STARFLEET

AKIRA CLASS STARSHIP

TECHNICAL MANUAL

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TM: 23807025

STARFLEET COMMAND

UNITED FEDERATION OF PLANETS

FEDERATION CLASSIFIED

Version

This is Edition 2 version 0.3.

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About this Document

This document was created to provide fans of the Star Trek franchise a detailed technical insight into the Akira class starships in the Star Trek universe. It is purely fanfiction. The majority of details in this document are purely fiction of the author.

Class Introduction

Mission Objectives

By Order of the United Federation of Planets Starfleet has been tasked with a variety of missions and services for the security and wellbeing of its citizen and other lifeforms at large. Many ships of all sizes and varieties have been specialized and commissioned for scientific research, exploration, diplomacy, civilian assistance missions and defense. Yet there is always the need for improvement and the need for a considerable number of more general purpose ships that are capable of executing a wide range of missions.

The Akira class represents Starfleet's continued effort to satisfy the increased demand of the growing Federation for security. The Akira has been designed and tasked to defensive, tactical, and emergency missions.

Pursuant to Starfleet Exploration and Perimeter Defense Directive, and Federation Security Council General Policy, the following objectives have been established for an Akira-class Starship:

1. Perform a wide range of security and relief missions.
2. Provide capability for crisis prevention, limited crisis management, and crisis recovery and relief missions.
3. Provide capability for execution of Federation policy options in outlying areas.
4. Incorporate recent advancements and improved weaponry.
5. Easy and fast to build.
6. Easy to maintain and repaired for a small crew.

To execute these objectives, the Starfleet Spacecraft Design Advisory Commission recommended to the Advanced Starship Design Bureau (ASDB) Development team on Antares IV, to meet or exceed design goals in the following categories:

Propulsion

- Sustainable cruise velocity in excess of Warp Factor 9.0
- Fifth-phase dilithium controlled matter/antimatter reaction primary power system, based on the more mature Galaxy Class project power system
- Improve Galaxy Class warp driver coil efficiency to meet or exceed 90% efficiency at speeds up to and including Warp 7. Minimum efficiency of 50% to be maintained through Warp 9.2. Lifecycle of all primary coil elements to meet or exceed 1350000 cochrane-hours between neutron purge refurbishment. Secondary coil elements to meet or exceed 2200000 cochrane-hours between neutron purge refurbishment.
- Based on the Galaxy Class project's secondary (impulse) propulsion systems (IPS) the IPS is to be simplified and minimized for easy maintenance, replacement, and production while retaining or exceeding in relative performance. The IPS is to provide sublight propulsion up to and including 0.92 light speed (c) with integrated subspace driver accelerators. All reactor modules to be field-replaceable.

Mission

- Sufficient sensory capacity to conduct all scientific subjects as needed. Sufficient sensory expansion capacity for future scientific missions.
- Considerable cargo space for emergency supply or evacuation mission. Many cargo bays to be convertible as shuttle bay. Sufficient medical capacity for immediate treatment.
- Support facilities for auxiliary spacecraft and instrumented probes for a wide range of squadron and limited fleet operations to include a large hangar bay. Carry extra fuel and spare parts to support such operations.

Environment and Crew

- Environmental systems to conform to Starfleet Regulatory Agency (SFRA)-standard 102.19 for Class M compatible oxygen-breathing personnel. All life-critical systems to be triple redundant.
- 10% of living quarters to be able to support Class H, K, and L and 2% able to support Class N and N(2) environment. All VIP guest quarters to support Class M, H, K, L, N and N(2) environment.
- Ability to support up to 4500 non-crew personnel for mission-related operations.
- All habitable volumes to be protected to SFRA-standard 347.3(a) levels for EM and nuclear radiation. Subspace flux differential to be maintained within 0.02 millicochranes.

Tactical

- Defensive shields to meet or exceed 6.5 x 10^5 kW primary energy dissipation rate. All tactical shielding to have full redundancy, with reserve shielding able to provide 66% of primary shield system rating.
- Tactical systems to include full arrays of Type X phaser bank elements on primary hull providing 360 degree coverage.
- Tactical systems to include compact rapid-fire photon torpedo launchers.

- Ability to transport, resupply, rearm, repair, and utilize a small carrier space wing for tactical and defensive missions

Design Life

- Spaceframe design life of approximately 100 years for an expected service life of 60 years with service life allowance of 20 percent. Major system overhaul or replacement is expected to be done for every 20 years. Continued upgrades are to be within intervals of 5 years.

General Overview

As the Federation prospered and expanded new civilizations were discovered, some friendly and some hostile. In the early 2340s some planners in Starfleet became increasingly concerned over the safety of the vast Federation territory patrolled by aging and limited capability starships. It was a time of peace and their voices were not heeded. Soon the Federation made contact with the Cadassian who were aggressively expanding their sphere of influence. At first it was only a border dispute, but tensions increased steadily. Around the same time contact was made with the Talarian who had a warrior dominated society with xenophobic tendencies. This combination turned relation quickly into a bloody conflict. Meanwhile problems on the Cadassian border stressed the capabilities of the fleet and ships to the limit. It was apparent that a new and more capable workhorse was needed for the Federation. Starfleet Command executed immediately a huge replacement program in which the Akira-class was but one cornerstone.

The Akira class starship entered service in 2364, too late for the first Cadassian conflict. Yet tensions grew soon again at the Cadassian border as well as with the Klingon and Romulan empires. In time Starfleet Command initiated a vast restructuration of support and production facilities to produce and maintain the new generation of starships.

Initial production of the Akira-class began at the ASDB Integration Facility Antares IV, and has since expanded to include the ASDB Integration Facilities at Utopia Planitia, Rigel VII, at Deneb V, and at Enya..

Unlike previous designs in her category the Akira class vessels cannot separate into two vessels. This design decision was approved by Starfleet Command for many of the recent utility class ships. This means that the primary hull and the engineering hull do not need a connecting section and can be merged. This division allowed a more effective deflector shield and a simpler warp field to be used which allowed a smoother transition into warp. Unknown to the designers at the time the warp nacelle configuration proved to be less destructive to the structure of subspace. This was soon discovered during inspection tests in 2370. The discovery was forwarded as a possible solution into newer starship projects like the Intrepid class. With the two hull extensions (extended-hulls) the space-frame resembles an ancient earth sailing boat known as a Catamaran.

In order to secure a fast and low risk development it was decided to base many system components on the Galaxy project and improve on them. Accordingly, it was decided to put the advanced torpedo weapon systems into a separate pod design while initially incorporating a standard system in the primary hull and keeping the option of upgrading it. This allowed the weapons pod to be modified according to weapons development progress without having to change the overall ship design. From the beginning it was clear that the three deck torpedo system of the Galaxy class project needed to be made fit for the Akira class hull. As system redesign, risk, delay, and failure was high it was decided to have two parallel torpedo launcher system developed; a conventional compact rapid firing system and a radically new system. The conventional torpedo launcher design proved to be more mature and was included in the production Akira class ships. As more possible but risky improvements became clear the project was divided into two teams. The main team was responsible for the basic Akira class design. A team on Thelavor, Andor was the second team and responsible for an overall improved variant based on the basic design. This team was specifically chosen for its reputation and design track record. This variant was called Akira-P type, P for performance. The Akira-P type entered service in 2368 due to many delays in development of key systems and will have the radical torpedo launcher system installed. Only three ships of this type have been approved: USS Ironheart NCC 65347, USS Nubia NCC 66123, USS Dragon Jaw NCC 66977. The radical torpedo launcher system went on to be further developed as upgrades to starbase defense. A third generation system will eventually be part of the Prestige class project expected to be commissioned in 2399.

In order to cover the vast territory of the Federation with the least ships available Starfleet Command pursuit the generalization of ever bigger ships. However, this resulted in less and less ships being build. Realizing the problem Starfleet Command requested the Akira class ship to be more flexible in defensive and support mission. For this reason it was decided to have the Akira class ship include more cargo space and a big shuttle bay both of which are to be reconfigurable for either function. This allowed the ship to carry out needed transport, supply, evacuation or troop mission without having to wait for the specialized ships to be present. When assigned a space wing the Akira class can act as a Space Control Ship vastly increasing local defense and security without additional ships needed as support. Starfleet Command also envisioned this configuration to be able to carry out quick strike missions behind the lines. It was obvious the compact ship was not suited for extended battle. In order to increase the survival rate, Starfleet sought to maximize the firepower to ensure a quick win. Accordingly the torpedo system was prioritized and the number of tubes increased. So was the crew requirement for such missions. The ship had to be able to be utilized by a small crew in case of heavy casualties or the lack of personnel due to war.

Author's note: To date the Akira class is the most torpedo heavy ship in its hull size.

Several recent incidents with the Borg, the loses suffered, and the rising threat of the Dominion had prompted Starfleet Command to deploy space wings to all Akira class ships as soon as they are available. This has led to the development of newer fighters to replace the age old Peregrine design. With these the Akira class ship has morphed into the backbone of every fleet. The Akira-class was assigned more and more patrol and defense related duties as well as intelligence missions until the Dominion War. In 2370, Akira class ships began deploying additional communications relays in various systems of their patrol area. These missions will prove vital during the Dominion War when the Dominion tried to disrupt Federation communication by destroying communications relays.

Like many the Akira class ships were overwhelmed by the initial Dominion attack but unlike many most of them avoided destruction to fight another day. While the Dominion War took a heavy toll on the fleet, the Akira class proved invaluable in defense and evacuation of attacked systems. The class was successful in most single engagements and its presence often resulted in a better outcome than the situation suggests.

As the war progressed and the Federation lost men and many valuable systems the remaining facilities were all overloaded with ships needing essential repairs. The situation was such that many necessary but not vital repairs had to be done by the crews themselves. Thanks to the foresight of the planners and engineers the robust and simplified design gave the Akira crews an edge over other less fortunate ship crews. The Akira class ship was among a small group of ships that could keep a readiness rate in excess of 80%. Another problem was that upgrades were virtually not available. As usual necessity is the mother of invention. A small number of ships crew were able to gather resources to create their own version of ablative armor and applied it at critical areas of the ship.

During the war Akira class ships often served as destroyer squadron flagships within fleets and on important group missions. They served in many frequent defense setups in that capacity. Although many were sunk, their performance against superior forces often proved their value.

After the end of the Federation-Dominion War in 2375, the Akira class continued to be produced to fill the losses of the war. With the appearance of many advanced post-war designs like the Luna, Prometheus, and Sovereign class ships the Akira class' glamour has faded. The Akira class has become outdated overnight. The Akira-P type was viewed as too complicated and just not attractive anymore. The Federation Council preferred the newer ships and was unwilling to approve further production of some old military favorite toy. Only one ship of this type, USS Dragon Jaw, survived the war and remains in service. Starfleet turned to modifying the Akira class ship. Among the various small modifications the ablative armor is the most critical. Ablative armor is still a highly guarded military secret and approval from Starfleet Command is needed for its use. For this reason only certain areas of the ship utilize ablative armor. The limitation is such that should a hostile force attempt to capture the ship it won't be able to attain any ablative armor left. The Akira class now replaces the Excelsior class and complements the Ambassador class as the backbone of the tactical and defensive fleets of Starfleet.

Author's note: USS Ironheart was lost during the defense of Benzar. She rushed by and stayed on station to help the defending starbase long after a retreat command was given by the 11th fleet. USS Nubia was lost in the defense of the Chin'toka system. She fell victim to the Breen energy dampening weapon. USS Dragon Jaw, half wrecked after intercepting Dominion reinforcement for Betazed, was towed to Mars for extensive repairs, and there she took part in defending Starfleet Headquarters against the Breen attack. Heavily damaged again and with more than half of her crew lost she would stay out of action until the final invasion of Cardassia.

Construction Chronology

Starfleet Command issued a request to the ASDB Development team on Antares IV in 2358 for a design and engineering specifications for a new Cruiser as the main instrument of Federation security. Starfleet Command requested a smaller, more heavily armed vessel than the Ambassador-, and Excelsior-class which can be crewed with a small crew if necessary. Starfleet Command was expecting fast vessels offering great mission flexibility. Additionally, the Akira-class was to be able to support a great number of auxiliary vessels. The opportunity of designing a major class for the fleet prompted the team to pay homage to Earth by basing the design on pre-Federation Earth starships.

At the time the Ambassador Class vessel was the premiere ship of Starfleet with the Galaxy class ships near completing their shakedown cruise. Starfleet Command expected to divert part of the development team to the new project.

The first hull was laid in 2361. 2363 saw the installation of the compact impulse drive and a further developed and modified Galaxy class type warp core. The computer cores followed soon allowing a warp core test in the following spring of next year. At the end of 2363 all compartmentalization, and crew-compartment pressurization was completed and the ship was ready for test flight. The hull received the name USS Akira and the temporary registry NX-62497. The ship was commissioned six months later.

Author's Note: There had been a proposal for a design with a fly-through bay and horizontally mounted warp core. However, the space constraints imposed by having three catapults would not allow the launching of big sized runabouts or fighters. A fly-through would only be possible for shuttles up to medium size. Several safety considerations with emergency ejection of the horizontal warp core were raised. As a ship is likely moving forward an ejection to the front would make it meaningless. An ejection to the rear, however, poses great danger of hitting the aft weapons pod or wing or extended-hull or nacelles. As flight control is likely to fail in crisis situations a ship will tumble due to self-generated autorotation. At relative common ejection velocity of 40 m/s a 40 m warp core needs two seconds to get clear toward the bottom, and four seconds to get clear toward the top. (1 second to clear its own length) For safety the ship may not rotate with more than 0.47 RPM. It is more dangerous if the ship rotates sideward. A horizontal warp core would be restricted to deck 5 and above if umbilical resupply connection port designs are ignored. If it is placed in the engineering section at the bottom it would have to be below the craft maintenance bay below the flight deck and behind the deflector dish assembly. Another proposal called for a twin warp core at the sides. In any of these proposals the matter/antimatter reaction assembly (M/ARA) would be short. A vertical warp core mounting was finally chosen.

Spacecraft Structure

Main Skeletal Structure

The primary spaceframe is constructed from an interlocking series of tritanium/duranium alloy macrofilament truss frames. These members average 1.2 square meters in cross section and are located, on average 20 meters apart across the ship's exterior.

These larger trusses provide the skeletal framework for the major ship systems. Smaller trusses are located approximately every five meters, and provide internal and core support for the spaceframe interior.

Attached to this frame are a variety of systems which utilize the hull for their operation, including sensor, communications and field systems.

Secondary Hull Framework

Mounted to the primary spaceframe is a secondary framework of microextruded terminium trusses to which the inner hull structure is physically attached. This frame work is mounted by a series of semirigid polyduranide support rods, which absorb a significant amount of stress as well as vibrations.

Secondary segments are separated from each other, in order to allow internal replacement or rearrangement without compromising the primary spaceframe.

The Structural Integrity Field (SIF) is active during powered spaceflight, providing reinforcement of the physical frame. The SIF is distributed through a network of molybdenum-jacketed waveguides, which in turn distribute the SIF energy into ceramic-polymer conductive elements throughout the spaceframe. Without the SIF, the spaceframe would be unable to withstand accelerations greater than 7.4 m/s^2 without significant hull deformation, or greater than 19.5 m/s^2 without unrecoverable structural damage. Without the SIF, the hull would begin to collapse under its own weight.

The exterior hull is attached to the primary frame by 4 cm diameter electron-bonded duranium pins at 1.2 meter intervals. These pins are covered by an AGP ceramic fabric jacket, which provides thermal and radioactive insulation of the spaceframe from the exterior hull. All these are gamma welded together.

Hull Layers

The exterior shell of the spacecraft consists of multiple layers which reinforce and protect the interior, including integrated waveguides and pathways for various fields and other utilities.

The exterior shell substrate is composed of interlaced microfoam duranium filaments. These filaments are gamma welded into a series of contiguous composite segments that are 5 cm. thick and are, on average, two meters wide. The substrate segments are electron bonded to three reinforcing layers of 1.2 cm biaxial stressed tritanium fabric, which provides additional torsion strength.

In addition to the standard duranium hull plates, it is possible to install Starfleet second generation ablative armor.

Structural Integrity Fields

The tremendous torque and stress loads during flight which the hull must sustain against are impossible without substantial reinforcement. This reinforcement is provided by the Structural Integrity Field System (SIF). The SIF applies forcefield energy directly to the spaceframe to absorb load forces on the structure.

Field generation is provided by a total of four SIF generators, two field generators located on deck 7 and two additional generators located on deck 12. Each generator consists of a cluster of sixteen 12 MW graviton polarity generators that feed a triple of 250 millicochrane subspace field distortion amplifiers. Heat dissipation for each generator is provided by a pair of 300000 megajoules per hour continuous-duty liquid helium coolant loops. Two backup generators are located on decks 7 and 12, providing 55% of maximum rated capacity for up to 12 hours. Typical duty cycle is 36 hours online with 24 hours maintenance, and with Graviton polarity sources needing servicing of superconductive elements every 1500 operating hours.

With fully active SIF the load limit can be as high as 156000%. Normal operation requires at least one generator to be active with additional ones to be activated by discretion of the Flight Control Officer. Safety programs can automatically activate additional generators or increase output if projected propulsion activation would exceed current capacity.

Author's note: The relative SIF generation is 125% compared to a Galaxy class ship with increased amplifier redundancy. This is necessary for the "extended" spaceframe design.

Inertial Damping System

As with loads on the spaceframe, inertial forces act on any objects within the ship. For their protection another system had to be operated together with the SIF. This system is the Inertial Damping System (IDF). This system generates a controlled series of variable-symmetry forcefields that serves to absorb the inertial forces before affecting the crew. The IDF is a separate system from the SIF, but is fed by a parallel series of waveguides that are conducted through synthetic gravity plates.

Flux generation is provided by two field generators on deck 7 and two generators on deck 12. Each generator consists of a cluster of twelve 500 kW graviton polarity sources feeding a triple of 150 millicochrane field distortion amplifiers. Heat dissipation for each generator is provided by a pair of 100000 megajoules per hour continuous-duty liquid helium coolant loops. Three backup generators are located on decks 7 and 12, and providing 75% maximum rated capacity for up to 12 hours. Typical duty cycle is 48 hours online with 12 hours maintenance, and with Graviton polarity sources needing servicing of superconductive elements every 2500 operating hours.

Author's note: The relative IDF generation is 133% compared to a Galaxy class ship with increased amplifier redundancy.

Emergency SIF/IDF Procedures

Failure of the SIF or IDF can result in loss of lives and ship. For this reason, each system has several types of redundancies built into each system, and likewise many layers of emergency protocols have been placed to anticipate the possible failure of each or both of these systems.

Failure of two or more generators will trigger an immediate signaling of Yellow Alert and the procedures for a safe deceleration until the vessel reaches full stop. After repairs are done the Commanding Officer and Executive Officer must determine whether the primary and secondary mission objectives can be achieved safely.

The failure of all generators requires an immediate Red Alert status. The Commanding Officer must stabilize the situation before taking steps to minimize potential risks to the ship and crew, and then to begin immediate deceleration maneuvers. Additionally, severe operational limits are imposed on vehicle maneuvers in form of adjusted steering and engine control protocols. Immediate return to sublight must be accomplished, except during ongoing combat situations. This must be accomplished by a simple field collapse maneuver; differential field maneuvers are NOT permitted.

Once it has been determined that no further system failures are imminent, the ship must be powered down to minimize incidents. Starfleet Command has to be notified for possible assistance and rescue efforts.

Saucer Separation Systems

The Akira-Class cannot separate its saucer hull from its engineering sections.

Ablative Armor Systems

The ablative armor system was developed by Starfleet R&D, Tokyo. This armor is the second generation based on war lessons learned from the Dominion War. The armor is 2cm thick in a hexagon structure. It consists of destructible material that dissipates, absorbs, and sublimes when exposed to high phased energy. Incoming energy is first dissipated over the hull armor surface. When the classified capacity threshold is reached, the molecular matrix bakes off at a controlled rate. The resulting cloud may scatter incoming beams disrupting their coherence.

In 2375 Starfleet Command approved limited application of ablative armor on Akira class ships. It is placed around the bridge, nacelle mounts, and aft-sail torpedo mount.

Author's note: Scattering clouds are a favorite in SciFi but are not realistically effective as they are thin and size-distances too small for any significant changes to weapons fire. Not to mention they are already saturated with energy.

Command Systems

Bridge

Overview

Primary operational control of the Akira-class is provided by the Main Bridge at the top of the primary hull. It is located on Deck 1. The bridge directly supervises all primary mission operations and coordinates all departmental activities. If a space wing is assigned, the bridge will be assigned to ship operation only. In addition, a Combat and Information Center (CIC) will be created for command, and flight operations of units under command.

The bridge is a highly restricted area; only security clearance personnel and authorized bridge personnel are allowed on the bridge. A small weapons locker is available to outfit the entire bridge staff with type II phasers. Only top officers may open the locker. Only the security officer may carry a weapon at any time.

The bridge is an ejectable and spaceworthy module with limited sublight capability. It serves as lifeboat for the bridge crew in case of a sudden or automatic evacuation.

Purpose

The bridge processes all shipboard related and tactical information. This information is collected, displayed, evaluated, and disseminated. This is primarily done by the computer system, and supervised by the operations officer. The purpose is to keep command and control stations informed of the status of the ship and the tactical situation at all times. This means the bridge must receive and process up-to-date information from all systems within the ship as well as data from Starfleet channels and allied ships. The bridge computer system must present the data in a form which will permit rapid interpretation of each new bit of information, and distribute information with its significant implications to all who need it in the performance of their duties. Procedures employed can be summarized as follows:

1. Collection.
2. Display.
3. Evaluation.
4. Dissemination.
5. Control.

Author's Note: Command is represented by the Combat and Information Center (CIC) while the bridge represents the ship as a unit within the command.

Collection

By means of internal and external communications systems, the bridge system collects data from the following major sources:

1. Internal system reports and internal sensor feedback
2. Long Range Sensors
3. Short Range Sensors
4. Communications records (posts, orders, etc.) and interceptions

5. ECM specific receivers and sentry routines
6. Visual lookouts

Author's note: As all active sensors have a passive sensor component integrated the listing of either active or passive has been dropped.

Display

Data collected are displayed in following format types:

1. **Tactical.** A relative display of the immediate surrounding typically beyond and within weapons ranges. The magnification can be adjusted as needed and may be automatically adjusted in case of imminent threat. It displays astronomical points and all sensor contacts with their appropriate symbols for friendly, enemy, civil or unknown with accompanying weapons ranges if available, velocity and bearing depending of magnification. It displays target assignment or engagement as soon as a friendly ship's targeting system has been activated. It displays enemy targeting if available as well as weapons fire or ordnances. Optionally known or projected flight paths may be shown.
2. **Strategic.** A starmap display of all sensor ranges including those of friends and intelligence. The magnification can be adjusted as needed. It displays all known astronomically relevant objects and local occurrences as well as all sensor contacts with their appropriate symbols for friendly, enemy, civil or unknown. Fleets, squadrons or flights are automatically identified as such and simplified. For each contact it displays velocity and bearing.
3. **Mission.** A relative display like the tactical but can be extended to planets. It displays a simple map with all relevant symbols for vessels, troops, building types, and structures. Troop types are displayed with known status and bearing.
4. **Ship Tactical.** A relative display of all ships in range, showing all axis, velocities, bearing, and additional information if requested. The magnification can be adjusted as needed and may be automatically adjusted in case of imminent threat. Optionally weapons, tractor, transporter ranges can be shown. Notifications are given if any of these ranges are reached as well as border lines, astronomical objects or astronomical phenomena perimeters. Target acquisition or course plotting are shown if available.

Evaluation

Evaluation (appraisal, determination of the tactical significance of information collected and displayed) is accomplished on two levels:

1. The recognition of possible intend based on tactical data (time, velocity, distance, bearing) of known contact.
2. The broader integration of the information thus gained with all available intelligence and information of tactical, strategically, political or social value, and the arrival at a conclusion or decision.

Dissemination

Information which has been collected, processed, and evaluated must be provided to those who need it. The following command and control stations are kept up to date:

1. Primary ship control.
2. Weapon and defense control.
3. Security control.
4. Space control.

Control

Having collected, displayed, evaluated, and disseminated each new bit of information, the bridge may be directed by command to take certain actions or to assume certain combat functions or missions. In reverse the bridge can direct the CIC to assume certain ship functions.

Following functions are usually assumed by the Bridge but may delegate to the CIC:

1. Control of all sensors and electronic countermeasures equipment.
2. Control of communications with other ships or vessels. (CIC always does this anyway)
3. Control of units under command and deployment of auxiliary vessels (CIC always does this anyway)

Author's note: Electronic countermeasures (ECM) are like most sensors have an active and passive component. Therefore, either mentioning has been dropped. Strategically, all active sensors must be under tight control to prevent from giving away one's position, velocity, and bearing. All communication systems in Starfleet are standardized in one common system with federation wide automatic integrated data exchange implemented, although logbook and extensive sensor detail data still has to be send on command for security and package size reasons. For this reason there is no need for a primitive system like JTIDS of the United States of America which was created due to incompatibility of systems among the armed forces.

When directed by command, the bridge will assume control in the following situations:

1. Control of ship actions and defense.
2. Executing certain objectives
3. Jamming certain or all enemy sensors.
4. Control of immediate space

Personnel

Normally, all command personnel are assigned to the Bridge for duty and for administrative purposes. The bridge staffers are a part of the ship operation department. The operations officer is the head of the department.

Every member is trained to perform the duties and accept the responsibilities of each station in Combat. Personnel participate in formal training programs aboard ship and in team-training activities at fleet training centers. In addition, the crewmen are rotated at the various positions during normal cruising watches to provide the broadest possible experience.

In the presence of a Space Wing or other units under the command, the operation of a CIC is necessary. The CIC itself is composed of Tactical Direction, Strike Operations, Space Control, Intelligence, Mission Specialist, and Systems Specialist. The extra personnel for CIC are provided by Starfleet Command and are attached with the Space Wing for simplicity. The following personnel are necessary in operating the CIC:

CIC Personnel

1. **Commanding Officer**
2. **Tactical Officer/Tactical Direction/Fire Control/TAC (Space Wing)**
3. **Mission Specialist/OPS (Space Wing)**
4. **Strike OPS (Space Wing)**
5. **Intelligence Officer (Space Wing)**
6. **Controller/Communications Officer/COM (Space Wing)**
7. **System Specialist (Space Wing)**

Bridge Personnel

8. **Executive Officer**
9. **Helmsman/CONN**
10. **Tactical Officer/Security Officer/Weapons Officer/TAC II**
11. **Science Officer/Mission Specialist/SCI**
12. **Engineering**
13. **Starship Operations/Mission Specialist/OPS II**
14. **Ships Counselor/Diplomat**

Starfleet employs a three 8-hour shift system for ship operation. At a commander's discretion a four-shift system of six hours may be adopted to keep crew fatigue down if necessary.

Typical Shift command is as follows:

- *Alpha Shift* - Captain (CO)
- *Beta Shift* - Executive Officer (XO)
- *Gamma Shift* - Night Conn

Personnel/duties

1. **Executive Officer/Evaluator:** By his qualifications and experience, he is well versed in all matters pertaining to Starfleet operations. He is kept informed of the general strategic and tactical situations in order to make the best evaluation of information available. The evaluator is charged with general supervision of the crew and ship.
2. **Commanding Officer/CIC officer:** He is charged primarily with the strategic operation of the Command and control of the Operation of all units under Command.

3. **Controllers:** They control, communicate and direct spacecraft in the assigned area. Some act as Strike Ops controllers. Controllers assist the tactical officer in evaluating the tactical situation and in coordination with Strike Ops.
4. **Officer of the watch:** He ensures the proper proceeding of procedures in accordance with regulations. He is responsible for maintaining logs and for the performance of the watch.
5. **Tactical liaison officer:** An officer responsible for sensor analysis and tactical evaluation. His purpose is to keep the Commanding Officer apprised of the overall tactical situation and recommend courses of action as appropriate. His duties include affecting the transfer of targets to Strike Ops and to tactical control stations. He must have a complete knowledge of the target designation and acquisition situation.
6. **Mission specialist:** An officer responsible for all information vital for missions. He has to be familiar with all possible natural characteristics of the areas of operation. He has to provide any peculiar information which could influence missions.
7. **Systems Specialist:** An officer responsible for all equipment necessary for the operation of the CIC. He has to be familiar with electronic warfare.

Author's Note: Usually the captain controls the Command from the CIC while the XO controls the ship on the bridge. Fire control was needed on old sea-based ships in order to calculate fire solutions and direct the cannons. In an all automated Star Trek universe with intelligent munitions this is no longer needed. However, keeping oversight of multi vessel action could make it viable in coordination of actions.

CIC Purpose Summary

The combat information center is an agency to assist the commanding officer in grasping the situation, maintaining situational awareness and ease tactical decisions. This especially simplifies and clarifies the work of command when multiple vessels or crafts are involved.

Under certain circumstances, CIC will be given Space Control. In this case CIC will control any vessel in the assigned space. This is usually the case when the ship is the lead ship of a unit of ships.

Bridge Layout

At the very front of the bridge chamber is a large display panel measuring 3.0 x 1.5 meter. This main viewer is the central display for all important visual projection for the bridge crew. This main viewer performs all the standard duties expected of it. However, the viewscreen is not always activated like most other Starships. It is a full Holographic display, which can be activated upon request. When the screen is not active, the bulkhead will be visible.

The central area of the Main Bridge provides seating and information displays for the Captain and two other officers. The Captain's Chair is raised from the rest of the Bridge Officers, to that of the Surrounding level which includes Tactical and Operations. The two Officer seats are equipped with fully programmable consoles for a variety of uses.

Directly fore of the command area is the helm and operations station, which faces the main viewer.

Aft of the command area is the tactical/security control station. Directly behind it is the strategic operations table.

The aft wall of the bridge contains a large master systems display monitor, similar to the one in main engineering. All relevant ship information is displayed on the cutaway image. This monitor can be used to direct ship operations. Configurable stations round up the controls.

Against the port side walls of the main bridge are the consoles for Science, Mission control.

Against the starboard wall of the main bridge is the large engineering station. This station has access to all systems and can display and control any of those. Directly aft of this station is the Engineering II station, which is fully configurable to run any other function.

Access to the bridge is provided by two turbolifts, two stair wells and one emergency ladder which connect the bridge to a control room on Deck 2. Except for the emergency ladder, the security officer has complete view of all entries which are all at the sides of the front display. Aft of the bridge are two doors leading to a conference room and the Captain's ready room.

The bridge module (deck 1) can be ejected as a whole; therefore, there are no escape pods necessary. The module has limited impulse propulsion and life-support for 252 man-days. Two pods on deck 3 are reserved for the bridge crew of the watch and senior officers. Only four other shift officers are allowed to join if necessary.

System Diagnostics

All ship system components have their own logs and self control and diagnostics. However, in case of preparedness or damage suspicions, all key operating systems and subsystems aboard the ship can be checked by running specially preprogrammed and intelligent diagnostic routines. These various diagnostic protocols are generally classified into five different levels, each offering a different degree of crew verification of automated tests. Which type of diagnostic is used in a given situation will generally depend upon the criticality of a situation, and upon the amount of time available for the test procedures.

Level 1 Diagnostic – This is the most thorough type of system diagnostic short of complete disassembling. Extensive automated diagnostic routines are performed in combination with physical verification of system mechanisms. This procedure was designed to guard against possible malfunctions in self-testing hardware and software. In many cases, the subject system must be disconnected and taken off-line.

Level 2 Diagnostic - This procedure is like a Level 1, but requires only physical verification of fewer elements. This procedure halves the time of Level 1.

Level 3 Diagnostic - This procedure is like Level 1 and Level 2, but requires only physical verification of key elements. This procedure is intended to be performed in ten minutes or less.

Level 4 Diagnostic - This automated procedure is intended for use whenever a given system is suspected. This procedure uses extensive automated diagnostics. For most systems, this can be performed in less than 30 seconds.

Level 5 Diagnostic - This automated procedure is intended for routine use to verify system performance. This procedure usually requires less than 2.5 seconds and is typically performed once a day. This also may be performed during crisis situations when time and system resources are carefully managed.

Bridge Stations

Flight Control Systems (Helm/Conn)

Traditionally known as the Conn, Flight Control is responsible for the actual navigation and steering of the ship. Many of the functions are automated, and offer existing flight programs to choose from. Despite only requiring the touch of a button, its importance requires a living officer to oversee these operations at all times.

The helmsman performs the following tasks in fulfilling his duty:

1. *Navigational reference & course plotting:* Verification of position and course with the help of sensor data and course projections. In case of doubt or alert, sensor data from long and short range systems can be cross-checked.
2. *Supervision of automated flight operations:* The important function of the Conn requires supervision, maintenance and inspection of its function. If required the officer can override and assume manual control of any automated system.
3. *Manual flight operations:* The actual execution of flight instructions and their complex control is done by the computer, but can be manually overridden or directly controlled.
4. *Starship position verification:* The Conn officer is responsible for the position verification of the starship in interstellar space. In concert with other ship resources, such as subspace communications or the science station, the Conn officer can verify the location of the vessel.
5. *Bridge liaison to the Engineering department:* The Conn officer is responsible in reporting any flight or engine malfunction to engineering as he is likely the first to notice failure.

Tactical

The Akira-class starship has a special console dedicated to defensive and offensive systems as well as ship security. During battle boarding security issues are delegated to the security center while system security is delegated to science. Normally the officer at this console has overriding power over the others.

The security center always monitors internal security and protected access to restricted areas aboard the vessel. Under normal operation it assists the tactical and security officer on the bridge.

The tactical officer has complete access to sensor data, system status, and weapon status.

Command Stations

At the center of the bridge is the commander's seat with an accessible console. Further two seating and console access are provided at his sides for guest advisors.

Typically, these seats feature miniaturized status displays for nearly every console on the bridge. Upon LCARS or vocal command, the captain can use these controls to override any console on the ship.

Sciences/ Mission Operations

There are two consoles dedicated to science and mission operation. Sciences I is typically manned by the Science Officer. The station provides complete access to all and any sensor data available to the ship. The science officer typically monitors system security and managed counter measures.

Sciences II is typically configured for mission operation and related issues. In the presence of a space wing, it is responsible for ship operation only. Additional information will be provided by CIC.

Environment

The ship's environmental control console, located near the engineering console, provides an additional layer of interactivity for the Operations Department. However, the environmental controls are highly automated, not normally needing any member of the crew to monitor.

Engineering

Located against the aft wall of the bridge, is the Bridge Engineering Console, a large master systems display monitor, similar to the ones in main engineering. This monitor can be used to manage ship systems directly. The consoles can be configured for limited flight control or to help the Chief Engineer to supervise Main Engineering from the Bridge.

CIC Stations

Intelligence

The console displays any information received by sensors for threat detection, data-mining, evaluation and counter measures.

Tactical/Fire Control

The station displays the tactical situation, the objectives, and the units available. Based on this the officer may direct or assign targets to units available including the ship itself.

Main Engineering

Main Engineering is the *heart* of the ship, comparable to the bridge as the *brain*. The main control stations are located on deck 12, they have access to all major systems aboard the starship. Any system can be regulated from the control stations in engineering. With comprehensive system displays repairs or upgrades are easily coordinated from engineering. Auxiliary control stations and access ports are on upper and lower level on deck 11 and deck 13.

Access to main engineering is provided by a pair of two large blast doors, one at the front and one at the rear on deck 12. Two Jeffries access doors provide access to the whole Jeffries network. Just behind the main doors are the various main control stations where technicians monitor various systems of the ship. In the middle of that space is a floor-mounted situational display desk that offers a comprehensive overall view and access to all systems of the ship.

Further inside is the main control ring corridor around the warp core, where the office of the Chief Engineer is located. It has two emergency blast doors which can be closed to separate the warp core room and the control area from the ring corridor. Numerous ladders and personnel lifts provide access to every engineering level, and numerous access panels to Jefferies tubes on every level provide additional access throughout the starship. On every level there is a general diagnostics control station with basic assembly and repair equipment as well as basic and specific medical equipment stored. Further there is a small ready room for the staff with two replicators, and four reconfigurable personal-use consoles, table and seats available on deck 11. It has a general display screen in the back wall used for briefing teams. Here the general schedule is posted as well as other engineering notices and publications.

In the center of Main Engineering is the Matter/Anti-Matter Assembly (M/ARA) or simply warp core. The primary power for the ship is generated inside the Matter/Anti-Matter Reaction Chamber (M/ARC). This system is under constant surveillance and each part checked manually on a regular basis with independent sensor equipment. This procedure ensures the correct workings of monitoring equipment as well as the machinery.

Access to the warp core is provided by a front port to the Dilithium matrix as well as an over side port for access to the warp plasma conduits.

On deck 11 are the controls for the various Fusion Power Plants, and Impulse Engines. On deck 13 are auxiliary consoles for Main Engineering, along with engineering research, workshops and secondary computer core support. Here is the small engineering dedicated computer core which can run all engineering related tasks independently in case of an emergency. Maintenance teams and Damage Control teams are mustered here.

A typical crew shift compliment in Main Engineering consists of twelve engineers and twenty-four technicians of various grades.

Computer Systems

Computer System

The main computer system of any Starfleet vessel is essentially the autonomic nervous system of the ship body other than the crew. It is responsible for the operation and maintenance of every single system aboard the starship.

Crew interface for the computer system is maintained through the Library Computer and Retrieval System, or LCARS. The LCARS provides both tactile and auditory input for the users, incorporating highly specialized artificial intelligence subroutines and graphic displays for maximum ease of usage.

Number of computer cores

There are two cores side by side occupying space on decks 6, 7, 8 and 9. Each core comprises three primary and one upper level, each level containing an average of four modules. Each module is composed of 256 clusters controlled by a bank of sixteen isolinear chips. The clusters themselves are optical transtator clusters with 1024 segments of FTL nanoprocessor units.

Author's note: The original computer cores occupy 4 decks. The processors are 60% faster than the ones on Galaxy class ships. This is quite a development in such a short time and while the Galaxy class have just entered service some years ago.

Type of computer cores

The computer cores found on the Akira class ships are experimentally optimized versions of the Galaxy Class Isolinear Processing cores. Total computer processing power is 45.7% compared to the Galaxy class but individually each core equals 64% of a Galaxy class computer main core processing power. The system is powered by a smaller, regulated EPS conduit directly from the warp core. Cooling of the isolinear loop is accomplished by a regenerative liquid nitrogen loop, which has been refit to allow a delayed-venting heat storage unit for "Silent Running." For missions, requirements on the computer core rarely exceed 45-50% of total core processing and storage capacity. The rest of the core is utilized for various scientific, tactical, or intelligence gathering missions - or to backup data in the event of a damaged core. Each core incorporates miniature subspace field generators (MSFG), which creates a symmetrical, nonpropulsive, field distortion of 3350 millicochranes within the faster-than-light (FTL) core elements. This permits data to be processed and passed at rates far exceeding the speed of light.

The Akira-P type have a newer computer core type with total computer processing power of 68.5% compared to the Galaxy class but individually each core equals 96% of a Galaxy class computer main core processing power. This computer type will also be used in the coming Intrepid class.

Core Memory

Main memory storage for the primary computer core is provided by 896 dedicated modules of 144 isolinear optical storage chips. Under LCARS software control, these modules provide access to memory averaging around 4600 kiloquads/second. Total storage capacity of each module is about 630000 kiloquads, depending on the current LCARS software configuration.

The Akira-P type have a new experimental data network which allowed transfers of 6200 kiloquads/second from also newer version of optical storage chips with a capacity of 725000 kiloquads.

Subprocessors

A network of 192 quadritronic optical subprocessors is distributed throughout the ship, augmenting the main cores. Within the habitable volume of the ship, most of these subprocessors are located near main corridor junctions for easy service and updating. While these subprocessors do not employ faster-than-light elements, the distributed processing networks improve overall system response and provide redundancy in emergency situations. Like the computer cores they are constantly fed with local system data and other subprocessors through the ODN network.

Both the Bridge and the Flight Control Center have each twelve dedicated and twenty-two shared subprocessors, allowing for the operation of ship's systems and flight operations in the event of computer core failure. These subprocessors are linked to the main computer cores through several redundant, protected optical data network trunks, as well as through ultra-high frequency radio (RF) links, providing even emergency data communications with the bridge.

Warp Propulsion System

Matter/Antimatter Reaction Assembly

The Warp Propulsion System is the heart of any Federation deep space starship, and at the core of the Warp Propulsion System is the matter/antimatter reaction assembly (M/ARA). Energy derived from the M/ARA is the principal power generation system within all ships of the United Federation of Planets Starfleet. The core used by the Akira-Class starship is a modified class 7 warp core of the Galaxy class to fit into the slightly smaller space. The lesser power production requirement eased safety requirement which made it cheaper to produce. This arrangement also lessens the cost for the Galaxy class war core as there are only minor differences in production procedures and tooling required.

The M/ARA consists of four subsystems: reactant injectors, magnetic constriction segments, matter/antimatter reaction chamber and power transfer conduits.

The Akira-P type has a quantum optimized and compacter class 9 warp core which delivers 10% more power while occupying less space.

Transient Warp Booster System

During the first design phase of the Akira class, concerns were raised about possible warp plasma synchronization problems. The Thelavor team leader proposed a solution from a parallel research project he was working on. The proposal was approved and quickly took form. Meanwhile the problem became known to other Starfleet engineers working on power conduit development. An unofficial race broke out between the groups. After several months both were able to present working solutions. The Starfleet Spacecraft Design Advisory Commission became aware of the incident and called in a review session. The commission intended to force a decision on the power conduits, but Starfleet Command soon was enticed by some advantages of the booster system. Finally, the commission requested both solutions to be included. The booster system was to be the primary system with the other as backup.

The Akira design was changed to allow the main warp plasma conduits to split into two lines shortly before the booster system. The second line remained as backup and as spare part.

The booster system serves primary as a buffer to allow synchronization of the warp plasma flow. It can control and manipulate any parameter of the warp plasma flow to the warp nacelle. The warp plasma stream from the warp core is kept flowing inside in an infinite loop before passing through an accelerator & valve system. The disadvantage is that the system requires more power than warp plasma conduits.

However, there are multiple advantages to the booster system. As it holds a significant amount of war plasma it could keep supplying the war drive for a short time even if the warp core does not to supply new warp plasma. At maximum warp core output level and fully filled it could theoretically supply the warp drive for up to 20 seconds. This can be extended if the ship slows down, but the booster system will have to drain some of it to power itself.

Provided the booster system is holding enough warp plasma, it can bring the ship to warp faster than the warp core. For a short time it could also supply the war drive with a greater warp plasma stream than can be produced by the warp core. The ship would effectively be able to go to higher warp velocities, but would be limited by warp coil stress, SIF and main deflector shield power.

Final tests revealed, the energetic war plasma was causing extreme radiation stress and material fatigue on the booster system despite generous considerations. The required maintenance was ten times higher than the warp core. Starfleet Command issued a standing order for chief engineers not to use it at full capacity unless required. It was recommended to be used at 10% capacity in order to align with warp core maintenance. Subsequently a cheaper much less capable, but easier to maintain design was approved for production. It still offered 20% of the original capacity.

Warp Field Nacelles

The warp drive on the Akira class is a type XIII warp drive. The energetic plasma generated within the Warp Core (M/ARC), passed through the power transfer conduits, arrives in the Warp Nacelles, where it is utilized in the creation and maintenance of the warp propulsion field. Each nacelle on an Akira-class starship consists of a specific set of subsystems that include the warp field coils, plasma injection system, emergency separation system and the maintenance docking port.

Each nacelle is constructed similar to the rest of the ship hull. Triantium and duranium framing members are combined with longitudinal stiffeners, and overlaid with 2.5 meters of gamma-welded triantium hull skinning. To further augment the nacelles structure, given the primary role of the Akira-class, an additional layer of Ablative armor has been added to both the nacelle hull and the nacelle mounts.

To brace the nacelle against the stresses of the Warp Field generation and use, directionally-welded cobalt cortenide provides additional mechanical bracing. All framing and skinning of the nacelles and their support extended-hulls accomodcates triply redundant conduits for SIF and IDF systems, giving additional support outside of the standard mechanical means.

In the event of catastrophic failure in the plasma injection system or warp nacelles, or if the nacelle is damaged in combat and could not be safely retained, the emergency nacelle separation system would be used. Each nacelle has a total of ten explosive structural latches. When detonated, the nacelles will be blown down and away at 30 m/s. These latches are standard Starfleet issue, and originally developed for the Galaxy Class starship.

Access to the nacelles is restricted to sublight, impulse-powered propulsion with the M/ARC in shutdown or during starbase layovers, due to the tremendous heat and radiation generated by the plasma induction coils. Access is accomplished either through external maintenance airlocks or by single-occupant turbolift through each support extended-hull.

Warp Field Coils

The warp coils of the Akira class are based on the warp coil used by the Galaxy class project. Each nacelle has a set of seventeen pairs of warp coil segments. The total mass for all warp coils masses 1168750 metric tonnes. Due to the fact that a smaller warp field is needed the overall efficiency of the system is higher than that of the Galaxy class. Higher warp velocities and endurance are also available but limited by the lesser number of warp coils.

Antimatter Storage and Transfer

All antimatter is kept contained by magnetic conduits and in compartmentalized tank while at a standard Starfleet fueling facility. During normal refueling, antimatter is passed through the loading port on deck 17, a 1.75m wide circular probe-and-drogue device equipped with twelve physical hard dock latches and magnetic irises. Surrounding the antimatter loading port system on deck 16 are seven storage pods and on deck 15 are fifteen storage pods in a pyramide arrangement. Each storage pod measures 4 x 8 meters and is constructed with polyduranium, with an inner magnetic field layer of ferric quonium. Each pod contains a maximum volume of 100 cubic meters of antimatter, giving the 22 pods a total useable volume 2200 cubic meters, enough for a normal mission period of 3 years. This will be reduced to 69 days in the presence of a Space Wing.

Each is connected by magnetically shielded conduits to a series of distribution manifolds, flow controllers, and electro-plasma system (EPS) power feed inputs. For emergency situations, the entire storage pod assembly can be detached by releasing the safety latches and replaced in less than ten minutes. While small groups of pods can be replaced under normal conditions, the magnetic pump transfer method is preferred.

The Akira-P type employ four 1250 cubic meter storage pods which occupy less space, increased safety by reduced ejection time, and less boil-off. These are installed in place of 17 of the basic storage pods. With the remaining 5 storage pods the Akira-P has a total useable volume of 5500 cubic meters. The tank bases are located on the ceiling of the deck to enhance ejection. All tank bases are shock mounted to reduce damage. Any tank could be ejected trough side hatches on the bottom at a velocity of at least 40m/s, with a maximum of only three ejection cycle, that's about one to two seconds. The whole antimatter storage area could be ejected in an emergency, if needed.

Due to its very nature, transporters cannot be used to move large amounts of antimatter without extensive modifications to the pattern buffer, transfer conduits and transporter emitters.

Refueling while in interstellar space is possible through the use of starfleet tanker craft. Tanker transfers run consider risks, as refined antimatter is an extremely valuable commodity, and vulnerable to Threat force capture or destruction while in transit. It is standard operating procedure for all tanker craft to have an escort of either Escort, Frigate or Light Cruisers during any movement.

Warp Propulsion Fuel Supply

The fuel supply for the warp propulsion system, or WPS, is contained within the primary deuterium tanks (PDT) on deck 4 through 7. The PDT, which partly feeds the impulse propulsion system, is normally loaded with slush deuterium at a temperature of 13.8K. The PDT is constructed of a forced-matrix 2378 cortanium and stainless steel, with foamed vac-whisker silicon-copper-duranite insulation laid down in alternating parallel/biased layers and gamma-welded.

The total useable volume, which is compartmentalized against losses due to structural damage, is 33000 cubic meters (97.8%). A full load of deuterium is rated to last approximately 2 years. This will be reduced to 160 days in the presence of a Space Wing.

Bussard Ramscoop Fuel Replenishment

A Bussard collector can be found at the forward end of each warp nacelle. It consists of two main assemblies. An assembly consists of an ionizing beam emitter, a magnetic field generator/collector and a continuous cycle fractionator. The curved nacelle endcap is one of the largest, single cast pieces of equipment on the ship. It is formed of reinforced polyduranide and is transparent to a specific narrow range of ionizing energies produced by the emitter. It is the function of the emitter to impart a charge to neutral particles in space for collection by the magnetic field. At warp velocities, the ionizing energies are transitioned into subspace frequencies so that the beam components can project out ahead of the starship, decay to their normal states, and produce the desired effect.

Based on theories developed by twentieth-century physicist and mathematician Robert W. Bussard, the ramscoop emanates directional ionizing radiation and a shaped magnetic field to attract and compress the minute trace gasses found within the Galaxy. From this gas, a ship can distil small amounts of deuterium for contingency replenishment of the matter supply. At high relativistic speeds, the gas accumulation can be appreciable, though not recommended for long periods due to time dilation issues. At warp velocities, extended emergency supplies can be gathered.

Onboard Antimatter Generation

As a matter of course, every starship within the United Federation of Planets Starfleet can generate small amounts of Anti-matter independently during emergency scenarios. Unfortunately, antimatter generation is typically prohibitively expensive in both power and matter consumption and is not typically considered under normal ship operations. However, in the event of an emergency, as with Bussard ramscoop hydrogen replacement, the generation of shipboard antimatter can be critical to emergency ship operations.

The emergency antimatter generator is located on Deck 14, located across from Primary Waste Management and the Secondary Deuterium Storage tanks. The Generators are based on the 4th Generation EAG design used in the construction of the Galaxy-Class starship. These generators consist of two assemblies:

1. The matter inlet/conditioner
2. The quantum charge reversal device

The entire generator measures approximately 8 X 14 meters and has a mass of approximately 1400 metric tonnes. The generator assembly is the second heaviest assembly in the entire spaceframe, second only to the warp field coils.

The generator produces antimatter at the ratio of ten tonnes of deuterium for one tonne of antimatter. The Law of Conservation of energy dictates that the energy created with, will be less than the energy used in the process. However, the antimatter created, no matter how small, may mean the survival of the ship until a tanker or starbase can be reached.

Engineering Operations and Safety

All warp propulsion system hardware is maintained according to strict Starfleet protocols utilizing the mean time for hardware failure, as well as hardware change out schedules. Due to its critical use in ships performance and operation, all WPS systems have the highest levels of system redundancy designed for maximum reliability.

Warpcore maintenance, however, is not designed for in-flight maintenance. The high energy core and WPS power transfer conduits are designed only to be serviced at approved ASDB integration facilities or Starfleet starbases. While docked, the entire WPS can be removed for inspection and repairs.

Emergency Shutdown Procedures

Due to the importance of the WPS, operational safety is strictly maintained. Limits in power levels and running times can easily and quickly be overrun. Typically, the WPS is protected by computer intervention, part of the main computer's homeostasis protocols. The main computer has been designed to be over-protective of the warp propulsion system; however, some human overrides are possible in certain extreme situations.

Catastrophic Emergency Procedures

Under certain, extreme situations, the WPS may sustain certain amounts of damage, typically from external sources. Much of this damage can be repaired by shipboard engineers to resume standard flight status. In certain situations, however, critical system (or systems) may be unable to be repaired and result in a catastrophic failure of the WPS system. Standard procedures for such an emergency include shutting down affected systems, closing off damaged compartments, and assessing systemwide WPS damage.

In the event of an uncontrolled containment failure cascade, when all other repair methods have failed, WPS equipment can be jettisoned. All containment failure ejection procedures require the ejection of the Warp Core, with the additional possibility of ejecting the primary anti-matter storage pods.

Core ejection occurs when repair efforts fail and the survival of the ship and crew is paramount, regardless if the WPS is still producing power.

Impulse Propulsion Systems

Impulse Drive

The basics of Impulse Engine design as employed by the United Federation of Planets, and most other major powers, have remained more or less static for almost a century now.

Starfleet uses simple deuterium fuel for its easier production and handling than tritium. Unlike a deuterium-tritium mix using only one type of fuel eliminates the necessity for two independent sets of fuel storage and handling systems within the ship. However, antimatter is being kept as reserve, and as an option to spike the output.

The fuel supplies for the Impulse Propulsion System (IPS) are contained within the primary deuterium tank (PDT) and sets of auxiliary tanks. Unlike the PDT which stores Deuterium at 13.8K, the auxiliary tanks stores Deuterium in liquid form. Transfers from the PDT to the auxiliary tanks must go through heating for proper fuel flow. Redundant cross-feeds and fuel management routines in the main computers perform all fuel handling operations during flight and starbase resupply stopovers. This will further reduce boil-off effects.

For usage the fuel is reduced in temperature to form pellets of solid Deuterium ice of variable diameter depending on the need. These are fed into the reactor where a set of fusion initiators are used to ignite the pellet whilst a magnetic field holds them in place. The proton-proton fusion reaction to energy gives a theoretical maximum efficiency of 0.7% - in practice other reactions and engine design produces different efficiencies.

Two sets of four individual impulse engines are grouped together to form the saucer module impulse engines supplied by a set of four auxiliary tanks with 113 cubic meters, a set of sixteen auxiliary tanks with 64 cubic meters, and eight eject-able 12 cubic meter antimatter tanks. Two sets of two individual impulse engines are grouped together to form the extended hull impulse engines supplied by a set of two auxiliary tanks with 113 cubic meters, and two eject-able 12 cubic meter antimatter tanks. There are four major components to any impulse engine; the fusion reactor or impulse reaction chamber (IRC, three per impulse engine), the accelerator/generator (A/G), the driver coil assembly (DCA), and the vectored exhaust director (VED). The standard impulse fusion reactor used is a sphere four meters in diameter, constructed of dispersion-strengthened hafnium excelinide. Four additional IRC are installed as backup power generation and if required can be channeled through the main system exhaust paths to provide backup propulsion.

Plasma created by the IRCs is exhausted to the accelerator/generator. This cylindrical component, 2.1 meters long and 3.85 meters in diameter, constructed of a mono-crystal polyduranium frame, and pyrovunide exhaust accelerator, accelerates the plasma before passing to the third stage, the space-time driver coil. The plasma stream passes through the 3.9 meter long space-time driver coil to generate a sub-warp cochrane field around the vessel, reducing its effective mass in order to boost the acceleration.

The final stage is the exhaust system which is designed to vector the thrust of the engine in order to correct for unusual mass distributions or provide off-axis thrust for enhanced agility.

Compared to the Galaxy class impulse engines the impulse engines used by the Akira class have been further enhanced by better flow characteristics and ignition components. In combination with the smaller but greater strength driver coil field size, the impulse engine performance is 125%. Although total IPS power generation is only 88% relative to a Galaxy class the enhancements allowed performance to be 110%. With impulse power the ship can reach a velocity of 0.933 c.

Author's note: Although the extended-hull impulse engines could be a much bigger version than even the Galaxy class engine, this was objected for the purpose of using the same components and tools as the saucer impulse engines.

Relativistic Considerations

Velocities at considerable fraction of that of light (c), known as relativistic velocities, incur time dilation effects on the crew. As time will pass slower for the crew it becomes an annoying life problem. Further in combat, the resulting slower reaction time can be fatal. For these reasons the Federation had impose of speed limit of 0.25 c.

Engineering Operations and Safety

System failures aboard a lone starship in the depth of space are unavoidable, but loosing propulsion is the worst possible. To avoid this circumstance, Starfleet has established maintenance procedures specifically for the warp and impulse systems. Monitoring protocols are used to determine the mean time between failures (MTBF) of the vital components. At specified MTBF’s these components, mostly high energy exposed elements, are changed to prevent radiation stress and metal fatigue failure. On average, this happen every 10000 work hours, this is well within the design life. Within Federation space all items, except the warp core and warp coils, can be replaced without the assistance of a starbase or orbital repair facility. Like all modern Federation capital ships the Akira class ships have limited self production ability, given enough resources.

“Safety first” is the general Starfleet policy which is realized in numerous computer safety protocols and hardware design rules. As such, the IPS engines cannot run at more than 115% output and only briefly between 100% and 115%.

Author’s Note: Operational limits are based on physical laws and cannot be overtaxed in any way. Probability of failure increases exponentially on reaching the limit, and could occur at any time. It is recommended to inspect and exchange the components after each exceeding use.

Emergency Shutdown procedures

Numerous circumstances can cause instability in control and safety fields or fuel and plasma flow or excessive overload. In such cases, the continuous computer risk assessments will warn the crew and if necessary throttle back or shutdown the system.

Emergency shutdown consists of immediately cutting off fuel flow and venting the reaction mass or plasma overboard. The safety fields must be maintained or reinforced if necessary and only shutdown after cooldown has been secured.

Author’s Note: The most dangerous circumstances are plasma flow imbalances and material stress. Failure can occur within milliseconds of appearance of these problems. Thanks to safety force fields this can be contained long enough for the crew to take action. Note that the control field already cannot keep control anymore.

Catastrophic Emergency Procedures

Should failure prevent the completion of emergency shutdown procedures, the crew can jettison the warp nacelles, the warp core, and the antimatter fuel tanks. Due to the importance of these components this action is viewed as a last resort.

Author's Note: The impulse system is generally not designed for jettison, as the destruction force and fuel danger are much less than the warp systems. However, the destruction force is more than enough to destroy a vessel. This and radiation protection considerations have established heavy shielding of the impulse engine room toward the living area of the ship. This shield is composed of physical arrangements and force fields.

Utilities and Auxiliary Systems

Utilities

Federation ships have many systems requiring a complex internal distribution or connection network. All of them require multiple redundancies and interconnect permutations for failsafe operations.

MAJOR UTILITIES NETWORKS

The utilities distribution network includes:

- Power
- Optical Data Network (ODN)
- Atmosphere
- Water
- Solid Waste Disposal
- Transporter Beam wave guide conduits
- Replicator and Food Service conduits
- Structural Integrity Field (SIF) wave guide conduits
- IDF wave guide conduits
- Synthetic Gravity Field Bleed
- Cryogenic Fluid Transfer
- Deuterium Fuel Transfer
- Turbolift Transport System
- Reserve Utility Distribution
- Protected Utility Distribution
- Shield interconnect wave guide conduits
- Antimatter transfer conduits

ADDITIONAL UTILITIES SYSTEMS

- Umbilical Resupply Connection Ports and Associated Systems
- Jefferies Tubes
- Corridor Access Panels
- Auxiliary Fusion Generators

Author's Note: The Akira class ship does not have a central utility core. It does have three utility distribution networks. The central one distributes tools concerning auxiliary crafts with stores located on decks 10, 9, and 8. The other two distribute tools concerning engineering and ship systems with stores on decks 13, 10,9,8,7 and 6. Back-up tools are stored on deck 8.

Exterior Connect Hard points

Each starship is expected to visit starbases or other facilities for maintenance, upgrades, and repairs among other things numerous times. Many supply or replenishment functions are carried out through a series of dedicated umbilicals, loading bays, and access hatches located over the entire starship.

The Akira class ship has two large dorsal supply ports behind the bridge structure. Two port clusters on the extended-hulls. Four cargo bay entries are on the saucer and extended-hulls.

Aft shuttlebay doors offer access to the big aft cargo bays, the central bay, and numerous cargo bays from deck 10 through 6. Cargo which cannot be routed through cargo corridors or elevators is transported into place.

Personnel transfers are accomplished by four turbolift connections on the bridge structure and saucer bottom. These are direct connections to the central shafts, allowing heavy traffic.

Reaction Control System

Normal flight steering control is realized by the Reaction Control System (RCS). It is an advanced version of past venier thrusters. The Akira class ships have 6 RCS clusters at the rim of the saucer and two semi RCS clusters on the weapons pod. This same system is used to maneuver within docks.

A RCS cluster consists of 4 thrusters arranged in four outbound vectors of an outbound half circle. Two are always activated at one time allowing three distinct control vectors for manipulation. This arrangement not only maximizes usage but also guards against total failure. The magneto-hydrodynamic thrusters are powered by fusion reactors. Each thruster produces 1.5 million Newtons. With these the Akira has a relative 21.7% increase in turn-rate compared to a Galaxy class ship.

Navigational Deflector

Federation ships employ a main deflector dish for navigation and protection from collisions along the path. It is composed of panels created from a duranium-molybdenum mesh on a tritanium frame. The dish can be mechanically steered three degrees off-axis. By employing phase-interference created by the array, the deflector beam properties can be manipulated within a 21 degrees cone. The main deflector is powered by three redundant generators located on deck 13, each consisting of six 45 MW graviton polarity sources. These feed two 550 millicochrane subspace field distortion amplifiers for use.

Author's Note: The beam finger is unrestricted below the length axis. At maximum output and focusing the beam at a point in space, a destructive energy can be placed. However, a 13.5 %

energy lost is always incurred due to diffraction. Precautions have to be taken as it is dangerous at certain spots along the beam. An Akira class's deflector can create a field with the same characteristics as a Galaxy class's but its properties fall off by far.

Long Range Sensors

As the main deflector is a major emitter of both subspace and electromagnetic radiation, it can interfere with many sensors. To minimize this, the long-range sensor array is located directly behind the main deflector. This arrangement permits the long-range sensors to "look" directly through the axis of the fields.

Operational Considerations

During normal sublight operation, the navigational deflector output is at 9.5 MW, with a surge load of 40.7 MW. At Warp 8 up to 80% of normal output is required, with a surge load of up to 231000 MW. At higher Warp the deflector generators have to operate in phase synch and to provide adequate surge reserve. All three generators have to be used from Warp 9.2 on.

Author's Note: The generators will be maxed at Warp 9.9. It is not recommended to operate at such or higher velocities.

The use of the Bussard ramscoop requires the creation of small field holes in the navigational shielding in order to allow stellar hydrogen to pass through.

Tractor Beams

Grabbing, taking-in, towing or throwing is an important task in space for work. The tractor beam is all that. It performs all these tasks with the ease of a graviton beam.

It is a Multiphase subspace graviton beam, which can manipulate objects from a submicron to a macroscopic level within the emitter's arc of 180 degrees. This results in significant spatial stress being imposed on the object; by controlling the focal point and interference patterns of the beam it is possible to use this stress pattern to place either a repelling or attracting force on the object.

The beam is created by emitters. Each emitter is directly mounted to the primary members of the ship's frame, which help to reduce torque, and stress forces. As there is potential damage to a vessel using a tractor beam, all tractor emitters are additionally protected by the structural integrity field system. Each tractor beam emitter is powered by four 475 millicochrane subspace field amplifiers supplied by two variable phase 15 MW graviton polarity sources. Interference pattern control is achieved with phase accuracy within 0.13 arc-seconds per millisecond. Each emitter's mounting can be directly reinforced from the SIF network.

The subspace field coils from the warp system can be used to decrease local gravitational constant for the region inside the field, making objects much easier to manipulate.

Effective tractor beam range varies with payload mass and desired delta-v. Assuming a nominal 5 m/s^2 delta-v, a payload approaching 8800000 metric tonnes can be manipulated at less than 1000 meters. At max range of 20000 kilometers the same delta-v can be imparted to an object massing just above one metric tonne. The short lifetime of gravitons does not allow longer ranges.

The Akira class has 2 ventral and 2 dorsal main beam emitters. One is just below the main deflector dish and faces forward. One is near the saucer bottom on deck 14 facing aft. One dorsal emitter is forward on deck 6 and one is aft of the weapons pod. Further there are 7 smaller auxiliary emitters for manipulating cargo and auxiliary crafts. Three are within the aft shuttle bays. One each is at the dorsal side cargo bay entry. One each is at the aft extended-hull cargo bay entry. In this arrangement, a maximum of two main aft emitters and two aft auxiliary emitters can be used to tow one very big object.

Author's Note: Aside from towing or manipulating objects, a tractor beam's ability can be used for defense or offence. A ship doesn't need to cover a whole sphere with emitters; at least half is good enough. In space up or down is the same. A ship just has to turn or spin around.

Replication Systems

Transporter technology has permitted the creation of the replication system. Now Federation ships can provide with ease food and hardware with data stored in the replication system. As with the transporter system there is a distinction between the systems dedicated to biomatter and deadmatter. These are called food replicators and hardware replicators. The food replicators are specially calibrated to a finer degree of resolution for accurate replication. Hardware replicators work on lower resolutions to save energy and to lower memory requirements. Sickbay and research labs employ specially modified food replicators at even higher resolutions to allow the replication of certain pharmaceuticals and scientific supplies.

Communications

All Starfleet communications are normally encrypted. Encryption algorithms are rotated and updated on a random schedule. Away team communication may use individual starship codes. Layered encryption or combination may be used as needed in certain communication cases.

Intraship Communications

Communications aboard Federation starships occur over the optical data network (ODN) through dedicated communications subprocessors and peripheral hardware nodes. The communications network is the most complex network aboard a starship, allowing data transmission to be sent at nearly instantaneously and with unparalleled clarity. The data stream is purely holographic and based on transfer protocol (TP) decoded back into voice transmission when necessary.

Author's Note: There are no true sound only dedicated communications network on the ship. Everything is in holographic or digital form.

Personal Communicator

Starfleet employs personal communicators for direct communication with or through onboard network systems and as small subspace radio devices offboard. These also provide identification and location for transporter operations.

Ship-to-Ground Communications

External communications can be routed by the main computer system to the radio frequency (RF) system or subspace radio as required.

Communications Hardware

The RF equipment consists of an array of ten triply redundant transceiver assemblies. These are interconnected by the ODN and electric lines. They are hull embedded, and distributed throughout the starship hull. Six are on the dorsal saucer, and four are at the saucer bottom

Each assembly is a standard hexagonal casing about three meters across and one-half meter in thickness. Each one can identify and process analog or digital data and can sent them over all known radio bands. Data transfer is supported by eight six-stage variable amplifiers, signal cleaning circuits, relativistic compensator, passive ranging, and up to 400 GHz transfer rate. They are supplied by type III EPS taps. Communication range is up to 5.2 Astronomical Units (AU). The deflector dish can extend the range to 300 AU.

Ten triply redundant medium-powered subspace transceivers are available in the same arrangement as the RF array. Each device is contained within a standard trapezoidal casing measuring 1.5 x 2 x 1 meters. They are supplied by type II EPS taps with a maximum total load of 71.5 MW. The devices have additionally subspace specific components. These are electro plasma conditioners for the subspace coils, and AI controlled data switching and synchronization. Communication range is up to 60000km.

Applications

Typical external communication distances range from 38000 km to 60000 km. The subspace transceiver network is linked to the transporter system for targeting. A minimum of three transceivers are necessary for a reliable transporter lock. Transporter lock distance is limited by transporter arc resolution and local subspace.

Ship-to-Ship Communications

In most cases communication between Starfleet vessels and or installations are the most powerful when used over great distances.

This is achieved by ten standard ultra-high power subspace transceivers. Each device is contained within a standard trapezoidal casing measuring 6 x 4 x 3 meters arranged throughout the hull. A direct field energy waveguide connects the device with its antenna. In addition, the system includes warp velocity signal compensation preprocessors. Data transfer rate is at 53.45 kquads/s.

Universal Translator

Communication with unknown people requires translation. This is mostly achieved by a complex computer program called the Universal Translator. It performs pattern analysis on an unknown language and empirical interpretation to create a translation matrix. The translator is included in all Starfleet personal communication badges and small receivers are implanted in the ear canal. A certain matrix can be uploaded from the ship database as required.

The Universal Translator has a standard database consisting of well over 100000 languages.

Transporter Systems

Transporter System Overview

Number of Systems: 12

Personnel Transporters: 4 x 6-person (Transporter Rooms 1-4)
Max Bio-Mass Payload: 1100kg (2423 lbs)
Max Range: 40000 km
Max. Beam Up/Out Rate: Approx. 130 persons per hour per Transporter
Average Safe Medical Evacuation Beam Up/Out Rate: Approx. 60 persons per hour per Transporter

Cargo Transporters: 4
Max Payload Mass: 800 metric tonnes. Standard operation is molecular resolution (Non-Lifeform).
Max Beam Up/Out Rate (Quantum Setting): Approx. 75 persons per hour per Transporter

Emergency Transporters: 4
Max Range: 15000 km (beam out only, range depends on available power)
Max Beam Out Rate: 140 persons per hour per transporter (total 560 persons per hour)

Limitations of Use

As powerful as the Transporters are, they do have several limitations.

- **Range:** Range is limited to 40000km by the median matter stream blooming tolerance of 0.005 arc-seconds, interstellar conditions, payload mass, and relative velocity. Emergency transporters are limited to 15000km.
- **Deflector Shield Interference:** When deflector shields are raised in their standard configuration, it is impossible to conduct transporter operations off-ship.

- **Duty Cycle:** Due to power cycling, pattern buffer cool down and reset, each system can average 1.9 complete transports per minute.
- **Transports while at Warp Speeds:** Differential warp velocities cause severe spatial distortion, making a full transporter cycle impossible. A transport is only possible at synchronized warp velocities.
- **Replication:** The Transporter holds all personnel images in a quantum-level matrix, using analog image data. Replicator technology uses molecular-level matrices, and image data is digital - much more precise, compressed, and at lower resolution. Therefore, transporters cannot use replicator data to replicate living beings.

Science and Remote Sensing Systems

Sensor Systems

Typically, Starfleet long-range and navigation sensors are located behind the main deflector dish. In this arrangement, static effects by the deflector are minimized. Around the majority of the rim are lateral sensor suits, each comprised of the six available sensor pallets. Additional specialized dorsal sensor suits round up the sensor suit of the ship. The sensor suit provides a full coverage in all standard scientific fields, but with emphasis in the following areas:

- Astrophysical phenomena
- Celestial object analysis
- Remote life-form analysis
- EM analysis
- particle detection including neutrinos
- Subspace field gradient
- Multispectral analysis

Each lateral sensor suit and its sensor pallet can be interchanged with others. The dorsal sensor suits are configurable.

Author's Note: By combining warp residue and warp field emission detection, it is possible to track ships up to a certain distance within a certain timeframe. By applying dynamic subspace propagation it is possible to interpolate the course within a certain error margin.

Tactical Sensor System

In addition to normal sensor systems, the Akira class is the first to have interconnected and independent special tactical sensors. These twenty sensors are specially harden against natural EM flux and are approximately ten times less prone to failure. Combined with other normal sensors a special analysis program can eliminate effects of most known ECM.

Further, the Akira-class has increased automation to ease processing and collecting of tactical data at different locations from crafts and probes.

Author's Note: Radiation hardened sensors are generally less sensitive than normal sensors. Since combat is usually fought within a light second, this predicament can be neglected. Under conditions where these sensors shine, long range munitions' sensors are usually inoperable. Therefore, long range firing is still limited to indirect firing.

Long-Range Sensors

Author's note: Maximum sensor range is limited by sensor resolution and array size. The Akira class has a 59% sensor range compared to a Galaxy class resulting in a maximum range of 10 light-years for low resolution, a 26.47 minute time lag. At warp factor 9.5 it would take the ship 2774 minutes to get there. Likewise a Runabout has a range of 0.2 Ly. At 10 Ly a single Runabout covers 0.6% of the horizon.

Navigational Sensors

Lateral Sensor Arrays

The standard Starfleet sensor complement comprises twenty-four semi-redundant suites of six standard sensor pallets.

Instrumented Probes

Under certain circumstances a ship cannot approach or be at a certain place in time to conduct scientific work. Such cases require the use of probes equipped with mission relevant instruments. There are nine different classes of probes for a variety of general missions. The frame generally consists of gamma molded duranium-tritanium and pressure-bonded lufium boronate, with triple layered transparent aluminum serving as sensor windows for internal sensors. All probes have a transceiver sensor suit for EM and subspace analysis, data transfer, remote control, and a molecular analyzer. All nine types are capable of atmospheric entry, but only three are designed for aerial maneuvering and soft landing.

A probe can be turned into a makeshift torpedo or mine by exchanging instruments for a warhead. A probe can also serve as a decoy, a buoy, a relay, and as emergency ship's log or report messenger.

Federation capital ships usually have all nine classes of probe available. So do the Akira class ships: (for details refer to the Star Trek TNG TM)

Class I Sensor Probe
Class II Sensor Probe
Class III Planetary Probe
Class IV Stellar Encounter Probe
Class V Medium-Range Reconnaissance Probe
Class VI Communications Relay/Emergency Beacon
Class VII Remote Culture Study Probe
Class VIII Medium-Range Multimission Warp Probe

Class IX Long-Range Multimission Warp Probe

Science Department Operations

Science Labs

There are sixteen science labs on the Akira-class; 8 labs are on Deck 5, 4 multipurpose labs and another 4 labs are on Deck 4.

Tactical Systems

Phasers

The Akira class employs Type-X phaser emitters developed for the Galaxy class.

Each of the large arrays consists of numerous emitters in a dense, linear arrangement for optimal control, firing order, thermal effects, fields of fire and target impact. Each group of emitters is supplied by several EPS connections, and is interconnected through both primary and secondary fire control systems, as well as thermal management systems and primary internal sensor lines.

Phaser array arrangement: One 214 degree dorsal phaser array with 100 emitters. Two 75 degree ventral phaser arrays with 67 emitters each placed 23 degree to the sides. Two phaser arrays are located on the wings covering the side and rear. One phaser array is aft of the weapons pod.

Author's Note: The location of the wing phaser arrays are unknown. They cannot be on the warp nacelles as the strong warp field would interfer.

Phaser Array Output: Each Type X emitter discharges at maximum 5.1 MW. However, any numbers of emitters can fire at once in the array to combine their powers.

Phaser Array Range: Maximum effective range is 300000 kilometers. Further distances are ineffective due to time-lag during which an enemy vessel can evade.

Phaser Operations

Federation phaser arrays can be adjusted to a variety of power levels and beam types for a wide range of options. An array can fire in any number of beams up to the maximum number of emitters. Multi beams are usually used for defense against attack crafts.

Low energy beams can be used to transfer energy or as flashlight for scanning or communicating.

High energy beams are typically for tactical purposes as well as planetary surgery.

Author's Note: The dorsal phaser array of the Akira class is exactly half as powerful as a Galaxy class' while the lower ones are each at 33.5%.

Photon Torpedoes

During the Dominion War, the standard torpedo turned out to be inadequate against Dominion vessels. The photon torpedo design was subsequently updated in the form of the Type XXV with in more space for fuel and warhead. The warhead yield rose to 18.5 isotons, although a maximum theoretical yield of 25 isotons could be achieved in the current configuration.

The standard capabilities include multi targeting and guidance, pattern spread, impact or proximity detonation, timed or self-destruct detonation, dormant mine mode, search mode or any of the mentioned in combination.

As Photon Torpedoes are semi-active weapons, the firing vector may vary within 10 degrees in any direction of the bore sight, allowing the torpedo to change the approach vector to target as necessary. If required, the torpedo may conduct immediate target tracking or acceleration as verified by sensors. For targets within 25 km, the weapon will automatically change into active mode, and accelerate away to prevent damage to the firing ship. Otherwise, active targeting will be activated 0.01 seconds or 10 km before interception point whichever is first. Should the target be elsewhere the torpedo will intercept accordingly or begin a search pattern until fuel exhaustion, upon which it will self-destruct.

With their high yield photon torpedoes are effective against attack craft formations (to a certain degree). In this case proximity detonation is recommended.

Photon Torpedo MARK XXV

Maximum Range: 4050000 Km
Current Maximum Explosive Yield: 18.5 Isotons
Theoretical Maximum Yield: 25 Isotons
Dimensions: 2.1 x 0.76 x 0.45 m
Mass: 186.7 kg

Torpedo Launcher

The Akira class ships use small launchers derived from the Galaxy class project. Their measurements are a third that of the original. Akira-class starships are capable of simultaneously loading five torpedoes at once in a single torpedo launcher, allowing for quick launch of all the devices. Standard torpedo launchers are capable of simultaneously fueling reactants into all of the torpedoes and can dispatch volleys of five torpedoes.

Arrangement: Fifteen torpedo tubes managed by ten torpedo launchers. Two launchers are located above the main deflector dish, two each at the saucer sides, and two each fore and aft of the weapons pod. These launchers are the second generation of modern launchers since the introduction of burst pulse fire torpedo launchers in the Galaxy class.

Payload: The ship can carry a maximum of 400 torpedoes. Forward saucer bay has 120 torpedoes on triple racks. The side bays each hold 80 torpedoes. The two weapons pod bays hold 120 torpedoes on double racks which can supply any or all of the launchers.

Standard launcher firing modes:

- **Single shot:** 2.3 seconds reload-time.
- **3 shot salvo:** 3 shots are fired within 0.5 seconds with a reload time of 2 second for next two torpedoes; 15.3 next batch.
- **5 shot burst:** Like single fire but launches 5 torpedoes. 15.3 seconds reload time.

Akira-P weapons pod launcher firing modes:

- **Single shot:** 2.2 seconds reload-time.
- **3 shot salvo:** 3 shots are fired within 0.5 seconds with a reload time of 2.2 seconds for next two torpedoes; 2.2 next batch.
- **5 shot burst:** 2.2 seconds reload-time.
- **Continuous 3 shot salvo or 5 shot burst**: 2.2 seconds reload time. After 5 firings a 5 second cooling period is needed for the launcher. Loading mechanism is unaffected and can continue without delay.

Deflector Shields

The tactical deflector shield system is the primary defensive system aboard all Federation Civilian and Starfleet Starships. The deflector shield systems create a localized, highly focused spatial distortion of highly energetic gravitons. The shield is created by a series of hull conformal grid emitters. The field is highly resistive to impact due to incursions of all types, ranging from relativistic subatomic particles to more massive objects such as comets or meteors and sublight velocities. When such an intrusion occurs, field energy is concentrated at the point of impact, creating an intense, spatial distortion.

Type: A symmetrical subspace graviton field. This type of shield is fairly similar to those of most other Starships. Recent threats by the Borg and the Dominion have seen to the introduction of shifting frequencies. The shields now also alter their graviton polarity for increased effectiveness. During combat, the impact feedback from the shield is analyzed, and appropriate adjustment are automatically made or proposed to the tactical officer.

Output: There are thirteen shield grids on the Akira Class. Each one can be supplied by a 192 MW graviton generator, resulting in a total shield strength of 2496 MW. However, during normal combat operations, only 8 generators are activated, with the remaining 5 generators serving as the emergency shield system. This means that, in normal combat operations, the shield strength is 1536 MW. The power for the shields is taken directly from the warp core and impulse fusion generators. If desired, the shields can be augmented by power from the impulse power plants. The shield protects against approximately 20% of the total EM spectrum at a time. Smart spectral choices and fast shifting frequencies, allowed the ship to use much less energy while covering virtually 38% of the total EM spectrum compared to older ships.

Range: The shields, when raised, stay extremely close to the hull to conserve energy - average range is ten meters away from the hull.

Primary purpose: Defense from enemy threat forces, hazardous radiation and micro-meteoroid particles.

Secondary purpose: Ramming threat vehicles.

Auto-Destruct Sequence

It is a fact of serving in Starfleet that the possibility may occur that the crew may have to make the ultimate sacrifice and destroy the vessel rather than having the technology, systems, or materials to fall into threat forces possession. This process, by its very nature, is an absolute last resort for the crew to consider when all other options are exhausted. As such, Starfleet has spent a considerable amount of time, effort and energy to use computer simulations to predict any and every possible situation where the need to destroy the vessel would occur.

Weapons pod

All standard Akira class weapons pod include the same weapons systems as the ones installed in the main hull. The Akira-P type weapons pod, however, employs a different system makeup. The loading system forms the heart of the pod. It feeds the torpedo launchers through two coordinated loading mechanism fed by all torpedo magazines. Any torpedo can be loaded into either front or aft launchers.

In continuous firing mode, each loading mechanisms runs through a circle of picking, readying, and loading the torpedoes into the launcher. Each cycle lasts 15.4 seconds. The loading itself takes 2.2 seconds. The mechanism can pick up five torpedoes at a time and seven loads each cycle. Fully loaded the mechanism provides 35 torpedoes ready to be fired. The first load requires 15.3 seconds like any other loading system aboard the Akira class. However, once fired-up it takes only 2.2 seconds for each consecutive load. The mechanism will feed the launchers until the depletion of torpedoes or when fire has been ceased by the officer in charge. For unloading the mechanism just runs in reverse, which was unpractical in normal systems.

Once the mechanism has been emptied it requires 15.3 seconds for another first load. The loading mechanisms have not been designed to directly exchange one load into each other, but their placement allows an easy transfer by the torpedo magazine transport system.

Due to the mechanical operation involved, no personnel are allowed in the magazine or the loading area when firings take place. The nature of fast loading and firing pose high mechanical wear on the launchers and loading mechanism. After every five firing sequences the launchers need a five second cool time. The loading mechanisms require a higher maintenance than normal systems. To support fast loading two antimatter tanks have been integrated into the weapons pod. The tanks serve as loading buffer for safety. Each tank can supply the mechanisms with 40 kg of antimatter a second. They can hold enough antimatter for all torpedoes in store. There won’t be a downtime in antimatter supply.

The weapons pod is equipped with three forward fixed-focus deflectors for protection and targeting sensor suits. A big bay access entry allows quick torpedo loading by workbees and easy exchange of torpedo launchers or loading mechanism or other systems.

Access to the weapons pod is provided by two jeffries tubes and four special two-man turbolift tubes. These turbolifts can only accommodate one space suit equipped engineer. There are no escape pods within the weapons pod.

Environmental Systems

Life Support and Environmental Control

The most important systems for manned flight are the Life Support and Environmental Controls.

These systems maintain habitable atmospheric M-class conditions, but not limited to following characteristics:

- Concentration of atmospheric gasses
- lighting
- temperature
- humidity
- gravity

Although, the Environmental Controls keep the entire biosphere under the same conditions, the crew members can modify locally any of the variables within operational standards for that compartment.

Atmospheric System

The Akira class ships employ the standard composition of biological and chemical systems in maintaining the ships atmosphere. Each one of the systems is triple redundant and can maintain a habitable atmosphere by itself. They are designed for a five year mission, after which major replenishment are necessary. Fully active, the systems can maintain the atmosphere for at least six months for a full evacuation load. The bio system is provided by a bioreactor which is also part of the waste disposal system. The chemical system is based on chemical reactions, and filters. This system relies on perishable chemical components and must be regularly replenished.

Gravity Generation

The Akira class ships include standard gravity generation designs which create normal terran gravity throughout the ship. The ship is divided into five regions with its own small network of gravity generators. The saucer has two regions supported by a total of 300 generators, the extended-hulls are each one region supported by a total of 100 generators, and the weapons pod itself is one region supported by 20 generators.

Emergency Environmental Systems

Despite multiple redundancies on Starfleet vessel, certain chain of events can lead to potential environmental crisis situations. In anticipation, emergency environmental support systems have been standard to provide suitable life support for periods of time sufficient for restoring either primary system or to the reserve system. The system has been designed to provide shipwide lighting and atmospheric supply for approximately thirty minutes.

A number of cryogenic oxygen storage tanks are available in addition to stored chemical batteries of various purposes and life-support.

Additionally, certain areas are also emergency shelters for extreme situations where the crew is forced to retreat immediately. Internal crew messes, crew lounges, sick bay, and rooms are designated emergency shelters. Each of these has emergency breathing gas, water, food, and independent power supplies for up to twenty-four hours of operation.

Waste Management

The Akira class ships employ the standard composition of biological and chemical systems in recycling the ships waste. Each one of the systems is triple redundant and can maintain full recycling by itself. They are designed for a five year mission, after which major replenishment are necessary. Fully active, the systems can maintain the atmosphere for at least six months for a full evacuation load. The bio system is provided by a bioreactor which is also part of the atmospheric system. The chemical system is based on chemical processing. This system relies on perishable chemical components and must be regularly replenished.

Crew Support Systems

Crew Support

The core of the each and every starship is the crew. The success or failure of any starship falls more on the abilities of the crew than any powerful, new technology. As a result, Starfleet has a long standing tradition of attempting to provide as useful and capable amenities for their crews.

Medical Systems

Sickbay: There is one large sickbay facility located on deck 7, equipped with intensive-care wards, laboratories, a nursery, the CMO's office, two surgical suites, a null-gravity therapy ward, a morgue, a biohazard isolation unit, a physical therapy, and a dental care office. Holo-emitters allow the usage of the Emergency Medical Holograph System. A secondary sickbay is located on deck 6. It is usually not in service. The sick bays have their own independent medical dedicated computer systems and control. An independent power supply based on micro fusion reactors and batteries can provide energy for a week at full capacity. The micro fusion reactors require between one and two seconds to fully engage. In the mean time, the batteries provide immediate energy. All surgical suits, isolation wards, biohazard ward and computers have priority over other wards. If necessary the CMO may change the priority of the other wards.

The ship's counselor has his office located on Deck 7, near the medical center. It consists of a private office, with standard furnishings. An individual therapy room furnished with chairs and couch for one on one session, as well as a large, group therapy room, consisting of several couches, and chairs, are located adjacent to the counselor's office.

In the event of a crewmember suffering a psychotic episode, and needing to be isolated from the crew, the ill crewman is kept in sickbay, in the isolation unit, or in the intensive care units, as determined by bed availability.

Crew Quarters System

General Overview: Officer's quarters are located on decks 4. The chief engineer and Space Wing officer have quarters on deck 12. Contingency officers may reside in guest quarters on deck 5 and 12. 4 VIP quarters are located on deck 5. Contingency quarters are on decks 5,3,A. Individuals assigned to ship for periods over six months are permitted to reconfigure their quarters within hardware, volume, and mass limits. Individuals assigned for shorter periods are generally restricted to standard quarter configuration.

Standard Living Quarters are provided for normal ship crew members. There are 26 family quarters, which are either assigned to a family or to two crew members.

Standard accommodations include the appropriate number of beds, a living or work area, a washroom with ultrasonic shower, and a food replicator. Dual suits have a wall or a pull-able wall to divide the bedroom area.

NCO's are assigned to dual or single suites. A personal holographic viewer is installed into the work desk. Small pets are allowed to NCOs.

Most crewmembers are assigned to a dual suite. Pets are not allowed to enlisted crew.

Space Wing crew members are assigned to dual contingency suits on decks 12, 10. These have standard accommodations, but with less space and comfort.

More contingency suits are available.

Any crew members may request to combine their quarters to create a single larger dwelling, if that is within safety considerations.

Officers' Quarters: Officers are usually assigned to single quarters. These quarters have a bit more space. Ensigns typically share a suite not much different than normal crew members or NCOs.

The Captain and Executive Officer of the vessel both have special quarters, located on Deck 4. These quarters are more luxurious than any others on the ship, with the exception of the VIP guest quarters.

VIP/Diplomatic Guest Quarters: The vastness of space makes any capital ship a symbol of UFP authority. Therefore, the Akira class includes facilities for diplomatic missions.

These quarters are located on Deck 5. These quarters include spacious living/office area, personal viewscreen, provisions for pets, and a sizeable closet. Additionally, anything within the production capability of the ship can be arranged. These quarters can be converted to class H, K, L, N, and N2 environments if necessary.

Food Replication System

Onboard Federation starships, food is provided by the molecular replication system. Based on transporter technology, it can produce, with near 100% accuracy, over 4000 types of foods stored in the Computer Core.

All replicators are supplied by the primary and secondary molecular matter matrix replicators located on deck 6. Certain quantities of raw materials are sent and modified to conform to a stored molecular pattern with a quantum geometry transformational matrix field.

Unfortunately, the replicator system is tremendously expensive in terms of resources and power consumption. However, compared to the expenses of traditional food storage and preparation, the replication system is cheaper.

Turbolift Personnel Transport System

Personnel transport within the ship is provided by the turbo elevator system, or just turbolift. A network of inductively powered transport tubes allows access throughout the ship.

The turbolift system consists of parallel main vertical arteries, which connect to the various horizontal networks located on each deck; the network is designed to provide alternate routing during times of heavy system usage. This design philosophy also minimizes the effect of any given single malfunction on overall system performance.

Four of the main vertical tubes can be connected to a starbase’s turbolift network, allowing direct transport between the two systems. Two docking connections each are located at the bottom and the bridge.

Recreation Facilities

Ship crews spent most of their life onboard ships. This can lead to social and mental stress as well as boredom. For this reason any sizeable ship has been offering recreation facilities for relief.

Holodecks: There are two standard holodeck facilities on the Akira Class, both located on deck 5.

Holosuites: These are smaller versions of standard Federation Holodecks, designed for individual usage (the two Holodecks themselves are to be used by groups or individual officers; enlisted crewmen and cadets are not allowed to use the Holodecks under normal circumstances). There are eight holosuites on Deck 5.

Phaser Practice Range: Sometimes the only way a Starfleet officer or crewman can vent his frustration is through the barrel of a phaser rifle. The phaser range is located on Deck A. The phaser range is heavily shielded, the walls being composed of a Duranium alloy, which can absorb setting 16 phaser blasts without taking a scratch. The structure around the area is also the most bulky, and hence, creating additional safety.

For practice type II or type III phasers are used. The practice range is actually a dark holographic simulation room. Normally the shooter stands in the designated middle stand and shoots at projected targets. Statistics are automatically recorded for review. Marksmanship tests are also performed in this way, but require the presence of an evaluator. Usually, the security officer and his lieutenant will be evaluating.

Marksmanship is evaluated for each weapons class with its own set of levels: hand-phaser, phaser rifle, heavy phaser rifles, launchers, and sniper. Federation personnel are required to be able to use hand-phasers, phaser rifles, heavy phaser rifles, and launchers. Proficiency is only required for hand-phasers, phaser rifles. Tests are done without use of computer aided targeting.

Weight Room/Gymnasium: This is one of the most used recreational facilities. As work on a starship is relatively light, the crew needs to keep their bodies fit by means of workouts. Federation personnel are also required to take physical fitness and hand-to-hand combat tests periodically.

These two rooms are located on deck 5. They offer a variety of exercise equipment and exercise apparatuses. Other sports articles are also available in its stores. Each room is big enough to hold two small sport competition such as judo.

Crew Lounge: There is a large lounge at the center of the ship located on deck 5. The lounge is the only place on the ship where crew members are equal. This lounge is the social center of the ship. An adjacent crew mess can be used for big events.

The lounge can offer a wealth of recreational games and assorted ‘means’. The tables include holographic projectors for games and entertainment. A number of pool tables and poker tables roundup the available choices. Cushioned seats help the crew to relax and enjoy their activities. There is also a bar which can offer various potent alcoholic beverages.

Numerous other crew lounges and messes are on nearly every crew deck.

Entertainment Park: Like most capital ships the Akira class has one little park on deck 5. Despite its size, smart arrangements, design, lighting, and paintings create an illusion of a complex park.

Ball Room/Sports Arena: For events, conferences or other festive activities for which the main crew lounge doesn't suffice a sizeable room has been reserved as ball room and sports arena. It can fit roughly 200 participants comfortably. Such occasions are rare, and the room is usually designated as storage.

Hydroponics: Two hydroponics offer crewmembers to relax and join a different kind of activity.

Auxiliary Spacecraft Systems

Shuttlecraft Operations

Each Akira-class starship can accommodate a small Space Wing. With the increasing threats, the success of the Defiant-class starships, and advancing technology, Starfleet took a new approach at bringing more guns into the field by using fighters. Since there are no carriers available since the Romulan War, Starfleet turned to the cargo and supply designs. The Akira was one of the favored designs due to its capacity. Its huge central cargo bay as well as the shuttle support design was ideal for the new role.

Flightbay/Cargobay

The central cargo bay is the largest on any ship of its size; only dwarfed by a Galaxy class bay. The bay is located on Deck 10. The flight bay is large enough to handle a squadron of 12 fighters as well as a squadron of runabouts. With repair and storage holds on Decks 8, 9, 10, and 12, the flightbay is the heart of the Akira-class starship. Two large aft cargo bays round roundup the list. Each one can hold up to 15-20000 metric tonnes of cargo.

Shuttlebay Operations

The flightbay control is operated from a central control center over-viewing most of the central area. Space control is located aft over the aft center shuttle bay with view over the flightbay, the aft side bays, and on landing approaches. The shuttle bay below can also be easily reached. Flightbay control is responsible for any operation within the bays. Space control is responsible for actual flight operation. In case of interest conflicts, flightbay control supersedes Space control. As long as a craft is outside the ship it will be space control's responsibility, except it has been turned over to landing control. However, landing operations requires coordination between the two controls. Therefore, a landing operations officer is required. Without a space wing onboard, the two controls are managed by the ships flight department which is essentially flightbay control. Controllers have consoles displaying the assigned area with the status and tactical information of any vessel, target or objective. A quick reference list allows switching or centering to a certain vessel or group of vessels.

Spacecraft Launch

In intensive shuttle operations, the shuttles can return through the aft bays, while unloaded shuttles can be launched by three graviton catapult launchers at the front. During combat operations, fighters leave from or land in the aft shuttle bays. Flightbay control is responsible for any launches or movement within the bays. Usually, a right over left rule determines traffic.

For a graviton launch, the shuttle is directed into the launch tube, which will be closed by a blast door and a force field for safety measures. The launcher will then levitate the shuttle into the center and launch it. All personnel are required to be seated for launch. It is not necessary for the shuttle to use its own propulsion during launch, but it should be on standby. This can save fuel or time to fully refuel, hence, increases, turnaround time, which can be important during evacuation.

Author's Note: Fighters are always bigger than shuttles, and cannot be launched by the forward graviton launcher tubes. Also during combat the forward section of the ship is likely under bombardment. A launching craft would simply be vaporize upon launch or crash into the ships own shield.

Graviton Catapult Launchers

The graviton catapult launcher is the most sophisticated launch system employed by Starfleet. It is essentially a canon with an inner barrel size of 30 x 7.78 x 2.8 meters. The three graviton launchers aboard the Akira class are powered by a triple of 450 millicochrane subspace field distortion amplifiers supplied by a pool of 18 variable phase 0.6 MW graviton polarity sources. The interconnected system allows immediate switching of power between the launchers. Each graviton polarity source is enough to operate all launchers with loads of up to 27 metric tonnes. Normally, two graviton sources are active. The catapults are set to launch a craft in 0.857 s from zero to a delta-v of 70m/s while exerting an acceleration of 8.3 g. In case the crafts' IDF failed the short duration of this high g force should be tolerable for most people. For safety the system is also tied to the launcher safety force fields. Aside from standard force field power, the force fields are partially fed by 10% of total launcher graviton generation, and are automatically reinforced on activation. This arrangement ensures there will always be a force field even if main force field power failed.

Spacecraft Recovery

Recovery of fighters and other spacecraft is conducted through the aft shuttle bay doors. A craft can either be guided into the landing bay by an automated tractor beam, or landed manually by the pilot of the recovering craft.

During a combat landing, the automatic landing beacon and sensors of the ship guides the craft in. The pilot of the recovering craft aligns their fighter along the computer projected flight path. This can be done automatically if whished. The shuttle bay force fields and tractor beams are always on standby to be activated at the slightest error.

Author's Note: Usually, the computer automatically lands a craft during combat as both the craft and the mother ship are maneuvering at combat speed. No pilot can compensate during the split second vector changes. Nor is it possible to see the bay and steer in time before crashing into the ship. Landing approaches also make the landing spacecraft an easy target.

Shuttlecraft

Type 17 Shuttlepod

Type: Medium short-range limited-warp capable shuttlepod.
Accommodation: Two to four(converted).
Propulsion: Two 800 millicochrane impulse driver engines, four RCS clusters, three sarium krellide storage cells, high performance micro fusion reactors.
Dimensions: Length 3.92 m; beam 2.5 m; height 1.7 m.
Mass: 1.06 metric tonnes.
Performance: Maximum velocity 14750 m/s; limited warp launch
Armament: Two Type-IV phaser emitters.
Overview: Developed in the mid-2360s, the Type-17 Shuttlepod is a middle way between a shuttlepod and a shuttle. It is the first shuttlepod which is warp capable when launched at warp by the mothership. It generally serves individual crewmembers to get around in-system without the need of a shuttle or the ship itself.

Type-9A Cargo Shuttle

Type: Medium short-range warp shuttle.
Accommodation: Two flight crew, one cargo specialist, 11 passengers
Propulsion: Two 2175 millicochrane warp engines (uprated), four RCS clusters.
Dimensions: Length 10.5 m; beam 4.2 m; height 3.6 m.
Mass: 4.5 metric tonnes.
Performance: Sustained Warp 2.2 for 32 hours.
Armament: None.
Overview: The Type-9A cargo shuttle is the most used orbital and interplanetary supply transporter throughout Federation space. It is a common sight at starbases and facilities. It is used for making regular supply transports and personnel transfer. With the introduction of much more capable runabouts like the Danube, it has become somewhat less used for long distance transports. However, due to its size it can perform faster for regular transports.

Type-8 Personnel Shuttle

Type: Light short-range warp shuttle.
Accommodation: Two flight crew, six passengers.
Propulsion: Two 1350 millicochrane warp engines, two 800 millicochrane impulse engines, four RCS clusters.
Dimensions: Length 7.965 m; beam 4.4 m; height 2.7 m.
Mass: 3.38 metric tonnes.
Performance: Sustained Warp 3.
Armament: Two Type-IV phaser emitters.

Overview: The Type-8 personnel shuttlecraft is currently in production and replacing the Type-6 shuttle. This craft is considered to be more adapted to interplanetary travel with increased reliability within planetary atmospheres, and provide slightly greater internal volume. A short-range transporter allows for easy handling of cargo and crew. This type of shuttle is currently in use throughout Starfleet.

Type-9 Personnel Shuttle

Type: Medium short-range warp shuttle.
Accommodation: Two flight crew, four passengers.
Propulsion: Two 1350 millicochrane warp engines, two 800 millicochrane impulse engines, four RCS thrusters.
Dimensions: Length 8.5 m; beam 3.8 m; height 2.8 m.
Mass: 3.2 metric tonnes.
Performance: Sustained Warp 3.4.
Armament: Two Type-IV phaser emitters.
Overview: With the ever increasing need of sophisticated shuttles for medium-ranged missions it became clear that a new design was needed to fill the gap between shuttle pods and shuttles. This was realized in the type-9 shuttle design. It is able to support independently a small team on medium-range missions not requiring bigger shuttles. With warp capability it also freed the need to use bigger shuttle for medium-range transfer.

Type-M1 Sphinx Workpod

Type: Light industrial manipulator (Sphinx M1A), medium industrial manipulator (Sphinx M2A), medium tug (Sphinx MT3D).
Accommodation: Pilot (M1A, M2A); pilot and cargo specialist (MT3D).
Propulsion: One microfusion reactor, four alfinium krellide power storage cells, four RCS thrusters.
Dimensions: Length 6.2 m; beam 2.6 m; height 2.5 m.
Mass: 1.2 metric tonnes.
Performance: Maximum velocity 2000 m/s.
Armament: None
Overview: The various Sphinx Workpod types are designed for construction work and repair. The Sphinx MT3D can be used for towing objects to and from the construction site. All variants of the Sphinx Workpod are commonly found at Federation Fleet Yards and Starbases, as well as on larger Starfleet vessels.

Danube Class Runabout

Type: General Purpose Auxiliary craft
Accommodation: Crew of 2-4. Evacuation capacity: 20 passengers; 40 if with passenger container.
Propulsion: One warpcore, two impulse drives, four RCS clusters.
Dimensions: Length: 23.1m, Draft: 5.4m, Beam: 13.7m
Mass: 158.7 metric tonnes

Performance:

- Full Impulse: 0.25c
- Cruise Speed: Warp 2
- Maximum Velocity: Warp 4.7 (for twelve hours)

Armament: 6 Type V phaser arrays, 2 micro-torpedo launcher in weapons pod (optional), 24 micro torpedoes

Overview: In recent times, the Federation's expansion had increased the workload on the aging fleet such that availability became a problem. A desire to shift some work load onto smaller vessels appeared. In 2363, ASDB began a study for a warp capable shuttle for short and medium range missions. It was to be able to carry out small scientific missions, cargo and personnel transport. It would to offer bases with the ability to carry out minor local and sector operations without the need to depend on capital ships.

As the range was to be much greater than general shuttles, the requirement for cargo transport adopted a container system. This increased its capability as starship replacement as well as increased cargo capacity and mission. The Danube introduced the runabout classification in Starfleet. Civilian ships of this size had been and still are classified as ships.

The development of the Danube-Class runabouts began in 2363, and reached production status in early 2368. The Danube features a detachable front cabin for four and a stardrive sled design. It typically carries an empty pressurized cargo module. The typical flight crew included a pilot, co-pilot/flight engineer, and two mission specialists. The Danube has a full-fledged a two-person transporter in the rear of the front cabin. Until now shuttles only offered limited transporter capability. The Danube runabout can be equipped with different modules for missions such as personnel transporter, cargo transporter, scientific expeditions, tactical assignments, prison transports, medical transports, etc.

A weapons pod with two micro-photon torpedo launchers or a sensor pod can be attached to the roof.

The impulse power is provided by two drives, each with four fusion reactors, build into the side housing. The impulse drive assembly includes modern driver coils and vectored exhaust directors. Bussard type intakes assist for atmosphere or interstellar travel. For maintenance the impulse drive assembly can be removed.

In the cockpit subfloor is a computer core measuring 2.3 x 2.1 x 1.3 meters. It is assembled from standard isolinear units consisting of 186 isolinear chips and 53 command pre-processors. Sub-nodes are installed throughout the runabout and are connected to the core by standard optical data network relays. This allowed the computer core to be compatible with starship and base computer system elements.

As part of a Space Wing, the Danube runabout typically serves in supporting roles:

1. *Search and Rescue* - Each Danube-class runabout can rescue pilots from damaged craft and tow damaged fighters back to the Akira-class carrier.

2. *Electronic Countermeasures / "Wild Weasel"* - Each craft can be equipped with powerful sensor jammers to help protect fighters on attack runs against both space-borne and planetside targets, as well as improved targetting against threat sensor systems.
3. *Science/Spaceborne command and control* – By mounting a sensor pod on the back the runabout can increase its scanning capability for scientific research or to control an area of space.

Fightercraft

The United Federation of Planets Starfleet employs three classifications of Starfighters in her inventory, each with a specific role. These classifications are:

1. **Space Superiority**: Space Superiority Fighters are designed destroy fighters and strike crafts.
2. **Strike**: Strike fighters are designed for fleet/strike/ground support. They usually deploy heavy weapons, but retain enough mobility to engage other fighters.
3. **Interceptor**: Interceptors engage enemy crafts within range. Interceptors rely on firepower and protection by sacrificing range.

Author's note: With Star Trek's powerful weaponry the difference between pure fighters and strike craft is slim to non-existent. Any craft equipped with torpedoes is technically a strike craft. All Federation fighters are equipped with phaser and torpedo weapons. With sublight speed limit more powerful impulse drives don't make a difference. With Star Trek weapon's range and speed as well as craft speeds, long-range sensors are also nonviable in engagement. A second long time-lag will equal a miss.

Valkyrie Type Fighter

The ship loses during the Dominion War had called upon the Peregrine fighters as a cheap and effective way to bring more firepower onto the battlefield. However, Starfleet's premier fighter was outdated and proved poorly in performance compared to other powers. Starfleet immediately requested a modern design. Despite great efforts the Valkyrie design suffered several delays due to technical problems and lack of experience of Starfleet engineers in fighter designs. The Valkyrie is the first true superiority fighter created in many years since the Romulan War. The Valkyrie incorporates the latest shuttlecraft system design combined with the latest in micronized weaponry.

After the end of the Dominion War the first Valkyrie squadron was commissioned and reached operational status at the end of 2376. The Valkyrie is being deployed to elite units at certain borders.

The Valkyrie is still being produced in low numbers, and considered classified due to some characteristics. Among these are the high-recharging shield system, and technologies recovered from the Dominion. Aside from these the Valkyrie can do anything shuttles can do, e.g. towing or recovering an object with a tractor beam. It can transport a small number of mines in the aft of the cabin and deploy them through the aft hatch.

The flight crew is required to wear flight suits which provide limited life-support functions in case of damage to the cabin. A one-way emergency transporter suit (ETS) is available for short range escape. The cabin can be separated from the main body and act as an escape pod.

Type: Space Superiority Fighter
Accommodation: Crew of 2.
Propulsion: One warpcore, four impulse drives, two RCS clusters.
Dimensions (estimated)

- Overall Length: 15.5-19 meters
- Overall Height: 3.2 meters
- Overall Beam: 12-15 meters

Mass (estimated): 15-28 metric tonnes
Performance

- Standard Impulse Configuration: 0.25c
- Maximum Sustainable Speed: Warp 5
- Cruising Speed: Warp 3

Armament

- 2 Type-VII pulse phasers (fore)
- 2 Type-VII phaser emitters (ventral fore, aft)
- 2 micro quantum torpedo launchers (fore), 10 micro torpedoes
- 4 Mark VI/XXV Photon Torpedoes/Mark III Quantum Torpedoes on external stations.

Peregrine Type Strike Fighter

The Peregrine was the most powerful fighter design in Starfleet since the Romulan War. Its design was created parallel to the Peregrine scout ship. It was the first to include a total of 8 canons of various weapons types. Until then heavy fighters would have to equip a weapons pack to match in fire power. The powerful and upgradeable Peregrine-class has served Starfleet in the role of defense and patrol fighter ever since. After the Romulan War, fighters had been considerate to be too fragile against sophisticated starships. The Peregrine designers tried to disprove this opinion, but never got the chance until the Dominion War. The Peregrine had shown its worth in the Dominion War, and had resurrected the value of fighters once again. The Peregrine series has shown to be an amazing expandable design that has far exceeded the original design expectations. However, it has outlived its design limit. Its great production number will warrant its existence for some time before being phased out from Starfleet inventory. It will probably be serving in its civil capacity for a much longer time than any ship class. Peregrine-class fighters have been decommissioned in batches, and released onto the civilian market as well as having been transferred to local defense organisations such as the Bajoran military.

The latest upgrade includes new computer cores, sensors, phasers, weapons interfaces, and redesigned weapons bays. It can now hot swap the latest fighter equipment and weapons without the need for reconfiguration.

Type: Strike Fighter
Accommodation: Crew of 2.

Dimensions

- Overall Length: 24.4 meters
- Overall Height: 5.82 meters
- Overall Beam: 17.5 meters

Mass: 132 metric tonnes

Performance

- Standard Impulse Configuration:0.25c
- Maximum Sustainable Speed: Warp 5
- Cruising Speed: Warp 3

Armament

- 2 Type-VII phaser cannon (forward firing arc)
- 6 micro photon torpedo launchers on wings, 50 micro torpedoes
- 6 Mark VI/XXV Photon Torpedoes on external stations

Captain's Yacht

The Akira-class vessel is not equipped with a yacht for the Captain. If the Captain requires a private vessel for transport, one of the Danube-Class runabouts is configured for their use.

Flight Operations

Introduction to Flight Operations

Operations aboard a Federation vessel fall under these categories: flight operations, primary mission operations, secondary mission operations, and flight deck or shuttle bay operations.

Flight operations are all tasks directly related to the operation or readiness of the vessel itself.

Primary mission operations are all tasks given and supervised from the Main Bridge.

Secondary mission operations are all task not under the supervision of the Main Bridge, or just independent work.

Flight deck operations are necessary tasks which typically fall under secondary mission operations. In missions where auxiliary crafts are needed, flight deck operation has to communicate and operate to primary mission operation needs.

Mission Types

Like most Federation capital ships the Akira class has been designed to offer a certain minimum of multi-role ability. In the vastness of space having a ship able to do anything necessary was still a necessary requirement in Starfleet to realize Federation Council policy.

Mission for an Akira Class starship may fall into one of the following categories, in order of her strongest capable mission parameter to her weakest mission parameter.

- **Tactical/Defensive Operations:** Typical missions include patrolling the borders and important Federation worlds. Deployment to hostile or conflicts areas.

- **Emergency/Search and Rescue:** Aside from standard rescue missions, its primary transport ability makes it the primary responder for small-scale planetary evacuation, disaster or crisis.

- **Federation Policy and Diplomacy:** As any Federation capital ship it can perform diplomatic missions during deep-space operations.

- **Deep-space Exploration:** The Akira class is equipped for long-range interstellar survey and mapping missions, as well as the ability to explore a wide variety of planetary classifications.

- **Contact with Alien Lifeforms:** Pursuant to Starfleet Policy regarding the discovery of new life, facilities aboard the Akira class include a variety of exobiology and xenobiological suites, and a small cultural anthropology staff, allowing for limited deep-space life form study and interaction.

- **Ongoing Scientific Investigation:** An Akira class starship is equipped with scientific laboratories and a wide variety of sensor probes and sensor arrays, giving her the ability to perform a wide variety of ongoing scientific investigations.

Operating Modes

The normal flight and mission operations of the Akira-class starship are conducted in accordance with a variety of Starfleet standard operating rules, determined by the current operational state of the starship. These operational states are determined by the Commanding Officer, although in certain specific cases, the Computer can automatically adjust to a higher alert status.

The major operating modes are:

1. **Cruise Mode:** The normal operating condition of the ship.
2. **Yellow Alert:** This is a state of increased readiness for possible crisis situations.
3. **Red Alert:** This is a state of emergency, imminent danger or combat situations.
4. **External Support Mode:** State of reduced activity when docked at a starbase or other support facility.
5. **Reduced Power Mode:** Approved procedures which reduce the power usage of the ship significantly.

Cruise Mode

Cruise Mode is the standard operating condition for all starfleet vessels. During Cruise Mode, all ship's primary operational personnel are organized into three distinct working shifts of 8 hours.

Cruise Mode operational rules include:

- Level 4 automated diagnostic series are run on all primary and tactical systems at the beginning of each shift. Some systems may have more frequent diagnostics, but that is at the discretion of the Engineering Staff.

- At least one major power system is to remain active and on operational status at all time. At least one additional power system must be maintained on hot-standby.

- Long-range navigational sensors to be active if the ship is travelling and superluminal speeds. Lateral and forward sensor arrays to be maintained at ready status, although these systems can be made available to secondary scientific mission use at the discretion of the OPS manager.

- Navigational deflector to be active as needed for protection from unanticipated debris or drag from interstellar media.

Yellow Alert

Yellow alert designates a ship wide state of increased readiness for possible crisis situations. During yellow alert, all on-duty personnel and attached personnel are informed of the alert by panel display and are directed, according to their training, prepare for emergency action. The next shift personnel are directed to prepare for duty on five minutes' notice. Cross-trained second shift personnel are directed to prepare for possible duty in their secondary assignments.

Some specific, ship wide preparations include:

- Level 4 automated diagnostics series run on all ship's primary and tactical systems to determine the ship's readiness status.

- Warp Core power brought to full operating capacity and maintained at 20% power output. Level 4 diagnostics are performed on warp systems and propulsion capabilities, including maximum available engine output.

- All tactical and long-range sensor arrays are brought to full operational status. All secondary missions currently using the sensor arrays can be overridden by the Ops Manager at a moment's notice.

- All deflector shields generators brought to hot standby. Secondary shield generators brought to standby as well. All operational backup generators are charged to 50% capacity.

- All phaser banks are charged to 50% capacity. Secondary power conduits are enabled and targetting trackers are activated. Level 4 automated diagnostics verify system capabilities.

- All photon torpedo launchers are brought to standby mode. One torpedo is loaded and primed to launch mode and primed with a standard anti-matter charge. This torpedo can be taken offline by either the TAC or OPS officers. Level 4 automated diagnostics verify system capabilities.

- The CIC is brought to alert status and backup CIC officers are notified for possible duty in the event of launch operations.

- The CAP is notified of impending hostilities and is put on alert. Alert wings will be directed to launching position. All flight crews are prepped for launch.

- Onboard sensors are brought online and record the location of all personnel and alert Ship's Security of any anomalous activity. Location and activity information is recorded for post-alert analysis.

- All level 5 diagnostics are preformed to verify readiness of all lifeboats.

Red Alert

Red alert designates a shipwide state of emergency readiness for crisis situations. During red alert, all on-duty personnel and attached personnel are informed of the alert by panel display. All personnel have to report to predetermined post.

Some specific, shipwide preparations include:

- Level 4 automated diagnostics series run on all ship's primary and tactical systems to determine the ship's readiness status and done so at five-minute intervals. Pertinent information is passed to the appropriate bridge officer immediately.

- Warp Core power brought to full operating capacity and maintained at 75% power output. Level 3 diagnostics are performed on warp systems and propulsion capabilities, including maximum available engine output. Level 4 diagnostics performed on all warp propulsion systems at five-minute intervals.

- All tactical and long-range sensor arrays are brought to full operational status. All secondary missions currently using the sensor arrays are shutdown, but can be overridden by the Ops Manager at a moment's notice.

- All deflector shields generators brought to primary tactical configuration unless overridden by the Tactical Officer. All secondary shield generators brought to standby as well. All operational backup generators are charged to 100% capacity.

- All phaser banks are charged to 100% capacity to full standby. Primary and Secondary power conduits are enabled and targeting trackers are activated. Level 3 automated diagnostics verify system capabilities.

- All photon torpedo launchers are brought to standby mode. One torpedo is loaded and primed to launch mode and primed with a standard anti-matter charge. Level 4 automated diagnostics verify system capabilities.

- The CIC is brought to alert status and backup CIC officers are notified for possible duty in the event of launch operations.

- The CAP is notified of impending hostilities and is put on alert. Alert wings will be directed to launching position. All flight crews are prepped for launch.

- Onboard sensors are brought online and record the location of all personnel and alert Ship's Security of any anomalous activity. Location and activity information is recorded for post-alert analysis.

- All level 4 diagnostics are preformed to verify readiness of all lifeboats. Readiness of ejection initiator servos are verified through a partial Level 3 semiautomatic check. Security officers are assigned to insure that all passageways to ensure lifeboat accesses are clear.

- Emergency bulkhead doors and force fields are automatically closed between sections to contain the effects of possible emergencies, including fire and decompression emergencies.

Blue Alert

Due to the unique shape of her hull, the Akira class cannot land within a gravity well and maintain hull integrity for transatmospheric operations. In an extreme emergency, the Akira class could attempt a touchdown. However, without atmospheric thrusters flight control is very limited. On touchdown the nacelles, wings, and extended-hulls will likely break away causing a turn over. The saucer will slam down hard destroying all lower decks. For this reason it is recommended to eject the warp core and any antimatter tanks before initiating landing operation. The crew should retreat to the center of the saucer and strap up.

Should flight control not be available it is recommended not to attempt a landing. Due to weight distribution the ship will like fall tumbling backwards, and smashing the extended-hulls and nacelles into the saucer on touchdown.

External Support Mode

While docked at a starbase or other support facilities with umbilical support systems the ship may go into limited activity. Systems not necessary to stay active at all times shall be deactivated. These will permit the repair, maintenance, or upgrade of all systems.

Reduced Power Mode

This mode is designed for maximum energy conservation in time of crisis, while maintaining a certain level of operational status. This is typically necessary when resources are low or when avoiding energy detection.

During Reduced Power Mode, all systems other than necessary to maintain life are shutdown completely. Life-support will be run at minimum. All non-essential areas are abandoned. Only medical replicators may be active. Emergency rations will be used. Any other systems may be reactivated periodically if necessary.

Separated Flight Mode

Due to the unique configuration of the Akira-class, no Akira-class vessels support Separated Flight Mode. The Akira-class vessel can use its greater complement of shuttlecraft and runabout for escape-mode.

Emergency Operations

Introduction to Emergency Operations

As on any Star Fleet ship the safety of the crew comes first. All key systems are triple redundant with critical systems having an additional backup. These system layers are physically separated to increase damage resilience. All safety systems offer several different technically based solutions, and offer manual operation options for each. These are also powered by an independent power source.

Fire Suppresion

The entire internal structure is augmented with fire-resistant materials pursuant to SFRA-standard 528.1(b) for inflammability in a nitrogen-oxygen atmosphere. All shipboard equipment and furnishings *must* conform to SFRA 528(c-f) classifications. Equipment and things not conforming to the requirement must be stored in specially designated storage. The Chief Engineer is ultimately responsible for the observance of these policies by all personnel.

Fire detection sensors are incorporated into the environmental sensor systems, any critical systems, and any room and stores throughout the spacecraft. These sensors are programmed to detect airborne particles or gasses typical of combustion or combustion byproducts. In the event that these sensors do not react fast enough, any crew member with a communicator or access to a communication panel can activate the fire suppression system.

In the event of a small fire, a containment force field would be erected around the fire, depriving the fire of oxygen. The computer will keep the field up until all combustible material within the field until temperatures within the field fall below combustible levels.

Larger fires may require whole compartments to be isolated through emergency bulkheads. Force fields and manned firefighting equipment would need to be used to contain the fire and prevent the spread of the fire throughout the ship.

In extreme emergencies, whole compartments can be vented to vacuum. Since this procedure would be lethal to anyone within the compartment, such venting cannot be performed until these areas are evacuated. The only exceptions to this protocol are if the Commanding Officer certifies that the fire poses an imminent danger to the whole of the spacecraft and crew.

Emergency Medical Operations

All Starfleet personnel are required to refresh their medics' skill every six month and to take part in emergency drills every month. At least one third of the crew in any department is to be trained to serve temporary as Emergency Medical Technicians, triage specialists, and other emergency medical functions. This arrangement was established due to the wide variety of emergencies at any given time.

The whole Decks 5 and 6 can serve as emergency intensive care wards at any time with minimum rearrangement. The aft Cargo Bays may also be used. Due to traffic the main flight deck can only be filled last. However, additional medical monitoring equipment will be necessary. 30 inflatable standard sized tents, 3 inflatable surgery tents, 360 foldable field beds, and medical field equipments are in storage. These allow deployments of field hospitals within minutes. More equipment can be replicated if necessary.

Lifeboats

Aside from the escape options of shuttlecraft, fighter, or transporters, the primary survival craft of the Akira-class is the escape pod or lifeboat. Each Akira-class vessel carries 71 escape pods with a capacity for 8 persons each, and 14 small escape pods for 2 persons each.. At full capacity each Lifeboat has a food supply of 168 person-days and life-support for 168 person-days. Life support can be extended if the lifeboats connect together. In this configuration only one lifeboat needs to run other equipment.

Rescue and Evacuation Operations

Rescue and Evacuation Operations for an Akira class starship will fall into one of two categories - abandoning the starship, or rescue and evacuation from a planetary body or another starship.

Evacuation/Rescue Scenario

Resources are available for rescue and evacuation to an Akira class starship include:

- The ability to transport 820 persons per hour to the ship via all personnel transporters including emergency transporters.

- The availability of all shuttlecrafts and pods with a round trip of one hour to allow the evacuation of 74 persons per hour. Additional 44 persons could be evacuated by Type 9A shuttles. A Danube runabout could evacuate 20-40 persons.

- Capacity to support up to 4500 evacuees with conversion of the flight bay and cargo bays to emergency living quarters.

- Ability to convert Holodecks, the observation lounges and the crew lounge to emergency triage and medical centers.

- Ability to temporarily convert aft cargo bays to type H,K, or L environments, intended for non-humanoid casualties.

Abandon-Ship Scenarios

Resources available for abandon-ship scenarios from an Akira class starship include:

- The ability to transport 1380 persons per hour from the ship via personnel and emergency transporters.

- The availability of all shuttlecrafts and pods with a round trip of one hour to allow the evacuation of 74 persons per hour. Additional 44 persons could be evacuated by Type 9A shuttles. A Danube runabout could evacuate 20-40 persons.

- Protocols also include the use of Lifeboats. Each Lifeboat can support a full compliment for 3 weeks with food for 3 weeks.

- Environmental Suits are available for evacuation directly into a vacuum. In such a scenario, personnel can evacuate via airlocks, the flight bay, or through exterior turbolift couplings. Environmental suits are available at all exterior egress points, along with survival lockers spaced through-out the habitable portions of the starship.

- Many exterior windows are removable, allowing for egress. However, these manual releases are only activated in the event of atmosphere loss, power loss, certain Red Alert conditions, and only if personnel in contiguous compartments have access to an environmental suit.

Space Wing

General Overview

Since the early age of space warfare, spacecrafts have supported their mother ship to varying degrees in various capacities. In those days, everything had to be hands-on and there were many things spacecraft could do. Their service and numbers grew into the system known as the carrier.

The spacecrafts were organized into squadrons of specific capabilities. The squadrons themselves were organized into a carrier space wing.

The commander of a space wing is called commander air group or simply CAG. The space wing is an independent military unit. When assigned to a carrier the CAG has privileges equal to a department head on the carrier. The CAG reports for duty to the commanding officer of the carrier. He has tactical command of the wing during wing operations. His responsibilities are similar to that of a department head. These responsibilities include internal administration of space wing personnel and material upkeep of assigned spaces and spacecraft. In matters concerning flight department functions, the space wing commander acts under the direction of the flight department officer. Under the direction of the operations officer, the commander cooperates in matters concerning operations department functions. The operations department has the responsibility of space operations and the combat information center (CIC).

Conclusion

Projected Upgrades

The Akira class ships are expected to receive new computer systems with bioneural circuitry upgrades now being developed for the Intrepid class ships. Second generation Type X phaser upgrades. Within the next twenty years, a new warp core and a warp drive are expected to be installed.

Mission Background

Appendix A - Technical Specifications

AKIRA CLASS VARIANT DESIGNATIONS

- I - Improved
- CVL – Light Carrier
- P - Performance

PERSONNEL COMPLEMENT

- Officers and Crew: 184 ; 500 with Space Wing
- Evacuation Limit: 4500

POWER PLANT

- 1500+ Cochrane warp core

DIMENSIONS

- Overall Length 444 meters

- Overall Draft 90.15 meters
- Overall Beam 331.38 meters

WEIGTHS

- Empty 2428000 metric tonnes
- Operational 3055000 metric tonnes

PERFORMANCE

- Normal Efficiency Cruise Velocity: Warp 8
- Maximum Cruise Velocity: Warp 9.5
- Maximum Velocity: Warp 9.8 (12 hours)

ARMAMENT

- 5 Type-X phaser arrays (2 on wings)
- 1 Type-X phasers on weapons pod rear
- 4 Forward Firing torpedo launchers (7 tubes)
- 4 Broadside Firing torpedo launchers (4 tubes)
- 2 Backward Firing torpedo launchers (4 tubes)

TRANSPORT

Cargo capacity: 80000 metric tonnes nominal; including complete center bay 200000 metric tonnes

Shuttlecraft and support craft complement (standard)

- 6 Type 17 Shuttlepods
- 4 Type 9A Cargo Shuttle (replaced by Danube if available)
- 6 Type 8 Personnel Shuttles (2375: replaces Type 7)
- 4 Type 9 Personnel Shuttles (2375: replaces Type 6)
- 2 Sphinx Class Work Pods
- 8 workbees

Additional Space Wing (Carrier role only)

- 1 Support Squadron with 2-4 Danube Runabouts (2 officers, 2 pilots, 8 operators, 16 mechanics, 1 supply)
- 1 Fighter Squadrons with 12 Peregrine or 2 Fighter Squadrons with 24 Valkyrie fighters (4 officers, 20 pilots, 24 operators, 48 mechanics, 1 supply, 24 weapons specialists)
- 1 Strike Squadron with 3 Peregrine or 6 Valkyrie fighters (2 officers, 4 pilots, 6 operators, 12 mechanics, 1 supply, 6 weapons specialists)

1 CAG, 8 officers (liaison, ops, mission, strike, intel, systems, supply, doctor), 24 controllers, 20 fuel/support specialists, 36 deck security, 4 nurses, 20 weapons specialists: 294 men

Additional Special Mission Options (only when special operation units are assigned)

- 2 Venture reconnaissance vessels
- 2-4 Argo type transports
- 2-4 SH-1A Magpie special transport shuttles
- 6-8 Wyvern, DR-1 Husky or DR-2 Pegasus Hoppers; plus no more than two additional LC type containers or M-4 combat support bots
- Or any combination not exceeding 6 shuttle crafts or 8 Hoppers

Troop deployment: Each DR-2 Hopper with LC type containers could deploy a max of 48 marines at a time. With two runs a battalion, complete with equipment, could be deployed. This is also the max recommended long-range transport capacity. Anymore and it's a waste to lose the ship. It is recommended to have one additional medic LC container for 42 patients. This should ease evacuation of the wounded from a transporter jammed battlefield.

Transporters

- Four 6-person
- Four cargo
- Four 4-person emergency

Appendix B - Deck Layout

Deck A-L/R(Deck 2): 2 Phaser Practice Range, 2 Crew lounge, 50 dual contingency quarters

Deck B-L/R(Deck 1): bottom aft extended-hull impulse engine bay, deuterium tanks, warp booster system

Deck C-L/R: top aft extended-hull impulse engine bay, deuterium tanks, antimatter tank, 2-men escape pods

Deck D: deflector systems, sensor control & support, bay access entry, torpedo bays

Deck E: torpedo loading mechanism, torpedo bay transport system,

Deck F: torpedo launchers, RCS clusters, aft phaser emitter

Deck 1: Main Bridge, Briefing Room, Captain's Ready Room, Emergency Stores, Restroom, Sonic & emergency hazard shower, Waste water recycling, Life support, Emergency propulsion

Deck 2: Waste water recycling, Solid waste disposal, Life support, Bridge crew lounge, 2 airlocks, emergency lockers, space suit lockers, System monitoring, Memory banks, ejection systems

Deck 3: Sensor rooms, main deuterium access hatch; deuterium purge vents, propulsion support systems; conduit stores, central stairhouse, central turbolift shafts, turbolift shafts to the bridge, 40 dual contingency quarters, Transporter support systems, upper escape pod section, cryogenic system, support systems; maintenance, sensor monitoring suits, sensor maintenance

Deck 4: central distribution, Filters, purge systems, support systems, supply shafts, Sensor room, 4 multipurpose science lab, 4 science lab, main deuterium tank, Captain's quarter, XO's quarter, bridge crew quarters, 4 single quarters, 8 half single quarters, 4 dual quarters, 16 dual contingency quarters, security center & detentions, cryogenic system, upper park & ballroom space, hydroponic, sensor monitoring suits, alternate captains quarters

Deck 5: 4 VIP quarters, 2 small guest quarters, wardroom, main security center (offices etc.), park, ballroom, hydroponic, 8 science lab, main crew mess, main crew lounge, 2 gymnasiums, central bioreactor/purification system, atmospheric reproduction and filtering system, reserve gas tanks, 2 Holodecks, 8 Holosuits, propulsion support systems; conduit stores, supply cargo lift shafts, main elevator shafts, workbee airlock/storage, Emergency Transporters

Deck 6: Umbilical connection hardpoints, warpcore housing, computer cores, computer core controls, cryogenic systems, Extended-hull cargo access ports, aft tractor beams, water tanks, raw bio matter/matter tanks; emergency provisions, emergency equipment stores, bulk consumables storage, consumables storage, secondary sickbay, 2 single quarters, 3 family quarters, security center & armory, Waste water recycling, extensive recycling of organic material, organic solids reprocessing, main replicator systems, main fore tractor beam emitter, computer power monitoring, systems monitoring suits, Deuterium conduits, fill & drain ports, tank purge ports, separation systems, environmental system monitoring

Deck 7: 4 family quarters, 2 single quarters, 36 half single quarters.16 dual quarters, CMO's quarter, Counselor's quarter, impulse support systems, impulse deuterium & antimatter tanks, SIF & IDF generators, cryogenic systems, Waste water recycling, main sick bay, clinical waste water recycling, upper escape pod section, Transporter support systems, environmental systems, solid waste recycling, space control, observation lounge, cryo chiller subsystems, engineering system programming office, defense strategy lab, tactical analysis, tactical planning, aid stations

Deck 8: 12 family quarters, 6 single quarter, upper main shuttle bay space, aft shuttle bay spaces, aft cargo bay spaces, central cargo hold ring, dorsal phaser array systems, phaser support systems, cryogenic systems, public restroom & shower, central security force field, impulse support systems, impulse deuterium & antimatter tanks, waste water recycling, space control, shuttle crew lounge/ready & briefing room, support systems, 2 squadron flight crew lounge/ready/briefing rooms, flight deck control, phaser maintenance

Deck 9: 8 family quarters, 4 half single quarters, transporter rooms 1-4, main shuttle bay upper space, aft shuttle upper bay spaces, cargo bays, aft cargo bay spaces, public restroom & shower, central cargo hold ring, broadside torpedo launchers, upper shuttle launch area space, spacecraft/shuttle systems programming, tool storage, upper impulse bay space, impulse overflow tanks/vents, impulse support systems, impulse deuterium & antimatter tanks, waste water recycling, support systems, 2 squadron flight crew lounge/ready /briefing rooms,

Deck 10: 108 dual contingency quarters, main shuttle bay , refueling dock, parking, maintenance, aft shuttle bays, aft cargo bays, workshops, emergency lockers, public restroom & shower, memory banks, central cargo hold ring, support system ring, maintenance, tool storage, impulse bay, impulse support systems, impulse deuterium & antimatter tanks, upper escape pod sections, escape pod sections, shuttle launch waiting area, shuttle launchers, ventral phaser systems, phaser support systems, cryogenic systems, cargo transporters, shuttle antimatter storage, shuttle lifts, transporter support systems, waste water recycling, RCS clusters, RCS controls & maintenance, lateral sensor control, sensor maintenance, phaser maintenance

Deck 11: main workbee bays & maintenance/parking, main shuttle bay maintenance/parking upper space, aft shuttle bay maintenance/parking upper space, main engineering lounge/briefing room & controls, public restroom & shower, fore torpedo launchers, Jeffries hube, cryogenic systems, engineering support systems, environmental support systems, purge systems, EPS Node Monitoring

Deck 12: 2 single contingency quarters, 42 dual contingency quarters, Chief engineer quarter, Space Wing commander's quarter, 2 guest officer's quarters, lower escape pod head section, Emergency Transporters, main shuttle bay maintenance/parking, aft shuttle bay maintenance/parking, aft shuttle bay storage, main engineering & controls, warpcore, warp plasma conduit, public restroom & shower, subspace coil, cryogenic system, electrohydraulic systems, SIF & IDF generators, engineering support systems; shield; fire suppression system, workshops,

Deck 13: main engineering damage control lounge/briefing & controls, main fusion reactor top, cryogenic systems, engineering tool storage, engineering support systems, workshops, maintenance, production center, remote alloy deposition furnace, single-use gel solidification unit, electroceramic solidification, main deflector dish support systems, main deflector dish generators, subspace coils,

Deck 14: main fusion reactor bottom, antimatter generator, main aft tractor beam emitter, cryogenic systems, demolition packs, engineering support systems, main deflector dish support systems, longrange sensors, deflector controls

Deck 15: antimatter tanks, antimatter conduits, system monitoring, sensor workshop, spare part storage, ejection systems

Deck 16: antimatter tanks, antimatter conduits, ejection systems

Hull-Deck 17: main fore tractor beam emitter

Appendix C – Operation Tactics

Show your best side

Like anything, a ship has its strength and weaknesses. The Akira class ship has many obvious weaknesses an enemy will try to take advantage of. Its compact primary hull is very tempting to shoot at as any hit would cause serious damage to the ship's systems. The ship's prominent extended-hull and wing structure are also tempting 'large' targets. The warp conduits are less protected by structure than most ships. The warp drive could be easily disabled. These same structures create a very sizeable phaser blind spot toward the rear and bottom.

The Akira's strength lies within its torpedo fire power and maneuverability. Although, the design and its size ratios make it look thin, it is actually a big ship. Considering these, the Akira is best at making fast continuous attacks. The Akira should always try to keep its rear covered, and never show its belly or top

Space Superiority

In order to establish superiority, space has to be under control. This means anything happening within a certain area is being known, and can be addressed at discretion or with full force. A ship alone cannot establish space superiority, as it cannot be at more than one place at a time while the area needing control is always greater than its weapon's range. A space wing or a destroyer squadron would be necessary.

Unlike 20th century radar on ships Star Trek ships can cover their hulls completely with sensors. As a result the sensor range difference between small space crafts and full-fledged ships is incomparably greater. An innumerable number of small craft would be necessary to cover any significant sized area of the mother ship's own sensor area. For this reason using small craft in the role like the AWACS does not yield. Still, the crafts allow response options beyond that of a single vessel. However, a craft cannot withstand the full firepower of any full-fledged ship for any long periods of time. For this reason the mother ship has be able to reinforce or to come to aid within 5 to 10 minutes. Typically any combat between two equal opponents is decided within 5 minutes.

Under these conditions, an area requires a certain number of patrols and a certain patrol pattern or formation. Ideally the patrols themselves should be within a timely distance to each other. In three-dimensional space the smallest formation setup would be a tetrahedron, followed by triangular dipyramid, cube, icosahedron and so on.

These patrols are generally known as combat patrol. To distinct this from others they are usually referred to as combat air patrols or CAP. The number of CAPs necessary is always N with N being the corner points of the formation. Under threat condition immediate reinforcement are needed, which are often referred to as Alert T, with T being 5 or 15. The reinforcement usually comprise of one CAP wing, one Strike wing, and one SAR shuttle. Defending additional areas require additional CAPs. For fighters, a CAP has to be flown by two craft as they are likely to engage, and hence, need to cover each other. Other craft only run, therefore, it is not necessary to have a second craft to be sacrified.

In war or like conditions, the primary patrols are BARCAPs with the option to strike. Also escort CAPs will be needed to protect other craft on their mission.

Under normal condition, flight crews should not be on duty for more than 8 hours in a row, and not flying more than 4 hours at a time. This means only a third of the flight crew will be available. In war, this is usually stretched.

The Akira class Space Wing cannot maintain any formation other than the tetrahedron without over-taxing the flight crews and their crafts.

Strike and Interdiction

In case the use of force is required, a strike force has to be ready at any time similarly to the Alert wing. Its role is to suppress or neutralize threats as soon as they are determined.

Under certain circumstances, a preemptive strike or an interdiction strike will be necessary. These targets are often very heavily defended compared to interception targets. To keep loses low the Space Wing should not carry out the mission alone. Fighters shall intercept their kin and neutralize defense systems. Strike crafts shall target important sections.

Appendix D – Crew Needs

Provision

A typical human requires 0.83 kg (pure) Oxygen, 0.62 kg frozen dried food (2.48 kg with water) or 2.5 kg food, 3.56 kg water for drinking and food preparation per day. These numbers do not include extra activity consummations, water for hygienic purposes or any other usages.

Supply storage has to be provided for a year’s worth for a full crew complement or 0.913 tonnes of raw bio matter and 3 tonnes of water per person or a month’s worth at full evacuation capacity, whichever is more. Extensive recycling of organic material allows replicator supply to be replenished and reused up to 4 times before loses become relevant. At which point new raw material have to be supplied.

Emergency Supply

Provisions have to offer at least 10000 kJ per person per day in dry form with a shelf life of at least five years. A three day package measures 17.5x15x7.5 cm^3 and weights about 1.5 kg. After each meal some water has to be drunk in order to help digestion.

Provisions have to offer 1.5 l of water per person per day.

Recommended rationing: For marine or space conditions rations can be lowered to one third. For land conditions rations can be lowered to one half. During the first 24 hours do only drink when really necessary. Afterward, do not drink more than 0.5 l per day. When supply is nearly exhausted one may drink only 1/10 l per day. Children usually drink 1 l per day. Their rationing should be more lenient.

Appendix E – Reference Ships

Galaxy class

Accommodation: 1012; 15000 evacuation
Dimensions

- Overall Length: 641 m
- Overall Height: 463.73 m
- Overall Beam: 195.26 m

Mass: 4960000 metric tonnes
Performance

- Normal Cruise: Warp 6
- Maximum Speed: Warp 9.6 (12 hours); Warp 9.9 upgraded (12 hours)

Armament

- 11 Type-X phaser arrays
- 3 photon torpedo launchers, 10 torpedoes burst fire, 275 torpedoes

Bibliography

This document is a follow-up from a fanfiction research document created back in 1998-2000 along with the 3D model of the Akira. Due to some revived fan base interest, work on this document has been reestablished in 2008. This document was created in part thanks to various references and information provided by fans on the internet.

The background of this document is independent from the general Star Trek fanfiction base with scientific research of its own based on the first document. Therefore, details differ to various degrees from accepted fanfiction.

References:

Star Trek: The Next Generation Technical Manual by Rick Sternbach and Michael Okuda. Pocket Books, a division of Simon & Schuster Inc. 1230 Avenue of the Americas, New York, NY 10020.
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Star Trek: Echoes, at http://wiki.stechoes.com/

Afterward

Authors Notes

I never intended to do this, but friends and associate fans convinced me otherwise. I'm sorry if it took so long, as I had various other non-Star Trek work.

This is the second version of my own, hence, Edition 2. The first version was purely a research project of a curious youngster. At the time, neither information nor diagrams nor detailed pictures have been released. This version has been started years later when more information was available, but was still based on the first scientific observation than wild fan wishing. As such this Technical Manual is very different from most fanfiction. This version is using established formats established by fanfiction as well as in the Star Trek - The Next Generation Manual. Many established Star Trek ship procedures have been included for completeness, while consistency has been kept as far as possible, but specific notes or differences have been included. Credit belongs solely to those original writers of the Star Trek: The Next Generation Technical Manual for the basic science fiction.

When comparing the description given for the Akira class by Alex Jeager, the designer, and the final CGI it became clear that it was an immature and incomplete design compared to the Galaxy or Intrepid class. As the CGI suggested possible advancement over the description given, I went on further based on the CGI. As my version is different to the general accepted view of fans I decided to put it as a one-time production variant with only one ship remaining in service.

Often fans based the ship operations close to 20th century Battle Group carriers, personnel, and procedures. These impressive great many presented research results seem old-fashioned in the Star Trek universe. Some of these have been addressed in this version to a certain extend only.

The reversion back to having a distinct CIC and a bridge has been included to satisfy some fans, including the explanation of the theory. In an all system and information integrated future, this distinction is no more necessary.

Out of fan base interest, this version includes the Air Wing theme, for which it includes the basic Valkyrie fighter from the Star Trek: Invasion game as an example. Other fictional crafts are only listed in name, although, 3D designs of the same do exist.

As I'm not quite all familiar with canon Star Trek, and don't consider myself a true Trekkie yet, there are probably some messed up timeline or story details.

Detailed Creation Notes

Most of the generated data have been done using common sense, a belief in some sort of Starfleet regulation and tradition, and the desire for advancement.

Alex Jeager, the designer, gave the following statement in Star Trek: The Magazine, Issue 2 (July 1999), page 48; "Designing the Akira Class":

"This was my gunship/battlecruiser/aircraft carrier. It has 15 torpedo launchers and two shuttlebays - one in front, with three doors, and one in the back. I really got into it with this one, with the whole idea that the front bay would be the launching bay, and then to return they'd come into the back, because they'd be protected by the rest of the ship."

There some more data available, but mostly unconfirmed or conflicting. Among these are data from the Star Trek: Deep Space Nine Technical Manual. The ship is stated to have 2 torpedo launchers and 6 phaser arrays. The two launchers are obviously a reference to the big Galaxy class launchers and characteristics. This would indeed satisfy depictured actions as each launcher could load and fire ten torpedoes at a time or in single shots. However, the launcher sizes are prohibitive for the statement by Alex Jaeger and the CGI model. There wouldn't be much space left for the stated forward shuttle bays or the deflector dish as there are two levels of launchers. This also applies to the weapons pod. The launchers had to be much smaller.

As stated there would be no rear launchers. The CGI, however, shows rear tubes on the weapons pod. It is possible to have a turning launcher inside, but why not make it able to fire in all directions? A Galaxy class launcher would not be able to turn in such tight spaces. Other than this it was incomprehensible not to have rear weapons.

The 3D model used in this document was mainly based on visual footage. Later it was adjusted with the released of three side diagrams. As it turned out the diagrams had mismatched axis scales in each view. The model was adjusted to a relative scale during construction.

The immature nature of the Akira had led to a ship size problem. Many fan analysis refer to visual ship-to-ship footage comparisons which are unreliable. Some use the bridge module which was copied and pasted from the Sovereign design. This was obviously even more unreliable as it was resized to fit, maybe even by eye sight. A more reliable reference was needed, and found. Although, it turned out to be arbitrary also, it was commonly used in designs and more reliable.

There have also been some discussions about the warp core and plasma flow. The plasma flow problem was an exaggerated problem compared to fusion plasma control, but was included for fun. While the problem seems to be important to fanfiction it was not raised when coming to multiple warp cores, which would surely be a synchronization problem. The various places where such cores can be placed are limited in size, not to mention innumerable internal arrangement problems.

From a volume stand point the habitable volume is roughly double that of the Intrepid class. Accounting various other weight factors and comparison with the Galaxy class the Akira should be lighter than had been given officially. Same applies to the necessary ship's crew.

When considering the carrier capacity of the Akira, it is passable. The Akira is suitable as a pure shuttle carrier, but not for war spacecrafts. Military crafts have to be bigger to be able to carry and to use powerful weapons as well as having enough range. Spacecrafts are not aircrafts. They have to include more kinds of machinery, and need more support. They cannot be parked or cramped in any way. There is no point in parking if it cannot be taken out easily or if there is no space to move it anywhere. At a maximum of 24 Valkyries it can barely operate as a carrier.

Why a warp booster and not a warp turbo charger? A turbo charger increases the engine output by self sustained feeding. This is not the case. Also it is rather a buffer or storage than anything else.

Deck height or ship internals are something most modelers don't take into account. It is a given that those models are rather esthetic than anything close to real. Therefore, it is useless to keep to the surface deck count and expect the ship to look nice. The model used here was created disregarding fake decks while keeping as close to the viable ones like the main flight deck. Several decks have been designated with extra structural reinforcements in mind as well as some internal ideas during the planning phase. Most engineering/machinery/cargo decks are in this category. This was done to fit the big machinery without having to waste half used deck spaces. Also this would save some extra utility network complexity by having them in the floor. With walls and doors this would have meant a lot of go around. As a result the deck count differs from the fan base. Of course having fewer decks means fewer choices and requires smarter internal arrangement in order to fit everything neatly.

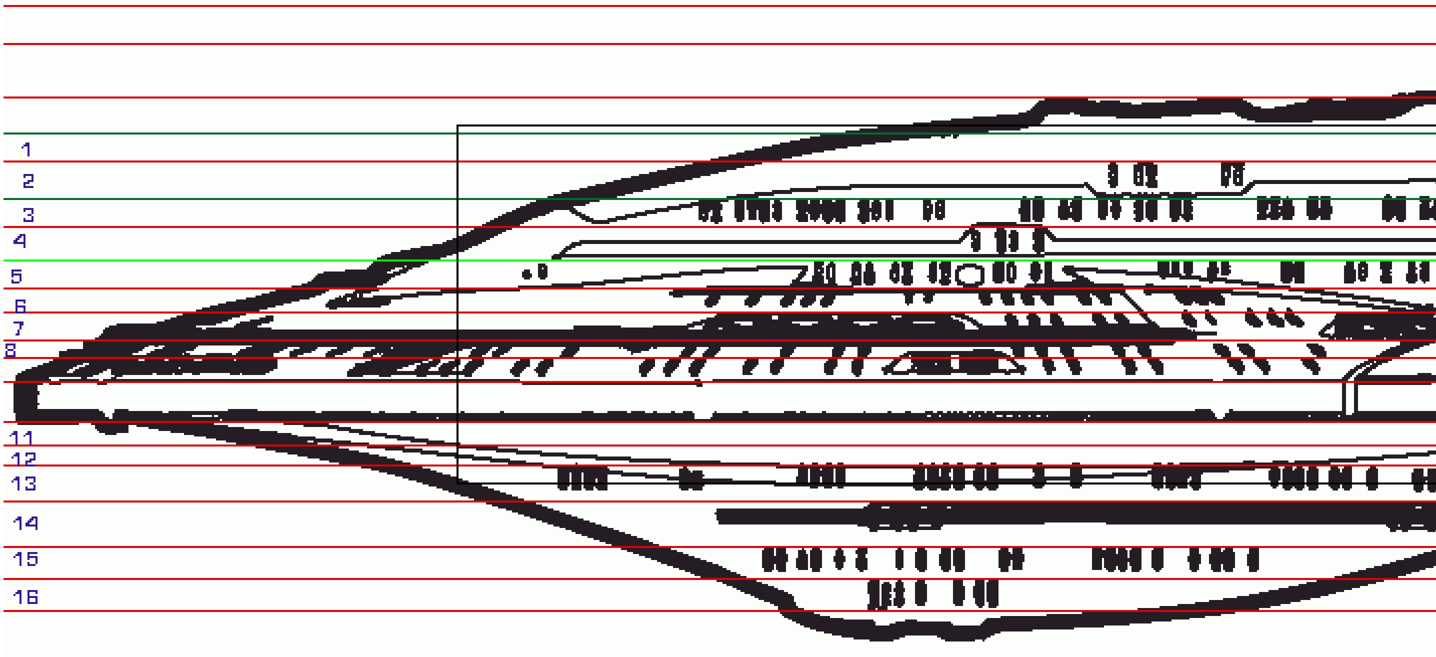
There appears to be some misconception about delta-v, the velocity difference of two objects on a relative vector. It appears to be understood as a way to break speed limits. This is not possible as propulsion cannot accelerate a vessel any faster than the maximum exhaust velocity (given that it does have enough thrust). Impulse drive do work a bit different, but non-the-less they too are limited by their 'impulse' rate. For example, a missile having a maximum velocity of 1000 km/h

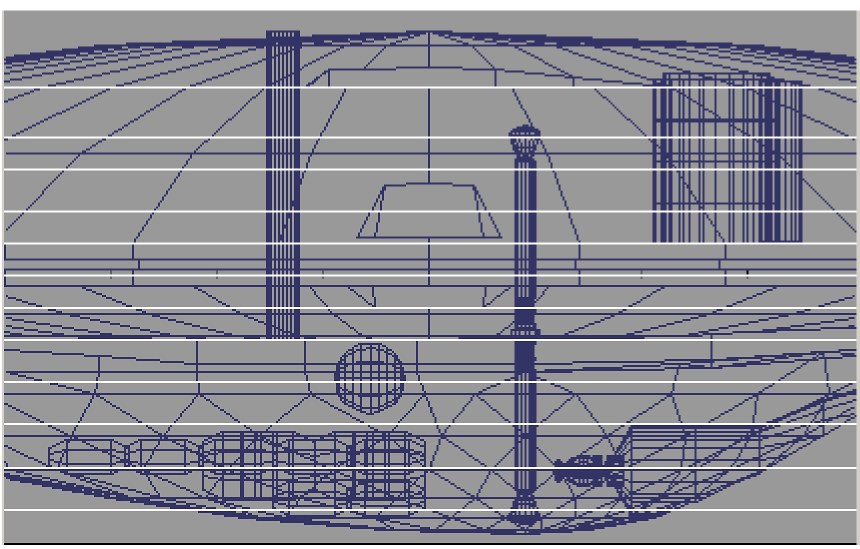
- A fighter flying at 500 km/h fires the missile. The missile instantly has a velocity of 500 km/h imparted and accelerates until it reaches 1000 km/h.
- A fighter flying at 2000 km/h fires the missile. The missile instantly has a velocity of 2000 km/h imparted, but will be slowed down by air friction to 1000 km/h and keep this until fuel exhaustion. The missile may break up before due to structural design limits.

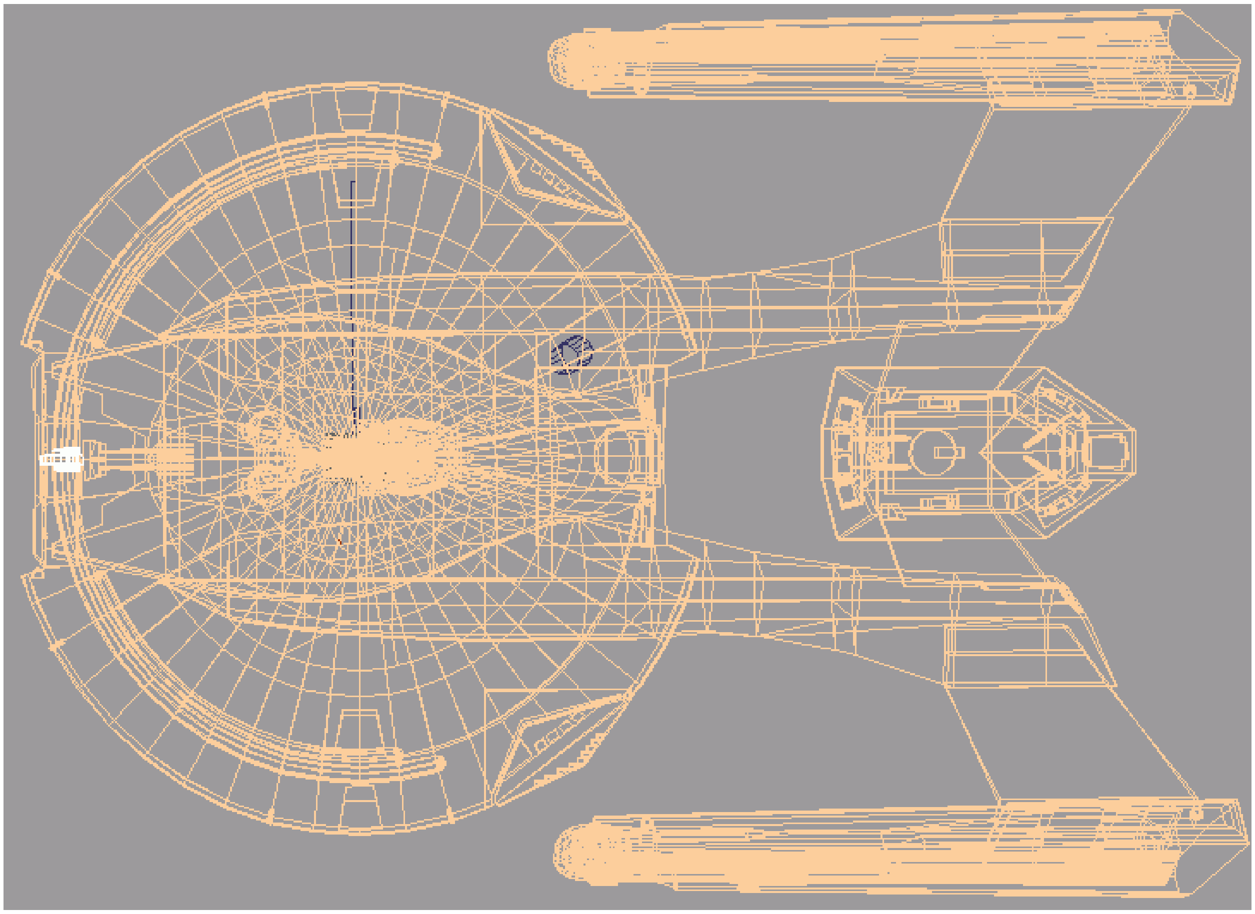
The following are 3D work in process pictures, but considered as good as done. Sample renderings are outdated and from the first edition. The crew quarters are considered complete. Empty spaces are considered being occupied by machinery and cargo holds. All missing items have been marked red in the deck layout appendix. All views are perspective camera views. The bridge module decks 1 & 2 have been moved forward, but included on deck 3 as reference to actual position. Decks below the flight deck have the predecessor deck as reference included.

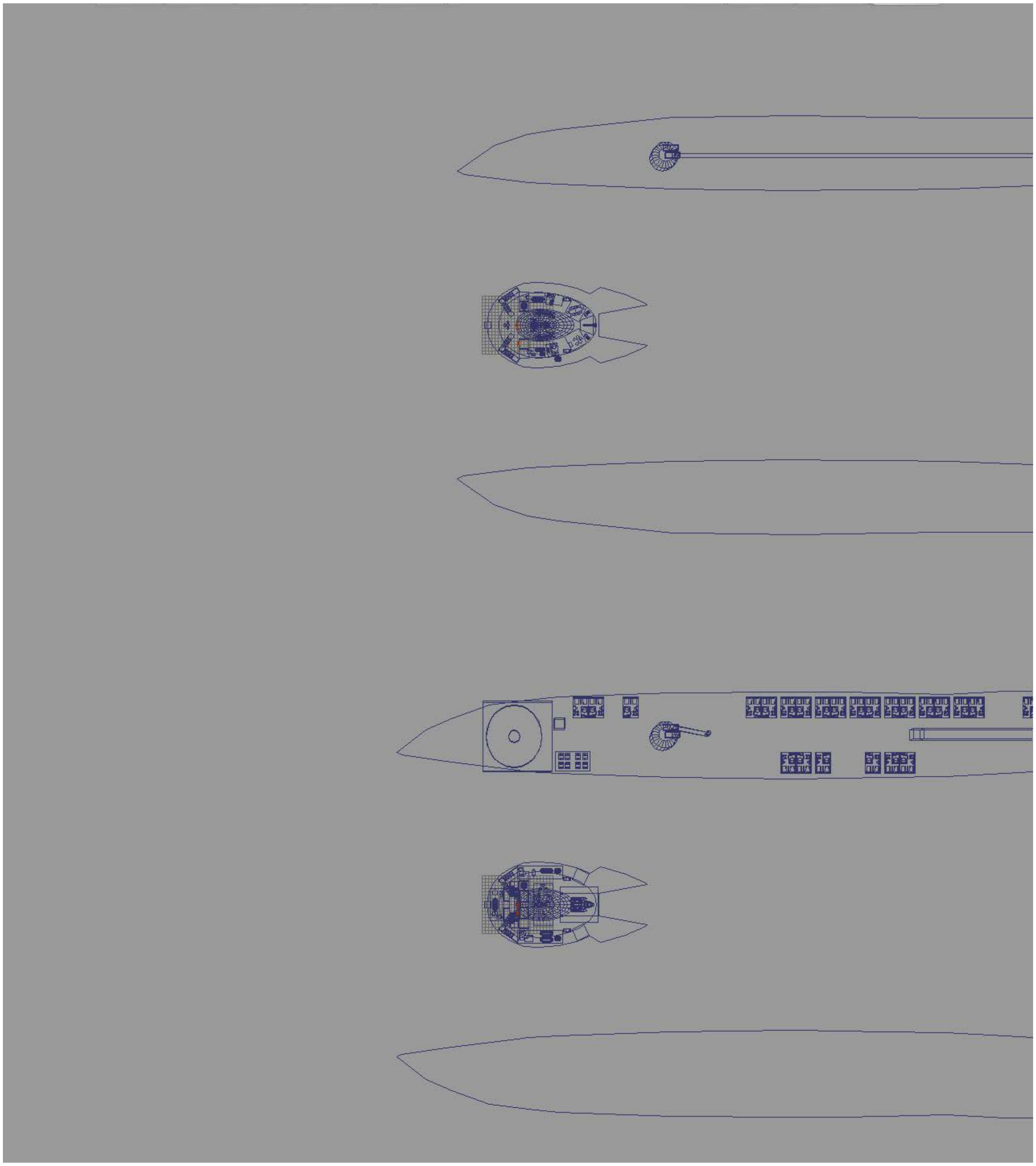
Other construction cues and references have been left also. All this was made for illustration purposes only.

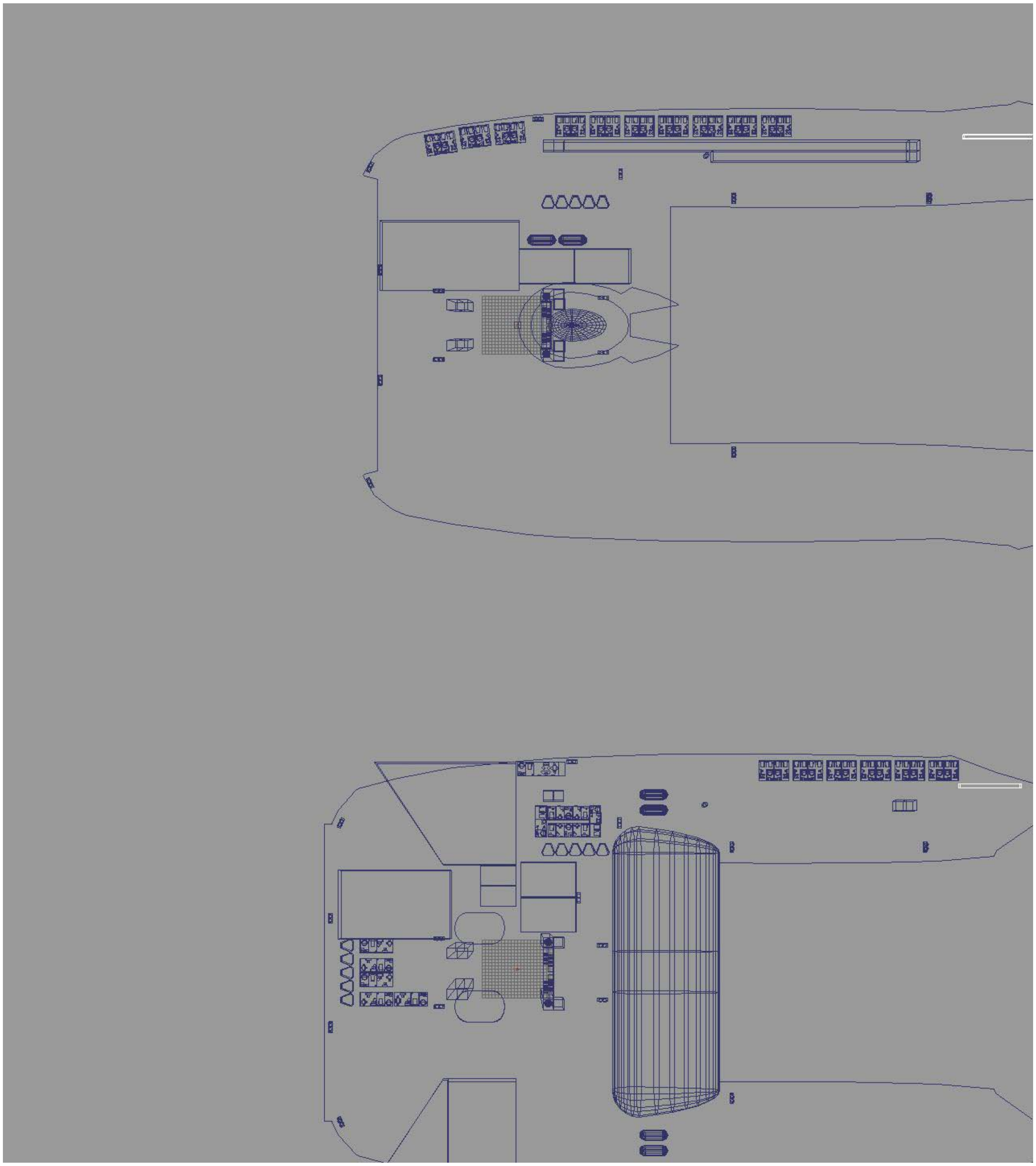
Deck Number reference for orientation; self created 3D model has generalized deck highs with some special stress reinforced decks with g

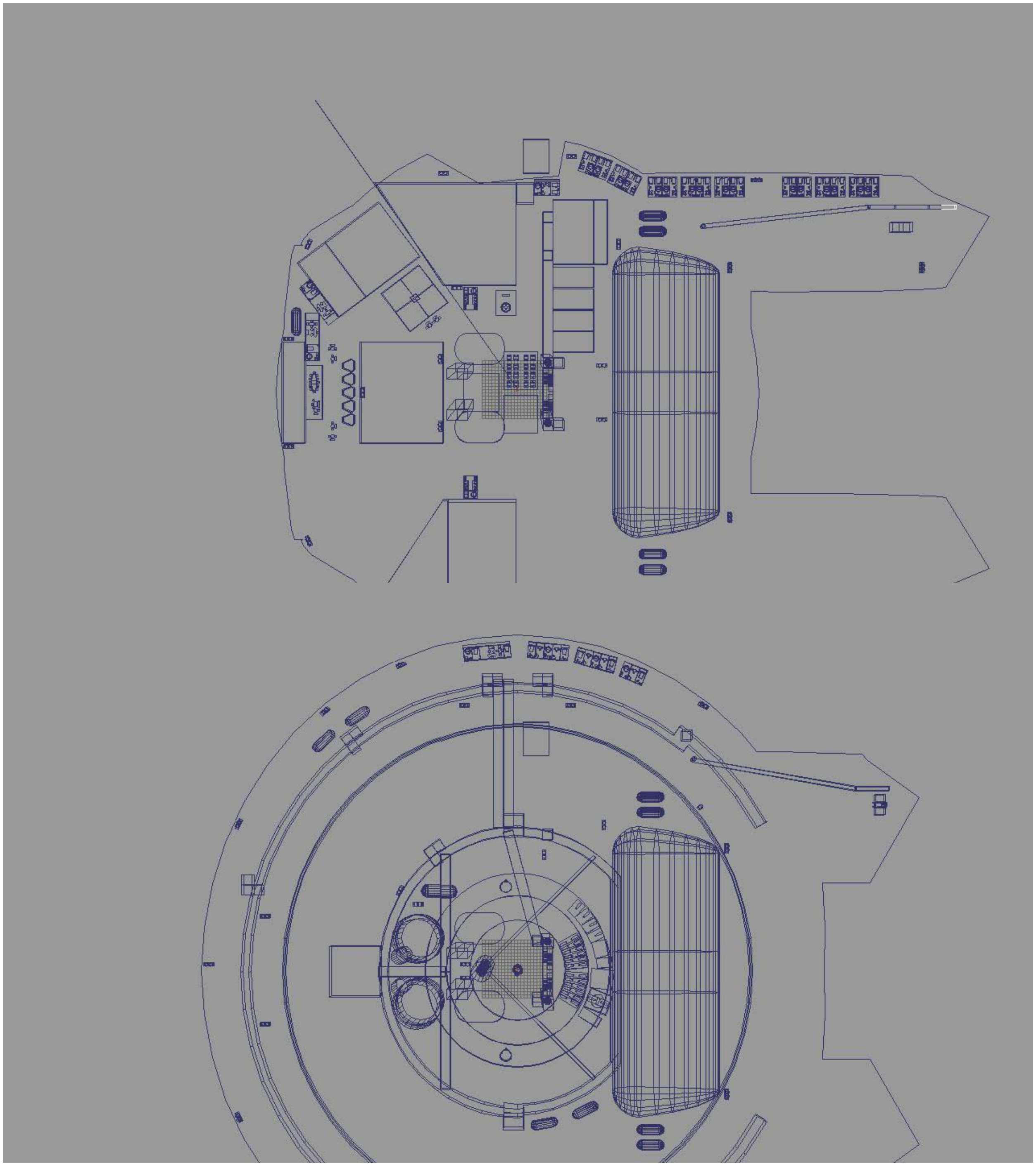


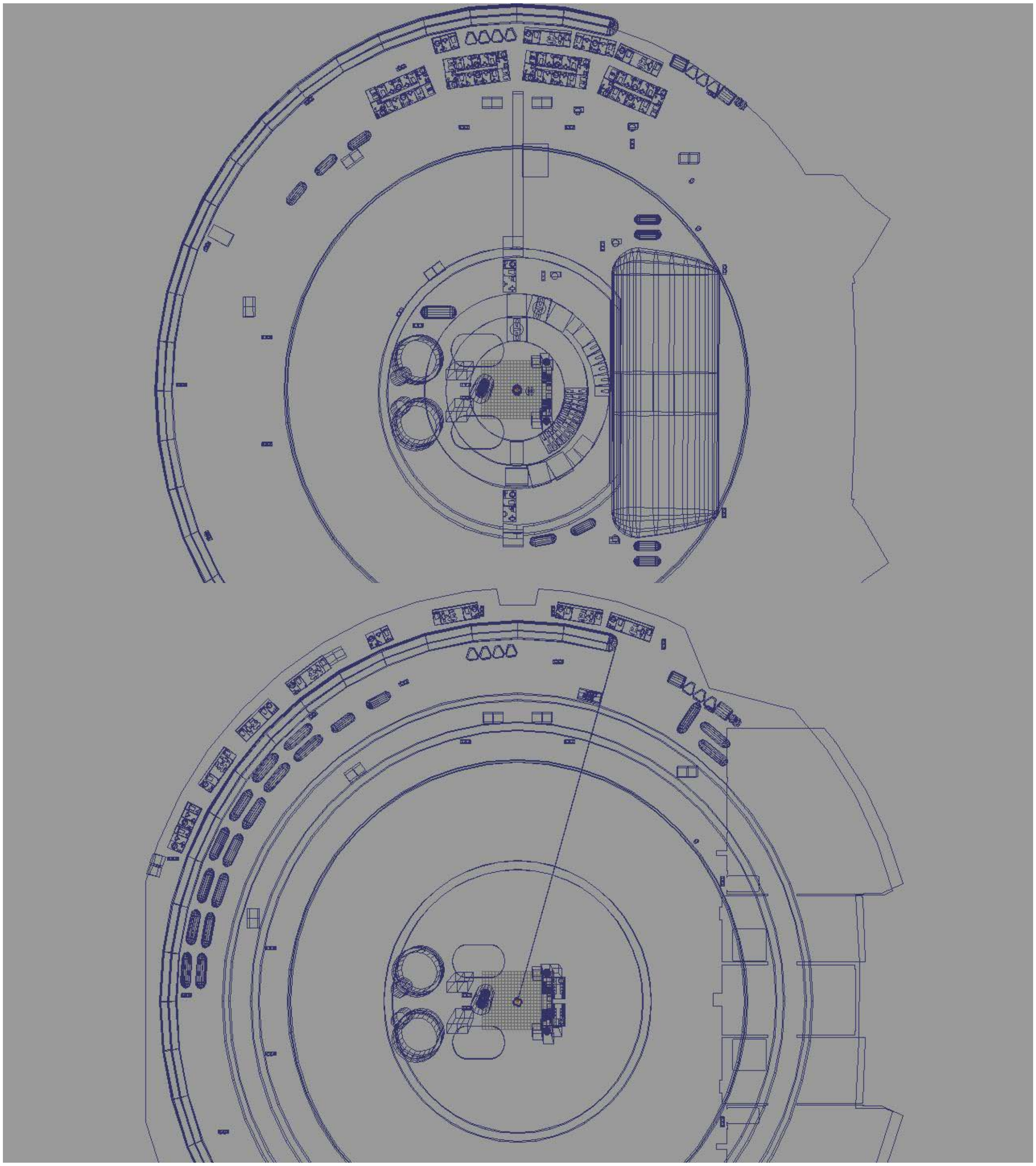


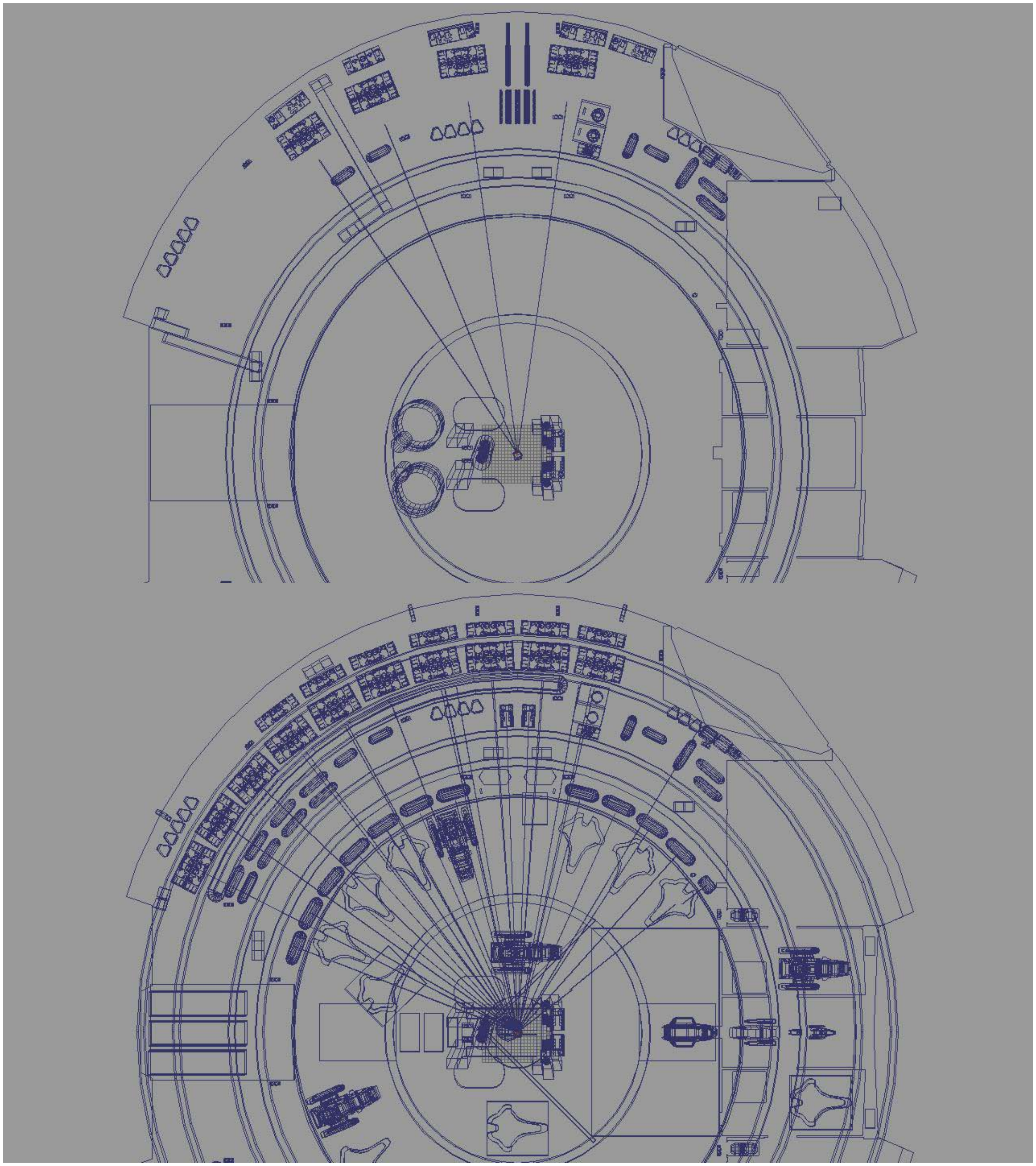


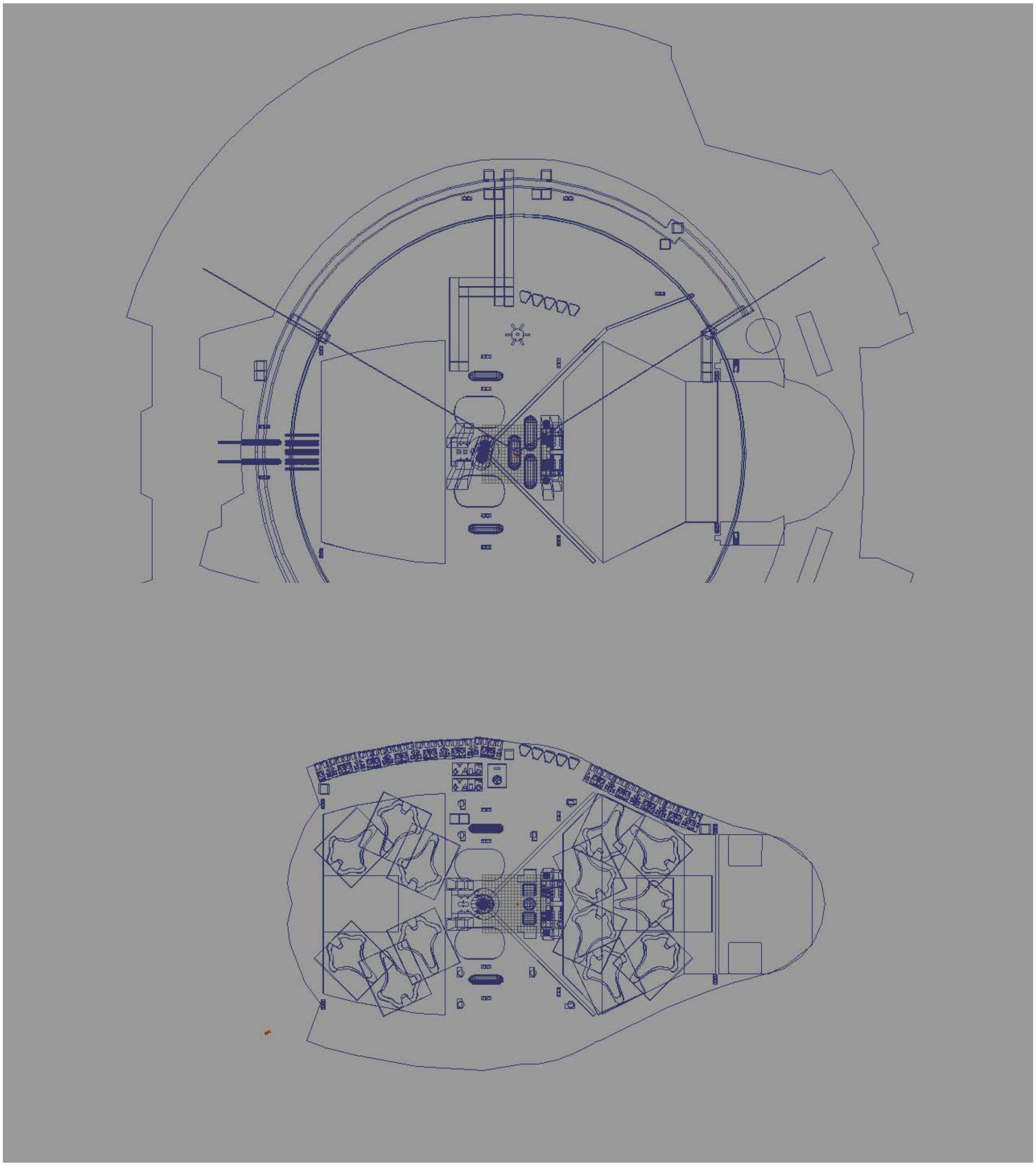


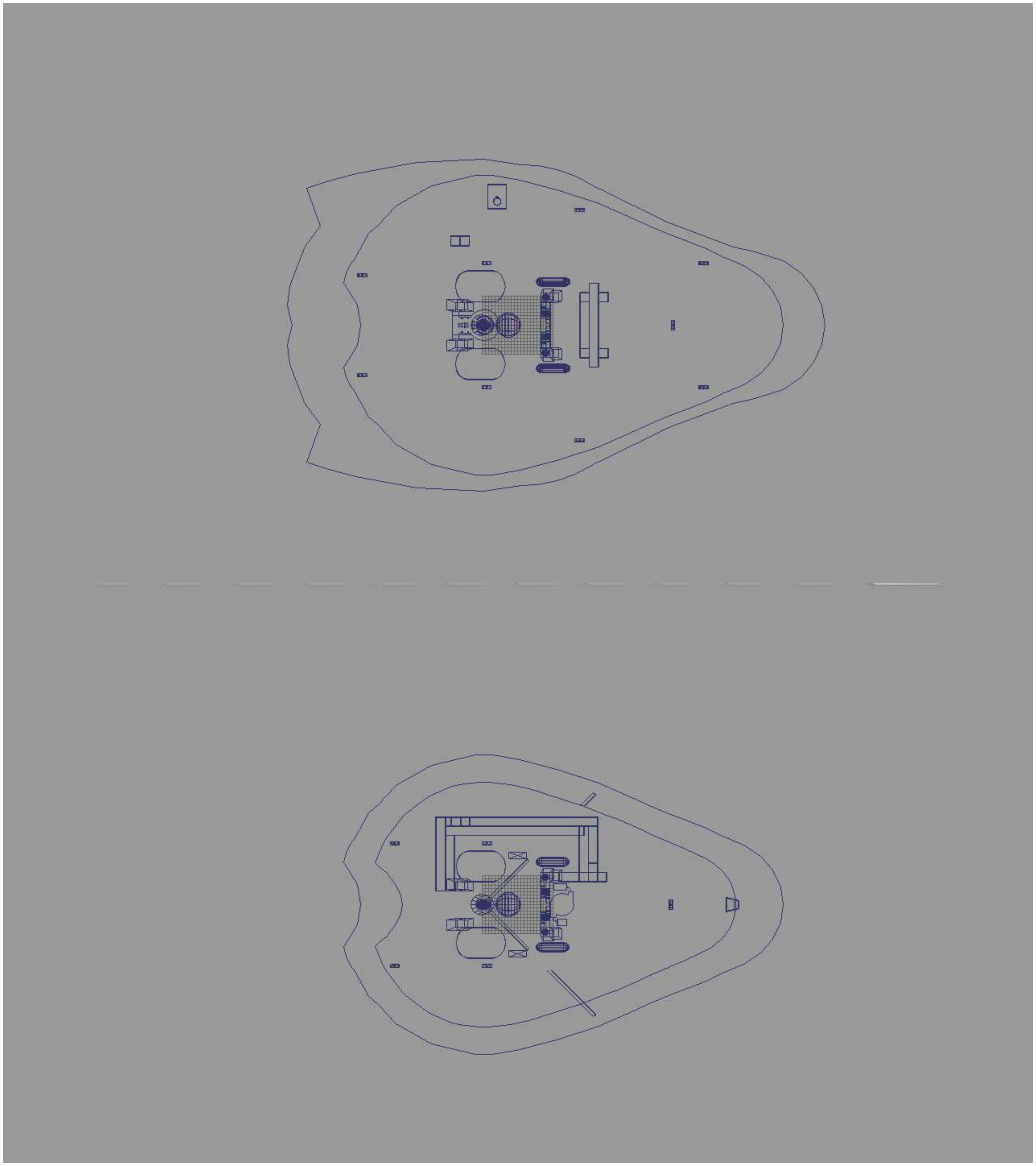


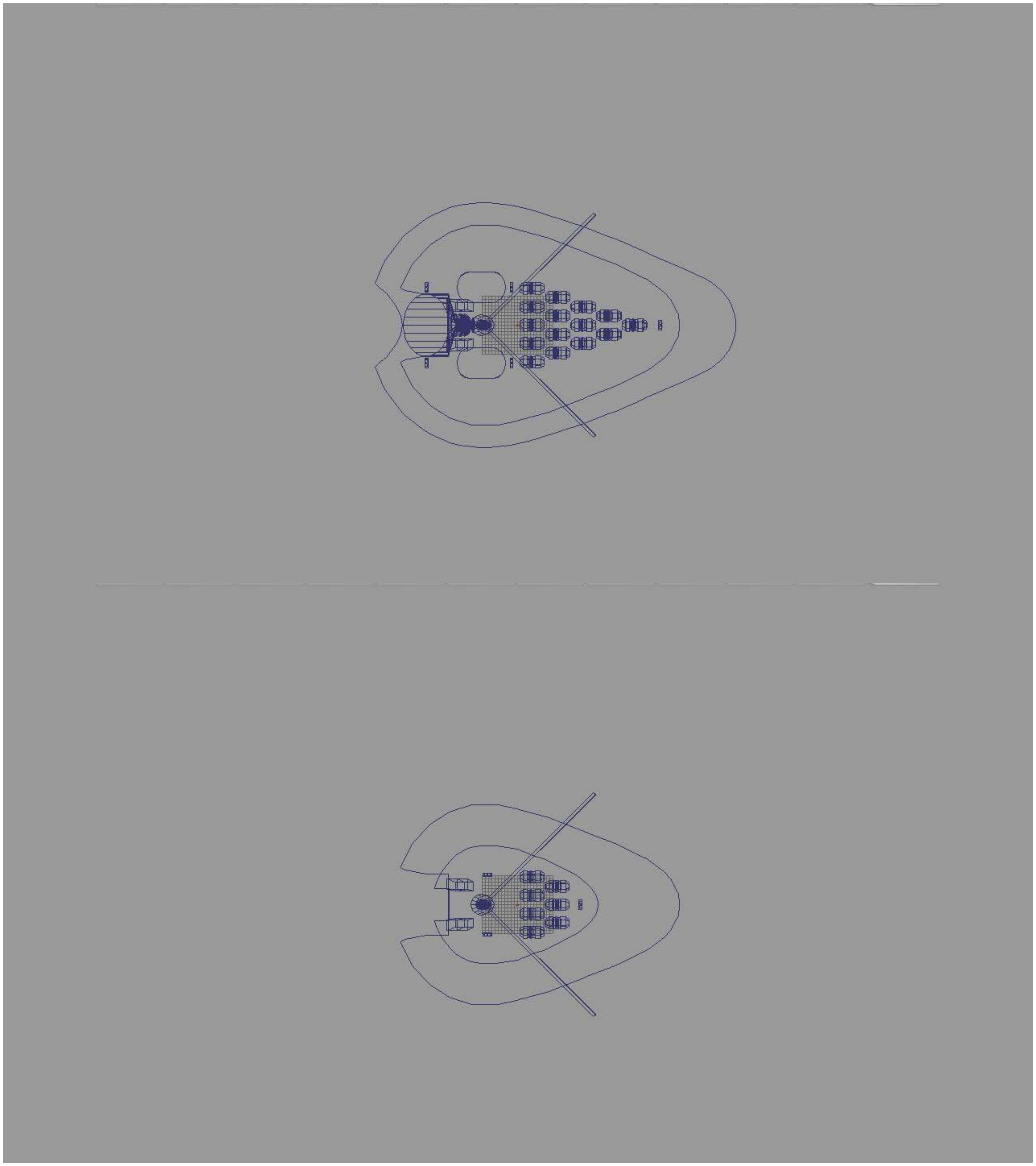


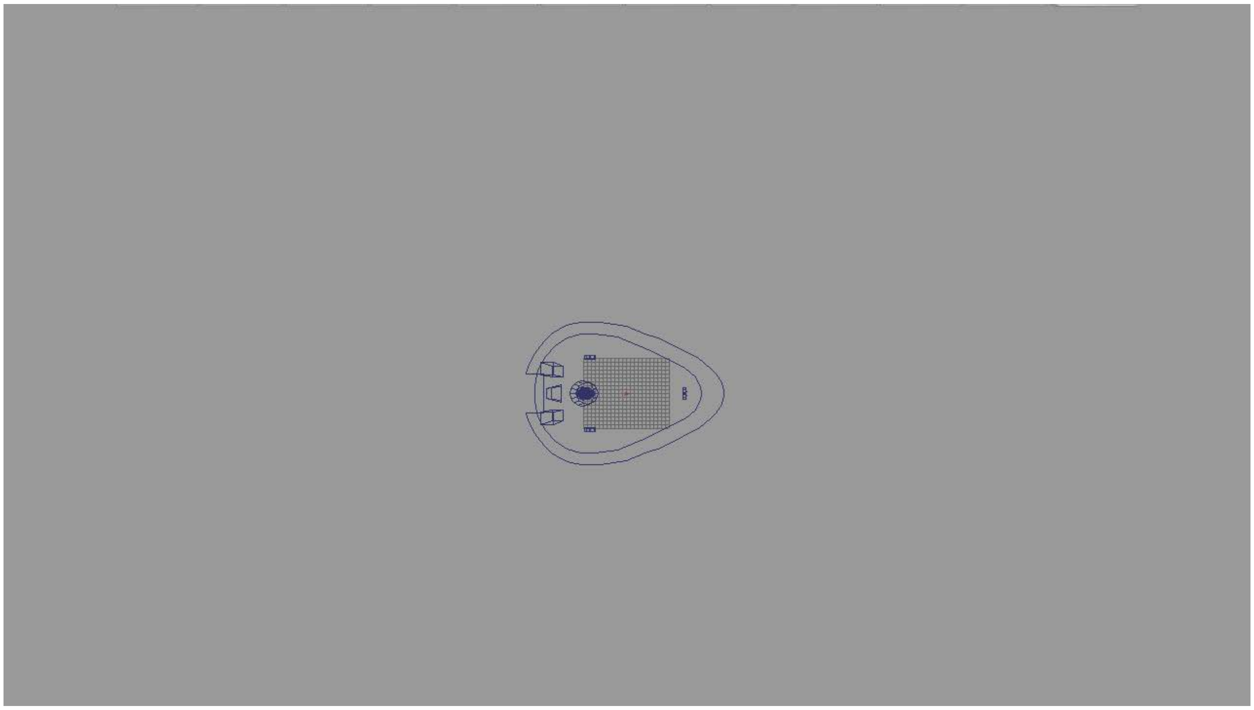


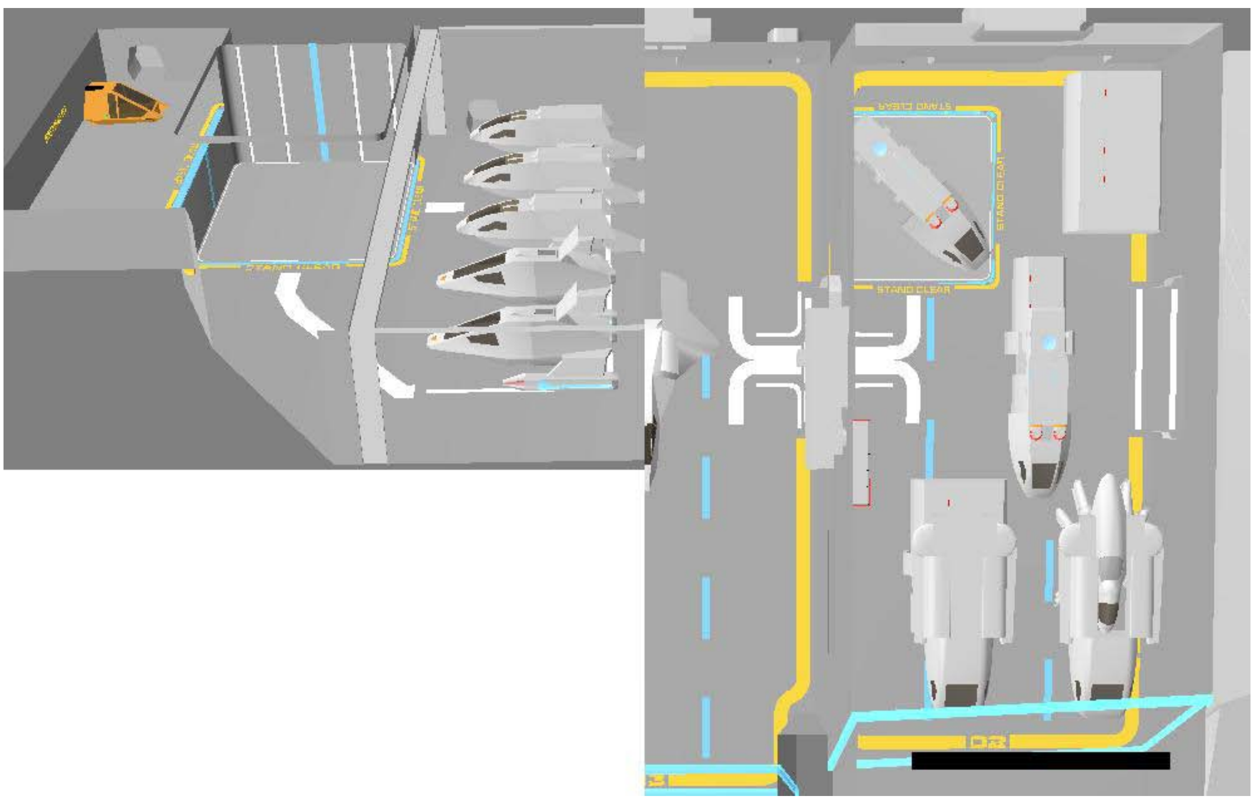












Ships of the Line

USS Akira NCC-62497
USS Thunderchild NCC-65549

USS Rabin NCC-63293
USS Spector NCC-63549

USS Carla Romney
USS Sharansky
USS Bondar
USS Garneau
USS Summit; destroyed
USS Sentinel
USS Gryphon

USS Geronimo NCC-69302
USS Devore NCC-64088