-
H-6 Ship’s Locker	0.001
H-7 10t small vehicle hangar	0.01
H-8 100t boat hangar	0.1
H-9 1000t hangar	1
H-10 10,000t hangar	10
H-11 100,000t hangar	100

SPECIALIZED SPACESHIPS

Shuttles

SB-7 10t shuttle (TL9)	10
SB-8 100t shuttle (TL8)	50
SB-9 1000t shuttle (TL9)	350

The SB-7 is an airframe, single-passenger (or 1t cargo) orbital speeder.

Privately-owned shuttles can often be found for hire at class E starports. Their rates will be high.

Tugboat

The tug is equipped with engines and structure strong enough to pull a ship ten times its volume from space to orbit and back. A tug requires a crew of 2.

TB-8 100t tugboat (TL8)	20
TB-9 1000t tugboat (TL9)	100

TB-10 10kt tugboat (TLA)	400
--------------------------	-----

Search/Rescue Boat

The search and rescue boat is equipped with excellent sensors, fast engines, and a spare crew. The ship carries medical personnel, engineers, emergency supplies, and emergency low berths.

RB-8 200t search/rescue boat (TL8)	50
RB-9 2000t search/rescue boat (TL9)	300
RB-10 20kt search/rescue boat (TLA)	1500

Defense Boat

From the tiny grav fighter (which pulls 17 G's) to the massive SD Cruiser (which sports a spinal weapon), system defense boats are armored, fast, and carry expert gunners.

DB-6 4t grav fighter (TLC)	4
DB-7a 10t fighter (TLC)	15
DB-7b 40t heavy fighter(TLC)	50
DB-8 400t system defense boat (TLC)	400
DB-9 4000t system defense b. (TLC)	3000
DB-10 40,000t SD cruiser (TLC)	20,000

FUEL AND MAINTENANCE

Fuel depots can be as simple as huge holding tanks, and may have mechanical hookups or pumps to refuel ships with.

<i>Component</i>	<i>Price (MCr)</i>	
Module F: Fuel Depots	<i>Down</i>	<i>Orbital</i>
F-0 custom tank	-	
F-7 10t fuel tank	0.001	0.5
F-8 100t fuel tank	0.005	1
F-9 1000t fuel tank	0.01	5
F-10 10,000t fuel tank	0.1	10
F-11 100,000t fuel tank	1	100
F-12 1mt fuel tank	10	1000
F-13 10mt fuel tank	100	10,000
F-14 100mt fuel tank	1000	100,000

Fuel tankers, which may be simply shuttles or modular cutters, are ships outfitted to carry fuel, and may or may not have refineries on-board to provide refined fuel for the starport holding tanks. Tankers run at the going price of spaceships; for example, the price may be around MCr4 per ton of fuel the tanker can carry (or per normal spaceship cost). Refineries are priced per normal spaceship cost and volume.

Fuel refineries are cousins to the shipboard fuel refineries, and are used to refine fuel on the spot for ships requiring it.

Module R: Refinery Installations	<i>Down</i>	<i>Orbital</i>
R-0 custom refineries	-	
R-7 10 tons/hour (TL9)	1	10
R-8 100 tons/hour (TLA)	10	100
R-9 1000 tons/hour (TLB)	100	1000

R-10 10,000 tons/hour (TLC)	1000	10,000
R-11 100,000 tons/hour(TLC)	10,000	100,000
R-12 1mt/hr (TLD)	100,000	1,000,000

Module M: Installation Maintenance Centers

M-0 custom maintenance center	-	
M-6 storage shed	0.01	2
M-7 portable outbuilding	0.1	5
M-8 permanent outbuilding	1	10
M-9 maintenance complex	10	100

THE SHIPYARD

A shipyard is necessary for the construction and maintenance of spaceships and starships. Shipyards can be quite large -- their size may depend on the amount of trade going through a system, or the size of the local population, or even the strategic importance of the system's location.

A shipyard consists of two components: a drydock area, which holds ship hulls, and the shipyard itself, which embodies all machinery and support for the build process.

A shipyard will have one naval architect's office per 100 ships (or 1000 dtons).

Drydocks and shipyards are built at the tech level of the mainworld.

Module DD: Drydocks	<i>Down</i>	<i>Orbital</i>
DD-0 custom drydock	-	
DD-7 10t drydock	1	10
DD-8 100t drydock	10	50
DD-9 1000t drydock	100	200
DD-10 10kt drydock	n/a	2000
DD-11 100kt drydock	n/a	20,000
DD-12 1mt drydock	n/a	200,000

* Drydocks are required for shipyards.

Module S: Shipyard	<i>Down</i>	<i>Orbital</i>
S-0 custom shipyard	-	
S-1 machine shop	1	10
S-2 minor repair center/1 ship	10	100
S-3 repair center/10 ships	50	1000
S-4 repair center/100 ships	400	4000
S-5 overhaul center/10 ships	200	2000
S-6 overhaul center/100 ships	1000	6000
S-7 overhaul center/1000 ships	8000	50,000
S-8 boatyard/1 ship/year	400	4000
S-9 boatyard/10 ships/yr	2000	15,000
S-10 boatyard/100 ships/yr	16,000	100,000
S-11 boatyard/1000 ships/yr	160,000	1,000,000
S-12 shipyard/1 ship/yr	10,000	20,000
S-13 shipyard/10 ships/yr	50,000	100,000
S-14 shipyard/100 ships/yr	400,000	4,000,000

S-15 shipyard/1000 ships/yr	4m	40m
S-16 shipyard/10,000 ships/yr	50m	500m

WAREHOUSES

Warehouses (with environmental controls, security systems, heavy shielding, &tc) are used to store goods for transport. One complex is used to store out-bound freight, while another complex is used to store in-bound freight. There is usually an additional set of warehouses dedicated to storing ship parts, construction equipment, and other starport machinery.

Module W: Warehouses	<i>Down</i>	<i>Orbital</i>
W-0 custom warehouse	-	
W-7 10t storage	0.01	5
W-8 100t storage	0.1	10
W-9 1000t storage	1	50
W-10 10kt storage	10	200
W-11 100kt storage	100	500
W-12 1mt storage	1000	4000

THE CONCOURSE

The concourse is where all public areas are housed, including retail shops, services, non-starport-related offices, passenger ticketing, and gates.

Also included is the surface transport terminal, which often has its own customs and security office from the mainworld government. It also has scheduled (or not!) shuttle flights to and from orbit.

Module C: Concourses	<i>Down</i>	<i>Orbital</i>
C-0 custom concourse	-	
C-7a portable outbuilding	0.1	1
C-7b permanent outbuilding	1	20
C-8 outbuilding complex	10	500
C-9 large starport complex	100	5000
C-10 industrial starport complex	300	50,000
C-11 commercial starport complex	1000	100,000

A major subsection of the concourse is the living quarters for the starport personnel and visitors. Larger starports require ship crew to leave their ship while they are docked. In some cases, the living quarters represent a hostel or hotel; on others it may represent a whole urban or suburban section of the port.

Personnel requirements can balloon rapidly. Think about the personnel requirements for a town or city. However, please note that downports can pull workers from Startown and therefore may require less maintained living space than orbital ports.

Generally, a habitat needs 10 dtons per person.

Module LS: Living Section	<i>Down</i>	<i>Orbital</i>
LS-0 custom living section		
LS-7 10 dtons (1 person)	0.01	0.2
LS-8 100 dtons (10 people)	0.1	2
LS-9 1000 dtons (100 people)	1	20

LS-10 10,000 dt (1000 people)	10	200
LS-11 100 kt (10,000 people)	100	2000
LS-12 1 mt (100,000 people)	1000	20,000

Hospitals are ranked by volume; however, they are also divided into room-spaces when they are built.

This table may also be used to designate research centers, laboratories, and other secure installations. Essentially, any building which needs redundant power systems and separate, secure environmental and network controls fits in this category.

Generally, these facilities need 2 dtons per person.

Module H: Hospitals, etc.	<i>Down</i>	<i>Orbital</i>
H-7 10 dtons (5 people)	10	100
H-8 100 dtons (50 people)	100	500
H-9 1000 dtons (500 people)	1000	5000
H-10 10,000 dtons (5000 people)	10,000	20,000

Other buildings cost MCr0.1 per dton for a downport location, and MCr0.2 per dton for a location on the highport. Examples of other buildings include:

- The Scout Lounge
- The Hiring Hall
- The Lone Star
- The Travellers' Aid Society
- Starship architect (Naval architect?)
- University departments
- Space academies
- Conference/exhibition centers
- Brokerages
- Various entertainment centers

MAGLEV

The starport maglev rail network connects the internal starport components together: airstrips, parkbays, building complexes, and shipyards. Likewise, the external maglev rail network comprises the transport between the starport and the outside world, and usually only connects to the concourse and warehousing, which tends to allow better installation security.

Maglev is first available at TL 9 at twice the listed cost. At TL A and above the cost is as listed.

Module X: Maglev Rail Networks

X-0 custom network	-
X-1 starport module connection	2
X-2 external module connection	5

BASES (MILITARY CUSTOMERS ONLY!)

Scout bases have refueling equipment, a parkbay, some service equipment and warehousing, and administration offices. They are open to public use for a price. Such a base may cost MCr200. A minimal scout base are equipped at 1 class lower than the commercial port, and usually (or perhaps initially) have the

following:

Scout Base	<i>Quantity</i>	<i>Cost (MCr)</i>
Parkbay	1	100
TP-11 PEMS	1	10
R-8 Refinery	1	10
DD-8 100t drydock	1	10
S-2 minor repair/1 ship	1	10
C-2 outbuilding	1	1
misc buildings, equipment, and supplies	9	
Total		150

Scout way stations are larger than scout bases, with facilities used to service the X-boat system, including tenders. MCr100 per ship in the X-Boat network to be serviced. The average way station is orbital or off-orbit and will have:

Way Station	<i>Quantity</i>	<i>Cost (MCr)</i>
F-10 10k fuel	10	1
R-9 refinery	2	200
R-8 backup	2	20
DD-9	2	400
S-5 overhaul	1	200
C-4 concourse	1	100
Total		921

Naval bases are huge affairs, often larger than the local starport itself. First-Strength bases are equipped at the same class as the commercial port; Second-Strength bases are equipped one class lower. In an emergency the naval base will open its facilities to the public for a price. A naval base has, at the minimum:

Naval Base	<i>Quantity</i>	<i>Cost (BCr)</i>
Airstrip	1	-
Parkbay	6	0.6
TP-14 PEMS or equiv.	2	2.0
TA-13 AEMS or equiv.	2	10.0
Defense Boats	varies	5.0
DD-10 drydock	1	2.0
S-6 shipyard	1	1.0
misc. other		0.4
Total		21.0

PEOPLE

Starports employ people unique to the world.

- Naval architects
- Starship Repo men
- Starport Authority workers

EXCERPTS FROM THE PORT AUTHORITY HANDBOOK (PAH)

"Ships and vessels arriving insystem must, upon entering normal space, transmit, and continue to transmit, proper identification via transponder.

Furthermore, these ships must establish direct contact with the nearest Starport Traffic Control Center. Communication with starport controllers will establish such special rules, regulations, and requirements as shall be deemed necessary by local authorities.”

- PAH 112ed

Ships not emitting a transponder signal may well be mistaken for pirates. Moreover, the crew may expose itself to danger or violations of local law by not discovering restrictions or hazardous conditions insystem. For example, a system’s refueling policy may be broadcast (i.e. no gas giant/wilderness refueling without a permit).

“Upon arrival at any starport facility, all civilian vessels shall furnish to appropriate authorities such records, registries, and relevant documents deemed necessary to establish the said vessel’s condition and past history; said vessel shall be required to furnish health statements, issued and signed by the ship’s medical officer, for each passenger and crewman on board. Customs, immigration, and health standards for the planet must be met, and Inward Clearance granted to the ship, before it shall be permitted to discharge cargo, passengers, or personnel.”

- PAH 112ed

After landing, the ship must wait for several people to perform an Inward Clearance check on the ship in person. Upon their arrival, several documents must be presented. Planetary law level is a general guide as to whether or not these papers will be accepted, plus any crew member with Admin skill.

- ship’s registry papers (signed by the owner)
- ship’s log (signed by the ship’s captain)
- medical log (signed by the ship’s medical officer)
- cargo manifest (signed by the cargo master)
- passenger manifest (signed by the head steward)
- crew manifest (signed by the captain or owner)
- etc!

If documentation is insufficient, hurdles will be imposed: a quarantine, confiscation, fines, or worse. The hurdle can be cleared by correcting the problem, bribing one of the people responsible for Inward Clearance (or perhaps just paying fines or fees). The presence of a noble or influential passenger can help; or perhaps an old friend who has pull with the Port Captain’s office.

Safety requirements for spaceships and starships generally follow this pattern:

1. Computer software
no illegal software
2. Evacuation planning
 - a. One vac suit per crew member
 - b. Two rescue balls in each stateroom
 - c. One emergency vac suit per airlock and ship’s locker
 - d. One emergency vac suit per airlock in ship’s boats
 - e. One rescue ball per seat in ship’s boats
 - f. One hazard suit per airlock in ship’s boats
 - g. One hostile environment kit per 4 seats in ship’s boats
 - h. One standard Imperial Survival Kit per airlock
3. Portable life support systems (PLSS)
Life support in vac suits inspected every year

4. Emergency survival system
 - Extra survival bubbles or rescue balls on bridge & engineering
5. Small med kits
 - Bridge, engineering, airlocks, ship's boats
6. Tools
 - a. Bridge: 1 set of electronic tools
 - b. Engineering: 1 set of mechanical & electronic tools
 - c. Ship's boats: 1 set of mechanical tools
 - d. 1 set of metalworking tools in engine room
7. Rescue system
 - a. 1 hull patch per displacement ton
 - b. 1 portable airlock
 - c. 1 radiation counter per airlock
 - d. Entry cutter
 - e. Iris valve opener
 - f. 1 flashlight per crewmember
 - g. laser cutter
8. Survival items: any 3 of the following
 - Atmosphere tester (2)
 - Emergency radio beacon (1)
 - Survival still (2)
 - Backpacks (1 per crewmember)
 - Flare gun and flares (2)
 - Inertial locator (1)
 - Machete (1 per crewmember)
 - Night glasses (1)
 - Desert survival kits (1 per crewmember)
 - 0.05MW or greater fusion+ plant

STARPORT UBP, MODIFIED (UNIVERSAL BASE PROFILE, MODIFIED)

B35673 Sa To Co

(OV) - overall ABCDEFGHYX

The following 5 elements have values 0-F. Capacity represents dtons as an exponent of ten.

The original version used a logarithmic scale based on 10, 30, 100, 300...

(DS) - dock size

(SF) - ship repair facilities (> 9 = shipyard)

(FA) - fuel available

(LA) - living area

(CH) - cargo handling

(FC) - facility classifications:

Or - orbital facility

Sa - orbital satellite

Be - surface beacon instead of downport

To - tourist facilities

Li - living cargo facilities

Co - commercial facilities

POOR STARPORTS

“Poor” spaceports will generally not be able to handle anything larger than a 95-ton Shuttle, and sometimes not even that. As handlers of in-system travel, the staff of such a spaceport will likely not be set up to deal with unfamiliar visitors (ie. star travellers). The usual users will be scheduled runs, familiar “bush pilots”, and local launch owners who don’t have the private space to keep their vehicles. They will likely have control “towers”, but will generally prefer to find out about their traffic via hand-offs from other ports. They will not necessarily be set up to detect visitors popping out of jumpspace.

Small worlds, or ones with poor starports, rely on the free traders for all freight and cargo to and from the world ... somewhere with only 100 T total exports per week will not expect (or even support) 10 free traders each week! As I mentioned in my posting on starport berths, IMTU these low-traffic systems are good adventure fodder:

“Nope, ‘fraid we ain’t got none cargo this week. You might want to visit Joe Windlake’s place, as I hear he is harvesting real soon.

“No, you don’t need a special bit of paper to fly your space wagon there ... just be careful where you land. I reckon you’d be better taking a ride, t’aint mor’n five days by horse and I’m sure fancy chaps like you will have one of them floating contraptions to do it in no time. Joe’ll be happy to set aside a place to set down once he knows you’re coming.

“Radio? No, I don’t reckon he has one”.

E-CLASS STARPORTS

E starports are the private airstrips of the interstellar scene. They are usually small and often unmanned. They are, however, still starports. The landing area is sufficiently built/packed/reinforced to handle starships up to a certain volume, be it 100 dtons, 1000 dtons, or higher. When manned, they will have someone on hand who can tell offworlders the things they need to know about the world.

BERTHING COSTS

There has been some discussion on the subject of starship expenses, particularly Berthing Costs. The consensus was that the costs in the various versions of Traveller were unrealistic, but that no one had the expertise to say by how much. I have been doing some research. The figures below are real-world; thanks to the Colorado Springs International Airport and the Port of Houston Authority. First, what are we talking about?

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

- *Book 2*, p. 8; *MT (Imperial Encyclopedia)*, p. 90; and *T4*, p. 97

TNE, p. 222, reads identically, except cost is Cr1000 for the first 6 days.

“Starport Docking Fees (per 1,000 cy per day) \$500”

- *GURPS Space*, p. 38

There are two candidate models for “starports” in the real world: commercial

seaports, and commercial airports. I looked at both. The rates quoted are current as of 15 May 1998.

Colorado Springs International Airport is about a "Class III" facility; it has full services but no significant repair or rebuild capability. Charges for non-preferential (i.e., not previously contracted - charter instead of scheduled airline) aircraft are:

- Landing fee:** \$3.04 per 2,000 lb landed gross weight
- Gate fee:** \$55.50 per use (enplane or deplane operation)
- Ground power:** \$25.00 per use
- Ticket counter:** \$31.00 per use (less than 6 positions)
\$73.00 per use (6 or more positions)
- Apron parking:** \$100.00 per use (> 2 hours)

Presumably, scheduled airlines get a significant break on this, but I didn't check.

Port of Houston Authority covers a collection of terminals best described as "Class V" - there are full shipbuilding facilities available. Fees here are significantly more complicated, but divide generally into two categories: dockage and wharfage. Dockage are those fees that pertain to the ships themselves. Many fees are based on the size of the ship, measured in Length Over All (LOA):

- Harbor fee:** \$130.35 (vessels 100-249 ft LOA - ~ 229-311 dtons)
\$385.00 (vessels 250+ ft LOA - ~ 311+ dtons)

This covers "expense of administration, maintenance and operation of fire prevention and suppression, personnel and equipment, with the view of preventing fires, aiding vessels in distress, and aiding in the extinguishing of fire in vessels and equipment and in their cargoes aboard such vessels, or upon wharves and in other facilities in the harbor." I found no mention of "harbor pilots", as such.

Dockage:

<i>LOA (ft)</i>	<i>\$/ft/day (main)</i>	<i>\$/ft/day (container)</i>
0-199	1.62	1.80
200-299	1.85	2.16
300-349	1.96	2.16
350-399	2.13	2.42
400-449	2.94	3.19
450-499	3.06	3.30
500-549	4.07	4.39
550-599	4.17	4.48
600-649	4.86	5.10
650-699	4.92	5.20
700-799	6.28	6.64
800-899	7.30	7.98
900+	8.50	9.53

Notice that these are not linear - there are breakpoints, which correspond to the lengths of the various wharves. The larger a ship is, the fewer wharves it can actually use.

Rates are charged in 12-hour blocks, and go down over time:

3d day	90%
4th day	75%
5th day	60%
6th+ day	50%

Failing or refusing to vacate a berth when ordered:

\$1,500/hour (main terminal)

\$700/hour (container terminal)

Note that you can be ordered to vacate for refusing to pay overtime to unload your ship. You then wait until all the ships that *are* willing unload before you get your turn again.

Water: \$35.00 + \$4.50/1,000 gal.

Electric Power: no data (supplied by subcontractors)

Wharfage fees apply based on the cargo, rather than the ship. All fees have a \$15-20 or one hour minimum.

Clearing Berth: \$187.00 (500 tons of cargo or less)
\$256.00 (more than 500 tons of cargo)

This charge does not apply to bulk, container, or vehicle cargo.

Terminal fee: \$2.65/vehicle
\$4.00/passenger

Cranes and handling equipment: \$200-400 per hour, no operator provided

Loading and Unloading: \$19.80/ton (main port)
\$23.00/ton (container port)
\$6.38/ton (container, net weight), or
\$63.50/container (loaded)
\$26.00/container (empty)

There are discounts for more than 3000 units or 500 hours per year.

Any single package (not container):

5-20 tons: +\$3.18
20-35 tons: +\$5.02
35-100 tons: +\$9.60

Wharfage: \$2.20/ton
\$0.88/ton (bulk, delivered in pipeline)

Cargo can remain on the wharf for up to 30 days without charge ('free time'). After that:

Demurrage: \$5.00/day (container)
+\$1.00/day (loaded, days 11-20)
+\$2.00/day (loaded, days 21-30), etc up to
+\$8.00/day (loaded, days 81+)
\$0.15/ton/day (days 31-37)
\$0.21/ton/day (days 38-50)
\$0.35/ton/day (days 51+)

There are also a tremendous number of services available, from marking crates to opening and resealing boxes for Customs inspection.

Quick Interstellar Trade System

Once upon a time, we started thinking abstractly about passenger and freight traffic along the Spinward Main; in particular, we decided to figure out a simple way of determining, in general, just how busy all these Imperial starports really were. This is the fruit of our labor.

INSTRUCTIONS

Traffic is determined between pairs of ports. First, select two worlds. Next, determine the trade indices of each world. Finally, use those indices to find the trade volume passing between these two ports.

Heuristic. Usually, any given world will have one major neighbor whose traffic surpasses the others by an order of magnitude or more. In such cases, it's only really necessary to figure out which neighbor that is, and then you've pretty much pinned down the total traffic through your port.

The Trade Indices. Add up all applicable modifiers from the table below to determine the composite trade index for a world:

<i>Feature</i>	<i>Mod.</i>
A or B starport	+1
D,E, or X starport	-1
TL A+	+1
TL 7-	-1
Military and/or Scout bases	+1
Capital world	+1
On the Xboat route	+1
High population	+1
Low population	-1
Rich world	+1
Poor world	-1
Agricultural world	+1
Industrial world	+1
Amber zone	-2
Red zone	-8

This produces a value V ranging anywhere from -12 to 8. Figure out the trade indices for two worlds, and call them V1 and V2.

Modifiers for Passenger vs. Freight Traffic. For more detailed traffic information, you may use two indices -- one for passengers and one for freight -- and use these rules of thumb for calculating index modifiers:

Passenger index +1 modifiers: Starport A/B; TLA+; Capital world; Xboat route; High population; Rich world.

Passenger index -1 modifiers: Starport D,E,X; TL 7-; Low population; Poor world; Industrial world.

Passenger index -2 modifier: Amber zone. -8 modifier: Red zone.

Freight index +1 modifiers: Starport A/B; TLA+; Capital world; Xboat route; High population; Rich world; Military/Scout bases; Agricultural or Industrial world.

Freight index -1 modifiers: Starport D,E,X; TL7-; Low population; Poor world; Non-Industrial world; Amber zone.

Freight index -8 modifier: Red zone.

Suffice it to say that there are many interpretations of the UWP, and this system is tailored with the general view in mind rather than a perfect and detailed view.

Figuring in distance. Distance to the neighbor world affects trade volume. For every two parsecs from the neighbor world, subtract one point from both world indices.

The Sparse Imperium. If your interstellar traffic is sparse, then you may want to subtract one point per parsec before applying distance modifications; or alternately, you could halve the trade indices before applying distance mods.

The Busy Imperium. If you prefer more trade, then you may want to double or treble the trade indices before applying distance modifications; or, alternately, if you want far-flung trade, you could subtract one point from the trade indices for every eight parsecs.

Throw Out the Negatives. Negative trade indices indicate that the port in question receives no publicly-advertized regular traffic. Now, if that world happens to have a class A starport, one might wonder just what is going on there, whether there is actually corporate or government traffic, or if something sinister is going on...

Determine Traffic Volume. Traffic volume is determined by multiplying the trade indices together, and taking their square root. The resulting number, X, is an exponent of ten. Treat it like this:

TRAFFIC VOLUME TABLE

<i>Value</i>	<i>Traffic</i>
1	10
2	100
3	1000
4	10,000
5	100,000
6	1,000,000
7	10,000,000
8	100,000,000

For the general index, this number represents passengers per week through the pair of starports in question. Freight can be assumed to be somewhere between 1 and 10 times this amount, in dtons. My preference is to multiply the traffic number by 2.5 to get the passenger count, and to multiply the traffic number by 10 to get the freight count.

Example: Inthe.

Yori 2110 C360757-A Ri De 713 index=2 dist=3

Inthe 2410 B575776-9 A Ag X 423 index=4

Risek 2712 A325579-A N Ni X 401 index=4 dist=3

Macene 2612 B000453-E N Ni As 911 index=3 dist=3

The distance to each of these worlds is 3 parsecs; using normal rules, this reduces each trade index by 1. So, the trade level with Yori is $\sqrt{1 \times 3} = 1.7$: perhaps 150 passengers per week and 1500 dtons of freight. Trade with Risek is $\sqrt{3 \times 3} = 3$, or 2500 passengers per week and 10,000 dtons of freight. Trade with

Macene is $\sqrt{3 \times 2} = 2.4$, or around 250 passengers per week and 1000 dtons of freight. The grand total, then, for Inthe is 2900 passengers per week and 12,500 dtons of freight.

Example: Jae Tellona.

Jae Tellona 2814 A560565-8 N Ni De X 913 index=3

Rhylanor 2716 A434934-F A Hi Cp X 810 index=6; dist=2

Porozlo 2715 A867A74-B Hi 201 index=4; dist=1

Rhylanor is the dominant partner by far. So then, we have $6 \times 3 = 18$; the square root is 4: maybe 25,000 people per week, and freight would be 100,000 dtons per week through Jae Tellona. Pretty heavy. But don't worry; Rhylanor is handling close to twice that, because a similar volume is arriving from Porozlo.

Example: Mora.

Mora 3124 AA99AC7-F A Hi In Cx X 112 index=7

Fornice 3025 A354A87-C Hi X 202 index=4; dist=2

$7 \times 4 = 28$; the square root is 5, giving us 250,000 passengers arriving at Mora per week, and 1 million dtons of freight arriving per week!

Starport Capacity. Once you have the weekly passenger volume, you can figure out what the starport is built to handle:

STARPORT CAPACITY TABLE

<i>Weekly</i>	<i>Daily</i>	<i>Hourly</i>	<i>Monthly</i>	<i>Yearly</i>
100M	14M	600k	400M	5B
10M	1.4M	60k	40M	500M
1M	140k	6k	4M	50M
100k	14k	600	400k	5M
10k	1.4k	60	40k	500k
1k	140	6	4k	50k
100	14	1	400	5k
10	1	-	40	500
1	-	-	4	50

Starport Shuttles. Use this table to determine quantity and type of shuttles the starport uses.

SHUTTLE AVAILABILITY TABLE

<i>Pass/hr</i>	<i>1000t (200p/760t)</i>	<i>100t (16/72)</i>	<i>VIP (30/20)</i>	<i>Parkbays</i>	<i>Downports</i>
600k	2916	300	400	329	36+
200k	974	100	133	110	18+
100k	487	50	67	55	9+
60k	292	25	40	33	5+
40k	194	25	27	23	4+
20k	95	25	14	13	3+
10k	49	14	7	7	2+
8k	39	14	6	6	2+
6k	28	14	4	5	2+
5000	23	25	4	5	2+
4000	19	14	3	4	1+
3000	14	14	2	3	1+
2000	10	4	2	2	1+
1500	7	8	1	2	1+
1000	5	4	1	1	1+
600	3	4	1	1	1+
400	2	4	.	1	1+
200	1	4	.	1	1
100	.	8	.	1	1
60	.	4	.	1	1
30	.	3	.	1	1
1	.	1	.	1	1

System Defense

UNDERLYING ASSUMPTIONS

The Imperium is interested in preserving trade between member worlds. System defense, then, is in direct proportion to the volume of trade on that world. Interstellar trade volume can indicate what level of Imperial system defense the system will receive, and also indicate the amount of system defense which should be provided by the mainworld.

Interplanetary trade for a system is estimated using the "Rob & Jon" starport trade system; therefore, a good idea of what that system's worth can be taken directly from there. This trade system can be found at the menu level of this collection. In short, the system uses a point system to determine the trade index of a world: the likelihood that that world contributes to the Imperial economy.

METHOD

The tonnage the Imperium will dedicate to defending a world is equal to the freight tonnage passing between this world and its largest trading partner per week (perhaps, MCr1 of ship value per dton of freight). The tonnage of colonial forces the world will maintain in addition to Imperial presence is equal to ten raised to the trade index of that world (perhaps worth dtons x KCr10). This is considered to be mortgaged equipment, rather than owned outright, and comes out of the starport's revenue and world subsidies.

Note that world defenses might not necessarily be invested in ships; for instance, some local defense money might be spent on a mortgage for a deep meson site.

System Defense Example - Jae Tellona

Jae Tellona 2814A560565-8 N Ni De Xb : 3 points

Porozlo 2715A867A74-B Hi : 3 points

Rhylanor 2716A434934-F A Hi Cp Xb : 6 points

Celepina 2913B434456-9 A Ni Xb : 3 points

Major trading partner: Rhylanor.

Freight = $10^{(\sqrt{3 \times 6})} = 17,378$ dtons per week.

This means the Imperium has 17,000 dtons' worth of system defenses keeping guard over Jae Tellona. Total fleet price: 17 billion credits!

Moreover, Jae Tellona has a colonial force totalling only 1000 dtons, worth about MCr 10 in yearly mortgage fees. But with the Imperium there, who's worried?

System Defense Example - Treece

Treece is a backwater on the Spinward Main, with a trade index of -3. With a little creativity we should be able to figure out what's happening there.

Treece 2311 D232866-8 Na Po : -3 points

This tells us that Treece itself has no system defense; however, there should be some number of Imperial patrols that cruise through.

SQUARE THE INDEX.

The result is the number of weeks between visits by Imperial patrols. That means that, for Treece, for every week an Imperial patrol squadron does a flyby, there are 9 weeks of insecurity.

This means a trade index of 0 (zero) implies there's probably always one patrol squadron passing through the system, though there may be occasional gaps.

SUMMARY

A few months ago, Jon Buller and I cooked up a relatively simple way to calculate trade between two systems, and by implication a way to calculate the total interstellar trade in one system. From this, then, we have attached a revenue onto every system. Since the 3l protects trade, then, the budget for this protection can be tied into the commercial revenue of a system. By making a few major assumptions (i.e. one week of trade in a system equals the system defense budget and determines the patrol schedule for that world), hard numbers have been derived as to how well-guarded any given system is. Moreover, the results appear to scale nicely, allowing people to scale defense up or down based on how the Imperium operates in their Traveller Universe.