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II Small warp-drive vessels

In addition to the high profile interstellar starships, The UFP Starfleet and its predecessors have employed a variety of short range or ‘coastal’ types. Even though lacking true interstellar legs, these ships are still normally equipped with warp drive and lighter versions of the traditional starship systems like torpedoes, phasers or shields. A motley collection of naming practices is in use for these small vessels, deriving mostly from old Earth naval traditions. Strict categorizing of small warpships and -craft is perhaps a bit artificial in face of this staggering multitude of overlapping designations. Still, the traditional division to corvettes, couriers, escorts, perimeter ships and scoutships on the upper tier, plus various small craft, runabouts and interceptors on the lower tier, is maintained in this work.

Corvettes, couriers, escorts, perimeter ships and light scouts

Although a minor footnote in the story of glorious starships, the various small patrol ships that operate inside star systems or other limited patrol areas still deserve more than a passing mention here. This mission class consists of a wide variety of vessels distributed for Starfleet planetary defense operations at all major centers of interstellar commerce, as well as for local patrol and police operations. Especially police cutters are often of local civilian manufacture, and further emphasize the separation of police and Starfleet forces. Local military forces may also operate converted civilian vessels in patrol duty. Such ‘auxiliaries’ are generally of limited use in the wider Starfleet operations.

Purpose-built patrol ships do exist, however: the traditional naval designation for these ships is corvette. Some corvette classes like *Thunderbolt* or *Procyon* have enforced intergalactic law for decades throughout the Federation. In local defense missions, corvettes usually serve in more limited space and time windows: these small starships seldom receive upgrades that could keep them apace with the advances of weapons technology and changes in threat environment. Registry numbers for corvettes originally included the letter L for ‘local defense’ or ‘law enforcement’, but the practice of letter codes was abandoned before the fielding of the *Daring* class in 2275.

The numerous corvette or equal classes from the eras preceding the Romulan War will not be covered in detail here, as they in their civilian-derived, low performance, low utility value multitude represent the ‘auxiliary’ category of spacecraft. Instead, the major corvette classes that have served in UFP Starfleet will be introduced. Common factors for the classes include small crews, low to medium warp performance, light to medium laser/phaser armament, good planetary landing and atmospheric maneuvering capacity, and generally also the lack of auxiliary craft. Hull form is usually simplified, lacking the traditional saucer of starships and instead incorporating either aerodynamic shapes or semi-exposed structures. Typical missions include insystem patrols, local SAR duty, oversight of system beacons, buoys and sensor arrays, and augmentation of planetary defenses. Deep space assignments are extremely rare occurrences. Save for deployment runs, these vessels are seldom seen outside the Oort clouds of their assigned star systems.

The heavy corvettes of the late 23rd century form an interesting exception in almost every respect, being more comparable to frigates in equipment, performance and operational profile. The political reasons for their misleading designation should be recognized by the reader, and are analyzed to some depth in this chapter.

* * *

Fast courier services for discreet messages, diplomatic packages and important personnel form a classic part of Starfleet operations. While the large starships are sometimes sent to these errands due to their superior speed and range, lesser but more specialized vessels are also available for this duty. These courier ships are still optimized for speed and range, sacrificing the overall versatility of similarly sized corvettes or research vessels in order to compete more evenly with large starships. Often a courier indeed is directly developed from a suitable combat or research spaceframe, by narrowing down the mission profile and stripping down the onboard equipment. The registry prefix letter D used to accompany the courier mission in the mid-23rd century.

An ever-present risk of courier operations is the possibility of hostile boarding. Foreign military and intelligence-gathering organizations have a considerable interest in capturing couriers and their cargo intact. Lacking heavy armament, couriers rely on their speed and sometimes also on stealth to avoid capture. Nevertheless, the crews are typically trained on swift and efficient destruction of delicate onboard items and data. In times of conflict, it was also once customary to equip couriers with powerful scuttling charges to deny the enemy his victory.

* * *

Although interstellar space is an unarguably hostile environment, it seldom makes sense for any organization to equip all its starfaring vessels with defensive weaponry. Such systems, even if compact by themselves, tend to require major computing and sensor resources, not to mention extremely challenging power arrangements – all of which may be needed perhaps once or twice during ship lifetime, if ever.

The sensible way to counter the occasional threat is to have the vulnerable vessels accompanied by a dedicated combatant. Yet it is equally senseless to amass military fleets large enough to protect each and every civilian vessel individually. Even the assigning of a full starship in protection of a convoy of merchant vessels can stretch the resources of a space navy intolerably. Two classic solutions exist to the quandary: modification of a small number of civilian ships into temporary combatants ('auxiliary cruisers') in times of crisis, or construction of low-cost combat starships scaled to exactly fit the escort mission.

The escort vessel is an intermittent phenomenon in Starfleet history. The first designs emerged for the Romulan War, but repeat performance had to wait until the peaking of UFP-Klingon hostilities in the 23rd century. The initial stages of this conflict took place under the aegis of primary combat fleets, without a need for dedicated commerce escorts. Frantic frigate and escort construction programs were only begun after the nature of the threat changed with the Axanar showdown. The registry prefix letter E was also introduced for the mission.

By the 2280s, capital ship forces adequately covered the main space lanes, when the threat of small, cloaked commerce raiders suddenly emerged. Existing escorts were found insufficient in quantity and quality, but only the former could be corrected: massive auxiliary cruiser conversions and light cruiser refits were initiated. Khitomer peace cut short such efforts, however. A surplus of patrol combatants from this era made escort construction unnecessary for the next half a century. The Cardassian and Dominion conflicts saw a resurgence of compact escort starships, and several types warrant mention here.

The typical escort is of good cruising performance and potent phaser armament, but often of poor spacekeeping and habitation. Major savings are attained by neglecting the latter aspect, as the greater volume needed for adequate accommodation leads to a vicious circle that soon spirals out to full frigate size. Recent times have seen an increase in the torpedo firepower of escort vessels; the volume of associated expendables, such as torpedo casings and launcher coolants, serves to further reduce the quality of berthing aboard these tough little ships. Escort crews reflect the special nature of their vessels, being a hardy breed of temporary warriors whose main assignments often lie with completely different aspects of Starfleet operations.

* * *

Classic patrol craft operations often hinge on the immediate availability of bases or tender vessels. In turn, deep space border patrol is the province of very large ships of high endurance and high degree of independence. Yet mounting a border blockade in deep space is a logistically untenable effort if it ties down major starship resources for months or years at an end. In the 22nd century, Starfleet had solved the problem of blockading Romulan space by creating a chain of fixed outposts, a massive engineering effort that could not be repeated on a larger scale.

In the 23rd century, when there again were borders to be closed, a rather desperate alternate solution was found. Instead of fixed installations, Starfleet would deploy small yet independent ships to provide warning and delaying action. These perimeter action ships would surely perish quickly in battle, yet be built so that they could afford to. Multiple torpedo launchers would empty their magazines in a few volleys, rapid-fire phasers would spit out pulses that would eat through the emitter crystals in a matter of minutes, and hopefully the enemy would suffer losses before the time came for the crew to abandon ship and pray for Klingon or Tholian disinterest in hunting down the survivors.

The perimeter ship concept got its baptism of fire in the post-Axanar border raids of the 2240s-50s. The introduction of linear coil warp engines gave the vessels a much-needed boost in performance in the 2280s, just in time for the peaking of the Klingon conflict. A further boost came from the adoption of engine saturation techniques, delivering high top speeds at the already accepted cost of rapid and violent equipment degradation. The prefix letter P was used in perimeter ship registries from the 2240s to the 2290s.

* * *

In addition to large starships dedicated to interstellar scouting missions, Starfleet has always employed small spacecraft for the reconnaissance role as well. In practice, this mission class has been one of the least defined, encompassing designs of all sizes and origins. As gathering of information is a primary mission for Starfleet, it could be argued that all the vessels and craft in its employ are in fact scouts. On the other hand, the ill repute of espionage missions often encourages Starfleet to designate its scouting forces in a more circumspect fashion.

This chapter mainly discusses scouting units in what could be termed the ‘traditional’ size range: the light scout, vessel comparable to corvette in both absolute and relative size. Indeed, corvettes, couriers and reconnaissance vessels of a given era often share elements of engineering and mission profile, and sometimes may even be flip sides of a single design. Starfleet designations reflect this fact, and many classes in this chapter are listed as combined corvette/scout or courier/scout designs, with the prefix letter L or D overriding the less often seen I applicable to intelligence gathering designs.

Nevertheless, the classic light scout is distinct in terms of engineering. Abandoning even the modest armament of corvettes, the type normally features only a small number of energy weapon emplacements, although in some cases also a small torpedo launcher system, primarily intended for deploying of reconnaissance drones. Endurance in cruise or combat is sacrificed for high speed and maneuverability. Atmospheric capabilities are in many cases a luxury, and missions requiring extreme agility are often best left to even smaller types in the scoutcraft category, to be described more fully in the third part of this work.

Kahs'khiori

Corvette
1924-2196

Completed:	169
Length:	110.0 m
Beam:	50.3 m
Height:	35.9 m
Mass:	12,210 tons
Officers:	3
Crew:	26
Max. speed:	w 3.1
Endurance:	2 years
Weapons:	2 phased particle cannon (50 GJ / 900 GW) on bow
Shields:	Hull armor Navigational deflector on lower bow
Transporters:	2 GP (3-pad) (select vessels)
SOURCES:	D ENT “Kir’Shara” (N own) (H own)

Since the days when interstellar pirates preyed on Surak's first disciples, civilian spacecraft converted for military tasks have played a role in the defense of the Vulcan home system. In those early days, this had been out of practical necessity: like the planet itself, the Vulcan system was poor in resources, and what little was available in the form of random asteroids had never excited the fighting factions sufficiently to create a spaceborne element to their aggression. Outside threats thus were met at first by vessels designed for profitable trade rather than triumph in combat.

In the late 21st century, when the first Earth representatives arrived in the Vulcan system, the strength of the space combat forces under Vulcan High Command was undeniable, yet home defenses still utilized converted civilian designs. Now, it was by choice: the large cruisers had been thoroughly optimized for the power projection task that maintained Vulcanian dominance in the interstellar neighborhood, and the local defense mission was seen as an unnecessary evil, even an embarrassment to the general policy of superior-strength pacifism. Apart from aging orbital fortresses and minuscule sublight fightercraft, the Vulcan system was mainly patrolled by corvettes deriving their ancestry from commercial vessels several centuries old.

The most prominent warp corvette type in frontline service at the time was the *Kahs'khiori* ('shooting star') - the last such type to defend Vulcan before the founding of the joint Federation Starfleet. The *Kahs'khiori* featured a classic two-element ring drive for warp 3.1 propulsion. The port and starboard ring elements both extended forward until tapering to points on both sides of the bow. Certain key engineering spaces were situated just inboard of the ring elements, but the main powerplant rode above the central hull, protected by an armored spine cowling. The centerline of the hull had originally been left free for loading of cargo through a series of bow doors into amidships holds. The holds were now largely gone, replaced by military machinery, but the central entry bay still served up to six small fightercraft of e.g. *Tshin* type.

Main armament for the type consisted of twin heavy particle cannon at the bow. Two additional point defense cannon commanded aft arcs from extreme stern. The command deck, a horseshoe protrusion atop the bulk of the hull, cradled behind it the bulging cowling of the main reactor. The next three decks were of increasing width, spacious enough as the result of the transport heritage of the vessel, and ideal for crew accommodation as well as the internal elements of the military C^3I systems. There were also six large and four smaller dorsal lifeboats for rapid evacuation. Decks 5 through 7 gradually narrowed to a series of ventral hold doors on Deck 8, and mainly featured assorted support systems plus an additional four large and four small lifeboats. The entire lower aft end was dedicated to the impulse propulsion system with its two large field-vectoring nozzles. The forward ends of Deck 5 and 6 held the powerful navigational deflector array, upgraded to military standards, although still flanked by the prongs of the original cargo cranes. Lateral docking ports on Deck 5 allowed for crew transfer or for boarding operations, although the latter were on some select vessels conducted by transporters instead.

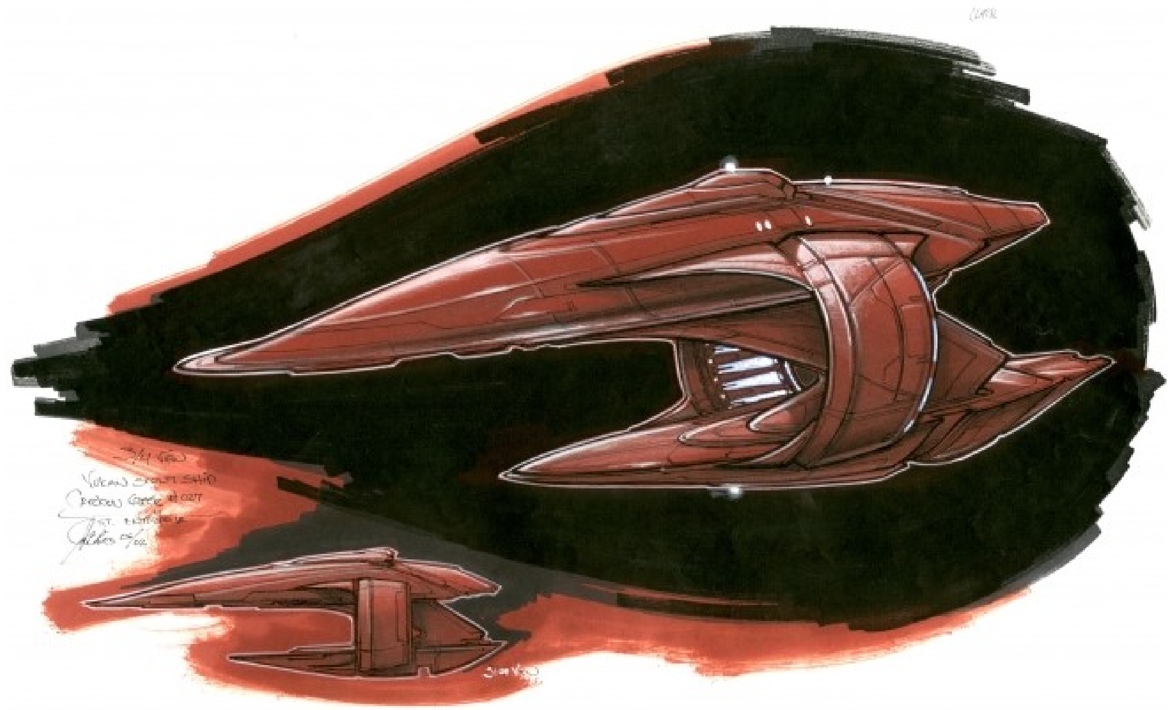
Up to six hundred of the old freighters had been built. Just 169 of them had seen conversion to corvette specifications. Most did not engage in interstellar missions after their original deployment runs, as the Vulcanian star empire still had many colonial holdings to defend. A contingent of four six-vessel flotillas was held in readiness at Vulcan during the 2154 altercation with Earth representatives; less than a tenth of the force was sufficient for evicting the UESF heavy cruiser. On the other hand, the 2157 exchange of fire with the Romulan suicide mission resulted in loss of five corvettes, as their armoring was woefully inadequate against modern threats and their targeting systems too slow against the enemies of the day.

After the formation of the United Federation of Planets, its defensive Starfleet obtained a token contingent of *Kahs'khiori* vessels. In practice, these continued service in protection of Vulcan assets exclusively. The last four were withdrawn from Hephaistos in 2196, replaced by half their number of *Pointer* class corvettes. Yet the durability of the design is excellent, and isolated examples are known to remain in service as freetraders or mercenary vessels – a fate that can befall ships of the highest-repute origin.

Tal'Kyr

Scout
1934-2198

Completed:	109
Length:	180.0 m
Beam:	59.5 m
Height:	62.8 m
Mass:	23,000 tons
Crew:	25
Troops:	50-200
Max. speed:	w 4
Endurance:	12 months
Weapons:	1 phased particle cannon (50 GJ / 200 GW) on main hull ventral bow 2 phased particle cannon (50 GJ / 90 GW) on secondary hull ventral stern
Shields:	Hull armor
Transporters:	2 GP (9-pad), 4 personnel (2-pad)
SOURCES:	D ENT (N STO) (H STO)



The Vulcan term for the Tal'Kyr *class does not lend itself to an easy translation. "Scouting" is an adequate approximation for the concept perhaps more accurately described as "securing in order to study", although Vulcans themselves offered the translation "surveyor" and initially also emphasized the rescue role of the class.*

The scouting forces of the Vulcanian star empire were an excellent example of Surakian thinking applied as a military doctrine. Rather than probe bravely into the unknown at warp speed, they mainly operated sublight vessels deployed by warp-capable motherships in star systems where Vulcan space superiority was undisputed. Such vessels were excellent tools for scouting relatively passive targets: local cultures of suitably low technology levels, local resources, and possible outside agents attempting to exert their influence over the first two.

Scouting out the positions of more mobile things such as enemy starfleets called for warp drive, but also for survivability that was best provided by cruiser size and armament. The niche for a warp-powered reconnaissance craft thus was narrow indeed, and Vulcans were not ones for idle engineering experimentation. It took a very specific tactical need to create a medium warp scoutship, then, and even when one did emerge, the Vulcans were loathe to confess to it. What they created in the 1930s was formally a "rescue vessel" – in practice, a means of extraction for agents operating in environments where larger warships dare not dwell or better not be witnessed. The reverse mode of operations was naturally also included, allowing Vulcans to quickly intervene with small but decisive force in disputes where an orbiting voidship would have undermined the Vulcanian position.

The extraction craft was thus designed for maximum stealth affordable at warp four; for the carrying of two platoons of special forces; and for the ability to defend herself against peer-level civilizations in cases of exposure, at least long enough to reach the safety of a *T'Khut* mothership. This combat voidship was specifically designed to carry large auxiliaries within her pivotable warp ring. The cruiser offered superb protection and significant range boost for her chattel, and was an ideal host for the new *Tal'Kyr* class in every respect.

A Tal’Kyr *takes her place in the middle of the warp ring of a* T’Khut.

Although the rescue vessel was but one of the potential loads for the cruiser, *T’Khut* dimensions nevertheless dictated those of the *Tal’Kyr*, limiting overall length and prompting the installation of warp power systems in a separate ventral hull, opposite the somewhat longer mission hull atop the warp ring. A pylon ran vertically through the ring, connecting the two hulls and also housing the stealthy impulse propulsion system. Both the hulls were exceptionally featureless, lacking portholes or protrusions other than the dorsal bridge dome and the surrounding sensor empennage. Their surfaces could be supercooled for spatial stealth and polarized for reflection scattering. Sensors were carried at main hull lower bows; active scanners were only operated in exceptional situations.

The 180 m vessel was somewhat large to be nudged into an atmosphere and was not provided with landing gear, but could hover low over ground targets if necessary; the ventral hull featured openings, ramps and other systems for physically deploying or extracting personnel or vehicles. More typically, agents were inserted and extracted using one of the six transporters available onboard. Assaults in force would involve the two nine-pad units, and some fifty commandoes would typically be deployed. Onboard accommodation could be arranged for up to 200 troops or evacuees, however. No auxiliary craft were carried, but docking systems at lower bows could interface with alien craft as well as with the mothership.

Various small caliber beam weapons and fine manipulation tools accompanied the docking system for breaching purposes (or, in theory, for more peaceful assist and repair work).Three plasma or phase cannon were available for heftier defense. The main gun was among the systems hidden at upper hull ventral bows, while rear guard was provided by lighter weapons at engineering hull stern. Relatively few *Tal’Kyrs* ever saw combat, though, as advanced mission planning systems and seasoned tacticians aboard the scouts made sure there were no close encounters of any kind with local defenses.

Of the fifty *T’Khut* vessels in existence, some thirty regularly shipped *Tal’Kyrs* on their missions of peace enforcement. A total of 109 scouts had been constructed, and some operated independently, while others were deployed aboard the smaller *Vokal* vessels. The warp assets replaced the combined use of *Tshin* sublight boats and high-warp motherships for the 21st and early 22nd centuries, and were effectively used against advanced starfaring civilizations such as Andorians and, according to some sources, Romulans. They were themselves conceptually outdated by the Romulan War and the retirement of the *T’Khut* force.

Beyond that conflict, Vulcan operated very few *Tal’Kyrs*, yet the manufacturing license was acquired by Starfleet Division. The warp four engine system represented quite a leap from the humbler drives obtained earlier on for the *Pirithous* and *Hippolyte* programs, and it took SFD almost two decades to get production going. The *Otrera* class lacked most of the stealth features of the original design but adopted a light photon torpedo system while reverting to plasma gun armament; the sixty units produced were all utilized as priority couriers until the 2220s.

Another possible warload for a T'Khut *was this high performance* Sn'Dahl *scoutship, with less emphasis on stealth and more on impulse agility, firepower and warp speed. Only six of the curiously asymmetric* Sn'Dahl *units were ever built.*

Pirithous / Hippolyta

Corvette (later clipper)
2130-2158 (Pirithous)
2155-2208 (Hippolyta)

Completed:	101 total: 1 *Pirithous* 100 *Hippolyta*
Length:	38.8 m (*Pirithous*) 44.0 m (*Hippolyta*)
Beam:	55.5 m (*Pirithous*) 56.2 m (*Hippolyta*)
Height:	43.8 m (*Pirithous*) 58.5 m (*Hippolyta*)
Mass:	24,200 tons (*Pirithous*) 24,200 tons (*Hippolyta*)
Officers:	2 (*Pirithous*) 3 (*Hippolyta*)
Crew:	12 (*Pirithous*) 20 (*Hippolyta*)
Cruise speed:	w 2.0
Max. speed:	w 2.8
Endurance:	1 month (*Pirithous*) 2 months (*Hippolyta*)
Weapons:	*Pirithous*: 2 laser emitters (200 nm / 150 MW) on warp ring 2 missile tubes w/ 20 light missiles on ventral main hull *Hippolyta*, original: 2 laser emitters (200 nm / 750 MW) on warp ring *Hippolyta*, 2182-2208: 2 laser emitters (200 nm / 750 MW) on main hull

2 laser emitters (290 nm / 1.0 GW) on warp ring

Shields: 1-layer globular shield

Laboratories: None

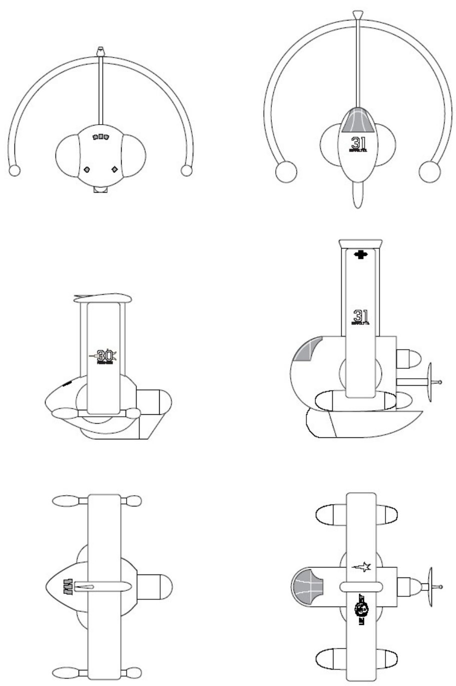
Transporters: None

Auxiliaries: None

Ships of historical interest:

USS Penthesilea (KLV-58 / NCC-L58)

SOURCES: (D aridas sofia)
(N aridas sofia)
(H aridas sofia, own)



When Earth entered into its first defensive alliance with Vulcan, some in the UEDP held hopes of obtaining Vulcan military technology to bolster Earth's primitive systems defense arrangements. Such hopes were quickly dashed. Vulcan was no stranger to alliances like this, having burned its fingers with some early experiments and thereafter having successfully nurtured long and slowly (if at all) progressing relationships with various client worlds. Earth's ambition may have been high, but it was by no means exceptional. Vulcan promised to keep between one and five cruiser-sized voidships close enough to Earth for early interception of military threats, and in practice had a vessel stationed within the Sol system at most times – but no Vulcan weaponry was distributed to the defenders of the worlds of Sol, and no Vulcan served onboard the ships or installations except in abstract liaison duties.

With the formation of the UE Starfleet, the articles of the defense pact were rewritten – now with much more experienced signatories on the Earth side. A warming of relations, if the expression can ever be credibly attributed to Vulcan diplomacy, finally allowed for some limited technology exchange. While deep space military programs met with political resistance at the highest levels, UESF set out to acquire local defense technologies at the earliest opportunity. This turned out to be

2130, when Vulcan agreed to releasing a single smallish military ring drive vessel for testing and acclimatization purposes.

The lithe *USS Pirithous* was an almost off-the-shelf example of Vulcan courier construction, with an ah'Hrak Soyn warp ring of 55.5 m diameter and a microfusion powerplant that provided a downright embarrassing warp 2 cruise speed – embarrassing for the double reasons of outperforming Earth's best capital ships, and being an almost complete mystery to UESF propulsion engineers. Evaluation of the small armed courier had to concentrate on assessing its export-cleared armament of fairly traditional laser cannon and missile tubes, its downgraded sensor systems, and the suitability of its egg-shaped hull for human accommodation and operations. The pennants painted on the warp ring did little to establish UESF ownership of the vessel, which officially remained on lease until her 2158 retirement.

Yet Sol desperately needed interceptors capable of high insystem warp, and the courier met and exceeded the propulsive requirements. Fifteen further ring drives were purchased at a king's ransom of mining and intellectual rights, and somewhat enlarged hulls were built for human operating crews and bulky Earth sensor and communications gear. The *Hippolyta* class vessels were dubbed corvettes and given pennant numbers 30-44 in the distressingly short series of warp interceptor units available for the defense of Sol. With mounting experience on interstellar adversaries, missile tubes were omitted as ineffective, and the laser cannon at the ends of the 260 degree warp ring were upgraded to 750 MW performance.

In search of survivors from the battle of Prantares, USS Penthesilea *of the second procurement batch engages her warp drive within the Celadon Nebula, producing the characteristic compression rings in the medium. Hull lasers have been added to the vessel in the hasty refit of 2155.*

Although quite capable of interstellar deployment, the *Hippolytas* were initially concentrated to defend Earth in the Romulan conflict. As the threat of an outright invasion was deflected by the costly counterattacks of 2155-56, UESF was able to deploy the vessels on assignments better fitting their performance specifics. Having been optimized for the dispatch needs of the compact Vulcanian star empire, they were not Earth's first choice for battlefield couriers across the vast theater of operations, and were only sparsely used to augment the *Athens* and *Strider* forces in the conflict. Instead, they performed independent patrol runs at the fringes of the battle areas, hoping to secure the perimeter and the smaller outposts against flanking maneuvers – a vain hope in view of their primitive sensor technology. Vulcan improvements to the sensing systems made a world of difference towards the end of the conflict, allowing *Hippolyta* units to provide early warning against some of the lesser Romulan strikes against frontier colonies. Mainly, the upgrades helped the corvettes in self-defense, however; the entire force survived the war without losses, although there were some close calls.

After the war, the thirty units continued service in the UFP Starfleet. Fifty more had been added during the conflict, and twenty completed at its conclusion. Their propulsion technology remained unmatched for the size category, even if larger Starfleet types now inched towards interstellar parity on Cochrane-type warp drives. Yet Starfleet could no longer settle for the size category of the *Hippolytas* when patrolling the increasingly imposing volume of space under its mandate. Further vessels were purchased with larger and more powerful warp drives, with larger hulls, and with greater potential for upgunning. These also came to be equipped with auxiliary Cochrane drives for combat dashes. The combination of superb propulsive attributes resulted in the vessels at first popularly and then officially being dubbed "clippers" – a redesignation embraced by the *Hippolyta* fleet as well, until its 2208 retirement.

Athens

Courier / scout
2148-2179

Completed:	22
Length:	68.0 m
Beam:	62.8 m
Height:	19.4 m
Mass:	13,500 tons (original) 13,250 tons (refit)
Officers:	2 (courier mission) 6 (scout mission)
Crew:	12 (courier mission) 16 (scout mission)
Passengers:	10-20
Max. speed:	w 2.0
Endurance:	3 months
Weapons:	Original: 1 plasma cannon (1.0 GW) fwd of bridge 2 plasma cannon (0.8 GW) flanking ventral sensor array Refit 2153: 1 Type C phased particle cannon (80 GJ / 100 GW) fwd of bridge
Shields:	Polarizable armor
Transporters:	None (original) 1 GP (1-pad); Mk I (refit 2153)

Ships of historical interest:

USS Sapporo (NO-21)

SOURCES:	D ENT / John Eaves (N own) (H own)

With the advent of Earth’s independent interstellar defensive capability, UESF found itself needing a whole range of support vessels it had not thought of before. Most of the defenses were tied in place, consisting of virtually immobile systems such as planetary interceptor bases, orbital battlestations or, later on, space tanks. Such forces could be deployed at Earth’s offsystem holdings only via the introduction of new kinds of military transport. Even within the Sol system, they needed more mobile support assets for replenishment, scouting and liaison.

Issues of prestige and cost prevented Starfleet from completely relying on conversions of foreign designs. On the other hand, as UESF expertise on combat systems and tactics remained modest, it was not completely clear what sort of support vessel program should receive Earth’s limited funds and resources. Playing it safe, the first indigenous construction programs concentrated on generic missions such as the all-important insystem/nearsystem liaison. Among the very first support vessels to accompany the *Djartanna*, *Iceland* and *Triton* forces were fast couriers and scouts of *Athens* class, first introduced in 2148.

The two-deck, aerodynamic hull of the *Athens* (NO-12) was a typical Earth engineering solution, courtesy of Empress SD&B of Luna. Less traditional were choices of propulsive system positioning. Making use of the novel gravitically polarizable armor, the *Athens* sought maximum protection of onboard systems via complete physical encasement. Thus, the warp engines were shielded by armored lateral cowlings, and only had smallish, aft-facing field windows. Similarly covered were the three plasma cannon, hiding behind armored gunports until deployed for firing. Such engineering solutions naturally limited the performance of the systems thus encased. Yet with a powerful compression fusion powerplant combined with careful internal shielding, the *Athens* could reach warp 2.0, and thus was cleared for the all-important mission of crossing interstellar distances.

Outsystem errands in support of cruiser missions demanded more than mere speed, of course. Range was provided by sizeable fuel tanks within the engine sponsons, leaving only select areas of the midhull for habitation. Main habitat functions were in the three-deck dorsal ‘sail’ structure, whose two upper levels featured large panoramic viewports. The uppermost served a navigational function, forming the forward and side walls of the control bridge. The lower windows provided passenger comfort, surrounding a lounge/mess area ahead of main passenger cabins. In times of crisis, the area would be transformed into a command center from which other forces could be directed via powerful communications systems installed on the deck below. Some further passenger cabins could also be found on this level, these in turn convertible to cargo holds for priority shipments, or to auxiliary analysis facilities for sigint missions. Berthing for the 12 crew was within the main body of the vessel, and tiny round portholes on the ceilings or floors had to suffice for exterior view. More meaningful situational awareness was obtained with a ventrally mounted sensor dome, a versatile installation measuring up to *Iceland* standards.

The Sarajevo *(NO-27) rendezvouses with the* Enterprise *(NX-01) on yet another mission crucial to Earth security – possibly a transfer of fresh fruit and other perishables, on short supply in deep space. Significantly faster than the majority of UESF support fleet, the* Athens *couriers were often tasked with capital ship replenishment and personnel rotation in the early 2150s. In scouting duty, they tried to pry the secrets of alien fleets through primitive sigint measures, with limited success. The late 2150s principally saw the ships serving as command and coordination vessels in the Romulan War.*

Taking an *Athens* down to a planetary surface was rather tricky, due to the considerable mass of the interstellar-grade warp engines. The awkwardly positioned impulse engines, high up on the aft end of the lower sail deck, did not help any, and the RCS systems on lower hull perimeter were hard pressed to stabilize the vessel in side wind conditions. Still, transatmospheric operations were an essential part of UESF requirements. Although practical passenger capacity was limited to 10-20 people, depending on mission duration, the courier could be pressed to perform rapid personnel rotation in systems ill equipped with lesser surface-to-orbit transports. Eight ships of the production run of 22 had their home ports on such colony systems, while the rest wore Sol colors but spent most of their time in deep space, up to a dozen lightyears away from Earth.

The mid-2150s saw a partial refitting of the class with transporter systems and a phased particle cannon. The former significantly lessened the strain of courier operations, as it negated the need for transatmospheric flight. The latter hardly meant reassignment as first line combatants – but half a dozen *Athens* vessels still saw battle during the Romulan War, typically in system defense situations. Four were lost in that conflict, although only three of them to a space duel; the *Sapporo* was blown to pieces in 2159 while powered down and docked to Spaceport Vega. A gradual withdrawing from service began during the war already, but colonial forces only gave up the last of their units in 2179. The succeeding *Strider* courier-scouts brought about few performance enhancements, even though they were more affordable overall, and constructed in somewhat higher numbers. Only the next century would give courier vessels the interstellar speed they needed in order to be viable on a Federation-wide theater of operations.

Strider

Courier / scout
2159-2197

Completed:	30
Length:	73.0 m
Beam:	42.1 m
Height:	17.6 m
Mass:	12,800 tons
Officers:	2 (courier mission) 6 (scout mission)
Crew:	18 (courier mission) 23 (scout mission)
Passengers:	10-20
Max. speed:	w 3.0
Endurance:	3 months
Weapons:	1 Type C phased particle cannon (80 GJ / 100 GW) fwd of bridge 1 Type C phased particle cannon (80 GJ / 100 GW) fwd of deflector dish (optional) 2 plasma cannon (0.8 GW) in twin mount fwd of deflector dish (optional) 4 plasma cannon (0.8 GW) in 2 twin mounts flanking stern shuttle target 2 fwd torpedo tubes at bow cutout
Shields:	Polarizable armor Navigational deflector beam on lower fwd hull
Transporters:	1 GP (1-pad); Mk I

Ships of historical interest:

USS Conti (NO-69), *USS Franklin* (NO-46), *USS Jackson* (NO-70), *USS Revere* (NO-50)

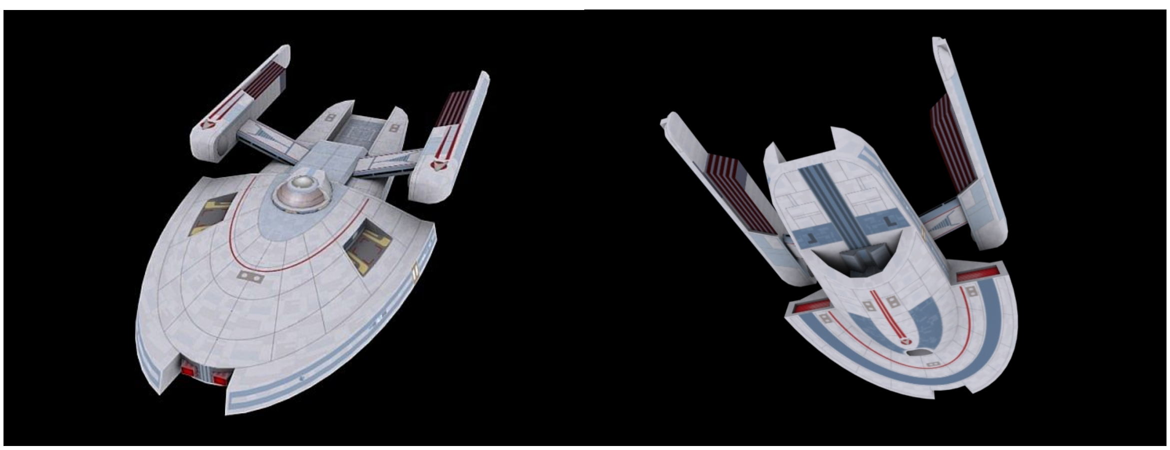
SOURCES:	(D ST:Legacy computer game) (N ST:Legacy computer game) (H ST:Legacy computer game, own)

The developments in advanced warp propulsion in the 2140s and 50s concerned the entire range of starfaring vessels. By technological necessity, though, smaller vessels could only hope to receive relatively modest upgrades. The multistage plasma recharging systems that gave cruisers their warp

5 plus performance were bulky pieces of machinery, and the massive protective chambers for dilithium foci did not easily fit aboard ships smaller than destroyer in size, either. Yet the UESF need for fast liaison and reconnaissance vessels in the first years of the Romulan War was acute, even desperate. Propulsive modifications on the *Athens* couriers were thus given a priority. The resulting *Strider* class courier/scout met the requirements, giving the Fleet its first warp three messenger.

The move from cowled to outriggered warp engines was a predictable one, facilitating the greater field strength that was provided by the Kingdom GX total conversion powerplant. This was housed in the boatlike lower hull in a heavily armored amidship compartment. Reactor swaps were facilitated by a ventral stern pullout port, a necessity for a vessel that was supposed to run her engines at maximum power for extended periods of time. Directly atop the reactor was a plasma manifold feeding twin impulse engines and topped by the field manipulation crystal. The plasma leads then branched to the upcanted pylons of the warp nacelles.

A high performance navigational deflector array forward of the reactor made possible on its part the great speeds that the engines would provide. Atop it lay the payload to be moved at warp three: a spade of a hull, not markedly different from that of the *Athens* in shape, but featuring a number of novel systems. For starters, there were twin torpedo launchers at the bow, each carrying ten casings in revolver loaders that injected antimatter from the main fuel tanks to the warheads just before firing. This was by far the lightest application of the antimatter torpedo technology yet, and promised parity with the Klingon *Raptor* class torpedo boats from which much of the technology had been copied in the first place.



A Strider *out of time? Numerous old scout hulls were carefully mothballed at retirement in the 2180s, as it appeared that Starfleet would remain short of battlefield couriers and light recce units in any conflict that would emerge in the next twenty or thirty years. Emergency activation did not take place within the lifetime of the drive systems of these veteran vessels. However, six were in 2256 re-engined with the system Starfleet would soon adopt as WD-1. The test fitting was a splendid success and allowed the old* Striders *to be employed as combat scouts for more than a decade, armed with modern twin phaser IV turrets.*

There were also two through-hull loading bays to increase the speed and flexibility of bringing the courier packages onboard. Anything from key personnel to crucial spares could be loaded, yet personnel ingress was also possible via a portside gangway; a pair of utility airlocks with an adjoining shuttlecraft target pad aft of the reactor area; or a single transporter platform, which was considered standard gear for the modern courier. Heavy projected energy weaponry was also fitted, in the form of a phase cannon on dorsal main hull, an optional (in practice never fitted) second bank on the corresponding ventral location, and plasma cannon positions flanking the fantail docking target and thus covering aft angles.

In contrast, command and communications facilities were kept to a minimum. There was no dedicated combat control room apart from the navigation bridge, and the modest communications facilities did not form a complex of planning and analysis rooms like in the *Athens*. Out in the battlefield, the *Striders* were doers and movers rather than commanders or analysts. Their role in fleet action was limited to bringing in spares, personnel and key intelligence, and even the latter was typically gathered by other types of vessel, such as the *Mercury* and *Doppler* frontline scoutships of proper muscle and instrumentation.

During the course of the war, thirty of the couriers were manufactured, and 26 fielded in time to see action. Losses were light, as the odds of intercepting a warp three courier were significantly lower than catching a warp two vessel. The ships were in great postwar demand, though, and several already suffered from fatigued engines in the Tarn conflict of the 2160s. Spare reactors were out of stock by the 2170s, and the final *Striders* had to be withdrawn from use in 2197. A remarkably different design would take their place as the principal glue that tied together the thinly spread Starfleet.

Ariadne

Clipper
2170-2328

Completed:	104 total: 25 *Ariadne* patrollers 15 *Abarta* patrollers 2 *Anansi* couriers 1 *Altjira* scout 1 *Abuk* scout 2 *Abassi* scouts 3 *Anbis* patrollers 2 *Alpan* patrollers 1 *Abaangui* courier 3 *Agni* patrollers 4 *Aholi* scouts 4 + 4 + 8 *Allowat Sakima* patrollers 1 + 1 + 4 *Ahaw Kin* scouts 23 *Amymone* patrollers
Length:	35.4 m (*Ariadne*)
Beam:	92.5 m (*Ariadne*)
Height:	106.8 m (*Ariadne*)
Mass:	24,200 tons (*Ariadne*)
Officers:	6 (*Ariadne*, *Abarta*, *Alpan*) 3 (*Anansi*, other couriers) 5 (*scouts*) 8 (*Agni*) 7 (*Aholi*)
Crew:	28 (*Ariadne*) 25 (*Abarta*) 31 (*Alpan*) 11 (*Anansi*) 18 (scouts) 45 (*Agni*) 15 (*Aholi*)
Cruise speed:	w 3
Max. speed:	w 4.0 (Clipper drive) w 3.2 (Cochrane drive)

Endurance:	4 months (*Ariadne*, *Abarta*, *Anansi*) 3 months (*Altjira*, *Abuk*, *Abassi*) 6 months (*Agni*, *Aholi*)
Weapons:	*Ariadne*, original: 2 laser emitters (200 nm / 750 MW) on main hull Standard fit, 2198-2208: 2 laser emitters (200 nm / 750 MW) on main hull 2 laser emitters (290 nm / 2.0 GW) on warp ring Standard fit, 2208-2245: 2 laser emitters (200 nm / 1.3 GW) on main hull 2 phaser IV emitters on warp ring Standard fit, 2245-2283: 2 phaser III emitters on main hull 2 phaser IV emitters on warp ring 1 light fwd torpedo tube on ventral main hull Standard fit, 2283-2328: 2 phaser IV emitters on main hull 2 phaser IV emitters on warp ring
Shields:	1-layer globular shield
Laboratories:	None
Transporters:	1 GP (1-, 2- or 3-pad); Mk I Select vessels brought to Mk III standard in 2268-70
Auxiliaries:	2 work pods

Ships of historical interest:

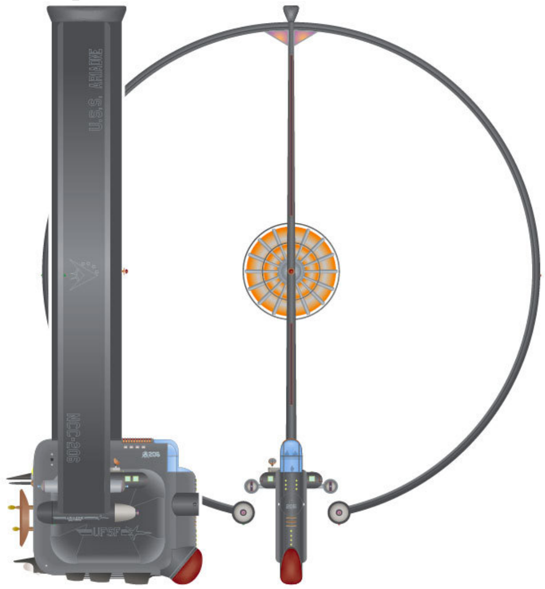
USS Anann (NCC-L238)

SOURCES:	(D FSRC/aridas sofia & Willy Whitten) (N FSRC/aridas sofia) (H FSRC/aridas sofia, own)

When Vulcan High Command in 2161 began pulling back its deep space patrol fleet, Starfleet was largely unconcerned. It was assumed that war surplus or continuation of wartime shipbuilding programs would quickly fill the ranks. After all, had not the Vulcan fleet at its Potemkine height consisted of just fifty primary combatants, easily replaced by Terran equivalents, plus no more than a couple of hundred smaller units?

However, there had been more to the Vulcan control of their half a dozen sectors than simple numerical strength. Each of the capital ships had been capable of warp six peak speed, many of warp seven. While the smaller patrol types had been no faster than their human equivalents, they had possessed superior cruise economy and endurance. In practice, substituting Earth designs for the patrol fleet would reduce its on-station time and thus potency by at least 50 %. Earth in the 2160s struggled with the unexpected industrial slump effected by the war, and was in no position to compensate by introducing a greater number of hulls. Instead, Starfleet representatives entered direct negotiations with ah'Hrak Soyn Voidsystems for acquisition of further Vulcan ring drive systems.

Ah'Hrak Soyn agreed to provide the highly efficient drives of *Solak* sentry vessels for an initial batch of 25 new patrol corvettes. Their hulls would be built on Earth in the slab-sided shapes of the pathfinding *Hippolytas*, to dangle at the lower end of the central spoke of the drive ring. The company also sold the engine license to Whitten, which would continue production for fifteen further vessels. The affordable patrollers were designed to be modular in their armament and sensor outfit, not so much in anticipation of widely varying missions but rather to allow just a minimum number of systems to be installed initially. A crew of 34 was to tend to the vessel in the barebones configuration, which featured a spartan sensor array, a laser armament of two 750 MW cannon, and a dual warp drive system. The ring drive would mainly be employed for cruising, especially in regions of high matter density such as the nebulae that pirates frequently exploited for their ambushes. An internal coil system of traditional Earth type was provided for combat dashes and acute maneuvering, however. Common to both was the fusion powerplant with 1:40 antimatter spicing. Flexible power management allowed the drives to be operated in any combination, or excess power to be channeled to the laser cannon pods at the ends of the open propulsion ring.



A typical Ariadne *patrol corvette (albeit formally of the wholly Earth-built* Abarta *subclass) displays to good effect the refinements introduced in the 2190s. In addition to the ring-end laser cannon, this 'clipper' mounts two phase cannon pods on upper hull flanks, just aft of the large flight control deck windows. Passive subspace sensors and a trailing gravimetric array are added to the lower hull, and a white surface finish is applied on the ring and parts of the hull. Return to more subdued colors and sensor-absorbing coatings in the 2220s would graphically display a change in status from hunter to prey. Yet in the 2190s, the* Ariadnes *could still hold their own against adversaries their size, such as this Zaranite warseeker prowling near Canopus.*

The 25-strong first batch was dubbed *Ariadne* at the 2170 launch of the inaugural vessel. An alliterative theme of Terran mythology was followed through the second batch, known as *Abarta*, and extended to later batches as well. These would follow the *Ariadne* lead in the choice of propulsion systems, but would feature modified primary hulls and systems, for a variety of roles. By far the heaviest was the *Agni* batch of three, with 2,600 ton hulls of inverted T shape and with dual internal coil sets plus torpedo armament; the lightest was the lone *Abuk*, a scout from the late 2180s with a slim crescent hull of 750 tons. In all, no less than fourteen variants could be discerned in the production run of 104! The differences were often minimal in practice, though, resulting from slightly dissimilar manufacturing practices on the six worlds involved in the production.

The dual-drive corvettes might not have been the most impressive warships ever designed. Yet their elegance and economy achieved what brute force could not: the assorted pirates, briefly emboldened at the end of the war, were driven from UFP core space for the time being. An efficient vigil at outer borders would warn of their return. Holes in the dragnet of still rather primitive sensors would be sewn shut by the significant cruise speed and sailing radius of the patrollers. Often reaching trouble spots well before heavier starship forces, the vessels of *Ariadne* descent became commonly known as 'clippers', a name apparently derived in part from the *Ariadne* mission class pennant code CP, or 'corvette, patrol'. The parallel designations 'corvette, reconnaissance' and 'corvette, dispatch' would soon be superseded by 'light scout' and 'courier', respectively, and their pennant codes CR and CD appropriated for other use – but 'clippers' would persist in Starfleet records well into the 24th century.

This is not to say that the *Ariadnes* would have enjoyed particular longevity. There were still half a dozen of the initial vessels in nominal Starfleet service by the time of Khitomer peace, but these tall ships were respected elders, preserved for reasons of prestige rather than practicability. The same already applied to most of the succeeding subvariants, introduced throughout the 23rd century to provide patrol combatant presence for border space, and especially for the vast nebulae of the rimward patrol sectors. The last of these let go of active commission in 2328, making way for vessels of brute strength and superior overall performance. Yet dozens still persist as training vessels or pleasure yachts across the operational theater of Starfleet, meticulously maintained and lovingly operated.

Pointer

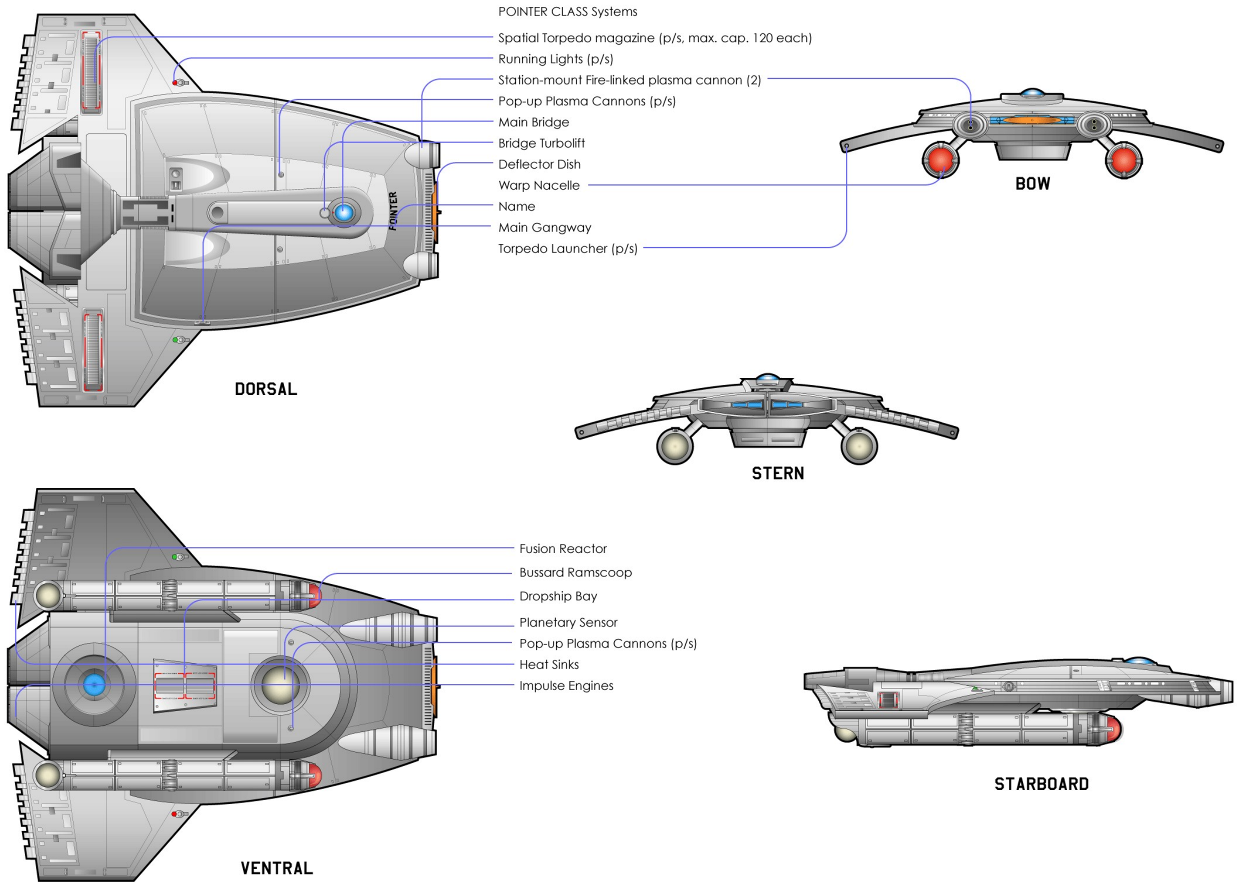
Corvette
2182-2208

Completed:	162
Length:	79.0 m
Beam:	72.8 m
Height:	14.4 m
Mass:	29,200 tons (original) 29,900 tons (refit 2198)
Officers:	3
Crew:	22
Max. speed:	w 3.5
Endurance:	6 months
Weapons:	2 twin laser emitters (290 nm / 2.0 GW) on port/stbd bow fairings 2 plasma cannon (0.9 GW) on dorsal hull 2 plasma cannon (0.9 GW) on ventral hull 2 rocket tubes w/ 240 KE rockets on lateral wings 2 Type G phase cannon (20 GJ / 100 GW) (MAWS modules, optional) 2 mine racks w/ 120 fusion mines (MAWS modules, optional) 150 KE rockets (MAWS modules, optional)
Shields:	1-layer graviton/subspace globular forcefield Navigational deflector at bow
Auxiliaries:	1 shuttlepod, 1 or 2 work pods Special tactical maneuvering units sometimes carried

Ships of historical interest:

USS McKenna (NCC-L53)

SOURCES:	(D SFC/Rick Sternbach, Irishman) (N SFC/Rick Sternbach) (H SFC)



After the unconventional *Ariadne* class had solved Starfleet's deep space patrol combatant problem, funds and resources could be allocated for a more 'traditional' – that is, more Terran – nearspace patroller. The *Pointer* class was introduced in 2182 to provide assistance to Federation local defense forces as well as customs and police units. In this role, the class replaced the bewildering collection of small craft and civilian conversions in service in the UFP member worlds, retiring for example the *Zoenamy* class of UESF corvettes, *Kuhulkka* class of Tellarite gunboats and *Husav* class of Andorian patrol craft. Larger than her forebears, the *Pointer* would be capable of operating efficiently outside the Sol system, even if she could not practically deploy across interstellar distances. Her role would be to guard the systems of UFP member worlds, as well as to protect shipments and maintain order within contested, only partially UFP-held systems like Rigel or Altair.

In the *Pointer* class, some key Tellarite engineering concepts were applied, for the first time in a foreign vessel. Andorian shielding technology was also an integral part of the design, as were Vulcan computers and tractor beam machinery. Yet the most prominent influences on the design were the traditional Earth cargo tug and the modern UESF scout. While not directly derived from an existing hull design, the *Pointer* in many ways resembled the forward compartment of an ECS freighter. Such tugs had proven quite maneuverable and durable against both pirates and Romulan forces when discarding their cargo sections. Starfleet was eager to make use of one of the proven strengths of Earth technology – not to mention the skills of ECS veterans who now formed the core of Starfleet local defense forces.

The close-mounted configuration of warp nacelles often found on tugs offered structural durability and well understood flight dynamics, and the two sets of 13,000 ton GP-13 warp coils were readily adaptable for such a mounting. The compression fusion powerplant was located in a flattened-cylinder engineering module that also directly mounted the flat-nozzled impulse engine, the only part of the propulsion system that subscribed purely to military standard.

The primary pressurized part of the hull was only lightly armored and exceptionally lightweight so that the total hull mass of the vessel (reactors, fuel, crew and equipment included) was mere 3,000 tons. In comparison with the prewar tugs, it was of much flatter shape, compacting the classic command sail into a single-deck spine. This narrow structure held a small flight control center forward and a swiveling, telescoping airlock and boarding tube system aft. The crew of twenty-five inhabited the upper deck of the wide pressurized structure beneath, sharing the spaces with fire control and communications rooms, navigation computers and life support systems. The lower deck featured ventral doors for twin auxiliary craft bays amidship and a forward array for short range survey sensors.

Aft of the pressurized area, non-shirtsleeves structures surrounded the reactor module. The two winglike extensions had no aerodynamic role to play, even in case of as such plausible emergency landings. Instead, they held magazines for hundreds of heavy KE rockets, to be fired from wingtip launchers. On the dorsal surfaces were hardpoints for modular auxiliary weapons systems, including additional rocket pods, mine racks, or even self-contained phase cannon. The principal energy armament of the type consisted of twin bow-mounted lasers, though, adapted from the podded units used on the *Ariadnes* but carried and fired in pairs. This was backed up by mundane plasma weaponry: two plus two guns, on dorsal and ventral shafts in the pressure hull.

USS McKenna *on debris-sweeping duty, in gleaming white and silver finish with the red double stripes of Defense Command. A bulky MAWS-mounted phase cannon is visible above the portside wing, ready to augment the deflectors and the tractor beam in this often thankless job of keeping system approach corridors clear of navigation hazards. The tucked-in arrangement of the GP-13 engines is far from the ideal warp-dynamic solution, but was chosen for structural integrity reasons.*

Intended mostly for debris clearing and police operations, these weapons were woefully underpowered against the shields of most known starship adversaries. Then again, the corvettes were never intended to be used for frontline combat. In second-line operations, and equipped with suitable combinations of MAWS modules, the small ships could partake in the defense of starbases and outposts. Offensive operations weren't limited merely by lack of punch and protection, but also by the modest propulsive endurance.

For long range deployments, the corvettes could be carried in place of cargo containers on many large freighter types. A versatile tender design called *Alexandria* class was also derived from the Class W freighter, capable of carrying two *Pointers* in place of aft cargo containers. The next pair of containers featured refueling and rearming systems with booms that could serve a total of four corvettes at a time. The containers forward of these held deuterium and tritium fuel, while the foremost containers were furbished for crew accommodation and medical care, and also held an operations control center with briefing and communications rooms. Six such vessels were completed to support *Pointer* operations.

The two Pointers *milking from a corvette tender of* Alexandria *class seem scant protection for the* Watt *class tanker and two* McCormick *factory ships that comprise Hanolin Asteroid Reclamation Project 2-7. Yet small vessels like this were very practical in the unstable Hanoli space, where large military vessels were at constant risk, and where even small and nimble pirate craft often dared not tread.*

With minor modifications, such as a 2198-99 fitting of new impulse nozzles for improved maneuverability, fuel efficiency and stealth, the *Pointer* corvette was used as the primary insystem patrol ship of the UFP for some 26 years, until again giving way to an increasing number of local designs. No common UFP patrol vessel was introduced for the turn-of-the-century decades, as Starfleet kept hoping for breakthroughs in lightweight warp propulsion systems as a means to extend corvette reach. *USS McKenna* of *Pointer* class briefly became a celebrity in the 2199 rescue of the civilian transport *Bleg-Ra*, distressed in a free asteroid cloud near Delta IV. Other ships of this humble class have not been immortalized on the pages of history.

Podish

Scout
2213-2247 (Podish)
2246-2258 (Tuverlind)

Completed:	40 total: 31 *Podish built in 2213-17* 2 *Tuverlind refitted from Podish and 9 built in 2246-48*
Length:	128.3 m (*Podish*) 90.1 m (*Tuverlind*)

Beam:	35.0 m (*Podish*) 44.2 m (*Tuverlind*)
Height:	36.8 m
Mass:	126,700 tons (*Podish*) 215,200 tons (*Tuverlind*)
Officers:	12
Crew:	89
Cruise speed:	w 4
Max. speed:	w 6.0 (*Podish*) w 7.3 (*Tuverlind*)
Endurance:	2 years
Weapons:	2 laser emitters (180 nm / 600 MW) on port/stbd ventral hull
Shields:	1-layer graviton/subspace globular forcefield Navigational deflector emitter on ventral fin 2 auxiliary navigational deflector emitters on bow
Laboratories:	1 GP, 1 planetary sciences, 1 life sciences or astrophysics
Transporters:	1 GP (3-pad), 1 emergency evacuation (22-pad); Mk I
Auxiliaries:	2 work pods

Ships of historical interest:

USS Podish (NCC-310), *USS Tuverlind* (NCC-341)

SOURCES:	D TOS-R (own) (N *Detroyat* Blueprints/Star Fleet Enginery Sheet) (H *Detroyat* Blueprints/Star Fleet Enginery Sheet, own)

Speed is one of the most alluring attributes of any vehicle, and of great practical significance to one that plies the distances between stars. For half a century, the vessels of Starfleet had been capable of reaching warp five, some of dashes at warp seven. In comparison, the modest top speed of the *Mann* class was singularly unexciting to the general public. However, every Starfleet engineer and commanding officer was thrilled by the prospect of maintaining warp four virtually indefinitely, a feat far beyond the capabilities of the best Vulcan designs of the past century. Now was the time to take the technology one step forward, to combine high flank speed with the ‘supercruise’ ability.

The vessels in need of a performance boost could be divided in three categories. The existing large cruisers might be able to accommodate the new technology with affordable modifications. A motley fleet of destroyers would need all-new successors, though. Smaller military vessels would have to wait for their turn, and for advances in miniaturization. Scientific and logistics interests generally fell in the category of lowest priority, with one notable exception: filling of the ‘scout gap’ that had opened with the retirement of the last Romulan War era vessels could wait no longer, for military as well as scientific reasons.

Dorsal bow quarter view of USS Manticore *(NCC-322) reveals best the aberrations from simple lollipop shape in a* Podish *scout. Hidden is the small dorsal stern hangarette for work pods only. The viewpoint also obscures the dorsal sensor dome, identical to its prominently visible ventral counterpart and crucial to the mission of the vessel.*

Haste was mother to many shortcuts. The Starfleet order automatically went to Chiokis, and specified a scaled-down sister design to the light cruiser, made even more affordable through the use of a single engine. The utilizability of a single ovoid hull was re-evaluated, as the warp drive would not scale down in neat synchronicity with mission systems, and mounting it semi-internally might present problems. The powerplant and the semi-recessed nacelle were therefore banished to a stern extension of the primary spaceframe.

An almost spherical hull 35 meters across and roughly one-third the *Mann* volume was quickly sketched out, and subcontractors began to add mission gear and support systems. Design of the main propulsion system would dictate the internal arrangement and structural specifications of the stern extension, however, and this design work was only initiated in 2208. It is thus no wonder that the scout companion to the *Mann* class was launched for her performance trials no sooner than late 2213.

The heart of *USS Podish* (NCC-310) was the PB-25 engine, a Pleshun CWS counterpart to the pahtfinding Cochrane Warp Dynamics PB-20. The forward two-thirds of its length were buried within the stern hull, forming an integral whole with a total conversion powerplant and its fusion auxiliary. Coupled to the primary plasma loop were six protruding impulse assemblies, laid out in a ring around the warp engine. Machinery also seeped out from within the confines of the hull at lower bow, where separate indentations presented the ramscoop window and the deflector array with a forward view, and along the dorsal surface of the engineering section, where plasma expanders and their venting systems glowed brightly to keep the high-strung powerplant content. Intercooler drums at nacelle aft end had small expander fins of their own.

Although eleven full-height decks were available within the primary hull, habitable volume was clustered on the upper half of the ship. The two of the decks above the equator of the sphere provided most of the berthing, while decks above these accommodated navigation and signals analysis facilities. The lower hemisphere was dedicated to assorted sensors, a minimal defensive armament of two 180/0.6 lasers and their targeting systems, and the aforementioned ramscoop and deflector machinery. Main fuel tanks at the bottom of the hull could be fueled through a ventral umbilical port just aft of the dorsal sensor dome, while the delicate antimatter was brought aboard through separate hatches at the bottom of the stern extension.

Starfleet's newest (and by many accounts ugliest) reconnaissance asset proceeded to gather a mixed record. By the end of 2213, as the first three sister ships to the *Podish* were launched, the prototype had established effortless supercruise and a top speed of warp 7.1, but had also suffered two near-disastrous breakdowns of the main drive system. Tinkering with PB-25 continued through the ultimate production run of 31 scouts, yielding a spectrum of combinations for high dash speed and correspondingly low reliability. Starfleet finally settled on warp six as the operational maximum speed, less than would have been allowed by main reactor output.

Reliability issues hampered execution of a deep space exploration program long in planning. The *Podishes* were content with tagging alongside cruiser task forces, or with leading formations of destroyers both obsolete and modern. Rapid progress with propulsive technologies was reshaping the Fleet; in most respects, the *Podishes* soon became as anachronistic as the oldest of their destroyer companions. However, PB-25 was only finding its potential, and the scouts were retained as a field laboratory for upcoming application in vessels such as the groundbreaking *Detroyat* heavy combatants.

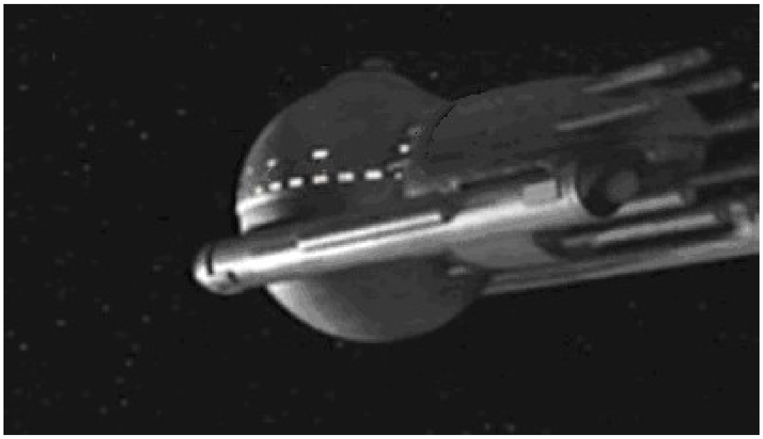
USS Foch *on approach of Spacedock Earth, part of a huge structure completed in the tenth anniversary of the Federation. Despite generous overengineering, the facility is currently too small for most frontline starships. The compact if somewhat inefficient warp engine configuration, particularly evident from this rear view of the* Foch*, allowed the* Podish *scouts to fit in with ease.*

Having completed this mission, the *Podish* class slowly faded to obscurity. The early years of Klingon aggression revealed their many flaws, often fatally so. Starfleet sought improvements through designs ranging from the lithe *Lowell* to the gargantuan *Hermes*, finding no single solution but a concord of wildly dissimilar ones.

Thrown into the mix was a *Podish* upgrade project, for which two ships were converted and a final nine units built. The design was to properly channel the available power into warp fields through the use of two sets of warp coils, outriggered on a curving support wing to port and starboard of the hull. The number of impulse units was increased to eight to compensate for the coil mass. The complex design entered operational trials in 2246 under subclass name *Tuverlind*, and was eventually cleared for a dash speed of warp 7.3.

The *Podish* story is quite typical of an organization in technological flux. While a definite improvement over preceding designs, and competent enough in its own line of work, the class would leave virtually nothing for later generations – save for the final iteration of PB-25, a self-contained engine as different from the 2213 original as that engine had been from the 'pre-Twenties' engines. Stories of heroism or tragedy do not endure, nor is there a lineage or school of design to perpetrate the ungainly lines of these tadpole scouts. A single hull serves as an orbital storage capsule at Vega, another as a beaconship near Hephaistos. Pleshun displays the original flight article of NCC-310's warp engine in the company museum.

The final active *Podish* was recalled in 2242 and decommissioned and stricken five years later; the last *Tuverlind* ceased operations in 2258. Related utility designs are legion, however: with the substitution of PB-35 engines on the *Tuverlind* hull, Chiokis was able to produce a range of high speed couriers and light transports that saw widespread civilian service. Such vessels could still be found in local duties in the early 24th century.



This Medusan courier is a typical example of the 'civilized' Tuverlind*, with a PB-35 pair filling in for the antiquated PB-25. Starfleet found no applications for the design, preferring the* Tavares *light transport that also had welcome planetary landing and takeoff capabilities.*

Lowell

Scout
2215-2239

Completed:	80
Length:	74.3 m
Beam:	38.8.m
Height:	23.7 m
Mass:	56,000 tons
Officers:	3
Crew:	10 + up to 20 research crew
Cruise speed:	w 4
Max. speed:	w 4.0
Endurance:	8 months
Weapons:	2 laser emitters (200 nm / 900 MW) on port/stbd main hull
Shields:	1-layer graviton/subspace globular forcefield 2 navigational deflector emitters on bow
Laboratories:	1 GP, 1 planetary sciences, life sciences or astrophysics
Transporters:	1 GP (3-pad); Mk I
Auxiliaries:	None

Ships of historical interest:

USS Siding Springs (NCC-I346), *USS Arecibo* (NCC-I355), *USS Lowell* (NCC-I340)

SOURCES: (D SFC, dimensions changed to match view)
(N SFC)
(H SFC)

During the period between UFP and Starfleet political stabilization and the return of the Klingon menace, interest in basic mapping and reconnaissance vessels was rekindled; the introduction of warp four cruise propulsion provided sufficient reach for modern scoutships to credibly operate at the far frontiers. Yet to be sure, this 'supercruising' was until the 2230s still largely the province and privilege of large ships. The latest PB-25 warp propulsion units optimized for use in the *Podish* scouts still massed some 90,000 tons apiece, and cost as much as two complete scoutships of the preceding generation. If Starfleet were to fill the gap in scouting resources, a more affordable alternative would have to be found.

Beckerman-Fusai MHG Corporation went for what could be considered '*de jure* supercruise', devising an engine just barely capable of sustained warp 4 at maximum power. At standard mission profile involving deployment runs of a few days, this translated to an endurance of 8 months – twice that of the various *Ariadne* –derived scouts with their monster engines, and this time with a useful scientific payload. The high performance engine nacelles were typical representatives of the third generation, their cylindrar main body terminating in a tapering aft segment with integrated intercoolers; the spooled coils massed barely 10,000 tons, but erection of a warp 4 field required four side-by-side sets. The powerplant was among the smallest total conversion reactors yet devised, housed in an external hull section of its own, and featuring separate antimatter tankage in dorsal pods. This presented virtually no demands on the pressure hull of choice, a stretched ovoid six decks high.

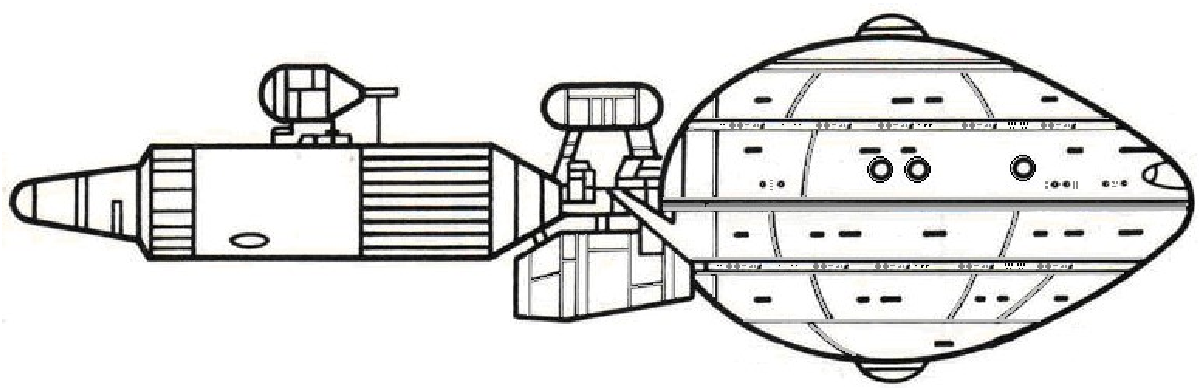
The combining of a tested and even somewhat dated spaceframe design of modest dimensions with these hypermodern engines raised a few eyebrows. But Beckerman-Fusai assured Starfleet and the Council that the economic reasons behind the decision were sound: the tightly packaged superengines needed to be proven in practice before series production of third-generation units for use in light vessels such as corvettes or couriers could be begun. And a science scout, intended to run fast and straight to her target and not to engage in violent maneuvering, was the ideal test platform. To reduce costs, the company was ready to tap into its R&D funds, in order to solidify its position as the warp engine supplier to the upcoming projects involving marketing prospects for third-generation engines.

In late August of 2214, three things were slapped onto Beckerman-Fusai's superengine: Starfleet's stamp of approval, a systematic Fleet propulsion block designation (in this case PB-26), and a spaceframe to carry a crew of thirteen plus abundant instrumentation for both technology demonstration and scientific study. Soon after leaving the dockyards next April, *USS Lowell* (NCC-I340) proved an excellent small scientific scoutship, demonstrating high speeds and the ability to accommodate and cater for the needs of research crews – in the relative context of very small ships, of course. The topmost of the six decks featured little beyond the navigation bridge and sensors; most control facilities, as well as cabins for the three officers, were on Deck 2. Two well equipped if small principal laboratories and various other research facilities dominated the middecks. Plenty of room was left for crew comforts, though, as propulsion and support machinery was mainly housed outside the main hull; Decks 4 and 5 could accommodate up to 20 visiting researchers in addition to the 10 operating crew if needed. Deck 6 mainly housed sensor controls and life support systems.

Standard hull surface and domed sensors similar to those applied on the *Mann* and refitted *Caracal* cruisers and *Podish* scouts were augmented by a selection of highly sensitive mapping instruments, including a trailing sensor pod deployed from above the support structure of the nacelles. A wide selection of probes could be sown from special racks mounted along the length of the support structure, or manually prepared in pressurized compartments and deployed through lateral chutes on Deck 3. For self-defense, two banks of lasers were also provided on that deck, and two navigational deflector emitters were inset at the bow.

The armament of the *Lowells* raised some initial critique. Admittedly the ships had been procured with tactical intelligence gathering in mind, as indicated by their registry prefix, and admittedly this presented the risk of combat. Yet the captains had no wish to engage an enemy of any military worth; effective sensors for early warning and sufficient speed for early retreat were felt to be more essential to survival than ship-to-ship armament. In combat against lesser opponents, the *Lowells* would in turn have trouble in bringing their weapons to bear, as the great mass of the warp engines and the fragility of the trusswork spaceframe were serious maneuverability handicaps. Nevertheless, Defense Command insisted on the relatively heavy laser mounts, which didn't present any engineering or power allocation problems as such, and consumed relatively little space on Deck 3.

A more proper target of critique was the ships' probe-launching capacity. The sublight probe racks and chutes were flexible and versatile tools for scientific study. Yet without a warp launcher, the scoutships would have to virtually overfly their targets in order to deploy their reconnaissance probes. For civilian applications, this was within the limits of practicability, but the threat environment of the 2220s required that even science scouts be ready to repel a Klingon invasion. Being fundamentally incapable of this, the *Lowells* lost some support, and the life-extension refits they required became less and less likely to take place. When the first of the *Flagstaff* scout drones became available in the early 2230s, Starfleet Command decided to abandon the *Lowell* class entirely. Even though the vessels were still perfectly capable of performing their original mapping and research missions, the military requirements imposed by the Klingon threat cut short their careers. This in turn put an end to Beckerman-Fusai's foray into the advanced warp engine business, leaving Pleshun, CWD and the newcomer Shuvinaaljis as the prime competitors in the field. The common small ship engine Starfleet had hoped for was not to be PB-26, but instead the humbler and less compact CWD PB-22 that initially was coupled with conventional fusion powerplants.



Hiding in the ring system of Gault, Lowell *class scout* USS Anchorage *(NCC-I341) deploys her swarm of probes for mapping operations, in preparation for assessment of colonization potential of the lush world. Signs of possible civilization on the planet later proved false, and the Prime Directive caution was unnecessary in case of this world which later turned into an important agricultural site for the UFP. The approach taken in the survey of Gault contrasts strikingly with that of Faicia, reflecting the new Prime Directive philosophy adopted after the consequences of the exchange with the Klingons at Boreth in 2209 were realized. Note the deployable trailing array, as well as the low-mounted impulse engines and the six high-mounted fuel tanks, all housed in an open trusswork instead of needlessly being enclosed within hull plates. The four-nacelle warp engine layout remains unique to this class.*

The *Lowell* scouts were retired gradually between 2235 and 2239, handing over their missions to newer, larger, faster and more militant *Hale* and *Bode* classes. One *Lowell*, *USS Arecibo* (NCC-I435), was lost to a puzzling Klingon attack in 2221 above Sarthong V, a planet of scant strategic but noted archaeological significance. In 2210, the trailing sensors of *USS Siding Springs* (NCC-

I346) intercepted the signals of a high velocity probe passing through the galactic plane at an estimated speed of warp 430. The alignment of the tight, narrow-band, high-energy signal (or actually its subspace aura, since the nature of the signal itself could not be determined) made it unlikely that the visitor had originated from any of the galaxies in the local cluster, thus suggesting this to be the first observation of intelligence outside our local galactic group.

Hunter

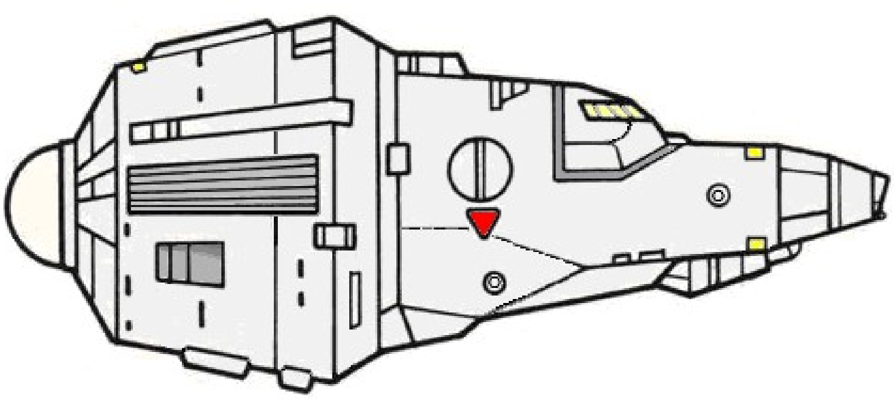
Corvette
2219-2243

Completed:	125 total: 95 *Hunter* 30 *Bloodhound*
Length:	85.0 m (*Hunter*) 92.2 m (*Bloodhound*)
Beam:	35.4 m
Height:	36.2 m
Mass:	24,725 tons (*Hunter*) 25,125 tons (*Bloodhound*)
Officers:	4
Crew:	26
Max. speed:	w 3.7
Endurance:	8 months (*Hunter*) 11 months (*Bloodhound*)
Weapons:	2 laser emitters (130 nm / 1.6 GW) on bow flanks 2 laser emitters (130 nm / 1.6 GW) on ventral mid-hull flanks (2.8 GW after 2234) 600 rockets in 2 ventral cassettes
Shields:	1-layer light conformal shields Navigational deflector on bow
Transporters:	None; some later refitted with 2- or 4-pad Mk I unit in former cargo hold
Auxiliaries:	None; special tactical maneuvering units sometimes carried in cargo hold

Ships of historical interest:

USS Nestor (NCC-L211)

SOURCES:	(D SFC) (N SFC) (H SFC, own)



Between 2208 and 2219, no common Starfleet corvette type was in operation. This was mostly due to the fact that the areas patrollable by such small vessels were largely stabilized by the beginning of the 23rd century, while the technology to extend the range of corvettes beyond this 'tamed' space did not yet exist. The next common corvette design was thus intended to succeed the *Pointer* class in domestic law enforcement missions only, with a nominal hull mass of less than 4,500 tons.

No deep space assignments were projected for the new lightweight corvette – the escalation of the Klingon threat had effectively ended the deployment of light combat vessels to the borderlands, since nobody wanted to 'lightly combat' the menacing adversaries. To stress the non-military nature of the new *Hunter* class ships, Starfleet for a time used the designation 'patrol boat' for them. The designation reverted back to 'corvette' in the 2230s when it became apparent that even these rather modestly armed ships might have to be assigned to the Klingon front after all.

With their four single 1.6 GW laser emitters and two sublight rocket cassettes, the *Hunters* were still quite capable of inflicting damage on adversaries larger than themselves. The corvettes also carried a selection of modern sensors, adequate for acquiring, tracking and identifying suspect vessels and directing laser fire at short ranges. No effort was made to heavily shield the ships against enemy fire, however, nor to install torpedo armament or frigate-quality computer systems. Economy of design was the main criterion in the shaping of the class.

A further shape constraint came from the requirement for following suspect vessels into planetary atmospheres and surfaces. Sub-impulse propulsion and material technology advances made it possible to give the type full landing capacity on Class M worlds. Yet to facilitate repeated maneuvering in the atmospheres of these planets, the single PB-22 warp engine had to be mounted inside the primary hull, with a huge plasma diffuser endcap at the stern and an annular ramscoop at the bow, aft of a deflector dish. The power systems surrounded the aft part of the engine in a conical hull section, while the rest of the ship was built above and below the forward part of the engine. This layout naturally placed safety limitations on the field output of the unit. Since heavy shielding of the engine was out of the question, only modest power levels could be used, and warp performance of these ships was limited.

The hull design introduced the extensive use of trititanium (nowadays known by the shorter name tritanium, and usually replaced by duranium in small spacecraft). The aft cone began at 28 m diameter astern, reached a maximum diameter of some 35 meters amidships, and then quickly tapered back to 28 m before blending into an aerodynamically shaped bow section. On the flanks were field windows for the warp engine, and below these the impulse nozzles. Very little of the conical space was arranged into personnel-accessible decks, instead being filled to capacity with the main fusion reactor, twin deuterium tanks, a single tritium tank, and two shield generators.

In the forward half of the ship, two decks sat atop the engine, including a windowed flight deck, main C^3I facilities and a pair of two-person officer cabins. Below these was a staging deck for boarding parties, with huge docking adapters port and starboard for latching onto a wide variety of targets. The deck formed the widest point of the forward hull, and necessarily so, because ship centerline there was taken by the warp coil shaft.

On the deck below, aft of the navigational deflector and the bow laser systems, the starboard side featured a power distribution room, then an austere crew compartment with bunks, a lavatory and a small galley plus lockers for personal items. Port of the engine shaft, in a corresponding location, were a sickbay and a stasis unit for consumables, plus a second, smaller crew compartment.

Below this, the hull tapered down to accommodate two more lasers with a ventral field of fire, a long landing strut below the bow, and two rocket cassettes for ground strafing. Within, there were holding cells, a workshop and a small internal cargo hold, squeezed wherever there was room and semi-practical access from the staging deck. The roughly 200 m^3 cargo space was in frequent use in colony support and maintenance missions, which were part of the postwar corvette mission profile. It later provided enough space for the retrofitting of a two-pad transporter system to some vessels.

A ventral planetfall ramp catered for ground egress, although with the single bow and twin aft landing struts deployed, the ramp had to reach down some 10 meters for level ground! Each of the aft landing legs was accompanied by a vertically mounted reaction engine beneath the center of gravity. Since the corvette easily outweighed most 20th century oceangoing warships, the helmsman had to carefully consider whether the landing surface was solid enough for turning off the gravitics; typically, the vessel would have to stay powered up throughout a surface visit.

No auxiliary craft were carried, since none were needed. In police or customs operations, the ship intercepted suspect vessels and demanded direct docking access. Refusing was not wise – during and after docking, both the side laser cannon were constantly pointed at the suspect at point-blank range. Indeed, if no hull opening was offered for use, the lasers could be used to swiftly create one. EV boarding assault was naturally also a possibility. Hand lasers were the norm in boarding operations, although projectile weapons were also carried for surface use.

The atmospheric capabilities of the corvette made her an excellent tool for special military duties. Twenty *Hunter* ships were deployed on Marine missions, serving as heavy auxiliaries and 'assault craft leaders' in support of lesser-capacity landing craft. In a ground assault mission, a team of six Marines in powered armor, or sixteen in standard combat gear, could be rapidly deployed from the cargo hold via the bottom ramp, or an underslung ground combat vehicle could be carried. Also, strafing runs could be performed using rockets. As the introduction of next-generation transporters and high-precision phaser armament to light starships made these mission types obsolete, however, Starfleet in 2239 withdrew the Marine ships and placed them on regular insystem patrol duty.

Ten other corvettes were employed by Starfleet Intelligence, presumably for operative insertion missions. Their exact configuration remains classified. Reputedly at least two were equipped with some kind of auxiliary craft, probably unmanned drones but possibly also manned reconnaissance or 'special tasks' craft. Rumors also abound of the existence and use of onboard warp transporters well prior to the official date of man-rating the teleporting technology. Boarding of ships at warp (or through other types of low-intensity duonetic fields) would certainly have been of interest for the intelligence community, and presented a nasty surprise for most adversaries. Also, the theoretical independent interstellar capability of the design was undoubtedly turned into operational practice in SFI service, since the Marine practice of deploying their assault craft and assault craft leaders from aboard large transports less than 100 AU from their target would not have provided the necessary degree of stealth for special operations.

Thirty vessels of a stretched configuration, featuring a four-meter hull plug forward of the airlocks and a three-meter plug for the powerplant section, were created for extended military patrol. These ships enjoyed greater endurance due to larger propellant and fuel tanks, improved life support and more comfortable crew facilities. Carrying the subclass name *Bloodhound*, they served in border starbases, patrolling nearby space up to the 500 AU defense perimeter and providing defensive as well as light offensive firepower. On such a patrol mission out of the Rigel II Fleet outpost, *USS Nestor* happened to witness a rendezvous between a Rigelian transport convoy and a Klingon destroyer in 2221, revealing the trade relations between the governments.

Most ships of the class received an update in 2234, in which 2.8 GW lasers replaced the ventrally firing 1.6 GW units. Engines were also uprated and shielding improved. Rocket cassettes were eliminated as obsolete in all but Marine vessels. Some extended vessels also accommodated four-person transporters by sacrificing cargo space, while most original *Hunters* made do with a twin-pad unit. This made the ships highly effective patrol vessels: they obtained a reputation of reliability, durability and flexibility in Defense Command. Thirty-five *Hunters* were delivered to civilian operators, including Federation Customs Service and Tellar Police Forces.

A family portrait. From left to right: patrol corvette USS Nestor *of* Bloodhound *class (NCC-L211), corvette* USS Franklin *of* Hunter *class (NCC-L184), and the medium sublight transport* Scrooge *of* Goose *class, modified for such use by removing the weapons and warp engine of a* Bloodhound *(NAR-10492). Inexpensive even if nonoptimal conversion of corvettes for civilian use is a tradition upheld in Starfleet, even now that surplus weapon sales are frowned upon.*

The last ships of the *Hunter* class were retired in 2243, and modern patrol vessels with higher warp performance replaced them in law enforcement missions. Many of the low-fatigue units served later as civilian luxury yachts or light cargo vessels, usually having their warp engines and all weaponry removed.

Guardian / Majestic

Heavy escort
2229-2258 (Guardian)
2243-2263 (Majestic)

Completed:	106 total: 62 *Guardian* 44 *Majestic*
Length:	149.0 m
Beam:	76.2 m
Height:	38.0 m
Mass:	190,000 tons
Officers:	10
Crew:	48
Cruise speed:	w 4
Max. speed:	w 4.7
Endurance:	8 months
Weapons:	*Guardian*: 4 laser emitters (130 nm / 1.6 GW) in 2 twin banks on dorsal primary hull fwd port/stbd quarters 4 laser emitters (130 nm / 1.6 GW) in 2 twin banks on dorsal primary hull fwd port/stbd quarters

Majestic:
4 phaser IV emitters in 2 twin banks on dorsal primary hull fwd port/stbd quarters
4 phaser IV emitters in 2 twin banks on ventral primary hull fwd port/stbd quarters

Shields: 1-layer conformal forcefield
Navigational deflector on bow

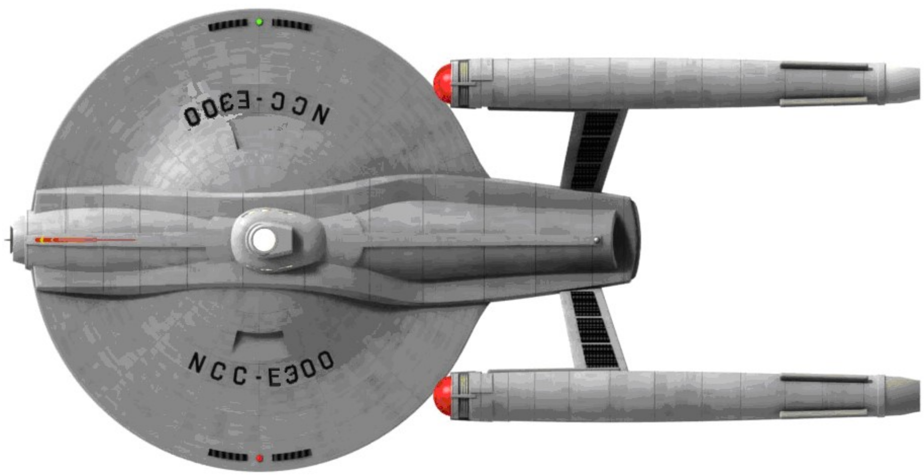
Transporters: None

Auxiliaries: 2 light shuttles

Ships of historical interest:

USS Guardian (NCC-E300), *USS Majestic* (NCC-E400)

SOURCES: (D SOTL2006/Aristomenis Tsirbas, STO)
(N LUG)
(H LUG)



As soon as supercruise capability was introduced to the elite units of the logistics fleet, the need arose to defend these units on their way to fleet support assignments. Detaching to escort duty the very starships the tenders and transports were supposed to assist would have been counterproductive indeed. Operating the support units only within the context of an entire fleet in motion would not be practical, either; strategic mobility definitely called for the option of shipping supplies back and forth between bases and detachments, even when the latter were operating at regions of high risk.

The first experiments with supercruising convoy involved *Kovaris* destroyers propelled by the capable PB-25 engines. When these turned out to be in too short a supply, designing of dedicated escorts based on the PB-23 of the logistics force began in earnest. Results could be presented by 2229, just in time to match the escalation of threat from Klingon long range raiders. The ransacking of the unescorted *Flying Fortress* was elemental in prompting Starfleet to proceed with making use of said results, despite the fact that the supercruising escort *Guardian* (NCC-E300) was not quite meeting the specifications.

There was nothing wrong with the drive system or its ability to sustain supercruise. A pair of PB-23 engines, bolted to a cigar hull a hundred meters long, was producing the required warp field under power from a reactor identical to the system concurrently installed on *Independence* fast transports. The single Scarbak KKR impulse engine below aft hull was also performing admirably, despite some reliability problems. The shortcomings resulted from the combination of these systems into a fighting unit, intended to provide armed escort in deep space for up to a year – affordably enough that a hundred convoys per year could be shepherded to destinations of high risk. The performance was there all right, but came at an unacceptable unit cost and consumed onboard resources so hungrily that maximum mission duration had to be set at eight months.

The *Guardian* was not the solution to Starfleet's escort woes yet, then. Yet it was a valiant start. The saucerlike extension of the main hull to port and starboard presaged future combatant designs, and housed a formidable weapon system of eight 1.6 GW lasers, later hidden under smooth gunports. Cowled at the saucer/cigar joint were various sensors and scanners enabling independent operations. A large sensor and deflector dish at the very bow facilitated warp four navigation, and combat shields were at what might be described as high corvette level. Sized nearly like destroyers but stocked with fewer weapon systems, more modest shield generators and no transporters, the escorts offered almost comfortable accommodation for the 58 crew. There was also a shuttlebay and hangar for two light liaison craft, providing welcome interfacing with the other ships in the convoy.

The bright glare of α Leonis shows the sleek lines of USS Majestic *in the best possible light. Wearing modern pennant colors, the escort belies her design age and the antiquity of her engines. Further nuances separating her from the original* Guardian *design include a reprofiled bridge, a smaller diameter bow sensor/deflector dish, and field guide trunks for upgraded SIFs running along the top and bottom surfaces of the centerline hull.*

Sixty-two of the bold combatants were produced in a great rush before Starfleet made up its mind about the deep space escorts it really needed. The *Guardian* was a tad too large and expensive for her role – yet frustratingly too light to accommodate the superior PB-35 engine when it became available. An all-new escort with an even bigger saucer hull had to be devised to make use of the engine. The single-nacelled *Remora* class greatly outperformed both the *Guardian* and its upgunned *Majestic* variant in almost every respect. Only a minor advantage in endurance kept a few of these vessels operational past the 2250s, at which point the *Hellespont* three-engine escort completed the generation change and consigned the two-nacellers to an early retirement. In practice, this meant disarming and export to friendly powers, all of which were now cleared for the early generation of supercruise propulsion.

There exists a surprising afterword to the story of the *Guardians*, however. The overall design was eagerly adopted by several of the cultures that had bought the surplus hulls. Production of comparable designs ensued at Andess and Lactra in the seventies, and when the Bilanans joined the Federation in the early 24th century, they soon had a modernized variant in production. This type originally remained in local use only. However, the Dominion War saw its adoption, with minor modifications, as the *Dervish* class patrol escort. This vessel, described in a later entry, has been found thoroughly satisfactory and is projected to spawn a range of related, more advanced patrol combatant designs.

Thunderbolt / Mandalay

Corvette / courier
2234-2269

Completed:	195 total: 52 *Thunderbolt* corvettes 101 *Battleaxe* corvettes 42 *Mandalay* couriers
Length:	88.0 m
Beam:	51.2 m
Height:	18.0 m
Mass:	44,800 tons (*Thunderbolt*) 46,900 tons (*Battleaxe*) 41,000 tons (*Mandalay*)
Officers:	4
Crew:	38 (*Thunderbolt*, *Battleaxe*) 22 (*Mandalay*)
Max. speed:	w 4.0 (fusion-powered *Thunderbolt*, *Mandalay*) w 4.5 (antimatter-powered *Battleaxe*)
Endurance:	2 months (*Thunderbolt*) 3 months (*Battleaxe*) 5 months (*Mandalay*)
Weapons:	1 laser emitter (130 nm / 3.8 GW) atop fwd hull 2 rocket turrets below fwd hull 1 phaser V emitter refitted in 2256 in place of laser (phaser IV or twin 4 GW laser in export versions) 2 phaser IV emitters refitted in 2256 in place of rockets (in Starfleet and some export versions) *Mandalay* unarmed
Shields:	1-layer conformal combat shields Navigational deflector on upper bow
Transporters:	None (many later refitted with various shuttlecraft transporters)

Ships of historical interest:

USS Bronson (NCC-L421), *USS Callaghan* (NCC-L357), USS Mandalay (NCC-D300)

SOURCES:	(D Starfleet Battles) (N Starfleet Battles, LUG) (H LUG, own)

Attach two warp nacelles to an overturned spoon and let go, and you have launched a *Thunderbolt* class patrol vessel – or so it seems. In reality, a corvette is always a tightly packed maze of technology, a work of engineering art. In the case of the *Thunderbolt* class, such extreme compactness was reached that the cramped berthing facilities became the primary endurance-limiting factor. This mattered little, as Starfleet's aim in creating the class was extremely rapid reaction capability for short range interception and traffic monitoring duties. A top speed of warp four or better, combined with a transatmospheric hull, would redefine the corvette mission class rather completely.

A rough and ready design sketch for the Thunderbolt *shows the major elements while revealing no compromising detail on weapons placement. The eventual* Mandalay *variant ended up looking much like the sketch.*

The *Thunderbolt* was originally designed in 2234 around two 20,000 ton PB-22 warp coils and a fusion reactor by a civilian design team, but in 2239, Starfleet engineers managed to fit a dilithium-regulated matter/antimatter reactor to the ship instead. The modernized version, which also later accommodated phaser weaponry, was named *Battleaxe* class, and was to be the mainstay of corvette forces during the forties and fifties. A parallel batch of courier vessels was initiated in the likeness of an unarmed *Thunderbolt* but upgraded entirely to unarmed *Battleaxe* standards within five years of project start. In all the versions, the reactor sat between the nacelles and fed drive plasma through two broad and straight winglike pylons that also housed radiators and landing legs. Behind the reactor was an impulse engine feeding directly from the main power source; there was no auxiliary power unit, save for a series of batteries in the space between the reactor and the spoonlike forward hull. Also in this space were two lifting engines for planetary landings (also ingeniously used for maneuvering by experienced captains), the tractor beam necessary for capturing uncooperative vessels, and the shield and artificial gravity generators, plus four propellant/fuel cells.

Atop the 'spoon hull' sat a 3.8 GW accelerated laser (later phaser V) turret, actually grossly oversized for the vessel. Ahead of this, the bridge of the ship had a set of windows opening directly forward into space. Below this compact five-person bridge lay a broad second deck with accommodation for the 42 crew, consisting of four cabins of five plus an officers' cabin and a general mess (although the latter designation was often rightfully applied on the entire interior by the disgruntled crews). A small sensor and deflector array took up space at the bow, and a service corridor and a monitoring room aft provided limited access to the reactor and propulsion systems. The outer rims of the deck did not attain full height due to the hull shape, and held tanks for liquid consumables, as well as proximity sensors and communications gear.

The third deck was narrower than the middle one; a central corridor was flanked by holding cells, storage holds and a cramped staging and briefing room. These competed for space with the main airlock that had a ventral docking adapter and smaller surface ingress/egress hatches opening aft port and aft starboard. Outside the pressurized area lay the bay for the forward landing leg, some space- and surface-scanning sensors, and two rocket-launching swiveling turrets. The turrets were of little use against shielded ships and intended mainly against 'soft' surface targets, such as recently deployed and vulnerable planetary assault troops. In later versions, these cumbersome ground-strafing weapons were replaced by two phaser IV emitters, but the rapid response anti-assault mission of the corvettes was retained. In theory, even the unarmed *Mandalay* couriers could be fitted with the rocket turrets or their later phaser replacements and perform in this role, after a few days of modification; there was no structural or systemic provision for installing the main laser or phaser, however.

As with most vessels of this size, the navigational deflector was of extremely limited power: to avoid micrometeoroid damage, the ship always flew with combat shields up. Originally, this was a minor inconvenience, since there were no transporters aboard anyway. Boarding of ships suspected of illegal activities was still done the way the *Pointer* and *Hunter* crews had done it – by actually latching onto the target vessel and demanding access by transfer tube or spacewalk. Weep the opponent who refuses, as the corvette captain turns on his lift engines and burns through the offender's hull... For less destructive hull breaching, the crew could use a wide variety of power tools adjacent to the ventral hatch.

Traffic control on Earth orbit. USS Lancer *sports a Federation Customs Service registry, but also doubles as a planetary defense vessel for Starfleet Earth. Highly populated and frequently visited worlds like Earth or Andor usually maintained a dozen corvettes for combined law enforcement and defense duties, while important colonies often supported a defense-dedicated corvette operated by the local Starfleet liaison team.*

About 150 *Thunderbolts* of various standards were produced for patrol and police duties, 40 going to Federation Customs Service and 50 to Starfleet local starbase patrols. Several customers later upgraded the ships with modern small craft equipment including transporters and navigation systems, plus new software, but engine or weapon upgrades proved too costly for most users. Starfleet has since given up the use of this class, donating all ships to other UFP users (the export-cleared, slightly downgraded version with a phaser IV or twin 4 GW laser turret was generally known as the *Vazzar* class, although many customers insisted on locally applied names). Some *Battleaxes* served in Customs duty until the 2310s essentially in their original configuration, as the onset of replicator technology made the supply of even antiquated spare parts virtually limitless and free of expenses.

The *Thunderbolts* and *Battleaxes* were not ideally suited for local defense missions, despite their heavy laser/phaser armament and rapid reaction capability. Shields were of low power and combat endurance poor due to nonexistent repair facilities and system redundancies. Nor was the rapid reaction configuration compatible with patrol missions of practical length, as the limits of crew endurance, both physiological and psychological, would be reached in a matter of weeks. Starfleet therefore decided to move toward even heavier corvette designs, which soon began to approach frigate size and complexity. The heavy corvette classes were often short-lived and production runs short, reflecting the difficulty of maintaining pace with weapon technology advances – corvette-sized vessels are in general too small to be able to receive significant upgrades.

The stories of *Thunderbolt* exploits are too many to be recalled or even believed. Two examples might be included: *USS Callaghan's* exposure, boarding and impounding of an Orion slave cruiser near Cygnet XII and *USS Bronson's* valiant three-month pursuit of a sensor ghost created by escape artist and con man Harcourt F. Mudd.

Sawyer

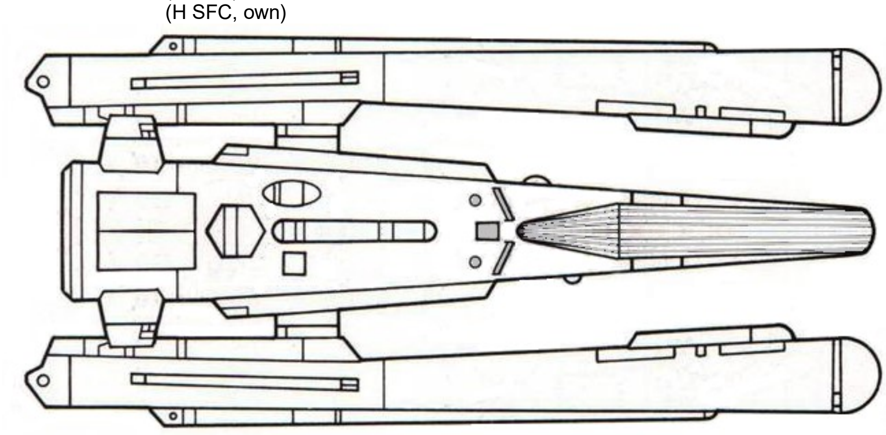
Light scout
2238-2255

Completed:	30
Length:	79.0 m
Beam:	34.8 m
Height:	27.3 m
Mass:	181,000 tons (NCC-I810) 184,500 tons (production vessels)
Officers:	6
Crew:	24
Max. speed:	w 6.0
Endurance:	2 years
Weapons:	2 laser emitters (200 nm / 200 MW) on single banks, above and below primary hull (production versions only)
Shields:	1-layer conformal forcefield Navigational deflectors on fwd hull
Laboratories:	1 GP
Transporters:	1 GP (3-pad); Mk I (NCC-I810) 1 GP (2-pad); Mk II (production vessels)
Auxiliaries:	None

Ships of historical interest:

USS Gulliver (NCC-I824), *USS Sindbad* (NCC-I823), *USS Ulysses* (NCC-I814)

SOURCES:	(D SFC) (N SFC) (H SFC, own)



After the experimentation on dilithium foci aboard the *Bonaventure* was finished, Starfleet finally unleashed its designing and engineering teams on the production of a new wave of spaceships – or, as the new name went, *starships*. The first series-produced m/am reactors with natural dilithium reaction control were harnessed to power warp drives in 2238, aboard light scoutships of *Sawyer* class.

USS Sawyer, NCC-810 (later NCC-I810), looked perhaps not so much like a star*ship* as a star*drive* let loose without a proper hull to accompany it. The two nearly 80 m long, 80,000 ton PB-36XD dilithium-compatible nacelles together far outbulked the rest of the ship, a narrow central body placed between the engines and joined to them with twin short pylons aft. The low-mounted forward pylons featured plasma feed lines from the revolutionary matter-antimatter reactor to the warp coils. The jettisonable reactor itself sat a couple of meters abaft of the pylons; sternmost, large dorsal loading hatches for fuel pods were flanked by the complex aft supports, which accommodated the impulse propulsion system. Major RCS functions were housed in the aft ends of the nacelles, along with a multiply redundant plasma purge system.

Forward of the reactor rode the payload of the vessel: a flight deck and habitat section for the 30 crew, and a bow compartment dedicated to advanced sensor gear. Some weaponry was later added to the design, in the form of 20 MW lasers above and below the central hull. At this early stage, there was no attempt to harness the power of the m/am reaction to energize the weapon systems, and high power lasers would have been too heavy a burden to the secondary power systems. Shielding of the ship was equally modest. Powerful shields would also have interfered with the sensor suite of the ship, which was not intended to be flown into battle anyway, and was eminently qualified to fly out of one if needed.

Initial propulsion tests were performed unmanned, and the prototype ship reached a staggering speed of warp 6.4 before the emergency limiters cut in. After a very brief manned test period, the ship was pressed into service and fourteen more ordered for the immediate scouting needs of the Federation. A year later, a further order for fifteen was made; while this did not yet fill the fast scout gap for good, at least it vastly improved the situation as regarded military data gathering. Even more importantly, adaptations of the high performance power system were fielded aboard other vessels, first on the *Baton Rouges* and later on other modern cruiser, frigate, destroyer and science vessel types. There was little hope of maintaining secrecy around the innovation, and in 2243 it was revealed that Klingons, too, possessed the new power source. Starfleet still believed it had a slight technological lead, especially in translating the raw power of antimatter-excited plasma into useful weapons output – a technology that never saw applications aboard the *Sawyer* class.

Days of testing far behind, a weathered Sawyer *warps into the Merak system on a courier errand. Slowish by the standards of the 2250s, the vessels faced stiff competition from dedicated* Centaurus *couriers, and had very few chances to demonstrate their military reconnaissance skills.*

The high performance scouts proved very useful in both reconnaissance and courier duties, taking over from the high-strung and high-fatigued *Frobishers*. However, the inherent inflexibility of the specialized design meant that very narrow mission profiles were available. In 2246, during the Secession crisis, *USS Gulliver* (NCC-I824) was sent to assess the political situation in the Axanar system and became the first ship to succumb to the Klingon forces there. In 2250, *USS Sindbad*

(NCC-I823) got the distinct honor of carrying President Varis to Axanar for the signing of the Rehabilitation Treaty, while in 2254, *USS Ulysses* (NCC-I814) proved that the Klingon threat had not receded by stumbling to an extensive attempt to influence Prime Directive-protected planets inside Federation territory.

By that time, however, the *Sawyers* were already so outdated that Starfleet did not even see it fit to equip them with communication gear compatible with modern subspace transceivers. Duotronics were out of the question, as were phasers – in fact, *nothing* could be refitted into the cramped vessels without ripping out their entire infrastructure. Instead of attempting extensive modifications, Starfleet promptly decommissioned and scrapped all the remaining scouts within fiscal year 2255. Instead of procuring a direct successor, it relegated the duties of the *Sawyers* to the new and capable category of larger vessels, of the *Procyon*/*Centaurus* type.

Procyon

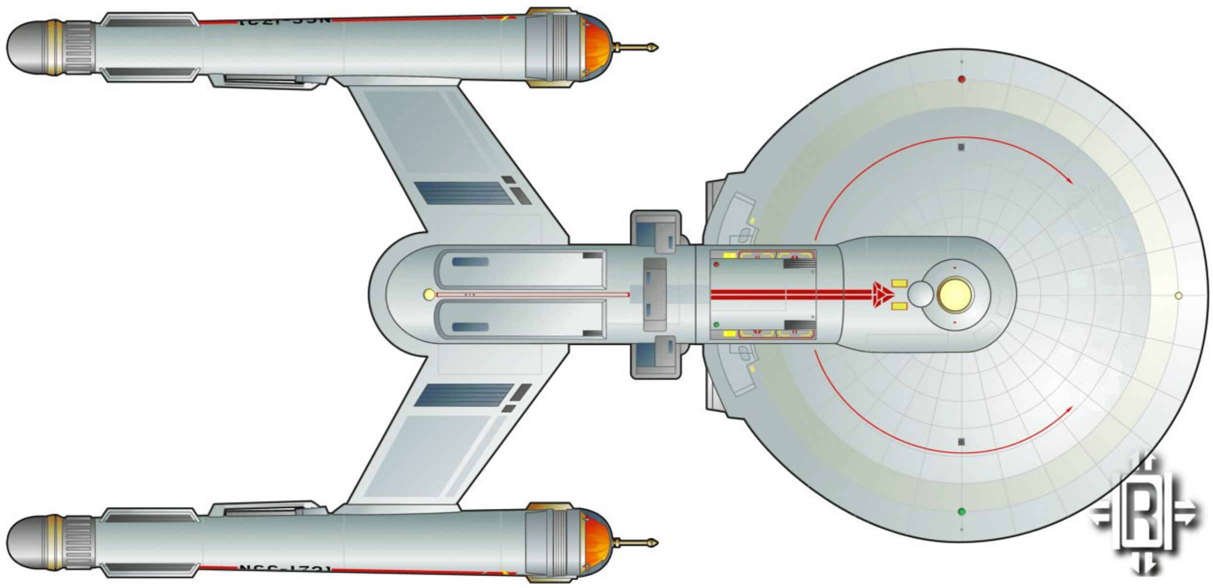
Corvette
2244-2283

Completed:	40
Length:	145.0 m
Beam:	69.7 m
Height:	20.8 m
Mass:	200,300 tons
Officers:	10
Crew:	68 (later 76, including 18 Marine boarding crew)
Max. speed:	w 6.0
Endurance:	1 year
Weapons:	2 phaser V emitters on dorsal primary hull, port/stbd of the bridge 1 phaser V emitter on ventral primary hull, fwd of lower sensor dome 1 mine tube w/250-1100 gravitic mines in optional ventral dispenser
Shields:	1-layer globular forcefield Navigational deflector on pod below secondary hull bow
Transporters:	1 GP (2-pad); Mk II

Ships of historical interest:

USS Antares (NCC-L717), *USS Lyra* (NCC-L723)

SOURCES:	(D Concordance / Brian Pimenta, Kris Trigwell) (N own) (H own)

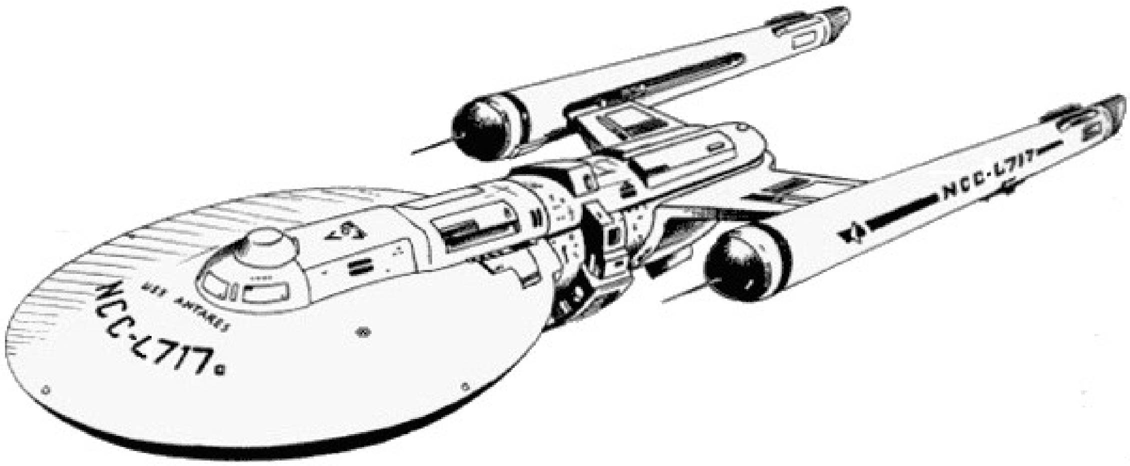


The introduction of antimatter-powered *Battleaxe* corvettes in the early forties provided Starfleet with an excellent rapid response insystem police vessel. However, this was hardly what Starfleet needed at the time. With local defenses at risk of falling apart for lack of fast enough starship support, and several planets expressing separatist interests, police action was of low priority. While the numerous *Battleaxes* could theoretically boost local defenses with their anti-assault capability, Starfleet hoped to extend these defenses beyond the 100 AU range normally limiting corvette operations, missile defenses and realtime scanning systems. A mere warp 4 police cutter could not hope to patrol the 5000 AU -radius sphere specified in Staff Requirement 452/2242/5B – it would take almost three days to circumnavigate the patrol area in one plane at such speeds. What was needed was a craft capable of a top speed of warp six within the duonetopause of a star system, reducing the patrol circuit to twenty hours and enabling a single vessel to intercept, identify and hopefully deter intruders in time.

Naturally, a vessel far larger than the underperforming *Battleaxes* (or the fast yet overly experimental *Sawyers*) was required. Landing capability was abandoned early on; so were the now obsolete sublight rocket weapons. Instead, emphasis was placed on adequate shielding, sufficient sensor and targeting capabilities, and a decisive system defense armament of heavy Type V phasers and gravitic mines. Three phaser emitters and at least 250 mines were to be carried. An antimatter powerplant was required for the desired performance, and a matching set of warp engines had to be created specifically for the type.

The daunting task of designing the extended-range corvette was given to a specially appointed Starfleet team of engineers. In later years, many of them would go on to serve in the Advanced Starship Design Bureau, Starfleet's own 'dream factory' whose first major product would be the *Excelsior* transwarp testbed. For now, the engineers had to cope with a shortage of time, but did have plenty of other resources.

Three major components were designed side by side: the compact 80,000 ton PB-34 warp engines with 75 m nacelles; the RMR-282 antimatter powerplant (later to be replaced by the more reliable KR05-P); and the 60 m dia. primary hull, fully capable of jettison and planetfall. By 2243, test articles of all the components existed, and the problem now became one of systems integration. Physically, this required the designing of a secondary hull and nacelle mounts. A streamlined four-deck structure superficially similar to *Constitution* secondary hulls was chosen, with the saucer mounted directly onto the upper bow so that the uppermost two decks of the engineering section met with the lowest two of the saucer. Then, a constant-profile, half-cylindrar top deck was applied over the length of the vessel to house a variety of mission and support systems. Finally, a Class 4 bridge module was installed atop the forward part of this top deck.



The first loss: on SD (11)4526.2, USS Antares *(NCC-L717) disabled herself through self-mining, sending the badly hurt spaceframe to mothballs for the following three decades. Although due to crew error rather than faulty design of either the weapon or its delivery platform, the incident discouraged future operational use of mines aboard the corvettes and emphasized their phaser armament instead.*

By March 2244, the first corvette was ready for launching as the UFP Starfleet Starship *Procyon*, NX-L700; it would not be until the time came to field a successor that a prefix-free registry would be allocated to a corvette, one befitting the size and complexity of this new breed of warship. Below the four-person bridge, the forwardmost top deck compartment housed targeting and fire control sensors and scanners; the top deck then tapered slightly into a utility compartment with resupply and docking fixtures, followed by a breach line between the primary and secondary hulls. Aft of the breach line began the long upper engineering section, housing diverse support systems within, a protruding dorsal antimatter fill port forward, and two cowlings for the main battery banks aft.

On the upper saucer level, Deck 3 featured officer accommodation and communications facilities; the engineering hull on this deck in turn held the secondary plasma distribution systems forward and the shuttlebay upper level aft. No shuttles were permanently carried, nor was there a service hangar, and typically the bay was reserved for carrying of additional mine or relay buoy racks. The warp engine pylons branched out laterally at this level. They incorporated plasma expanders and radiator surfaces, and also served as attachment points for underpylon impulse nozzles. Primary plasma was led to the propulsion systems from the bottom of the secondary hull via conduits faired to follow the hull exterior.

Deck four in the saucer housed starship-standard crew accommodation without a need for hot-bunking; a comfortable galley; a well-equipped sickbay; and assorted utilities. Thus furnished, the ships could perform patrol sorties as long as the nominal refueling interval of one year, without endangering the welfare or combat readiness of the crew. The secondary hull part of the deck held the top segments of the m/am reactor, and the lower level and space doors of the shuttlebay. Deck five was the bottom level of the main reactor systems. The navigational deflector machinery was out of necessity significantly larger and more powerful than in preceding corvette designs, and was housed in a separate pod attached to the bow of Deck 5. Also podded was the revolving minelaying system, inset into a berth forward of the reactor. Alternately, an additional fuel tank or a cargo pod could be carried. Finally, the only partially personnel-accessible Deck 6 housed engineering utilities, radiators and matter tankage ports.

In brief but demanding test runs, the original ventral radiator was found insufficient and replaced by a far bulkier assembly girdling half the hull. Corresponding changes were made to the two dozen other corvette hulls already under construction. The overall success of the design, verified by the tests, also meant that two hulls were immediately set aside for conversion to courier and scoutship variants. Operational deployments began in August 2244, when *USS Shaula* (NCC-L702) took over system patrol of Regulus from three *Thunderbolt* class corvettes. She was soon joined by *USS Vela* (NCC-L705), at which point the two elderly *Marklin* destroyers deployed in the system moved out into deep space. The goals of the corvette program were being met.

USS Sheliak *(NCC-L703) chases an Orion Wanderer, a ship greatly influenced by the* Procyon *design. The Wanderers were developed in the mid-2240s largely through industrial espionage, and provided the Orions with their first truly modern and competitive ship design in several centuries. The innovations that had allowed the corvettes to reach warp six were applied in double the scale and power, enabling for example this Orion vessel to ultimately shake off pursuit. Other cultures have tried to copy the excellent Federation design as well, but few have had the resources of the Orion cartels for doing so. The Klingon approach usually is limited to crippling and capturing a ship or two, then reverse-engineering some components and adapting them to use aboard Klingon-designed ships; the Romulans in turn seldom find Federation technology worthy of copying.*

A total production run of 40 *Procyon* class corvettes was completed between 2244 and 2249. In theory, greater production volumes or faster timetables could have been achieved, but the production lines were also utilized for the construction of the promising courier and scout variants of the basic design. Thanks to the lull of Axanar, the corvettes did not see much combat initially. Instead, their high warp speed allowed the extension of operations to true interstellar space along the old Deneva run. While the success of anti-piracy operations in the late 23rd century is generally attributed to the fielding of high numbers of frigates, it must be argued that the *Procyon* class also played a role in securing most of the spacelane from Earth to Rigel, thereby depriving Orion forces of their most bountiful hunting grounds this side of the Borderlands. The heavy phaser armament of the corvettes proved more than sufficient in deterring or destroying typical pirate vessels. Towards the end of their service, virtually none of the *Procyon* ships were carrying their intended primary arsenal of gravitic mines. Yet they no longer wore the belittling L prefix, either, having finally been accepted as full members of the starship community.

In the mid-2270s, operational strategies once again changed to favor heavier and faster local defense vessels, and corvettes faced a reassignment back to law enforcement duties. However, the success of the *Procyon* class was a major factor in encouraging Starfleet to experiment further with the heavy corvette concept. The relatively high operating costs of the *Procyon* corvettes were somewhat unexpectedly being countered by the high efficiency of the vessels in traffic protection duty – indeed, there was a clear monetary net gain for the Federation from the pacifying of the spacelanes. Ultimately, the path of heavy corvette development would again lead towards a more openly military operational role, and vessels would close the 'lineage gap', with the *Okinawa* class representing *Procyon* growth to frigate dimensions and the *Daring* experimenting with miniaturization of the *Surya* to corvette size.

When the *Darings* were fielded in mid-2270s, the *Procyon* class vessels gradually bowed out. Yet their heritage was being continued, not just on the conceptual level, but also in the form of the directly derived *Antares* multi-mission corvette series. Constant refinements on propulsion, armament and eventually also spaceframe would carry the *Procyon* line to the latter half of the 24th century, albeit in a greatly changed form, as described in the *Antares* and *Merced* entries.

Centaurus

Courier / scout
2244-2288

Completed:	40
Length:	145.0 m
Beam:	69.7 m
Height:	20.8 m
Mass:	200,100 tons (courier) 199,500 tons (scout, estimated)
Officers:	3
Crew:	26
Max. speed:	w 6.9
Endurance:	3 months
Weapons:	1 phaser V emitter on ventral primary hull, fwd of sensors (optional)
Shields:	1-layer globular forcefield Navigational deflector on pod below secondary hull bow
Transporters:	1 GP (2-pad); Mk II

Ships of historical interest:

USS Typhon (NCC-D867), *USS Kismet* (NCC-D861), *USS Sphinx* (NCC-D853)

SOURCES:	(D Concordance / Brian Pimenta) (N SD Perry "S31: Cloak", LUG) (H own, SD Perry "S31: Cloak", LUG)

Project *Procyon*, Starfleet's effort to create a corvette capable of patrolling entire star systems, spawned in 2244 a breakthrough in small vessel warp propulsion. The PB-34 nacelles and the compact KR-05P antimatter powerplant were immediately earmarked for use in two other projects topical at the time: a high-warp courier for both diplomatic and military use, and a small scout or advance surveyor. Yet the development of new small starship classes was in the event deemed unnecessary. Highly positive early experiences from operating standard *Procyons* in these roles prompted a swift downselect to a type minimally modified from the corvette design. A smooth introduction of the mission-dedicated types in parallel construction ensured that by 2251, Starfleet possessed forty thoroughly modern multi-purpose couriers and scouts, formally grouped under the class name *Centaurus* despite the theoretical interchangeability of the three designs.

Naturally, in a spaceframe this cramped, configuring for one mission necessarily meant removing of all gear intended for other roles. Externally observable, but requiring a trained eye, were the omissions of the dorsal phasers and the revolving mine dispenser. Internally, the saucer was gutted of fire control and combat support hardware to provide improved accommodation. Endurance was boosted with the dedication of the faired-over mine dispenser berth to fuel storage, and the transporter room and surrounding facilities were modified.

In the courier role, accommodation and amenities for four VIP parties were provided, although the luxury facilities could be rapidly dismantled and stowed away to allow the ship to transport a maximum of 80 passengers or up to 3,000 tons of priority cargo. In scouting duty, all internal gear in the compartments was simply omitted to save weight. Actual scouting sensor payloads still remain largely classified.

Although the ventral phaser assembly was still carried, it was typical to shut down the phaser power feeds in flight, so that all power could be directed to warp propulsion. Different power allocation protocols were in the end the primary reason for the high top speed of the courier and scout versions in comparison with the corvettes. A *Centaurus* class courier could achieve warp 6.9 safely enough and sustain warp 6 for the duration of an interstellar journey. Dash speeds of warp 7.3 were reputedly reached during scouting missions.

Courier or scout? USS Minotaur *(NCC-D842) probably wears at least two hats on this diplomatic mission to the Catullan system in 2267. Externally distinguishable from the simplest courier configuration are the two duonetically transparent covers beneath the bridge, although admittedly many of the ships carried these sensor orifices without mounting any associated instrumentation. Tellingly, the original registry prefix for the vessels had been the I of intelligence gatherers, evident also from the sequentiality of the numbers with the preceding* Sawyer *class of scouts.*

The *Centaurus* couriers were among the long-lived classes that saw their mission-coded registries converted to regular NCC numbers, in this case simply by dropping the prefix letter. The last units were retired in the late 2280s, after decades of constant and demanding service. Many had succumbed to wear and tear along the way, but only two had met a violent end. *USS Sphinx* (NCC-D853) was sabotaged in 2265 by unidentified foreign operatives and burned out her powerplant at extreme warp, at which point the crew was already dead due to life support shutdown. *USS Typhon* (NCC-D867) in turn was in 2286 ransacked by pirates readily identifiable as Elasi, and just as readily traceable to the Klingon intelligence payroll. As the result of the raid, data on Starfleet defensive sensor networks in the Archanis sector was assumed compromised, and the whole Firechain tripwire system had to be abandoned at the worst possible moment.

On the positive side, scouting missions brought in significant intelligence on Klingon spacelanes and garrison chains, despite the limited range and speed of the small scouts. The original *Centaurus* force met Fleet short range scouting needs through the Organian peace and well into the 2270s. A refit in 2279 would give some of the vessels a significant engine upgrade, described in a later entry.

Chasseur

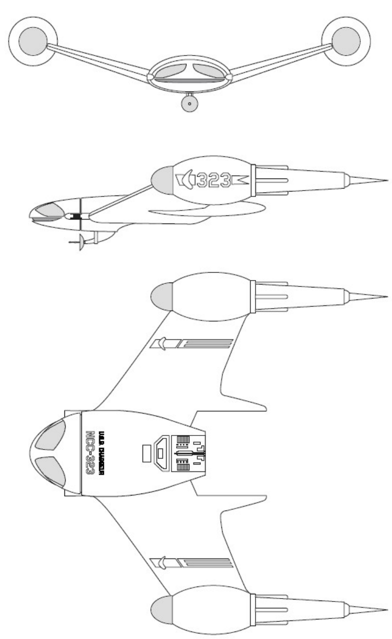
Clipper
2245-2267

Completed:	7
Length:	110.0 m
Beam:	110.0 m
Height:	29.8 m
Mass:	190,700 tons
Officers:	6
Crew:	18
Max. speed:	w 6.5
Endurance:	2 months
Weapons:	2 phaser V emitters on pylon roots
Shields:	1-layer globular shield
Transporters:	1 GP (2-pad); Mk II

Ships of historical interest:

USS Chasseur (NCC-323)

SOURCES: (D aridas sofia)
(N aridas sofia)
(H aridas sofia, own)



The multirole *Ariadne* class remained an excellent tool in filling the gaps in UFP perimeter defenses even in the 23rd century. Yet the very gapfiller nature of the design read as a challenge for ship designers, especially those believing in the Cochranean sequential-coil drive type. In the early years of the 2240s, various compact solid state warp engines were developed and fielded for use with natural dilithium powerplants, including the PB-34 which was compatible with smallish patrol vessels. When this engine was slotted for system patrol corvettes and optimized accordingly, veteran third generation warp technology provider Yatanesi saw a market opening and instead worked its comparable PA-450 to deep space specifications.

The portly engine came to feature capacious ramscoops, a bypass plasma venting system for rapid recovery from high warp sorties, and plasma diffuser spikes for adequate stealth en route. Starfleet adopted the design readily enough on first proposal, dubbing it the PB-38. Nylstroom Astris was contracted to produce a fairly generic scoutship hull, an ovoid with an undercut and with a stern section where any suitable antimatter powerplant could effortlessly be fitted. At 25 m maximum width and 55 m length, the hull barely outbulked the twin nacelles, which were rigged on very long, 30 m pylons both for providing a wide, maneuverability-optimal warp field and for protecting the crew from the field output.

Additional protection came from a Hobbs navigational deflector and long range sensor booster dangling on a ventral pylon, and from an internal combat shield generator of TaT make. This left minimal room for accommodation, as the forward end of the hull was dominated by a multilevel command facility. The lowermost deck had a panoramic window arching around a half-circle of control stations, with the commanding officer's station and a situation table at the middle. Ship's ladder gave access to two upper levels where fire control and communication personnel worked their gear beneath vast duonetically transparent panels. Closet-sized quarters for 24 crew were arranged along the outer walls of the midhull, with some communal spaces and supply holds in the center, but with support systems for the antimatter reactor taking up most of the centerline space.

As the name chosen for the pathfinding vessel suggested, the *Chasseur* would defend the perimeter by virtue of being an advance skirmishing force – but unlike the later, larger perimeter ships, it didn't have the ability to loiter in wait yet. Mad dashes at warp six or better would bring the ship's two M-43 phaser emitters to bear on an intruder. The technique was rigorously tested for several months in various dry runs and wargames, and found completely unrealistic: the craft lacked the persistence, firepower and range necessary for frontier operations, as well as the growth potential to rectify the shortcomings.

What the seven *Chasseurs* built for the testing did excel in was reliability. Within the decade, Starfleet would be forced to create a border defense fleet, its back against an impassable wall. Vessels built with better powerplants for the PB-38 would be the way to proceed, resulting in defenders of superior endurance and weapons output but nevertheless affordable dimensions. These perimeter ships would also pay heed to certain well-working ideas about the internal layout, and would arrange their large combat control centers in similar horseshoe manner.

The seven pathfinders were not forgotten. Short on all other qualities, they capitalized on their dash speed in scouting rather than skirmishing tasks. Minor but crucial sensor upgrades turned them into useful perimeter assets for starbase commanders, in a fitting scale model of the defenses provided by their larger siblings much farther away from home. The *Chasseurs* benefited from the engine support infrastructure of the strategic PA fleet, and only stopped scouting when their hulls and secondary systems wore down in the late 2260s. The even more compact *Archer* scoutships took over their role smoothly enough.

Portsmith / Bedford

Escort

2246-2263

Completed: 155 total:

	92 *Portsmith* 63 *Bedford*
Length:	158.0 m (*Portsmith*) 142.6 m (*Bedford*)
Beam:	50.1 m (*Portsmith*) 48.7 m (*Bedford*)
Height:	58.4 m (*Portsmith*) 71.2 m (*Portsmith* command variant w/ antenna) 48.7 m (*Bedford*)
Mass:	130,000 tons (*Portsmith*) 131,600 tons (*Portsmith* command variant) 128,500 tons (*Bedford*)
Officers:	10
Crew:	84 (*Portsmith*) 73 (*Bedford*)
Max. speed:	w 5.0
Endurance:	1 year
Weapons:	*Portsmith*: 2 laser emitters (130 nm / 1.6 GW) on dorsal aft hull port/stbd 2 laser emitters (130 nm / 1.6 GW) on ventral aft hull port/stbd *Bedford*: 1 laser emitter (130 nm / 1.6 GW) on command towerl 2 laser emitters (130 nm / 1.6 GW) on ventral aft hull port/stbd
Shields:	1-layer globular forcefield Navigational deflectors on bow
Transporters:	1 GP (3-pad); Mk II

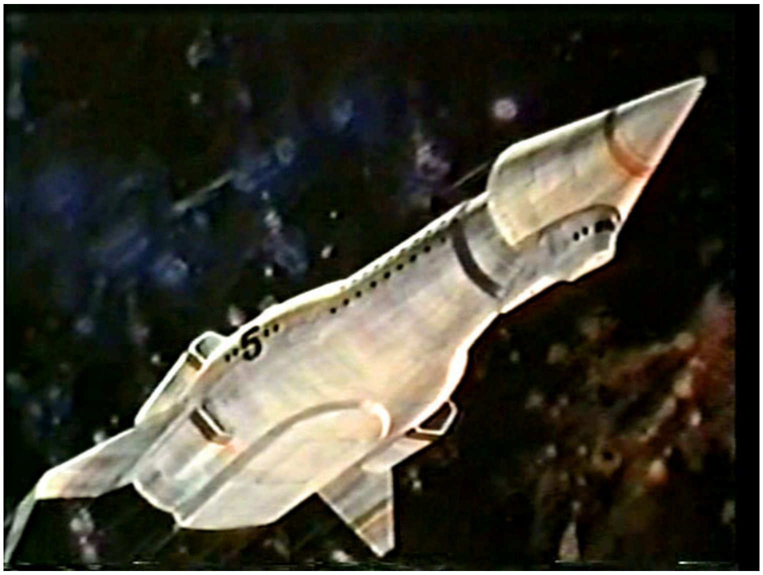
Ships of historical interest:

USS Bedford (NCC-E592), *USS Portsmith* (NCC-E500)

SOURCES:	(D SFC) (N SFC) (H SFC, own)

Not two weeks had passed since the Klingon intrusion at Axanar when Starfleet issued a set of instructions and orders to all commercial traffic in the region. At first, all flight plans would be subjected to Starfleet review; within sixty days, convoy was to be established, with escort provided under Starfleet control. Actual combat units would not be available in sufficient numbers for such a massive undertaking, as Axanar offered Klingon raiders access to some of the highest-volume spacelanes in the entire Federation. Instead, Starfleet would perform 'handover escort' in the style of the old Romulan conflict, and would only provide select convoys with duly armed protection. Others would have to fend for themselves – but Starfleet also intended to provide them with the means to do so.

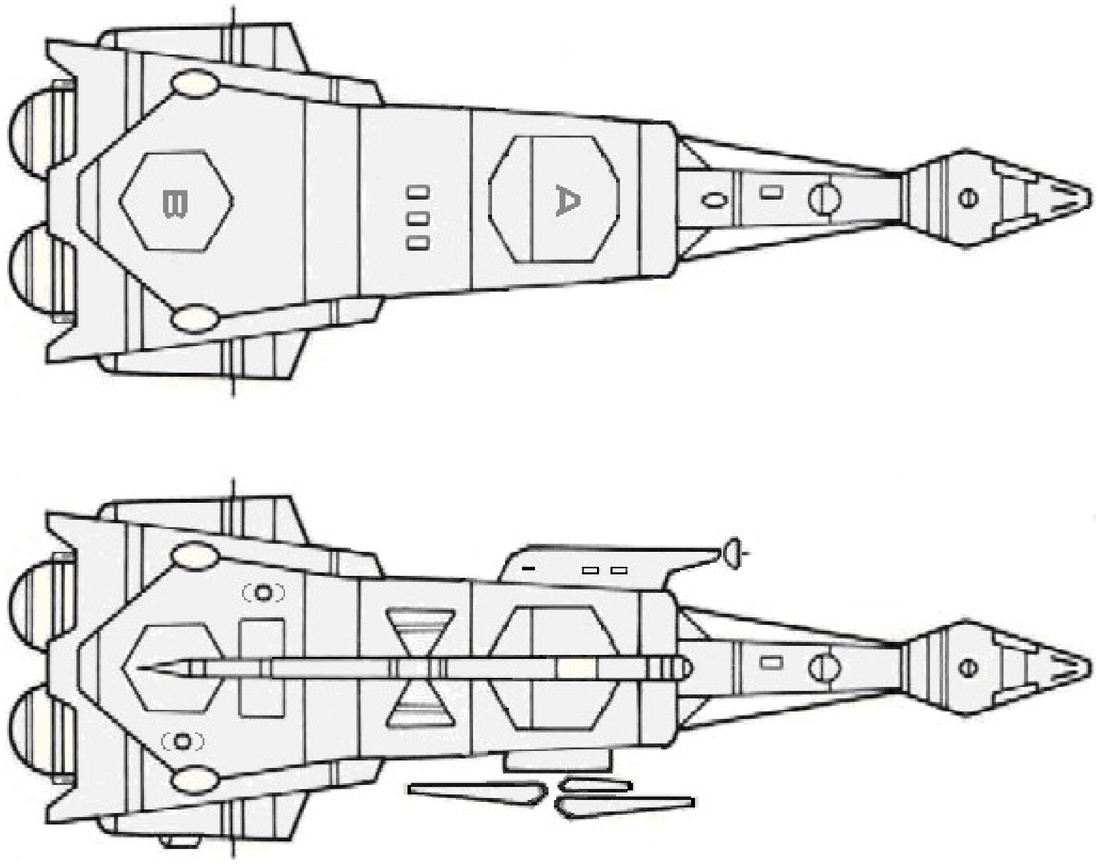
Among the directives of the Convoy Act was a requisition order for two hundred medium freighters for immediate conversion to escort vessels. Preferred types were Rigelian *Noljottu* and *Rekul* general cargo ships, sturdy bottlelike designs with good warp performance and solid handling. Fleet yards would add combat shield generators, scabbed-on targeting sensors and an array of directed energy weapons. Select units would be assigned convoy command duty and be provided with a subspace surveillance antenna.



The Bedford *conversion diverged rather minimally from the original freighter, a design already familiar to Starfleet's Earth branch from the 22nd century when leased examples of the class had been used for early interstellar exploration and exploitation. The command tower hidden from view here would display the most add-ons, including subspace antenna blades and a ball turret for a 130/1.6 laser. The corresponding ventral gondola is a detachable liaison craft, a relic of pre-transporter days. The pennant number here specifies the convoy rather than the individual destroyer escort; the logistics of convoy in the most hectic years of the Klingon conflict had little room for subtlety.*

Within a month, nineteen *Noljottu* freighters had been converted to *Portsmith* escort destroyers, armed with four medium lasers each. Two were under conversion to command ships, with a dorsal antenna boom, lateral sensor and communications antenna clusters, and a cluster of independently pressurized C^3I modules within the main holds. Twenty-three of the somewhat smaller *Rekuls* had become *Bedford* escorts, with just three laser emitters, some extra communications gear, and the capacity for berthing small combat craft.

Crews of slightly less than a hundred would operate these vessels in zones of convoy. Half would be mercantile personnel dedicated to keeping the ships moving, while the other half would consist of Starfleet-trained gunners and a Fleet liaison officer, two fire control officers and two sensor specialists. A command-configured *Portsmith* would in addition feature civilian staff for the Convoy Commodore, plus an additional Fleet officer in charge of communications. Crewing was on volunteer basis, and quickly became a coveted assignment for young officers.



This dorsal double schematic of USS Goochland *(NCC-E321) showcases the alterations that turned a transport hull into a* C^3*I-augmented* Portsmith *escort destroyer. Firepower is provided by four staggered laser turrets on the aft hull. Advance warning of enemy movements comes from the dorsal subspace array rigged on tapering pylons amidships; convoy coordination requires an extensive antenna array with one medium and two low frequency blades to starboard, with a sensor pylon to port. Internal holds are filled with combat shield generators and command facilities. Nevertheless, the transport retains the hexagonal cargo doors now blocked by the surveillance array plus the large-diameter docking port near the bow.*

The *Portsmiths* and *Bedfords* were at first intended to be a stopgap measure as Starfleet prepared a series of dedicated escorts. However, doctrinal planning was soon thrown into chaos: Fleet primary combatants found few targets of classic military nature, and instead became entangled in hunts of small intruding enemy formations. Reliability of local defenses was questionable in light of the Axanari betrayal; reprisal flotillas and planetary counterattack task forces had to be improvised in response to the guile of Klingon surprise attacks at unpredictable targets. There were no resources to waste for developing a dedicated convoy protection type just yet, not until Starfleet could re-establish something resembling lines of battle. Between 2246 and 2250, the converted merchantmen were the primary type of escort for commerce in the ill-defined battle zone.

The nature of the conflict ultimately degenerated to a series of uncoordinated punches and counterpunches, and the convoys found themselves safe from systematic hunting. Random raids by stray Klingon captains hungry for glory were an ever-present threat, though. There was to be no rest for the escorts until the late fifties, well past the expulsion of primary Klingon military forces from Federation space.

Once the deep raiders were evicted from their forward bases, though, Starfleet could again establish a border guard and a tripwire defense, allowing the vectoring in of deadly primary combatants whenever a Klingon adventurer threatened the lines of commerce. The usefulness of the *Portsmiths* and *Bedfords* was at an end practically overnight when Admiral Kkorhetza's forces in May 2250 limped back to their side of the prewar border. Of the 92 and 63 vessels, respectively, 86 and 54 had survived the conflict. Just 24 and 3 survived its end, seeing some limited service on lawless sectors important to Federation commerce. The last *Portsmith* was retired from escort service in 2263, converted back to a Fleet support vessel.

Kiaga / Agilis

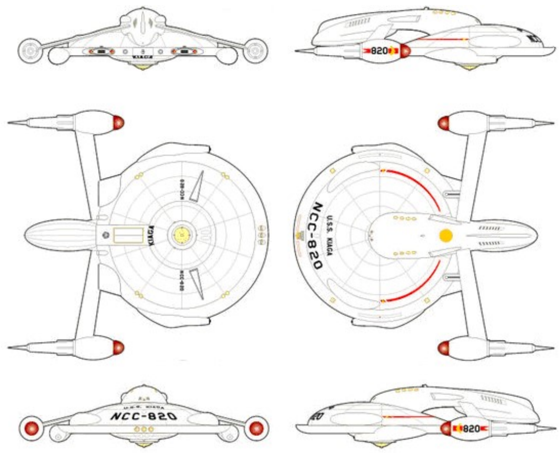
Perimeter action ship
2248-2294

Completed:	189 total: 35 *Kiaga* 154 *Agilis*
Length:	155.5 m (*Kiaga*) 159.8 m (*Agilis*)
Beam:	102.0 m (*Kiaga*) 102.8 m (*Agilis*)
Height:	20.5 m (*Kiaga*) 21.6 m (*Agilis*)
Mass:	207,000 tons (*Kiaga*) 209,500 tons (*Agilis*)
Officers:	7
Crew:	42 (*Kiaga*) 44 (*Agilis*, typical)
Cruise speed:	w 5.0
Max. speed:	w 7.0
Endurance:	1 year
Weapons:	4 phaser V emitters in 2 twin banks on dorsal primary hull 4 phaser V emitters in 2 twin banks on ventral primary hull 2 fwd light torpedo tubes w/40 (*Kiaga*) or 68 (*Agilis*) torps on ventral hull
Shields:	1-layer conformal forcefield Navigational deflector above fwd torpedo tubes
Transporters:	1 GP (4-pad); Mk II (*Kiaga*) 1 GP (2-pad) Mk II (*Agilis*)
Auxiliaries:	None

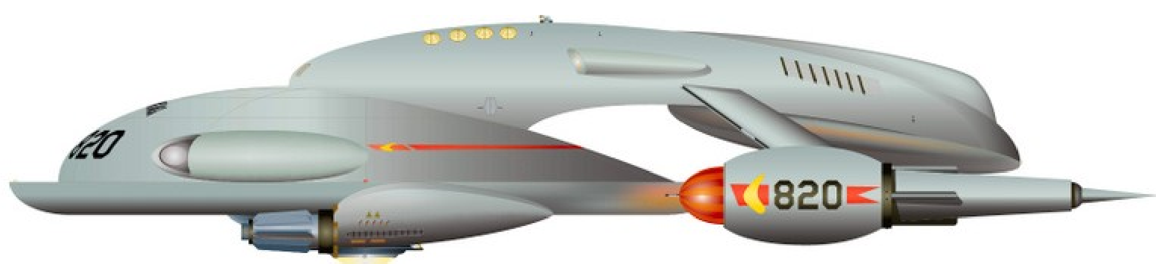
Ships of historical interest:

USS Aerfen (NCC-P858), *USS Kaira* (NCC-P831)

SOURCES:	(D aridas sofia, Voyda N McIntyre "The Entropy Effect", own) (N SotSF) (H SotSF)



The open confrontation between UFP and Klingon forces at Axanar was a relief for Starfleet in many ways. Not only had Federation ships prevailed in the psychologically decisive first clash, but the Federation itself was on a much more secure footing now. The dissolutionary movement lost its staunchest supporters overnight. The now unveiled face of the true enemy frightened the ranks into coherence and cooperation. However, the danger of secession was factually far from over. Some sensitive defensive technology had already fallen in Klingon hands at Axanar; moreover, it had been brought to bear on the Starfleet forces sent to the system. Were worlds closer to the disputed Klingon borders to switch sides, dangerous gaps could be created in Federation defenses – and taking back these worlds would be all the harder if their system defenses changed ownership intact.



Shocked by the Axanari defection, the Councils of the UFP were quick to effect a major change in frontier defense doctrines. Instead of funding the construction of system fortresses and fixed-node sensor nets as had been done at the Romulan border, the Defense Council now required Starfleet to prepare a defense line under direct central command, and independent of local support and control. In practice, this meant gearing up all combat starship construction. Obvious problems of affordability prevented the acquisition of significantly increased numbers of cruisers or frigates, however. Yet how could smaller, shorter-range, lower-endurance ships hope to defend the borderlands?

Starfleet could but try. Technologically, it would be quite possible to pack frigate armament into a ship half the size, by omitting virtually everything else from long range sensors to power coupling backups. Tactically, such a vessel would be purely an attrition unit, incapable of withstanding enemy pounding, but still able to deliver a few decisive punches of her own. Operationally, a combination of tender and courier vessels, carefully positioned forward resupply stations and deep space sensor platforms could keep the patrol combatant supplied with consumables and tactical data, without a need for planetary support. Strategically, a fleet of 200-300 such 'perimeter action vessels' might be sufficient for securing the Eridani Gap, in the sense of being able to provide early warning and some delaying action in case of an invasion.

The questions faced by Starfleet in 2246 were predominantly economic, however. Choices of engine type, propulsive performance requirements, torpedo magazine size, crew complement, or computing power were all matters of balance: the bottom line would be counted not in crews or ships lost or individual battles won, but in raw credits. Starfleet could not afford to field a partially complete defense of capable ships, to be expanded when budgets allowed, but had to introduce a complete defensive chain of fixed scope at one stroke. It took until November 2248 for the die to be cast. Out of four prototypes offered, the newly appointed Chief of Planetary Defenses Dahia al-Latif picked the Nylstroom Astris Schiffwerke proposal, PAX '48. Production immediately began under the class name *Kiaga*.

USS Kiaga (originally NX-820, eventually NCC-P820) took very literally the concept of being half a frigate. A five-deck saucer 66 meters across mounted two single torpedo launchers of the type used in pairs in the *Loknar* frigates, carried a single supercharged antimatter powerplant in a central longitudal boom and was propelled by two 80,000 ton PB-38 engines in nacelles roughly half the length of the PB-31 capital ship units. Phaser firepower was closer to full *Loknar Mk II* standard, featuring six Type V emitters, and setting the *Kiaga* apart from the somewhat similar *Procyon* corvette. Total mass was slightly higher than that of the corvettes, mainly thanks to the different powerplant and heavier armament.

The nacelles were mounted close to ship centerplane, on slender pylons slanting down slightly from the dorsal engineering boom, thus creating a minimal frontal profile. Just as with the *Chasseur*, a wide separation resulted in significant warp maneuverability. To meet the high endurance requirements of the type, the PB-38 nacelle ramscoops were boosted by scooping coils on the sides of the engineering boom. The coils fed directly to primary stage plasma intake, just aft of the warp core, and were quite welcome in compensating for the disproportionately high fuel expenditure during the brief warp dashes that characterized perimeter ship operations. Farther astern on the boom was a single MHD tap to primary plasma, then the massive bulge of the shield generator.

Second-stage conduits doubled back along the upper surface of the boom, feeding primary hull systems. The main navigational deflector, intended to protect the ship on warp dashes, was housed in two bulges on dorsal hull forward quarters. For cruising, it was augmented by a triple-emitter, low signature auxiliary array at the bow. Passive sensors were spread out on hull surfaces, most active scanners clustered in a dome at hull lower vertex. A twin phaser bank on ventral bow was paired with a single emitter on the dorsal side; two further units fired aft from between the twin impulse assemblies on the primary hull trailing edge, and a single emitter was placed atop the engineering boom. Torpedo systems were mounted in lateral pods whose looks could be described as utilitarian or downright menacing. The magazines for twenty rounds each were housed inboard, however.

Amidst the high energy conduitry were squeezed 49 crew and their supplies and support systems for a one-year patrol sortie. The accommodation standards would have appalled a 22nd century observer, yet modern amenities eased the situation somewhat. Still, isolation was the keyword for perimeter ship crews. Communications silence was strictly maintained, as stealth was the only way these ships of limited propulsive power could hope to be within intercept range of Klingon units if and when they made a threatening move. Yet when the time came, the ships would have to be capable of coordinated aggression in decisive numbers.

These conflicting tactical imperatives could only be resolved by honing the group combat skills of a PA squadron to perfection and beyond. The clichéd comparison to a wolfpack would be a poor one in this case, as the intent of the squadron was not to wear down the enemy in vicious pursuit. Rather, the formation would stalk its prey with the patience of a lion pride: the individual vessels quietly seeking best possible pouncing positions, getting their cues from external sources via datalink, and only switching on their targeting scanners when moving in for a kill.

The first 35 *Kiagas* (NCC-820-854) were swiftly produced on a large number of dockyards, to a wide variety of standards resulting from the differing resources and methods of the yards. Concurrently, the sensor and control stations for the perimeter action system were erected on the Eridani Gap area and integrated to the existing sensor networks. Targeting data began to pour out in March, 2249, deliberately aimed to alert the Klingons to the existence of the new defense chain. Codes were allowed to leak across the border, and 'orders' were given to dozens, later hundreds, of nonexisting perimeter ships. The technique was successful especially because the distributed perimeter ship production was difficult to monitor by traditional Imperial Intelligence methods, and thus the nonexistence of a given ship was more difficult to prove.

The second (NCC-855-874), third (NCC-P875-P928 in a new scheme that was retroactively applied on the earlier registries as well) and fourth (NCC-P928-P1008) perimeter ship batches were all built to a common improved standard, featuring a stealthier primary hull and a more powerful D-2A onboard computer. Transporters were reduced in size and capacity, primarily to allow more torpedoes to be carried. Some of the second-stage plasma leads were redrawn after an explosion aboard *USS Kaira* (NCC-P831) killed two and shut down all power for nineteen harrowing hours until help could arrive. Numerous third batch vessels were equipped with sigint systems, and also took the calculated risk of carrying a two-way datalink as onboard processing power was lacking. The subclass name *Agilis* is often collectively used for these later production batches.

Total *Kiaga* production reached 189 vessels by 2257. By that time, relations with the Klingons had been through several ups and downs, but the general atmosphere was one of frustrated restraint. The concept of perimeter ships had never been properly put to test, as Klingon raids after Axanar had been uncoordinated and strategically aimless. It was not tactically sensible to expose the PA pack to deter a lone privateer or to block the return of a raiding party to Empire space. Ships built for attrition ended up suffering zero losses in the campaign. In retrospect, Starfleet might have attained the same deterrence value by simply broadcasting 'targeting data' to a wholly nonexistent perimeter fleet!

The scarlet war paint of USS Aerfen *(NCC-P858) is not to be found in any Starfleet field manuals or regulations, yet formality mattered little in the perimeter fleet. Significant leeway, not only with regard to hull art but to procedures and tactics as well, was typically granted to the PA commanders. Of these, Capt. Hunter of the* Aerfen *was among the most legendary, although a PA commander without a legend to his or her name would be difficult to find.*

Operations against lesser adversaries gave the *Kiagas* a chance to gain combat merit, yet also brought forward problems inherent in their unique nature and narrow mission profile. By the end of the 2260s, most perimeter ships had been withdrawn to their support bases. Organian peace was not the only factor in the idling of the fleet – on the other side of the coin, expansion of Klingon forces and Klingon space had rendered the fleet of less than 200 units strategically impotent. The new bottom line for perimeter ships was written in red ink: further procurement of PA units was economically unviable.

Idling of the perimeter fleet was as much a relief to Starfleet as the Axanar showdown had been. Once again, the strategic situation was simplified and clarified. Sensor chains now extended across the Klingon borders, and modern starships had the speed and firepower to react flexibly to Klingon intrusions. The lack of fixed defensive installations or their perimeter ship mobile counterparts was no longer considered a shortcoming, as doctrines moved more and more towards fully mobile defenses.

The next two decades would again alter Starfleet's perceptions. From the viewpoint of the 2280s, the inability to support a perimeter fleet had been dismissed too lightly. Would the Xindi have been able to strike their claws so deep into the soft coreward flank of the UFP if there had been perimeter defenses in place? Could not their aggressions have been contained the same way the PA ships had done to the Tholian ones in the late fifties? Was the price truly not worth paying, when the red ink was made of humanoid blood?

Once the false lull of Organia was over, *Kiaga* and *Agilis* ships were pressed back to service. Technologically obsolete, they would be at greater risk than ever. Yet combined with over a hundred new PA ships, they could once again mount an effective tripwire defense, alerting the main fleets to Klingon incursions and slowing them down as much as possible.

In the end, the incursions never came. The Khitomer peace had the same effect as the Organian one, as far as border fleets were concerned: standing down from alert status meant withdrawing the PA ships to bases. This time, however, there would be no return to active service. The ships had been built for a single purpose only, and that purpose no longer existed in the new political situation. Lacking the relative versatility and multipurpose abilities of corvettes, or the high performance of the newer perimeter ships, the last *Kiagas* were scrapped in 2302, after two initiatives to refurbish them for service at the Romulan border were blocked.

Mustang

Corvette
2252-2279

Completed:	70
Length:	88.6 m
Beam:	47.5 m
Height:	13.4 m
Mass:	77,000 tons
Officers:	6
Crew:	27 + up to 20 Marine boarding crew
Max. speed:	w 5.7
Endurance:	10 months
Weapons:	1 phaser V emitter on dorsal bow 1 phaser V emitter on ventral bow 2 phaser IV emitters on ventral stern

Shields:	1-layer graviton/subspace globular forcefield 4 navigational deflector dishes on bow
Transporters:	None
Auxiliaries:	1 atmospheric shuttlepod, 1 work pod

Ships of historical interest:

USS Madahan (NCC-L803)

SOURCES:	D TNG (N SFB) (H own)

The unqualified success of the *Procyon* corvette was somewhat curtailed by the high acquisition costs of the type. At nearly six times the total mass of a *Battleaxe*, the heavy corvette also embarked three times the firepower and twice the crew complement, not to mention her ability to take aboard (if not sustainably operate) auxiliary craft. When the undeniable tactical, strategic and even financial advantages of the *Procyon* concept began to manifest in the late forties, Starfleet began to ponder if it were not possible to barter at least some of these superb attributes for lower price.

Vital to the expanded mission profile of the heavy corvettes was the high speed warp drive system. The Starfleet request for proposals in 2249 thus specified a maximum sustainable speed in excess of warp five. This implicitly ruled out gradual upgrading of the *Battleaxes*, since only radically new hull solutions would allow the required outsize engines to be fitted on a vessel of compact overall dimensions. Indeed, when the respective prototypes of VXT Interstellar of Voltara and Starfire of Deneva were presented for Starfleet scrutiny in February 2251, their hulls were scarcely larger than the engine nacelles that flanked them, and were of extreme structural robustness and outward simplicity.

The VXT 'CCV-50' proposal dedicated relatively little of the interior to warp power generation, and placed more drive components in the nacelles than the competing Starfire 'ADSC' did. The subsequently superior warp performance of the Starfire vessel ultimately swayed Starfleet, even though the roomier Voltaran design was considered more practical from a systems integration standpoint. In September 2251, a go-ahead was given to develop the Starfire prototype into the *Mustang* class compact deep space corvette.

The characteristic 'trimaran' structure of the *Mustang* consisted of two 52.8 m, 35,000 ton nacelles of smooth cylindrar shape, plus a 88.6 m vertically flattened cylinder serving as the main hull. The nacelles (dubbed PB-37 in Starfleet service) housed nine solid state warp coils apiece; ramscoops and m/am reaction chambers and antimatter tanks for plasma reheaters at bow; and a powerful stern-mounted RCS system. Drive plasma was fed via broad, high-mounted horizontal pylons from a centrally mounted fusion reactor, from which power also flowed to twin impulse assemblies cowled on both sides of the stern.

With the essential propulsive systems in place, it was time for Starfleet to step in and offer input on the equipment to be carried. An armored command module was placed atop the main hull, just forward of the pylon juncture. It was largely assembled from *Procyon* hardware, and featured a five-person navigation bridge, essential communications systems and a recorder marker dispenser. Of the four decks within the hull, the topmost was dedicated to combat and propulsion subsystems. The upper main phaser of the heavy Type V was located at upper bow, flanked by the QIK-11 long range sensors. Main fuel tanks were followed by the plasma distribution system beneath the bridge, then by paired radiator and plasma purge assemblies.

Crew amenities took up much of the lower bow, sharing the space with navigational deflectors and short range sensors yet offering significantly more room than the *Battleaxe* design nevertheless. Amidships, engineering functions dominated the interiors of Decks 3 and 4. Housed in the tapering stern was the second ‘heavy corvette’ feature deemed worth preserving: a hangarette with a rolling ceiling door could support one shuttlepod plus one work pod, or temporarily accommodate a pair of light shuttlecraft. The impulse cowlings straddled the lower level of the hangarette port and starboard.

A compartment directly below the hangarette, on Deck 5, was reserved for a minelaying system. Flanking this were two light phasers, providing cover fire for troops disembarking via one of the three planetfall exits, one astern and two to the sides. The second main phaser was located at lower bow, directly below its dorsal counterpart. Six landing legs helped support the considerable mass of the vessel under up to 1.2 gravities, provided that the helm officer managed to find sufficiently solid ground.

In April 2253, Starfleet representatives could sit back and enjoy a demonstration of the first three production *Mustangs* in carefully staged action. High speed intercepts, boardings and strafing runs proved select aspects of *Mustang* prowess, but belied the limited impulse maneuverability resulting from the weight of the warp engines. Crew size and overall dimensions and mass were the three factors kept as low as originally planned; costs threatened to spiral out of control nevertheless, resulting in the omission of several pieces of mission gear. No minelaying tube was installed, for example. Phaser fire control systems were also of a less capable type than originally planned, and sufficient shielding proved difficult to achieve within the mass limitations.

Overall, the *Mustang* class proved a mixed success. Two batches of 35 vessels each were finished in 2253-58, and augmented the *Battleaxe* force in both law enforcement and local defense through the fifties and sixties. Due to the inherent shortcomings, the vessels did not quite distinguish themselves – especially since there was very little enemy action in their designated patrol areas, falling between the core worlds and the *Procyon* outer prowling grounds, during that period. The pirate hunts of the late sixties were the true heyday of the class, but even there its role was largely a passive one. While the *Mustangs* stood guard at key port systems, the excitement of combat was left to heavier types, and the intelligence gathering groundwork to significantly lighter ones.

Built around and sized for the highly specialized PB-37 system, the *Mustangs* were far from the ideal choice for an engine refit in the early 2270s when Starfleet began looking for a modern light corvette type. In the end, the search proved futile, and the *Mustangs* were retired, their doctrinal niche finally superseded by the heavy corvette one. The last *Mustang*, *USS Madahan* (NCC-L803), was paid off in late 2279.

Somewhat morbidly, the *Mustang* class has achieved most of its good reputation a century after being stricken from Fleet strength. Built with robust conservatism, unlike some more fine-tuned and high-strung light combatants, the spaceframe can cater for radical interior and system modifications and shifts in mission profile. Deactivated vessels have been assigned a great variety of post-combatant roles, such as testbeds, target drones or probes. Perhaps the most famous of these roles came with the 2367 Borg incursion of Earth, where fifteen *Mustangs* retired from Earth Defense Forces and converted to defense drones were flown laden with antimatter against the Borg Cube, in a last-ditch attempt that did not even fail spectacularly. The drones, attacking in formations of three, were simply vaporized by the Cube.

A row of 'Colt' drones at the Sinai Planum defense station. Modified by removal of the bridge, ramscoops and life support systems and installation of 26 antimatter charge chambers within the forward hull in 2308 already, the drones had to await action for six decades. In fact, Starfleet had never seriously expected to put these weapons to use, as the originally projected targets, large spaceborne lifeforms, were less prevalent than initially estimated. Against maneuverable or defensively armed opponents, the drones turned out to be less than practical weapons.

Remora

Escort
2257-74

Completed:	78
Length:	144.8 m
Beam:	101.9 m
Height:	41.7 m
Mass:	138,200 tons
Officers:	7
Crew:	56
Cruise speed:	w 5
Max. speed:	w 6.0 (first and second batches) w 7.0 (third batch)
Endurance:	1 year
Weapons:	4 phaser IV emitters in 2 twin banks on dorsal primary hull, port/stbd of bridge 4 phaser IV emitters in 2 twin banks on ventral primary hull, port/stbd of sensor dome
Shields:	1-layer conformal forcefield Extensible globular forcefield Navigational deflector on fwd secondary hull
Transporters:	2 GP (2-pad); Mk III All ships brought to Mk IV standard after 2268

Ships of historical interest:

USS Remora (NCC-E800)

SOURCES:	(D FASA, dimensions altered) (N FASA) (H FASA, own)

Starfleet's two corvette designs for the 2250s totaled some 110 hulls, or 150 when counting the scout and courier versions of *Procyon*. In a Federation now controlling thousands of planets and hundreds of star systems, it was obvious that these light units would seldom be available for duty outside their assigned insystem or nearsystem patrol volumes. Also limiting such assignments was the fact that neither PB-34 nor PB-37 could be considered a viable deep space propulsion system.

In this respect, post-Axanar threat scenarios were troublesome indeed. After the Klingon offensives of 2246-50 subsided to aimless raiding, it was harder and harder to efficiently use conventional battlefleets for defense. What was needed were low-cost, light units that had no obligations beside local protection. Some of these – the corvettes – would guard star systems and other fixed 'point targets', fighting a delaying action until higher-performance, higher-cost units could arrive. This placed very modest requirements on propulsion. Others – the perimeter ships – would do the same across the vastness of border space. Their engines had to provide significantly greater dash speed. But spacelanes were too vast targets to be secured by either ship type or doctrine; instead, protective forces would have to concentrate on covering the actual shipping that plowed the lanes. This placed a most stringent requirement on propulsive systems. Constant deep space cruising at convoy speed would have to be presented, yet at low enough acquisition cost to allow sufficiently many of the escorts to be built, and at low enough maintenance cost for them to be operated.

Staff Requirement 137/2255/1C was exacting in its specifications. Only one warp engine could match the criteria: Cochrane Warp Dynamics' PB-35 was explicitly decreed as the propulsive system of the hundred and twenty escort vessels to be constructed between 2257 and 2264. *USS Remora* (NCC-E800 in the mission-specific registry scheme) was completed by Eckard Collins Fleetworks Ltd in early November, 2257, to meet the specifications to the letter. A saucer markedly larger than the *Procyon* or *Kiaga* hulls, some 85 meters in diameter, was introduced for crew accommodation and weapon and sensor mounting. Propulsive systems in turn resided in a 90 degree cutout astern: two FIB impulse engines flush to the sides, and a beavertail secondary hull some 55 m long and 10 m deep in between, mounting the multilinear Fairey RMR-720 warp core horizontally on the upper level, the single PB-35E nacelle dorsally, and the Hobbs navigational deflector dish ventrally.

Combat resilience of the escort hinged on her F-type shield generators, outriggered laterally in finlike extensions that allowed the ship to erect a protective shield bubble around her closest protégés in addition to shrouding herself in a conformal field. The fins also mounted radiator surfaces and plasma expanders; these gave surge reserves to the power systems, for the famous minute of sheer terror among the months of uneventful waiting and cruising. At the first sign of threat, shields would be brought to full power and four twin banks of Type IV phasers would be preheated – yet not fully charged until absolutely necessary. At anything higher than the nominal cruise speed of warp five, the *Remora* was a notorious underachiever, dangerously starved of power. This was only to be expected, for a ship this small inevitably had to make compromises when emulating the various functions of proper starships. Like a PA ship, the escort would quite deliberately sacrifice herself when committing to battle, giving time for the convoy to scatter and the combat fleet to respond.

Starfleet small ship construction facilities at the time were largely occupied with the PA ship program, which stretched the *Remora* construction schedule somewhat. Nevertheless, in addition to the prototype and three preproduction vessels, two batches of 37 escorts had reached completion by 2265, when production was halted due to changes in the operational environment. The great hunt for Orion slavers had cut down piracy overall so much that an escort force half the originally intended size would be able to deal with the remainder, both Klingon and otherwise.

Unlike the perimeter force, the escort fleet had by then faced plenty of actual combat. Also, unlike the corvette case, engagements had mainly involved Klingon opponents. Prior to the Organian peace, a dozen vessels were lost with all hands, lending credibility to the belief that Klingons took no prisoners. Typically, the killers had been battle cruiser flotillas, but lesser enemy units had also taken their toll on the shipping and its protectors. Assignments aboard the escorts were the exact opposite of perimeter fleet positions: hated for their mind-numbing boredom, feared for the deathtrap nature of the ships, devoid of the 'sniper thrill' of the attack-oriented PA force, and undervalued even by the mercantile crews the escorts were trying to protect. Only minor job satisfaction could be derived from the higher accommodation standards the *Remoras* enjoyed over the austere *Kiagas* or even the *Procyon* or *Centaurus* ships.

Two Karoo *merchantmen huddle inside the shield bubble of* USS Marlin *as Elasi pirates try their luck. In this 2263 engagement, fortune was on the side of Starfleet. Careful alternating of phaser volleys, moments of shielding and bold sallies disabled three Elasi marauders and drove off the remaining two, saving the dolamite, fabricator and narcotics convoy from pillaging. Such tactics had less success against Klingon forces, for whom capturing of loot was a secondary concern.*

The Organian lull resulted in thorough reorganization of commerce protection, among other things. Perimeter ships and escorts, the controversial 'sacrifical lambs' of Starfleet, were withdrawn as economically and ethically unviable, and capital ships freed by the truce were deployed in their stead. Frigates of multiple types drove pirates either out of business altogether or into the clutches of the semi-civilized Orion syndicate. Light cruisers cut to pieces those who did not conform. With sighs of relief, the escort crews moved on to other assignments.

The *Remora* vessels themselves, idled as they were, were not significantly affected by a 2267 culling that left just the most spaceworthy two dozen vessels in active reserves. Starfleet had vague plans of rearming and re-engining, but mainly went ahead with the mothballing because the associated costs were minimal. *USS Remora* herself was singled out for testing the LN-61 light linear engine, and entered a box dock at Titan in August 2267, to emerge for first trials in January 2268 already. The results of this experiment and its unexpected offshoot are described in detail in a subsequent entry. The story of the original type ends in 2274, with honorable discharging and swift scrapping of the entire remaining force.

Hellespont

Escort
2260-2277

Completed:	60
Length:	126.9 m
Beam:	66.4 m
Height:	39.6 m
Mass:	325,400 tons

Officers:	12
Crew:	55
Cruise speed:	w 6
Max. speed:	w 8.0
Endurance:	1 year
Weapons:	4 phaser IV emitters in 2 twin banks on dorsal primary hull fwd port/stbd quarters 4 phaser IV emitters in 2 twin banks on ventral primary hull fwd port/stbd quarters 1 light fwd torpedo tube w/ 17 torps on ventral primary hull
Shields:	1-layer conformal forcefield Navigational deflector on ventral primary hull
Transporters:	2 GP (2-pad); Mk III

Ships of historical interest:

USS Bretha (NCC-E885/NCC-3425), *USS Crimea* (NCC-E882/NCC-3402), *USS Matterhorn* (NCC-E897/NCC-3457)

SOURCES:	(D SFB, dimensions altered; idea borrowed from Neale Davidson) (N LUG) (H LUG, own)

The low-cost *Remora* class was rather obviously but a partial answer to the commerce protection equation. Many commercial routes would extend beyond the range of the simplistic vessels; many shipments could only be subjected to convoy if allowed to proceed at the modern high cruise speed of warp six. From the beginning, therefore, it was hoped that a multi-engined counterpart to *Remora* could be fielded simultaneously with the single-engine type.

Initial simulations on a twin-engined *Remora* hull indicated difficulties with maintaining the required cruise speed; indeed, PB-35 had never achieved sustainable speeds in excess of warp five. Yet installing a PB-45 would certainly result in unacceptable unit costs. It was because of this that Starfleet decided to go for the rarely utilized three-nacelle configuration. Some of the computations for the field shapes were ready, thanks to work done on the *Federation* class. But an escort was no dreadnought, and PB-35 was no PB-47 in terms of flexibility and asymmetry control. Vulcan duonetics specialists had to spend two years calculating a customized field configuration before the *Hellespont* medium range, high speed escort could be put into production.

From there on, the mathematics became much simpler. The three-engined escort could be built in roughly one-third the *Remora* numbers; thirty hulls were allocated production slots on the yards currently churning out the lighter escorts, and ninety additional PB-35Es ordered. Crew size would be kept more or less unchanged, although a higher number of engineers now held officer rank. Internal volume for accommodating the personnel also remained stable. While the *Hellespont* primary hull was just 66 m across, it featured pronounced dorsal and ventral structures, the latter of which now also housed a single-tube Mk 13 light torpedo launcher. Long range tracking and early warning was markedly boosted by the adoption of a ventral sensor dish, outriggered in the fashion of larger destroyers. For combat at shorter ranges, four twin Type IV phaser emitters were again carried, although now mounted closer to bow for better clearance of the warp engines.

Engineering systems consisted of a structural frame of T cross section, with nacelles at each end, and a vertical setup of three parallel containment tubes. The lower forward parts of the vertical section provided main tankage. Hands-on access and dilithium focus were at saucer level, in a slightly broadened midpart of the vertical section. Plasma expanders, surge and antimatter tanks and main batteries in turn filled the broad horizontal part of the T hull. Crawling in the access tubes was unenviable work: even in standard cruising mode, there were stability problems with the three-engine setup, and the slightest maneuvering called for constant presence of monitoring personnel.

Indeed, whatever complaints a *Remora* crew had, the heroes who kept the *Hellesponts* working could file in triplicate. In the hectic half a decade before Organian peace, some six hundred *Hellespont* escort sorties were recorded, typically featuring just one escort vessel per convoy. There would seldom be time or facilities for proper maintenance either en route or at turnpoint, and uninterrupted eight-month missions were not unheard of. Nominal endurance was set at twelve months, in practice requiring a second crew that would be berthed on the convoy transports for the first half of the voyage.

Often dependent on her mercantile chattel for her supply of fuel and consumables, a Hellespont *escort rarely received support from Fleet tender vessels. Deep space replenishment from a* Justice *class transport is nevertheless underway here; newest-issue hand weapons were distributed to all local defense units in 2270, via clandestine shipments that often took the recipients by surprise as well.*

Unlike the *Remora*, the heavier *Hellespont* did not carry extensible shields, but relied on her torpedo firepower for keeping the enemy at an arm's length. Dangerous weaknesses in aft shielding, endemic of three-nacelle configurations, combined with near-complete obscuring of stern firing arcs to give the type a lethal vulnerability to attacks from astern. Six of the original thirty vessels and two of the similarly sized successor batch of 2267-68 were lost to relatively lightly armed raiders this way before general recall orders were sent in 2273. The last of these was *USS Crimea* (originally NCC-E882, later NCC-3402), mauled in a 2271 attack that claimed the lives of her bridge crew.

There remained little sense in subjecting the surviving vessels to the rigors of deep space again. Refitting of *Remora* units with linear-excitation warp engines was producing a new breed of escorts that would propulsively outperform all commercial transport types in service. The multi-engine configuration thus no longer provided any added value. When the last *Hellespont*, *USS Bretha* (ex-NCC-E885, now NCC-3425), powered down for good at New Judaea after her notorious misadventure into Gorn space in 2277, a plethora of modern frigate and heavy corvette designs already illustrated a new strategic reality. Economics no longer dictated the fielding of woefully underpowered and undergunned commerce protectors against overwhelming odds.

It may interest the escort enthusiast that no less than four examples of the *Hellespont* class survive in spaceworthy condition. Their post-Starfleet employment by private security enterprises involved many internal changes and some external redecorating, but essentially they still exude the historical spirit of convoy service. This is especially true of the former *USS Matterhorn*, shepherd of the first post-Khitomer Federation merchant convoy into Klingon space.

Graynet

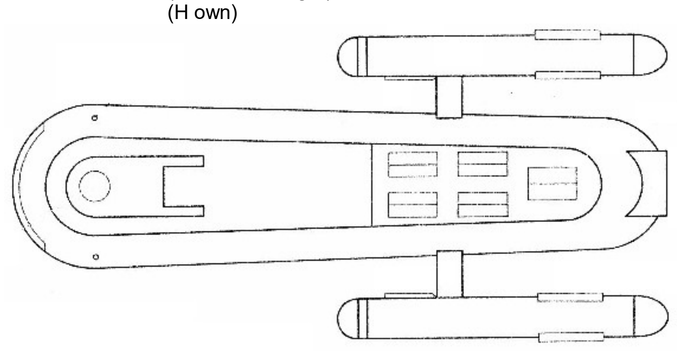
Support corvette
2261-2284

Completed:	18
Length:	117.3 m
Beam:	52.8 m
Height:	14.6 m
Mass:	50,000 tons
Officers:	8
Crew:	32 + up to 32 Marine boarding crew
Cruise speed:	w 5
Max. speed:	w 7
Endurance:	10 months
Weapons:	2 phaser IV emitters on dorsal bow, port/stbd of bridge 1 phaser IV emitter on ventral stern 1 light fwd torpedo tube w/20 torps on ventral bow (select ships)
Shields:	1-layer graviton/subspace globular forcefield 4 navigational deflector dishes on bow
Transporters:	2 GP (6-pad)
Auxiliaries:	5 boarding shuttles

Ships of historical interest:

USS Graynet (NCC-5010)

SOURCES:	(D Daniel Biringer) (N Daniel Biringer) (H own)



VXT Interstellar's failure at the 2252 corvette competition prompted the company to search for a more capable warp engine to go with the original design. In order to grab a share of the lucrative escort market, VXT would have to match PB-35E in performance, yet the 90,000 ton coil mass of that engine was prohibitive for the application. On the other hand, traffic control and planetary defense duties would be hampered by even the 70,000 ton combined mass of the two PB-37 engines that had originally cost VXT the corvette sale. The company kept looking for lighter and cheaper alternatives, but had to mind the requirement for warp 5 cruise speed that would enable the escort sales.

Yet technology was advancing rapidly in the aftermath of the Great Awakening, branching off to an increasing number of user groups. In the end, it was Federation Customs Service that approached the company with a requirement for traffic control vessels – and an engine to propel them with. While this order for *Masterson* class police cutters ultimately went elsewhere, negotiations on the use of the PB-40 engine culminated in the introduction of the *Graynet* class, a heavy cutter that was everything VXT had hoped for.

The first heavy cutter was launched within six months of signing, thanks to the compact and modular plug-in nature of the propulsion system. The two warp engines dangling on short, straight pylons on both sides of the legacy spaceframe were not exactly of PB-40 type, but of the PB-40B variant lengthened by one-third, all of it effective coil mass. Performance was hiked up to warp 7 flank speed, while cruise remained at the desired warp 5. The lightweight hull could barely take the stresses of sustained cruise, and would probably have torn apart at warp 7 maneuvers. This concerned the designers relatively little, as FCS was ready to settle for far lower performance figures, and Defense Command in turn was in desperate enough a jam to buy almost anything with warp 5 written in the specs.

The systems aboard the *Graynet* catered for both customers. Atop the bow, the bridge superstructure was configured for 10 command crew, but also had an adjoining telescoping airlock and docking berth for ease of boarding action. The next, full-length deck featured five holds accessible through dorsal doors, each theoretically capable of housing a light assault or boarding craft, even though there were no maintenance or refueling facilities available. Forward of these lay a holding compartment with five separate detention cells to starboard, an armory and supply room to port, and an extensive forensics laboratory to the bows. A rather superfluous turboshaft system ran at the centerline, connecting the various decks.

Deck 3 was of full width as well as length, and housed the officers in eight luxuriously sized cabins. Ahead of the ship's main armament of two phaser IV banks, the bow was dedicated to a mess hall for the entire crew. At centerline was the main computer, with a six-pad transporter platform at the forward and a three-bed sickbay at the aft end. Aft, beneath the holds, was a staging area for Marines, put to storage or recreation use when assault missions were not on the schedule; the rest of the stern was dedicated to machinery.

Deck 4 accommodated the Marines as well as the crew, in up to 20 cabins with three to six bunks each. The layout of the cabins was flexible, though, and as few as six could be shipped if there was a need to use the remaining space for carrying of cargo, or for other purposes. At the center, two 10-pad assault transporters remained the one immutable element in the layout. Astern lay Main Engineering, terminating in a four-nozzle Scarbak KKS impulse engine, while at the other end of the ship, a broad TaT 'Danel' deflector emitter curved around the bow.

Deck 5 housed tankage and support services, but VXT had made sure to leave room for a lightweight torpedo launcher as well. Although few of the ships ever came to carry this weapon, its installation in place of the bow disposal chute would have been a matter of mere days. A third phaser IV emitter was always carried at the aft end of the lowest deck, and an all-important tractor beam was located near the bow.

The flexibility of the design was a welcome change from the affordable austerity of the *Mustang*. The two types ended serving side by side on some Starfleet assignments, but generally the eighteen *Graynets* completed for Starfleet needs were dedicated to sedate escort runs while the *Mustangs* guarded star systems. The division of labor was natural for several reasons, perhaps leading among them that despite the limited mass and streamlined body, the *Graynet* did not behave well within atmospheres. The Marine platoon was rarely shipped; the vessels instead often carried vital spares and supplies for the convoys they escorted, earning a 'support corvette' designation. This was also fitting for their role when acting in concert with *Mustang* vessels. The larger but more lightly armed *Graynets* provided many types of assistance, ranging from transrep of spares and consumables to reception of casualties or prisoners.

A mutually complementing working relationship with the *Mustangs* continued till the late 2270s, but ultimately the *Graynets*, too, had to give way to heavy corvettes. There was never a good opportunity to test the *Graynet* planetary assault or boarding capabilities against a powerful military opponent, although many a boarding action successfully enforced Federation law during the 2260s and 2270s.

A Starfleet Graynet *impounds a yacht suspected of spying for the Klingons. Between the escort, traffic control and convoy support assignments, Starfleet never could decide whether to go for an E or L prefix, and ultimately opted for neither; the corvettes got 'straight' registries in the NCC-5010-5027 range, reflecting their support commitments by following the registries of the* Tavares *class corvette tenders.*

Lenthal

Escort
2264-2295

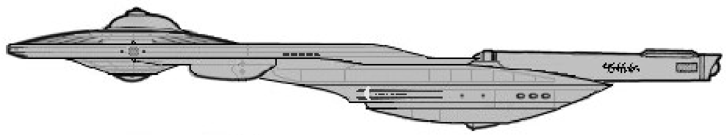
Completed:	31 total: 20 Mk II escort leaders built in 2264 11 Mk V escort leaders built in 2269
Length:	260.0 m
Beam:	110.4 m
Height:	39.9 m
Mass:	313,700 tons (Mk II) 285,300 tons (Mk V)
Cruise speed:	w 5 (PB-35) w 6 (LN-61)
Max.speed:	w 7.0 (PB-35) w 9.0 (LN-61)
Endurance:	3 years
Officers:	28
Crew:	132 (Mk II) 137 (Mk V)

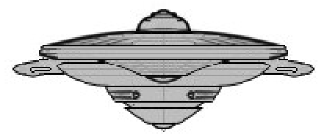
Weapons:	6 phaser V emitters in 2 triple banks on primary hull lateral fairings
Shields:	1-layer forcefields Navigational deflector on secondary hull bow Secondary navigational deflectors on primary hull lateral fairings
Laboratories:	None
Transporters:	4 GP (4-pad), 2 emergency evacuation (22-pad), 1 cargo; Mk III
Auxiliaries:	2 light shuttles (Mk V)

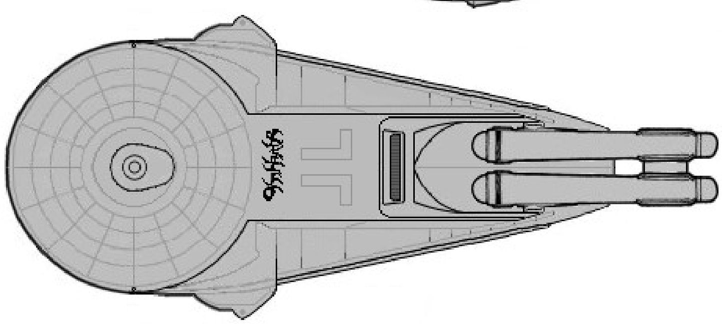
Ships of historical interest:

USS Lenthal (NCC-)

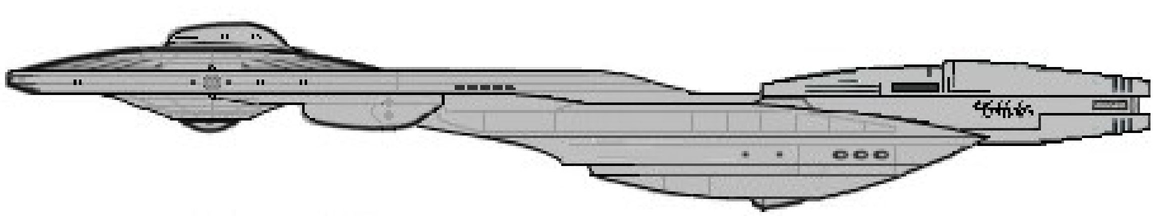
SOURCES:	(D FASA, dimensions corrected) (N FASA) (H FASA)







In parallel with the *Thufir* program, the ASDF in the 2260s introduced a lighter and more affordable local destroyer type of a very similar design, merging a saucer with an otherwise traditional Andorian layout. The dimensions chosen were still formidable, and in essence only two factors supported the light destroyer designation over, say, the light cruiser one. One was the choice once again to leave ashore all hardware, software and personnel distracting from the classic destroyer mission; the other was the omission of torpedo launchers from the lateral weapons wings. Trademark heavy shielding in cowlings of the secondary hull (this time encircling it laterally rather than drooping down), combined with the tucked-in warp engines, made the destroyer a fearsome opponent in head-on attacks nevertheless, and guaranteed at least native interest in the design.

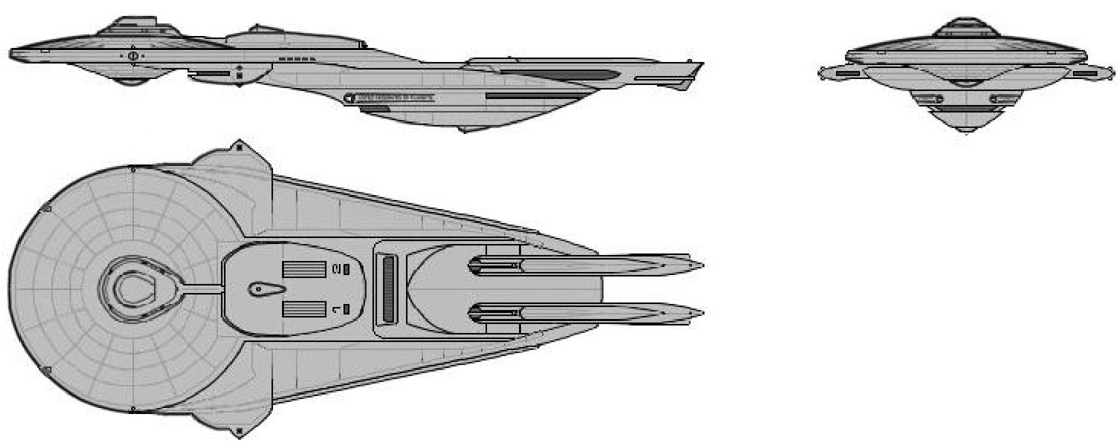


The Mk I version of the destroyer, with DLL-H engines, served with relative indistinction in the ASDF for a decade, then bowed out in favor of its Starfleet-compatible variants.

In contrast with the *Thufir* project that had courted general Starfleet interest with common hardware, Salazaar opened with an all-indigenous Mk I sporting a pair of DLL-H warp engines, half the size of their Kh-type or PB-31 counterparts. Two flotillas of the vessels were produced until

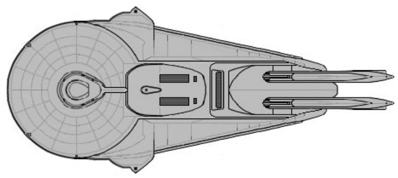
Starfleet agreed to experimentation with PB-35E propulsion. This proved a technological success, giving the Mk II admirable performance specs for a twin PB-35 type and making her a serious contestant in the quest for twin-engined deep space escorts. A combination of maneuverability and affordability issues cost the *Lenthal* the ultimate escort prize, though. Starfleet did deploy twenty units between 2264 and 2278, but reneged on mass production; the lighter, more limited *Griffon* type was to be the preferred format of twin-engine escorts.

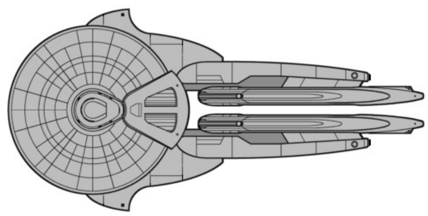
Undeterred, the ASDF proceeded with three further batches for local use, sporting indigenous warp engines and improved phasers and targeting systems but retaining the agility-compromising engine layout, advantageous in classic head-on destroyer attacks. When the escort fleet in the 2270s began receiving the superb LN-61, the class was offered to Starfleet for a second time. When the 2269-vintage Mk V was in 2274 refitted with this modern engine and with an amidships shuttle hangar module plus modernized deflectors, sales of eleven units were secured. The vessels successfully acted as escort leaders alongside the somewhat jury-rigged *Babcock* and *Keith* types, but once again proved too expensive to serve as the rank and file of the escort force.



The "linearized" destroyer escort was a far less awkward construct than her Babcock *competitor aesthetically, but suffered from excess bulk, maneuverability shortcomings and the lack of torpedo armament. A launcher similar to that of the* Babcocks *could have been carried as an alternative to the modular dorsal shuttle facility. However, Salazaar did not see the need for the integration effort as Starfleet procurement plans would not have been significantly altered even with this addition.*

Linear refitting did not impress the ASDF, which dealt less with high speed escort and more with local defense. Its separate destroyer force continued with modest upgrades only, and Andorians soon turned their attention to the emerging light frigate types. The standardized *Daran* and *Ianar* frigates were very much to their liking, and their acquisition in strength ended the story of the native destroyers right after the conclusion of the Klingon conflict in 2293.





It is only in dorsal view that the significant difference between the two Andorian destroyer designs becomes apparent. In both the 2260s and 2270s incarnations, with both native and generic warp engines, the Lenthal *sports half the coil mass of the* Thufir*, and operates at one less warp factor in cruise and dash. The humbler weapon wings also consistently lack torpedo launchers. Starfleet's decision not to invest in escort ships of such muscle is still rather understandable.*

Griffon

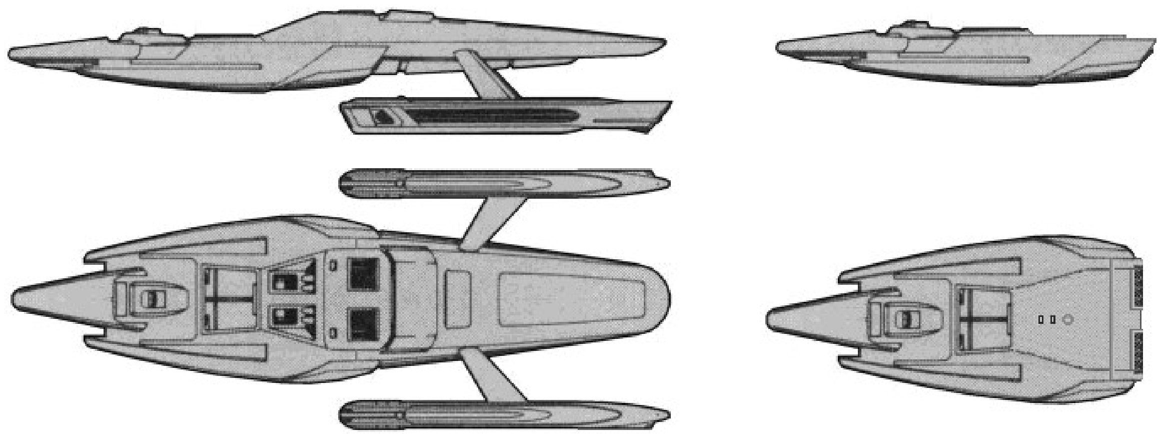
Escort
2267-2312

Completed:	236 total: 208 *Griffon* built in 2267-68 28 *Terrier* built in 2272-73
Length:	167.8 m (*Griffon*) 168.0 m (*Terrier*)
Beam:	66.0 m (*Griffon*) 65.8 m (*Terrier*)
Height:	21.0 m (*Griffon*) 32.2 m (*Terrier*)
Mass:	240,195 tons (*Griffon*) 210,450 tons (*Terrier*)
Officers:	9
Crew:	76 (*Griffon*) 78 (*Terrier*)
Cruise speed:	w 5
Max. speed:	w 7.2 (*Griffon*) w 8.0 (*Terrier*)
Endurance:	4 months
Weapons:	4 phaser IV emitters in 2 twin banks on forward secondary hull 1 light fwd torpedo tube w/ 35 torps on ventral primary hull 1 light aft torpedo tube w/ 15 torps on ventral primary hull (*Terrier*)
Shields:	1-layer conformal forcefield Navigational deflectors on forward secondary hull
Transporters:	2 GP (2-pad); Mk III or Mk IV Select ships brought to Mk V standard after 2285
Auxiliaries:	2 work pods (*Terrier*)

Ships of historical interest:

USS Feist (NCC-E977), *USS Saluki* (NCC-E962)

SOURCES: (D FASA, dimensions corrected)
(N FASA)
(H FASA)



Starfleet escort needs peaked in the mid-2260s, after the *Remora* and *Hellespont* classes had been fielded and their initial production runs completed. Yet from the contemporary viewpoint, the peak looked like the foothills of a towering mountain range. With no way of knowing that in just a few years, the Klingons would be signing documents of truce and the core space pirates would be driven into hiding on the outer rim or behind Orion backs, Starfleet had no choice but to continue procurement of dedicated commerce protection vessels. Since vessels with single and triple nacelles had proved suboptimal, the next step was obvious.

The *Griffon* deep space escort was conceived with mass production in mind. Specifications relating to performance included but two items: warp five sustainable for operations spanning one year (to be attained with twin PB-35E engines), and torpedo armament (consisting of one launcher of any suitable type). Apart from these, solutions enabling a production run in the hundreds should be favored in all respects. Salazaar's *Lenthal* was simply too large and costly even before the addition of the required torpedo system. ECF's saucer hulls proved prohibitively expensive as well, and the company also acknowledged its failure to reduce mass enough to make the twin-engine configuration perform as required. Empress offered a radically simpler and lighter design, compatible with a production rate of 24 keels per year at its Morena yards. In the August of 2266, Starfleet signed on to purchasing five annual yields and providing the engines thereto.

The Empress proposal was essentially a *Corona* series lifting body converted for warp drive by welding a propulsive appendage astern. The engineering section doubled the length of the vessel, and the laterally rigged warp nacelles quintupled the mass, depriving the combination of atmospheric maneuvering or landing capabilities. A forward hull jettison mechanism restored these options in emergencies, though. The lifting body was a practical primary hull structure in other respects as well, already featuring mounts for two twin phaser banks and military-standard shield generators. Starfleet opted for Type IV of the former, and H series for the latter. The necessary interstellar sensor and deflector gear was installed on the dorsal forward end of the engineering section, along with beam armament. The original impulse engines of the lifting body were replaced by larger ones of military FIE-1 standard, and operated independently of main power. Also added in this section was a *Graynet*-style Mk 14 light torpedo launcher with 35 rounds, replacing the original ventral cargo ramp/elevator.

The piecemeal construction was a quick and inexpensive way to proceed, and very little integration was performed on the resulting hodgepodge of systems. When the first *Griffon* (NCC-E940) was delivered in March 2267, Starfleet was immediately forced to increase the onboard crew from planned 62 to 85. Personnel expenses were insignificant in the escort equation, however, and 51 of the affordable vessels were fielded by the end of the following year.

A simulated emergency ends the service of USS Saluki *(NCC-E1149) at the Arcturus Test Range, demonstrating primary hull separation and atmospheric entry. Deep space sensors, deflectors and the double twin phaser banks can be observed above the explosive glow of the separation line, just forward of the twin plasma expanders and the housing for the shield generator. There are some striking conceptual similarities to the* Kovaris *destroyers half a century older in the* Griffon *design; it is perhaps not so surprising, then, that those vessels would be pressed to escort duty in the 2290s alongside their* Griffon *counterparts.*

Operational experiences were "satisfactory" in official reports. Crews were less than enamored with the compact design, but valued the firepower of the torpedo launcher. A stern tube would help with the poor turning rate, and additional aft sensors were also requested. More speed would also be welcome, and in fact Starfleet was quite ready to provide it: if either LN-23, LN-41 or LN-61 panned out, the *Griffon* class would be a prime recipient.

However, Organia and the anti-piracy crusade put *Griffon* production on hold for 2268. Like most yards, Empress was reeling from multiple other starship program cancellations or downrampings, and wanted to hang on to the escort program the best it could. Reinventing the mission profile would be more important than reworking the technical details; keeping costs down would be absolutely paramount for project survival. The linear engine refit was postponed, the extra torpedo tubes left ashore for the time being, and the next two batches of sixty finished with more austere sensor systems pared down to nearspace, policing-oriented specs. The *Griffons* spent more time as system protection cutters than in accompanying transports and merchantmen between systems – a valuable role as such, even if a waste of PB-35 capabilities.

Yet Empress never gave up: plans to install a linear drive were constantly reworked to best match the stage of completion and state of equip of the latest vessels off the dockyards. Sure enough, in 2272 the permission came to finish the final 28 vessels to the LN-61 propulsive standard. Production then moved to the higher endurange *Genser* type; beyond that, Starfleet had no need for so-called "medium escorts" any more.

The vessels of the second batch had a rather different silhouette out of technological necessity: the linear-excitation engines were rigged below the vessel to give a line of sight between the field windows. All the requested improvements were introduced, and since it was already known that production numbers would be limited, funds were also directed at modern interiors, encompassing both creature comforts and user interfaces. While some chided this as wasted effort, operating crews certainly held the opposite view.

Out of the 208 vessels of the first batch, some 145 saw service to the early 2300s, and 82 of these were refitted with improved interiors although not with the modern propulsion system. The second batch was not slated to outlive the first. At the end of active operations, there were 21 confirmed

Griffon losses, mostly in system protection duties at the restless frontier, and three vessels declared missing. A final training unit (*USS Feist*, NCC-E1164) was retired in 2312; she was the last example of classic Empress lifting body design in Starfleet service.

Richtofen

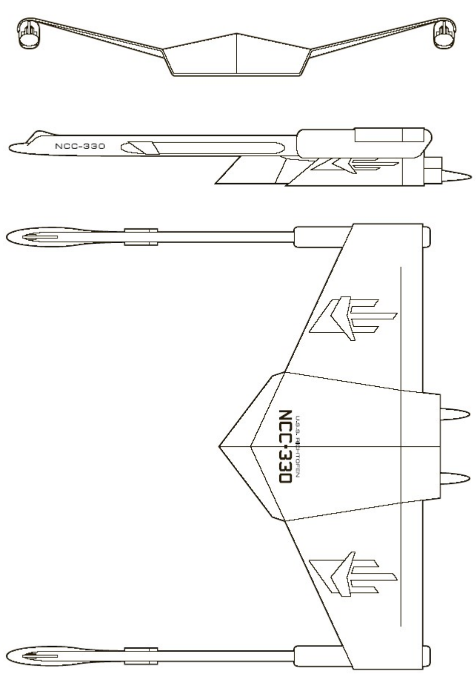
Clipper
2268-2293

Completed:	20
Length:	141.9 m
Beam:	135.0 m
Height:	17.0 m
Mass:	95,100 tons
Officers:	2
Crew:	16
Max. speed:	w 6.5
Endurance:	5 months
Weapons:	Phaser IV emitters on nacelle bows
Shields:	1-layer globular shield
Transporters:	1 GP (3-pad); Mk III

Ships of historical interest:

USS Richtofen (NCC-330)

SOURCES:	(D aridas sofia) (N aridas sofia) (H aridas sofia, own)



For the latter half of the 2260s, the attention of starship and starcraft designers was turned towards the novel concept of linear-sequential rather than radial excitation of warp coils. The possibilities of the new type of drive were alluring. The practical execution proved elusive, however, and threw many procurement projects to disarray with repeated delays and complications. But even traditional warp technology had something to offer for the latter half of the 23rd century. It was just a matter of scale.

Once, the *Ariadne* clippers had attained their considerable speed through the use of immense ring drives. The joint Vulcan-Terran enterprise Panastric offered to repeat this feat of relative advantage with two 128-meter, 40,000 ton nacelled drives, further promising superior acceleration and top speed. The vessel being put forth was not a light cruiser, however. Rather, a crew pod just two decks high would be riding between the mammoth drive units, almost apologetic in its slimness and lack of major systems. The nacelles would contain virtually everything required for propulsion, starting with bulging bow sensors and ramscoops, continuing with coil sections, and ending in sequential fusion reactors and the MHD taps in their exhaust systems.

For crew safety, maximum separation would be maintained between the active sections of the nacelles and the habitat pod. Each nacelle would protrude far ahead of the pod, and the stern ends would be rigged some 130 meters apart on broad wings of pronounced dihedral that also held the vessel's fuel reserves. The pod was pentagonal in shape, 65 meters long at centerline and 45 meters wide at the broadest point, and was smoothly, nearly featurelessly covered in thermoceramic armor. The hull exposed but two impulse propulsion units aft and a few access hatches on the ventral side.

Showing the flag, or showing off? Granted that barrel rolls offer the squabbling Tellarite and Frenni merchantmen an egalitarian view of the prominent UFP symbols painted on the broad wings of USS Belinski *(NCC-336), but the phaser armament of the clipper would enjoy full firing arcs also without such orientation changes.*

The type was in theory chiefly an engineering exercise. In practice, it was also a sales success, as Starfleet procured twenty hulls and ten spare pairs of engines outright. Class leader *USS Richtofen* (NCC-330) continued where the *Chasseur* class had left off and rounded out Starfleet's modern scouting forces with a fast albeit low endurance type.

An established top speed of warp 5.5 inevitably led to a 'clipper' designation, a useful distinction in an era whose other scoutships remained lumbering heavyweights. Furthermore, scouting was to be but one of the many duties of the type: a principal application was as priority courier, for dignitaries and dispatches as well as for troubleshooters and tactical teams. If not for the rather horrid unit price, Starfleet would have ordered another fifty.

A *Richtofen* needed considerable engineering support at home base, to be sure. Planetary patrol missions initially projected as taking place from colonial bases had to be limited to systems of high level of technological resources and know-how. This was just as well, because some 70 % of the *Richtofen* force ultimately fell under the direct command of Fleet Operations.

Availability problems were a primary factor in downscaling of *Richtofen* operations in the late 2280s, with the succeeding *Frobisher* class largely taking over. However, miniaturization had also led to the highly successful *Tai* series of courier sleds, less than half the size of the *Frobishers* yet almost as fast and capable as the *Richtofens*. A handful of the old clippers survived in Admiralty VIP transport role until the 2290s, then gracefully bowed out to their betters.

Remora refit

Escort
2268-2287 (*Remora (II)*)
2272-2299 (*Charger*)

Completed:	38 total: 22 *Remora (II)* converted from *Remora* 16 *Charger* converted from *Remora*
Length:	150.1 m
Beam:	109.5 m
Height:	41.3 m
Mass:	133,450 tons (*Remora (II)*) 131,200 tons (NCC-3482) 127,260 tons (*Charger* standard)
Officers:	7 (*Remora (II)*) 8 (*Charger*)
Crew:	56 (*Remora (II)*) 72 (*Charger*)
Cruise speed:	w 7
Max. speed:	w 9.0 (*Remora (II)*) w 12.0 (*Charger*)
Endurance:	1 year
Weapons:	*Remora (II)*: 4 phaser IV emitters in 2 twin banks on dorsal primary hull, port/stbd of bridge 4 phaser IV emitters in 2 twin banks on ventral primary hull, port/stbd of sensor dome *Charger*: 4 phaser V emitters in 2 twin banks on dorsal primary hull, port/stbd of bridge 2 light fwd torpedo tubes w/ 15 torps on lateral fairings

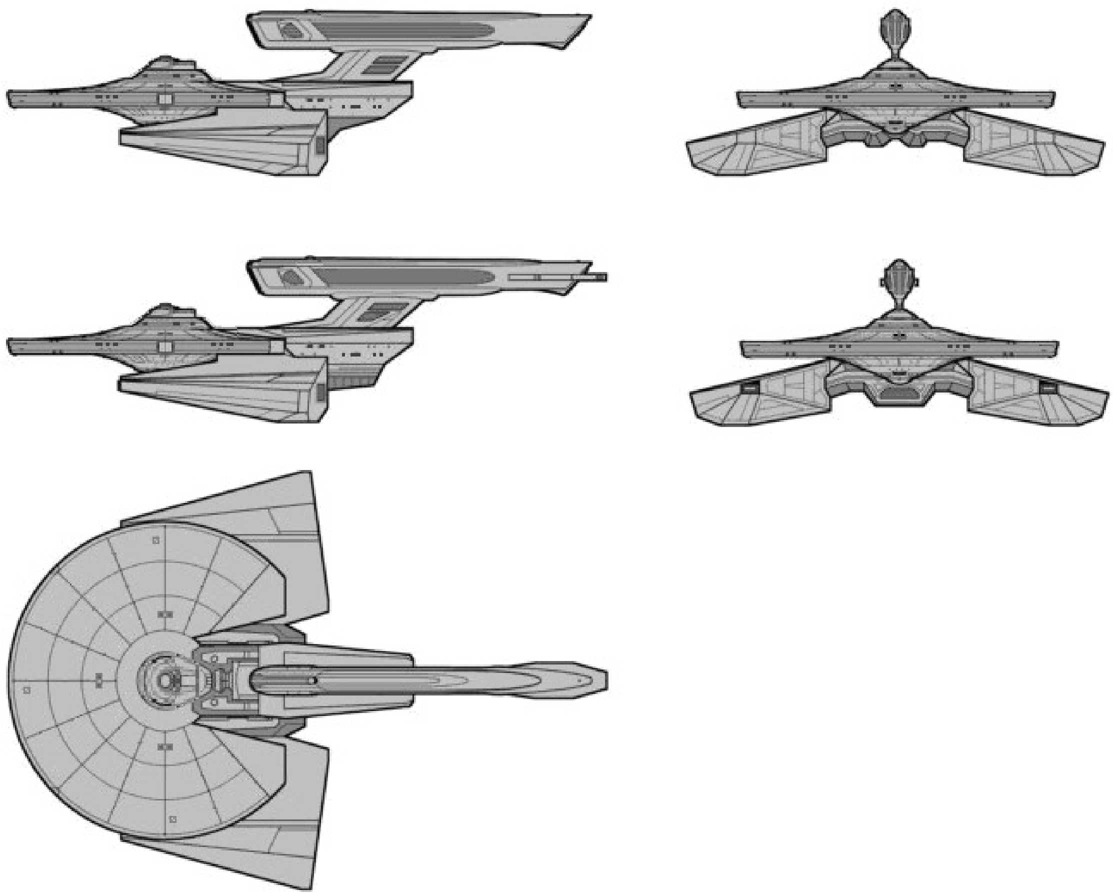
Shields: 1-layer conformal forcefield
1-layer globular forcefield (*Remora (II)*, NCC-4100)
Navigational deflector on ventral hull (*Charger*)

Transporters: 2 GP (2-pad); Mk IV
Select ships brought to Mk V standard after 2285

Ships of historical interest:

USS Agriotês (NCC-3491), *USS Iku-Turso* (NCC-3494)

SOURCES: (D FASA, dimensions altered)
(N FASA, *Charger* Joshua Spencer)
(H FASA, *Charger* Joshua Spencer)



When linear excitation of warp coils was first theorized to have advantages over the classic circumferential method, physicists and engineers alike thought small – and fast. Starships in the 50-70,000 ton hull mass category were the preferred testbeds and likeliest beneficiaries of the technology, with the promise of tenfold increase in maximum speed. Even when experiments with large linear engines in the fifties and sixties ended in disappointment or disaster, faith in the successor to the compact PB-35 remained firm.

The respite of Organian peace made experimentation on small starships especially attractive. Not only were R&D funds released from operating budgets and suitable surplus spaceframes piled up; treaty limitations on new construction of large vessels also steered development towards operational testing aboard light combatants. The leading engine manufacturer in this field was Cochrane Warp Dynamics, with the sleek LN-61 that was to be a scale model of the greatest breakthrough in company history. Repeating the PB-35 development history, the LN-61 would be developed into a cruiser engine and refitted onto as many capital ships as Organian limitations allowed.

First had to come the proof of concept. Escort vessel *USS Remora* had her PB-35E discarded and replaced by the similarly dimensioned but somewhat lighter linear excitation unit, while major internal changes were made to the engineering systems to accommodate total intermixing within the hull of the ship. Sufficient space existed in the engineering section, and some radiator structures on the escort's wings even became redundant in the modification. Nevertheless, some ten thousand tons were added to hull mass by the addition of the inboard KR02 intermix machinery, completely new YPS impulse systems, and an experimental new Type H shield generator pair. A bulkier pylon assembly was also required for the warp engine, not so much due to its manageable mass of 75,000 tons nor for the increases in torque and shear forces, but for the now necessary external plasma expander and flushing systems.

There was some disagreement between Cochrane, Yoyodyne and Prentice-Schafer over the rationality of testing all the respective new hardware in a single spaceframe. The former two clearly required the integration experience from the standpoint of propulsive subspace field interaction, but the shield company only needed to tap into the new power system; why was a 'live' test bench needed? However, Starfleet did not want to dedicate a hull solely to the testing of combat shields in the delicate times immediately following the Organian negotiations. In the end, *Remora* testing did not suffer undue setbacks from the work on the shield generator, and operational experiences could be gathered from early 2268 on already.

The upgraded escort retained her original armament and sensor and communications systems, yet clearly was superior to her previous incarnation, and worthy of a "full" NCC registry. There was now power to efficiently operate the weaponry in all tactical situations, as well as added sublight maneuverability and thrust. Operating crew size remained unaltered, while crew morale could not have undergone a greater change. Flying the fastest small starship in the Fleet was a prestigious assignment, and tall tales of warp 10.5 peak speeds in test runs began to gain in credence with expanded and better publicized test programs.

By 2269, there were nine converted *Remoras* in operation; by 2270, twenty. Two more would yet leave the slipways, but the first casualties were suffered before completion of the conversion run. *USS Grouper* (the former NCC-E841, now NCC-3471) exploded without warning in May 2271 when seeing a deuterium transport from Vega to Dinan; no reason was ever discovered. *USS Sturgeon* (NCC-E853/3472) had to be abandoned after being devastated by the Xindi in August 2272, with light casualties only; *USS Pirarucu* (NCC-E820/3465) survived to limp to port, but 48 of her crew did not.

On a less tragic note, two *Remoras* would leave Starfleet for the private sector in 2274, purchased to escort a twenty-ship settler convoy to Cutting Edge at Epsilon Librae. Building on the two military surplus vessels, the Nightshield mercenary corporation would soon expand to a major commercial success, securing dozens of colonial sorties throughout the late seventies and eighties. Private security enterprises were tolerated well into the 24th century, even if their exploits at times conflicted with general UFP interests.

The *Remora (II)* class soldiered on till the 2287 détente, at that point replaced by a significantly more qualified holder of the designation 'fast frigate', the *Ianar* class. Although four units were removed from Fleet strength in 2279 with the introduction of *Daran* frigates, no further combat losses were suffered. Then again, the light armament of the type kept it out of the deadliest engagements, now that the triumphant Starfleet finally could decide where, when and whether to deploy its anti-piracy forces. Against a determined Klingon anti-shipping campaign, the *Remoras* would have been useless in any case.

* * *

In March 2270, with eighteen unconverted *Remoras* still remaining in mothballs at Titan, Eckard Collins designers managed to attract the attention of Commodore Joseph R. Holman, head of the Sol VI yards. Holman had to turn down their ambitious plans of rearming the vessels with medium torpedo launchers, but he recognized great potential in the powerplant uprating suggested in these plans. A two-pronged attack plan by Holman involved approaching Fleet command with a white paper on the great potential of linear-engine refitting, as well as cuing ECF to market its refit program mainly as a significant propulsive upgrade.

Combining the new through-flow intermix chamber with LN-61J, the 'jauntier' sibling to the now fully operational original (far be it from CWD to name their engine after 'Joseph'!), was eventually verified to give performance previously undreamed of. After a bit less than two years of conversion work and six months of testing, *USS Charger* (ex-*USS Catfish*, NCC-E813, now NCC-3482 to systematically succeed the *Remoras*) on her maiden voyage in July 2272 achieved warp 12 – and sustained it for more than 12 hours! The results were manna for the engine manufacturer, and all but secured complete market dominance for the company's LN-64 series, now undergoing installation on heavy and strike cruisers.

Eckard Collins in turn secured contracts for converting fifteen more *Remoras* into *Charger* class light destroyers, torpedo-armed sisters of the *Remora (II)* design. The Mk 14 launchers that would transform the mission class of the vessels were mounted on the bows of the lateral shield generator fairings. A mechanical swiveling system made available broad forward firing angles even at the point blank ranges of convoy combat. Fifteen torpedoes were stored per launcher, and medium range targeting was boosted by an all-new sensor cluster. Also new was the Edan navigational deflector. The Type H shields were retained but their secondary bubble mode was lost as the associated coils had to give way to torpedo machinery; a deflector beam added to the aft ventral hull in turn provided extra forward protection for high warp. Upper phasers were changed to RIM-9 Type V units, and impulse propulsion to twin Scarbak FIF engines, whose fuel tanks were reduced in size. More than 6,000 tons of mass could be shaved off by the changes.

The lavishly equipped little ships had less combat value than their initial designation suggested. Their high speed admittedly gave them excellent response times in missions of intercepting border incursions, yet combat resilience was low in comparison with heavier destroyers. Some delightful victories were scored against pirates during the brief resurgence of Orion activity in the mid-2270s, when Starfleet's frontier campaigns drove the slave hunters back towards inner UFP space convoys. Mistaken for meek *Remora (II)* vessels, *Chargers* would pounce on unsuspecting raiders with the full ferocity of their namesake, the Centauran antelopoid. For example *USS Agriotês* (NCC-3491) managed to render immobile two pirate vessels thrice her size while escorting colonists to the Kessik waystation in 2278; the raiders promptly scuttled the wrecks before their Orion identities could be confirmed.

With the 2287 retiring of the *Remora (II)* class, certain maintenance and training resources for the *Charger* class also became scarce. By 2290, the construction of two-engined *Babcocks* and refits of old *Kovaris* destroyers had made the *Chargers* redundant in the role of torpedo-armed contingency escorts. Lifting of the Klingon threat in 2291 thus was just one more step down a path whose end already was in sight. The last units were deactivated in 2299, with *USS Iku-Turso* (NCC-3494) listed missing in the direction of 53 Aquarii.

Genser / Babcock

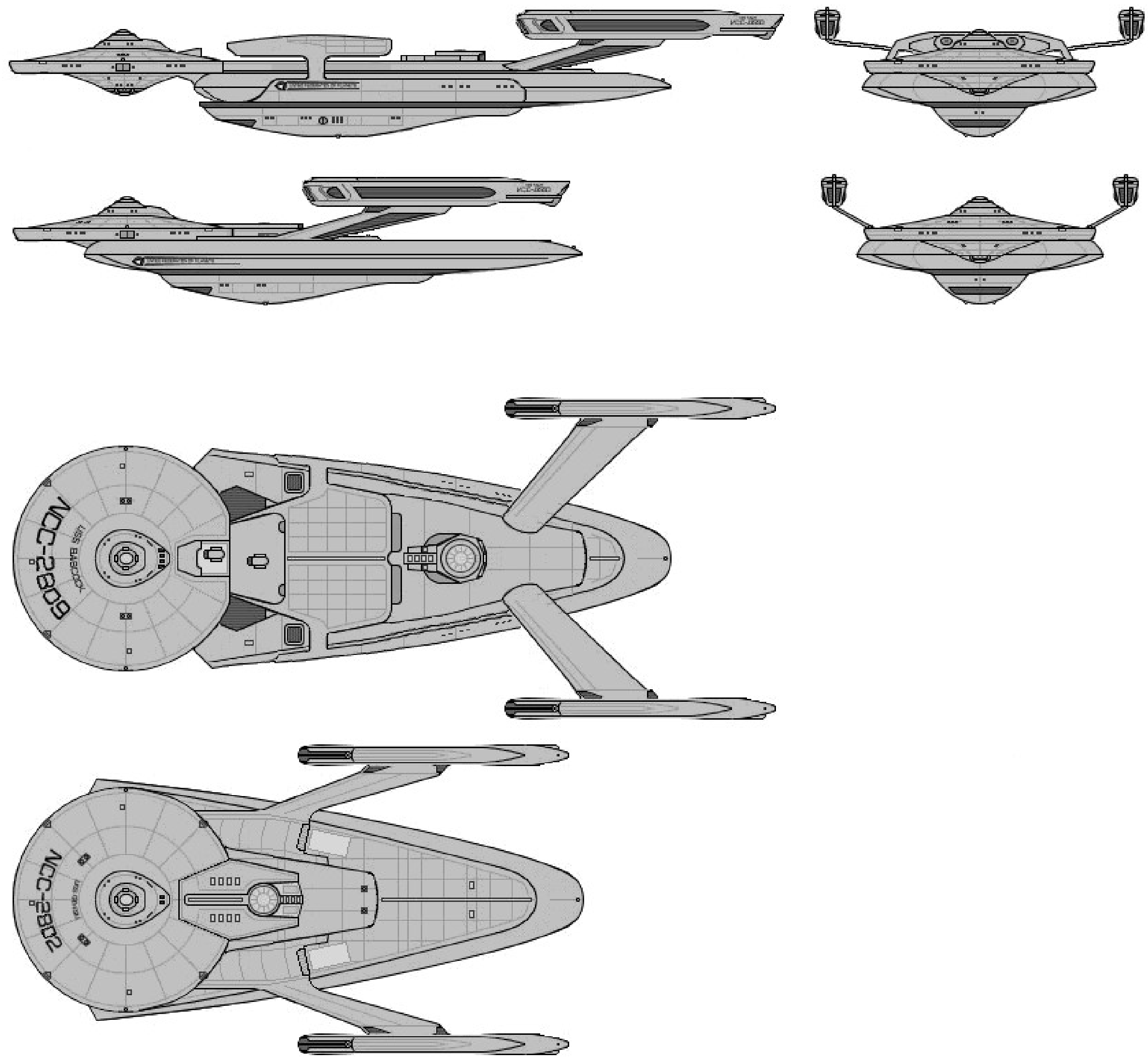
Escort
2274-2312

Completed:	17 total: 12 *Genser* escorts built in 2274-2276 5 *Babcock* escort leaders built in 2274-75
Length:	180.0 m (*Genser*) 240.0 m (*Babcock*)
Beam:	98.2 m (*Genser*) 102.0 m (*Babcock*)
Height:	40.1 m
Mass:	182,300 tons (*Genser*) 213,750 tons (*Babcock*)
Officers:	9 (*Genser*) 12 (*Babcock*)
Crew:	71 (*Genser*) 96 (*Babcock*)
Troops:	10 (*Genser*, occasionally embarked) 30 (*Babcock*, seldom embarked)
Cruise speed:	w 6
Max. speed:	w 8.0
Endurance:	1 year
Weapons:	*Genser*: 4 phaser IV emitters in 2 twin banks on dorsal primary hull, on fwd quarters 2 phaser IV emitters in single banks on ventral secondary hull 2 phaser IV emitters in single banks on dorsal aft secondary hull *Babcock*: 4 phaser IV emitters in 2 twin banks on dorsal primary hull, port/stbd of bridge 2 phaser IV emitters in single banks on ventral secondary hull 2 light fwd torpedo tubes w/80 photorps
Shields:	1-layer conformal forcefield Navigational deflector on secondary hull bow
Transporters:	2 GP (2-pad), 1 cargo; Mk IV (*Genser*) 2 GP (2-pad), 3 cargo; Mk IV (*Babcock*) Select ships brought to Mk V standard after 2285
Auxiliaries:	1 light shuttle, 2 work pods (*Genser*) 2 light shuttles, 6 work pods (*Babcock*)

Ships of historical interest:

USS Babcock (NCC-2812), *USS Genser* (NCC-2800)

SOURCES:	(D FASA, dimensions corrected) (N FASA) (H FASA)

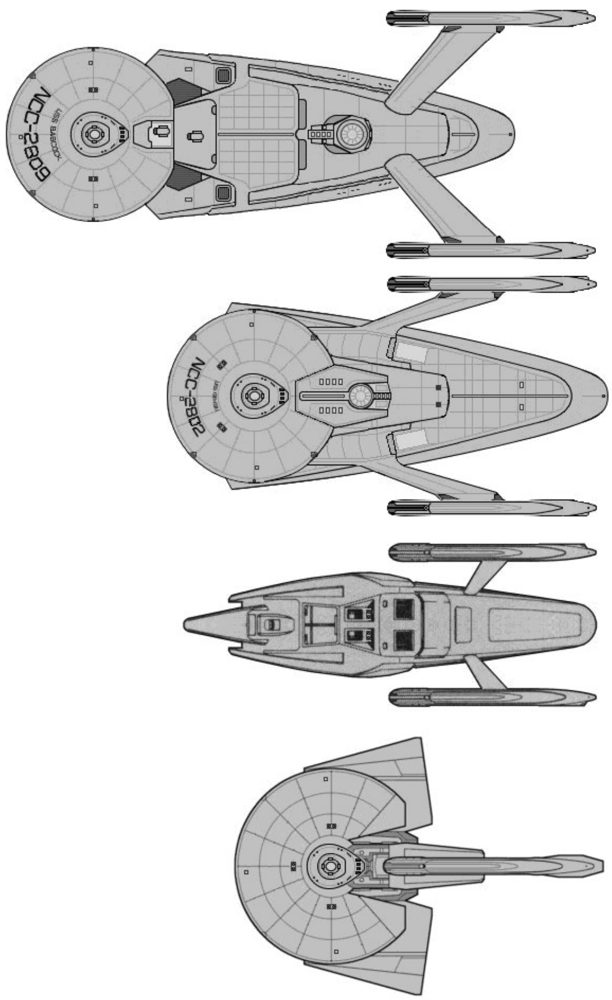


Starfleet's experiences with the *Griffon* class had proven the limited utility of small deep space escorts. Despite general affordability, such ships suffered from severe endurance limitations, and the shielding that could be carried in the small hulls was inadequate for most purposes. In the 2270s, Starfleet was forced to reattempt the application of "proper" saucer hulls and heavy shield generators on twin-engined deep space escorts. Fortunately, the engine technology at least was working as planned, and the versatile LN-61 was now ready to equip ship categories that just a decade earlier could never have hoped to afford the comparable PB-35.

An experimental re-engining of the old *Keith* class surveyors resulted in a ship of the proper size range attaining all the performance figures required of a modern escort. Just a little bit of additional work on the *Keith* spaceframe was needed to turn this experiment into a practical production model, then. The primary hull was adopted as such, merely with the two twin phaser IVs moved from port and starboard positions to the bow quarters.

The secondary hull lost its flexible "mission pod" nature, though, having its amidship shuttle hangar replaced by a full-fledged engineering section that housed the KR02 reactor and its antimatter tankage. The arcane hinged engine pylons of the *Keith* had to go, too; the stems of the new pylons for LN-61 nacelles were fixed on both sides of a modern high-performance Avidyne impulse deck. Small hangarettes were restored to both sides of the engineering complex, below the shoulders of the engine pylons; one held a liaison shuttle, the other a pair of work pods necessary for deep space operations. The aft part of the secondary hull was reserved for fuel, stores and supplies, while the forward part hosted additional crew support systems and workshops. A ventral bulge was added for a deep space navigational deflector of TaT make. Equally vital to the mission was the Type H shield system, borrowing from the success of the *Lenthal* design philosophy. Similarly housed in a lateral bulge that encircled the entire secondary hull, it gave the class excellent shield extension capabilities.

The resulting *Genser* class of escorts followed the unyielding pattern of arithmetic that had governed *Remora* and *Hellespont* procurement already: against the 22 *Remora* refits, only half as many of the two-nacellers could be completed. A mere dozen vessels were still more useful than the hundreds of *Griffons* against any future Klingon aggression. While the lighter ships would have to settle for partway escort to and from Federation core worlds, only protecting the happiest hunting grounds of Klingon raiders near the choke points of incoming and outgoing traffic, the *Gensers* could escort a convoy all the way to the colony zone and back.



Babcock, Genser *and* Griffon *in a family portrait with their smaller* Remora/Charger *cousin. The LN-61 was a forgiving engine, and easily capable of propelling ships of this modest size at useful interstellar speeds, but could not compete in sheer performance with the LN-64 engines of modern heavy corvettes.*

True deep space operations still called for somewhat more extensive capabilities, at least for one of the escort vessels in a given convoy; essentially, an affordable ‘escort leader’ was needed in the image of the destroyer leaders of yore. Salazaar immediately offered an up-engined *Lenthal*, but the Vulcan designers at Merak crunched out the numbers for a more affordable alternative. The *Genser* was stretched by some sixty meters. The saucer was moved forward, the warp propulsion pack aft, and a large torpedo pod was mounted amidships. The carefully blast-shielded twin tubes were aimed barely past the bridge, and the magazines held a bountiful total of 80 torpedoes.

The secondary hull with its shield generators remained largely unchanged, save for two seven-meter plugs for the ventral bulge, to accommodate convoy command spaces and two extra docking ports, plus curved lateral ‘saddle bags’ on top of which the torpedo launcher supports rested. The primary hull phasers were relocated to the sides again as internal command spaces were reworked. The aft cutout of the saucer, now freed from hosting the impulse engine, instead accommodated a shuttle hangar for two light liaison craft. Their approach vectors were greatly complicated by the presence of the torpedo pod. Plenty of hangar space was provided beneath said pod, however, within the top deck extending all the way along the secondary hull spine, from the saucer to the pylon roots.

The creation of the stretched escort leader proved structurally unproblematic. The elongated ships did suffer from agility limitations, but easily bested the *Lenthal* Mk V upgrade in this respect.The swapping of a Kloratis IP-3 impulse deck for the RSE original gave the leaders good acceleration. Five hulls of the stretched configuration were completed, and considered the separate *Babcock* class as per the name of the leader first launched. A light frigate designation was briefly considered, but found excessive in comparison with the likes of *Daran* class; this slight detour left the escorts next to the *Loknar* frigates rather than the *Hellespont* escorts in registry range, with *USS Genser* at NCC-2800 and *USS Babcock* at NCC-2812. The upgraded *Lenthal*, procured to round out the arsenal but deselected from future production, was given numbers starting at NCC-2817. The separate letter identifiers that had still been used for the *Griffon* class were now abandoned for good.

Satisfied with the demonstration of capabilities, Starfleet ceased procurement in 2276. The facilities at Cait could reassume construction of either escort type on short notice, the only bottleneck being the availability of further LN-61 pairs. Yet in the political atmosphere of the time, little effort was made to actually secure these engine resources. The intensifying of the Klingon threat during the following decade prompted no change in this respect: vessels equipped with the much more capable LN-64 engines were proving to be the more cost-effective way of providing deep space protection. Such patrol vessels, while low in number and impossible to mass produce in a crisis, could utilize their superior speed to have short reaction time compensate for limited local availability. Their firepower also best matched the newest Klingon adversaries, against which shield extension was an impractical tactic.

The *Gensers* never were produced beyond the proof-of-concept batch. The extant vessels still flew escort missions of worth, often accompanied by modernized *Keiths* acting as sensor pickets, and by *Remora* or *Remora* (II) units, with a *Babcock* or a *Lenthal* in the middle. Escort formations of up to seven ships were by no means a rare sight, even though actual convoy was never really effected in the 2280s or 2290s and the groups of merchantmen to be protected were small. It remains a matter of speculation whether a gaggle of escorts could have successfully opposed a Klingon raiding flotilla featuring heavy units. Certainly it made a difference against various pirate vessels and formations, and could have been a deterrent to Klingon *Ch’ing* cloakships as well. No combat losses were confirmed, but operational losses included two ships going missing. In addition, the entire crew of *USS Genser* was lost during an apparent interphase incident also involving an alien ship or object of unknown origin or purpose.

The escorts were retired along with the last *Griffons* in the early 24th century, long after their tactical and strategic usefulness had come to an end.

Daring / Renner

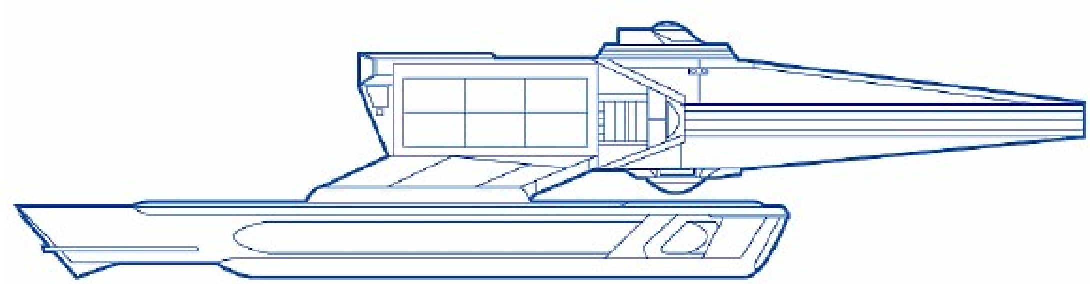
Heavy corvette
2275-2319

Completed:	39 total: 18 *Daring* built in 2275-78 21 *Renner* built in 2283-85
Length:	215.6 m
Beam:	82.9 m
Height:	49.8 m
Mass:	674,000 tons (*Daring*) 671,000 tons (*Renner*)
Officers:	11 (*Daring*) 12 (*Renner*)
Crew:	94 (later 103, including 32 Marine boarding crew; *Daring*) 116 (later 128, including 32 Marine boarding crew; *Renner*)
Max. speed:	w 9.0 (*Daring*) w 10.1 (*Renner* standard) w 11.0 (*Renner* upgrade)
Endurance:	2 years
Weapons:	<u>*Daring*:</u> 2 phaser VI emitters in twin bank on dorsal hull, fwd of bridge 2 phaser VI emitters in twin bank on ventral hull, fwd of sensors 2 phaser V emitters in twin bank on dorsal hull, aft of bridge 2 phaser V emitters in single banks below impulse engine 2 fwd torpedo tubes w/20 photorps each <u>*Renner*:</u> 6 phaser VI emitters in 3 twin banks on dorsal hull, fwd, port and stbd of bridge (*Renner*) 2 phaser VI emitters in twin bank on ventral hull, fwd of sensors 2 phaser V emitters in twin bank on dorsal hull, aft of bridge 2 phaser V emitters in twin bank below impulse engine 2 light aft torpedo tubes w/16 photorps each 2 mine tubes w/20 gravitic mines each Up to 4 racks of 200 mines each carried in shuttlebays (optional)
Shields:	1-layer globular forcefield Navigational deflector on bow
Transporters:	1 GP (4-pad), 1 emergency evacuation/assault (12-pad); Mk IV (*Daring*) 1 GP (6-pad), 1 emergency evacuation/assault (12-pad); Mk IV (*Renner*) All ships brought to Mk V standard after 2295
Auxiliaries:	2 work pods (*Daring*) 4-8 work pods and either 2 medium or 1 heavy shuttle or 4 tactical craft (*Renner*)

Ships of historical interest:

USS Impeller (NCC-2397), *USS Republic* (NCC-2404) *USS Katana* (NCC-3268), *USS Regal* (NCC-3270), *USS Renner* (NCC-3250)

SOURCES:	(D FSRC, IFP/ Rafael Gonzalez, own) (N FSRC, IFP/ Rafael Gonzalez) (H own, IFP/ Rafael Gonzalez, Diane Carey "Wagon Train to the Stars")



The onset of relative peace with the Klingons after Axanar did not halt Starfleet's plans for escalation; indeed, even the peace treaty of Organia twenty years later did little to slow down the acquisition of military hardware. But the role of local defenses was altered as a direct consequence of the Axanar events, and control of defensive spacecraft was taken from local authorities firmly into Starfleet hands. In practice, Fleet corvettes would now handle not only system defense but traffic control and law enforcement as well, even in systems where indigenous vessels and crews had formerly been available.

The supply of *Battleaxe* and *Procyon* corvettes was not inexhaustible, and many colonies and trading posts between 2246 and 2266 had to make do without any permanent Starfleet spacecraft presence at all. Nevertheless, by the sixties, Starfleet had managed to cover the major freight ports and strategic mining and farming planets in decisive strength. Key to this was the three-tiered system of affordable defense vessels, increasing in cost and complexity from corvette to escort to perimeter ship.

Enter Organia, exit Klingon threat. Deprived of its budgetarily convenient arch-enemy, Starfleet in the early seventies could ill afford three tiers of defense. Consolidating these into two was an attractive proposal when first made in May 2270, following the successful Holman-CWD pitch for linear-excitation warp engine application on small and medium combatants. The experimental LN-61 engine was quickly adapted for corvette use and mounted on *USS Riverstone* of *Battleaxe* class (formerly NCC-L427, now NX-2393). The original GA antimatter power systems were left mostly intact, but practically all other equipment was removed; new weaponry, consisting of six phaser V emitters (three RIM-9 twin mounts) and one phaser VI unit (RIM-10B single mount), was mounted on the main hull, and new communications, control and analysis gear installed. Since the main powerplant and the computer core were modified little from their original standard, the systems performed below the levels projected for a full conversion or a newbuild production model, and Starfleet had no plans for putting the ship to operational use after initial tests.

These tests, however, were a spectacular success. With only minimal modifications, the LN-61 engine could be made to propel the *Riverstone* to a phenomenal warp 10.3. New phasers offered excellent coverage and functioned well in test firings and combat simulations. Despite the patchwork nature of the upgrade, the *Riverstone*'s various systems worked admirably. The only downsides were high conversion costs and increased crew requirements accompanied by a severe shortage of space – problems that Starfleet hoped to amend by building the next wave of corvettes completely from keel up.

Ironically, success meant oblivion for the LN-61. The positive experiences gained on the *Riverstone* conversion encouraged everybody to set their aims higher. For the *Daring* class, an unprecedented top speed requirement was placed: the new corvettes were to achieve warp 10 in order to be able to serve independently in deep space, thus combining the escort, border patrol and system defense roles in one spaceframe. The *Darings* were thus to be built into true starships about half the size of the projected *Daran* frigate class. A total of four phaser VI and four phaser V emplacements were to be fitted; a pair of light torpedo launchers was also proposed. There would be hangar facilities for interceptor craft, navigation systems for long interstellar sorties, a Duotronic III –level computer system… The vessels would clearly remain corvettes in name only.

However, Starfleet's ongoing fascination with small frigates might better have been served by investing more funds in the *Daran*/*Knox* program. After five years of trying, Starfleet engineers had to admit that there was no way of stuffing all the required weaponry and engine technology into a single hull of the specified dimensions. The program was divided in two: eighteen ships would carry a torpedo armament, twenty-one a combination of escort fighters and gravitic mines. Common to both would be the selection of the propulsion system, comprising a full-scale LN-64 warp engine and an IF-453L twin impulse unit, both powered by a short KR07-L vertical antimatter reaction core. Specific to each subclass would be the shape of the main hull. That of the *Daring* subclass would be a narrow arrowhead with laterally faired torpedo launchers amidships. That of the *Renner* subclass would broaden out much more to accommodate the hangar facilities and inboard mine bays.

By 2275, the first *Daring* spaceframe, NX-2394, was ready for engine installation. The hull flared from a narrow deflector bow into a five-deck central section, then tapered into an engine compartment that housed the impulse and power systems. A plasma distribution node directly below the power core fed both the impulse engine and the warp nacelles through very short conduits, while a fourth conduit ended in a power tap that channeled energy to the weapons and other ship's systems. Two twin phaser banks were on the dorsal side, a Type VI (RIM-10B) assembly forward and a Type V (RIM-9) one abaft of a standard Class 3 bridge module; one twin Type VI and two single Type V banks were located forward and abaft of the ventral sensor cluster, respectively. The rapid-firing Mk 16 torpedo launchers protected by athwartships cowlings were lightweight variants of Common Claw, with a single loader and a magazine for 20 shots each, and with a simplified, reduced-range targeting system commensurate with the overall capabilities of the ship.

A crew of no less than 105 was required to operate this unwieldy vessel. The engines and power systems were especially labor-intensive. The choice of the LN-64 mod 4 variant common with the emerging *Daran* frigates proved a costly mistake for the *Daring* class. Surmounting maintenance problems effectively halted the production of the fighter-carrying/minelaying variant for eight years, as an alternate high performance engine was sought. Meanwhile, the *Darings* made do with an engine that not only generated constant feedback into the underengineered main drive plasma system, but also threatened to tear apart the entire spaceframe at high speed. Warp factor 8 proved to be the ultimate operational limit for the type. Externally, however, the problems were only evident in the adoption of an exceptionally broad pylon structure and adjoining plasma intercoolers from *USS Formidable*, NX-2395, onwards.

The *Darings* were initially put to border patrol use in the Gorn and Tholian fronts, peaceful since the late sixties. Press coverage of their humanitarian missions helped divert attention from the earlier unrest in Xindi space. All factions of Starfleet and the Defense Council were satisfied with the project, and further support was given to the development of a follow-on class. Also, Starfleet was allowed to stockpile externally mounted mine racks for use on the first-batch corvettes, even though these dispensers were very rarely carried and never saw combat use.

While the development program for the improved *Renner* subclass dragged on, the *Darings* attained much fame as police cutters. Despite their low numbers, they were elementary in pacifying the rampant Orion, Elasi and Landorian piracy in previously unprotected UFP and neutral systems outside of main spacelanes. New ground was broken when Starfleet cutters were assigned as escorts to a convoy of civilian colony ships heading for the Belle Terre system. If not for the valiant fight of *USS Impeller* (NCC-2397) under the command of Capt. Gunnar Merkling in defense of a colonial transport isolated from the convoy, the entire expedition might eventually have been lost to Orion slave hunters. Realizing how lucrative targets colonization expeditions presented to Orions, Starfleet subsequently deployed a cutter escort for any convoy carrying more than 500 settlers.*

When the dedicated LN-64B mod 1 engine was introduced in late 2283, space trials of the *Renner* (NX-3250) could finally begin. At this point, series production of the type was a foregone conclusion, and the trials a mere formality: the *Remora* deep space escorts were at the end of their viability already, and would have to be immediately replaced. Fortunately, the *Renner* performed as planned, reaching at first warp 8 and soon thereafter warp 9 in risky, partially crewed tests. Her weapons systems were tested at Arcturus following a deployment cruise that almost ended in a core jettison due to a power spike; the engineers, a selection of Starfleet's finest, managed to save the ship from such a humiliating and potentially dangerous maneuver. In welcome contrast, the new Mk 23 torpedo system, its two aft tubes crammed beneath the impulse engine, met the modest expectations placed on it. The lateral hangars were tested with various combinations of support shuttles and 'Killer Bee' fighter kits, but found to be the most useful as storage spaces for gravitic mines to be sown from two aft deployment tubes, whose integrated magazines could only hold 20 mines each.

Two Renners *laying mines as part of Factor Two, a massive yearly exercise that between 2284 and 2293 spanned the entire Eridani gap. At the outbreak of a full-scale war, system defense corvettes would rapidly mine key approach vectors, then turn into phaser-armed predators, flanking the approaching Klingon formations and striking at targets of opportunity. Sister ships would be assigned deep space escort duty and general anti-shipping missions. Little was left of the old passive system defense doctrine in which corvettes had made a stand within the Kashishowa perimeter of a system.*

By 2285, all twenty-one *Renners* were completed and ready to begin operations. *USS Escovedo* (NCC-3263) opened her career with a stunning discovery: sent to discreetly monitor the planet Organia to find out why so many of the Klingon border provocations now went unchallenged by the noncorporeal rulers of the planet, she found Organia wiped clean of any and all forms of life. There was no indication of the cause of this devastation (or possibly simply a relocation?). Clearly, it had not been effected by conventional weapons. The captain and crew of the *Escovedo* were sworn to secrecy, and other Starfleet-controlled traffic quietly rerouted so that nobody else would stumble on the dangerous information. It is not known when exactly Klingons found out about the Organian disappearance – but barely a year later, war was declared again, under the pretense of the Genesis incident involving Starfleet captain James T. Kirk, Dr David Marcus and Klingon captain Kruge sutai-Brahar.

While all parties well knew that the war would be a cold one, the Klingon fleet being incapable of taking on the bloated warfleet of the Federation, the *Renners* were sent to reinforce border patrols and starbase defenses nevertheless. A contingent of some forty Marines was regularly carried on special Starfleet Intelligence missions, and the *Renners* gradually amassed a respectable number of captures of small enemy vessels: while Klingons were just as eager to fight to death as the Romulans had been, they were far less trigger-happy with self-destruct systems. Starfleet PR specialists had a hard time explaining out the capture missions which inevitably ended in complete loss of the Klingon crew (or, in many an unadvertised case, in loss of the Marine teams, although only two capture attempts ended in loss of the entire target ship, and none in the loss of the corvette herself). Still, the missions were vital for Starfleet in providing up-to-date information about enemy movements, command codes, transponder frequencies and deployment orders. Similar missions were regularly performed by the Klingons as well, and labeled as simple piracy by UFP press.

After a much-needed computer upgrade to the D-4A2 standard, the *Darings* also embraced the intelligence gathering role, carrying sensor probes deployable by the torpedo launchers but also embarking Marines. Six units were lost in uneven border skirmishes in the wake of the Genesis crisis. In face of the attrition, the idea of building midget frigates began to look economically sounder, at least in comparison with the prospect of losing *Darans* or *Akyazis* at a similar rate. With relatively low investments, advanced successors to the *Renners* were rapidly designed and deployed, mainly concentrating on engine serviceability and endurance increases. Some of these improvements also diffused down to the *Renner* class, which was rated for warp 11 dash speed in 2288. The LN-64B, essentially a cruiser engine, was able to accommodate the increased stresses easily; the rest of the systems simply had their lifetime estimates revised, an unhealthy but relatively commonplace practice in the late 2280s.

All the earlier, outdated corvettes had by then been recalled to port and their crews transferred to training for the more modern vessels. Within five years of Genesis, Starfleet had remade its entire corvette fleet; the *Renners* and their successors of *Juliet* and *Riga* classes were all deployed to the border starbases, and the guarding of ‘secondary’ star systems was left to their local navies. Once again, Starfleet was fully geared for a war with the Klingons.

As is well known, the peak of escalation coincided with its unexpected end. The surviving ten *Daring* vessels were retired near-simultaneously in 2293, mere weeks after the Khitomer conference, and their crews rotated back to the lighter *Antares* units. The sixteen *Renners* soldiered on until 2319, their mine bays sealed off and converted into cargo holds. They never managed to find a true civilian niche. Somewhat ironically, the lithe *Riverstone* pathfinder was to enjoy the longest service life among the modern corvettes, succumbing to an unfortunate collision with a service platform in 2349 after an acclaimed career as a navigation training vessel.

* Ultimately, this decision also led to many colonization parties setting 500 people as the upper limit of their expedition, to guarantee the colonists full independence. Proliferation of small high performance warp engines further accelerated this development.

Centaurus refit

Corvette / courier / light scout
2278-2369

Completed: 98 total:

1 *Antares* courier/corvette/light scout converted from *Procyon* in 2278
10 *Centaurus (II)* (later *Antares* Mk I) corvettes converted from *Centaurus* in 2278-80
5 *Centaurus (II)* (later *Antares* Mk I) corvettes built in 2279-83
1 *Mizar* (later *Antares* Mk IIa) corvette converted from *Procyon* and 6 built in 2289-95
1 *Ianetos* (later *Antares* Mk IIb) light scout converted from *Procyon* and 15 built in 2292-96

20 *Antares* Mk III (*Sedna*) couriers/corvettes/light scouts built in 2298-2301
19 *Antares* Mk IV (*Pollux*) couriers/corvettes/light scouts built in 2300-03
20 Antares Mk V (*Capella*) corvettes/light scouts built in 2313-15

Length: 143.5 m

Beam: 63.5 m

Height: 19.2 m

Mass:
300,500 tons (*Centaurus (II)*, typical)
303,800 tons (*Mizar*, typical)
302,300 tons (*Ianetos*, typical)
306,000 tons (*Antares* Mk III, typical)
306,900 tons (*Antares* Mk IV, typical)

Officers:
3 (*Centaurus (II)*, *Mizar*, *Ianetos*)
4 (*Antares* Mk III, IV)

Crew:
37 (*Centaurus (II)*)
39 (*Mizar*)
32 (*Ianetos*)
42 (*Antares* Mk III, IV)
38 (*Antares* Mk V)

Max. speed: w 8.1

Endurance: 3 months

Weapons:
2 twin phaser V emitters on dorsal primary hull (NCC-717/NX-3000)
2 twin phaser V emitters on ventral primary hull (NCC-717/NX-3000)
4 single phaser IV emitters on dorsal primary hull (*Antares* Mk IIb)
4 single phaser IV emitters on ventral primary hull (*Antares* Mk IIb)
4 single phaser V emitters on dorsal primary hull (others)
4 single phaser V emitters on ventral primary hull (others)
1 light torpedo launcher on ventral primary hull (*Antares* Mk III-V)

Shields:
1-layer globular forcefield
Navigational deflector on secondary hull bow

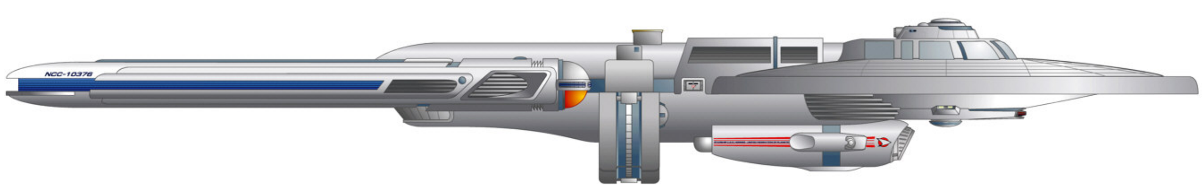
Laboratories: 1 GP (*Ianetos*)

Transporters:
1 GP (2-pad); Mk IV (*Centaurus (II)*, *Mizar*)
1 GP (4-pad); Mk IV (*Ianetos*)
1 GP (2-pad); Mk V (*Antares* Mk III-V)
All surviving ships brought to Mk VI standard in 2323

Ships of historical interest:

USS Antares (NCC-717/NCC-3000), *USS Mizar* (NCC-714/NCC-3006), *USS Hermes* (NCC-10376), *USS Ianetos* (NCC-710/NCC-3013)

SOURCES:
(D Kris Trigwell, based on Mike Morrisette original)
N TNG (LUG, SotSF, own)
(H own)

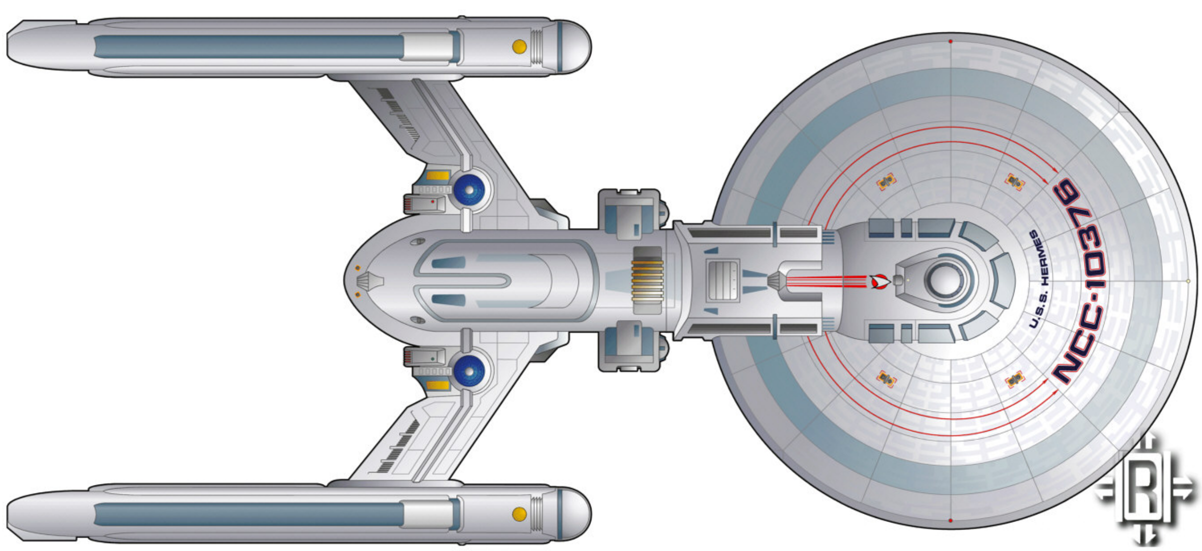


The relatively peaceful post-V'Ger, post-Xindi 2270s were a good time for Starfleet to experiment with linear engine refits. Yet to get a modernized starship design into production was a more demanding undertaking. The threat environment suggested an emphasis on local-action, dual-use designs such as corvettes and frigates, on exploration forces such as heavy cruisers and surveyors, and on concentrated reserve firepower such as dreadnoughts and strike cruisers. Certain other starship resources were allowed to dwindle, not only as the result of failed refit attempts, but even when experimental linear engine installations had proven relatively satisfactory and affordable on ships of these types.

As previously explained, no follow-on design emerged for the lighter end of the corvette fleet despite the success of the experimental *Riverstone* LN-61 refit. This bode ill for other ship types in need of light and affordable linear engines for nearspace applications. The *Procyon* family of corvettes, couriers and light scouts, ships otherwise befitting the peaceful posture of the Fleet, would soon disappear from active records. Attrition of these vessels from combat losses or accidents was low, but the wear and tear of high speed operations was taking its toll. By the end of the decade, especially the state of the light scoutships was intolerable: apart from the lithe *Missions* and *Archers*, there were just a dozen *Centaurus* units in mothballs, only theoretically serviceable, and another 17 in active service yet no more than nine still capable of the original warp seven dashes.

Modern light warp engine development did not end with LN-61, however. In 2272, Shuvinaaljis introduced the Advanced Circumferential Engine, a worthy competitor to the Cochrane Warp Dynamics LN-64 at least in single-nacelle applications. When hopes of cruiser sales were dashed, ACE development was directed at lighter applications. In waiting for the final breakthrough of *Cochise* destroyer sales, Shuvinaaljis fielded the Medium ACE, an engine type ideal for revigorating the *Procyon* family.

The damaged *Procyon* corvette *USS Antares* (NCC-717) was in early 2277 recommissioned for testing the methods and tools of the refit. In addition to MACE installation, the complex procedure would involve a complete pylon and impulse engine remodeling and changing of the main reactor. Similarities with the ongoing cruiser refit programs helped dockyard engineers streamline the process somewhat; nevertheless, work on the *Antares* exposed several problems, most of them relating to the structural integrity of the much-abused hull. Rather than convert further *Procyon* units, Starfleet thus decided to recall for upgrading ten of the surviving *Centaurus* couriers. These vessels were less fatigued structurally than the corvettes, due to lesser impulse maneuvering, yet definitely in need of a thorough propulsive system overhaul after more than two decades of high warp service.



The re-engined and re-registered USS Antares*, NX-3000, was originally destined for a short and tasking career as a propulsive systems testbed. However, new technology allowed Shuvinaaljis to bench-test full MACE systems in near-*

operational conditions, leaving the Antares *to a sedate life as guardian of the Sol system. Here she frustrates Academy pilots in advanced tactical flight training at Saturn, breaking a formation of* Wasp *craft with a mock phaser attack.*

The courier mission profile did not require the latest instrumentation or weaponry. However, mission gear for scouts had evolved significantly during the quarter century of *Centaurus* operations, and an extensive primary hull refit was ultimately warranted. The saucer lost its separation engines, but received all-new sensor pallets on Deck 2 bow. The trio of phasers was replaced by no less than eight modern Type V emitters, arranged in twin RIM-9 banks on the *Antares* but evenly spread on the saucer surfaces in single M-57 banks on the *Centaurus* refits. Contours of the lower saucer half were altered along with the dorsal sensor and phaser removal, even though the general structural frame stayed intact. A modern shield grid was applied overall, and the bridge revamped to match the quality of the equipment controlled from it. Thus armed and protected, the upgraded design basically took on all the three roles of the original spaceframe.

The utilities compartment forward of the breach line was remodeled to house multi-purpose equipment/cargo/consumables holds and more neatly packed umbilicals for rapid consumables transfer. At the same time, as a side effect of the installation of the new warp reactor and its radiator surfaces, the secondary hull bottom half was rather completely dismantled. Deck six was gone, replaced by a smooth half-cylindrar hull surface, and the ventral module berth omitted altogether. A new main deflector and long range navigational sensors were introduced simply by swapping the respective pod structure.

Re-engined, rearmed and thoroughly refurbished, the vessels sailed out again in 2279-80, led by the *Antares* and followed by the ten units of what was then known as the *Centaurus (II)* subclass. A newbuilding program immediately followed, as Starfleet was now convinced of the worth of advanced propulsion scout/courier/corvette ships. Decisive in the change of heart was the high top speed attained by the modifications, somewhat moderated by the high costs of the refit. Starfleet anticipated continuing wear and tear on the scout fleet, and wanted to avoid further refitting or major refurbishing of the aging hulls. Therefore, the so far unrefitted *Centaurus* vessels were retired in their original configuration, as were the *Procyon* corvettes. In addition, new construction of the multimission type was halted at five units; more keels would be laid as the original ones wore down. Were major new mission equipment to emerge in the meantime, it would be installed on the new units but not refitted on the existing ones. At first, individual surplus *Procyon* hulls could serve as testbeds for each batch, letting the dockyards iron out any integration problems with the new gear; later on, technological advances could be expected to negate the advantages of such precursor hulls.

In accordance with this plan, yet in flexible response to the political events, the last vessels (in the new, largely subclass-free nomenclature dubbed *Antares* Mk V rather than the systematic *Capella*) were fielded in 2313, while retirement of the first MACE units began in 2292. The final batches were armed with the new Mk 28 light torpedo launcher under the primary hull, and carried the latest in anti-cloak sensor technology. Yet they found few practical applications for the new gear when the Klingon border was declared off limits. This steered the multipurpose units back towards courier duties. However, in this role they found themselves challenged by the increased dimensions of the operational theater; at shorter ranges, the challenge came from the proliferation of small interstellar craft.

An Antares *of 'Mk III', actually the fourth distinct* Antares *configuration to be fielded, externally differs from a* Centaurus (II) *or 'Mk I' ship hovering alongside in paint scheme only. Hidden are the ventral torpedo launcher and the uprated shield generators, computer and sensors. Such minor differences had once called for subclass designations. Now, the only controversy regarding the decision to use the common* Antares *class designation from 2300 on lay in the fact that the commercial sector continued to operate the prominent* Antares *class of medium transports, creating the potential for confusion.*

Law enforcement and traffic control thus employed the torpedo-armed Mk IV and V units till the end of their active service careers, in 2328 and 2337, respectively. Beyond this, only the light scouting mission theoretically remained. Yet the scientific ambitions of the organization called for scoutships of markedly longer range and greater capabilities, and so did the next military threat to emerge. Only three *Antares* units were activated for the border wars: *USS Acrux* (NCC-10379, Mk V), *USS Sedna* (NCC-3059, Mk IV) and *USS Hermes* (NCC-10376, Mk V) ran errands on various theaters in the years of conflict. The *Hermes* was stricken from Fleet strength in 2369, after sporadic service amounting to nearly four decades.

Firestone

Courier / corsair
2284-2328

Completed:	40
Length:	157.0 m
Beam:	39.5 m
Height:	39.0 m 78.3 m (w/ largest ventral subspace antenna)
Mass:	74,500 tons (w/o antenna or optional weapons)
Officers:	3
Crew:	12 (boarding or sigint mission, estimated) 5 (courier mission)
Cruise speed:	w 4
Max. speed:	w 7.0
Endurance:	1 year
Weapons:	2-4 phaser IV emitters in single or twin banks on port/stbd primary hull 1 fwd torpedo tube w/ 12 torpedoes (optional) 2 aft torpedo tubes w/16 torpedoes (not in NCC-1905-1909)
Shields:	1-layer conformal forcefield Navigational deflector on nacelle bow
Laboratories:	1 signal processing (select ships)
Transporters:	1 GP (4-pad); Mk IV
Auxiliaries:	Boarding pods sometimes carried

Ships of historical interest:

USS Emerald (NCC-1908)

SOURCES: (D FASA/David R. Deitrick)
(N own)
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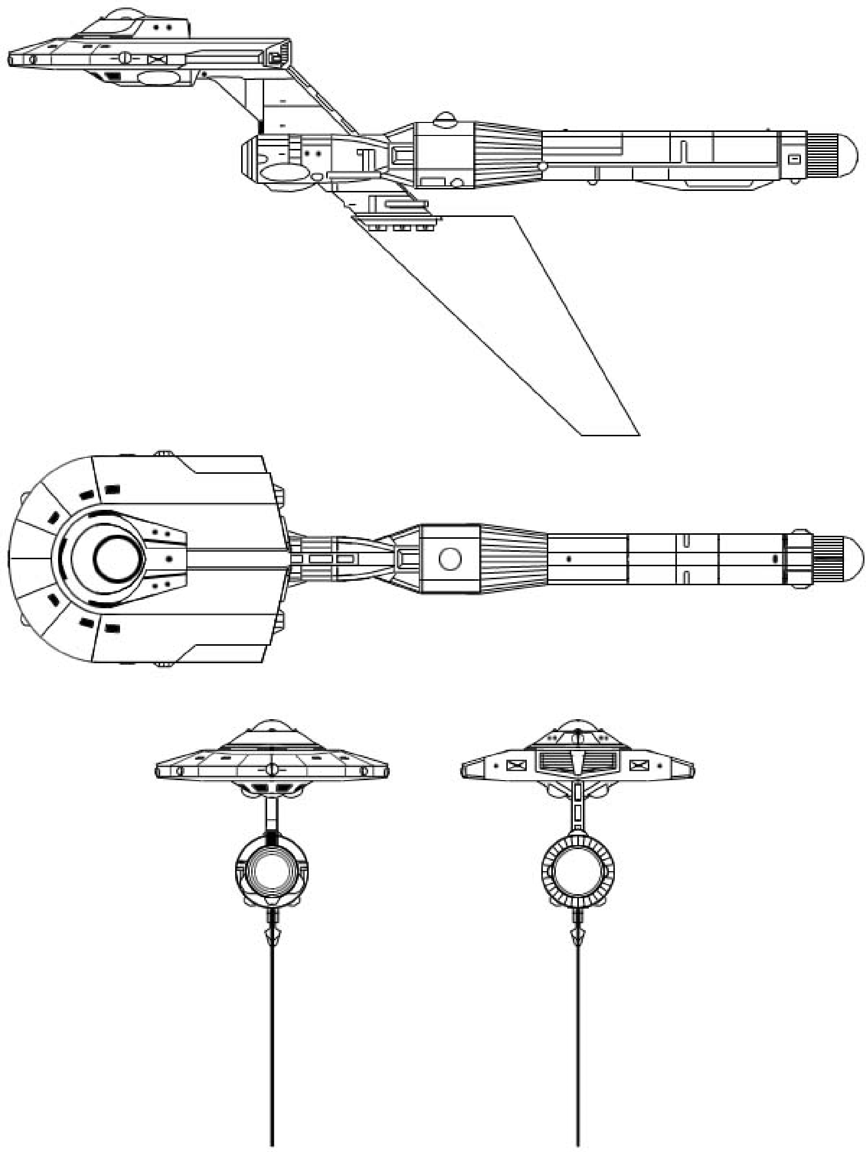
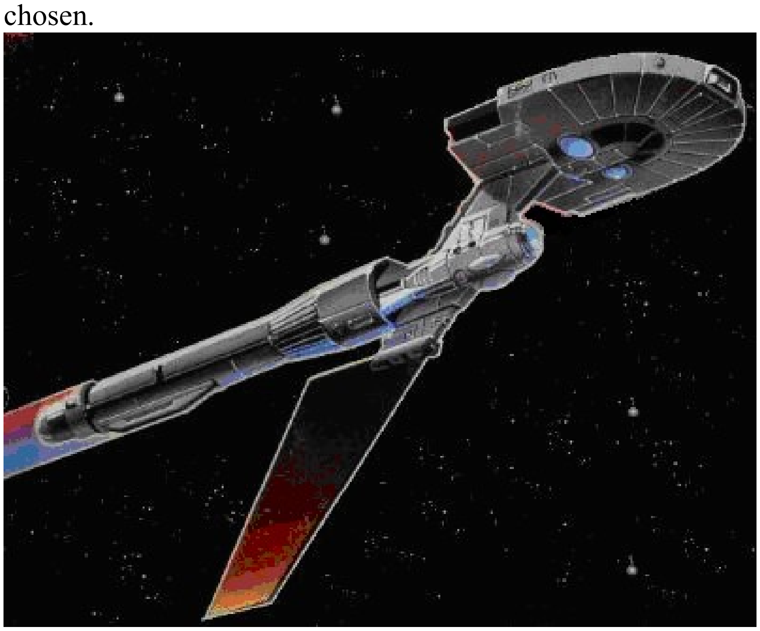


While the *Antares* family of small multipurpose starships was a direct descendant of the *Procyon* law enforcement corvettes, the contemporary *Firestone* design had a more notorious pedigree. Designed to augment Starfleet's growing force of 'corsairs' or boarding ships, the *Firestone* combined a powerful engine with a hull pared down to the barest essentials of a mission that bordered on piracy.

The distinct looks of the *Firestone* had certain basics in common with the single-engined scoutships of the past centuries. An angled support structure attached the warp engine ventrally to the habitat and command hull, resulting in a fairly classic side profile. However, this interhull was barely two meters thick and only featured a narrow passageway and second-stage plasma trunk. Main power systems were packed away in an extended midpart of the engine nacelle, fully automated and almost inaccessible in flight. Lack of extensive passageways made it all the easier in emergencies to sever the whole assembly from the forward section of the nacelle, which in turn contained a powerful narrow-beam Lorill navigational deflector, three QIM-40 or -42 FTL sensor blisters and a cramped systems monitoring room.

Aft of the reactor lay the warp coils, relying on conventional circumferential excitation; reactor ejection would thus rid the ship of the coil assembly as well. Gone would also be power to the sublight engines and weapons of the vessel, since the meager onboard batteries would not be able to provide for these systems.

Barring a separation event, both impulse propulsion and firepower would be in ample supply on the compact vessel. Her two-deck main hull of tombstone shape was built around a greatly oversized Scarbak TS twin-nozzle impulse system, flanked by two aft-firing Mk 24 torpedo tubes for discouraging pursuit; the semicircle bow held brutally efficient accommodation for the twelve crew, but also managed to fit in an optional armament of two single or twin Type IV phaser emitters and/or a forward torpedo launcher. If the forward launcher was left ashore, a docking port could slip in its place, with an equally modular internal compartment taking the place of the magazines and serving as a boarding party staging room, a signals intelligence laboratory, or possibly a high security vault. Two lateral docking ports were a more permanent fixture; their universal docking adapters were accompanied by lateral grappling systems and forcible access tooling. On a narrower deck below, additional sensor assemblies helped either with hunting down boardable prey or with more conventional gathering of crucial intelligence, depending on the modular configuration chosen.



The pennants worn by this Firestone *identify her as the* Claymore. *While most* Firestones *changed names more often than they purged trilithium resin, edged weapons were typically associated with corsair missions and precious stones with courier duty, while names of sensing instruments were chosen for signals intelligence sorties. Confusingly,* 'Claymore' *here sports a large ventral subspace antenna seldom used for corsair work .Use of the names was seen as a frivority in any case, there being little relevance to whether or not an ally or a victim would spot such an identifying detail on the hull of a particular vessel.*

Atop the hull, officer accommodation and a fourth docking port adjoined the bridge, from which the daring raids would be coordinated. At speeds of up to warp seven, the *Firestone* could outrun most commercial vessels to effect boarding. The speed would also help evade pursuit, were the vessel to be caught listening to subspace transmissions deep within enemy territory – a task assisted by ventrally mountable fin antennas up to sixty meters long.

Of the forty *Firestones* completed, just five would utilize their considerable speed for the less clandestine courier mission. These were also the only vessels to carry NCC registries (1905-1909), and not to carry the grappling mechanisms and torpedo launchers. The space freed by the omission of these systems provided some cargo capacity, while passengers could be accommodated in relative comfort thanks to the reduction of crew to just the engineering team of eight. Ventral subspace aerials would also be left ashore, although the priority transports retained full use of their phasers and targeting systems, and also carried their datalinks for a secondary sigint mission.

The exploits of these special vessels were mostly in the subdued colors of Starfleet Intelligence, and therefore remain poorly known. History records the loss of three hulls, supposedly respectively named the *Sapphire*, *Kivas* and *Amethyst* at the time. All three vessels were declared missing between 2288 and 2291, in obvious connection with the peaking of the Klingon confrontation. The exact nature of their mission has not been disclosed, however, and records pertaining to the matter have apparently been destroyed.

Despite its highly specific nature and exclusive SFI employment, even the *Firestone* class could not avoid contributing to Federation scientific knowledge. In 2306, *USS Emerald* (NCC-1908) took a shortcut through a magnetic monopole stream and found herself displaced by some fifteen lightyears in a matter of minutes. The existence of tachyon upswellings in dense magnetic phenomena had been hypothesized before; experiments now confirmed strong if erratic tachyonic flows in several such formations. Propulsive applications are unlikely to emerge, although scattered reports of 'hypercurrent' travel have been filed ever since. Study on the significance of tachyonic flows to earlier starfaring cultures such as the Etoshans is ongoing.

Akyazi / Arbiter / Akula

Perimeter action ship
2285-2349

Completed:	105 total: 38 *Akyazi* 42 *Arbiter* 25 *Akula*
Length:	216.1 m (*Akyazi*) 215.8 m (*Arbiter*) 215.5 m (*Akula*) 222.4 m (*Akula* NCC-P1093, -P1095, -P1098, -P1101, -P1105-6, -P1108-10, -P1112, -P1114)
Beam:	120.2 m (*Akyazi*, *Arbiter*) 108.0 m (*Akula*) 119.9 m (*Akula* NCC-P1093, -P1095, -P1098, -P1101, -P1105-6, -P1108-10, -P1112, -P1114)
Height:	27.5 m (*Akyazi*, *Arbiter*) 68.7 m (*Akula*) 70.4 m (*Akula*- NCC-P1093, -P1095, -P1098, -P1101, -P1105-6, -P1108-10, -P1112, -P1114)
Mass:	548,000 tons (*Akyazi*) 547,000 tons (*Akyazi* NCC-P1043-6) 549,250 tons (*Arbiter*) 548,700 tons (*Arbiter* NCC-P1065, -P1065-6, -P1069, -P1074, -P1081, -P1084, -P1086-88) 554,500 tons (*Akula*) 557,200 tons (*Akula* NCC-P1093, -P1095, -P1098, -P1101, -P1105-6, -P1108-10, -P1112, -P1114)
Officers:	8 (*Akyazi*) 7 (*Arbiter*) 8 (*Arbiter* NCC-P1053, -P1054, -P1058, -P1061, -P1072-3, -P1085)

	7 (*Akula*)
Crew:	76 (*Akyazi*) 70 (*Arbiter*) 72 (*Arbiter* NCC-P1053, -P1054, -P1058, -P1061, -P1072-3, -P1085) 68 (*Akula*) 74 (*Akula* NCC-P1093, -P1095, -P1098, -P1101, -P1105-6, -P1108-10, -P1112, -P1114)
Max. speed:	w 8.0 (standard drive) w 21.5 (*Akyazi*, saturation drive) w 22.0 (*Arbiter*, saturation drive) w 18.5 (*Akula*, saturation drive)
Endurance:	2 years (6 months unsupported)
Weapons:	6 phaser VII emitters in 3 twin banks on dorsal primary hull 6 phaser VII emitters in 3 twin banks on ventral primary hull 2 phaser VII emitters in single banks on aft engineering hull (*Akyazi*, *Arbiter*) 1 phaser VII emitter in single bank on aft engineering hull (*Akula*, *Arbiter* NCC-P1050-51, -P1055-7, -P1062-4, -P1067-8, -P1076-80, -P1089) 2 fwd torpedo tubes w/20 torpedoes in bow cutout 1 aft torpedo tube w/12 torpedoes in aft cutout (*Akyazi*, *Akula*) 2 aft torpedo tubes w/20 torpedoes in aft cutout (*Akula*) 2 phaser VI emitters on deflector pod (*Akula*)
Shields:	1-layer conformal forcefield Spherical deflector/shield system Main deflector array in forward cut-out, above torpedo launchers Auxiliary deflector emitter in dorsal pod (*Akula*)
Transporters:	1 GP (6-pad); Mk V
Auxiliaries:	None (most *Akyazi*) 1 light shuttle, *Chisu* type (NCC-P1095, -P1105-6) 1 medium shuttle, *Atai* type (NCC-P1110, -P1114)

Ships of historical interest:

USS Akula (NCC-P1090), *USS Akyazi* (NCC-P1010), *USS Araxes* (NCC-P1030), *USS Arban* (NCC-P1087), *USS Arbiter* (NCC-P1048), *USS Bengal* (NCC-P1021), *USS Sitka* (NCC-P1108), *USS Talence* (NCC-P1062)

SOURCES:	(D SotSF) (N SotSF) (H SotSF, Eddie Sharpe)

The perimeter action ships of the late 2240s were born out of desperation, yet achieved the impossible: together with the internal dissent that weakened the Klingon Empire at the time, they prevented the collapse of UFP border defenses during the 2246-50 raids. Yet the first generation of PA ships was a stopgap one at best, awaiting the development of more advanced and more durable classes. It was to be a long wait. Throughout the 2260s and 2270s, such development proceeded on a theoretical level only. The *Kiaga* and *Agilis* ships were worn out and in a state of disrepair by the mid-2260s, and would have to have been withdrawn even had not Organian peace intervened. Recalling of the patrol combatants did not entail refurbishing them, and for some two decades, the ships languished on border starbases, awaiting action but not being prepared for it.

The attempted relaunch of perimeter ship development in 2269 stumbled in the very beginning on twin hurdles. First came the technical problems encountered in giving such small ships the endurance of deep space patrol combatant, now that the 2260s exploration program had redefined ‘deep space’. Then, in the aftermath of the Xindi Incursion, followed the 2273 Cammell IV investigation and a wave of acquisition program re-evaluations. The funds originally reserved for modern PA development were eventually channeled to the dreadnought upgrades and the *Daran* frigate project, which approached the tactical and strategic problem of border control from wholly different angles.

Temerand design bureau never gave up the development work, though. Low on funding yet fueled by the innovative spirit of the engineers, Temerand explored the potential of the linear warp engine in giving the perimeter ships a shorter intercept time. Tactical analysis indicated two extreme possibilities: construction of 600 to 750 ships capable of warp 10, or a hundred vessels capable of warp 17 or better. Knowing the financial realities and refusing to yield to the technological ones, Temerand chose to pursue the latter.

In 2283 came the spark that would re-ignite Starfleet's PA program: the Klingon Taal Tan offensive. This fatally undermined the pacifist block in the Federation Council, and funds were released almost immediately for the construction of a new class of perimeter action vessels.

Serendipitously, this event came hot on the heels of the 2282 SF R&D report on findings from the first decade of linear-coil operations. According to this data, saturation of warp coils by high intermix ratio power pumping would allow a modern engine to keep on coasting on a self-generated warp shockwave. The technique was applicable to vessels from a certain minimum size up, yet at successively higher power costs. In theory, even a defender could be prompted to warp-coast, yet with no appreciable improvement in performance. The *Ianar* and *Decisive* light frigates were eventually configured to utilize the technique, resulting in a top speed of warp 14 – at the cost of dangerous field gradients around the nacelles every time a new power pulse was administered. But danger was part of the perimeter ship mission description, and Temerand engineers trusted the nacelle/hull clearance of their design would protect the crew.

Barely two months after the Taal Tan offensive, practical development began on no less than eleven prototypes, based on the results of Temerand Duplicat's Internal Perimeter Program 1 (IPP-1). Prototype evaluation began in early 2284 with the removal of the LN-83 purpose-built saturation engine from the first Temerand test articles and installation of the super-tuned LN-90 successor design, and finally the somewhat less risky LN-91 and 94. Demonstration flights convinced Starfleet observers that a practical border patrol combatant could be derived out of the prototypes. In 2284, orders were placed on what would eventually be a fleet of 105 perimeter ships. The burden of construction was spread not only across dozens of dockyards, but also between Temerand and Avondale Group, the latter being contracted to build eleven of the initial ships.

USS Akyazi (NCC-P1010) was the class ship for the first operational saturation-drive PA vessels – yet not the first of her class to be launched, that honor going to *USS Bucke* (NCC-P1020) on December 11, 2285. She was built around a saucer five decks tall and 107.6 m meters wide, with a bow cut for twin Mk 5 torpedo launchers and an aft cut for the single Mk 9 rear launcher and for the field safety clearance. A Class 5 bridge module featured a standard docking port, and another was fitted on Deck 3; these were the only auxiliary craft fixtures aboard. Twelve phaser VIP emitters in six twin banks fired on extreme compression mode, and were supported by two single emitters flanking the aft tube. RCS systems were backed up by the FORS emergency impulse thrusters for separated flight mode, in the likely case of having to ditch the main propulsion systems.

The LN-90 nacelles were mounted on long, nearly horizontal curving pylons, and shrouded with field reflectors for extra stealth. The shrouds as such merely hid the intense flash of the saturation pulses, and actual stealth characteristics were dictated by the Orissa system, a very efficient partial cloak and stasis countermeasure suite based on a test article flown on *USS Sparrow*. The primary field stabilization crystal capped the warp generator compartment at the pylon junction. Test flights had dramatically shown that the warp field gradients would eat through the IMRF regulator in a matter of hours, so the *Akyazi* also carried a smaller backup, coupled to the primary for extra stability. The CCE impulse engine was mounted at the extreme aft of the engineering pod. In a catastrophic situation, twin booms connecting the compartment to the saucer could be severed in a fraction of a second, with rapid-reaction forcefields sealing off the primary plasma conduits that gave raw feed to the phasers. Antimatter for torpedoes was contained in the primary hull and required no feed lines.

In addition to the phaser and torpedo systems, powerful shield generators for the Close In Deflector Shield (CIDSS) system (post NCC-P1021 vessels constructed by Arbing and Lidde received the CIDSS (heavy) upgrade), the FORS emergency impulse system and the Ilorin main computer, the primary hull had room for little else. The major concern of ship evacuation was addressed by a separating bridge module and a set of sixteen three-person lifepods. Accommodation for the crew of 84 was beyond cramped, with most personnel hot-bunking in cabins of six. Officers shared a single cabin, save for the CMO and CEO berthed at their posts. Supplies had to be stashed in personnel spaces for extra on-station endurance. Yet neither Temerand nor Starfleet would consider enlarging the hull, as the crucial speed advantage of the field configuration would be lost.

As the initial fleet of 38 *Akyazis* began to take shape in 2286, operational deployments commenced in the Cursa and Hromi sectors of subquadrant 4. Klingon forces soon paid attention to the increased Starfleet firepower, and made probing strikes against the perimeter vessels. *Akyazi* responses were swift yet restrained, as the fleet was nowhere near fighting strength yet. *USS Akitsu* threw back a light probing raid on April 27, 2287, only two months before the Nimbus III hostage crisis temporarily curtailed Klingon activity in the borders. *USS Abreus* was destroyed on April 3, 2289, during an engagement with no fewer than seven hostile craft, which had lured her there by transmitting a fake distress signal. The hostiles were believed to be either Romulans or Klingons using Romulan vessels.

* * *

A second batch of 42 vessels, dubbed the *Arbiter* subclass, had already been ordered for fielding in 2287; this class featured twin Mk 20 tubes both forward and aft, had a reduced crew, and introduced numerous design improvements made following operational experiences with the *Akyazi* group. The exterior angle on the primary hull edge was inverted compared to the *Akyazis*, as a result of warp field tests. The *Arbiter* group carried the Iulus Protective Envelope Generator between the engineering section support booms; this system rendered the *Arbiter* class vessels almost totally invisible, even to directed mass sensors (the major weakness of Federation cloaking systems thus far).

Like all *Akyazi* class ships, the *Arbiters* carried a broad range of sigint systems and sophisticated sensors in order that they act as mobile borderspace listening platforms if necessary – secure two-way datalinks could now be counted on to protect the vessels from exposure even when relaying their findings. *Arbiters* were equipped with the slightly more powerful LN-91 warp nacelles and with the CME primary impulse engine. Emergency impulse power was provided by two ASL engines, fitted just outboard of the engineering pod support booms. The improvements made to this subclass allowed the crew quarters to be home to much smaller groups of crewmen and -women and also put an end to the hated hot-bunking system. They did not, however, solve the problem of stores being kept in quarters; the complaint of the captain of the *USS Talence* about the crates of self sealing stem bolts in his quarters has become notorious- "…and no one even seems to know what the bloody things are *for*!"

Due to the placement of the Iulus system, most *Arbiters* only had one small craft docking port, on the aft of the bridge module; some early build vessels, however, had two ports on the topside primary hull. These were deleted from later vessels due to their weakening of the overall structure. Other variations were also notable; the Singapore-constructed vessels had a starburst deflector grid pattern rather than the conventional fit. These vessels also had only a single aft phaser, as did those ships constructed by Star Fleet Division.

The *Arbiter* group suffered early casualties. During the Makus Fleet Maneuver in February 2288 the *Eigar* and *Arashi* collided while attacking the *USS Monitor* (NCC-1713). The *Eigar* sustained massive hull damage and 12 fatalities but the *Arashi* was destroyed with all hands. However, the *Arbiters* soon proved that the design was a sound one; the *Talence* and *Thrace* regularly outscored and 'disabled' the heavy cruiser *Alkaid* (NCC-1829) during trials in 2290.

Tactics against the feared Bird of Prey raiders were devised, even though the intended main role of the PA ships still was to cripple invaders of cruiser size. Also, exercises were performed to hone the stealth and evasion skills of the PA crews. In the 2290 Primmin's Hunt Exercise, the *Accera*, *Jico* and *Armavir* were ordered to evade hunter groups of cruisers and fast frigates within certain volumes of space. After six days, only the *Accera* had been located. While speaking well of the abilities of the PA ships, the exercise unnerved Starfleet, as Klingon vessels of comparable capabilities (that is, Birds of Prey) could wreak untold havoc in six days.

Theoretically, use of the saturation drive was to be kept at a minimum at this stage. In practice, each six-month patrol sortie involved at least two or three accelerations, up to the established top speed of warp 22. Reports of intense spiritual (or, at times, rather carnal) experiences during saturation drive initially alarmed Fleet physicians. Yet no physical or physiological reason for the phenomenon could be found, and it eventually came to be dismissed as a psychosomatic effect of the extreme stress and overcrowding onboard. Crews spoke of "saturation space", base commanders of "overdrive madness". Thanks to factors like this, the perimeter fleet eventually attained a strong mythos, the crews being considered a very special breed. Service aboard PA ships was both coveted and feared, much like deep space exploration assignments aboard the heavy cruisers.

* * *

The third batch of modern PA ships, the 25-strong *Akula* subclass, was planned for commissioning in 2288 and contained two main variants, A and B. The B model was produced in response to financial realities and would be closer to the previous two batches in configuration than the initial, more ambitious A model. Several design changes were made, essentially reworking the *Akyazi* design around the massive Bia series deflector pod. LN-94 warp nacelles were fitted on swept back support pylons, held slightly inboard compared to the LN-90/91 units on the other *Akyazi* batches and the *Akula B*. CME-A impulse engines were fitted with ASL-5A emergency units. The engineering hull support booms were slightly longer than in the preceding batches and the Bia pod was slung underneath these. The support struts for the pod necessitated the reduction of aft torpedo tubes to the single unit of the original batch. Two Type VI phaser emitters were fitted to the pod, however.

The *Akula A* bridge module was more functional than the *Akyazi* or *Arbiter* modules; it was fitted with a full thruster package as well as the magnetic drive system. The more spartan B models had a standard *Arbiter* bridge. All vessels were equipped with 24 three-person lifepods, all located on Deck 5. The *Akula* class was also equipped with the best crew accommodation of the *Akyazi* group; all personnel were housed in two-bunk quarters, with shared bathroom facilities, and the CO, XO and Tactical Officer had their own cabins. None of this stopped additional supplies being crammed in wherever possible, as a strong tradition had already formed – even if this time, the boxes on the corridors might contain some Stiegel crackers or Delavian souffle rather than just TKL rations and crucial spares. The *Akula* batch also featured the most sophisticated communications and intelligence gathering equipment, including two holocom rooms on Deck 5. These could also be utilized as holographic entertainment facilities, a luxury previously reserved to cruiser-size starships. Intelligence drone information could also be analyzed here.

Avondale-built B variants carried deflector enhancement grids on the primary hull topside and either *Chisu* or *Atai* class shuttlepods rigged between the engineering hull support pylons. The craft were made independently impulse- or warp-capable via add-on propulsive modules as needed. For special assignments, a stealthy *Chisu* variant known as the *Sekasu* class was also sometimes embarked.

The first operational experience for the *Akulas* came in 2288 when the *Akula*, operating with the *Atago*, was challenged by Orion fast attack craft at the outskirts of the Kat system. In the mistaken belief that the Starfleet ships were there to close down their latest smuggling route, the Orions claimed that Starfleet had no jurisdiction in Kat as the system was not part of the UFP. After being informed that the Conservator of Kat II had requested Federation protection, the three Orion craft opened fire on the *Akula*; once she had informed the *Atago* (then 4 parsecs distant) the *Akula* neutralized two of the hostile craft with torpedoes. The third vessel was neutralized two hours later by the *Atago*. The *Akula* suffered only minor damage.

The standard deployment pattern for the *Akyazi* class vessels was intended to reinforce Starfleet's post-Axanar doctrine of spherical defense independent of fixed planetary assets; the PAs would delay invading vessels for as long as possible in order to give heavier forces time to gather and intercept from strategic dispersal points in the inner defensive spheres. The *Akyazi* design was supposed to be able to engage five *K'teremny* class battle cruisers or 'destroyers' for thirty minutes and inflict 20% casualties. Even though the PA ships now operated on multiple theaters, the choice of a modern Klingon vessel as the baseline for this projection was far from accidental: in the 2290s more than ever before, it was believed that the Klingons were the most brutal of the UFP opponents, bent on occupying the Federation at all costs. It is somewhat ironic, then, that the last *Akula* class ship was launched in 2293, just in time for the Khitomer peace conference. The events of this conference were the death knell for the attitudes that had turned Starfleet into one of the most powerful offensive forces within a thousand lightyears and a thousand years.

It soon became clear that the *Akyazi* class ships had been intended to play a vital part in the offensive against the Klingons planned by the militaristic conspirators in Starfleet and the Federation Council. Fortunately, none of the projected moves into Klingon space by the class ever took place. The perimeter ships chose to display their famed independence in defense of Federation integrity, their captains refusing to obey orders to the contrary and, in the case of the *Jersey*, completely disappearing for two weeks.

At first it seemed that the perimeter action vessels would go the way of the dreadnoughts and strike cruisers, decommissioned under the category of "excess offensive units", but this was not to be the case. It was recognized by both sides that each had other enemies to deter and borders to defend, and so each side was allowed to keep most of its PA or equivalent vessels. However, the stipulation was included that none be deployed along the Federation-Klingon border or within two weeks' travel at normal speeds; in addition, the first 15 vessels of the *Akyazi* group were placed in reserve depots, along with many Klingon craft, under the joint administration of the UFP and Empire. The remaining ships were then dispatched to assignments in other sectors. Crews were assigned for two-year periods, but the vessels usually called in at a starbase every six months, to replenish their supplies and allow the crew to get out and stretch their legs in a different environment before taking up their lonely vigil once more.

Over the next two decades, another ten vessels were retired, only to be hurriedly reactivated to reinforce Starfleet's shattered defenses along the Romulan Neutral Zone following the *Tomed* Incident (during which one *Akyazi*, five *Arbiters* and two *Akulas* were listed destroyed). From 2317 onward the class was assigned to less rigorous duties; system and starbase defense, convoy escort, customs, etc. Indeed, the class was instrumental in again defining escort type vessels as small, fast and heavily armed craft rather than the converted freighter designs of the desperate eighties. By the beginning of the Cardassian conflict, only 18 ships remained in service, all *Akulas* or *Arbiters*; two were destroyed while escorting convoys, a task which deprived them of the crucial advantage of superior dash speed. The remaining units were retired by 2349.

Starfleet briefly considered reactivating the perimeter ships after the first Borg crisis, and again in 2375. In the first instance, all the ships, already even more cramped than the originals had been due to early 24th century refits, were denied both modernization and activation. In the second case, three ships stored in the Sol system were temporarily powered up for patrol in the aftermath of the Breen attack. They were placed back in storage three months later, having never officially re-entered the active ship roster.

Frobisher

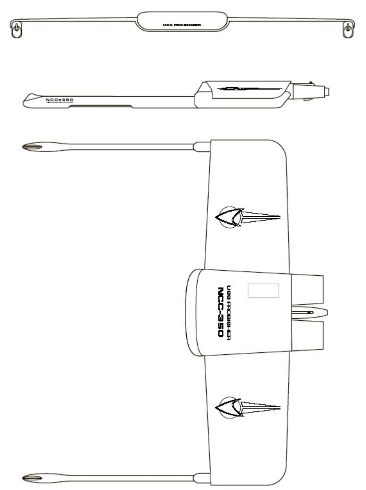
Clipper
2285-2333

Completed:	47
Length:	147.5 m
Beam:	165.2 m
Height:	12.5 m
Mass:	109,500 tons
Officers:	6
Crew:	18
Max. speed:	w 9.5
Endurance:	4 months
Weapons:	2 phaser IV emitters on nacelle forward ends 1 aft mine/torpedo tube w/80 gravitic mines or 20 fusion torpedoes (optional)
Shields:	1-layer globular shield
Transporters:	1 GP (3-pad); Mk IV

Ships of historical interest:

USS Frobisher (NCC-350)

SOURCES:	(D FSRC/aridas sofia) (N FRSC/aridas sofia) (H aridas sofia, own)


USS FROBISHER
NCC-350

Due to the numerous breakthroughs and setbacks in warp propulsion technology, efforts to increase the speed and range of Starfleet's lighter units proceeded at an uneven page between the 2260s and 2280s. When refitting of linear warp systems into couriers and light scoutships did not immediately yield desired results, Starfleet turned its attention back to the reliable Vulcan technologies that had served the *Richtofen* and *Tai* classes so well. For short range courier work, *Tai* production was increased and the logistics of the separable payloads further streamlined. For longer ranges, a successor to the *Richtofen* was devised, with a significantly more powerful reactor and a capacity for sustained warp 9.5 flight.

The improved *Frobisher* model featured slightly larger warp and impulse engines and simplified hull contours. Crew size, sensor capabilities, armament and other mission aspects remained more or less unchanged. Just an optional aft tube was introduced for mine deployment, or for a special Mk IISP light torpedo that had both sublight and warp firing modes yet was plagued by varied performance and reliability problems.

Much like the *Richtofen*, the *Frobisher* was to principally perform courier duties and secondarily engage in scouting and skirmishing whenever other forces were slow to arrive. In practice, the primary mission swallowed the entire production run of 47, and still left the operators wanting. Light scouts with higher propulsive performance were slow to emerge, though, so Starfleet continued to exploit the vessels in a variety of ways, and retained the broad 'clipper' designation on the *Frobisher* class until the end of operations in 2333. Armed conflict never was part of the *Frobisher* service history, though, and the operating crews were trimmed down to just ten people in the 2310s when the phaser armament was further automated and a completely defensive posture assumed.

The following generation of medium couriers abandoned the hot rod aspect of the preceding Vulcan designs. The *Condor* featured non-phaselocked engines of compact design tucked close to the capable and versatile hull, and provided much more operational flexibility even if settling for the speeds first reached in the 2280s. Certain organizations and private operators continue to wring ever-higher performance out of the *Richtofen*/*Frobisher* configuration, however. The design is a popular one for warp racing, in somewhat scaled-down form.

A handover of diplomatic packages between USS Nef Inka *(NCC-366) and the* Tai/Sait *craft* Hasaku *(VS 5022) reveals the conceptual similarities and differences between the two sizes of courier.*

Engage

Perimeter action ship
2285-2356
2374-2377

Completed:	28
Length:	225.9 m
Beam:	108.0 m
Height:	29.9 m
Mass:	555,450 tons
Cruise speed:	w 8
Max. speed:	w 15.0 (standard drive) w 22.0 (saturation drive)
Endurance:	6 years (2 years unsupported)
Officers:	8
Crew:	72
Weapons:	10 phaser VII emitters in 5 twin banks on saucer hull 2 phaser VI emitters on aft engineering hull. 4 phaser VIIP heavy pulse phasers on forward primary hull. 2 VIIP heavy pulse phasers on aft primary hull
Shields:	1-layer conformal forcefield Spherical deflector/shield system Deflector array on forward primary hull
Laboratories:	None
Transporters:	1 GP (6-pad); Mk V
Auxiliaries:	4 work pods

Ships of historical interest:

USS Engage (NCC-P1125), *USS Enfield* (NCC-P1129), *USS Estouin* (NCC-P1150)

SOURCES:	(D Eddie Sharpe) (N SotSF) (H Eddie Sharpe)

The life of a perimeter action ship was a lonely one. Ever since the first deployments of this type of vessel, PA crews would spend months at a time cruising in deep space, out of contact with any starbase, outpost or other vessel. This was not solely due to distances involved. The vast majority of PAs were deployed to the area of greatest threat, be it the Romulan or Klingon neutral zones or the Cardassian border. On such a deployment, the PA typically remained within a few days or at most two weeks of a Starfleet facility or staging area, and maintained her isolation out of choice.

Yet some areas of the Federation border have always been out of effective support range. Despite their distance from important (or interesting) features, these areas of space are vulnerable to a long range penetration attack or infiltration by enemy intelligence-gathering vessels. This was something Starfleet had learned well during its confrontations with the Klingons, for whom a conquest victory held intrinsic value even if the targets were devoid of true strategic import. For these faraway operational theaters, a class of PA capable of a cruise length of about 6 years and 2 crew rotations with minimal external support would have to be fielded.

The design for a vessel in this niche had been started along with that of the *Akyazi* class in 2269. Like the *Akyazi*, the *Engage* class high endurance perimeter ship was delayed for almost 15 years due to bureaucratic infighting, pacifist elements on the Federation Council and the controversial Procuia Report. These delays arguably benefited the design effort, however. When permission to build was eventually given in 2283, following the Taal Tan offensive, the design for the *Engage* was fully mature. The class had been based on the *Akyazi* spaceframe, but with several major changes. The forward cut-out was almost entirely filled in, two Type VIIP heavy pulse phasers were installed in the space provided and two more were mounted under the primary hull. An additional fusion reactor was fitted to provide more power for the combat systems. The aft torpedo tube was removed and replaced with a pulse phaser as well. The elimination of torpedo launchers was intended to remove a major type of expendable that the PAs frequently had to replenish (usually, torpedo stocks were used up even in peacetime, in live fire exercises and in the deployment of long endurance remote sensor platforms, which used photorp casings) and to store aboard (the pulse phaser armament took up less than 40% of the volume of a full torpedo system). The forward ventral phasers were also deleted.

The aft spaceframe was extended to fill in the triangular space between the aftermost part of the saucer section and the engineering hull support pylons. This section was mainly filled with cargo facilities, including space for two spare warp coils and two additional workbees. The propulsion section support pylons were extended by ten meters compared to the *Akyazi* group vessels. The warp field dynamics dictated that the LN-90 warp nacelles be mounted slightly closer to the propulsion section than in the PA-1010 design. The propulsion section was deeper than that of the *Akyazi* vessels, in order to accommodate larger antimatter storage facilities. Additionally, a deuterium storage tank was fitted under the primary hull. These latter two modifications were the most significant in tripling the endurance of the *Engages* over that of the *Akyazis*.

USS Engage*, fresh from the docks in 2284, is put through her paces at the Fleet Test Range. From an official Starfleet press release.*

The first vessel was commissioned in late 2284, with the construction run of 28 ships planned to last until 2295. The class was fitted with a variety of defensive features, including both conformal shields and an early form of deflector/shield bubble. In addition, an extensive electronic warfare suite was included, including a full cloaking device (removed in 2311). Despite the extensions and modifications, the *Engage* class was almost as stealthy as the *Akyazis*, with a low mass and warp signature; it was virtually undetectable by civilian sensors and exceptionally hard to get a lock on even for military units. Most of the systems installed on the *Engages* also saw service aboard the *Akyazis*. NCC-P1125, -1126, -1127 and –1128 had the same exterior angle on the leading edge of the primary hull as the *Akyazi* batch PAs. All subsequent hulls had this angle inverted, as in the *Arbiter* and *Akula* batches. NCC-P1130-45 were fitted with LN-91 engines and hulls NCC-P1146-52 were fitted with LN-94 warp nacelles. The primary impulse engine on all vessels was the CME model with the improved CME-2 fitted to NCC-P1129 onward. FORS emergency engines were fitted to the *Engage* and *Flore* but ASL units were fitted to all other ships.

Docking ports were provided aft of the bridge assembly (itself fitted with magnetic drives for use as a lifeboat) and between the propulsion section support pylons on Deck 3. Transporter facilities were limited to a single six-pad mark V unit; perimeter action vessels were not supposed to do much boarding, and in most situations an armed away party of six was enough to perform customs duty.

Like the *Akyazi* class vessels, the *Engage* class was built at a variety of shipyards around the Federation, resulting in a number of differences between individual ships. *USS Enfield* was built in the Singapore yards and featured the starburst deflector grid that had been used on several *Arbiter* group vessels built in that yard; *USS Firtina* also exhibited this feature. Other vessels differed slightly in internal arrangement and fittings.

As planned, the *Engages* were deployed to the remotest borders of the UFP. Only very rarely did they come to contact with other vessels. They were resupplied and recrewed once every two years by a tender vessel; as a result of this extreme loneliness, the *Engage* class was fitted with expanded entertainment facilities, including advanced VR systems. Every six years, the PA would return to a starbase for a 3-month period of resupply and repair. Due to the long periods of time that they were expected to spend inside their ships, crews for the *Engage* class were selected very carefully and subjected to a battery of psychological tests to establish their suitability for the mission. Perimeter action vessels were considered an elite assignment and competition was tough; only personnel with Class 1A deep space clearance were considered for candidacy, and only one in five of those who applied for transfer to the PA force were accepted.

In service the *Engage* class performed well, intercepting numerous smugglers and pirates trying to enter or exit Federation space through what they believed were lightly defended or deserted safe passages. Sometimes these interceptions involved an exchange of fire, sometimes not. In addition, in accordance with the policies of the day, several vessels of unknown origin were destroyed at the border after they refused to answer hails or slow down. Such questionable practices did not mean the deployment of the borderland PA fleet was unjustified, however: *Engage* class ships also intercepted at least three Klingon and four Romulan scout vessels in obvious missions of malice. Losses were infrequent. *USS Enrico Toti* disappeared without trace in 2299, and the remains of *USS Falk* were found 12 light years from her patrol area in 2314. Additionally, *USS Fylla* was scrapped in 2301 due to damage sustained engaging a Klingon vessel. Cardassian forces destroyed *USS Fox* in 2349 as she was performing convoy escort duty.

USS Firtina *in 2349. Looking old and battered, she is escorting a Starfleet convoy near Cardassian space. A modern sensor array has been fitted on her primary hull, but compared to an* Akyazi *class vessel viewed in the same year, she has far fewer visible modifications – testimony to her spacious cargo bays, now put to other uses.*

Out of the perimeter fleet, the *Engage* class vessels were to serve the longest in their original role. They were deployed on the far perimeters until 2339, when they were drawn in to a variety of postings, including convoy escort, planetary and solar system defense and customs duty in some of the unrulier portions of the Federation and its allies' space. The variety of upgrades they underwent ate swiftly into their extensive cargo facilities. Thanks to this sacrifice, though, the *Engages* at least avoided the ergonomics nightmares the *Akyazi* class vessels had turned into during the last years of their service. In the late 2350s, the *Engage* class was finally moved to inactive reserves, and was expected never to be reactivated.

In 2374, however, Starfleet needed every viable hull to guard against the Dominion. Five *Engage* perimeter ships were deemed suitable for reactivation and were deployed to system defense stations in the Sol and 40 Eridani systems. Breen forces destroyed *USS Engage* during their attack on Earth in 2376. Despite the exemplary service of the class during the Dominion War, the remaining ships were retired almost as soon as the threat on Earth receded. Their many inherent strengths were offset by their low accommodation standards, questionable serviceability and high structural age.

Juliet / Lautaro / Riga

Heavy corvette
2286-2333

Completed:	57 total: 17 *Juliet* built in 2286-87 23 *Lautaro* built in 2288-90 17 *Riga* built in 2293-94
Length:	212.0 m
Beam:	79.3 m
Height:	40.0 m 42.6 m w/mine or torpedo pods
Mass:	672,000 tons (*Juliet*, *Lautaro*) 672,550 tons (*Juliet*, *Lautaro,* w/2 torpedo pods) 673,200 tons (*Riga*) 673,750 tons (*Riga*, w/2 torpedo pods)
Officers:	9
Crew:	90 (standard, including 32 Marine boarding crew) 102 (w/pods, including 32 Marine boarding crew)
Max. speed:	w 11.0
Endurance:	3 years
Weapons:	2 phaser VI emitters in twin bank on fwd dorsal hull 2 phaser VI emitters in twin bank aft of bridge 2 phaser VI emitters in twin bank on ventral hull 2 phaser V emitters in single banks below impulse engine (*Lautaro*, *Riga*) Mine dispensers or torpedo tubes in 2 ventral pods
Shields:	1-layer globular forcefield Navigational deflector on bow
Transporters:	1 GP (6-pad), 1 emergency evacuation/assault (12-pad); Mk V

Ships of historical interest:

USS Juliet (NCC-3300), *USS Lautaro* (NCC-3317), *USS Riga* (NCC-3340)

SOURCES:	(D own) (N SotSF) (H SotSF)

As soon as the *Daring* class had crashed through the political and economic hurdles of heavy corvette introduction, development was begun on an advanced follow-up type – not just the *Renner* subclass to deliver on the initial promises, but an upgrade surpassing even those rather grandiose dreams. All parties involved were confident that an operational justification would be found for the new performance specifications, once they had been put to practice.

A lightweight version of the angular main hull was introduced. It now housed a balanced fit of just six phaser emitters (albeit still of the notably heavy Type VI), a lighter sensor assembly optimized for the corvette mission, and a simplified structural support system that left more internal volume available for the crew and ship's systems. Twin mine or torpedo pods could now be carried ventrally, providing greater flexibility than the integrated mine bays or launcher fairings of the original models. Crew requirements, while still formidable for a corvette, could be pushed down to a hundred thanks to increased automation and a more refined powerplant design.

The development of this hull was a rather straightforward process compared with the drawn-out history of *Renner* hull construction. More significantly, the warp engine integration process was greatly simplified as well. The first testbed, *USS Juliet* (NX-3300), was laid down in May 2286 and received her LN-64D engines in October, embarking on her initial test flights in early December. The engines, mounted laterally on short and broad pylons, effortlessly propelled the ship into warp 9. Unmanned tests soon pushed the envelope to the projected warp 11: at that point, series production of the type had already begun.

A Juliet *maneuvers amidst jetsam from a damaged Frenni transport. Although the original captioning of the shot refers to the aftermath of a Klingon raid, it appears the damage here is the result of a simple impulse drive failure. Starfleet press releases acquired a somewhat unpleasant tint during the early 2290s, downplaying the civilian heroics of traffic control vessels and highlighting the other half of the corvette mission profile. The* Juliet *here carries only one torpedo pod, possibly indicative of the initial reliability problems with the podded Mk 18 launchers.*

Seventeen *Juliet* heavy corvettes were initially ordered, and all were delivered before the end of 2287. As the recently redeclared Klingon war continued to loom over the Federation, these ships were used exclusively for border patrol missions near the starbases of the Klingon frontier. None of the older, pre-2270s types of corvettes could be expected to perform operations of this type, not with top speeds of warp 4 or less. Even the modernized *Darings* were having trouble keeping up with Klingon movements, and none were predicted to remain in active Starfleet service beyond 2299. This meant that more than fifty outdated vessels would have to be replaced soon.

To replace the last *Battleaxes* remaining in Starfleet service, Defense Command ordered a further batch of 23 heavy corvettes, differing from the *Juliet* baseline mainly in having extra phaser V units under the impulse engines. The batch had actually been designed back in 2286 as an alternate configuration for the *Juliets*, but the introduction of the extra phasers and an upgraded Lacerta computer system was delayed to allow the basic configuration to be adequately tested aboard the initial batch. The so-called *Lautaro* subclass was procured just as swiftly as the original batch: by 2290, Starfleet corvette strength was up to 67 despite the massive retirement of older types. By

2295, the numbers had reached 84, as the improved *Riga* class was introduced. Seventeen of these vessels were built between 2289 and 2295 with higher endurance LN-64E engines, lengthened aft hulls and a greatly augmented sensor array.

At this point, Starfleet decided that the aims of the programs had been met. An uneasy peace again held between the UFP and the Klingon Empire. Not only did this free the corvettes back to law enforcement and spacelane protection duty, but also released high numbers of frigates for these duties. Piracy of UFP vessels dropped to virtual zero, and the survival odds of merchant crews abandoning their ships in emergency increased by some 700% from the grim 2260s-2280s figures. Naturally, this did not come without a cost. The heavy corvettes were too heavy and too defense-oriented for their own good, and operating expenses were a continuing bane to Starfleet, which kept shuffling the ships from Defense to Logistics to Colonization Ops and back.

The selection of 2280s-era corvettes remained in service until the 2320s without major modifications. But when the time for midlife upgrades came, Starfleet found the vessels lacking in future potential. As soon as piracy was eradicated, their heavy armament had turned into a liability; their overcomplex powerplants did not help any. Most damningly, the high performance engine configuration precluded transatmospheric operations and use of surface bases, capabilities that would be essential in the new frontier theater of operations. By 2330, only a handful of *Lautaros* and *Rigas* continued the securing of spacelanes.

In the previous century, the retiring heavy corvettes would automatically have been sold to UFP allies for local use. In the 2330s climate, such a move was considered both unethical and economically unnecessary, thanks to the rapid market changes effected by the introduction of replicators. Arguments were made that the corvettes might still be useful in future conflicts, possibly in escort duties. The heavy corvette lobby was far less powerful than the perimeter ship fraternity, though, and had to yield to the prevailing rationality of Fleet disarmament and streamlining. Thus, virtually all the vessels were scrapped within two weeks of their decommissioning.

Kirsanov

Large perimeter action ship
2288-2351

Completed:	11
Length:	260.0 m
Beam:	127.1 m
Height:	41.2 m
Mass:	680,000 tons
Cruise speed:	w 7
Max. speed:	w 11.4 (standard drive) w 14.0 (saturation drive)
Endurance:	3 years
Officers:	28
Crew:	124
Weapons:	12 phaser VII in 6 twin banks in saucer hull 2 phaser VI on aft engineering hull 4 photon torpedo tubes (2 forward, 2 aft) w/48 torpedoes in primary hull mounts

Shields:	1-layer conformal forcefield WADE plates on forward of primary hull (either side of torpedo launcher cutout)
Laboratories:	None
Transporters:	1 GP (6-pad), 2 emergency evacuation (12-pad), 1 cargo; Mk V
Auxiliaries:	2 work pods

Ships of historical interest:

USS Katyusha (NCC-P1173), *USS Köln* (NCC-P1177), *USS Fife* (NCC-P1172)

SOURCES:	D (Eddie Sharpe) N (SotSF) H (own)

The *Kirsanov* class large perimeter action ship stands out in Starfleet history as the only class of vessels to be given that designation. Officially, the design was a response to operational lessons learned with Starfleet's first generation of perimeter action ships, the *Kiaga* and *Agilis* classes. These vessels had performed admirably against a number of foes, including the Klingons and Tholians, but a number of weaknesses had also been exposed. On certain occasions, it was necessary for PA ships to act in conjunction with each other or with vessels of other classes. The communications equipment provided in the *Kiaga* and *Agilis* vessels was found to be inadequate to the task – after all, the vessels had been designed to run silent, relying on a very specialized, one-way type of targeting data feed. In addition, operations involving only PA class ships were found to be extremely difficult to co-ordinate due to the lack of facilities for multi-ship command and control.

It was decided that the best way to correct these problems would be the creation of a single class of vessel, somewhere between a PA and destroyer in size, which could operate as a PA command ship. In addition, the new *Akyazi* class PA vessels would have vastly improved C^3I facilities, yet in practice they would still require the assistance of a pack leader vessel. Initially this new design was designated a perimeter action command ship, but this was changed in late 2289 to large perimeter action ship. Either designation helped disguise the other, more sinister reason for the creation of such a class of vessels: Starfleet wanted a vessel that could coordinate *offensive* missions involving the stealthy and heavily armed yet so far primarily defensive perimeter skirmishers. Construction of the new class, by now designated *Kirsanov*, began in early 2290, with six ships completed by the end of that year and five more in 2291. All eleven vessels were constructed in Martian or Alpha Centauran shipyards and, despite the ongoing overall escalation, were completed on time.

The design was based on an eight deck, saucer shaped primary hull of 127.1 m diameter with a small engineering hull of two decks attached directly to the bottom of the saucer. From this engineering hull (which contained little more than the warp core, antimatter storage and some communications equipment) two pylons, sweeping back and down, mounted two LN-62 warp nacelles. A cutout at the forward edge of the primary hull mounted two photon torpedo launchers, in a manner similar to the *Akyazi* class vessels. Two more cutouts were made on the extreme port and starboard sides of the saucer, facing aft. Each of these allowed a photon torpedo launcher to cover the aft sectors. Twelve phaser VIIs in twin mounts were located on the primary hull and two phaser VI single mounts were installed on the aft dorsal and ventral surfaces of the engineering hull. These phaser mounts were, like the *Akyazi*'s, JAKA models, capable of brief, extremely powerful bursts when necessary.

The bridge was fitted with magnetic drives and had full separation capabilities, and was designed to support up to 12 personnel for up to three weeks, a necessary precaution in the borderlands. Four-person escape pods were fitted on the ventral surface of the primary hull, and the engineering hull could be ejected in an emergency, as could the antimatter storage cells. The forward part of the engineering hull was crammed to capacity with the state of the art DSFH communications system, and additional systems were located in the lower primary hull. These were supported by the Mark III Combat Information and Control System (CICS), which allowed the *Kirsanovs* to control up to 15 other vessels. This controlling would be done from the Flotilla Operations Room on Deck 5; in combat, this would be under the command of a Flotilla Commander, usually a captain, and the *Kirsanov* herself by a commander.

Navigational deflection was provided by two Wide Angle Deflector Emitters, which were mounted on the forward primary hull, either side of the forward torpedo cutout. *Kirsanov* class ships carried two workbees, but no other auxiliaries were carried on a permanent basis although docking facilities were provided on Deck 2 and it was possible to convert one of the forward cargo bays to a small shuttlebay (occasionally used for customs assignments in the later years). Two intelligence drone launch bays were also fitted.

Operational deployments of the *Kirsanovs* started immediately after acceptance trials had been completed. Initial exercises were highly satisfactory; in December 2290 a flotilla of five PA ships (three *Akyazis*, two *Arbiters*) under the direction of *USS Katyusha* (NCC-P1173) engaged the *USS Affiliation* accompanied by *USS Canopus* and their support groups. The dreadnought was 'crippled' and the cruiser 'destroyed', along with a scout, two destroyers and a frigate. All the PAs were 'destroyed', but they had held up the intimidatingly strong simulated invasion force for one hour, two minutes, having relied completely on the *Katyusha* for targeting and coordination. The experiment was deemed a great success. The invader could no longer defeat the stealth of a PA group by listening in on its external targeting data flow. The defender in turn could operate against larger adversary groups than ever, by pooling multiple PA ships without curtailing their tactical independence.

Although Starfleet readily released material on the launch and testing of PA vessels, visual records on actual operations are relatively rare. USS Ierax *here is seen rendezvousing with two* Engage *PAs, prior to an operational sortie where the ships would maintain a much greater separation. An old* Kovaris *destroyer is floating in the background, possibly serving as bait for the trap set up by the PAs.*

The eleven PKAs were dispatched to the various perimeter defense sectors to assume their roles as defensive coordinators – and as the possible leaders or any offensive into the Klingon Empire. *USS Sahin* (NCC-P1180) was conducting offensive exercises as early as June 2291; the results of these exercises are believed to have been distributed to the commanders of all perimeter action groups. When, in 2293, the militant conspirators struck, three of the *Kirsanovs* were supposed to lead hunt-and-destroy 'lion prides' of perimeter action vessels against Klingon border defenses, so that heavy units could slip in through the holes created. However, here the conspirators had misjudged their support badly. In the event, only one of the *Kirsanovs*, *USS Köln* (NCC-P1177) agreed to follow the orders, but her captain was prevented from proceeding by a combination of the PAs that were supposed to make up the strike force, and by the refusal of several of his officers to carry out the strike orders. The captains of two other *Kirsanovs*, *USS Ierax* (NCC-P1174) and *USS Kvikk* (NCC-P1178) later admitted that they too were supposed to attack the Klingons.

Post-Khitomer, three of the *Kirsanovs* were retired and used as a source for spare parts for the remainder, which were distributed to perimeter defense locations far away from the Klingon Empire. Most of the other perimeter action ships followed the *Kirsanov* lead. The ships subsequently saw action against the Tholians and also took part in a variety of anti-piracy operations. In the early stages of the Cardassian conflict, *Kirsanov* class vessels were used as convoy escorts, notably the *USS Fife* (NCC-P1172) and *USS Ingolf* (NCC-P1175). By the early 2350s the *Kirsanovs* were too small for deep space duty, and their weaponry and communications gear, despite numerous upgrades, were too old to be useful. With Starfleet no longer tasked with perimeter patrol of the kind the PKAs had been built for, it was decided that the *Kirsanov* class could be safely retired. It was briefly considered that they be reactivated for their picket abilities when the Borg threat was discovered, but upgrades to unmanned sensor systems were deemed the more practical alternative. All the *Kirsanovs* were left in the surplus depots, where they theoretically still remain available.

Asmodeus

Light corvette
2292-2315

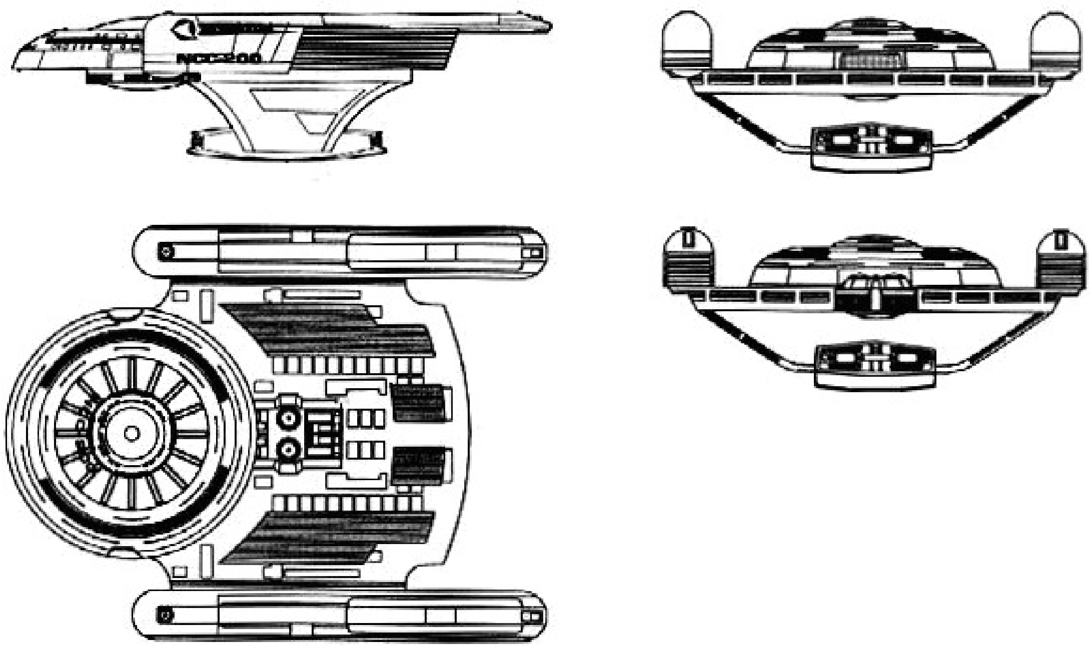
Completed:	62
Length:	114.0 m
Beam:	88.9 m
Height:	30.5 m
Mass:	111,100 tons
Cruise speed:	w 4
Max.speed:	w 7.0
Endurance:	6 months
Officers:	4
Crew:	21
Weapons:	1 phaser V emitter on bow 4 medium torpedo tubes w/ 60 torps in ventral pod
Shields:	1-layer forcefields Navigational deflector beam on bow
Laboratories:	None
Transporters:	1 GP (6-pad); Mk V Most ships later brought to Mk VI standard
Auxiliaries:	None

Ships of historical interest:

USS Asmodeus (NCC-5200)

SOURCES: (D SFP)

(N SFP)
(H SFP, own)



The brief warming of relations between the UFP and the Klingon Empire in 2287-88 did little to slow down Starfleet acquisition programs. This was only to be expected, considering that such undertakings involved time intervals far longer than the fleeting gust of détente. Yet some programs were unfortunate enough to be caught at a vulnerable moment. The design process of the *Fury* frigates was practically completed yet construction contracts not yet signed in 2287; the effects of the cancellation of the project could not be reversed when bellicose feelings again surfaced in 2289. Time was running short now, and Starfleet began to worry that the replacement *Decisive* frigates would not be ready for the inevitable invasion across the border.

Starfleet's original hope had been for the direction of that invasion to be from Ardana, Ajilon and Archanis into the heartland of the Empire. Fleet strength was almost sufficient for attack now, yet the mechanisms of space warfare always strongly favor the attacker. If the Fleet strategists had miscalculated, if the détente had delayed the timetable a crucial year or two and the Klingons struck first, the role of the defender would be much harder to play with the existing number of vessels. To protect the vulnerable UFP commerce, Starfleet began equipping and fielding ersatz escort vessels whose main requirements were convoy speed and some modicum of firepower. To secure the border star systems, makeshift defenses were also needed, but the requirements there were quite different.

The elite force of system defenses were the heavy corvettes, bolstered whenever possible by frigate units. No ships from the higher end of the arsenal could be spared for the role, though, if Starfleet wanted to retain the initiative in the battlefield. Two types of lower-end vessels would be needed in their place: a minelayer and a torpedo platform. The former could be converted out of light civilian and Fleet transports at a moment's notice, but the latter took some planning and preparation. In 2291, the decision was made to use the *Garneau* spaceframe as the basis.

It was a surprisingly simple matter to fit a torpedo pod in place of the towing fixture of a *Fisher* class light tug, the most practical and affordable *Garneau* variant available at the time. *USS Asmodeus* initially experimented with a stock *Miranda* pod mounted on reinforced pylons. The weapon that ultimately went to production, however, was a barebones four-tube Mk 26 launcher assembly that lacked all the sensor systems of the *Miranda* pod. A total of 60 shots could be stored in the pod, enough for three of the 'light corvettes' thus equipped to carry the battle for a day. For targeting, the ships were completely dependent on external assets. A CLLT secure datalink was carried; in addition, fire control required either a proper starship or a standard system defense network. The *Asmodeus* forces were thus deployed mainly to boost the defenses of already guarded locales, rather than bring new systems under Fleet protection.

Within a year of project start, sixty *Asmodeus* light corvettes of production standard were completed and deployed. This was still strategically insufficient, yet a very good start in fortifying the borders without weakening the offensive forces. Production would surely have continued if not for the Khitomer peace. Just as surely, the cessation of hostilities meant a sudden end for the program – not only for production but for operations as well. The vessels had no peacetime role whatsoever, and were quickly recalled to port and mothballed. Their value on other potential war theaters was limited as well, since their weapons were largely reliant on fixed targeting systems of now outdated type.

One aspect of the class was not outdated, however. The production line had been little modified, and could swiftly be converted back to producing *Fisher* tugs. Their number was soon brought to 93. Production beyond this was discontinued only because Logistics Command foresaw the complications of container operations resulting from the post-Khitomer spatial expansion. The same complications made it unwise to retrofit the *Asmodeus* ships into tugs. Forty units were disarmed and sold off to foreign users as light transports. This was not an ideal solution for either side, since the *Fisher*-type interiors of the ex-corvettes couldn't accommodate as much cargo as those of the other *Garneau* variants, but at least it allowed Starfleet to recoup some of its investment in the class.

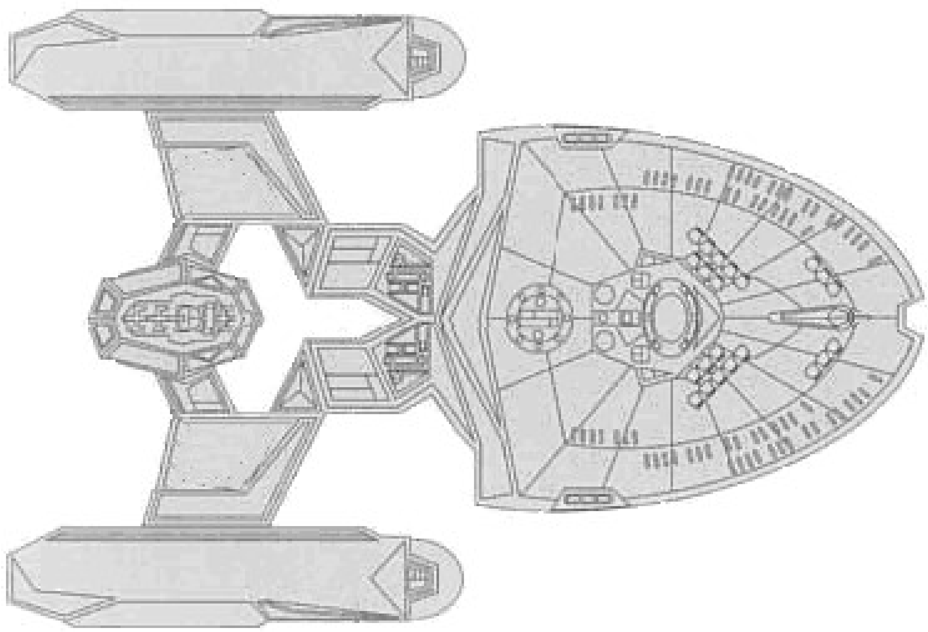
Since Starfleet did not have to weather the feared frontal assaults on the border worlds, history does not remember *Asmodeus* corvettes of distinction.

Merced

Corvette/escort
2312-

Completed:	51 total: 16 *Merced* Mk I corvettes (later corvette / escorts) built in 2312-14 32 *Merced* Mk II (*Nomad*) corvettes / escorts built in 2325-27 3 *Merced* Mk III (*Frontier*) heavy corvettes / escorts built in 2348
Length:	187.0 m (Mk I, II) 187.2 m (Mk III)
Beam:	122.0 m (Mk I, II) 122.4 m (Mk III)
Height:	41.6 m
Mass:	174,000 tons (Mk I, II) 303,000 tons (Mk III)
Officers:	8
Crew:	42
Cruise speed:	W 5
Max. speed:	W 8.6 (Mk I, II) W 9.2 (Mk III)

Endurance:	1 year
Weapons:	1 phaser VII emitter on dorsal superstructure 2 phaser V emitters on dorsal hull, port/stbd of bridge 1 phaser V emitter on ventral bow 1 light fwd torpedo tube w/ 50 torpedoes on dorsal bow 1 light aft torpedo tube w/ 25 torpedoes on ventral stern
Shields:	1-layer conformal forcefield Navigational deflector on bow
Transporters:	2 GP (4-pad), 2 emergency evacuation (8-pad), 2 light cargo; Mk VI
SOURCES:	(D LUG) N TNG (H LUG)



The shifting political climates of the early 24th century also greatly influenced the position of corvettes. Convoy escort assignments and anti-piracy operations were rapidly decreasing in importance. Full starships such as the *Daran* and *Miranda* frigates were handling 'coastal defense' operations in the expanding operational theater. Border patrol was becoming impractical as a concept, save for the Romulan Neutral Zone and certain other special areas. What remained of the traditional corvette mission profile was traffic control and law enforcement. But such mundane duties deep inside the Federation could not be plausibly assigned to vessels as heavy, expensive and specialized as the *Daring* or *Juliet* classes.

As far as Starfleet could see, the future of the corvette lay in modest dimensions and equally modest if flexible mission gear. The lineage that would be perpetuated was not the *Daring* or *Juliet* one, but that of the *Antares* series. The Mk IV design of that series had recently entered service, while Mk III was bowing out; plans for Mk V were already well advanced, featuring only incremental upgrades. For Mk VI, Starfleet hoped to introduce improvements that would guarantee a future till the mid-century at least.

Among the first and most crucial changes would be warp propulsion. To succeed the MACE, Shuvinaaljis was already testing a beamier but otherwise equally compact LANCE light, non-phaselocked circumferential engine. Computational predictions offered warp 5 cruising on the new scale, and a dash speed close to warp 9. Early tests were promising enough to secure orders for the engine, thus also dictating Starfleet's choice for impulse propulsion. A unit twice as powerful as the *Antares* system was needed for dragging the LANCE coils through the required sublight maneuvers.

Meanwhile, mission system choices were being made independent of propulsive considerations. The new mission profile did not call for minelaying gear or auxiliary craft and their associated secondary hull facilities, and Starfleet no longer saw a need for large holds either for courier or endurance boosting purposes. It didn't take long for the design committee to drop the requirement for a secondary hull altogether, and the designers were prompted to go ahead with a single integrated hull configuration. What had until then been considered *Antares* Mk VI now became an all-new corvette class, quickly gaining the class name *Merced* for a theme of Earth seaports of note.

The Mk 28 torpedo launcher was still current for offensive and defensive work, and two would be packed aboard the new corvette. As for energy weaponry, Starfleet went for the old *Thunderbolt*/*Battleaxe* configuration, with a single heavy Type VII cannon atop the dorsal superstructure aft of the bridge to complement the regular Type V emitters elsewhere. Fire control and sensor capabilities were to be upgraded apace with advances in performance and affordability, again introduced to new batches of corvettes but not necessarily retrofitted to existing batches. A modular approach for fitting the systems was thus not dictated.

Within these constraints, Arbin & Lidde created a hull design that matched the *Antares* in capacity but resembled the small *Thunderbolt* in shape. Atop the spade hull lay the command bridge, aft of it the phaser VII turret. On Deck 2, there were two phaser V emitters flanking the bridge and one heavy tractor beam turret capable of handing aft angles; inside were fire control facilities. The wide Decks 3 through 5 provided main accommodation, with berthing in comfortable two-person cabins that all had exterior portholes for psychological comfort. Replicator technology offered improved sustenance and increased endurance without requiring large holds, galleys or comparable facilities. Also provided on Decks 3 and 4 were 22 three-person lifepods for the 50 crew, alleviating another concern of previous corvette and perimeter ship designs. Interstellar missions as long as twelve months could now be projected; Starfleet was on the road to redefining 'local defense', putting greater and greater distance between the locations to be protected and the forces doing the protecting, both physically and psychologically.

The forward torpedo launcher was housed on Deck 3, its barrel shamelessly protruding through the dorsal bow surface to give the ship an aggressive silhouette. Deck 5 featured a small notch at the very bow to accommodate the navigational deflector system, and two clusters of RCS engines to port and starboard. Deck 7 was but a narrow canoelike structure for mounting primary sensors and a secondary, forward-facing tractor beam, plus the aft-firing second torpedo launcher and its magazines.

Power generation was divided in two, with separate port and starboard reactors riding aft of the hull and cross-feeding to the warp nacelles and to an impulse pod in between. There was little need to access the lower levels of the tilted warp cores, or the pressurized compartments of the impulse assembly, formally labeled Decks 8 and 9.

The first *Merced* batch, built in 2312-14, comprised 16 vessels. Smoothly replacing the *Antares* Mk IV group, they adopted its traffic patrol and troubleshooting mission, but failed to diversify to other roles. The second batch, constructed in 2325-27, was for all purposes identical to the first, and replaced *Antares* Mk V. While production numbers were doubled over the inaugural batch, it was quickly determined that the expanding theater of operations would be too great a challenge for such a slow design. Thus, the third batch was to bring about a leap in propulsive abilities, as LANCE was succeeded by LF-25, again doubling the coil mass without significantly altering the external dimensions. Yet only a few examples of *Merced* Mk III were ever fielded – the all-new *Saber* design offered greater overall performance and significantly more growth potential.

To be sure, all the *Merced* batches enjoyed longer service than any of the *Antares* ones, but in duties of little consequence. Few managed to make a mark in history: *USS Trieste* (NCC-37124) is mentioned in most reference works, but only because the famous sentient android Data served aboard her after being accepted to Starfleet. Lamentably, once again the paths to glory were to be chiefly found in battle – and thankfully, the class saw little of it.

At the onset of the Border Wars, the *Merceds* were pressed to escort duty, and appropriately redesignated. Lacking in sustainable speed, they were tasked with protecting slow convoys, while more modern *Chimera* escorts and various frigates covered fast convoys and priority shipments. This proved a blessing to the *Merced* class, as few Cardassian, Talarian or Tzenkethi attacks were actually directed against the slower shipments. In 2354, *USS Pumori* (NCC-27029) was lost to Cardassian action, along with the three light freighters she was protecting; the loss prompted the retirement of all the remaining Mk I vessels. The newer *USS Boston* (NCC-37007) fared much better against Tzenkethi aggression in 2358, admittedly fighting alongside two *Sabers*. No other shipment escorted by the older corvettes came under serious attack, and the Mk II could be retired with zero combat losses by 2367. Several units were disarmed and sold forward, their outdated technologies deemed harmless enough for export and their military potential nil.

The three heavy Mk III vessels continue serving in a training role, grooming new crews for *Saber* corvettes. The formal subclass name *Frontier* has been semi-officially applied for the trio in a favorably received gesture.

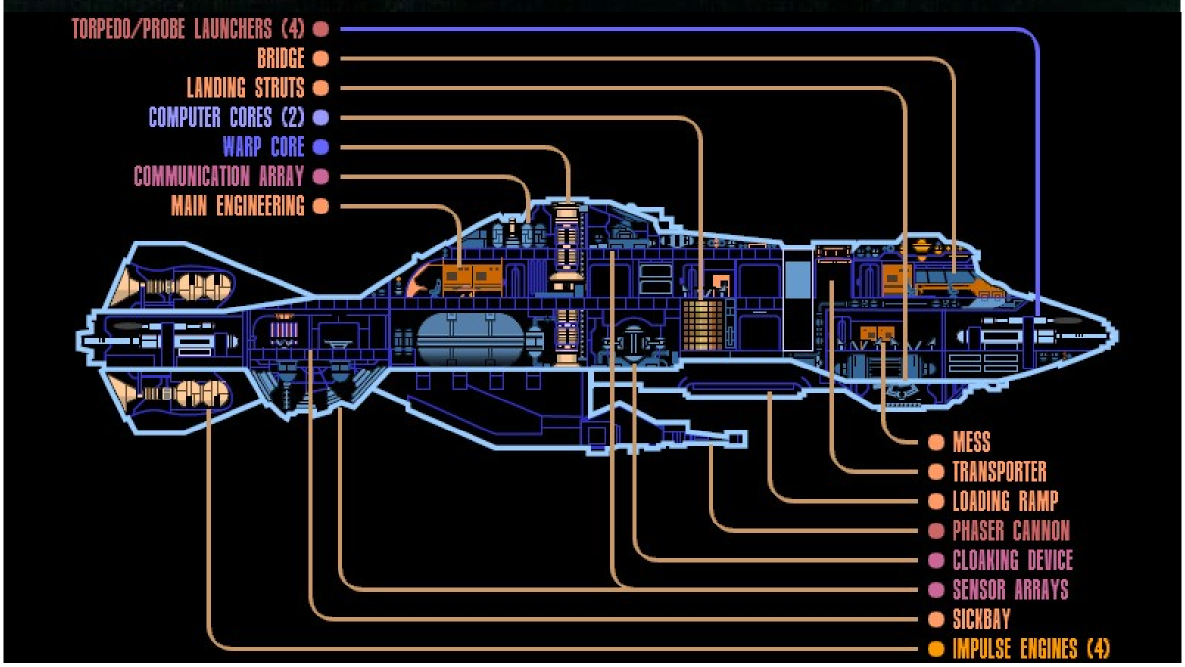
Condor

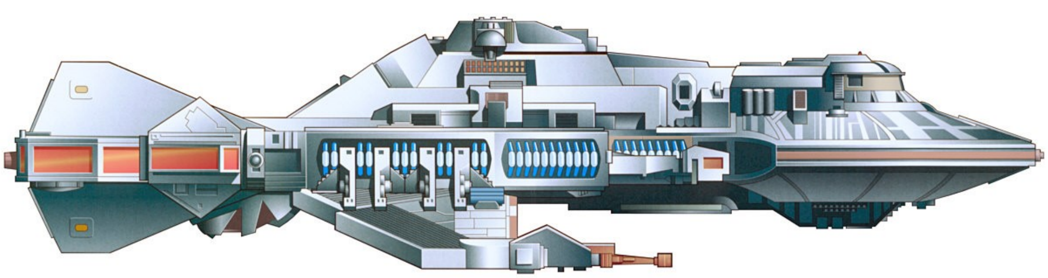
Courier
2320-2364

Completed:	183
Length:	82.2 m
Beam:	90.0 m
Height:	20.9 m (landing gear retracted) 22.3 m (landing gear extended)
Mass:	174,000 tons
Crew:	8
Passengers:	12-40
Cargo:	100 tons (batch I) 40 tons (batches II, III)
Cruise speed:	W 6
Max. speed:	W 7.0
Endurance:	9 months
Weapons:	2 wingtip phaser VI emitters 1 phaser V emitter on dorsal aft hull 1 phaser V emitter on ventral aft hull 1 medium fwd torpedo tube

1 medium aft torpedo tube (batch II)
2 medium aft torpedo tubes (batch III)

Shields:	2-layer conformal forcefield Navigational deflector on dorsal bow
Transporters:	1 GP (2-pad); Mk VI (batch I) 1 GP (2-pad), 1 emergency evacuation (6-pad); Mk VI (batches II, III)
SOURCES:	D TNG, DS9, VOY N VOY (*Condor* own) (H own)





The introduction of multiphasic warp technology had little initial effect on small craft like shuttles and runabouts. The engines of these craft were less finely tuned than starship engines to begin with, and usually paid little attention to cruise efficiency. It was the upper tier of small warp vessels that stood to gain the most – and as with the introduction of linear coil technology, the benefits were mainly in cruise performance and economy. However, in courier vessels, cruise speed was pretty much equated with maximum operational speed, and any improvement in this field thus translated to expansion of the performance envelope.

The first commercial manufacturers to take advantage of multiphasics were AsTrans of Deneva and Ardep of Bolarus. The former fielded a full range of light and medium transports between 2315 and 2330, and in poetic revenge, ensured that Star Fleet Division's *Deneva* class would drop out of the commercial scene. The latter, however, operated in a market niche devoid of Earthly competition since the early 22nd century: Ardep starcraft were optimized for transatmospheric performance. The combination of warp drive and the ability to replenish, rest or hide on a planetary surface offered a unique range of applications, from local defense to ambulance duties or tourism.

In 2318, Ardep presented the *Ju'day*, an 82 m transatmospheric transport capable of sustained warp six. The winged vessel only offered some 60 m^3 of actual cargo space, but this was provided with neat, integrated loading cranes for ease of access. The three-deck forward hull could house the six to eight crew and a dozen passengers in comfort, but space for up to 40 passengers was available through rearranging of movable bulkheads in the hold area and installation of suitable modular interiors. Unlike the more capacious competitors in the 150,000 ton mass niche, the *Ju'day* was a rugged vehicle, virtually independent of infrastructure beyond refueling stations. Extensive instrumentation around the bow section allowed the ship to operate in areas with poor or nonexistent traffic control networks. Multifuel impulse engines had impressive safety margins, and there was power to spare from the main antimatter powerplant.

Kicking up dust, USS Westwind *approaches the crash site of dolamite freighter* Kalandra*. The* Condors *provided rapid response to a greater range of emergencies than any previous design. Starfleet did its best to keep them free of military obligations, so that their versatility could better be exploited.*

Here was an opportunity Starfleet could not ignore. Its own attempts at finding a replacement to the frigatelike heavy corvettes had resulted in the far less flexible *Merced* design whose atmospheric abilities were more theoretical than practical. Parallel procurement of *Ju'days* would offer significantly expanded capabilities in colonial support and control. The fast vessels would also excel as long range couriers, especially on routes where only the core region endpoint offered a service infrastructure. In 2320, the first twenty vessels were purchased, and named the *Condor* class.

As the *Condors* would be tasked with law enforcement and defense, they were armed from the outset with wingtip phaser VIs, dorsal and ventral defensive phaser Vs and Mk 20 bow torpedo tubes. They also received a full suite of pursuit, tracking and fire control sensors, most of them in a tight ventral cluster near the stern. A second batch of eighty was equipped with CSNDR datalink and High Point attack scanners for medium range targeting. To make good use of the increased targeting range, the batch carried Type III torpedo ammunition and also mounted a stern tube, an addition that required some engineering effort as the commercial model structures did not cater for such placement. The third and final batch, basically similar in equipment to batch two save for the use of a twin aft launcher, brought the total number to 183. The latter two batches sacrificed almost two thirds of their cargo capacity for the improved weapons systems. Yet the compact vessels were primarily considered couriers, and some insisted on referring to them as craft, despite the full starship registries and names assigned to them.

During the Cardassian offensives of 2355-58, the identity crisis largely kept the *Condors* from seeing combat. Their local defense prowess was not recognized, nor did system commanders have any of these craft under their direct authority. While the Marines often used formations of *Condors* in small scale raids on Cardassian outposts or in countering similar Cardassian raids, the ships were formally always ‘on loan’. Yet the Marines openly envied the atmospheric agility of the ships over that of the primary Marine rapid deployment vessel of the time, the *Saber* corvette.

Regular upgrades would no doubt have kept the class in service well into the latter half of the 24th century. However, diminishing interest in colonial courier duties after the Border Wars led Starfleet to sell its *Condor* fleet almost entirely to civilian operators. Several militaries swiftly purchased ex-Starfleet *Condors*, recognizing them as the perfect midsize combatants. If not for UFP export limitations, Ardep could have made significant profit in the market niche so far dominated by Klingon Birds of Prey. Despite such limitations, several UFP adversaries acquired *Ju’day* units that were put to action against Starfleet. The Maquis counterinsurgents operated half a dozen such craft, reputedly possessing some datalink-equipped ex-*Condors* as well.

A Maquis Ju’day *strafing* USS Defiant *in 2373, at the height of the rebellion. Wingtip phasers have been supplemented by numerous heavy disruptors, and shielding boosted to withstand direct phaser hits. Torpedo armament rivals that of late-batch* Condors*. Unidentified additional systems speckle the exteriors. The kind of ingenuity used by the Maquis in upgunning their ships and craft would surely have multiplied Starfleet firepower against the Dominion as well, yet little effort was made to adapt civilian designs into combatants in that crisis.*

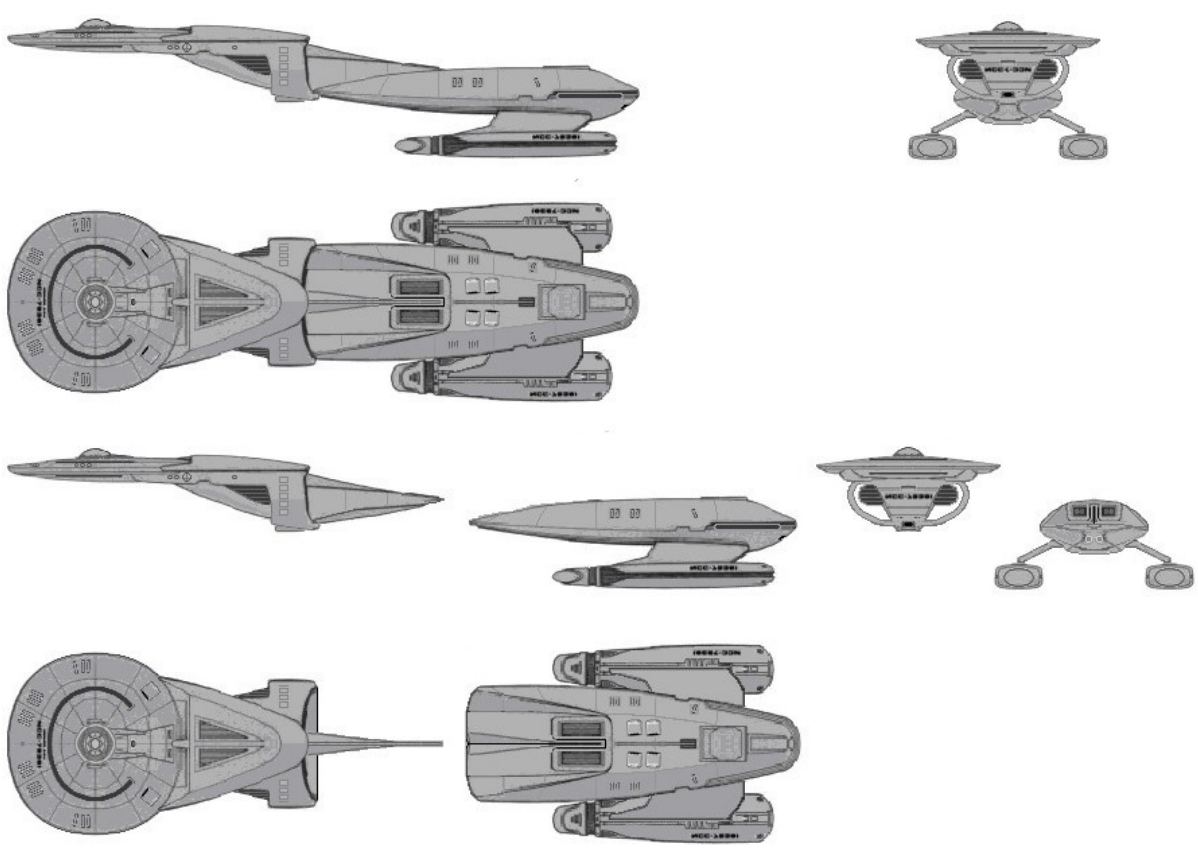
Currently, some 450 *Ju’days* are believed to remain operational. Ardep terminated production in 2365 in favor of the more refined *Drex’lar* model, and has agreed not to provide further support for users classified by Starfleet as security risks. Recent SF Marine interest in Klingon planetary assault tactics has prompted speculation that Starfleet might purchase further transatmospheric high warp craft in this category. No concrete procurement plans have been formulated as of 2377, however.

Moscow

Scout
2342-

Completed:	22
Length:	155.0 m (Mk I) 147.2 m (Mk II)
Beam:	45.0 m
Height:	35.0 m (Mk I)

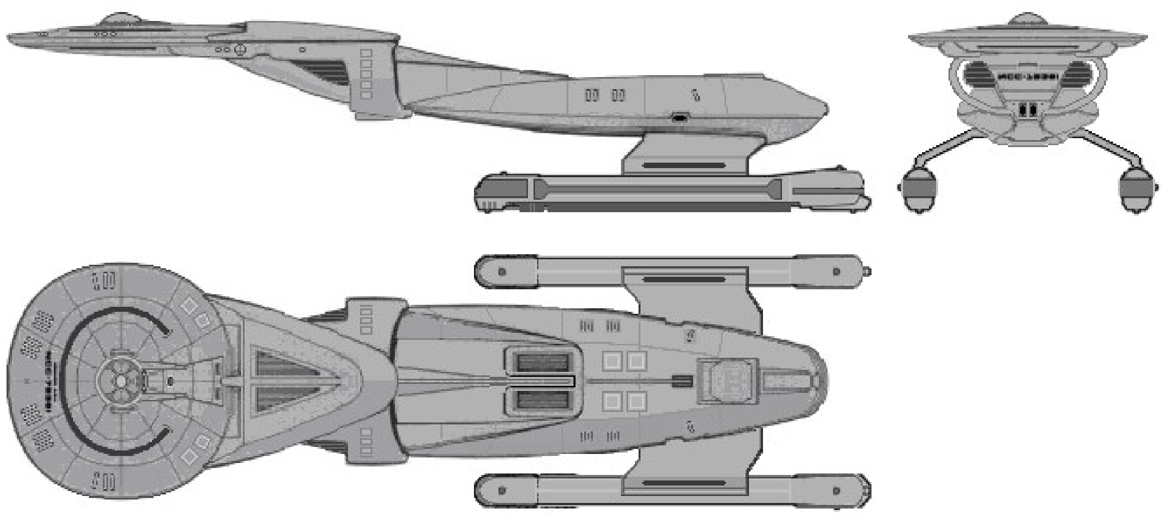
	29.9 m (Mk II)
Mass:	123,200 tons (Mk I) 116,300 tons (Mk II)
Crew:	45
Cruise speed:	W 7
Max. speed:	W 9.0
Endurance:	15 months
Weapons:	2 phaser V strips on primary hull 2 phaser V strips on engine pylons (Mk I) 2 phaser V strips on secondary hull stern (Mk II) 2 fwd torpedo tubes w/ 22 torpedoes or probes on scoutcraft keel (Mk I) 1 fwd torpedo tube w/ 28 torpedoes or probes on scoutcraft keel (Mk II) 2 aft torpedo tubes w/ 8 torpedoes on secondary hull stern flanks (Mk I)
Shields:	2-layer conformal forcefield Scoutcraft navigational deflectors on connecting neck flanks Secondary hull navigational deflectors in dorsal bow depression
Transporters:	1 GP (4-pad), 1 light cargo; Mk VI (scoutcraft) 1 GP (6-pad), 2 emergency evacuation (12-pad), 1 cargo; Mk VI (secondary hull)
Auxiliaries:	2 shuttlepods
SOURCES:	(D FASA, Mk I redrawn to match dimensions, dimensions corrected for Mk II) (N *Moscow*, DW-21, *M'Benga* FASA, *Graceful*, *Wei-Fa* LUG) (H FASA)



In the first half of the 24th century, the role of small scoutships was steadily and significantly reduced as the radius of scientific and tactical reconnaissance missions increased beyond the reach of low-tier vessels. Tactical scouting across short ranges could also increasingly rely on compact craft as their performance was increased by the gradual adoption of multiphasic technologies. It was thus no foregone conclusion that the 2339 initiative for a long range scoutship in the 150,000 ton category would yield viable results.

The combination of range and speed dictated by the expanding area of responsibility was just half the equation. For mission success, the small ship would also need stealth and agility – Starfleet demand was for a tactical scout capable of spying on guarded and defended military installations and formations. Changes in the operating environment complicated matters in this respect as well. With the use of cloaks out of the question after 2311, reductions in physical dimensions and warp signature were the only options available to the designers.

The inherent stealth advantages of the ring-type warp drive were brought up at this point. Yet the requirement for compact dimensions put ring drives at a disadvantage: for decent cruising speed across the specified ranges, a ring some hundred meters across would be needed, defeating both stealth and agility. The solution of ASDB was a two-stage system, where a small, stealthy and agile ring drive craft would ride on a cruise stage propelled by relatively heavy twin nacelles of modern make and high performance. Separation would take place outside the sensor range of the target, and the supporting stage would remain crewed and alert for the eventual recovery.



The original configuration of the Moscow *featured the best small warp engine of the day, the brand new GD-12. Optimized for high cruise performance with correspondingly high plasma loads, the engine had very poor stealth characteristics, but needed none thanks to the two-stage concept of the scout. The onboard reactor was incapable of providing coil saturation even in theory, leaving the scouts with a top speed of warp nine even when the engines in their other prominent application in* Chimera *class could be commanded to deliver more.*

The scouting end of the system was quickly sketched out: a saucer some 45 meters across, two decks thick in the middle but just one at the habitation-dedicated rim, would feature two Type V phaser strips, and mount the ring drive below a trailing edge hull extension. Sensor systems would be housed in the forward upper part of the extension, and in the upper part of a tapering keel going down all the way to the bottom vertex of the ring. Closer to the bottom would be twin Mk 24 probe or torpedo launchers, fed from a tall vertical magazine, and flanking the keel on both sides would be deflector domes with associated forward FTL sensors. For best possible stealth, impulse engines were located inside the ring drive: aft of the deflectors, on both sides of the sail-thin aft part of the keel.

The secondary hull grappled the scoutcraft's aft keel with a groove in the dorsal bow, the aft end of the keel neatly fitting between the two slanted deflectors of the secondary hull. These deflectors would only come to play after separation, but were quite essential at this mode of warp operations. Once separated from the scoutcraft, the cruise hull resembled a smoothly filed stone axe blade, with a broad leading edge and a rounded, gently tapering stern. Accommodation was arranged amidships, just aft of the deflectors. Power systems astern fed two warp nacelles on downcanted pylons and an auxiliary impulse engine at the upper part of the stern (as the well-positioned primary engines of the scoutcraft would take care of sublight propulsion in combined mode, linking up to the same secondary hull bow tanks for fuel).

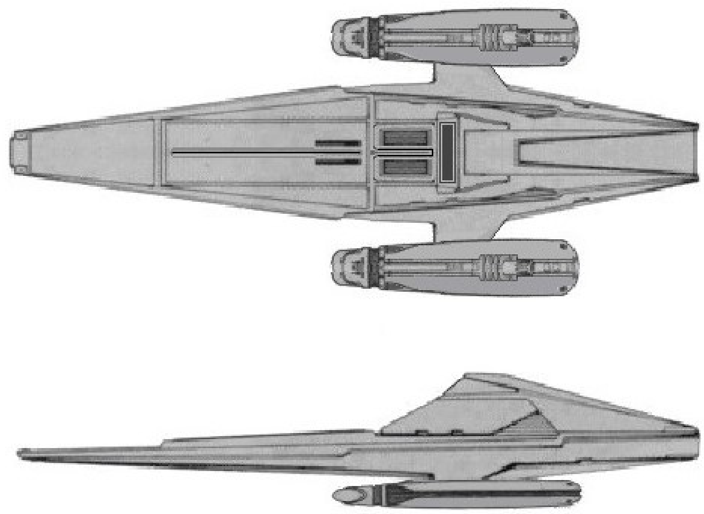
At both dorsal and ventral amidships, there was also a quartet of modern lifepods, plus two ventral berths for compact shuttlepods between the pylons. The pods would mainly be used for corraling and towing the lifeboats in case of evacuation in high-risk volumes of space, but could serve as maintenance craft if needed. There was no need to task them with liaison operations, as the hull featured both a personnel and a cargo transporter.

The cruise section also had some self-defense capabilities at detached mode, in the form of phaser V strips on engine pylons and aft torpedo tubes on stern flanks. The magazines for the latter supposedly only held four rounds each, though, concretizing the extreme crampedness of the section. A likelier reason for the inclusion of the launchers is the deployment of high performance recorder markers for discreet reporting.

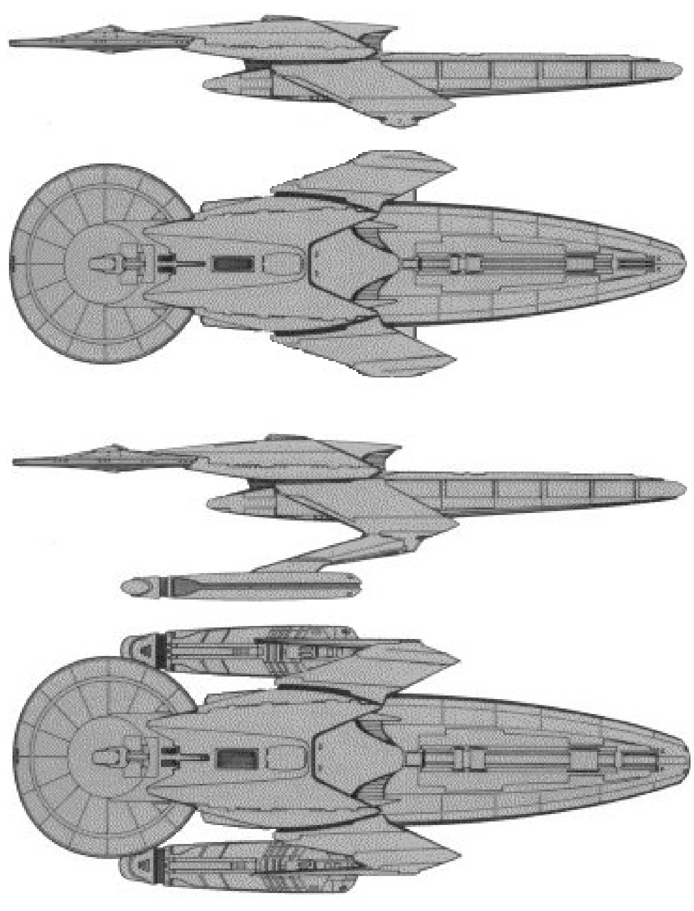
The *Moscow* scoutcraft was built in modest numbers appropriate for her clandestine task. Just twenty-two of the vessels are known to have been built, although it appears that at least two extra scoutcraft without the cruise stage were also completed, quite possibly for testing purposes only. Evidence also exists for the use of different reconnaissance stages, including drones, from aboard the cruise stages, as well as from a further evolved launcher stage dubbed DW-21.

As operational experiences mounted, there were some equipment upgrades, most of them difficult to discern from exterior view. It was not until 2362 that the scouts received major modifications, chief among them the installation of lightweight GN-10 warp engines. The new pylons no longer featured phaser strips; these were moved to the lateral flanks of the stern, while the secondary hull torpedo launchers were removed. The scoutcraft system was upgraded to the single-tube Mk 50 standard of practrical combat worth.

Events appear to have proven the concept sound, as there have been no *Moscow* losses in the recent conflicts. On the other hand, it is unlikely that Starfleet would have deployed the scouts on penetration missions against the superior sensor capabilities of the Dominion. Nor have these only symbolically shielded ships been deliberately engaged in combat.



While the elaborate Moscow *combination of vessels saw relatively little production, the cruise stage soon evolved into a Starfleet Intelligence workhorse. The pared-down DW-21 drone support platform retained the propulsion system and the powerful deflectors of the* Moscow *secondary stage, yet apparently omitted most crew spaces, there being no need to support a crewed reconnaissance vessel. Instead, a flight deck was added atop the hull, supposedly to help control the launching of a wide range of payloads from an elongated bow platform. The DW-21 appeared unarmed, with performance figures probably matching or exceeding those of the* Moscow *cruise stage.*



In contrast with the rather secretive DW-21, the existence, characteristics and production numbers of the distinct derivatives of the scoutcraft are a matter of public record. The Graceful *rapid response medical ship mounted a wider, two-segment ring drive, of dubious stealth qualifications and optimized for dragging along an inert pod that in the ambulance configuration could move up to 170 patients quickly out of the harm's way. The* M'Benga *variant later added two GN-10 nacelles to the mix, mounted on the tugship rather than on the pod. Note the lack of phaser strips on the saucer, for pressing reasons of internal space allocation rather than for pacifist symbolism. The nimble* Wei-fa *tanker restored the phasers and carried a cargo of antimatter and neutronic fuel tanks for frontline use.*

Chimera

Escort
2347-

Completed:	221
Length:	103.5 m
Beam:	67.2 m
Height:	31.4 m
Mass:	232,700 tons (batch 1) 233,000 tons (later batches, upgrade 2350-52)
Officers:	10
Crew:	49
Cruise speed:	W 7
Max. speed:	W 8.9
Endurance:	1 year
Weapons:	2 phaser VIIP emitters in bow cutout 1 phaser VI strip on dorsal primary hull (upgrade 2350-52) 2 phaser VI strips on ventral primary hull 2 phaser VI strips on pylons 1 phaser VI strip on aft secondary hull
Shields:	1-layer globular forcefield Navigational deflector on dorsal bow
Transporters:	2 GP (2-pad); Mk VI All ships brought to Mk VII standard after 2352

Ships of historical interest:

USS Ithurial (NCC-57419), *USS Minerva* (NCC-57402), *USS Portland* (NCC-57418), *USS Rapid* (NCC-57498)

SOURCES:	(D Jim Martin *Defiant* predesign) N DS9 (LUG) (H Ed Sharpe)

Despite the new experiences from the Klingon threat in the 2280-90s and the Romulan scare in the decade after the *Tomed* Incident, Starfleet's strategic thinking was still conducted in the shadow of the only major interstellar war it had fought, the Romulan War of 2156-60. This war had begun (in retrospect analysis at least) with the disappearance of numerous Earth and allied freighters in the direction of the Romulan Star Empire. As a result, events of the early 2340s deeply worried Starfleet planners: several vessels, including a Starfleet surveyor, had gone missing in the direction of the Cardassian Union, with whom the Federation had enjoyed peaceful trading links for many years. As merchant losses mounted in 2345-6, commercial lines and Starfleet Logistics Command requested that a convoy system be implemented to ensure the safety of their vessels.

Operations Command agreed, but only reluctantly. While Starfleet could provide convoy escorts out of primary combat types in the short term, this would result in a reduced number of ships available for fleet combat duty if there were a war – an event Starfleet Intelligence now considered highly likely, having learned to better know the Union's bellicose nature during the long Cardassian-Klingon conflict at Betreka. It might be possible to pull corvettes from their local duties to travel with the convoys, but this would leave many systems without defenses and vulnerable to piracy and smuggling. As a result of this, Starfleet decided to rapidly develop a new high endurance combatant that could be manufactured on smaller yards, in essence a modern counterpart to the perimeter ships of the late 23rd century. In the meantime, the aging original PA ships themselves would be pressed into duty one last time to fill the escort gap.

Design work commenced in November 2346 and, building heavily upon proven solutions, was anticipated to reach final validation phase by late September the following year. This was not to be. In May 2347, Cardassian forces commenced a series of probing strikes against small frontier settlements. Attacks on the economically more important Federation colonies and Starfleet installations in the border space would surely follow soon. Main Starfleet combat forces were promptly dispatched to the threatened areas, leaving mercantile shipping completely exposed. Starfleet thus had to upgrade the priority on what was now known as the *Chimera* class deep space escort.

Design work was hurriedly completed, resulting by the end of 2347 in the fielding of a slightly simplified version of the class. All the vital systems were installed in the earliest constructed ships, but for example shuttle facilities were not furbished to operational capacity, and the crew quarters were somewhat more spartan than originally planned. The first fifty vessels were intended as a stopgap measure to be rushed to the front while the remaining vessels, at least a hundred and fifty in number, were to be completed to full production standard.

Even the early *Chimera* specimens were starships of high performance and considerable complexity, however. The basic primary hull form was a flat three-deck spade, with two Type VI phaser strips on the ventral side and two heavy phaser VIIP cannon in a bow cutout. These were supplemented by three Type VII strips on the complexly shaped engineering section, covering the lateral and stern angles. This would be the very first time strip phasers would be operationally fitted on such small vessels, and represented a major technological risk despite extensive testing on some deactivated *Soyuz* and *Daran* spaceframes. Yet the stepped-up timetable of escort production meant that time of testing was over. If successful, the new weapons would give Starfleet a qualitative upper hand in all multitargeting combat scenarios, and would alleviate its quantitative shortcomings in the outer colonization zone.

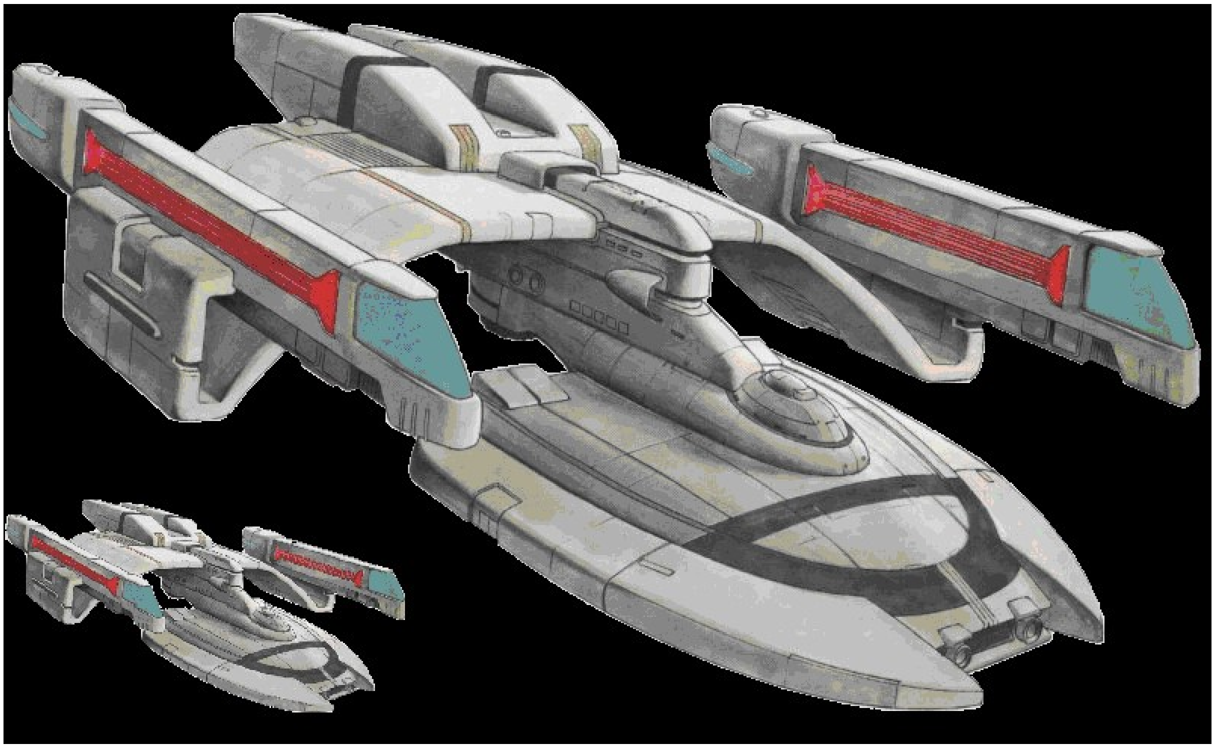
The flat primary hull had barely enough room for the 59 crew and the heavy phaser systems. All engineering functions including primary life support were banished to the secondary structures, which consisted of a sturdy dorsal fin and broad, horizontally extending pylons. The base of the fin served as a pedestal for the main bridge, but also extended astern beyond the rim of the primary hull in a fantail, through which the ship's warp core could be ejected downwards. The upper surface of the fin base served as the breakaway line in case of primary hull separation; the complexity of cleanly severing the ship along such a long surface was offset by the aerodynamic elegance of the resulting spacecraft, equipped with four BRP thrusters on the aft rim for deorbiting and controlled landing.

The following two decks in the fin, barely five meters wide, reached even farther back; the third finally flared out into pylons of 25 meter initial chord, large enough to hold main fuel tanks, plasma expanders and radiator surfaces. Out of tradition, main bridge was labeled Deck One, while the fin decks from breakaway line up were referred to as Engineering Levels 1-3. The confusing naming convention only served to highlight the strength of the obscure tradition of placing the bridge at the very top of a starship: apart from various dorsal pods or other not permanently manned modular assemblies, the *Chimera* engineering section was the first exception to the rule for the better part of two centuries! In any case, it was EL 2 that held the forward navigational deflector and twin long range sensor cowlings, and EL 3 that carried the primary communications and datalink package. Atop EL 3 stern section and the upper end of the warp core sat a massive two-pronged impulse engine assembly, perhaps not ideally placed for sublight maneuverability, but so grossly overpowered that this mattered little.

A curious pylon arrangement cradled the two 90,000 ton GD-12 warp nacelles. Curving down from the initial flat angle to final 45 degree anhedral, the pylons then twisted sharply up to fully vertical, ultimately mounting the nacelles inboard. Apart from providing extra radiator surfaces for the muscular power system, the exotic pylons to some degree shielded the crew spaces from engine emissions. The robust but almost blade-thin GD-12 provided sustainable cruising at warp 7, well beyond the capabilities of the corvettes that in other respects were the closest counterparts of the *Chimera* design. Saturation drive mode was a theoretical option only, when the conventional top speed of warp 8.9 already exceeded typical convoy speed more than three times over. Starfleet had no intention of burning out the engines when more sustainable operating modes could be tactically afforded.

Later vessels brought to use a small shuttle hangarette at the extreme aft of the engineering hull, at EL 2 just below the impulse engines – a capacity that was also added to the first fifty *Chimeras* between 2350 and 2352 (thus removing the last excuse of separately referring to the later batches as the *Ariel* subdesign). Adding of a transverse dorsal phaser on the primary hull rounded out the weapons suite, and the two transporter installations were upgraded to Mk VII standard. Communications suite was comprehensive to begin with, as the *Chimeras* were expected to communicate with and coordinate large numbers of civilian freighters and Starfleet transports.

Chimera class vessels began to replace the *Akyazi*, *Engage* and *Kirsanov* classes in escort roles in August 2349, although some of the latter two classes would remain in service until the 2350s. The *Chimeras* assigned to each convoy, three in the ideal case, were expected to be able to deal with most Cardassian vessels smaller than the '*Cheetah'* cruisers (soon learned to have the native designation *Akril* class). Essentially, their mission profile when faced with anything larger was to delay it long enough for the convoy to scatter and escape. Between August 2349 and March the following year, most *Chimeras* were accompanied on escort missions by old PAs which, thanks to their standoff weaponry, better acted as command ships for the escort mission. As the theater of operations became more active, larger vessels were occasionally assigned to convoys, along with increasing numbers of *Chimera* class ships being churned out by Federation shipyards.



USS Firedrake *(NCC-57408) and USS* Ithurial *(NCC-57419) seen from a freighter in convoy YTK-972T in 2349. One freighter was lost from this convoy and two Cardassian raiders destroyed.*

The class performed well in service, although eight were lost to Cardassian forces; freighter loss rates were reduced by 95% with the introduction of the convoy system and *Chimera* escorts. The finest hour of the *Chimeras* came in 2350, when the *USS Minerva* (NCC-57402), *USS Otus* (NCC-57441) and *USS Plymouth* (NCC-57468), along with the *Kirsanov* class *USS Katyusha,* destroyed two Cardassian '*Cretin I*' (*Galor* Type I) heavy cruisers which attempted to attack convoy DXY-890A. As Starfleet prepared to strike back at the Cardassian Union, several *Chimeras* were called to fleet duty, in order to assess how well the class would perform as escorts to capital ships in a fleet engagement. The answer turned out to be "very well indeed", mostly owing to the extraordinary cruise performance of the class. Once the war with Cardassia was over, the ships of the *Chimera* class were assigned to a variety of duties. Some took on convoy protection tasks in other trouble spots, but most were given border patrol and security duties, often backing up corvettes in their enforcement of Federation law and order. The designation 'fast frigate' is suggested in some sources for reflecting the new role of the vessel, but it never was officially adopted by Starfleet.

USS Rapid *(NCC-57498) and* USS Somme *(NCC-57437) escort* USS Onslaught*, flagship of the Seventh Fleet in 2373. All three vessels were subsequently lost to the Dominion.*

When war came again, in the 2370s, the class was ready to serve once again in both its roles, as protector of freighters and of the mighty warships which were massing to defend the Alpha Quadrant against the Dominion. Once more, the *Chimeras* found themselves doing battle with Cardassian vessels, and this time it was not as easy going. The upgraded *Hideki* class ships deployed by Cardassia were extremely capable and destroyed several *Chimeras* in deep space duels. However, the class did give a good account of itself, killing 2.1 enemy vessels for every *Chimera* lost. The 69 survivors of the class are expected to be retired by 2400; this relatively early decommissioning date is due to the heavy strain placed upon the spaceframes in high speed maneuvering.

Saber

Corvette
2350-

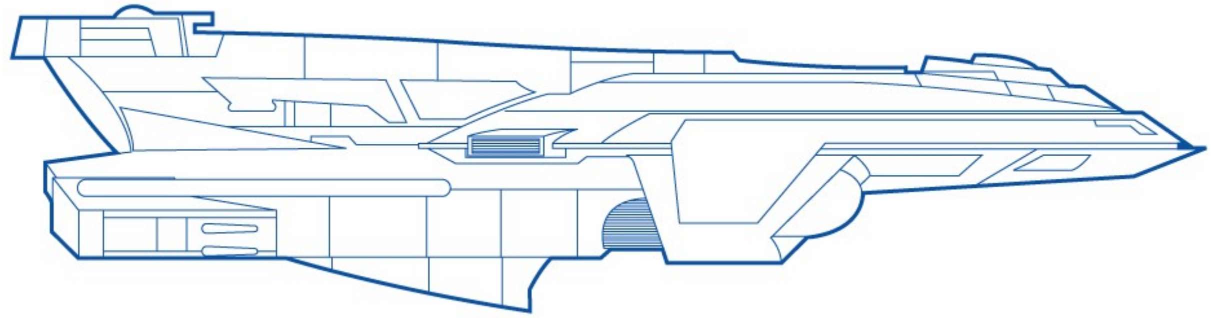
Completed:	419+
Length:	172.7 m
Beam:	159.9 m
Height:	40.0 m
Mass:	310,000 tons (batch 1, typical) 312,500 tons (batch 2) 317,500 tons (batch 3, typical) 318,000 tons (batch 4) 315,000 tons (batches 5-6, typical) 317,200 tons (batch 7 onwards)
Officers:	20 (typical)
Crew:	76 (typical)
Cruise speed:	W 6
Max speed:	W 8.8 (LF-25D –engined) W 8.9 (LF-25F –engined) W 9.0 (LF-25H –engined) W 9.2 (LF-25J –engined)
Endurance:	2 years (batches 1-4, pre-upgrade) 6 years (batches 5-6) 10 years (batch 7 onwards)
Weapons:	Batches 1-2: 2 phaser VII strips on dorsal fwd hull 1 phaser VII strip on ventral fwd hull Batches 3-4: 2 phaser VII strips on dorsal fwd hull 1 phaser VII strip on ventral fwd hull 2 light fwd torpedo tubes w/ 80 photorps or probes Batches 5-6: 2 phaser VII strips on dorsal fwd hull 1 phaser VII strip on ventral fwd hull 2 light fwd torpedo tubes w/ 120-160 photorps or probes 2 light aft torpedo tubes w/ 40 photorps Batch 7 onwards: Quantum torpedo compatibility added Orbital bombardment variant: 2 phaser IX emitters added on ventral aft hull
Shields:	1-layer globular forcefield Navigational deflector on ventral aft hull
Transporters:	4 GP (6-pad), 2 cargo, 2 emergency evacuation (26-pad); Mk VI (standard) 1 GP (6-pad), 4 cargo, 1 emergency evacuation (26-pad); Mk VI (SCE support vessel) 1 GP (6-pad), 1 emergency evacuation (26-pad); Mk VI (sigint vessel) All ships brought to Mk VII standard after 2353 Select ships brought to Mk VIII standard after 2374

Auxiliaries: 1 medium and 1 light shuttle, 2 work pods (defense mission standard)
2 light shuttles, 1 shuttlepod, 2 work pods (exploration mission standard)
2 shuttlepods, 2 work pods (sigint vessel)
2 light shuttles, 4 work pods (SCE support vessel)

Ships of historical interest:

USS Yeager (NCC-61947), *USS Da Vinci* (NCC-81623)

SOURCES: D ST:FC (J Ordover et al. “SCE”)
(N Alex Jaeger)
(H J Ordover et al. “SCE”, own)



The midpoint of the 24th century saw Starfleet in an unbearable situation. There was a peace to be protected on the spinward flank of the Federation, yet no means existed of accomplishing this mission. Starfleet’s top Zakdorn analysts only confirmed what everybody already knew: the rampant colonization on this flank was a thorn in the hides of Cardassian Central Command, Talarian High Electorate and Tholian Assembly, and the thinly spread Starfleet forces only served to highlight the *de facto* power vacuum in the region. Mobile defenses would protect the Federation core, of that there was no question. But they could do nothing to protect the fringe worlds, and Starfleet had no strategic deterrent capable of spanning the cold void between Earth and Cardassia Prime.

Up until 2350, many in the Councils chose to believe the soothsaying factions that promised a renewed local defense network as the result of new frigate development. But when the technologically superb *New Orleans* class was finally fielded and the true costs and timetables of its further procurement became clear, few could put their faith on it any longer. Those who did were arguing that the ends could still meet if just 20% of the colonies could be withdrawn and defenses rearranged. But the ‘retreationist’ faction was small and lacking in support.

Even if the retreat was to be effected, Starfleet still had to field a replacement to the geriatric *Miranda* class, and the *New Orleans* was not to be it. The most optimistic estimates now put *New Orleans* procurement at a hundred and ninety vessels over a 15-year construction period. What Starfleet needed were 350-450 ships in ten years. Starfleet saw no alternative but to cut costs by stripping down the ships to the barest minimum. Sufficient cruise performance was a must, although not quite as important as in actual deep space combat duty. Survivability was negotiable – the ships could pacify the frontier by their mere presence, once they got there, and the ultramodern weaponry of the *New Orleanses* might not be needed. Endurance was a function of support infrastructure – ships could employ an austere, economical mode of operations to give the desired five-year endurance at first, then step up activities as upgrades were performed and supply lines improved, and still retain five-year missions. Finally, versatility was expendable – it would suffice to build the ships so that they would be capable of taking on wider roles by accepting new modular equipment and gradual upgrades.

In essence, the desired defensive starship thus began to look very much like the light frigates or heavy corvettes of the late 23rd century, and the proposals put forward all outlined a vessel of similar size. Yet mere attrition units or law enforcement vessels of *Renaissance* or *Merced* ilk would be unacceptable from economic, strategic and tactical viewpoints. The ships had to have major growth potential, even if little of it was to be realized at first. So Starfleet started with a ship of sufficient size ('*Renaissance*-plus'), mounting engines of sufficient performance ('FN-15-plus'), and left plenty of room for everything else.

For the main spaceframe, a design derived from the sturdy *Steamrunners* was chosen. A family relationship to the *Yorkshire*, *London* and *Whitewater* transports was obvious also, and commercial standards were actually employed in the construction of the hull. Nacelles would be integrated to the hull in *Steamrunner* fashion, yet the overall layout was compacted so that the main powerplant and navigational deflector would now both sit next to the primary hull. The lightweight Shuvinaaljis LF-25D engines were selected for their availability and affordability; they utilized a standard Tsayev HK warp core, giving maintenance commonality with the military transport fleet. Impulse systems were ordered from Kloratis, another trusted transport fleet supplier. The navigational deflector was an off-the-shelf unit from the *Yorkshire* and *London* programs as well. Therein, however, ended the cut-and-paste nature of the ship.

Veterans of frigate operations were once again brought in to give input. With the *Renaissance* class, the question had been "what would you do better?"; with the new defenders of the frontier, it was "what do you really need?". The answers dictated the initial equipment and organization of the ships, and laid the groundwork for future upgrades.

A formation of two Sabers *helps secure SB 375 at the height of the Dominion War. This ventral view shows the clustering of engineering functions at the stern of the vessel, with core and fuel pod ejection hatches and refueling valves in the fantail cutout and with plasma conduits following the trailing edge of the primary hull, feeding both impulse and warp systems. It also reveals the limited weapon coverage aft. Until the addition of aft torpedoes in batch 5, the ships had to rely on their maneuverability to bring the dorsal phaser strips to bear on six o'clock adversaries. To consider this a 'problem' would be quite an overstatement, though…*

In February 2350, two prototypes for the new class were launched. *USS Saber* and *USS Hammer* were barebones testbeds for the propulsion systems, but did carry three important pieces of mission hardware: hard-punching HiBeam phaser VII strips, DCS computer cores based on most recent experience but trusted hardware, and twin bow-mounted shuttlebays. Weapons testing ensued in May, and by the end of the year, both vessels were commissioned to operational status and sent to the spinward sectors. They now carried crews of 68, cruised at warp 6 and could reach warp 8.8 without major risk. Within months, four more ships followed, featuring improved shield generators and larger crews and correspondingly increased numbers of single-occupancy lifepods. During the following four years, two ships would be completed each month, and given incremental improvements – a plasma conduit upgrade here, enlarged fuel tanks there, six instead of two subspace scanners, and finally two, then four Mk 51 or Mk 75 torpedo launchers.

On the *Saber* procurement process, the classic subclass or 'mark' notation was dropped, as refits performed on select vessels of earlier batches rapidly blurred the distinctions in equipment and performance. Instead, the 'batch' notation in this entry is intended to indicate the innovations and improvements associated with the launch of each new production lot.

The *Saber* class was fielded far too late to quell the border crisis, but did serve with distinction during the actual Cardassian War. Primary missions for the type were convoy escort, fleet outrider duties, and active support of planetary assault missions and colony evacuations. In the latter role, the shuttle facilities proved elemental. Indeed, Starfleet began to view the neglecting of these facilities on the far larger *Springfields* and *New Orleanses* as a grave mistake. The original designation of 'corvette' was soon amended to 'strike corvette', to emphasize the planetary assault role.

By the end of the war, *Sabers* had become full-fledged deep space combatants. With moderate crews of 96, they enjoyed an endurance and cruise performance quite comparable to the high-tech light cruisers; they had also begun carrying laboratories and survey sensors, after the latest upgrade of computer capabilities had provided the computing power necessary to run these systems. In fact, after the informal ceasefire of 2359, there was no practical difference between the roles of these ships and that of, say, *Griffin* class vessels.

A *Saber* from 2364 was a very different beast from a *Saber* of the 2350s. The three phaser VII strips now enjoyed advanced fire control and fell nothing short of modern frigate performance. LF-25H could reach warp 9.0 easily enough, and Fasav-Lahnamäe shield generators gave sufficient protection against most frigate- or even cruiser-sized adversaries. However, only about 40 of the 170 vessels produced represented this standard; while most ships at least now carried torpedo launchers, the majority featured engines of LF-25F standard or lower. In the threat-free environment, there were no pressures for upgrading the early specimen further.

It would only be in 2371 that Starfleet would regret this choice. Mounting evidence of the power and malevolence of the Dominion made it obvious that a reactivation of *Miranda* assets would once again be needed. In search of a less desperate alternative, *Saber* production was restarted and upgrade programs initiated, now with an emphasis on escort missions. The formal 'escort' designation was pondered, and even 'light cruiser' was touted as a politically advantageous moniker, yet 'corvette' ultimately still made the most sense. For the financial and technological environment of the 2370s, production of *Sabers* was a simple matter – until the strains of the war finally began to have an impact. In face of the devastating power of the Dominion, the concept of 'attrition unit' lost its meaning: no class of starships could be replaced apace with combat losses, not a frigate or light cruiser, nor a huge explorer. The minuscule *Sabers* at least fared better than most, filling in for fallen *Mirandas* at an eventual pace of four per month.

The early 2370s saw the *Sabers* taking over all the *Miranda* niches and also expanding to directions the *Mirandas* had previously taken. Six ships were refitted for sigint duty, this time without the pretentious 'survey' moniker. Four units (the *Khwarizmi*, the *Musgrave*, the *T'Pora* and the *da Vinci*) were configured for SCE field operations needs, with vast cargo and workshop spaces, industrial replicators, and heavy tractor beams, and subsequently reduced crew facilities. Nine

Sabers were also built specifically for orbital bombardment, utilizing heavy stern-mounted phaser IX units. Further diversification is likely to take place, and longevity similar to that of the *Miranda* class is now seen as the unavoidable fate of the *Sabers*.

Bradbury

Heavy corvette
2362-

Completed:	178+
Length:	247.8 m
Beam:	71.1 m
Height:	33.9 m
Mass:	452,000 tons (NX-72307, original) 468,000 tons (NX-72307, modified) 471,200 tons (production standard)
Cruise speed:	W 6
Max.speed	W 9.1 (NX-72307, original) W 9.3 (NX-72307, modified, and production standard)
Endurance	3 years
Officers:	22
Crew:	158
Weapons:	<u>NX-72307, original:</u> 2 phaser VII strips on dorsal primary hull 2 phaser VII strips on ventral primary hull 2 phaser VI strips on aft dorsal primary hull 1 phaser VI strip on aft ventral secondary hull <u>NX-72307, modified, and batch I:</u> 2 phaser VII strips on dorsal primary hull 2 phaser VII strips on ventral primary hull 2 phaser VI strips on aft dorsal primary hull 2 phaser VI strips on aft ventral primary hull 2 phaser VI strips on engine pylons 1 phaser VI strip on aft ventral secondary hull 2 fwd medium torpedo tubes w/40 torps in secondary hull 4 mine tubes w/480 gravitic mines in primary hull <u>Batch II:</u> 1 phaser VII strip added on ventral secondary hull Aft ventral secondary hull phaser VI strip divided in two
Shields:	1-layer globular forcefield Navigational deflector beam on fwd secondary hull Auxiliary deflector on fwd primary hull
Laboratories:	1 GP, 1 planetary sciences, 1 astrophysics, 1 signals and communications
Transporters:	2 GP (6-pad), 2 emergency evacuation (12-pad), 1 cargo; Mk VII
Auxiliaries:	2-4 light shuttles, 2 work pods

Ships of historical interest:

USS Bradbury (NCC-72307), *USS Heinlein* (NCC-74444), *USS Pournelle* (NCC-73602), *USS Strugatski* (NCC-73912)

SOURCES:	(D Rick Sternbach *Voyager* study models) N TNG (H own)

With the colonial guard role of the corvettes gone for good, and with the border wars under control at last, Starfleet in the 2360s once again began seeking ways to combine traffic control and medium to long range combat missions into a single spaceframe of high performance. This time, the incentive for upgunning was not an ongoing arms race, nor a desire to market warships as police vessels for political convenience. Rather, heavy corvettes would be created just to see if they could.

Several key technologies had emerged that would finally allow the packing of decisive combat gear like integrated torpedo launchers and independent fire control systems into compact and affordable dimensions. Significantly, too, peace had brought prosperity, and freed major replicator technology resources for experimental starship ventures. Finally, precise numerical modeling of warp fields was reality at last. It was inevitable that radically new types of small and medium starships emerge. In the corvette category, this was combined with a true tactical need to produce at least 120 fast patrol combatants by the end of the decade, as the numbers of *Renaissance* units gradually began to dwindle.

Project requirements for the *Bradbury* class heavy corvette were set in early 2360. Total length was to be about 250 meters, 50 of those due to the tail ends of the long, heavy-duty warp engines that would propel the ship to warp 9 and possibly beyond. Maximum width was only 70 m, thanks to a sleek primary hull configuration utilizing lessons learned from the *Griffin* class. New materials and extensive application of SIFs would keep the total mass down to about 400,000 tons, despite the massive engines.

It took less than two years to transform *USS Bradbury*, NX 72307, from a naval construction contract to a working starship. The ship that emerged from the Chandley dockyards was a curious mismatch of components, bristling with newest engine and weapon technology and sensor and computer systems but relying on rather bulky and conservative GD-18 nacelles as the support structures of her advanced warp coils. Her primary hull was roughly the shape of an upturned spoon or an antique pressing iron, featuring five decks of successively smaller area, topped by a bridge assembly.

The lowermost of the primary hull levels, Deck 6, housed main habitation functions and, as a novelty for corvettes, four rather well-equipped laboratories, as well as a holodeck for recreational and training use. On the next deck above were additional quarters, plus lateral docking ports on the spine aft of the primary hull proper. An auxiliary navigational deflector at the bow provided extra security. In case this security proved insufficient, there were 14 lifepods for evacuation on Decks 5 and 6. Decks 3 and 4 were largely free of portholes and dedicated to weapon systems, mainly the two primary phaser VII strips and an indented bow sensor platform.

The top primary hull deck, which contained a mess hall and officer accommodation, was capped by a modern bridge module that included amenities like five more lifepods and spacious ready room and conference facilities for the senior officers. Aft of the bridge, in the spine, space was reserved for an amidships sensor platform, to be installed later.

The original configuration of USS Bradbury. *Blanked-out hull openings await the installation of some of the operational sensors and weapons. Note the narrow spine structure, lacking the central impulse engine.*

More armament was carried on the lower part of the vessel, including two more phaser VII strips on the ventral side of the primary hull and two auxiliary Type VI strips on the upper aft corners of the hull, inboard of RCS clusters. The five-deck secondary hull initially housed no weaponry, and was streamlined for maximum warp efficiency as well as for possible atmospheric tests. Secondary accommodation was provided in the forward part, and four upward-firing lifepods were available for the needs of the secondary hull crew.

Decks 7 to 9 tapered aft into an engineering facility where a short but high performance bypass-cooled vertical warp core sat amidst support equipment. The aft part of Deck 7 flared out into twin down-curved pylons that housed port and starboard impulse engines and supported the warp nacelles. Impulse systems could be powered either by their dedicated fusion reactors or by direct tapping of warp plasma. Their location gave the ships excellent maneuverability and unprecedented reverse thrust capabilities, and also augmented in maneuvers within gravity wells.

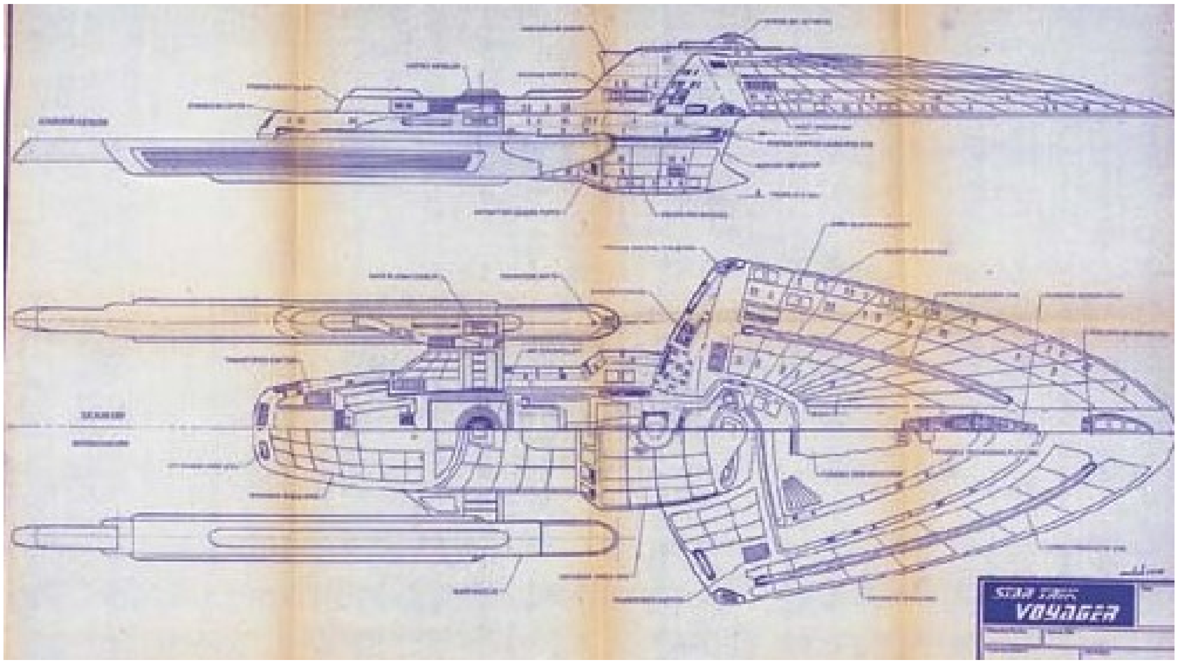
Landing capacity was a major part of the specifications for the corvette program. Four landing legs could be deployed from behind protective hatches; wide pads unfolded to support the immense mass of the ship even on relatively soft ground. The mass of the warp nacelles balanced the effect of the forward-extending primary hull.

After the completion of the prototype, some sixteen months of testing in locations across the Federation explored the full flight envelope of the vessel. Landings were performed on Class L and M worlds of 0.8-1.3 Earth mass, and combat maneuvering simulated at both warp and impulse. Recommendations were made on three main fields. Refined warp nacelles should be installed for maximum performance; to compensate for their increased mass, a third impulse engine should be added to the upper part of the spine and the port and starboard ones uprated; and the secondary hull should be expanded to house additional systems deemed necessary for the ships' eventual operational use.

The modifications were to be implemented on the second keel laid, NX-73264. However, as the operational need for the vessels was not pressing, Chandley was told to first modify the original prototype, and only then proceed with completion of further units. While manufacturing and assembly techniques based on replicator technology were well established, Starfleet wanted to experiment with their application on refitting and overhauling, and the low-priority corvette project and its modestly scaled contractor were deemed ideal for the testing.

In a starbase layover of eight months, the aft hull of the *Bradbury* was extensively remodeled. The extreme stern was widened on Decks 7 and 8, and atop was added a landing approach platform for shuttlecraft, flanked by two transporter emitters. Light shuttles could now enter through a sliding door into a shuttlebay on Deck 6, then descend via an elevator to a service hangar within the secondary hull. Aft of the hangar, there was now room for a lounge area with spectacular aft view through panoramic windows. Otherwise, the hull expansion did not cater for major new facilities, as the shuttle hangar ate up most of the extra space.

The new GD-20 warp nacelles were of immense size for a ship this small – essentially frigate standard, and more than half the total length of the vessel. Ramscoops were generously overengineered to provide maximum endurance and range augmentation. This was of practical significance as the *Bradburies* would actually spend time cruising in deep space, in the manner of the 23rd century heavy corvettes. Other mission systems appropriate for the heavy corvette type included two twin mine tubes added on Deck 5, and two forward-firing torpedo launchers on the enlarged forward secondary hull, on Deck 8. Phaser VI strips were added on warp engine pylons and aft ventral primary hull, and the sensor suite completed.



The modified configuration. Addition of the central impulse engine proved inefficient, as thrust from this unit would not be available for planetary landings, and had to be restricted below the levels of the port and starboard engines out of structural concerns. In contrast, the GN-20 warp engines were a resounding success and met all performance goals on this originally quite speculative ship type.

Further testing was to prove some of the modifications unnecessary. When Starfleet decided on a production standard in October 2363, it was for a vessel with just two, uprated impulse engines, and with a streamlined spine and quarterdeck structure. These improvements were implemented on two new keels without major problems. *USS Pournelle*, NCC-73602, was originally to carry the name of the abandoned NX-73264, *USS Voyager*, but that name was transferred to the second *Intrepid* light cruiser (NCC-74656) only weeks before the launching ceremonies. *USS Strugatski* (NCC-73912, originally intended to be *USS Discovery* before losing that name to another upcoming *Intrepid*), suffered from initial engine problems and was kept under study for half a year at Arcturus until the problems were traced down to faulty specifications in the warp coil casting process. New coils were cast and the originals scrapped.

In the meantime, four more vessels were ordered with a slightly heavier weapons fit, including a ventral phaser VII strip and extended-length Type VI strips on the primary hull corners. *USS Strugatski* was also scheduled to be refitted with the ventral phaser, followed by the *Heinlein* and the *Lem.* The experimental power system layouts of *USS Bradbury* and *USS Pournelle* prevented the installation of this weapon on the pathfinder ships. Regardless of this, series production could finally begin in 2364.

Combat at close quarters, the way corvette captains prefer it. Rather sluggish at warp, sacrificing maneuverability to speed, a Bradbury *turns into a fierce mongoose at impulse speeds. Even though the heavy and long warp nacelles present undesirable momentum arms along two rotational axes, the placement of impulse engines close to nacelle center of gravity makes possible extreme translational maneuvering. In this engagement from late 2374,* USS von Harbou *(NCC-73978) easily finds a blind spot behind a Jem'Hadar attack ship and proceeds to secure victory.*

The need for fast corvettes in scouting operations has been demonstrated by the large number of combat deployments in recent history. All the *Bradbury* class ships completed by 2373 partook in the Klingon Border War, usually operating in concert with frigates and heavy cruisers. In January 2373, *USS Pournelle* was forced to engage a Klingon *Vor'cha* attack cruiser and her two escorts while rendezvousing with *USS Tecumseh* for replenishment, and suffered a debilitating impulse reactor explosion. Thirty lives were lost, but the ship was quickly brought back to service and played her humble part in the decisive fleet action against Dominion shipyards in December 2373.

USS Heinlein (NCC-74244) came under Klingon attack while escorting the medical vessel *USS David Ho* (NCC-59064) and two Corvallen transports to the Cardassian colony of Vernara II in 2372, shortly after the beginning of open hostilities. The crew fought off two scout-class Birds of Prey for six hours before reaching the relative safety of the colony, after which the Cardassian destroyer *Hanaki* defeated the surviving BoP – the first joint Federation-Cardassian military action in history, not to be followed until late 2375 and the battle of Cardassia Prime. The *Heinlein* was finally destroyed in the 2373 Borg invasion, and was thus the first permanent loss for the class.

Even corvettes can make scientific discoveries. The shields of USS Blish *(NCC-74234) light up Saigyo nebula, prior to 2371 thought to be an inert Type 9 phenomenon. The* Blish *encounter revealed the presence of an intricate and self-organizing inner structure, which the corvette was able to record to great accuracy.*

The currently active *Bradbury* heavy corvettes, numbering more than 170, are deployed on the Bajoran sectors and near Romulan holdings, patrolling space against Dominion or Borg advances. They will be moving on to their intended local roles only after Starfleet has recovered from the heavy losses on its primary patrol forces, possibly only after the fielding of the next frigate generation. *Bradbury* production is expected to continue till the late 2380s at the very least, although a major powerplant modification is also on the drawing boards and might lead to a structurally different follow-on subclass.

Paladin

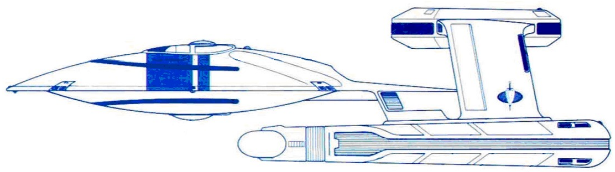
Scout
2366-

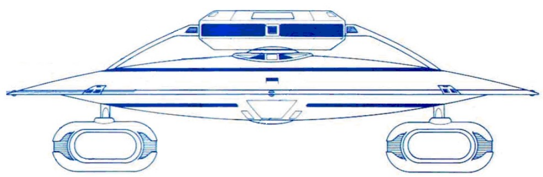
Completed:	30+
Length:	107.1 m
Beam:	95.8 m
Height:	28.6 m
Mass:	66,520 tons
Officers:	17 (typical)
Crew:	58 (typical)
Cruise speed:	W 5.5
Max speed:	W 7
Endurance:	1 year
Weapons:	1 phaser VI strip on dorsal fwd hull 2 phaser VI strips on ventral fwd hull 1 light fwd torpedo tube w/ 20 photorps or probes (podded, optional) 1 light aft torpedo tube w/ 20 photorps or probes (podded, optional)
Shields:	1-layer globular forcefield Navigational deflector on ventral fwd hull
Transporters:	1 GP (6-pad), 1 cargo, 2 emergency evacuation (26-pad); Mk VII
Auxiliaries:	2 light or medium shuttles, 2 work pods

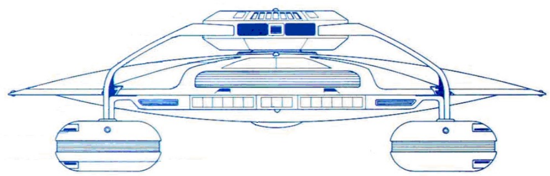
Ships of historical interest:

USS Valkyrie (NCC-73994)

SOURCES:	(D Temporal Graphics) (N Temporal Graphics, Robert Simpson DS9 *Mission Gamma: Lesser Evil*) (H Robert Simpson DS9 *Mission Gamma: Lesser Evil*, own)







It is often said that schools of thought only die out when the last scholar does. In starship design, schools survive through their classes; in the mid-2360s, Starfleet's search for a next generation of small scouts was directed – and perhaps misguided – by the considerable success of the *Nebula*, *Akira* and *Galaxy* classes in a completely different size and mission category.

Research and development had been tending towards a narrow hull form for quite some time, for both aerodynamic and warp-dynamic reasons. Some smaller vessels such as the *Bradbury* heavy corvettes had already adopted this hull type. Yet there were aerodynamic and utilizable volume advantages to the gracefully curving saucer of the *Nebula* type, some of which could be downscaled for an atmospheric-capable scout design. No such type had been fielded for the past half a century. Scouting at the far fringes of the known called for larger vessels with more capable engines, and the tactical theater was less and less dependent on atmospheric reconnaissance operations thanks to modern sensing technology.

It was thus clear from the start that the *Paladin* class scout would be a niche type, competing with larger and more versatile vessels not in terms of affordability, but in special abilities. Sized like a corvette or escort, the *Paladin* would feature a compact six-deck hull 107 meters wide, propelled along with the smallest and newest in GN series starship warp engines. Many solutions familiar from small craft GN applications were adopted, including integrating a landing plate system at the bottom of the 65 m nacelles, and using a flat, laterally fed warp core of low maintenance requirements. The core was located in a separate dorsal module which also housed the navigational deflectors and an optional suite of sensors, light torpedo/probe launchers, or both.

An admirable top speed of warp seven was squeezed out of the system without creating an excessive maintenance burden. Impulse drive was coupled to the main power feed, so that drive plasma flowed from the engineering pod down to the nacelles, then up again to a slim beavertail structure featuring two impulse nozzles and a row of aft-firing lifeboats between them. The beavertail merged to the aft rim of the saucer, with the doors of a wide shuttlebay just above so that the auxiliary craft could use the top surface as a landing target. When landed, the scout could utilize this flat top as a staging area for various surface operations: a tractor beam at the aft bottom of the engineering pod could double as a crane for delivering loads to and from the surface.

More direct surface access came from a giant combined landing leg and ramp at forward centerline, folding down from the saucer ventral surface. The ramp connected to vehicle holds on Deck 6; further scouting and survey stores were located on Deck 5, along with the lower, two-part Type VI phaser strip for primary offensive punch. The middecks held accommodation and support services, while Deck 2 housed analysis facilities and the upper phaser strip. Deck 1 was a semi-sunken command center, surrounded by some navigational sensors. The hull was extensively armored and featured few portholes. A primary tactical aim for this specialist scout was advance assessment of hostile environments in preparation for planetary assault, with a secondary role in inserting, extracting and supporting special strike teams. In both roles, the ability to carry two medium shuttles (typically specifically configured for reconnaissance) and a dozen surface action vehicles was of practical use; the latter role called more for the armament, but both benefited from the heavy armoring and shielding.

Production began in early 2366, leading to initial series of 16 scouts armed with torpedoes and 14 lacking this armament but featuring a more capable sensor suite. No mass production commeasurate with the affordable size of the *Paladins* was attempted. The operational niche of the type was too narrow, and ultimately the versatility of competing generic small starships too great. The *Nova* surveyors and *Ukora* corvettes are crowding the niche now, while also covering many other areas of concern for the modern Starfleet. The exemplary service record of the *Paladins* in their field of speciality will allow them to carry the "*Galaxy* family" design philosphies to the far future nevertheless – quite possibly ultimately leaving the nimble scouts as the last active members of that family.

Defiant

Escort/anti-Borg platform
2371-

Completed:	60+ total: 5 anti-Borg platforms / reconnaissance ships 55+ escorts
Length:	170.7 m
Beam:	134.1 m
Height:	30.1 m
Mass:	387,500 tons (initial prototype configuration) 355,000 tons (anti-Borg / reconnaissance configuration) 343,500 tons (escort)
Officers:	10
Crew:	30 (anti-Borg configuration) 42 (reconnaissance configuration) 40 (escort)
Cruise speed:	W 6
Max. speed:	W 9.5
Endurance:	6 months
Weapons:	<u>Standard anti-Borg / reconnaissance fit 2375:</u> 4 pulse phaser IXP emitters on engine cowlings 2 fwd medium torpedo tubes w/ 40 quantum or photon torps 2 aft medium torpedo tubes w/ 10 quantum or photon torps

	1 fwd heavy torpedo tube w/ 20 quantum or photon torps or probes Additional weapons emplacements available for defensive phasers etc. <u>Standard escort fit 2375:</u> 4 pulse phaser IXP emitters on engine cowlings 2 fwd medium torpedo tubes w/ 40 quantum or photon torps 2 aft medium torpedo tubes w/ 10 quantum or photon torps 1 phaser VII emitter on dorsal hull 1 phaser VII emitter on ventral hull
Shields:	1-layer globular forcefield Ablative armor coating Navigational deflector on fwd hull
Transporters:	2 GP (6-pad), 1 cargo; Mk VII
Auxiliaries:	2 shuttlepods, 1 light shuttle, 2 work pods
SOURCES:	D DS9 N DS9 H DS9 (DS9 TM)

The smallish but heavily armed *Defiant* was an early result of the crash program that was launched in 2365 to provide defense against a Borg intrusion. Far from a success story at first, the design underwent a series of drastic alterations, humiliating dismissals and disastrous early deployments. Nevertheless, by the time of the Dominion war, the *Defiant* and her small band of sisters had established themselves as an invaluable armed reconnaissance asset and a solid point defense platform.

When first conceived, the class was to be a conservative mount for an as yet undecided mix of the latest anti-Borg weaponry. Initially, the project involved a rather pedestrian hull design modified from the general utility *Nova* spaceframe to hold six heavy launchers for firing of superfast antimatter or zero-point energy torpedoes. However, it was soon realized that the expected lifetime of such a weapons platform was so low that she could not hope to fire her weapons to maximum effect before succumbing to Borg fire.

Clearly, one had to consider the ship as an integrated weapon system rather than a mere flying turret. As of December 2365, ASDB decided to put more emphasis on survivability and outlined a smaller, more mobile vessel with just one fixed heavy launcher. Firepower would be boosted by installation of a series of berths for palletized standard torpedo launchers and other, hopefully more decisive modular weaponry yet to be developed. Also, new pulse phasers capable of rapid frequency shifts were introduced as the main directed-energy weapon for the type.

Massive solid state warp coils of more than 16,000 tons apiece, adapted from off-the-shelf *Norway* GN-40 coils and thus somewhat ill fitting for a ship of this size, were to be suspended inside heavily SIF-reinforced protective cowlings. Initial plans called for five coils per side, with small aft-facing field windows of superb forward-angle stealth characteristics and maximized survivability in head-on engagements. Drive plasma venting via a driver coil positioned inboard of the field windows would provide drastic impulse boost in situations where stealth was of no essence, while a trio of FIG-4 impulse units (this time off the *Griffin* and *Intrepid* shelves) cowled astern would handle normal sublight propulsion needs with far greater discretion. The prototype was to be powered by an exceptionally powerful, heavily shielded Class 7 warp core that could theoretically drive the less than ideally configured ship to warp 9 and beyond, as well as feed the new phasers with the required raw power.

The unorthodox hull shape, more reminiscent of scoutcraft than of full starships, was chosen to meet two contradictory needs: to accommodate the oversized propulsive hardware borrowed from far larger vessels, and to minimize vulnerable hull area. Should the enemy still score a hit, a layer of ablative material within a surface forcefield matrix would protect the outer hull – the first application of significant amounts of physical armor since the late 22nd century.

The hull between the warp coil cowlings was extremely flat, with only five full-height decks, plus partially reduced-height access areas divided between the engine cowlings. The uppermost deck held a recessed, armored bridge, some officers' quarters, a six-pad transporter and the uppermost level of the main engineering facility, complete with deuterium tankage. Lifepods were also provided here, as were berths for various lateral sensors. Deck two housed more engineering facilities, including the high bay for the actual engine room, plus crew quarters, the sickbay and mess hall. In the cowlings were the upper main phasers, as well as four berths for weapons/sensors, usually housing two targeting scanners and two torpedo launchers. The main computer cores and warp and impulse engines extended down from this deck, which also contained the main power trunks.

Deck three held the lower level of the engine room; the deck below, the main antimatter tankage. Permanent cargo holds extended across both decks, accompanied by three modular spaces that could accommodate a variety of systems. In the prototype, two of these were pressed to use as shuttlebays for a total of two shuttlepods and two work pods. The cylindrar central space had originally been projected to hold a vast rotating ZPE cannon, a weapon that never lived up to its potential. Instead, the facility mostly served as an additional cargo hold until converted into another shuttle hangar. The horizontal shafts for turbolifts were drawn through Deck three, extending from the bow structure to the aft impulse engineering spaces.

Deck four was the lowermost of the full-height main hull decks, only the engine cowlings and the bow structure extending down from there. The cowling part of Deck five housed the lower main phasers, elements of the two shuttlebays, plus six weapons/sensors berths; typically, these mounted two to four torpedo launchers and two long range scanners. Deck six in turn held miscellany like contingency accommodations, life support subsystems, landing legs and recorder markers.

The striking bow structure spanning Decks 2-5 housed navigational deflector and sensor arrays and shield generators, and featured a forking walkway and double airlocks for primary starbase access, or for boarding use in some rather fanciful projections. It also contained a heavy photon torpedo and probe launcher. Due to the extremely strong forward shields, the ship could practically ram through most opponents, and this was indeed intended to be one of the combat modes in a battle against the Borg. In an emergency, the bow structure could be separated to perform an independent ramming run, relying both on kinetic energy and the onboard torpedo warheads to create maximum subsurface destruction on a Borg cube.

Starfleet realized early on that the technologies being developed and fielded against the Borg would be of great interest to the more conventional enemies of the Federation as well. Disinformation campaigns were initiated, and an 'escort' designation assigned to the pulse phaser and torpedo prototype. Construction of the initial three spaceframes was trusted on Antares Shipbuilding Industries, which chose the Rho Nemesis yards, a relatively isolated Cardassian war vintage forward repair base in the Bajoran sector, as the suitably inconspicuous construction site. The compact *USS Defiant* (NX-74205) was the first to be completed, off the record yet in record time, launching in June 2366; engine testing commenced mere two weeks later.

However, the rushed program predictably resulted in unpredicted problems. Power transmission systems were found to be woefully lacking, and the nonconventional warp field design tried to tear the ship apart at high power levels. Weapon systems performed as planned in test firings in the

Arcturus and Lalande 21185 ranges, but integrating them to the ship prove frustrating, as targeting systems development met with repeated delays. The *Defiant* was in the middle of post-testing teardown on Martian surface when the Borg struck in New Year ‘67. Frantic efforts were made to deploy the ship even without hull plating or warp drive to defend the Sol system, but she remained on the surface throughout the battle.

Soon after the Borg incursion, Starfleet aborted development and mothballed the troubled vessels. Their phaser systems were copied for installation aboard other, more advanced Borg-fighters, and the quantum torpedoes were fielded aboard modern defense ships. The *Valiant* was stripped of virtually all internal gear. Warp coils were removed from the *Defiant* and the *Triumphant* and tested to destruction, to ascertain what had gone wrong with the power transmission design. A dozen more warp coils were allocated from *Norway* surplus stock, allowing a redesigned set now comprising just four coils per side to be mounted on the *Defiant*. Final installation of the modified drive system was put on indefinite hold, however.

In 2370, the program took a dramatic step back to limelight when Commander Benjamin L. Sisko of Deep Space 9, part of the team that had developed the design, was given command of the *Defiant* for a very special mission. After negotiations with Romulan and Klingon envoys, Starfleet had fitted the ship with a Romulan cloaking device and basic support systems to enable her to perform reconnaissance missions in the Gamma Quadrant space controlled by the enigmatic Dominion. Access to the distant part of the galaxy was through the newly discovered Bajoran wormhole, a physically stable but politically delicate centerpoint of Federation, Klingon and Cardassian activities and now a possible attack route for the merciless warriors of the Dominion.

The Defiant *in battle with the Borg cube in 2373. Rapid-fire pulse phasers are close-combat weapons, having maximum effectiveness at the range of 100 km or less, and maximum practical range of only about 10 000 km. Improved targeting systems are in development, though, and may in time increase the range of these weapons to perhaps half a lightsecond. Meanwhile, the* Defiant *relies on her excellent maneuverability and heavy armor to ‘get personal’ with her opponents.*

The prestigious mission did not quite establish the *Defiant* as Starfleet’s most potent asset; rather, it showed that she was considered the most expendable. As predicted by the gloomy pre-mission simulations, the aggressive reconnoitering into Dominion space ended in a dismal failure and temporary capture of the vessel. No diplomatic relations could be established with the leaders of the Dominion – and although their identity and whereabouts at least could be determined, it was also found that challenging them militarily would be beyond Starfleet’s means.

But the *Defiant* was subsequently refitted with improved power and support systems and production-standard quantum torpedoes, and was utilized for numerous military intelligence missions through the wormhole and permanently stationed at DS9. She played a crucial part in defending the Federation against Dominion intrusion in the early 2370s, and was also extensively used for anti-Maquis operations. In 2373, she was finally deployed for the mission she was designed for, as she successfully fought the Borg cube that intruded UFP space that year. Sadly, in 2375, the *Defiant* was lost to joint Breen and Dominion forces at Chin'toka.

With the success of the design in handling the Gamma Quadrant assignment, Starfleet ordered the production of further *Defiant* class vessels for armed reconnaissance purposes; five such units have been completed to date, all with slightly different equipment standards in search for the best possible weapons and sensor fit. One of these, *USS Valiant* (NCC-74210, one of the original prototypes brought to more or less *Defiant*-like standard), has been lost in battle so far. As many as 55 more vessels have been constructed for fleet/convoy defense duty, a truly ironic twist in mission profile when one considers the original, false designation for the class. The second such vessel, *USS Sao Paulo*, was renamed *USS Defiant* in honor of the historic vessel lost earlier that year, and assigned to DS9. Several others are based at key ports along endangered trade routes, while others stand by to accompany major military formations as their nimble and hard-striking perimeter guardians. Half a dozen war losses were suffered among the escort fleet, but replacement vessels are coming off the construction docks at a steady pace of eight per year.

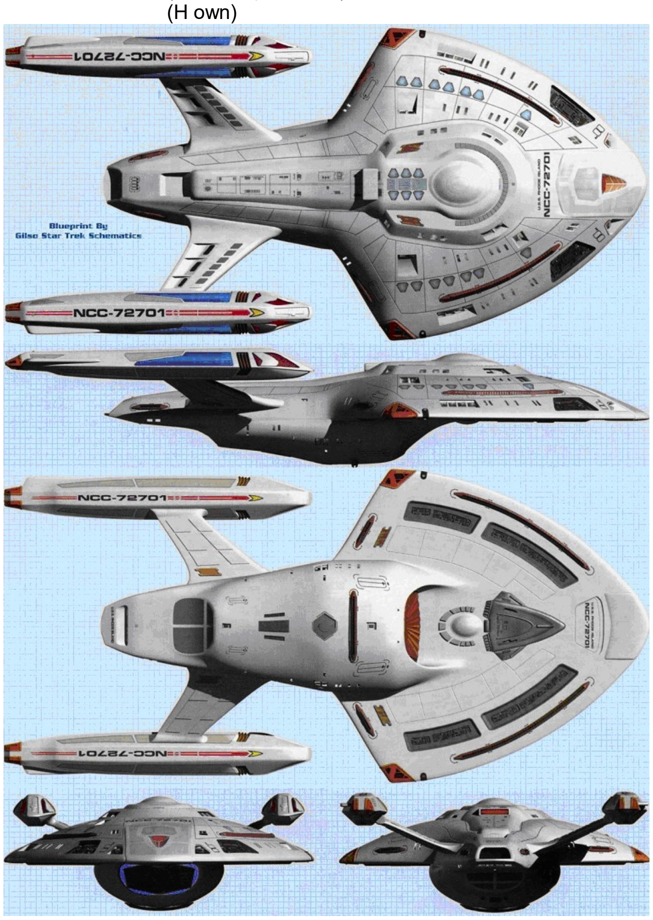
Studies are underway to further modify the rather satisfactory type to scouting missions by installing more conventional warp propulsion machinery. Near-term upgrade plans to existing *Defiants* include removing the upper pulse phasers and installing a reconnaissance-dedicated bow structure lacking a torpedo launcher or destruct charge. A number of ships will still be retained in the original, heavily armed configuration for possible anti-Borg use.

Ukora

Corvette
2372-

Completed:	99+
Length:	178.0 m
Beam:	86.2 m
Height:	34.5 m
Mass:	269,000 tons
Officers:	18
Crew:	73
Cruise speed:	W 6
Max. speed:	W 8.0
Endurance:	2.5 years
Weapons:	4 phaser VIII strips on forward primary hull 4 phaser VI strips on aft primary hull 1 phaser VIII strip on ventral secondary hull 2 phaser VI strips on aft secondary hull 2 fwd medium torpedo tubes w/ 30 photorps 2 aft medium torpedo tubes w/ 30 photorps and 120 gravitic mines
Shields:	1-layer globular forcefield Navigational deflector on fwd secondary hull Auxiliary navigational deflector on fwd primary hull
Transporters:	2 GP (6-pad), 1 cargo; Mk VIII
Auxiliaries:	2 light shuttles, 1 atmospheric auxiliary, 1 work pod

SOURCES: D VOY
(N LUG Spacedock)
(H own)



While the *Bradbury* was a high performance experiment designed largely as a technology demonstrator, the *Ukora* class was created out of very real strategic need. As the decade separating the conceptions of the classes had seen little in the way of military conflict, however, this strategic need came as a rude surprise to Starfleet. The solution thus was somewhat hasty and improvised, both technologically and operationally.

The prime threat of the early 2370s came from across the galaxy, yet had repercussions close to home. Dominion meddling turned the Klingons and the Cardassians to the warpath once again, and thus threatened the very core of the UFP. The doctrine of active reserves hinged on the concept of advance warning, and thus had a "proximity gap" the far-flung fleet of capital ships could not fill in time. Ironically, the ideal rapid reaction defensive vessel was one with short range and low speed, immune to the temptations of deep space assignments. Starfleet defensive technologies had recently plateaued on a very potent level where even relatively humble starships could qualitatively outgun the known enemies. Thanks to this, the two remaining criteria for the new defensive type were affordability and availability, not lethality and invulnerability.

The acuteness of the Klingon threat narrowed down the selection; availability criteria were met by one type only. The *Nova* multipurpose spaceframe was mass-produceable, adaptable, and already armed well enough to challenge Klingon and Cardassian units of comparable size. Four could be built at the cost of a *Saber*, the preceding benchmark in affordable defenses. Indeed, four spaceframes were immediately diverted from surveyor production, and modified or purpose-built modular mission gear was ordered.

The *Nova* standard used as the basis was the deep space surveyor. Patrol ships would add a larger navigational deflector, and feature more powerful shield generators in the ventral cavities while sacrificing some endurance. Interiors would also be rearranged to accommodate the required targeting and tactical analysis facilities, as well as mission gear like holding brigs, boarding party assembly rooms, utility spaces for storing basic repair gear and confiscated contraband, etc. Main bridge would be increased in volume to better accommodate the C^3I needs of a fighting vessel, and better shielded as well.

The highest number of torpedo launchers installable on the *Nova* spaceframe was naturally carried. Extra magazines for up to 80 torpedoes increased the combat endurance of the corvette. Impulse engines were of greater power and bulkier construction than in any other *Nova* variant, and allowed for sublight maneuvering comparable to that of the earlier *Renaissance* and *Chimera* patrol types; a key element here was an enlarged double-coil IMRF arrangement. Warp propulsion in turn was basically retained at original *Nova* specifications, although H-47 mod 1 featured some sequencer software adjustments to allow for faster plasma feed adjustment and consequently higher accelerations. The H-47 mod 2 had a thoroughly strengthened primary plasma system negating the need for intercooler fins, and was introduced to ships from fiftieth spaceframe onwards.

During the course of the war, ninety *Ukora* ships were finished to the initial standard, and six more were given a modified atmospheric craft for enhanced planetary assault capability. Combined with *Sabers* and *Bradburies*, even though losing out to these two types in capacity, they were an important addition to Federation defenses on multiple fronts. A proper strategic analysis of their importance is still to be made, though. So far, production of *Ukoras* has been continued at a relatively low rate, since the ships share construction resources with *Nova* variants of higher peacetime utilizability.

On the other hand, no decision has been made to discontinue *Ukora* production, either. Indeed, Starfleet is ready to introduce improved phaser armament to the next production batch, should one be procured. Shielding advances will be equally crucial in giving such small vessels an edge over adversaries. If truly superior weapons and shields emerge from the recent Borg technology captures, it could be that spaceframe and engine design becomes relatively irrelevant tactically. Affordable, low propulsive performance light starships would then be at the forefront of Starfleet rearmament, and conventional starships of larger size would become wasted effort, with economic inertia their only justification for survival. However, "superior weapons" are a recurring theme in the history of warfare, and one of its most fleeting elements. Starfleet can hardly be blamed for applying conservative thinking for the next generation of starships – and that is likely to include continued support for the *Nova* class, in all its incarnations.

Loki

Courier
2372-

Completed:	18+
Length:	183.5 m
Beam:	86.2 m
Height:	34.5 m

Mass:	509,000 tons
Officers:	12
Crew:	35
Cruise speed:	W 8
Max. speed:	W 9.92
Endurance:	2.5 years
Weapons:	4 phaser VIII strips on forward primary hull 1 phaser VIII strip on ventral secondary hull 2 phaser VI strips on aft secondary hull 2 fwd medium torpedo tubes w/ 20 photorps
Shields:	1-layer globular forcefield Navigational deflector on fwd secondary hull Auxiliary navigational deflector on fwd primary hull
Transporters:	2 GP (6-pad), 1 cargo; Mk VIII
Auxiliaries:	2 shuttlepods or 1 light shuttle, 1 work pod
SOURCES:	(D DS9 TM) (N LUG: The Price of Freedom) (H DS9 TM)

The latest addition to Starfleet's inventory of fast courier vessels is a modification of the *Nova* class design. Actually directly modified from the pathfinder vessel for the *Defiant* class program, the class ship *USS Loki* sports a four-nacelle configuration. Not only is the number of nacelles doubled, but there are also two active warp cores aboard. The purpose of the duplication is nothing less than providing a 'pony express' of two alternatingly running starships within one spaceframe. By idling one of the drive systems while the other one operates, the hypermodern courier can sustain high warp for several weeks, and warp eight for up to ten months.

The upper H-47 mod 3 nacelle pair leads slightly on the lower, both pairs being mounted on class-specific swept pylons that also hold standard heat exchanger systems. Extra structural strength is gained from the omission of the equipment bay that in the *Novas* would hold aft torpedo launchers or buoy/mine racks. Instead, virtually all of the secondary hull volume left free for mission gear is taken up by the second warp core and its support systems.

The main shuttlebay is slightly reduced in length from the already cramped original model. Two shuttlepods or one light shuttle can still be carried. In *USS Loki*, no atmospheric auxiliary craft berthing is provided beneath the primary hull, as none was included in the *Defiant* test program. In production-standard *Lokis* utilizing standard *Nova* hull components, the area is simply plated over, featuring neither an auxiliary nor a sensor cluster.

In general, the primary hull is kept free of unnecessary clutter. As has been the practice since the *Centaurus* vessels, easily movable partitions and internal modules can be rapidly swapped for accommodating up to four VIP parties or a hundred passengers, two dozen intensive care patients and medical personnel, or a wide variety of priority cargo. The latter was the main reason for creating the courier in the first place: at times, it could be necessary to move expert personnel extremely rapidly from place to place, but the only thing that could require the maintaining of warp eight for months at an end was the carrying of physical objects. Expertise would travel swiftly enough in the form of holographic abstractions, and should not be needlessly idled within a starship cabin.

At the time of this writing, eighteen *Lokis* have been completed, including the prototype. The class saw significant action during the Dominion war, although luckily not of the combat kind. Superior Dominion sensor capacity did prove futile Starfleet hopes that lone couriers would go unobserved. Still, warp 9.92 was enough to shake off pursuit of most types. On SD 51822, *USS Japori* even reported outrunning both torpedoes and polaron beams fired by two Dominion cruisers in initially close pursuit.

Production of *Loki* couriers is expected to continue after standard *Nova* production is resumed. However, demand for special high endurance couriers might have been overestimated originally. Starfleet is hesitant to engage in extensive procurement of this new technology, when there is promise of breakthroughs in transwarp research. Within ten, perhaps even five years, radically new shapes of starships may be propelled by radically new drive systems. Major ships built in the past two decades will no doubt continue service, for economic reasons alone. Whether there still is a place for smaller, less expensive, more expendable vessels like the *Novas* and the *Lokis*, time alone will tell.

Dervish

Heavy escort
2386-

Completed:	82
Length:	245.5 m
Beam:	243.5 m
Height:	71.0 m
Mass:	850,000 tons
Officers:	36
Crew:	154
Cruise speed:	w 6
Max. speed:	w 9.5
Endurance:	1 year
Weapons:	2 phaser VI strips on dorsal primary hull fwd port/stbd quarters 2 phaser VI strips on ventral primary hull fwd port/stbd quarters 3 more strips somewhere 2 fwd phaser cannon somewhere 4 aft phaser strips 1 fwd, 2 aft torp tubes (Mk 75)
Shields:	1-layer conformal forcefield Navigational deflector on bow
Transporters:	2 GP (3-pad), 2 cargo/emergency evacuation; Mk VIII
Auxiliaries:	1 runabout, 3 medium shuttles

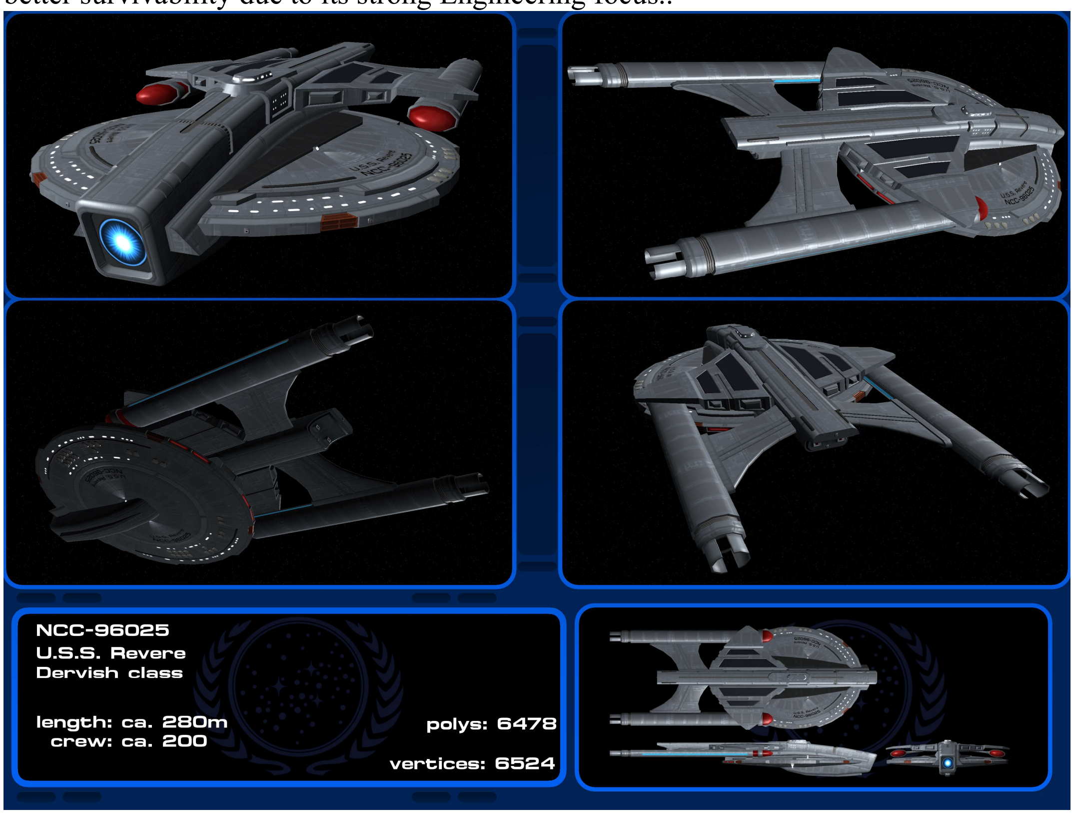
Ships of historical interest:

USS (NCC-), *USS* (NCC-)

SOURCES:	(D STO) (N STO) (H STO)

Modern counterpart to Guardian....

“The Dervish Class has a more traditional saucer section with the largest deflector nose of all the variants. It has four Reaction Control Thrusters and protruding Impulse Thrusters at the back of the saucer. The large nacelles feature wide angle Bussard collectors at the front. Its center pylon is the largest with side pylons that sweep backward.
While being marginally less agile than the other Tier 5 Federation escorts, the Patrol Escort enjoys better survivability due to its strong Engineering focus..”



-The big fins atop nacelles are a mystery…
-Are the pulse phasers in the “intakes” next to the deflector and flanking the bridge area?
-Where to put the bow torpedo launcher? Below the nose? Stern pair is in the aft hull.
-LF-45 / FIG-4 engines.

Small craft

Being assigned to a vessel belonging to 'the lower tier of sub-starship vehicles' sounds distinctly unappealing – yet craft in this category are actually coveted assignments in Starfleet, both as stepping stones towards command duties aboard larger vessels, and in offering the thrill of independent command without delay. The small craft in Starfleet service aren't primarily intended for training duty, however, since modern simulator systems offer a much more versatile and economical training tool. Instead, the craft perform hard work in specific applications the larger vessels either cannot handle, or can only handle at needlessly high operating expenses.

Few of the craft are multipurpose machines; rather, they seek optimum performance via unique engineering solutions. It is thus often easy to recognize the type and mission of such a craft with a glance. This in mind, the entries in this chapter only give sporadic examples of craft in any given mission category, often concentrating on a single groundbreaking design. The reader should understand that other craft classes in the category have been in use in other time periods, and can be assumed to have generally similar appearances and characteristics. Since the active lifetime of a small craft design is typically a fraction of that offered by a larger vessel, there are likely to be dozens of small craft classes per century and mission class, rather than just a handful. On the other hand, a small craft design may still see a century of use, even when it no longer represents the state of the art.

* * *

The scouting mission, among the least specific in Starfleet, nevertheless often calls for special gear. Gathering of military intelligence may prove impossible unless extreme stealth is used, commonly dictating small profile for the reconnaissance craft. Certain military targets may still carry the risk of near-certain exposure and destruction, in which case smallest possible craft should be expended. Targets of scientific interest may place size limitations on reconnaissance craft as well, in terms of access or the amount of disturbance the presence of the scouting unit creates.

Although often sporting Fleet registries (possibly with O or I prefix) and performing independent instead of auxiliary missions, few of the craft at the lowest range of the scouting arsenal officially meet the classic criteria of starships. Armaments may be omitted altogether, as combat endurance cannot be built into the small spaceframes no matter what. Main onboard equipment consists of numerous sensors and recording devices, optimized for the mission. Online analysis systems are kept to a minimum, and skeleton crews of two to five typically fly the missions.

There is little need for crew comforts due to the low overall endurance. After all, scoutcraft do not use their speed to combat the vast distances of interstellar space. Instead, they face far more concrete opponents of battle, such as spaceborne defenses around hostile worlds or mortally dangerous radiation belts in areas of scientific interest.

Aerodynamic hull shapes and landing capacity are a must for most scoutcraft. Where even the scouts dare not go, an arsenal of probes can be sown from onboard dispensers. The crew is seldom risked on planetary forays, and transporters are reserved mainly for boarding and emergency use instead of away team deployment.

* * *

Although courier services across interstellar ranges call for high speed and thus generally for large engines, the volume and mass of items to be carried is often low. This contradiction has prompted several cultures to develop specialized small craft that feature grossly oversized engines, often in a detachable warp sled configuration. Small size provides some obvious tactical and practical advantages, and some disadvantages. To simplify slightly, small couriercraft are the most useful in areas of the very highest or the very lowest risk: they can run the gauntlet of an alert enemy by their inherent stealthiness and unobtrusiveness, and are cheap to operate – yet when caught, are helpless to defend themselves.

Some couriercraft operate without the need for warp sleds, since there still remains a need for couriering across relatively short distances, and at the lowest possible cost. Propulsive advantages that would make small craft truly practical at longer ranges remain beyond the horizon, though.

* * *

Prospecting of resources has always been a prime motivator for interstellar flight. Governments mount resource-hunting missions for purposes of expansion, or in order to deny the resources from competing governments. Private enterprises seek to obtain resources to sell to their governments or in the open markets. Individual prospectors in turn offer their services to governments and enterprises alike. Our galaxy is full of star systems that have no habitable planets or other obvious targets of strategic interest; often, only the private prospector is ready to take the risks of checking out these uninteresting targets for possible hidden treasures.

Typical prospector vessels cater for the private enterprise or the individual risk-taker. They are high endurance modifications of small commercial or military designs, carrying specialized sensors pre-tuned to the signature of the coveted resource type. They usually require and support minimal crews only. Two primary types exist: landing-capable vessels with inboard warp engines, or larger vessels carrying surface-to-orbit auxiliaries. In any case, direct access to planetary surfaces is a necessary part of prospecting operations. On occasion, Starfleet has taken an active role in developing and fielding vessels of these types, in order to secure strategically vital resources like dilithium or topaline.

* * *

Manned spatial fightercraft are rooted deep in UFP history, beginning with their introduction to the internal conflicts of Vulcans some 2,500 years ago. Even after adopting a less bellicose lifestyle, Vulcans have maintained a strong tradition of using tiny craft with just three or four crew for demanding missions of defense, reconnaissance and, when necessary, offensive action. However, it takes Vulcan discipline to successfully operate such craft on extended missions. Humans have tended to favor simpler craft of very limited mission duration, range and utility. Andorians believe in strength in numbers, and this applies to crew size as well; Tellarites abhor the idea of building simplistic minimum-cost craft when proper large combatants could be constructed instead. Yet many UFP opponents have used fightercraft with vehemence and skill, capitalizing on the low acquisition price, low observability, high maneuverability and the never to be underestimated glory of “single combat”.

Until the 2210s, fighters launched from starbases or dedicated carriers were an important antiship weapon on par with capital ship main guns. Transatmospheric designs were available even to the most primitive cultures, and could inflict considerable havoc if left unchecked. A warp-capable escort fighter could in turn be the only thing standing between destruction and escape for a mercantile convoy. For the past 150 years, however, the role of fightercraft has steered more and more towards independent defensive operations. Evolving technology has greatly reduced the effectiveness of fighter weaponry against capital ships or fortified fixed targets, yet boosted the performance of fighter propulsive systems and shielding. As a result, modern fighters principally serve as interceptors that are deployed in small numbers from austere forward bases or multipurpose starships, rather than operating en masse from dedicated support assets.

In times of intense conflict, modern interceptors can still take on a more aggressive role, providing saturation fire against large ships and ground installations, as well as preventing the enemy from responding in kind. Offensive use of interceptors places the pilots in considerable jeopardy, though, and is therefore a doctrine reserved only for dire military emergencies.

Typical fighter designs of all eras feature massive engines (be they warp, impulse or sub-impulse) and basic utilities for planetary operations (aerodynamic surfaces, gravitics, landing gear) combined with a small yet well protected cockpit and a selection of both onboard energy weapons and hardpoint-mounted missile weapons. Endurance is traditionally extremely limited, yet a niche has also always existed for craft that can perform interstellar journeys if required.

* * *

The smallest warp-capable Starfleet type save for shuttlecraft is the runabout, essentially an overgrown shuttle with increased independent operations capacity. Less volume is sacrificed to engines relatively than in the faster couriercraft or the more heavily armed fightercraft, and the runabouts feature a very balanced overall equipment fit. In addition to warp engines of medium performance, the craft in their modern incarnation carry moderate phaser armament, tractor beams, transporters, short and medium range sensors and various buoys and microprobes. The main operational realm for these craft is as starbase and outpost liaison vessels, especially in remote locations where distances are too great for simple medium shuttlecraft.

Apart from running errands for starbases, the craft can perform short-duration patrol and SAR missions in the local space. They require minimal maintenance, getting along just fine with a simple dirtside workbench and a low-power antimatter generator if starbase facilities are not available. A typical Class I-III starbase might house 1-6 runabouts, or a combination of runabouts and one or two heavier craft, like corvettes or couriers. Larger starbases may permanently support true starships for local use, but runabouts are likely to always be present as well.

Runabout-like craft have sometimes also been called cutters or gigs, or classified as heavy shuttlecraft, but only old starbase deckhands are likely to be able to follow through the convoluted logic of these designations. It is sufficient to know never to refer to a Starfleet runabout as a ‘yacht’ within earshot of a Starfleet officer or crewman, as this designation is solely reserved for pleasure craft of essentially similar characteristics.

Toj Lol

Survey craft
1834-2198

Completed:	91
Length:	24.0 m

Beam:	17.0 m
Height:	8.2 m
Mass:	2,150 tons
Crew:	3-5
Max. speed:	w 2
Endurance:	8 months
Weapons:	1 phased particle cannon (50 GJ / 200 GW) on dorsal bow
Shields:	Hull armor
SOURCES:	D ENT (N FASA) (H FASA)

Although the aerodynamics of the traditional Vulcan ring drive are more than acceptable for orbit-to-surface applications, the weight penalty of a ring element oftentimes is not. In Vulcan scoutcraft construction, warp propulsion was often sacrificed in order to secure superior agility and payload. Detached operations wherein a mothership of characteristically high warp performance deployed a sublight scouting force were the basis of Vulcan survey and surveillance doctrine for the 19th and 20th centuries; Vulcan psychological stamina enabled scoutcraft missions of several months or even years between mothership visits. Nevertheless, survey parties craved for operational independence. There existed a definite need for a survey command craft with at least rudimentary warp capability. For the 19th century, the answer to the need was the *Toj Lol* class.

In essence a 24 m atmospheric barge equipped with two impulse modules and a partial, folding ring drive for warp 2 travel, the *Toj Lol* seemingly exhibited little of the classic Vulcan spacecraft design elegance. An upper deck featured numerous physical portholes, both on the forward flight deck and on the cabins circling the central sensor and laboratory area. Middeck spaces housed survey gear, supplies and consumables, with docking ports to both sides and a defensive particle cannon in a forward mount. The lowermost deck had ventral, fan-shuttered doors for surface access, plus a tripod landing gear consisting of a nose leg with adjoining ladder plus the downfolded outer elements of the warp ring.

Four control petals stabilized the craft in passive atmospheric entry, enabling shockwave manipulation for maximum aural stealth. Generally, the *Toj Lol* was not supposed to challenge surface surveillance systems. Most observations would be conducted from orbit, behind the safety of a radar-scattering field. Extreme caution was called for during surface operations. All but the technologically most primitive targets of survey or surveillance could be expected to pose a danger to the *Toj Lol*, and her ability to escape to warp would be of no use inside atmospheres or down on planetary surfaces. Yet under proper operating protocol, the vessel would be cost-effective, reliable and still capable of completing her mission 150 years after the end of production.

A Toj Lol *showing its age in an ear-rattling atmospheric turn down the lush Hayama Valley on Tarsus III. The fairly primitive gravitics of the craft meant reliance on lifting surfaces, hull contours and engine power, and resulted in undue noise and lack of agility in comparison with more modern types.*

Minimum operating crew for such a craft was three, but survey and surveillance missions typically involved five multi-disciplined operators for whom accommodation was secured for up to 12 months. In operative insertion and extraction duty, some twenty troops could be carried for a more limited length of time. Variants with extended endurance existed for both courier and covert long term surveillance applications, while stripped-down versions were carried in the daughtership berths of the voidcruisers for planetary forays of maximum cargo capacity; only the latter were ever produced in significant numbers compared with the basic survey command type.

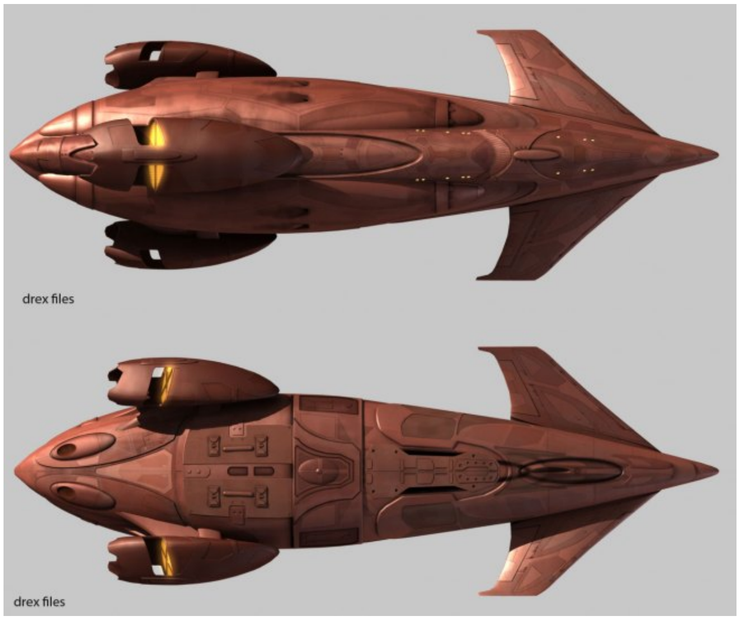
An almost timeless design in its robust, no-nonsense excellence, the *Toj Lol* would succumb in the late 22nd century to the needs and weaknesses of non-Vulcan operators. The unique psychological stamina of the Vulcan crews was crucial to the balance of qualities that made the *Toj Lol* so capable and affordable at the same time; a crew from a lesser species would have to be provided with a vessel optimized for a shorter mission time, resulting in a completely different balance. Earth obtained its first *Toj Lol* units in 2087, illustrating less the low esteem in which Central Command held the type by that time and more the fact that its performance did not exceed that of Earth's finest native achievements. As the result, little practical use was found for the craft, beyond hauling key personnel between well-established and not too distant ports of call. Survey operations in the unknown would certainly have exceeded both the endurance of the craft under human command and the mandate of Starfleet.

While Vulcan continued to operate survey units of compact dimensions on its own, its contribution to Federation shipbuilding would be biased towards craft of increased speed or reduced independence. The last *Toj Lol* of the 91 built between 1834 and 1858 was pulled from active service in 2198.

Tshin

Sublight gunboat
1907-2202

Completed:	1,016
Length:	36.0 m
Beam:	12.0 m
Height:	10.1 m (landing gear retracted) 10.7 m (landing gear extended)
Mass:	2,150 tons
Crew:	3-5
Max. speed:	Sublight
Endurance:	3 weeks
Weapons:	Phased particle cannon (50 GJ / 100 GW) on ventral bow
Shields:	Hull armor
SOURCES:	D ENT (N own) (H own)



The classic Vulcan gunboat design has changed little in the past half a millennium. Even drastic improvements in performance, such as addition of rudimentary FTL capability, have resulted in few departures from the teardrop aerodynamic form that was established as superior thousands of years ago, or from the arrangement of subspace coils around the stern of the craft that give them their superb agility and interplanetary reach.

One reason for the lack of variation or evolution is naturally the long-practiced Vulcan policy of pacifism from the position of superior firepower, and the related untouchability of the Vulcan homeworld. The last gunboat type to have been tested in battle is the *Tshin* class, dating to the mid-20th century. These 36 m craft participated in the last colonial conflicts of pre-Federation Vulcan, and remained an element of colonial and homeworld defenses till the beginning of the 23rd century.

Elements typical of the *Tshin* included gigajoule-tuning particle cannon and a trio of propulsion units, an elegant paring down from previous models. Gone were external hardpoints for missile weaponry, given the versatility of the phase gun armament. Reduction of drive unit numbers from the six or five of the preceding types was also due to the increased capabilities of modern systems. The gunboats could achieve 800 g acceleration for two days straight, although there were few applications for this; typical combat operations took place within a lightsecond of the point of deployment.

What the craft mostly were tasked with was planetary defense, involving interception tasks from well-equipped planetary bases, and additional patrol duty in systems that lacked full defensive sensor networks. However, up to ten craft could also be carried on a *T'hyla* cruiser, or two on a *Suurok*. As there were many power projection duties for the Vulcan fleet in the 20th and 21st centuries, such deployments were common. By the 22nd century, a much more standoffish policy was adopted, and interventions became indirect in nature. A pair of *Tshins* would now typically move down a special forces unit, then possibly loiter for fire support and surveillance – a task that called for neither the speed nor the agility of the aerodynamically and propulsively refined design.

On the other hand, there were many useful stealth features built into the craft, at least when the observers to be fooled did not possess technologies to detect subspace or gravitic emissions. The hull had sufficient superconductivity to cool down almost instantaneously after atmospheric entry, with the gravity generator acting as the internal heat sink. Reflectivity could be adjusted to near-zero across a broad EM wavelength range, and atmospheric turbulence was minimal even at medium supersonic speeds. Gravitics-only landings could be performed with precision, the craft coming to rest on two large landing pads on the stern and one near the bow. Lying horizontally, she would be easy to camouflage by a variety of techniques built in to the hull. She was thus much preferable to certain more generic types of shuttlecraft in the operative insertion and support mission.

There were generic characteristics of utility value to the type as well, to be sure. Two 2 x 4 meter hatches on the lower flanks amidship allowed loading and offloading of various gear, including surface reconnaissance vehicles. A centrally mounted lift provided further access to the amidship holds, and served as the standard means of personnel ingress. A small hatch integrated with the forward landing gear was also available for the purpose below the bow, and compatible with the docking adapters of daughtership bays on *D'Kyr* or *M'Lat* ships for transfer of crews in space. A tractor beam of moderate power could be deployed from above the cockpit area as a docking aid.

Two Tshin *craft from* VCS D'Vahl *delivering an intervention force to Relka V, where a native Class E culture came under the influence of Andoria in the 2020s. Near-perfect chameleon camouflage is already setting on the hull of the closer craft, while the other kicks up minimal dust in a gravitics-only final approach.*

High Command ultimately expressed its displeasure of continuing use of cruiser deck space for gunboats, condemning the *Tshins* to homeworld defense tasks and the odd colonial mission by 2150. The banishment turned out to be a mistake in the Romulan war, resulting as it did in a lack of experience on shipboard operations. While large numbers of gunboats were involved in the Romulan conflict, their performance was often sub-par. Especially damning was slow deployment or recovery of the craft from cruisers newly shielded with forcefield devices; infamous examples of voidships caught "with their pants down" include the *Lanama* and the *D'kan* at the Battle of 198 Eri.

While almost a thousand craft were manufactured originally, replacements in the following centuries totaled barely a hundred. No craft were built after 2104, and only about two hundred persisted after the Battle of Cheron. The last *Tshin* combat units were disbanded in 2190, and individual craft used as trainers or range support vessels ceased operations by 2202.

Franklin

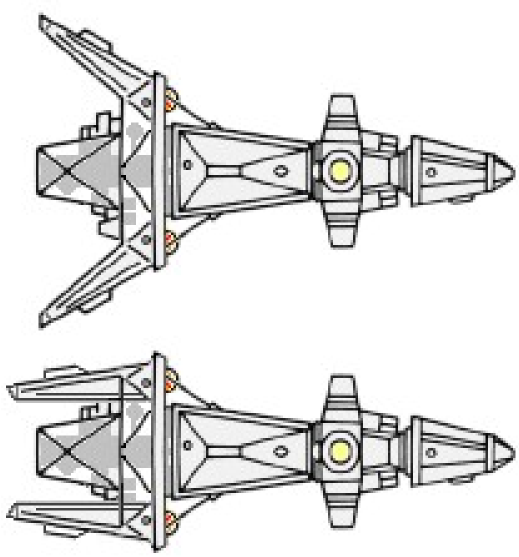
Scoutcraft
2075-2102

Completed:	129
Length:	45.0 m (nacelles retracted) 42.5 m (nacelles extended)
Beam:	18.5 m (nacelles retracted) 29.9 m (nacelles extended)
Height:	11.7 m
Mass:	542 tons
Crew:	4
Max. speed:	w 2.2
Endurance:	6 months
Weapons:	2 plasma cannon (50 MW) on midhull module wingtips 2 rocket cassettes w/ 250 KE rockets on midhull module wings
Shields:	None; radiation/impact armor between main body and power/propulsion block
Auxiliaries:	None; 4 personal maneuvering units typically carried

Craft of historical interest:

USC Bering (SC-021)

SOURCES:	(D SFC, own) (N SFC) (H SFC)



The *Franklin* series of warp-powered scouts holds the honor of being the first series-produced small warp vessel utilized by the UESF. The direct forebears of these vessels were created as interceptors for chasing other near-Earth warships; several designations were used for them and their subvariants, including SI-21, ST-21B and OFS-A-1, but no class name in the naval tradition was ever given. Indeed, the naval format was only slowly taking hold of space forces jargon, and aerospace phraseology was still predominant in many projects.

The craft were typical of the dozens of space fighter types that emerged on Earth in the 2030s. Despite continuing efforts to ratify the LAST III treaty against spaceborne weapon systems in the NUN, various small combat spacecraft were being built by almost all countries with access to the necessary technology, and the SI-21 interceptors were among the most advanced. Their conical pressure hulls, amidships fuel tanks and external clusters of machinery and armament were typical of the era, and bore little resemblance to the sleek shapes of later starships. The interceptors featured powerful reaction engines capable of interplanetary operations, fission powerplants located behind a radiation/impact shield, and the first working versions of craftborne inertial damping systems. Their armament featured KE rockets, particle cannon and plasma cannon in various modular mixtures.

Some typical 21st century orbital and interplanetary craft docked to an orbital replenishment post. SF-21 interceptors in NUN livery topmost, closest to the communications array.

More than 400 such interceptors were built and launched to Earth orbit between 2036 and 2049 as part of the escalation towards WW III. However, the fragmentary records from the 2050s do not tell whether the ships performed well in combat or ever even saw it. The warp-capable *Franklin* scouts were based on the design not because of the armament, but because of the availability of the spaceframes and their superior structural integrity and compatibility with warp power systems. Much of the equipment of the interceptors was retained, but the power system was converted to utilize the ‘Block Gamma’ version of antimatter-spiced fusion reactors detailed in the Bellnet. Two 12.5 m warp coil tubes were secured to the sides of the craft by titanium-aluminum scaffolding.

This did not much affect the external dimensions of the scout, yet naturally increased her mass, in this case almost fivefold. The reaction engines, built to move the craft across interplanetary distances and to accelerate them to intercepts of equally violently maneuvering opponents, had no trouble coping with this increase when merely tasked with boosting the craft in and out of the no-warp zones around planets. The warp tubes also did their best to assist, erecting a mass-reducing subspace field during sublight transit. They had to be mechanically repositioned for the task, making the *Franklins* resemble Earth’s idiosyncratic petal-fieldguided warships both in silhouette and function.

The six-man crew of the interceptors was replaced by a four-person team and provisions for extended missions of up to half a year. Navigational instrumentation was modified for the needs of long range missions, and some scientific sensors were installed in dome mounts atop and below the amidships weapons module. Plasma guns and rocket cassettes were retained, though. The mass or power consumption of extra machinery was of little concern on the generously overpowered little craft; endurance was dictated by life support consumables and psychological pressures first, overall equipment reliability second.

The colonies that emerged on Class M worlds in Earth's vicinity after the introduction of warp drive soon began adopting and supporting former NUN peacemaker and national vessels, and the conveniently sized *Franklins* were high on their wish list. The UESPA was happy to part with the craft, as more powerful ships were coming to its possession via UEDP and later UESF acquisition programs. The small scouts were initially utilized by the colonists in risky exploratory missions far beyond UE-surveyed space, paving way for other explorers, traders and settlers. The *Franklin* class was thus the first in a long line of small craft pressed into hazardous scouting missions, extending now to the ultrafast *Talon* class of scoutships and forming one of the most fascinating components of Starfleet's ongoing exploration efforts.

The small crew posed serious risks, however. The isolation of a small scoutship brought about many social and mental problems. One *Franklin* scout, *USC Bering*, was assumed lost because of mental disorders among the crew, while two deaths and one near-disastrous explosion aboard UESF-operated craft were also blamed partially on mental problems and extreme neglect. As a result, ships of this size were no longer sent by the UESF to long exploratory cruises until considerably faster warp engines had been developed for small vessels. The last *Franklin* was stricken from Fleet strength in 2101.

Missions by colonial operators were naturally a different matter, and suffered from fewer operator-imposed limitations, although practical uses of this very short-ranged craft in interstellar space were inherently limited. Typically, the colonial *Franklins* and their derivatives would see service as escort vessels, running shotgun to 'boomer' transports on routes plagued by space pirates, and replenishing from these transports for extended range. Such humble escorts hardly increased the survival odds of the shipments, however. For the first two centuries of starflight, Earth and her colonies would factually lack any means to curtail or even challenge piracy – and small craft of *Franklin* kind would not be part of the solution found in the late 23rd century.

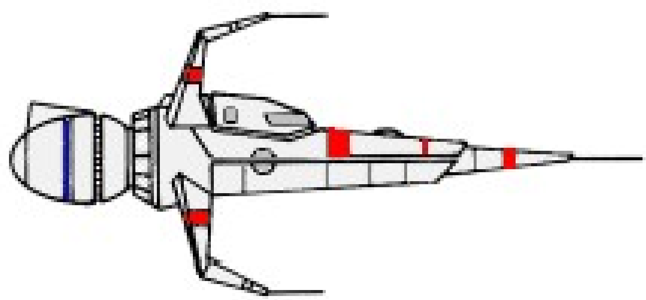
A colonial Franklin *and a Y class transport photographed from a second escort craft at warp 1.2, somewhere between Draylax and Arcturus. Insurance premiums for escorted ECS vessels were actually higher than for unescorted ones, as the presence of additional warp cores and the possibility of warp field overlap represented a significant risk to both the transport and her supposed protectors. Escort services were thus mainly purchased by large companies operating multiple freighters, moreso because the costs of* Franklin *operations were often prohibitive for single-ship family businesses.*

Arrow / Galliant / Dagger

Escort fightercraft
2147-2169

Completed:	430 total: 220 *Arrow* 180 *Galliant* 30 *Dagger*
Length:	30.0 m (*Arrow*, *Galliant*) 34.1 m (*Dagger*)
Beam:	19.2 m
Height:	15.0 m

Mass:	142 tons (*Arrow*) 170 tons (*Galliant*) 192 tons (*Dagger*)
Crew:	1 (*Arrow*) 2 (*Galliant*, *Dagger*)
Max. speed:	w 2.3 (*Arrow*, sustainer only) w 2.4 (*Galliant*, sustainer only) w 2.8 (*Dagger*, sustainer only)
Endurance:	1-2 weeks
Weapons:	4 laser emitters (250 nm / 30 MW) on pylons 2 plasma cannon (60 MW) on fwd hull (*Galliant*) 2 Type D phase cannon (30 GJ / 500 MW) on fwd hull (*Dagger*)
Shields:	Light polarizable armor
SOURCES:	(D SFC, MJ Friedman “Starfleet: Year 1”) (N SFC) (H SFC, MJ Friedman “Starfleet: Year 1”)



The 20 ly radius sphere around Sol where UESF and UESPA explorers operated in the beginning of the 22nd century was but a fraction of the space actually visited by humans. Entrepreneurs ventured far into the stellar neighborhood in search of trade contacts; adventurers went farther to find fame. Yet the fifty to sixty lightyears from Sol where the farthest ‘boomers’ traveled aboard their slow freighters were the hunting grounds of dozens of predatory species. Pirates ranging from self-sufficient Nausicaans to rebellious Andorian factions to government-sponsored Klingons took their toll on all traffic. Yet these deliberate and business-savvy operators often were downright civilized compared with the chance encounters with conquistadors or adventurers from empires just outside the Vulcan sphere of influence.

Human counterreactions to piracy were twofold. Most cargo operators simply accepted the roughly 40% losses of shipments as part of the business, as long as the crews weren’t harmed. Others equipped their ships (illegally) with plasma weaponry, or chartered escort services, either from Earth security companies, or from better equipped yet perhaps less trustworthy alien mercenaries. Were a freighter to run into Orion slavers or Breen raiders, though, neither graceful yielding nor feeble armed resistance would offer much protection. The demand for more potent armaments in the 2100s-2130s was huge.

Yet it would only be in the 2140s that human cargo operators would get access to an escort vessel with sufficient endurance and agility to be of practical use. The answer lay not in improving the *Franklin* family of heavy warp craft, but in quite the opposite direction. The first step in boosting the warp endurance of the escort craft was to remove her warp core altogether!

The *Arrow* deep space escort fighter of USF Industries relied on a Zhilkovski S-230 warp sustainer, essentially a set of warp coils energized by induction from an external warp field. The bulbous assembly massed mere one hundred tons, less than a single set of coils sans power systems, yet allowed the *Arrow* to maintain speeds up to warp 2.3 virtually indefinitely, as long as a nearby warp core was feeding the external field. Onto the sustainer was added a dartlike hull some 23 meters long, with a pressure compartment for a single pilot, and with four laser cannon outriggered on spindly pylons.

A preproduction run of 20 *Arrows* was delivered to UESF 23rd and 25th Advance Scout Fleets for operational testing in 2147, mainly for use in outer base defense. A squadron of fighters riding on the warp field of a scout or a corvette provided a force multiplier for perimeter defenses. However, by 2150, the fighters were being distributed to Transport Fleets as well, in face of ever-increasing pirate activity. It would soon become obvious that much of this piracy was in fact privateering, being orchestrated by a hostile foreign power. Ships unescorted by UESF units did not survive to tell of the attackers, a drastic and telling change from the grab-and-grab-again modus operandi of most pirates.

Full production of *Arrows* and improved two-crew, plasma-armed *Galliant* fighters was begun by 2150, and continued beyond the transcendence of the conflict from privateering to open interstellar warfare. By the time UESF knew it was facing the Romulan Star Empire, some 220 *Arrows* had been built, and the production run of *Galliants* was extended to 180 units. A heavier variant with two light phase cannon instead of plasma cannon was also introduced, under the name *Dagger* class. These craft offered a fighting chance for Terran shipments to reach their destinations, when virtually no other vessels could be spared for escort duty. And fight they did: combat losses by the end of the Romulan war were calculated at 298 fightercraft, out of 430 built.

Popularly called ‘cochranes’, the sustainer-engined fighters were deathtraps if stranded away from their independently warp-capable protégés, or if hit by any sort of enemy fire. The incredible maneuverability of the lightweight craft allowed a skilled pilot to remain within the warp envelope of the convoy, however, so that a running battle could be fought. Slowing down to sublight would almost invariably spell doom for the convoy, but a careful cooperation would make possible counterattacks where the cochranes dropped out of warp en masse, dispatched of the enemy, and picked up speed again with the help of a nimbler-than-average freighter hanging behind for this very purpose. All in all, though, climbing into the cockpit of a cochrane took a very special kind of character. Even when not engaged in combat, a ‘cochrane jockey’ would face untold hardships as the cramped craft would have to remain at warp for at least a week or two at a stretch – slowing down for rest and replenishment any more often would delay the shipments intolerably, and often also invite in a Romulan raid.

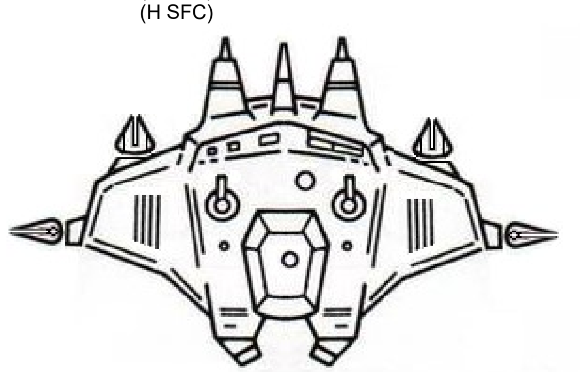
A trio of Arrows *rides on the warp field of an FY class freighter, apparently photographed from a fourth fightercraft sometime in the mid-2150s. Gambling this many escort fighters on a single warp engine suggests an especially valuable shipment. It also suggests that in case of an attack, a pilot who dropped out of warp to fight would not be retrieved by the transport afterwards.*

In practice, the sustainer-engined craft were often crewed by ECS pilots or former human mercenaries. Prior to the Romulan conflict, they had amassed the most experience on escort operations. After the war, input from these veterans was used in formulating UFP Starfleet tactics and technologies. Yet only a single generation of postwar cochranes emerged, as described below. Expansion of Earth's naval forces and consolidation with alien defense organizations soon made possible the construction of dedicated warp-capable motherships for fightercraft, and the art of carrier warfare was reborn for the latter half of the 22nd century.

Clark

Space tank
2150-2178

Completed:	20
Length:	61.0 m
Beam:	97.3 m
Height:	21.4 m
Mass:	13,050 tons
Crew:	10
Max. speed:	w 1.0
Endurance:	1 week
Weapons:	6 plasma cannon (200 MW) in single banks on dorsal, ventral and lateral hull 2 plasma cannon (900 MW) on fwd hull 2 fwd missile tubes w/20 fusion missiles on bow
Shields:	Polarizable armor
SOURCES:	(D SFC) (N SFC) (H SFC)



The introduction of hull polarizing in the 2110s rather thoroughly transformed Earth space combat doctrines. It no longer was vital for a ship to get in the first shot, nor fatal for her to receive a single plasma bolt or even a nuclear projectile. In practice, this meant increased survivability at shorter engagement ranges, and decreased maneuverability requirements. Quite naturally, UESF interest quickly turned to the use of slow yet heavily armed and armored space fortresses.

The primary mission of such fortresses would be system defense, in which sustainable speed played a minor role to begin with. Reaction speed still mattered, however, and even the earliest and most austere designs for armored system defense weapon platforms featured warp engines. Propulsive endurance was limited to short dashes, yet the machines were still too mobile to justly be called ‘fortresses’. The name ‘space tank’ soon caught on, and production began in 2122 on the first tentative designs.

The early *Guderian* and *Tal* thousand-ton space tanks were not success stories, however. In absence of real threats, the best balance of weapons, protection and mobility could not be plausibly established, and simple cost analysis favored the use of lightly protected and armed yet very mobile lifting body designs. Only a dozen *Guderians* and *Tals* were produced. The first half of the 22nd century clarified the nature of the interstellar threat, and steered Earth farther away from the concept of space tanks. Yet the attack on the Delta VII mining outpost in 2146 demonstrated the need for system defenses in human dwellings other than Sol. As constructing such defenses across interstellar distances was well beyond UESF capabilities at the time, mobile space fortresses were the only viable solution.

The space tanks to be sent to guard distant systems were significantly larger than the *Guderian* and *Tal* types. The first *Manta* class craft, completed in 2149, massed 1,890 tons before the installation of warp engines, and measured almost seventy meters from wingtip cannon to wingtip cannon. The *Clark* class of 2150 was larger still, its total mass some 3,050 tons when fitted with six 200 MW and two 900 MW plasma cannon and two missile tubes, and carrying ten crew. When UESF began shipping out the components of twenty *Clarks* to Vega, the first true diplomatic conflict between Earth and Vulcan began to brew.

Defense of the human home system was acceptable and prudent even according to the Vulcan principles of pacifism. However, deployment of permanent warship forces in ‘non-native’ systems ran contrary to Vulcan policy. The alternative acceptable by Vulcan standards, reliance on starships deployed on demand, was not available for the ship-starved UESF. When the cruiser *V’lith* arrived to ‘escort’ the transports carrying the *Clark* components, UE Senate considered recalling the shipments. However, the mechanisms of star travel worked in Earth’s political favor for once: it would have been unsafe to turn the ships back after midpoint, especially after the *Nebukadnessar* sprang a leak and the reactor of the *China Beach* began acting up. The space tanks arrived at Vega as planned, and were assembled by February 2152.

A tidy formation of Clark *tanks deploys from the orbital port of Vega. A centralized maintenance facility was built next to the commercial port, and a rudimentary sensor and control network erected across the system. Apart from these, the tanks required little support, running as they did on commercial grade deuterium. Reliance on external sensor networks did mean that a tank could be rendered virtually blind, deaf and useless by hitting the nearest sensor buoys.*

Meanwhile, production of further *Clark* units was halted while diplomats fought the Vulcan ban. This time, the advantage was on the Vulcan side, as the Xindi crisis diverted attention from traditional insystem defenses to preemptive deep space missions and rapid interdiction. For the better part of the decade, UESF only brought up the space tank argument when it needed leverage for other acquisition programs or military moves, and never seriously considered resuming *Clark* production.

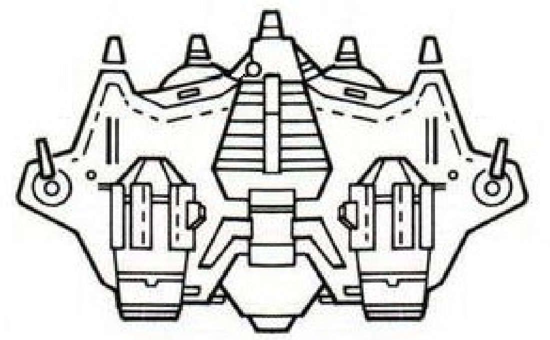
When the tanks finally were tested in battle, results were mixed. On April 17th, 2159, they made a weak showing: Romulan light units blew up the orbital spaceport of Vega and retreated before the *Clarks* had a chance to concentrate their fire. The second engagement, on May 21st, was a splendid success, however. Two Romulan cruisers were immobilized and prompted to self-destruct, a third destroyed outright, and the invasion of Vega averted. All this was accomplished to the loss of four tanks and without the involvement of the destroyer *Concord* replenishing in the system. Belatedly, UESF began deploying space tanks on other human systems as well, even as the fleets were gearing up for an offensive.

The *Clarks* at Vega remained in service until 2178, fourteen units persevering through the cannibalization of the other two. System defenses of completely different type were being erected at the time, and training of space tank crews was discontinued in 2173 already. No tank-type craft moved in to replace the *Clarks*; instead, Vega became home port for the light cruisers *Sahara* (NCC-921) and *Los Angeles* (NCC-930) and garrison for a regiment of Marines. The tanks were floated down to the planetary surface, and dismantled for raw materials – save for a single specimen preserved for decorative purposes at the gate of the Glass Plains garrison.

Bradley

Space tank
2160-2181

Completed:	153
Length:	70.0 m
Beam:	108.2 m
Height:	25.7 m
Mass:	19,628 tons
Crew:	8
Max. speed:	w 1.2
Endurance:	1 week
Weapons:	4 plasma cannon (2.2 GW) in single banks on lateral barbettes 3 Type B phased particle cannon (80 GJ / 200 GW) on bow 2 fwd missile tubes w/20 fusion missiles on bow
Shields:	Polarizable armor
SOURCES:	(D SFC) (N SFC) (H SFC)



Revival of the space tank concept in the aftermath of the Battles of Vega was as swift as it was brief. Blueprints for improved space tanks had existed for several years, and had been updated to acknowledge the latest advances in phase weaponry. When the decision in September 2159 was made to resume space tank production, the *Bradley* class craft already existed down to the minutest detail in the databanks of Martin DefenseLine. The incarnation of three units two months later was only slightly delayed by material shortages, and sights were set at production of 150 more.

The *Bradley* was significantly more advanced than the *Clark* in terms of armament and targeting systems. Three Type B phase cannon were installed at the bow, for a devastating punch against both sublight and low-warp targets. They could not be fired while the tank itself was at warp, though, for reasons of power allocation. FTL scanners on optical, RF and upper duonetic regimes were available at all flight modes. Eight crew were needed to tend to the weapons, engines and sensors, and their carefully repositioned workplace at the heart of the craft was armored more heavily than ever.

The Blue Angel*, a typical* Bradley *in smart indigo warpaint, taking potshots at passing Romulan fightercraft at Draylax.*

Deployment of the *Bradleys* throughout human space came at a time when need for system defenses was rapidly dissipating, though. Unlike was the case in many later military conflicts, the Romulan Star Empire did not operate free-roaming fleets deep in enemy space – a typical sign of a novice star power still accustomed to fighting a 2D planetary battle and thinking in terms of supply lines and fronts. Thus, when the Earth offensive moved forward, Romulans everywhere fell back into more defensible positions, leaving behind no direct threat which the space tanks would need to address. Efforts were made to redeploy the tanks in the wake of the advancing Earthforces, so that new conquests and reconquests could be rapidly secured against counterattack without tying down actual conquest vessels. Yet although the *Bradleys* were quite mobile in insystem terms, with warp 1.2 top speed, they weren't the easiest type of hardware to transport from star to star. Only about 40 space tanks ultimately followed UESF to the heart of the Star Empire, and even these were pulled back when the First Treaty of Algeron established the Romulan Region of Sovereignty and sealed it behind the Neutral Zone.

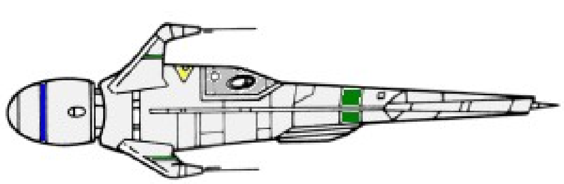
Investment in the 153 *Bradleys* was minuscule compared with what had been spent on the war overall. There was no official denouncing of the concept, nor a move to discontinue operations. On the other hand, no attempt was made to support the space tank infrastructure after the end of the war, either. The major factor influencing the decision was the diminishing value of polarizable armor, and the incompatibility of the *Bradley* design and concept with modern shield generators. The fighting force was allowed to decay until, in 2181, the last *Bradley* was stricken from active strength and immediately recycled for raw materials.

Space tanks have not been seriously considered as a viable space combat type for the past two centuries. System defense 'fortresses' today are light, mobile, distributed and expendable units that do not require onboard personnel. Certain planetary assault vehicles do resemble miniature space tanks with all their armoring and concentrated firepower, however. Even the *Defiant* class, carrying modern armor and forward-firing weaponry, owes to the space tank concept – but speak of a continuous 'lineage' in this context would be quite misleading.

Normandy/Port Stanley

Escort fightercraft
2162-2187

Completed:	510 total: 370 *Normandy* 140 *Port Stanley*
Length:	40.0 m
Beam:	12.2 m
Height:	11.5 m
Mass:	195 tons (*Normandy*) 202 tons (*Port Stanley*)
Crew:	3 (*Normandy*) 2 (*Port Stanley*)
Max. speed:	w 2.9 (*Normandy*, sustainer only) w 2.8 (*Port Stanley*, sustainer only)
Endurance:	2-3 weeks
Weapons:	4 laser emitters (270 nm / 40 MW) on pylons 2 laser emitters (270 nm / 60 MW) on fwd hull (*Normandy*) 1 laser emitter (270 nm / 60 MW) on fwd hull (*Port Stanley*) 2 Type D phased particle cannon (20 GJ / 4.0 GW) on fwd hull (*Normandy*) 4 Type D phased particle cannon (20 GJ / 4.0 GW) on fwd hull (*Port Stanley*)
Shields:	Light polarizable armor
SOURCES:	(D SFC) (N SFC) (H SFC)



The end of the Romulan war spelled the end of convoying as well. Although theoretically a good anti-piracy measure, the practice of forcing multiple ships to share destination, timetable and speed was not commercially viable in the long term. Yet the transports did not have to do without the protection of escort craft – wartime industry, although gearing down, could still produce such overwhelming numbers of escort fighters that practically every single transport could be accompanied by one.

Surplus *Galliant* fighters were not a favored solution, though. The discomfort to which their pilots were subjected had not changed, nor had their combat performance increased despite the many wartime inventions and refinements. Both ECS and Starfleet called for an improved design, but could not hope for miracles. What they got was a moderately enlarged model, with space for three crew so that piloting could be performed in shifts. Life support endurance was increased to about 500 hours. Propulsive endurance naturally remained theoretically infinite; yet the warp 2.8 top speed of the sustainer engine, once considered excessive, now meant that some transports had to throttle down so as not to outrun their escorts!

A quantum leap in combat capabilities was taken when miniaturized phase cannon were mounted in the forward hull for FTL engagements. Targeting data could be shared via a subspace transceiver array mounted ventrally amidship; onboard scanners could lock on to targets with two warp factors of speed differential. Shielding remained as nonexistent as ever, however; shuttle-standard armor plating might withstand the glancing hits of particle cannon, but a sustained laser beam would easily cut the craft to pieces, and a proximity nuclear detonation would be lethal to crew and equipment alike. Half a decade of operations was sufficient to erode Starfleet's trust on the vulnerable craft. As casualties mounted in action against the Tarn and the Nausicaans alike, a production run of 370 *Normandy* and 140 *Port Stanley* escort fighters, a major commitment in prewar terms, was shrugged off as a misinvestment in 2164. Operations continued until 2187, but with a diminishing number of craft involved in progressively shorter escort missions.

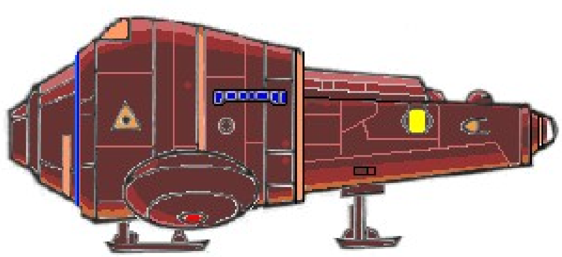
A wing of Port Stanleys *swoops past a perimeter sensor platform at Rigel. Independent sublight patrol was hardly the ideal role for the design, yet little other employment was available in the 2180s. The decision of the Starfleet Merchant Marine not to operate escort fighters was especially damaging to the future of the type.*

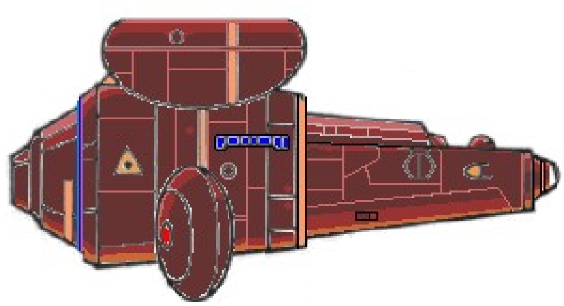
Warp sustainer technology made steady progress in the following decades, and helped extend the reach of torpedoes and probes. It was not applied on manned craft any longer, however. The accidents suffered in escort operations ultimately weighed more than the combat losses, and deep space escort was completely relegated to frigate or destroyer vessels. The number of escorted shipments fell to 2% of the 2160s figures, but improved intelligence helped Starfleet provide protection where it was truly needed. Fightercraft escort was an outdated concept in the late 22nd century anyway, since the pirates that still dared operate within the UFP sphere of influence were by definition tactically formidable opponents, not to be scared off by a pair of phase cannon mounted on a shieldless outgrowth of a shuttlepod. In the 2180 defense review, an explicit decision was made not to develop a successor of any sort to the escort fighter line.

Powers

Scoutcraft
2165-2185

Completed:	80
Length:	75.0 m
Beam:	78.2 m
Height:	37.5 m (impulse engines in landing position, landing gear stowed) 42.1 m (impulse engines in cruise position and/or landing gear extended)
Mass:	4,100 tons (typical)
Officers:	2
Crew:	18
Max. speed:	w 2.0
Endurance:	8 months
Weapons:	4 Type D phased particle cannon (20 GJ / 4.0 GW) on fwd hull
Shields:	Navigational deflectors on port/stbd bow
SOURCES:	(D SFC) (N SFC) (H SFC)





During the inaugural years of UFP Starfleet, shipbuilding was largely a secondary concern, as there were bountiful sources of pre-existing vessels. Surplus from wartime construction programs was only one of these. Even more importantly, the member navies had previously operated overlapping ship types, of which the best could now be selected for joint Federal use. The Vulcan fleet was perhaps less eager to donate warships than the others – but the logic of utilizing the best available technology for the common cause was inescapable, and there was no question as to whose small craft were the best. The bullet-shaped *Tshin* craft with their three evenly spaced impulse engine pods had superior agility for atmospheric and nearspace combat. The medium warp capabilities of the *Toj Lol* survey craft in turn made possible interstellar as well as interplanetary operations, and variants of the type had already seen Earth service in roles ranging from courier runs to stealthy operative insertion.

Even when the remains of the once-mighty Vulcan combat fleet were being scrapped, *Toj Lol* and *Tshin* production continued for Starfleet use. At first, it was thought that the craft could fill both the insystem interceptor and interstellar scoutcraft roles. The new operating organization – or rather, the new operators themselves – brought about unforeseen problems, though. While a crew of three to five Vulcans could easily perform a twelve-month survey mission within the confines of a hull just a couple of dozen meters long and barely six across at the widest point, crews made up of other species would face insurmountable psychological hurdles. In 2164, Vulcans were asked to consider the construction of markedly larger scoutships. Simple upscaling was complicated by both technological and industrial policy issues, and the design that emerged a year later was unique rather than derivative of either predecessor.

USS Grace Hopper*, an early production model* Powers *carrying dorsal subspace scanning arrays, embarks on a survey mission. Despite a thoroughly altered balance of habitable volume, crew complement and workload, endurance still fell short of comparable Vulcan missions. Yet nobody was willing to entrust the Vulcan Science Council with a monopoly on surveys.*

There were obvious Vulcan influences remaining in the new medium scoutcraft, of course. The shattered-ring warp drive surrounding the stern of *USS Legrand Powers* was an obvious giveaway as to the origins of the vessel, even for those UFP member species that could not distinguish between Vulcan ceramic red and Earth gunmetal gray. The two lateral impulse assemblies rigged outboard of the warp arches featured mechanical vectoring that facilitated planetary landings even in the most demanding conditions. For a 75 m vessel with a hull mass of 2,300 tons, plus the two 900 ton warp segments, this was no mean feat.

Standard crew included two officers and 12 ship operations ratings, plus six mission specialists. For the first two decades of *Powers* operations, these specialists were mainly employed with basic surveys of inner UFP systems and the sectors opened up by the dispersing of the Delphic Expanse. Some patrol duties were also undertaken, although the nose-mounted phase cannon were of greater symbolic than tactical worth.

By the 2180s, the *Powers* vessels were hopelessly outdated as survey craft, however. Their limited speed on the expanded theater of operations was the primary argument when they were reassigned to system patrol duty. Hardly the equals of modern corvettes, the former scoutcraft barely spent two years on their new assignments before being retired *en masse*.

This stumbling of Starfleet's early attempt at sustaining its strength through continuing procurement and development of prewar types was bad news for the whole Fleet. It hit Exploration Command especially badly, though, as block obsolescence of larger scoutships coincided with the withdrawing of *Powers* assets. Lack of long term procurement planning was beginning to show, and the scouting fleet would remain a victim well into the 23rd century.

Montcalm / Meridio

Liaison craft
2169-2273

Completed:	160 total: 107 *Montcalm* 53 *Meridio*
Length:	21.1 m
Beam:	19.8 m
Height:	10.6 m
Mass:	323.1 tons (*Montcalm*) 318.8 tons (*Meridio*)
Crew:	3 (*Montcalm*) 2 (*Meridio*)
Passengers:	12 (*Montcalm*) 4 (*Meridio*)
Max. speed:	w 1.6
Endurance:	10 months
Weapons:	None
Shields:	Navigational deflectors on port/stbd hull blades
SOURCES:	D TOS (N Todd Guenther/Mike Morrissette, own) (H Todd Guenther/Mike Morrissette, own)

In the wake of the *Powers* project, several enterprises sprung up to hybridize Vulcan and human technologies for the rapidly expanding human market. A typical combination would see a Vulcan medium endurance vessel transformed to a low endurance human counterpart, the joint result of a less economical drive system and a more claustrophobic clientele. Among classic examples were the *Gadshen* and *Sharan* classes, adopted for production as liaison craft and warp yachts in the late 2160s. The former is of special interest here not only as a pioneering UFP Starfleet starcraft, but also as one of the foremost private warp cruisers for the following hundred years.

Most liaison craft followed the longstanding Vulcan tradition of threefold symmetry and general teardrop shape. However, the three propulsive pods of the original 2163 interplanetary *Gadshen* ('aurora') design were in 2169 replaced by two much more potent, nacelle-mounted CWD Model 9442 warp engines, and an interstellar success story began.

Much like the legendary Voroth *class vessels from a century prior, the* Gadshen *dedicated two sectors of the hull to main propulsive power generation and one to secondary power and mission systems. The almost perfect symmetry of the exterior view betrays little of this.*

The improved *Gadshen* was immediately adopted for production by Star Fleet Division, to meet a Starfleet liaison need. This spawned multiple commercial orders, and Duotechnica of Luna also bought the license. The former yards launched a total of 108 craft under the class name *Montcalm*. The product of the latter was slightly different, and marketed as the *Meridio* class. Panastris also continued production of the original type at Vulcanis Space Facilities to the somewhat more modest total of 55 hulls.

Principal differences were to be found in accommodation standards. The basic *Meridio* was registered for six persons, with egalitarian bunking and a dining area on the lower deck and a compact flight deck and map room on the upper one. A more luxurious interior, selling well in corporate circles, reduced capacity to four; in either case, two would be qualified pilots. Access was through a bow docking port; the adjoining extensible ladder was seldom needed, as surface operations were a rarity for the type. Interplanetary and interstellar journeys from orbital station to orbital station were far more common, the craft having little to do in systems where such facilities were lacking. *Montcalm* served Starfleet needs at shorter ranges by carrying up to a dozen personnel on the lower deck, with the flight crew of three operating a less automated set of instrumentation, a bit austere in some respects, sophisticated in others. Communications gear was particularly advanced in this variant, although for example no weaponry was ever integrated to the design.

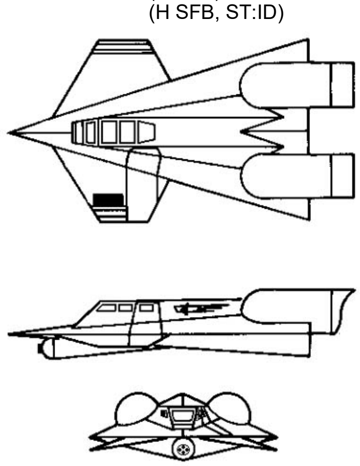
A somewhat artificial shot from Starbase 32 shows a range of private and ex-Starfleet Gadshen *craft at neighboring piers. A luxurious Catullan yacht on the forefront is differentiated from a Farland courier mainly by a gaudier paint job, although enlarged heat exchangers on the yacht's nacelles hint at an uprated warp propulsion system, one of the many popular targets for tinkering.*

Starfleet would come to operate a combined total of 160 vessels, divided not only among the three subclasses but into no less than 34 minor variants (the slight differences ranging from landing gear type to deflector grid patterns, as the manufacturers experimented on newest available refinements). Starbase liaison and light utility transport assignments kept the craft busy from 2174 to 2180. This prompted numerous manufacturers to start designing cutters and runabouts of similar size and improved performance for government use. Even minor improvements in propulsion and internal volume were welcome, and the original type was retired from Fleet service entirely by 2181. Private and corporate operators readily purchased the retiring vessels, adding to the pre-existing numbers of pleasure craft and status symbols. Despite some serviceability problems, many were still encountered on UFP fringe areas in the late 23rd century.

Big Cat series

Sublight fightercraft
2182-2266

Completed:	380
Length:	7.5 m
Beam:	6.6 m
Height:	3.6 m
Mass:	50-55 tons (typical)
Crew:	2-3
Max. speed:	0.8 c
Endurance:	2 days
Weapons:	1 Type D phased particle cannon (20 GJ / 3.0 GW) on ventral bow (original) 1 Type G phased particle cannon (20 GJ / 100 GW) on ventral bow (later models) 2 ventral weapons bays for a maximum of 2.6 tons of ordnance 4 to 6 hardpoints for various weapons on canards (some models, optional)
Shields:	Polarizable armor
Transporters:	None
SOURCES:	(D SFB, ST:ID) (N SFB) (H SFB, ST:ID)



The standard replacement for the fightercraft of the Romulan War was long in coming, for two principal reasons. The first was the great distaste towards risking live pilots like they had been risked aboard the sustainer-engined escort fighters. The second was the optimistic wait for an independent warp propulsion system that could offer more speed and range than the old Vulcan designs. Yet the 2170s came and went without breakthroughs in small-scale warp engines, and Starfleet again began to look at impulse-propelled light combat craft as the answer to its tactical needs.

During the two decades of inaction, those tactical needs had changed little – or rather, no strategic opponent had presented itself, leaving Starfleet unsure of the nature of the threat it should prepare against. Planetary defenses hinged on a combination of resident or visiting warships, vast missile arsenals and a menagerie of medium interceptor craft that still included some space tanks. The latter two aspects were rapidly becoming antiquated, though, and Starfleet ultimately came to consider this as the proper niche of modern fightercraft operations.

High impulse thrust was thus declared essential for timely interception. The ability to carry hard-hitting anti-starship weapons was paramount. For versatility in basing options, transatmospheric capacity was a third major requirement. On this basis, the fightercraft of the latter half of the 22nd century evolved away from the wartime agile needles with warp sustainer bulges and became brute force arrows shooting into space in straight paths to meet a superior enemy in numerical strength. Out of the half a dozen designs produced in the era, the *Big Cat* is a typical example.

The basic body of the fighter was an arrowhead some six meters long and wide, with impulse pods attached at the trailing edge midspan to port and starboard. For atmospheric agility, there were full-width canards at the bow, their anhedral following the angle of the main hull top surface. Atop the arrowhead rode a boxy pressure compartment housing two to three crew. Unlike in the comparable Vulcan interceptors, the pilot was provided with an angled windshield and lateral portholes for direct visibility, and only the weapons officer(s) relied on a fully synthetic view of the outside.

The craft was capable of planetary takeoff and landing, with tripod landing gear folding out from the bottom, and with gravitics to provide initial lift and maneuvering assistance. The jam-packed hull featured just enough space at centerline to carry the main armament of the fighter, a single GW-range phased particle cannon. Twin ordnance bays flanking the cannon were almost an afterthought in comparison, and anything carried within would have been of little use against starship-sized opponents. A secondary role against ground targets theoretically existed, though; for this role, some later models were fitted with additional exterior hardpoints under the canards, mainly for light projectile weapons and freeflight ordnance.

On the left, an early Big Cat *spits fire from the engine nacelles, as fusion heating mode takes over from the hypervelocity exhaust mode and provides the fighter with atmosphere-compatible thrust. Note the conical impulse engine housings, short canards and the smallish windshield, identifying the* Tomcat *model.The craft on the right carries canard-mounted extra ordnance in the form of tip lasers and two mid-span rocket projectors, but nevertheless represents the same model.*

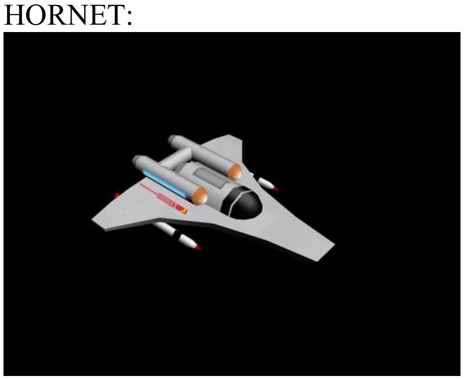
The *Big Cat* series did come to feature surprisingly many such models, persisting despite lack of actual confrontations where the fighters could have demonstrated their worth or realistically assessed their shortcomings. Shipboard variants such as *Panther* and *Jaguar* emerged in the 2190s already; they could mainly be accommodated by the militant variants of the *Horizon* cruiser family, and especially the *Advance* battle cruisers embarked them for the dual purposes of escorting their unarmed shuttlecraft in assault tasks, and of boosting antiship firepower in impulse battles. The craft were a familiar sight also aboard the later *Albions*, even though by that time their antiship capabilities had been revealed to be largely theoretical.

The last hurrah of the *Big Cat* series came with Starfleet's early experiments on carrier starships in the beginning of the Klingon conflict of the 23rd century. It was believed that fightercraft could still make a difference if deployed in sufficient numbers. *Titan* and *Valkyr* vessels had the necessary deck space, and on the other hand the *Big Cats* had the deck-saving dual qualifications of space superiority and planetary assault capability. While better fighter designs were emerging for both applications and also for their combination, the veteran design persisted and received upgrade after upgrade on phase guns, targeting systems, engines and armor, all the way till the very final *Bearcat* model completed in 2226. It was not until 2266 that the very last wings operating this model were disbanded.

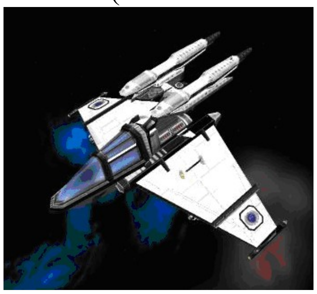
A pair of tactical craft deploying from USS Napoleon*, the abortive 2260s experiment at a new type of carrier. At this point of their history, the fighters were chiefly serving as trials stand-ins for more practicable craft. Note the extended canards, the somewhat wider cabin with side portholes, and the lack of a sensor system "tail" between the impulse nacelles, identifying the* Bearcat*. Such mere nuances actually stand testimony to the longevity of the basic design.*

Other SFB fighter types:

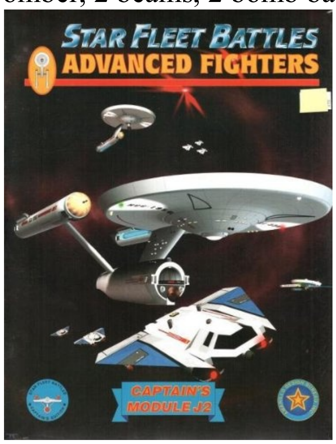
HORNET:



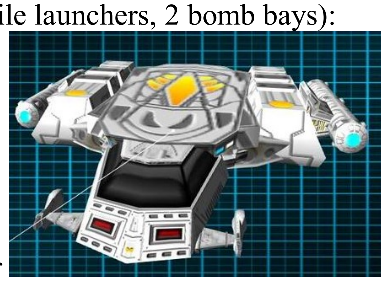
EAGLE (described as “economy” version of Hornet, 2 particle beams):



WARTHOG (bomber, 2 beams, 2 bomb bays):



AVENGER (bomber, 8 missile launchers, 2 bomb bays):

 or 

VOODOO:

UNKNOWN:

Hubble
Runabout
2219-2262

Completed:	374 total: 180 *Hubble* Mk I 194 *Hubble* Mk II (*Penzias*)
Length:	33.0 m
Beam:	22.1 m
Height:	11.5 m
Mass:	1,630 tons
Crew:	3-6
Max. speed:	w 2.9
Endurance:	4 weeks
Weapons:	Usually none Hardpoints provided for 2 laser emitters (200 nm / 180 MW), above and below hull
Shields:	1-layer light conformal forcefield Navigational deflectors on engine pylons
Transporters:	None; some later refitted with 1 2-pad Mk I unit
SOURCES:	D TOS-R (Diane Carey “Final Frontier”) (N Diane Carey) (H own)

The *Hubble* runabout was one of the first adaptations of modern lightweight warp engines for Starfleet’s high speed liaison needs. At the time the class was created, the starbase network of the UFP was only gradually taking shape, with a base built per five years or so. Distances separating the starbases were considerable, and the mission of runabouts was not one of shuttling between the bases. Instead, the small liaison craft were supposed to extend the range of local operations around a starbase, moving crews and supplies between starports and planets in the vicinity of the base.

Key to the construction of Starfleet's inaugural high speed runabouts was the DB-01 engine, whose two 18 m, 750 ton nacelles for the first time matched the local interstellar average in small engine performance. The compactness was due rather to the maturity of technology than to any radical breakthroughs: DB-01 was still very much a 'second-generation' engine. A simple SPCR-20 fusion powerplant at centerline was used to energize the spooled coils to 60 c field strength equivalent, affording a top speed of warp 2.9. Deuterium-tritium fuel purity requirements were higher than for earlier systems, and user-serviceability somewhat lower. Nevertheless, the engine marked yet another milestone in Starfleet's quest for technological parity with its competitors.

The 33 m long, oval cross section hull of VXT Interstellar make was built to be as lightweight as possible. The mass of the warp engines was supported by sturdy pylons that featured a short, slightly trapezoid vertical part and a broader horizontal wing box that ran between the main decks. The reactor was bolted atop the wing box at centerline, with fuel tanks and impulse systems directly aft.

The midpart of the craft was dedicated to a two-level cargo hold, where either level was also configurable as passenger space; customers could specify portholes for this space as needed, although Starfleet did not opt for any. A wide aft door was provided on the lower hold for cargo loading and offloading, opening into an undercut beneath the reactor, while a central elevator ahead of the holds enabled loading of the upper hold under the influence of gravity. The doors and the elevator were structurally quite affordable, since the major strongbacks of the craft were the upper and lower keeps and lateral spars running level with the upper deck floor, not the thin tritanium hull itself.

The four-person flight deck was at the bow, slightly raised from the upper deck level, and featured one forward porthole. A dorsal personnel airlock and observation dome were provided aft of this control room. The *Hubbles* could be armed with two 180 MW lasers for self-defense or system approach lane clearing operations; these would be installed in upper level spaces flanking the airlock. Below the flight deck was the bunking compartment with accommodation for a crew of three (short runs) to six (multi-shift sorties), including galley facilities and a lavatory.

Ventral supports on the pylons next to each nacelle extended skidlike landing pads for landing, yet retracted them for atmospheric flight. Two smaller pads were provided below the bow, along with a small retractable sensor turret mainly serving as a landing aid. Two sensor/deflector dishes were provided at the pylon kinks, representing the simplest possible hard- and software. Also, conformal shields were applied for micrometeoroid protection. No lifepods let alone auxiliary craft were carried on the Starfleet craft, since the runabouts were supposed to operate well within range of rescue vessels and an overall support infrastructure.

USS Vercellino *(NCC-B116) on approach to SB 2. Liaison craft crews were understandably proud to operate vessels with full starship-like names painted on the hulls, yet whether the little* Hubbles *were deserving of the honor is a matter of opinion.*

In second-batch craft, built by VXT in 2226-29, the warp engine room was slightly modified to house a smaller fusion reactor. This off-the-shelf item from starbase inventories replaced the original high endurance system, resulting in significant weight and operating cost reduction. Theoretical range of operations was decreased by some 30 %, yet other performance figures remained practically unchanged. The greater frequency of refueling stops barely affected the operating procedures of the craft. Investment in a larger number of the craft could be made now, yet the technology still remained relatively immature, and the odds of finding a *Hubble* in a given star system low as ever.

The *Hubbles* saw service until the 2250s, when even further miniaturized warp systems began to appear, benefiting from dilithium regulation technologies. The direct successor design, the *Mission* class, was produced in some quantity both for Starfleet and the civilian market. The various Class F and G warp-capable shuttles emerged as the true inheritors of the insystem liaison vessel role, however. Since these shuttles were also carried by starships, Starfleet was happy to retire the last *Hubbles* in 2262 to simplify and commonalize equipment.

On the civilian market, *Hubble* was already something of a commercial standard. Various models were available, including VIP transports, interplanetary personnel haulers, light cargo craft and assorted utility types. The modest speed and range, falling short of most Starfleet interstellar requirements, still satisfied the nonmilitary clients. Even when faster and more practical interstellar runabout types began to emerge in the 2260s, the *Hubbles* (going by a variety of commercial names) remained popular among those ill able to afford the latest technology. No doubt dozens of these craft remain in service as of this writing, although most users finally abandoned the design in the early 24th century.

Flamsteed / Fraunhofer / Flagstaff

Scout drone
2232-2298

Completed: 45 total:

20 *Flamsteed*
15 *Fraunhofer*
10 *Flagstaff*

Length: 36.0 m

Beam: 15.4 m

Height: 12.5 m (landing gear retracted)
14.3 m (landing gear extended)

Mass: 7,000 tons (*Flamsteed*, estimated)
10,000 tons (*Fraunhofer*, estimated)
11,000 tons (*Flagstaff*, estimated)

Crew: None

Passengers: 5

Cruise speed: w 4 (automated operations)
w 3 (w/ passengers)

Max. speed: w 6.0 (*Flamsteed*, automated operations, estimated)
w 7.0 (*Fraunhofer*, automated operations, estimated)
w 8.0 (*Flagstaff*, automated operations, estimated)
w 4.0 (w/ passengers, estimated)

Endurance: 2 years (estimated)

Weapons: Original:
2 laser emitters (130 nm / 200 MW) on hull flanks
Refit 2265-66:
2 phaser III emitters on hull flanks (possibly replaced by phaser IV in 2275)

Shields: 1-layer conformal forcefield
Navigational deflector on fwd hull

Laboratories: None

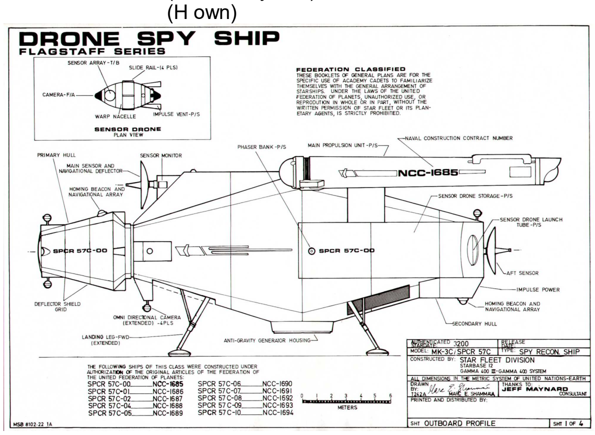
Transporters: 1 GP (2-pad); Mk IV (possibly installed in 2275)

Auxiliaries: Up to 20 reconnaissance and tactical sub-drones of varying types

Craft of historical interest:

USS Ball (NCC-I691)

SOURCES: (D Jeff Maynard)
(N Jeff Maynard)
(H own)



It did not take Starfleet long to realize that the problems the *Bode* scoutship project was facing in 2230 were formidable, and potentially crippling to the overall intelligence gathering effort. Alternatives to the high speed scouts were thus sought basically from the outset. Some suggestions were on the conservative side, and stressing tried and true technologies and high volume production. Others dabbled on alternative supertechnologies. The solution Starfleet settled on featured elements of both approaches. Instead of finding middle ground, though, it changed the rules, broke new ground, and eventually gave SF Intelligence the full capacity it coveted.

The secret of high speed warp propulsion was not all that secret in the end. High output powerplants and high throughput warp coils could be defined simply as high risk adaptations of existing powerplant and warp coil technology, constructed for extra performance at the cost of drastically diminishing reliability, durability and endurance. The optimum curve for the technologies didn't allow for supercruising midget starships yet, but it did allow for supercruising drones that utilized acute warp field gradients and thoroughbred antimatter reactors, sidestepping the issues of poor duonetic attenuation and insufficient delta radiation shielding by removing the vulnerable crew.

A fully automated 36 meter, 7,000 ton starcraft could in fact be constructed to carry the desired automated reconnaissance payload at speeds beyond warp six, cruising at a steady warp four. Moreover, this craft could be given landing capacity, the ability to carry and deploy sub-drones in quantity, and a potent armament for defending the nevertheless vital onboard assets from enemy action. Craft of this description began appearing in 2232, duly equipped with standard navigation and identification systems, yet carrying equipment of undisclosed nature, and frequently disappearing from the traffic control nets onto missions of utmost secrecy. Three distinct batches had been ordered, propelled by various 20-meter engines, the first of these clearly based on the commercial DB-04 model. I series registries were allocated, the *Flamsteed* model receiving NCC-I650-669, the *Fraunhofers* NCC-I670-684 and the *Flagstaffs* NCC-I685-694.

The innocuous-sounding naming schemes followed the tradition of allocating people, places and events from Earth's history of astronomy to vessels scouting deep space. This was not completely in the name of subterfuge: the intelligence drones had a very real role to play in the charting of outer UFP commerce routes and their surrounding space. Witnessed propulsive endurance of two years facilitated thorough mapping runs, during which crew fatigue would not be an issue. The occasional launch of probes, drones or other hardware from the two stern deployment chutes of the craft did not detract from the mapping missions, and in some cases actually legitimately complemented it. The daughter and mother drones both had illegitimate uses as well, though, entering regions of space closed, for various reasons and by various means, to UFP traffic.

At least two types of sub-drone capable of independent warp travel were observed. Also, it was evident that the truncated cone bow section of the craft could be jettisoned and was equipped with warp coils of its own, possibly for intrusion to regions of extreme risk, possibly for extraction of data packages from such if the main craft were compromised. Also in evidence was the ability of the drones to take onboard passengers (with apparent but ill defined means of special protection against the field gradients and radiation). Insertion and extraction of intelligence operatives was an obvious application, yet for example *USS Ball* (NCC-I691) distinguished herself in 2266 by rescuing the crew of prospector *SS Malverne*, performing a complex series of tasks that involved phasering open the side of the drifting ship.

The refitted drone USS Helin *(NCC-I692) mounts a lonely vigil at the Romulan Neutral Zone, counting comets and sorting out stardust. Assisting in the task are modern subspace sensors as well as an onboard astrophysics expert AI, upgrades* *afforded the drones in the early 2290s. Another asset worth noting is the cloaking field generator installed at upper stern. Even thus modified, the* Helin *retains full landing capability and armament, and was utilized as the backup for droneship* Potemkin *(NCC-I657) in the surface extraction element of Operation Retrieve, the 2293 plan to release James T. Kirk from Klingon captivity.*

The exploits of the intelligence craft encouraged Starfleet to experiment with dedicated rescue drones, up to and including the massive *USS Recovery* launched in 2273. In reconnaissance missions, the trend was toward smaller craft instead. Few of these got NCC series registries, and only the very smallest, least capable ones were built in significant numbers. The F drones remained the mainstay of the uncrewed scouting force, keeping up with the times by adopting new engines in addition to new sensors and weaponry. The *Fraunhofers* were equipped with DB-404, the *Flagstaffs* with solid-coil PB-42. The original lasers were replaced by phasers, probably of Type III but later possibly of Type IV as well, with possible stun mode weapons installed on select drones. There is some evidence of the presence of transporters on late standard *Flagstaffs* as well.

Retirement of the drones was not to be an issue. By the 2270s, all the *Flamsteeds* and all but one of the *Fraunhofers* had been lost in action; the last *Flagstaff* was written off in 2298. No fatalities have ever been reported in connection with F series missions, unless one counts lives lost when recovery missions were aborted for various reasons, or enemy casualties in purpoted aggressive operations where lasers or phasers were fired in anger or explosive or otherwise destructive ordnance deployed by the drones. Data on such aspects of the drone missions is still lacking, either unpublished or destroyed altogether.

Talion

Sublight fightercraft
2242-2276

Completed:	420 total: 300 *Talion* 120 *Torch*
Length:	6.8 m (*Talion*) 7.1 m (*Torch*)
Beam:	4.7 m
Height:	2.6 m
Mass:	63 tons (*Talion*) 70 tons (*Torch*)
Crew:	1 (*Talion*) 2 (*Torch*)
Max. speed:	0.8 c
Endurance:	2 days
Weapons:	3 phaser IV emitters on ventral bow (*Talion*) 2 phaser IV emitters on lateral bows (*Torch*) 4 minitorpedoes on ventral rack (*Torch*, optional)
Shields:	1-layer light conformal forcefield
Transporters:	None
SOURCES:	(D Carmen Carter “Dreams of the Raven”, FASA) (N own, *Tennet* Carmen Carter “Dreams of the Raven”) (H Carmen Carter “Dreams of the Raven”, own)

The multi-thousand-ton cutters, scoutcraft and runabouts of the early 23rd century did not quite represent the state of the art in miniaturization. In theory, even smaller warp vessels could have been built – but as long as these still exceeded the maximum size for practical starship auxiliaries, nothing concrete could be achieved by the effort. The craft in use aboard both general starships and dedicated carriers thus tended to remain warp-incapable, and operating doctrines were formulated accordingly.

Lacking alternatives, Starfleet steadfastly refused to accept the failure of the sublight fightercraft as an anti-ship weapon. Lack of warp drive meant short engagements where the initiative was on the side of the warp aggressor. Yet new phaser weaponry could give Class Five fighters enough destructive power to triumph even in a brief melee, and offered a limited warp response as well.

Rather than just bolt phaser IV emitters onto heritage craft, Starfleet initiated the development of dedicated platforms. Still preferring the shape of the Romulan war era fighters, it picked the Genchi *Talion*, a seven-meter silver dart with a single impulse engine, four mass masking coils and three aerodynamic fins clustered at the stem. The single pilot would sit in a faceted-window cockpit just ahead of the engine compartment, with the modest protection of a light shield generator in front of him. On the lower bow would be the three phaser cannon, on the upper bow their targeting sensors.

The *Talion* was meant to be primarily flown from the *Valkyr* and *Titan* carriers, yet was flexible enough to be operated out of other ship types or even surface bases. Small numbers could be carried aboard cruisers if needed, yet this did not fit Starfleet doctrine of the time. Genchi was contracted for just 300 craft, to replace the Class Five arsenals of the *Valkyrs* and *Titans*. The Regulan manufacturer secured parallel deals with a broad Federation clientele, however, and had completed more than 1,100 craft by the time Starfleet in 2242 declared its first wings operational.

Clawed paw against clawed paw, five-flights of Talions *confront their feline Xindi equivalents in the battle of Parkinson Point. The 2272 Xindi invasion was both a trial of fire and a curtain call for the* Talions*, whose role in the Klingon conflict was minimal. Thirty classes of fighter pilots had served on the type without firing a shot in anger.*

It was interstellar demand that prompted Genchi to develop a heavier variant, armed with two additional lateral phaser cannon. While Starfleet did not opt for the design, dubbed *Tasran* by the main Frunalian operator, the subsequent upgrade did attract its attention. The type split her pair of phasers to lateral bows, leaving the ventral surface for the carriage of up to four minitorpedoes, or alternately a sensor array. These twin-seat fighters were potent raiders and siege machines, despite their short range and lack of independence. Under the service name *Torch*, ten dozen were added to Starfleet arsenal for these roles in 2246, shortly prior to the Axanar confrontation. Another Class Five twin-seater with phaser IVP units, the *Tennet*, was later fielded, but again only for non-Starfleet markets.

The *Talions* and *Torches* opened an unfortunate chapter in Federation history, however. Their diminishing role in Starfleet operations led to Fleet disinterest in controlling their proliferation. By the 2250s, extra-Federation governments ranging from unsavory to savage were in possession of the phaser-armed raiders, and pirates began operating carrier vessels that could arrogantly mount fightercraft ambushes deep inside the Kashishowa perimeters of trade port systems. True 'pirate copies' of the original designs ensured continuing proliferation even after stricter control measures were slapped onto technology exports.

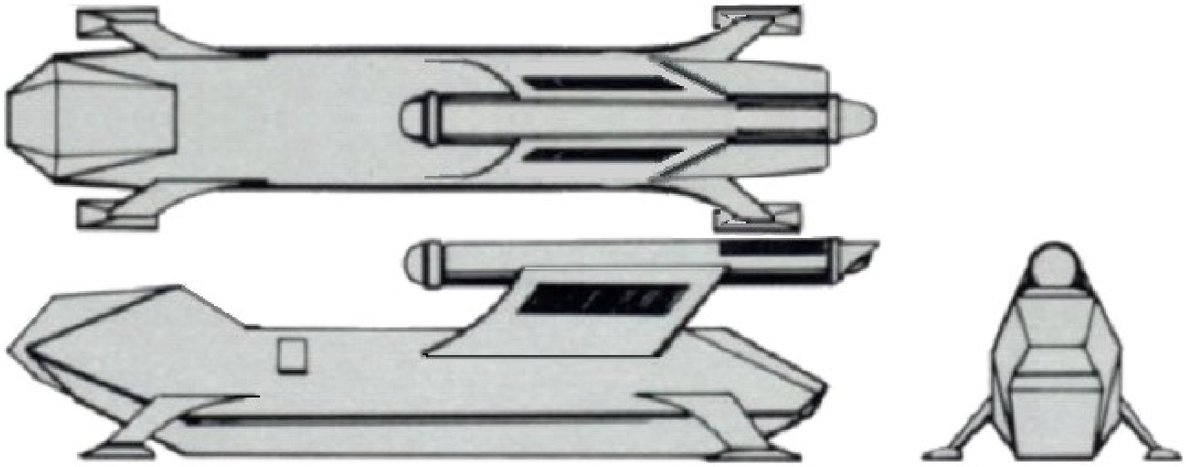
Tactically speaking, insystem fighter attacks were not a particularly difficult threat to countermand. Dispatching of modern corvettes to the systems under pirate siege usually made short work of the attackers, although starships of at least frigate size were needed to render the heavily armed carriers harmless. Nevertheless, this new mode of pirate operations tied down valuable Starfleet resources. Like the Klingon raids, it can be argued to have delayed the Fleet's great exploration program by two decades, so that only in the 2260s were significant benefits reaped from Project Starship and its spinoffs.

Despite their agility, the *Talions* never were much good in anti-fighter operations. The austerity of their sensors and targeting systems, combined with lack of endurance and need for extensive support systems, made them quite dependent on motherships – and the modern cruisers and heavy frigates would actually fare better against fightercraft if not encumbered with craft of their own. The anti-ship capabilities of the *Torches* were mainly theoretical; Starfleet withdrew the last twin-seaters from training use in 2276.

Chameleon

Light courier / scoutcraft
2242-2294

Completed:	912 total: 208 *Chameleon* couriers 197 *Tegu* scientific scoutcraft 302 *Gila* tactical scoutcraft 205 *Gecko* tactical transports
Length:	32.4 m
Beam:	8.0 m (landing gear stowed) 10.0 m (landing gear extended)
Height:	8.0 m (landing gear stowed) 10.0 m (landing gear extended)
Mass:	2,900 tons (*Chameleon*, typical) 2,200 tons (*Tegu*, *Gila*, typical) 3,000 tons (*Gecko*, typical)
Crew:	2
Max. speed:	w 3.5
Endurance:	4 weeks (*Chameleon*, *Gecko*) 3 months (*Tegu*, *Gila*)
Weapons:	None
Shields:	1-layer light conformal forcefield
Transporters:	1 GP (2-pad); Mk II
SOURCES:	(D FASA) (N FASA) (H FASA)



Starfleet's attempts in the 2220s and 2230s to field interstellar-capable utility craft were frustrated by lack of progress in lightweight engine development. Available designs were coming short either in speed, range, reliability or affordability, in paralyzing combinations. This was not for lack of trying: efforts of Starfleet and the civilian sector alike were concentrated on miniaturizing the now more or less standard circumferentially excited, monoaxial engine type. Yet the experimental types in the 10 to 15 m total length, 1,000 to 2,000 ton total mass range only slowly crept towards the desired warp three interstellar performance. In 2237, the *Hubble* runabouts still represented the cutting edge in light craft propulsion.

Yet solid state coil technology was inevitably permeating to light craft stardrives as well. Without a compact total annihilation powerplant, a solid state engine would not yield massive improvements in speed, but at least it would solve the reliability and endurance problems of spooled designs. When Cochrane Warp Dynamics introduced the groundbreaking DB-30, Starfleet jumped at the opportunity and ordered immediate construction of light craft mounting one nacelle of this type. Project Salamander thus began life as a utility transport, yet impressed Starfleet with its propulsive performance, and quickly diversified into a variety of battlefield and exploration roles.

There are obvious practical problems with creating a single-nacelle craft capable of planetfall. A top-heavy dorsal mount is virtually the only possible configuration, and craft like this tend to be very beamy for relaxed, SIF-off surface stability. The Salamander went another route, sporting a long and narrow body braced by widely spread landing struts at both ends. The fusion reactor was packed astern, while the two-pilot flight deck in front sat atop a flight and life support systems compartment, a two-pad transporter, and a minimal berthing space.

Payloads in the low-lying midsection could be easily accessed by surface crews and cargo handling machinery. They typically consisted of containers five meters on the side and 2.5 meters high, but a single box hold five meters wide and fifteen long could also be carried. Offloading in this configuration called for perfectly smooth and almost level landing sites. Even with smaller packages, a roll angle limit of 9 degrees and positive yaw limit of 5 degrees had to be observed.

It is difficult to tell the exact type or mission of a Chameleon *from her looks alone. This pair helpfully sports Exploration Command logos on the sides of the forward hull, suggesting* Tegu *interiors and a Locust assignment, although both craft show signs of scabbed-on side armor typically found on SFI 'spydroppers'. The division to subclasses found in official sources is indicative of initial production batch designation only, as many of the craft underwent repeated back-and-forth modifications to comply with the broad range of tasks burdened on them.*

Prepared landing sites could generally be expected in the utility role, yet Starfleet wanted to push the envelope. Development of more flexible or specialized craft would have to wait: Starfleet's first small craft capable of exceeding warp 3 on a regular basis would be pressed on to scouting duty. In this application, amidships holds would simply be furnished with crew quarters for extended operations; with a field laboratory; and with a sensor and computer package. Military intelligence gathering would call for a slightly different balance of equipment, and configurations dedicated to operative insertion and extraction were also requested early on. By 2240, Project Salamander had mutated to the multifaceted Project Chameleon, and the first production craft began operations as Exploration Command surveyors, Logistics Command couriers and SF Intelligence scouts.

The voluminous production run would extend to 2252 and to no fewer than 912 hulls, after which a further 833 would be manufactured for the civilian market. Many of the Starfleet *Chameleons* would also be liquidated at that point by turning them into mercantile transports; the Fleet would by the fifties be well supplied with more affordable types of light interstellar utility and liaison craft, eventually in the shuttlecraft category as well.

This is not to say that the *Chameleon* would have been a transitional type of little operational value. To the contrary, Project Locust in the mid-forties had seen the survey craft taking the lead in planetary prospecting operations within the sectors of the calm Romulan border and coreward wastes. Swarms of up to dozens of craft, accompanied by other interstellar scout types and a number of tenders, would quickly cover vast surface areas in search of key planetary resources. Unsuited for operations against the adversity of harsh environments, enemy harassment, or complex cultural or political issues, the craft specialized in assignments of low risk – and consequently often of low return as well. Exceptions were the norm in this business, however: many a Locust swarm ran into enemy action, often with fatal results, while others hit notable paydirt despite the modest survey gear allocated.

As losses began to mount, the Locusts were pulled back. Conversions to Marine landing craft were short-lived, due to the poor handling of the type, but retrofits to second-line utility transports were favorably received. Still, the last of the Great Projects swept away the majority of Starfleet *Chameleon* assets: under Project Tradewinds, some three thousand light units of Starfleet origin or design were transferred to boost commerce when Klingon aggression seemed to paralyze all trade.

Starfleet withdrew its last *Chameleon* units from insystem utility service in 2294. None of the numerous museum pieces found across the Federation are preserved in the original Starfleet condition, even though some have been retrofitted into such a configuration for showcasing purposes.

Mission

Runabout / scoutcraft
2248-2285

Completed: 1,293 total:

393 *Mission* Mk I utility craft built in 2248-52
120 *Mission* Mk II (*Jgonas*) utility craft built in 2248-52
60 *Mission* Mk III (*Galileo*) scoutcraft built in 2248-50
306 Mk Ib utility craft built in 2259-65
372 Mk IIb utility craft built in 2259-65
42 Mk IIIb scoutcraft built in 2259-61

Length: 32.0 m

Beam: 25.0 m

Height: 13.1 m

Mass: 3,620 tons (Mk I, II)
3,810 tons (Mk III)
3,710 tons (Mk Ib, IIb)
3,900 tons (Mk IIIb)

Crew: 3

Passengers: 6 (cargo operations)
50 (passenger operations, Mk I, II)

Cargo: 5,000 tons (Mk I, Ib)
7,500 tons (Mk II, IIb)
3,750 tons (Mk III, IIIb)

Cruise speed: w 3

Max. speed: w 4.0

Endurance: 15 months (Mk I, III)
8 months (Mk II)

Weapons: 1 laser emitter (200 nm / 600 MW) on ventral bow (original series)
1 phaser III emitter on ventral bow (b series)

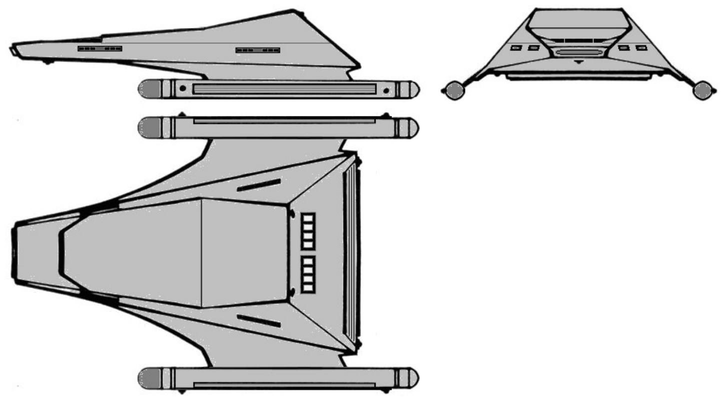
Shields: 1-layer globular forcefield
Navigational deflector on bow

Transporters: 1 GP (3-pad + cargo); Mk III (b series)

Craft of historical interest:

USS Mission (NCC-B500), *USS Galileo* (NCC-I6600), *USS Jgonas* (NCC-G1000), *SS John Paul Jones* (NCC-G1001/NPT-23841)

SOURCES: (D FASA, corrected to match side view)
(N FASA)
(H FASA)



When Starfleet in 2243 set out to acquire a replacement for its aging *Hubble* runabouts, there was considerable excitement among small craft manufacturers. Why a dull utility vehicle would create such interest was obvious in the specifications for its warp drive system. For the first time, a dilithium-regulated antimatter reactor and associated solid state warp coils would be mounted onto a small craft, and access to these technologies would give the project winner a definite lead in the market.

There was considerable financial and conceptual risk in the project, though. Nobody knew how much the new drive system would eat into available space and payload capacity in a vessel whose dimensions had already been fixed to approximate *Hubble* values. There was even less idea about how the hopefully increased drive performance would affect the doctrines of runabout operations. Yet it was obvious that priority freight carriers would be the first to call for civilian sales. Starfleet had nothing against the idea, and arranged for risk mitigation through a deal to produce some 70 hulls for the civilian market concurrently with 40 Fleet liaison craft. In 2247, the lot fell on three manufacturers: VXT Interstellar, Arbing & Lidde, and Thornycroft.

The companies would produce three distinct variants of the design. VXT's version emerged in March 2248 with a cargo capacity of 5,000 tons and a large cargo elevator; A&L's design carried 7,500 tons at reduced endurance; and Thornycroft's craft was cleared for 3,750 tons, but dedicated to a scouting mission and featuring a range of special sensors and onboard analysis computers, probe deployment chutes, and an advanced navigating suite. Externally the vessels were virtually indistinguishable, with wedgelike hulls that had broad windows for the command deck ahead and a raised stern section for the RMR-500 military-standard antimatter reactor. The two DB-38 solid state nacelles each weighed some 1,500 tons, a heavy price indeed to be paid for the performance increase over spool technology. Out of structural necessity, the engines were slung low to minimize stresses when gravity and integrity systems were idled; landing pads just inboard would ease the craft to the surface, then retract to bring it to rest on the engine nacelles.

Despite the structural challenges, integration of the modern drive system was achieved to Starfleet's satisfaction. There were wide performance margins in the design, and a nominal maximum speed of warp four in no way inconvenienced the powerplant. Power could for example be diverted to a 200 nm laser emitter covering the forward angles in all flight modes. Shielding was the weak point in the tactical whole, but would suffice for most applications; the level of protection afforded by the military-standard FS series bubble field generator was certainly unprecedented in small craft like this.

Thanks to the speed and especially range of the new craft, Starfleet satisfied itself with 393 of the all-important Mk I couriers, ten dozen Mk II utility transports with drone control option, and sixty

Mk III scoutcraft, collectively designated the *Mission* class even though variant names *Jgonas* and *Galileo* were sometimes also used. Mk II was also produced in the unarmed Mk IV guise for civilian needs, as promised. In addition to shuttling between starbases, the vessels tailed exploratory assets to systems of interest, assisted in surveys, helped in founding outposts, and generally did their best in maintaining momentum on the exploratory program. Pressure from the Klingons nevertheless largely kept the big starships away from their projected exploration assignments. In their absence, the *Mission* craft had the opportunity to shine on their own, as the high-tier element of Project Locust.

A Mk III scout in innocuous livery comes under fire during an infiltration operation at Klingon borderlands. An undisclosed number of the Galileos *were at SF Intelligence disposal, and these "X-craft" operated actively against Klingon assets during the border wars of the late 2240s.*

Beginning in 2259, Starfleet procured some 720 additional craft in the series, with emphasis on utility operations. Scouting tasks were moving on to more advanced types, as even modern phaser armament could not guarantee the safety of the *Missions* on the frontier. Ever-smaller interstellar liaison craft and ever-faster couriers kept emerging as warp technology matured; as the 2270s approached, it was obvious that the two decades of frontline service were not going to be followed by a third. The lion's share of the more than a thousand *Mission* craft was sold forward to civilian operators in the 2270s, with only a token handful remaining for starbase support. As the last of these retired in 2285, civilian operation and production of the type was still going strong, and would dominate the market for years to come.

As the first truly interstellar runabout asset of Starfleet, the *Mission* class also suffered an unprecedented number of casualties. Almost a hundred craft were registered missing or destroyed, most in transit, although landing accidents also plagued the type. The low-slung nacelle configuration was found disadvantageous, and the follow-on *Messina* type took the opposite approach. A myriad other examples of technology maturation also prompted Logistics Command to move in different directions in runabout design, and from today's point of view, the *Mission* looks awkward and antiquated. Yet few other Starfleet-originated designs have gone to similar UFP-wide commercial success. For the interested hobbyist, a *Mission* of Starfleet origin (but typically layer upon layer of commercial improvement and upkeep) is one of the easiest vintage starcraft to find.

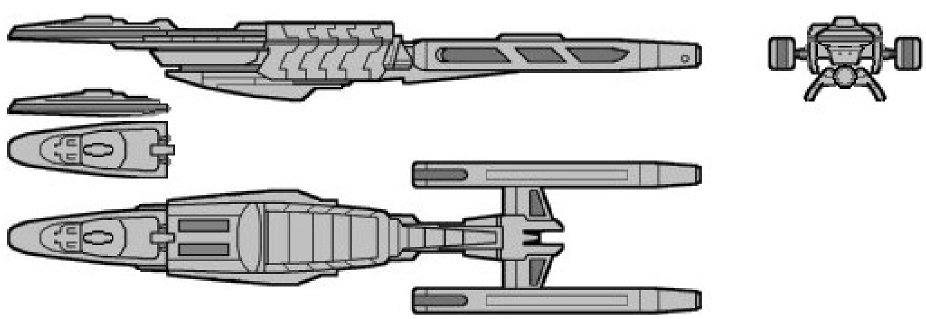
Solar

Cutter
2250-2280

Completed: 1,619 total:

588 Mk I built in 2250-2
410 Mk III refitted from Mk I in 2262-68
621 Mk VI built in 2264-70

Length:	90.0 m
Beam:	20.2 m (PB-40) 20.0 m (PB-60)
Height:	12.1 m
Mass:	47,100 tons (Mk I) 44,100 tons (Mk III) 46,400 tons (Mk VI)
Crew:	23
Passengers:	6
Cargo:	250 tons
Cruise speed:	w 5
Max. speed:	w 5.7 (Mk I) w 7 (Mk III, VI)
Endurance:	15 months
Weapons:	Mk I: 1 laser emitter (200 nm / 600 MW) on lower bow 1 laser emitter (200 nm / 600 MW) on lower hull flanks Mk III: 2 phaser III emitters in twin bank on lower bow 4 phaser III emitters in 2 twin banks on lower hull flanks (optional) Mk VI: 2 phaser IV emitters in twin bank on lower bow 4 phaser IV emitters in 2 twin banks on lower hull flanks (optional)
Shields:	1-layer globular forcefield Navigational deflector on ventral pod
Transporters:	1 GP (6-pad), 1 small cargo; Mk III
SOURCES:	(D FASA) (N FASA) (H FASA)



For the first decade of the Great Awakening, development of compact solid state warp engines approached the underutilized middle from both ends. Corvettes, escorts and skirmishers got their interstellar drives at a tad below hundred thousand tons per coil set, while *Chameleon* and *Mission* squeezed warp three cruise performance out of engines massing in at the low four digits. It was PB-40, at 15,000 tons per set, that best met the needs of the civilian market, though. The promise of warp five cruising would be kept with the *Masterson* patrol cutters, *Graynet* corvettes and *Tavares* light transports – but only after being put to a test in a craft designed solely for speed.

The *Solar* class of fast revenue cutters by VXT was not intended for Starfleet use, despite its large, military-standard engines and relatively heavy armament. Fleet experts nevertheless watched with keen interest as Federation Customs Service put the craft through the paces, running the Moloch A antimatter powerplant at the limits of its performance. The closely spaced engine pair produced a spindle-shaped warp field for a peak speed of warp 5.7; for maintaining warp five, the reactor had to be surrounded by an array of heat dissipation plates that also helped contain less benign types of radiation. There was little else to the craft, save for an arrowhead crew compartment that clamped onto a shirtsleeves engine monitoring section just forward of the reactor, and a cylindrar pod for the navigational deflector beneath this compartment.

Faster than the more lavishly equipped *Mastersons*, the new cutters were ideal for early interception of vessels in need of pilot services or a quick verification of identity and intent. Search and rescue services were another matter. Even though a *Solar* carried a large transporter with twin rows of three pads, there was little room for evacuees, almost nothing in the way of medical facilities, and only a rudimentary sensor array for sorting out survivors from debris. Three laser cannon were included in most of the 588 craft built, their aiming being burdened on the then-standard L-14 central computing unit that had severely limited capacity for such extra duties. Affordable and standardized equipment was nevertheless essential for attaining such procurement numbers, and for equipping virtually every UFP port with a *Solar* or two.

The Mk II version for civilian markets was not a sales success, as it offered less than the similarly engined *Tavares* in virtually every respect, for only slightly lower price. A mere technology demonstrator wouldn't sell – unless it demonstrated something more impressive. In 2262, the Mk III government and Mk IV civilian refits of the respective originals remedied some of the equipment shortcomings, providing the craft with cargo transporters and phaser armament. More importantly, they introduced the sleek PB-60 engine, which gave warp seven dash speed for the same power costs and weighed only mariginally more.

The Mk III was also offered for Starfleet, and 24 units were adopted as training craft. Several shortcomings in habitability and spaceframe durability were identified, and the manufacturer was prompted to design remedies. A reinforced structure and a beefed-up armament increased the mass of the special, all-newbuild Mk VI variant by two thousand tons, while crew facilities were rearranged to accommodate three instructors. The option of using the crew compartment as a separable lander was seldom used by other operators, yet Starfleet took the opportunity to carry out various rendezvous and docking training maneuvers with the lander. Introduction of the fully landing-capable *Epsilon* cutter soon outdated these units, though, and Starfleet sold all 24 of its Mk VI acquisitions forward.

Production of Mk VI ultimately reached 621 craft, which largely replaced the earlier models but did not spread high speed cutter services to new starports; that was left to the *Epsilon* class. As fast craft had fast replacement cycles, almost all the original *Solars* were gone by 2270, and the Mk VI batch was retired by 2280. Despite its lack of longevity and modest contribution to Starfleet, the class retains a prominent place in small craft history for launching not just one but two groundbreaking warp engines.

Sulek / Velikovski

Prospector
2253-2286

Completed:	282 total: 122 *Sulek* 160 *Velikovski*
Length:	18.3 m
Beam:	7.9 m

Height: 7.6 m

Mass: 2,820 tons (*Sulek*)
2,910 tons (*Velikovski*)

Crew: 3-5

Cruise speed: w 3

Max. speed: w 3.2

Endurance: 3 years

Weapons: None

Shields: 1-layer globular forcefield
Navigational deflector on bow

Transporters: None

Craft of historical interest:

SS Jefferson Randolph Smith (NAR-29402), *SS Lucas Garner* (NAR-29611)

SOURCES: (D John M. Ford "How Much for Just the Planet?", Jason Lee)
(N John M. Ford)
(H John M. Ford, own)

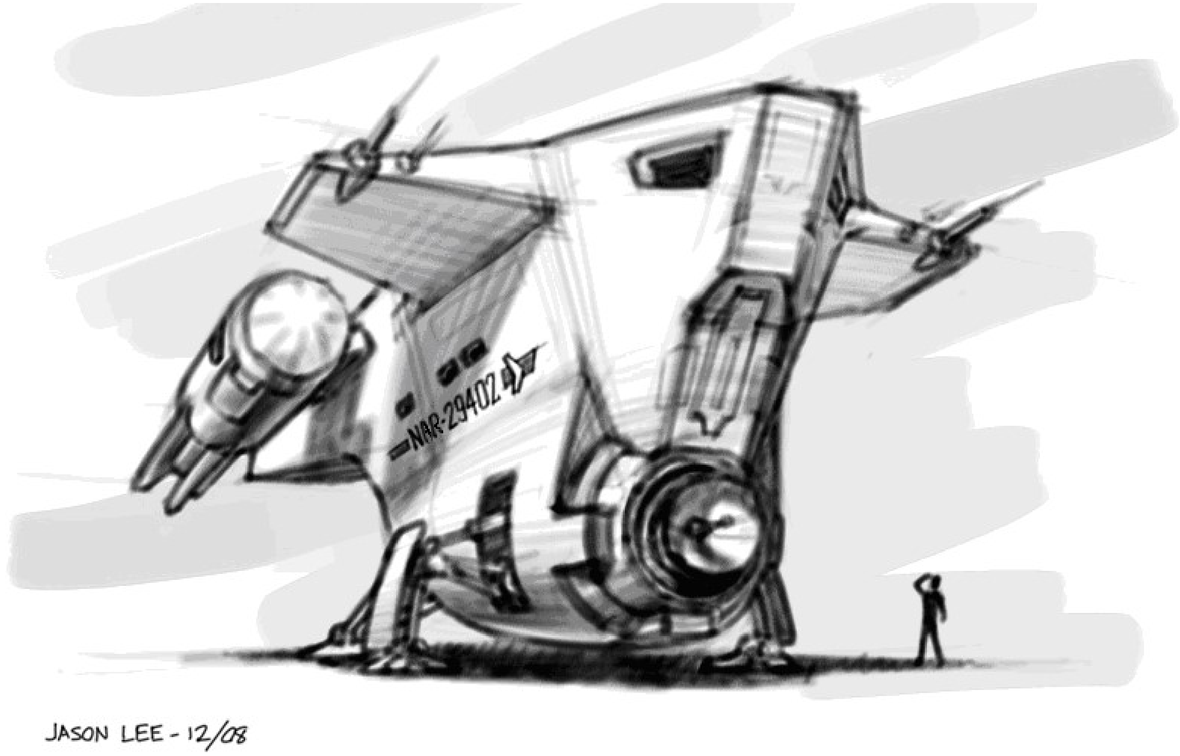
Starfleet has supported interstellar prospecting operations since its founding. Most of the Exploration Command vessels carry sensors capable of rapidly assessing planetary resources. Through its 'scientific subsidiaries' like UESPA, VIS or ACI, Starfleet also offers automated sensor packages to commercial vessels. However, it has seldom deployed specialized prospector vessels under its direct command.

The *Sulek* class of the 2250s is a significant exception to this rule. Necessitated by the dilithium revolution of the late thirties and early forties, the class was fielded by the Resources Division in considerable numbers to secure sources of the vitally important crystals for Federation use. Even though most of the vessels operated under NAR registries, their design was based on Starfleet's trademark military-scientific thinking and represents one of the few commercial successes of this approach.

Smaller than most Starfleet surveyors, the *Suleks* required a crew of only three to five to operate. The hull was of anvil shape, with antimatter-powered warp engines semi-recessed in cowlings on the dorsal stern prong, and the single vectorable impulse nozzle between them. The minimal-maintenance RMR-404 or RMR-406 reactor in the rounded "foot" of the anvil fed the propulsion units with power for a warp 3.2 maximum speed. There was no fusion or fission backup system, only a series of batteries for auxiliary power – the impulse engine was directly powered by first-stage plasma from the warp power system.

A navigational deflector and high power active sensor array also drew power from the reactor, being mounted directly ahead of it. Main prospecting sensors, some with deploying antennas, were housed in two stub wings on top of the anvil; the wings also provided some lift both in the aerodynamic sense and by virtue of built-in landing antigravs. Four folding legs and a ventral aft ramp catered for planetary forays.

Internally, the craft was divided into four small cabins, a combined mess/sickbay/social space/staging floor, a flight deck/survey center with two portholes for good visibility forward and down, a hygiene space and a single dorsally firing lifepod. On the lower semi-deck, survey resources included equipment and consumables holds and racks of miniature probes. Survey systems were generally tailored for only one or two target resources at a time. No weaponry was carried, nor was there a tractor beam available.



The crew of the Lucas Garner *(NAR-29611) is seen loading their vessel at the starport of Starbase 11 for yet another prospecting sortie. The staggering amount of survey gear and supplies the craft could carry is graphically evident here, as each item is neatly piled next to the vessel. On this 2268 mission, the* Garner *would score big time, staking the iridium-platinum asteroids of Beta Vertis for Federation use.*

This minimal craft was optimized for one aspect only: it had an extreme endurance for a vessel of its size. Up to three years' worth of life support and propulsive power could be coerced out of the design. In practice, every week of those three years was needed, as prospectors tried to maximize their active survey hours and minimize port calls in between. Furthermore, an average of fifteen planetfalls would be performed during a typical prospecting sortie. While dilithium could be sensed from across half a lightyear, non-emitting minerals like topaline or pergium had to be charted from low orbit, and findings verified on the surface.

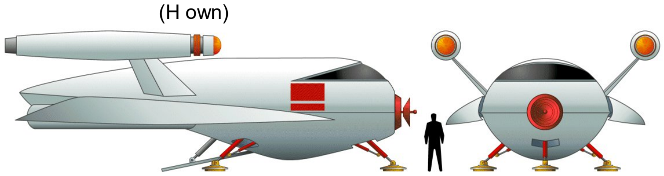
The extreme stresses imposed on the ships led to a typical vessel lifetime of about twelve years. Some were able to operate several vessels in succession, but normally a prospector ran down his or her ship in a single bid for success. Nevertheless, between 2253 and 2269, dozens of findings of crucial economic importance to the Federation – and to the prospectors – were made by *Sulek* and improved *Velikovski* vessels.

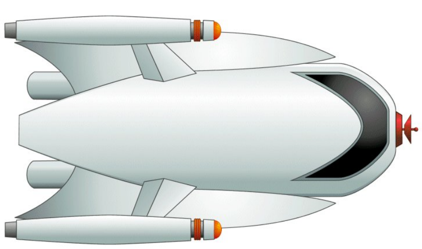
Federation support was pulled from the last *Velikovskis* in 2286, as the political situation made government-backed prospecting operations all but impossible. Comparable design ventures have not been directly tackled by Starfleet since, even though the organization maintains a keen interest in the prospecting business. Support of civilian research in the field still remains an important part of Fleet R&D; for example, the ASDB *Danube* runabout program has recently spun off improvements in commercial prospector design.

Aden

Light scoutcraft / support cutter
2253-2279

Completed:	57 total: 23 *Aden* (Mk I) 62 *Malaka* (Mk II) 30 *Reval* (Mk III)
Length:	21.1 m (*Aden*) 24.4 m (*Malaka*) 28.4 m (*Reval*)
Beam:	9.2 m (*Aden, Malaka*) 12.0 m (*Reval*)
Height:	7.1 m (*Aden*) 7.2 m (*Malaka*) 7.5 m (*Reval*)
Mass:	700 tons (*Aden*) 950 tons (*Malaka*) 1,100 tons (*Reval*)
Crew:	1-3
Max. speed:	w 2.5 (*Aden*) w 2.7 (*Malaka*) w 2.8 (*Reval*)
Endurance:	4 months (*Aden, Malaka*) 7 months (*Reval*)
Weapons:	None
Shields:	1-layer globular forcefield Navigational deflector on bow
Transporters:	None
SOURCES:	D TAS “More Tribbles, More Troubles” (Kris Trigwell) (N own) (H own)





As Starfleet Resources Division in 2250 launched its major dilithium-searching endeavor, funds were allocated on all aspects of prospecting. Development of the *Sulek* and *Velikovski* prospecting vessels was just one element of the program. In addition, Starfleet hired experts and consults, analyzed and integrated extant mineraological data, developed new types of sensors, organized a prospecting support infrastructure complete with a system of permits and grants – and purchased a number of civilian vessels. Among these were dormitory and depot ships for mining communities, light transports for coversion to assay use, and existing low performance prospector vessels.

A starcraft type widely used by prospectors in the 2250s-2280s was something of an antithesis to the *Sulek* class. The *Cirian Vey* family of scoutcraft was neither Starfleet-designed nor optimized for endurance and internal volume. Rather, the various models of this Centauran design featured economical GT/T 237 or 247 warp engines and a basic fusion powerplant for short range operations, carried a powerful sensor cluster at the bow, and required only a single pilot for efficient surveys of asteroid swarms, moons and other potential sources of mineral wealth.

The basic configuration was common to all *Cirian Veys*. An egg-shaped forward hull housed the single combined control and habitat cabin with an adjoining hygiene space and underfloor machinery spaces. Also underfloor were the tripod or quadrupod landing gear and the gravitic lift engine or engines. Aft of the cabin, the 'egg' was elongated into a tail containing the fusion reactor and the relatively pedestrian impulse engine. Fuel tanks for deuterium extended into two aerodynamic strakes flanking the aft body; a tritium tank was mounted centrally. Short pylons held the lightweight cigarlike nacelles above the aft hull.

Access to the cabin was through a ramp below the tail, practical for surface forays but rather awkward for dockings. Compatibility with other spacecraft wasn't one of the strong suites of the *Cirian Vey* family in any case. Only relatively large ships could hope to carry the scoutcraft aboard, and such vessels were not standard prospector hardware. The refueling, recharging and maintenance access ports for the scouts were arranged for easy ground access, not clustered for the needs of a starship hangar refueling arm.

Despite these incompatibilities, Starfleet felt the design met its requirements. An initial purchase of 23 Model L resource scouts under the *Aden* class designation in 2253 was followed by Fleet production of improved variants. The *Malaka* class introduced a three-meter hull plug and a military-standard fusion powerplant, and could carry 5 tons more sensor gear. The improvements proved largely superfluous, though, and did not compensate for the added costs. A further off-the-shelf purchase of 30 somewhat larger Model V craft as the *Reval* class was a cost-effective move that met Resources Division needs and concluded the first stage of the prospecting project.

Patience is the keyword when an Aden *replenishes in space. Up to thirteen different umbilicals may need to be manually connected to transfer power, data, fuel and consumables to the scoutcraft – a laborious task on a starship or starbase, let alone alongside a tender vessel not equipped with large hangar facilities.*

Out of the 62 *Malakas* built, some thirty were in 2267-68 configured as hybrid resource/sigint scouts, capable of both mapping planets and monitoring certain key transmission types. Three-person crews were sent to mingle with prospecting parties and to keep watch on competing Klingon survey teams. The original *Adens* were modified as well. Some became range support vessels for Starfleet's various weapon and sensor testing areas. Others were used in starbase perimeter patrol, employing special scanners or soot dispensers to ferret out any cloaked vessels that might lie in ambush whenever a starship deployed from the base.

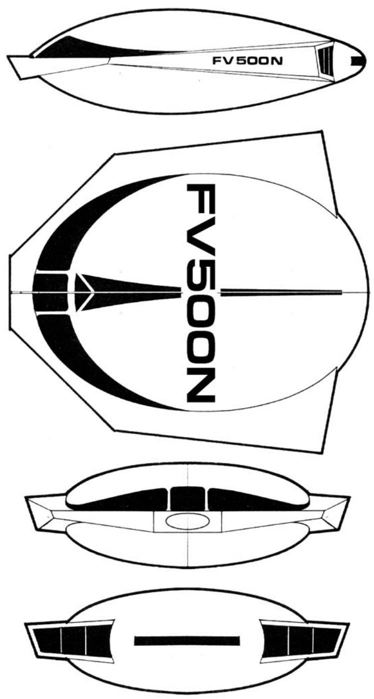
In the end, though, the *Cirian Vey* variants still were clumsy, slow and short-ranged craft that utterly lacked growth potential. They were practical only in the sense of being commercially available at a reasonable cost; even then, only the dilithium prospecting program prompted Starfleet to purchase them. At other times, scoutcraft procurement has not involved commercial purchases; instead, the civilian market often has benefited from Starfleet R&D performed on scoutcraft-sized vehicles.

The last *Reval* resource scouts were paid off in the late 2279, and briefly replaced by early *Messina* scouts in the dilithium-hunting role. A thorough core space resource mapping completed by *Darwin* light surveyors in the 2290s ended Starfleet's need for light prospecting vehicles, however. In the 24th century, vehicles in the shuttlecraft category handle the other, less demanding aspects of *Aden* or *Reval* operations with ease.

Benares

Hopper
2257-2269

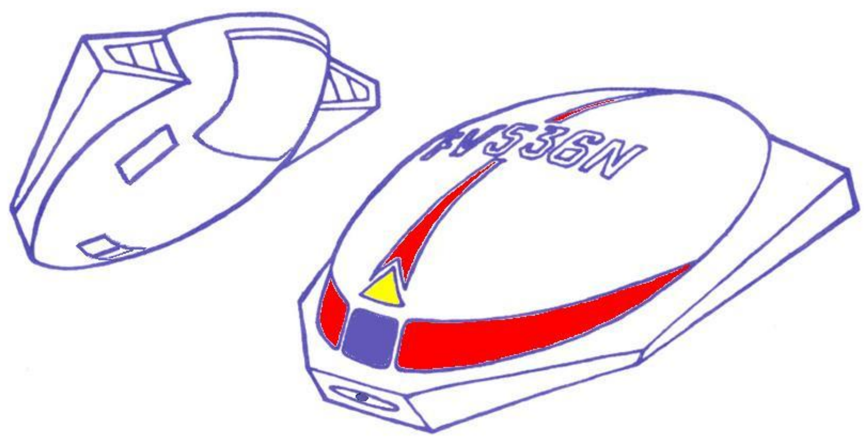
Completed:	2,410
Length:	6.0 m
Beam:	4.9 m
Height:	2.3 m
Mass:	35 tons (troop transport) 37 tons (gunship)
Crew:	1 (troop transport) 4 (gunship)
Passengers:	14 (troop transport only)
Max. speed:	0.005 c
Endurance:	2 days
Weapons:	1 phaser III emitter at bow 2 phaser III emitters in single dorsal turrets (gunship) 1 phaser III emitter in ventral turret (gunship)
Shields:	1-layer conformal forcefield
Transporters:	None
SOURCES:	D TAS (N SotSF) (H SotSF, own)



Generally, the hopper is not included in works describing small spacecraft. Rather, this vehicle type is classified as ground equipment, considering its limited spatial or even transatmospheric capabilities. The *Benares* class is an interesting exception, having forged its reputation primarily as a starship auxiliary of sorts.

The through-deck cruisers of *Coronado* class were versatile vessels, not structurally optimized for any single type of mission. In practice, their operational flexibility hinged on two factors: the ability to support the widest possible variety of small craft, and the availability of such craft. Both the requirements put demands on the craft rather than on the ships. Efforts to create the craft types needed came a step or two behind *Coronado* development, forcing the ships to initially sail out with nonoptimal mixes of pre-existing hardware.

The *Benares* troop deployment hopper was the only craft dedicated to *Coronado* operations that could be fielded in time for the ship class inauguration. Essentially a suborbital, aerodynamic vehicle adapted for orbit-to-surface operations, the *Benares* carried neither impulse nor warp propulsion systems. Like its civilian counterparts, the hopper relied on gravitics and thermal thrusters alone. The modest propulsion was the greatest strength of the design, as it allowed for lightweight and compact construction wherein most of the interior of the ovoid hull was available for troop accommodation. The sub-impulse hoppers could perform the tactical mission of assault shuttles thanks to the nature of their mothership: a *Coronado* could literally drop them atop the enemy from low orbit, while simultaneously providing firecover. This deployment mode led to the *Benares* type sometimes being dubbed a 'jumpship hopper' or a 'jumpship' for short.



The final N in the registry of Fighting Vehicle 536 marks her as capable of orbital deployment, there being little to tell her apart from her suborbital sisters otherwise. The contrast to other hopper designs from the mid-23rd century is minor as well, although typically the lifting body aerodynamics yield more to the need to maximize interior volume.

A single pilot could control the vehicle, enjoying direct forward view through a single small viewport that had armored shutters. The troop accommodation was arranged with six seats on the centerline, facing outward, and four on each side facing inward. Each seat featured a basic communications hookup and a gooseneck retina projector for situational awareness. The orbital deployment models had life support umbilicals as well, with the machinery stowed under the center seats. In either version, the troops could disembark rapidly and safely through a wide rear hatch/ramp that operated effortlessly in vacuum as well as under external atmospheric pressure; the pilot would wear a pressure suit for all orbital and orbit-to-surface operations, even though the troops seldom donned full spacesuits if the intended mission was on the ground.

Apart from duty aboard the through-deck cruisers and troopships, the *Benares* was widely utilized as a battlefield hopper, and thus produced in four-digit numbers. The main suborbital variants typically carried a more austere navigation suite and lacked the replenishment ports for personal life support systems, but were otherwise identical to their spaceborne sisters. The squat little vehicles could maneuver into and out of tight spots, and be easily hidden between or even inside buildings, or covered in adaptive camouflage nets. Active defenses were not their forte, though. The troop transports were never given shield generators of credible combat standard, and their armament was limited to a single Type III emitter at ventral bow, lighter than assault shuttle standard and badly positioned to protect the craft from pursuit or surprise attack.

To protect the hoppers against hostile forces, Starfleet hoped to field an impulse or subimpulse fightercraft of similarly compact dimensions. When development was delayed beyond the start of *Benares* operations, special gunship variants of the hoppers themselves filled the gaps. Three turreted phaser III assemblies were added, each requiring a gunner. These units never saw combat action, being replaced by *Tycho* fightercraft in the early sixties. The regular troop hoppers in turn served through several low-intensity campaigns in the restless Dilithium Belt sectors in 2262-68, mainly in support of peacekeeper and police forces.

The *Benares* survived in battlefield use in limited numbers until the 2290s. Starfleet withdrew its final units from starships in 2269, however, briefly substituting the faster, slightly less capacious *Coronet* hopper. Later assault starships kept embarking hoppers, yet generally not in the orbital deployment role: a *Steamrunner* would typically carry some sixty to eighty such vehicles, but deliver them to the battlefield via heavy assault barges alongside skimmers, rollers and other ground equipment. Direct deployment was deemed too risky in the threat environment of the 2290s already, with increasing medium range phaser activity all across the battlefields.

Questor

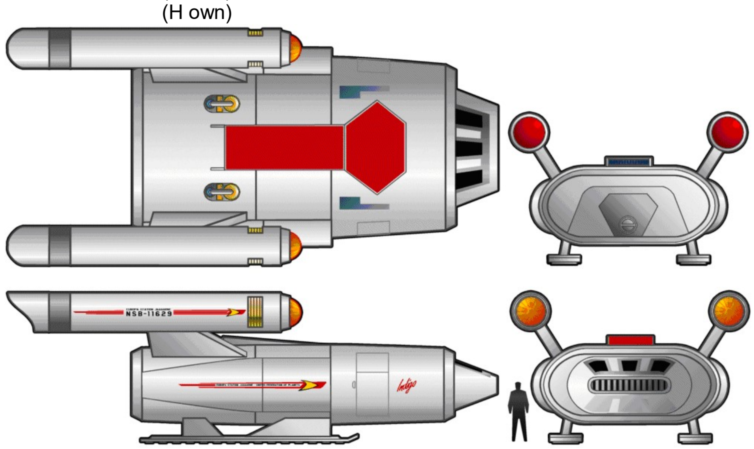
Runabout
2259-2286

Completed:	149
Length:	16.0 m
Beam:	7.7 m
Height:	4.9 m
Mass:	511 tons
Crew:	1
Passengers:	1-3
Max. speed:	w 3.0
Endurance:	15 months
Weapons:	None
Shields:	1-layer globular forcefield Navigational deflector on bow
Transporters:	None

Craft of historical interest:

SY Cybil Mae *(NDG-22821)*

SOURCES: D TAS "The Survivor", "Mudd's Passion" (refinements Kris Trigwell)
(N own)
(H own)



Among the first small warp-driven Federation craft that were truly suited for interstellar operations was the *Questor* class warp yacht. The extremely compact Class H commercial design featured a small one-man cockpit with six angled windows at the bow of a main body of oval cross section, and was propelled by two impressive-looking PNG-2 warp coil assemblies on sturdy side-by-side dorsal pylons. The ratio of drive system volume to habitable volume was exceptionally high, but this alone did not yet allow such a small craft to break the barriers of interstellar flight.

The craft gained its interstellar legs through the adoption of a military-standard RMR-400 antimatter reactor, a simple and reliable design relying on a pulsed antimatter feed and a gas vortex containment and cooling system. Second-stage plasma chargers added power to the design. An impulse nozzle peered from atop the main hull, between the nacelles and above the main powerplant. Ram air intakes on both sides of the hull and large skid-type landing pads were the other significant protrusions from the geometrically simple hull. A speed of warp three could be maintained for more than a year if necessary, allowing a determined pilot to reach a wide range of interstellar targets.

Naturally, fifteen-month cruises were full of hardships for a one-man crew, and onboard conditions could become unbearable in far shorter time. It took special courage for a pilot to venture that deep into space aboard such a small craft. In addition to guts, special competence in warp engine repair and antimatter technology was required for obtaining a master's license for a *Questor*, not to mention the considerable wealth needed to purchase the vessel in the first place. Typical customers were corporations that utilized the vessels in short interstellar or insystem liaison operations; in these less arduous journeys, up to three passengers in addition to the pilot could be semi-comfortably accommodated in the simple bunk compartment amidships and the central social space and entry foyer forward of it. Access to and from the interior spaces was through side doors with integrated one-man airlocks, or a dorsally deployed docking tube.

A corporate Questor *touching down on Mars, displaying the simple but efficient landing gear to advantage. Gas-heating atmospheric engines handle precision guidance at final approach and touchdown, negating a need for powerful lateral gravitics.*

Some lone eccentrics in possession of sufficient resources did buy the vessels for personal use, be it simple pleasure or more altruistic goals. Of the latter, the Australian-Denevan dilithium zillionaire and philanthropist Carter Winston is a good example. Tragically, this colorful if controversial researcher perished while exploring space on his own, in search of ancient, alien arts of healing. His battered vessel *Cybil Mae*, recovered near the Romulan border by *USS Enterprise*, was in 2270 brought to display on the Winston memorial grounds in Canberra.

While theoretically stowable aboard starships, the *Questor* design did not quite meet Starfleet's needs for an advanced starship auxiliary. There were obvious shortcomings in the design from the military point of view, like the lack of combat shielding or long-range communications or sensor gear, or incompatibility of refueling and resupply systems. Much of the warp performance was superfluous for a starship auxiliary, whereas onboard spaces were optimized for habitation, not cargo and passenger volume and efficient ingress/egress. Still, an evaluation period in 2261-63 established the value of the craft in outpost liaison missions, and Starfleet purchased some 149 *Questors* for use as runabouts. These were mainly distributed across the administrative outposts of the colonization zone, as well as a number of embassies and consulates on non-Federation worlds.

The last *Questors* were drawn from Fleet service in 2286, at which time comparable types of long-range shuttlecraft were already in regular use on starbases and being deployed on large starships as well. Still, the *Questor* design had whetted Starfleet's appetite for modern runabouts, and directly prompted the development of the *Juneau* class in the 2280s. Unofficially, several distant outposts retained *Questors* for liaison tasks well into the 2320s.

Archer

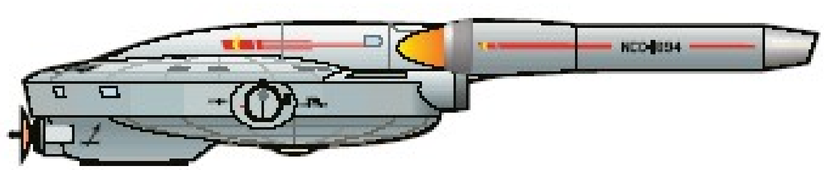
Light scout
2261-2289

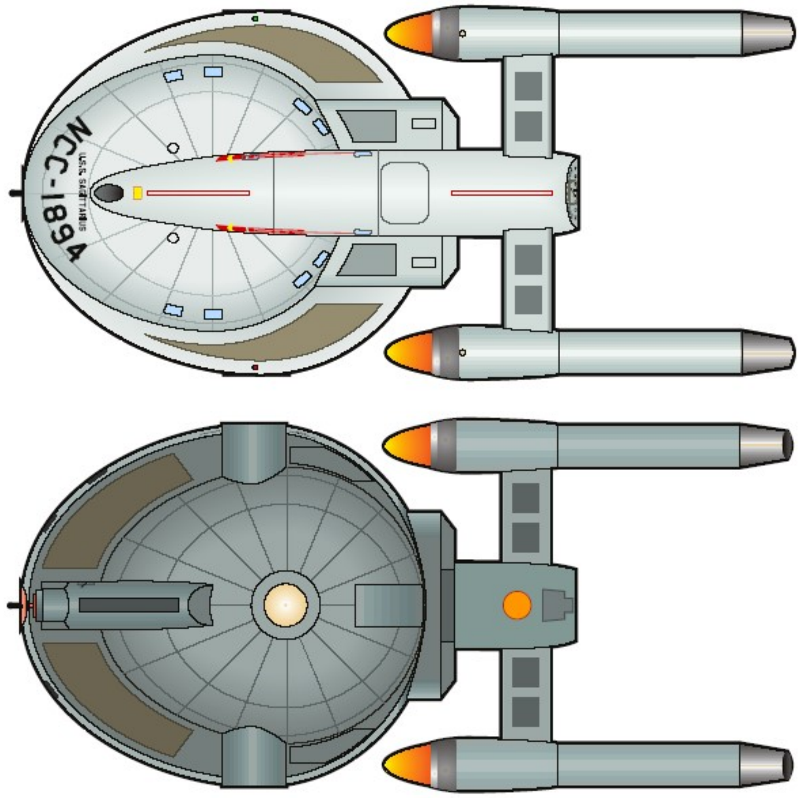
Completed:	40
Length:	45.5 m
Beam:	27.2 m
Height:	9.0 m
Mass:	9,100 tons
Officers:	4
Crew:	10
Cruise speed:	w 3
Max. speed:	w 5.1
Endurance:	5 months
Weapons:	2 phaser IV emitters on dorsal primary hull port/stbd 1 light fwd probe tube on dorsal primary hull w/10 probes
Shields:	1-layer globular forcefield Navigational deflector on pod below primary hull bow
Transporters:	1 GP (1-pad); Mk III

Craft of historical interest:

USS Bowman (NCC-I884), *USS Sagittarius* (NCC-I894)

SOURCES:	(D Masao Okazaki & David Mack "Vanguard") (N David Mack "Vanguard") (H David Mack "Vanguard")





At the very lower limit of what Starfleet would acknowledge as ships, the two score tiny *Archer* class scouts were both a technology demonstration and a potential solution to a pressing operational problem. Due to their compact nature, they are described in the small craft section of this work, the first heralds of the benefits of miniaturization in high performance warp propulsion.

The *Sawyer* light scouts had been retired at a time when the Federation had its hands full maintaining its existing borders. Half a decade on, expansion was to commence again, spearheaded by fast, far-ranging starships. Simple geometrical concerns dictated diminishing returns from the increased procurement of such expensive assets, though; in addition to spearheads, Starfleet needed lesser vessels to fill the gaps in between. Project Locust tried to address this concern with massive numbers of small craft configured specifically for exploration, but the *Mission* and *Chameleon* units had low endurance and were virtually defenseless in face of military threats. Starfleet wanted a more survivable light scout of its own, a dual mission design capable of handling both resources scouting and military reconnaissance.

The Prospecting And Reconnaissance Integrated Scoutship would have little in common with her ‘civilian’ counterparts and their blocky construction. Rather, she would resemble a small starship in appearance, with a compact saucer hull, a separate engineering section housing a RMR-600 miniature antimatter reactor and mounting two large CWD PB-39 engines for warp 5 dash performance, and a life support system capable of providing for 14 people for up to five months. The tiny ship would not haul extensive supplies for a survey base or pallets of sensors in a large multipurpose hold, like *Mission* or *Chameleon* had done. The sensor payload would be packed into a cluster of combat and navigation instruments in a ventral pod. Survey gear, including an all-terrain vehicle or two, would be carried in a tiny stern hold less than half the size of the *Chameleon* cargo compartment. Space and resources would be dedicated instead to a probe launcher, a dorsally installed system with a magazine for 10 versatile reconnaissance drones or up to 50 smaller sounding devices.

A PARIS-High and a PARIS-Low join in a demonstration of comparative capabilities, with Starfleet representatives aboard both vessels. The demonstration would secure contracts for M'Yengh on both Archer *scouts and* Karekh *prospectors, although not in the expected quantities.*

The layout of the hull grew out of the simple need to pack these systems in as small a space as possible. Crew berthing in the saucer required one deck only, with three-shift hot bunking for twelve in four single cabins, and a small communal space serving as both a mess/galley and a briefing room. Two slightly more private cabins were provided for the commanding and executive officers, although the latter facility was reconfigurable as a miniature sickbay, while the former often did double duty as a laboratory of sorts. The four-person bridge between the officer cabins completed the crew-accessible spaces in the saucer; support systems were packed in a ventral bulge, with slight ventral protrusions for a portside gangway and a starboard escape pod berth, and a ventral stern hatch-ramp for accessing the cargo hold.

Main power generation was compartmentalized into a secondary hull which also extended forward in a continuous spine atop the saucer. This forward part housed a single-pad transporter amidships and the Mk 13P probe launcher at the bow. Single phaser IV turrets flanked the launcher, sharing targeting resources and power loops. Level with the saucer aft rim was the impulse propulsion system; warp power components, including the fully ejectable core and fuel pod, dangled behind the saucer. Ladderways provided access to the transporter alcove and to the engineering spaces, and allowed internal maintenance to be performed on the bow ventral sensor pod as well.

Simple horizontal pylons supported the nacelles so that the 3,000 ton coils in the aft sections enjoyed an unobstructed view of each other, while the ramscoops of slightly larger diameter peeked just above the main hull. The flat, closely spaced configuration gave commendably high speed at the expense of maneuverability. The generously sized scoops in turn boosted deep space endurance, compensating for up to 70% of fuel consumption in ideal cruising circumstances.

Despite being optimized for spatial operations, the PARIS was an adequate atmospheric performer, and was cleared for landings and takeoffs in a variety of Class M environments. Unlike the clumsy *Missions*, the PARIS had maneuvering power to spare for complex surface support operations. And unlike *Chameleon*, the craft could perch itself on rough terrain thanks to an ingenious three point, long stroke landing gear arrangement.

In 2260, the project had reached sufficient maturity for Starfleet to decide that it be split in two. Many of the advanced features created for the program would be superfluous in the prospecting mission. Exploration Command thus procured a parallel low-end craft in a more austere configuration, in turn freeing the high-end design from some compromises inherent in the dual role. In 2261, the PARIS-High was put into production as the *Archer* class of scouts. Initial plans called for attaching of one *Archer* unit at every frontier starbase to expand their situational awareness horizons. To this end, twenty scouts were procured by 2264 and shipped to their assignments aboard suitable large transports. Twenty more followed in 2269, differing from the first batch solely in terms of naming practices – the theme of archery masters and hunting gods had been quickly milked dry, and a more diverse range of vaguely militant names was opened up for future needs, beginning with *USS Nairobi* (NCC-I900). Yet plans for deploying a further batch of forty in support of rimward resource hunts were halted by a cost-efficiency analysis that favored the lighter *Karekh* (PARIS-Low) craft on one hand, the more capable *Garneau* derivatives on the other. Despite retaining the ability, *Archer* was never to assume a prospecting role; the thoroughbred spyship remained an expensive if capable toy of frontier intelligence chiefs.

The Rama *(NCC-I905) makes good use of local resources to extract herself from yet another misadventure.*

The scout never quite gained a clear-cut successor, either. While *Karekhs* were eventually refitted with linear-excitation warp engine technology, and as the result attained propulsive parity with the original *Archers*, there was no interest in re-engining the military scouts in the same manner, for no tangible gain. In the seventies, Starfleet Intelligence readily switched over to the improved *Karekhs* which accommodated slightly larger crews and bigger cargo holds, even if they did omit the handy probe launcher and (as far as is known) the defensive armament. Towards the end of the decade, the *Archers* began showing signs of their age. Unit after unit was removed from frontline duty, not the least because Klingon aggression was ramping up. By the eighties, *Archers* no longer dared operate in contested space, enjoying neither the protection of sufficient escape speed nor the cover of adequate stealth.

Yet in the thirty years of active operations, the tiny scouts had proved their worth many times over. Many of their intelligence victories went unannounced, of course, but their role in filling the gaps in exploration in the sixties was widely acclaimed. Some vessels like the *Kyūdō* (NCC-I889) and *Bowman* (NCC-I884) even scored combat victories against pirates, earning the gratitude of frontier traders and colonists. In contrast, the *Sagittarius* (NCC-I894) was involved in the cover-up that exposed the colony of Gamma Tauri IV to alien attack, with fatal consequences.

Currently, some half a dozen *Archers* are maintained as museum pieces on Starfleet installations across the Federation. Only one remains spaceworthy, however: the *Flidais* (formerly NCC-I887) has been fitted with a modern powerplant and continues warp operations for recreational purposes at Hanuman.

Karekh

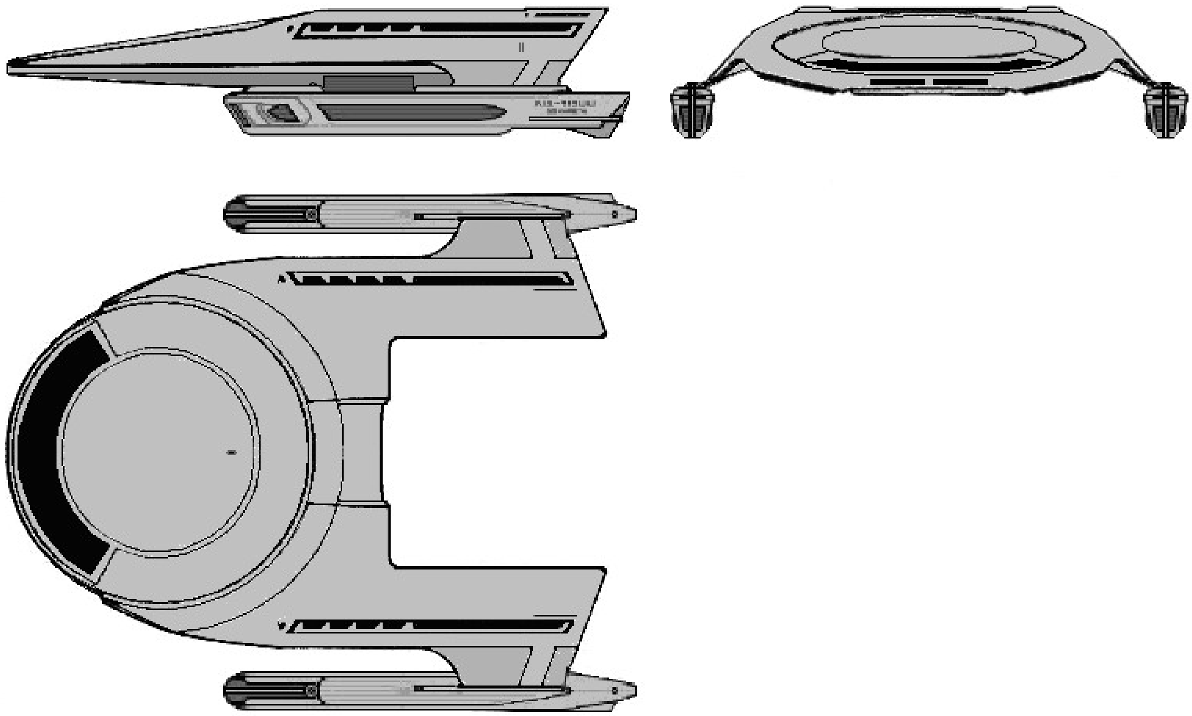
Prospector
2261-2339

Completed:	125
Length:	35.0 m
Beam:	26.1 m
Height:	6.9 m (original) 7.0 m (refit)
Mass:	9,140 tons (original) 14,530 tons (refit)
Crew:	5-9 (original) 6-9 (refit)
Cruise speed:	w 3
Max. speed:	w 4 (original) w 5 (refit)
Endurance:	1 year
Weapons:	None (original) 1 fwd phaser IV emitter (refit, possibly intelligence scouts)
Shields:	1-layer globular forcefield Navigational deflector on ventral bow
Laboratories:	1 mineralogy (prospector) 1 sigint (intelligence scout)
Transporters:	1 GP (2-pad); Mk III

Craft of historical interest:

SS Alexey Stakahanov (NAR-31473), *USS Ariel* (NCC-I904)

SOURCES:	(D FASA) (N FASA) (H FASA)



When Starfleet in 2259 launched the Prospecting And Reconnaissance Integrated Scoutcraft program, the blatantly spelled-out intent was to procure just a single type of craft for both resource hunting and military scouting. Yet the challenges of improving upon the performance of the *Mission* scoutcraft were quickly found too great, and the conceptual dream of a warp 3/5+ light prospector gave way to mundane warp 3/4 reality. This was still an improvement over the *Sulek* family of prospecting vessels, and in 2260, Starfleet agreed to bifurcating PARIS to the high-end *Archer* scouts and the *Karekh* series of prospectors.

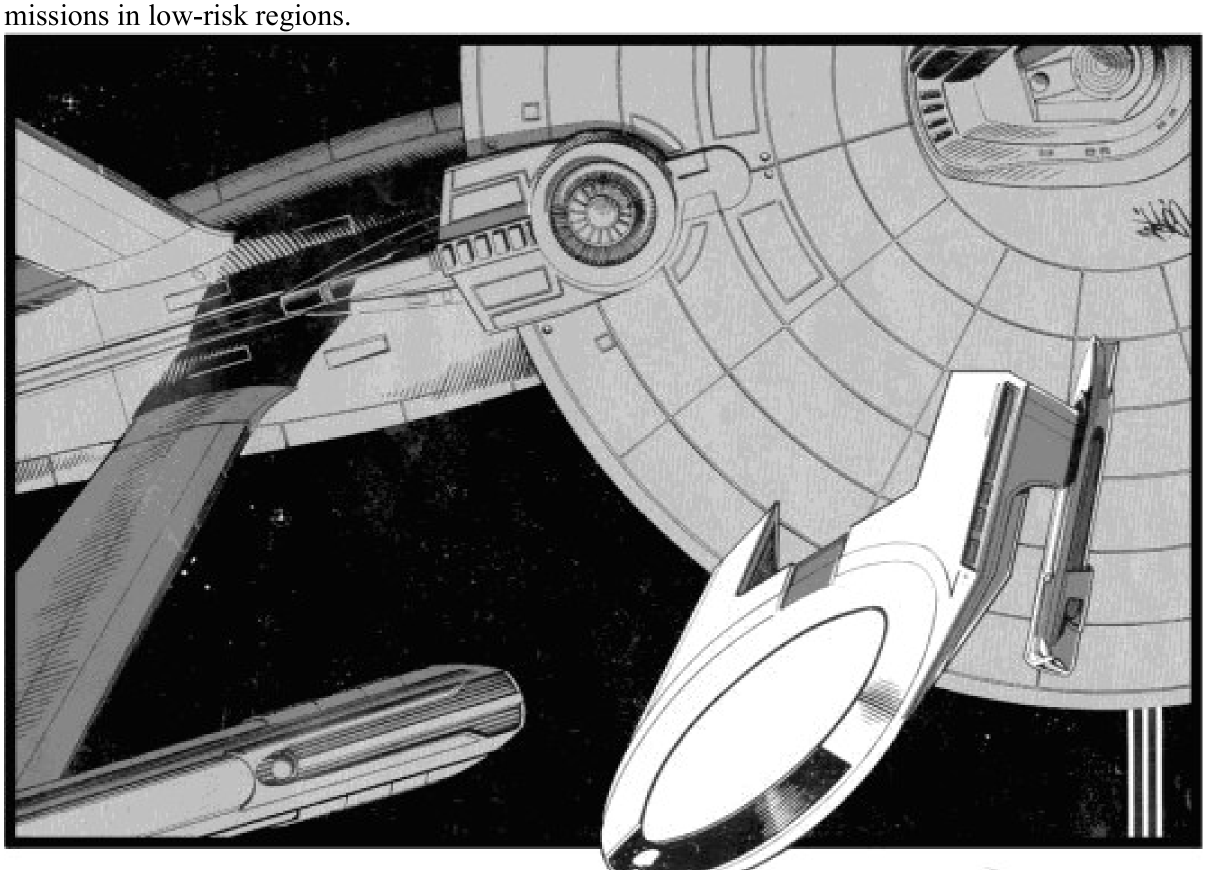
Karekh held on to some *Mission* concepts, such as low-slung, solid state nacelles trailing behind the center of aerodynamic lift, extremely lightweight hull construction, and a ventral hatch for effortless equipment loading and offloading. Internally she was a prospector through and through, however: the two decks in the sleek, circular hull 19 m in diameter were optimized for long term habitation for a multitasked crew of five to nine. Versatile analysis systems were compacted and automated so that the powerful L-14 computer could turn the single humble assay room into a university-standard laboratory.

Service in Starfleet Intelligence does not always entail covert excitement and mortal danger. This publicity photo of USS Ariel *(NCC-I904) is from a pre-contact survey mission where the only party kept in the dark was the native population of Beldan II. Note the extensive forward dorsal viewport and its two ventral counterparts, invaluable aids at landing the vessel. Also obvious are the separation lines that allow jettisoning of the propulsion systems in emergencies, leaving a smooth, aerodynamically stable saucer as the survival section for the crew.*

Spinoff technology from the *Archer* program further improved on the basic capabilities. A modern Mk III transporter was something of a luxury item aboard the fully landing-capable vessel. A ventral garage just aft of the saucer hull, in the engineering structure that also supported the engine booms, provided additional access by housing a pair of surface vehicles and full survey gear. The prospector was secured for underwater operations, and accepted a variety of fuel grades for both the main m/am reactor and the two small fusion backups integral in the impulse systems of the booms.

With the 21 m, 4,100 ton DB-40 engines at 60% power, warp 4 could be achieved and maintained for some 12 hours. Extra power could be channeled to powerful shields, but no armament was fitted on any of the 125 craft procured. Unlike *Archer*, the prospector was supposed to steer clear of trouble, even if the missions took the type much farther out than the lesser *Sulek* and *Velikovski* vessels. The vast majority of the vessels were delivered to civilian prospecting enterprises, with Starfleet initially only taking possession of 12 hulls for SF Intelligence needs.

As prospecting operations wound down in the 2280s, surprisingly many of the *Karekhs* were still spaceworthy. In an attempt to re-enact the success of Project Locust, Starfleet purchased 85 of the survivors and engaged in a refitting project that would give the vessels linear-excitation engines and a modest phaser armament. In functional terms, the project was a disaster, resulting in a grossly overweight design of poorly defined operational concept. Space within the range of the improved vessels was already thoroughly charted in mineralogical terms, and Exploration Command attempted in vain to find a meaningful deep space role for the type. The eventual niche for the upgraded *Karekh* class, dutifully filled until the late 2330s, was as pathfinders for colonization missions in low-risk regions.



The upgraded Karekh *prospector* Alexey Stakhanov *(in Starfleet hull paint but without the associated pennants, indicating her recent adoption by a private operator) banks away from an* Enterprise *heavy cruiser at the beginning of a pre-colonization survey in a system declared safe by the starship. The prospector-scouts also ran liaison missions between* *colonization parties and Starfleet, and acted as the eyes and ears of the military at a time when even regions deep within UFP borders could be penetrated by cloaked Klingon raiders. In November 4th, 2291, the* Stakhanov *did not survive her Klingon encounter.*

Tycho

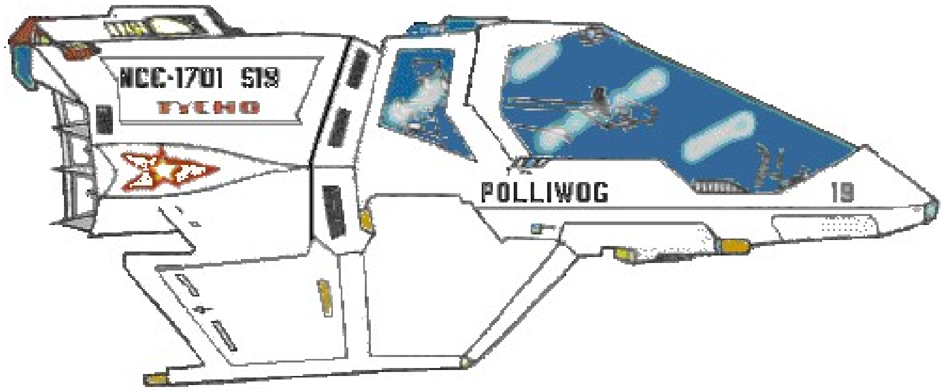
Light sublight fightercraft
2262-2289

Completed:	720
Length:	4.8 m
Beam:	4.4 m (wings extended) 2.8 m (wings folded)
Height:	1.7 m (wings extended) 1.3 m (wings folded)
Mass:	42 tons w/o work pod
Crew:	1
Max. speed:	0.8 c
Endurance:	4 days
Weapons:	2 phaser IV emitters on ventral bow
Shields:	1-layer conformal forcefield
Transporters:	None
SOURCES:	(D Brian Thomas) (N Diane Carey “Dreadnought!”) (H Diane Carey “Dreadnought!”, own)

The much-needed compact escort craft for troop hoppers and assault shuttles was finally created out of modular elements. The basis for the sublight escort design was the ubiquitous Patterson-Massey PFD-200 series work pod design, the most recent representative of the pod category commonly known as the ‘workbee’. The barebones pressurized control cabin had already been fitted onto a variety of space cranes, cargo module trains and waldoes in several imaginative ways. It was also a more or less standard feature aboard all starships in the 2260s, and as such a practical life support module for the projected fightercraft.

At Starfleet request, an impulse engine for space propulsion, a pair of wings for atmospheric maneuverability, a gravitic system for deck handling and landing, and a shield generator were clustered by Daewoo into a single module massing just 42 tons despite the driver and shield coils. The workbee cabin would latch onto the bow of the module, cradled on the lower flanks by a structure that extended the shield grid over the cabin. The cradle also mounted compact phaser IV emitters, to give sting to the ‘hornet’, as the modular mini-fighter fondly was called.

The more official designation for the craft was *Tycho* Class Five sublight fightercraft. Up to eight *Tycho* kits were carried aboard select heavy cruisers and twelve aboard some heavy frigates from 2262 onwards. The workbees could be turned into *Tychos* at a moment’s notice, the moment being somewhat shorter on the frigates (20 minutes) than on the cruisers (40-50 minutes) due to the more accessible stowage arrangements and the roomier processing spaces. *Coronado* through-deck cruisers now routinely carried preassembled *Tychos*, rather than *Torches* or *Talions*, for troop transport escort, although these came too late to protect the vulnerable first generation of *Benares* hoppers whose withdrawal from the ships began in 2265. Folding wings allowed for very compact stowage even when assembled.



The Polliwog*, a kit assigned to* USS Enterprise *as of 2270, cradles a workbee, but not of the PFD-200 series. The kits were compatible with a range of work pod cabin models; a pilotless command capsule was also proposed but found inferior to the use of dedicated combat drones.*

The *Tycho* cabin/engine combination was flawless in technological execution, but suffered from several shortcomings nevertheless. Onboard typical multipurpose vessels, the process of assembling or disassembling the craft was found disruptive to normal operations. What some strategists dismissed as a minor nuisance, the captains of these ships considered a price not worth paying, not for the minuscule tactical value of the *Tycho*. Planetary assault escort was the only plausible task for the craft; attacks against starships would have been suicide, and defense of mothership an equally untenable position. Low endurance (four days at economic flight mode), low acceleration (200 g at best) and limited onboard avionics further reduced the space combat value of the *Tycho*; they were the direct result of using the cramped, sparsely equipped and fragile work pod as the structural core.

As a tactical concept, the sublight escort fighter remained a contested issue. The actual operational record of the *Tycho* class played a far smaller role in the debate than century-old doctrinal views did. No true combat victories could be scored in *Tycho* operations between 2263 and 2282, due to the overcautious deployment tactics employed. On the other hand, losses were light, mostly limited to noncombat failures of navigation or life support systems, or the rare reactor explosion. Cabin separation via an explosive severing of the cradle structure was a theoretical emergency bailout option, yet was never successfully performed in an operational situation.

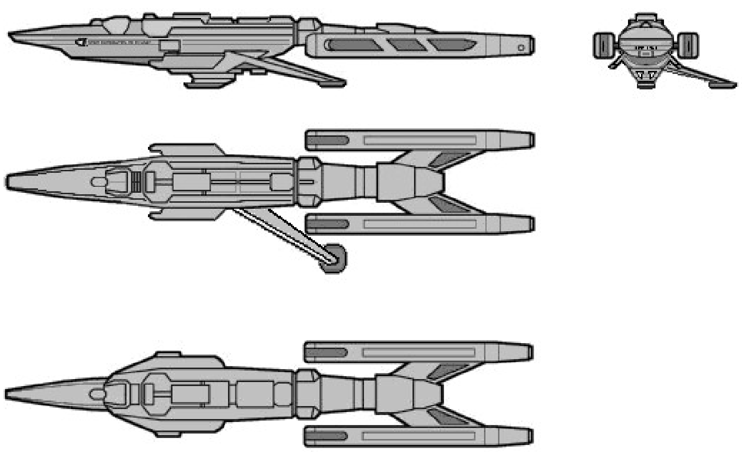
After the end of active operations in early 2280s, the *Tycho* was flown in the basic trainer role at Starfleet Academy. In a sense, this came naturally for the craft since, among other things, the work pod had recently been harnessed as a shipboard flight simulator cabin. The ‘retirement job’ did not last long, however. Having nongeneric control qualities and performance, yet not corresponding to any operational craft either, the *Tycho* was a nonideal trainer in every respect. By 2289, only a couple of dozen craft were still flying, mainly for nostalgic reasons. In the final burst of escalation before the Khitomer peace, nostalgia did not carry far, and the *Gadfly* light impulse fightercraft was substituted as the basic/lead-in trainer.

Epsilon

Cutter
2263-2290

Completed:	805 total:
	461 Mk I built in 2263-65 344 Mk II built in 2266-68
Length:	86.0 m

Beam:	18.0 m (landing gear stowed) 28.2 m (landing gear extended)
Height:	12.0 m
Mass:	43,925 tons (Mk I) 51,975 tons (Mk II)
Crew:	25 (Mk I) 28 (Mk II)
Passengers:	10 (Mk II)
Cargo:	250 tons (Mk II)
Cruise speed:	w 6 (Mk I) w 5 (Mk II)
Max. speed:	w 8.0 (Mk I) w 6.0 (Mk II)
Endurance:	15 months
Weapons:	2 phaser IV emitters on port/stbd stub wings 2 phaser III emitters on port/stbd stub wings
Shields:	1-layer globular forcefield Navigational deflector on bow
Transporters:	1 GP (6-pad), 1 small cargo; Mk III
SOURCES:	(D FASA; inconsistent three-way divided into the two variants listed) (N FASA) (H FASA)



The *Epsilon* was in 2261 drafted as a twofold improvement on the *Solar* class of cutters. It was to introduce the PB-60 warp engine for higher performance, as well as provide the configuration with full transatmospheric, landing and takeoff capabilities. In the end, customers also opted for reengining their *Solars* and refurbishing their fatigued hulls, thus yielding PB-60 -propelled cutters in 2262 already. Yet the first *Epsilons* of 2263 represented such a concentration of capabilities that nearly all government acquisition programs on revenue cutters from then on opted for this design, despite its higher unit cost.

The propulsion section of the *Epsilon* was from the start optimized for the PB-60 engine, featuring swept-back pylons that distributed the weight of the nacelles better than the straight *Solar* ones originally built for DB-2250 / PB-40. There was no radiator-clad reactor section now, as the newer engines could run on lower reactor output levels; the antimatter powerplant was neatly housed within the aft end of a smooth hull of ovoid cross section. Various support system appendages did project through the dorsal side, though, and there was a ventral canoe fairing for antimatter tankage and for mounting the central, non-retractable landing leg that also featured the main ground accessway. Two other legs would hinge out horizontally on their long, angled struts, stabilizing the craft on the ground.

The hull tapered as it extended forward, featuring a bow undercut in which an Arkenis D20 navigational deflector was housed. Atop were two saddle mounts for communications systems and sensors, as well as a small dome for the three-person flight deck.

Weaponry was mounted on stub wings that would fold out from the lower hull flanks, and comprised twin phaser mounts on each wing: one Type IV for antiship applications, and one Type III for atmospheric use and possible ground combat support duties. A gangway hatch was located on the port side of the hull just above the port weapons wing, and was equipped with forced entry tooling to enable boarding of uncooperative vessels, be it in law enforcement or rescue duty.

Some 460 units were produced in 2263-65. These saw widespread service in the starports of the outer colony worlds where the landing capability simplified maintenance considerably. Few were assigned as direct replacements of *Solars*, though: refurbished older craft and late production versions of *Solar* held on to the core starport assignments for the time being. They'd soon need a successor for their sheer fatigue, however. VXT thus conducted careful analysis on the desired characteristics of the follow-on design.

As the result, the next *Epsilon* variant was configured with large side sponsons for carrying of cargo and passengers (or in the typical case, impounded goods and incarcerated wrongdoers). Both sponsons now featured gangway hatches and associated tractor cranes for moving the cargo. The nose profile of this Mk II cutter was trimmed down to keep the center of mass close to the original location atop the ventral takeoff engine, which was in turn swapped for a more powerful type. In contrast, the warp engines were downgraded for affordability: significant savings came from the adoption of the older DB-2243 familiar from *Argon* transports. Performance was accordingly reduced to warp 5/6, and some seven thousand tons were added to total mass, yet satisfied customers eagerly bought some 340 craft to replace their *Solars*.

Starfleet Training Command ended up purchasing just four Mk I craft for basic training and later adding two ex-FCS Mk II craft for support duties. These were retired in 2290.

Ranger

Scout / courier
2264-2324

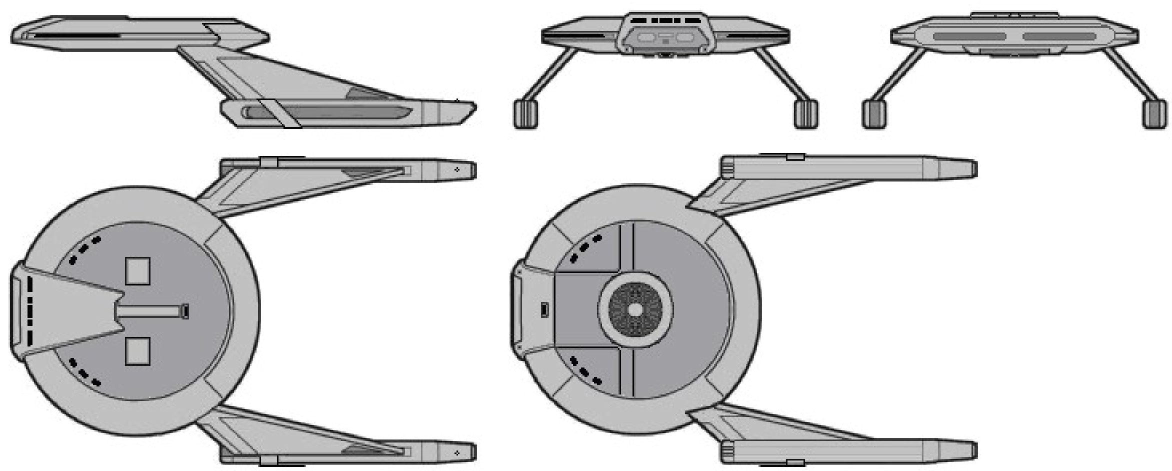
Completed:	264 total: 102 Mk I in 2264-2268 3 Mk II refitted from Mk I and 105 built in 2269-71 54 Mk III built in 2272-74
Length:	68.0 m
Beam:	43.5 m
Height:	16.0 m
Mass:	81,300 tons (Mk I) 85,150 tons (Mk II)

	89,300 tons (Mk III)
Officers:	4
Crew:	19 (Mk I) 23 (Mk II, III)
Passengers:	10-50
Cruise speed:	w 5
Max. speed:	w 7.1
Endurance:	18 months
Weapons:	2 phaser III emitters in single banks on bow port/stbd of deflectors (Mk I) 4 phaser IV emitters in 2 twin banks on dorsal hull port/stbd (Mk II, III) 1 fwd light torpedo tube on ventral hull w/10 photorps (optional) 1 aft light torpedo tube on dorsal hull w/10 photorps (optional)
Shields:	1-layer globular forcefield Twin navigational deflectors on primary hull bow
Transporters:	2 GP (1-pad), 1 emergency evacuation (padless); Mk III
Auxiliaries:	2 shuttlepods (Mk I)

Craft of historical interest:

USS Strider (NCC-7141), *USS Francis Marion* (NCC-7168)

SOURCES:	(D FASA, dimensions altered) (N FASA) (H FASA)



VXT wasn't the only company interested in making use of the new PB-60 engine, and Federation Customs Service wasn't the only organization interested in purchasing the resulting vessels. Yet the market niche remained a narrow one in the 2260s, as antimatter powerplants remained expensive to operate. People capable of securing a private warp five yacht could well be assumed to have powerful backers of possibly shady repute, and to utilize their high speed craft for dubious purposes. Larger vessels with more obvious utility value were the safer bet for the designers and marketers, and in 2263, Panastris took on the challenge.

The market Panastris aimed at was not the generic warp five transport, since PB-40 was already giving maximum performance for the *Tavares* class, and the newer engine would only generate deadly field gradients if semi-internally mounted onto the compact vessel. A higher-performing vessel would need to mount the engines on long pylons, in such a configuration as to rule out landing capability. So a thoroughbred starcraft was built instead, with a clean 36 meter saucer hull that mounted a powerful deflector and sensor array at centerline bow and twin impulse engines on the trailing edge. The reactor sat in the very middle, atop an IMRF crystal that completed the propulsive ensemble of the craft. Reactor control spaces and the flight control center were combined into a compact facility just ahead of the reactor, atop the bow arrays.

The bow quarters of the hull were left for crew and passengers, with wraparound window slits and shutterable dorsal and ventral portholes. The spaces could be configured for various purposes, including separate cabins, communal areas or various functional facilities. A single transporter pad was provided on each side, and the initial model also featured compact dorsal berths for three-person shuttlepods. The discerning customer could add centerline launchers for light torpedoes and two phaser III emitters on the lower corners of the bow array.

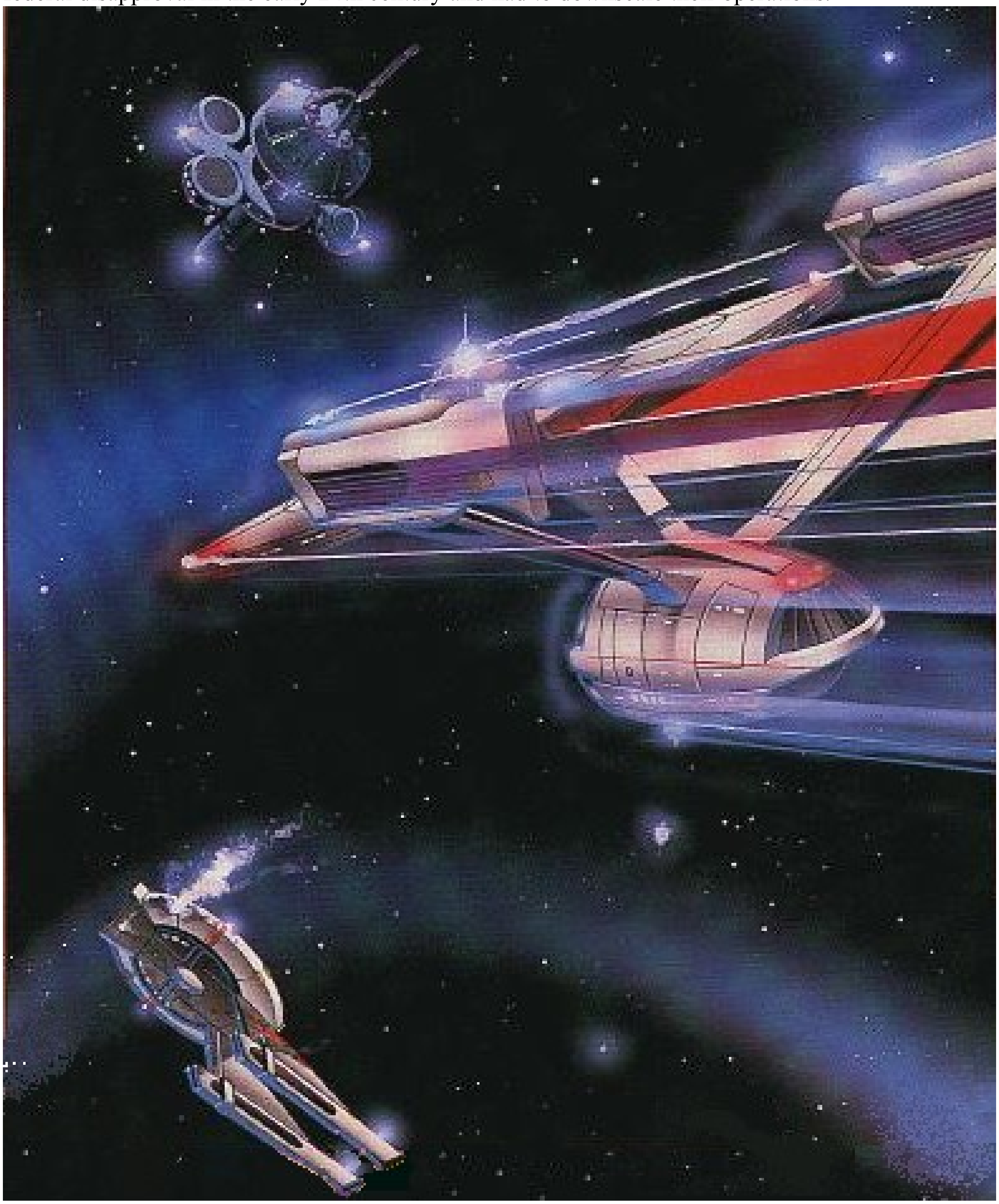
A rare Ranger *to* Ranger *meeting in deep space. The craft often operated in groups of three in local defense missions, but courier or scouting tasks were handled solo. These Mk I craft fire their original bow phasers to good effect. Note also the field constrictors and modified ramscoops on the PB-60s, optimized for the rare high endurance role of the engine here.*

More than a hundred of these large craft were sold as couriers to various Federation customers; Panastris was unable to secure rights to offer the PB-60 to foreign markets, and there would have been no point in offering the craft with a lesser engine. Government orders followed after a more heavily armed and provisioned Mk II variant was introduced. The most visible change was replacement of pod berths with twin Type IV phasers, giving the model serious firepower for gunboat missions. A final batch of fifty was added in the early seventies, before the benefits of linear excitation warp drives began to trickle down to this size range of starcraft.

Starfleet Training Command made use of fifteen of the craft (NCC-T6000-T6014), gradually selling them forward to the civilian market in a stripped-down configuration until just three were left. These soldiered on until 2324, providing practical training in high speed astrogation and allowing for extended missions involving large numbers of trainees. Forty more saw brief service in armed light scouting and courier duty, with regular registries in the NCC-7140-7179 range. These were attached to border starbases and outposts, and continued the work of the smaller *Archer* scouts under their commercial class name *Ranger*, despite name conflict with the frontier cruisers from the beginning of the century.

A different kind of Ranger *to* Ranger *encounter. In theory,* USS Ibn Rustah *of* Pytheas *subclass kept the cruiser class name* Ranger *in active Starfleet use till the 2290s, creating terminological overlap with the small craft. In practice, confusion was unlikely in every respect.*

Up to thirty Mk II and III craft are also known to have been operated by Starfleet Intelligence at various times, presumably also taking part in corsair operations. A corresponding number were dedicated to combat tasks in regional fleets and mercenary organizations, both of which met with federal disapproval in the early 24th century and had to downscale their operations.



USS Strider *in distress.The offensive action taken by the scout against the Klingon Empire in 2273 was never given a satisfactory public explanation, nor was the timidity of the Klingon response. The mysteries are typical of the era of clandestine operations and counteroperations that was supposed to culminate in open war.*

Tai / Sait

Light courier
2265-2357

Completed: 183 sleds total:

111 *Tai*
72 *Sait*

468 pods total:

170 *Atai*
78 *Fikaru*
180 *Manasu*
40 *Chisu*

Length: 48.0 m (*Tai* sled)
50.2 m (*Sait* sled)

18.7 m (*Atai* pod)
28.3 m (*Atai* pod w/ warp engines)

19.5 m (*Fikaru* pod)
29.2 m (*Fikaru* pod w/ warp engines)

13.8 m (*Manasu* pod)
20.1 m (*Manasu* pod w/ warp engines)

10.0 m (*Chisu* pod)

Beam: 25.6 m (*Tai*, *Sait* sled)

11.1 m (*Atai* pod)
15.0 m (*Atai* pod w/ impulse engines)
22.3 m (*Atai* pod w/ warp engines)

8.2 m (*Fikaru* pod)
11.2 m (*Fikaru* pod w/ impulse engines)
18.6 m (*Fikaru* pod w/ warp engines)

7.8 m (*Manasu* pod)
9.6 m (*Manasu* pod w/ impulse engines)
16.1 m (*Manasu* pod w/ warp engines)

5.6 m (*Chisu* pod)
6.4 m (*Chisu* pod w/ impulse engines)

Height: 8.5 m (*Tai* sled)
10.8 m (*Sait* sled)

4.4 m (*Atai* pod)
22.3 m (*Atai* pod w/ warp engines)

4.2 m (*Fikaru* pod)
4.6 m (*Fikaru* pod w/ warp engines)

3.5 m (*Manasu* pod)
5.3 m (*Manasu* pod w/ warp engines)

3.1 m (*Chisu* pod)

Mass: 48,800 tons (*Tai* sled)
72,800 tons (*Sait* sled)

88 tons (*Atai* pod)
182 tons (*Atai* pod w/ impulse engines)
524 tons (*Atai* pod w/ impulse and warp engines)

122 tons (*Fikaru* pod)
211 tons (*Fikaru* pod w/ impulse engines)
843 tons (*Fikaru* pod w/ impulse and warp engines)

72 tons (*Manasu* pod)
124 tons (*Manasu* pod w/ impulse engines)

	355 tons (*Manasu* pod w/ impulse and warp engines)
	59 tons (*Chisu* pod) 89 tons (*Chisu* pod w/ impulse engines)
Crew:	None (*Tai*, *Sait*) 4 (*Atai*) 5 (*Fikaru*) 2 (*Manasu*, *Chisu*)
Passengers:	14 (*Atai*) 38 (*Fikaru*) 6 (*Manasu*) 2 (*Chisu*)
Max. speed:	w 4.1 (*Tai*) w 4.9 (*Sait*) W 5 (both sleds, adopted after 2309) w 2.0 (*Atai* w/ warp engines) w 2.1 (*Fikaru* w/ warp engines) w 1.9 (*Manasu* w/ warp engines)
Endurance:	3 weeks (w/ warp sled) 5 days (w/ impulse or warp engines)
Weapons:	2 phaser IV emitters atop main hull of pod (all pods) 2 phaser IV emitters on ventral bow of pod (select *Atai*, *Fikaru*, most *Manasu*) 1 phaser IV emitter on ventral bow of pod (most *Chisu*) 2 phaser V emitters on warp sled mid-hull Hardpoints provided for 4 weapons pods on the warp sled
Shields:	1-layer conformal forcefield (all pods) 1-layer conformal forcefield (*Tai*, *Sait*) Navigational deflector at midhull (*Tai*, *Sait*)
Transporters:	Normally none 1 emergency evacuation (2-pad); Mk III or IV (some *Atai*)
SOURCES:	D TMP/Andrew Probert (Jackill, Reeves-Stevenses “Ashes of Eden”) (N Jackill, own) (H own, Reeves-Stevenses “Ashes of Eden”)

One of the most important light courier types of Starfleet in the late 23rd century was the *Tai*/*Sait* class. These couriers were actually two-component craft, and the class names *Tai* and *Sait* refer to the two models of the warp propulsion component, an unmanned sled featuring two or three warp nacelles, respectively. Unlike in the contemporary *Richtofen* class, each of the long, slender nacelles formed a self-contained propulsive module, with sensors at bow, warp coils and ramscoops amidship, and reactors, fuel pods and impulse engines astern. The nacelles hung below a flat structure that housed docking mechanisms, shield and deflector systems and various other navigation subsystems. For planetary landings, the warp section was left in orbit, while a small, wedge-like shuttlepod performed the actual planetfall.

There was a large family of shuttlepod designs available for use with the *Tai* and *Sait* warp sleds. For courier duty, the most widely used type was the *Atai* shuttlepod, an 88 ton, 18.7 m vehicle capable of carrying up to 14 passengers in relative comfort, or smaller diplomatic parties in significant luxury. The crew of four enjoyed a completely synthetic view of the outside from a flight deck situated behind a flat-plate atmospheric shield. Below the deck was the main cabin area, with a portside entry door with a small ramp for ground access, and sets of windows to port and starboard. Beyond these lay a sectioned passenger/cargo compartment with a standard configuration for two large and two small cabins. At the extreme stern, an airlock with a standard docking collar and two to six spacesuits provided exterior access and interfacing with other spacecraft or installations. A ventral iris hatch catered for the rare situations where access to and from the warp sled was needed, while a corresponding dorsal hatch was for emergency use only.

Most engineering facilities, small in size due to the nonindependent nature of the craft, were conveniently mounted above the habitat area. Thanks to standardized interface arrangements, the main power systems could be directly coupled to those of the warp sled whenever the craft was attached to one. Latching was handled by two large gravitic plates at the bottom; four smaller gravitic emitters facilitated soft landing. Propulsion was limited to RCS thrusters at the corners of the spaceframe, but the craft had integrated shielding systems and even sported two phaser IV emitters atop the hull. Some *Atai* models also featured additional emitters at ventral bow, offering a field of fire forward and down even in attached flight mode.

Four principal variants of the shuttlepod were in Starfleet service. In addition to *Atai*, a stretched heavy cargo version dubbed the *Fikaru* class could be operated from the *Tai* and *Sait* platforms. The *Fikaru* had broad side doors and ramps and a dorsal rolling door for cargo loading and offloading, and sported a relatively austere one-deck crew area, but carried essentially the same systems as the *Atai*. Two compact liaison vessels, the *Manasu* and *Chisu* classes, were seldom operated from aboard the warp sleds, although they, too, sported the required interfaces. Instead, the smaller craft were used as starbase and starship auxiliaries, mainly by the Vulcans but to some degree by Starfleet as well – they were for example adopted for the *Akula* class PA ships which had no hangar facilities for other types of craft.

Each shuttlepod came with accessories that could turn it into an independently operable shuttlecraft. There were lateral impulse engine packs available for all four types, and combined impulse and warp packs for *Atai*, *Fikaru* and *Manasu*. Propulsive performance was comparable to standard shuttlecraft of the time, save for limited endurance. Accessorizing also included lateral and dorsal weapon packs and extension modules for the pressurized volume, yet Starfleet had little use for these. Indeed, the necessity of stockpiling add-on modules made the shuttlepod family generally unattractive for starship auxiliary applications. A typical starship would need both *Manasu* personnel and *Fikaru* cargo craft, *and* separate impulse and/or warp-plus-impulse packs for each, there being extremely few situations where the pods would be useful in unboosted configuration.

Yet even as wholly integrated shuttlecraft of other types were purchased for starships, Starfleet's inventory in the late 2260s grew to include 111 *Tai* and 72 *Sait* sleds and nearly five hundred compatible pods of various kinds. The three-nacelled *Sait* variants initially enjoyed a top speed advantage and later served as executive long range shuttles for UFP officials and Starfleet Admiralty, while the standard two-engined *Tai* craft performed more general courier duties. Vulcan, the original manufacturer of the type, remained a principal operator, with more than seven hundred sleds and thousands of pods. The design also saw extensive service among Andorians (as the *Vasej* class) and Vegans (where the name *Lzzak*, or *Javelin*, was adopted).

Still decelerating toward SB 72, a Sait *sled releases an* Atai *courier pod and prepares to receive a fully laden* Fikaru *in a largely automated touch-and-go maneuver. Interestingly, this* Fikaru *also sports lateral impulse packs, suggesting an independent interplanetary mission at the other end. This combination was a rarity in normal courier duty, as the warp sleds were by no means in short supply and could be assigned to deliver their pods to the very doorstep of the customer. Note the characteristic pink paint scheme of Vulcan Diplomatic Service on the* Atai*, and the contrasting beige of the sled and the Starfleet* Fikaru.

Starfleet retired most of the two-engined vessels in 2331, as new *Peregrine* light craft offered greater flexibility and their heavier *Condor* sisters carried more cargo, both at greater warp speeds than the *Tai*/*Atais* or *Tai*/*Fikarus*. But many of these craft continued in UFP diplomatic service, offering high passenger comfort as well as starship-like speeds. Some *Sait*/*Atai* or *Sait*/*Fikaru* craft also continued in Starfleet service until the late 2340s. Vulcan still operates the type in civilian roles, and provides Federation customers with a wide range of evolved models as well. However, Vulcan input in Starfleet small craft design and production is diminishing, despite continuing cooperation on theoretical propulsion studies. Apparently, the logic of constantly striving to increase the speed and range of small craft evades the Vulcans, who are perfectly satisfied with the current selection of liaison vessels.

Leonardo / Rogge / Carbonare

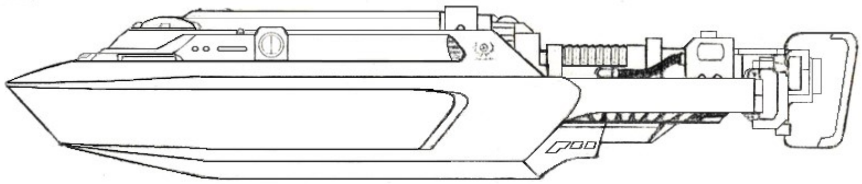
Corsair
2268-2307

Completed:	180 total: 116 *Leonardo* 28 *Rogge* 36 *Carbonare*
Length:	86.4 m (*Leonardo*) 89.0 m (*Rogge*, *Carbonare*)
Beam:	30.2 m
Height:	17.8 m
Mass:	176,000 tons (*Leonardo*, estimated) 202,000 tons (*Rogge*, estimated) 216,500 tons (*Carbonare*, estimated)
Officers:	2 (ship operations) 1 (boarding operations)
Crew:	8 (ship operations, *Leonardo*) 10 (ship operations, *Rogge*, *Carbonare*) 30 (boarding operations)
Cruise speed:	w 3
Max. speed:	w 4.5 (estimated)
Endurance:	5 months (estimated)
Weapons:	2 phaser IV emitters on dorsal hull 2 phaser IV emitters on ventral hull (*Carbonare*) Additional special weapons assumed carried
Shields:	1-layer globular forcefield
Transporters:	4 assault (2-pad); Mk III (*Leonardo*) 4 assault (2-pad); Mk IV or V (*Rogge*, *Carbonare*)

Craft of historical interest:

USS Rockefeller (NCC-R045)

SOURCES: (D SRC)
(N SRC)
(H own)



Certain aspects of Starfleet covert operations have always bordered on the illegal. While there is little evidence that SF Intelligence played anything but a loyalist role in the coup attempts of 2270, 2293 and 2372, several operations have involved gross violation of the sovereignty and rights of targeted political entities or persons, both within and outside the UFP. Still, strict safeguards supposedly are in place to prohibit SFI from participating in assassinations, kidnappings, mind altering and torture, which are standard procedure for many other intelligence agencies. In light of this, it is rather curious that Starfleet in late 2260s would have mandated operations amounting to piracy. Yet from the 24th century viewpoint, there are few other ways to describe the corsair operations that took place during the Organian peace.

As soon as SFI realized what disastrous effects the peace would have on its ability to directly gather intelligence on the Klingon Empire, arrangements were made to start gathering it in a more circumspect manner. The Empire was far from independent economically. Even though scores of conquered planets and subject races labored to keep the highly centralized core of the Empire fed and armed, trade relationships and bilateral pacts with outsiders were equally vital to the survival of the Empire and the stability of the seat of the Chancellor. They were also the Empire's greatest weakness, and SFI was determined to exploit it.

In order to infiltrate the flow of traffic to and from the Empire, SFI needed inconspicuous vessels crewed by reliable agents. It soon became evident that the latter could not be drafted from within the Empire, which was at the peak of its expansionist period and thus also of its self-assurance. In November 23rd, 2267, an alternative approach was taken: operatives deployed from corvette *Lyra* (NCC-723) surprised the crew of Barolian transport *Ditima* and commandeered her into the Empire, using her regular cargo run to H'atoria and back as a cover for signals intelligence gathering and covert mapping. The crew was released from custody two weeks later, suffering from amnesia – whether due to drugs, telepathic manipulation or generous payment, records do not tell.

Obviously, such foolhardy operations could not continue without significant risk of politically disastrous exposure. Yet the commandeering of mercantile vessels was a potent weapon by itself, and the undeniable success of the *Ditima* raid seemed to prove that Organians would turn a blind eye on such a practice. The Empire certainly was in no position to condemn privateering, being an active practitioner of the art itself. Starfleet was far less experienced, yet an immediate effort was begun to give Fleet forces the necessary skills and hardware for 'commerce interception operations'.

A prime requirement was the fielding of a vehicle capable of carrying a boarding party of thirty and deploying it via warp transporters to a mercantile vessel traveling at speeds up to warp 4. Stealth was essential, yet even more so was affordability: raiding hordes numbering in the hundreds would guarantee victory better than a small silver bullet fleet. The Thornycroft and Hiemdahr-Gan yards were contacted by SF Logistics Command for production of some 150 'small craft' of externally relatively inconspicuous design for undisclosed transport duties. These 86.4 m vessels would be propelled by two semi-recessed WD-1 solid state warp engines and a complex Kostas vectoring impulse assembly of surprising power, and for unspecified reasons also mounted a General Systems B-12 heavy tractor beam emitter astern. They would carry some thirty ‘passengers’ and their ‘baggage’ under the supervision of an operating crew of ten. Four independently acting two-pad transporter units immediately adjacent to the central passenger compartment would be standard equipment. The crew spaces and command facilities at the bow would primarily be accessed via lateral docking ports, but a docking tube equipped with versatile ‘emergency’ power tools could also be deployed dorsally, from the aft end of the passenger area.

Two lower decks would feature spacious lateral cargo and equipment holds, with planetfall ramps deploying between the drooping warp engine cowlings. A central access corridor would connect the aft engineering spaces to the forward sensor and power distribution rooms. Landing legs and gravitic engines would cater for planetary landings and takeoffs. A rather unconventional requirement was set for the ability to completely depower the ship within two minutes of planetfall, and to include numerous external storage compartments for rapidly deployable protective covers.

A picture of a Leonardo *lying in wait on a planetary surface, carefully camouflaged with multispectral covers, may not be the most impressive way to demonstrate the vessel in action. Yet apart from standard tarmac shots, this is as close as one gets to a visual recording of an actual corsair operation. Even this picture of* USS Colombo *was taken during exercises right next to the Korvat III homeport of the vessel.*

Thornycroft was happy to deploy the first eight craft, from *USS Leonardo* (NCC-R025) through to *USS Bonnano* (NCC-R032), in just four months. It was equally happy to receive payment disproportionate to the engineering effort, and disinterested in asking unnecessary questions. Logistics Command received nearly forty of the craft within 2268, and operations began in late September of that year, although under the authority of a different Starfleet branch.

Several questions about the *Leonardo* class still remain open as of this writing. Official performance figures have never been published, for example. And although the mass of the WD-1 engines is known to be 80,000 tons apiece, exact structural mass and mission load for the craft remain a matter of guesswork. These technical details are still easier to come by than records of *Leonardo* operations. While Starfleet never engaged in full-scale privateering operations against the Klingon Empire, a dozen cases of commandeering are documented from the late 2260s, and sporadic records throughout the 2270s total some fifty incidents. Little in the way of details can be found, however, beyond dates and vessel names. Apparently, the operations did produce desired results, as Starfleet continued *Leonardo* procurement until 2274, and ordered the evolved, LN-80C-engined *Rogge* and *Carbonare* subclasses in 2281 and 2289, respectively.

The total number of these 'small craft' fluctuated between 200 and 300 during the Organian impasse, featuring a motley collection of civilian purchases in addition to the purpose-built craft. Starfleet consistently referred to the vessels as light transports until the 2289 *Jatyin-Rockefeller* incident, in which a raid against a supposed topaline transport turned into a bloodbath. As an open state of war existed between the UFP and the Empire at that point, even from the UFP viewpoint, Starfleet was found fully justified in eliminating the transport crew of twenty and freeing the true cargo of some sixty Orions. The status of the cargo as 'slaves' was challenged somewhat when the Orions killed seven of their liberators, then demanded extradition back to the Empire. The public and the media thereafter commonly referred to the *Rockefeller* and her sisters as 'corsairs', overdramatizing several aspects of the incident.

In reality, privateering was but a minor part of the 'corsair' mission profile in the 2280s. The vessel type was found quite ideal for a number of special operations applications, and saw extensive service in operative insertion and extraction missions. On the other hand, these missions only involved a small part of the corsair fleet. The activity status of the rest followed the temperature changes of cold war, never quite reaching the all-time high of 2269 again. Production of *Carbonare* units continued until 2294, and supposedly some *Pakokku* transports were also modified for high-end corsair duties.

Peace with the Klingons spelled an end for privateering. The other duties of the corsairs kept the ship type busy for another fifteen years, yet only a few dozen vessels stayed in active service. The rest remained in inactive reserves till 2302, when sales to civilian and foreign military operators began. The latter were soon discontinued, when the morals of weapon sales were brought to general review. It took longer for Starfleet to decide that privateering was in fact contrary to Federation law, even during declared wars. Perhaps driving the decision was the pragmatic fact that neither the Romulan nor Cardassian foes were as vulnerable to this type of warfare as the Klingons had been. Or perhaps it was realized that the Federation was at the greatest risk of all in this respect, were the tables ever to be turned.

Wasp / Dragonfly

Light interceptor
2274-2318

Completed:	1,080 total: 639 *Wasp* 441 *Dragonfly*
Length:	8.9 m
Beam:	2.6 m
Height:	1.9 m
Mass:	220 tons (*Wasp*) 249 tons (*Dragonfly*)
Crew:	2
Max. speed:	w 2.2
Endurance:	1 week
Weapons:	2 phaser IV emitters flanking cockpit 2 phaser VP emitters between nacelles (*Dragonfly*)
Shields:	1-layer conformal forcefield
Transporters:	None

SOURCES: (D Mike Rupprecht/Mark Wilson)
(N Mike Rupprecht/Mark Wilson)
(H own)

The adapting of linear coil warp engines for small craft warp propulsion was a breakthrough for tactical craft operations as well. If a modern medium shuttlecraft could reach warp two, a craft built around the same engine but omitting the hull and substituting a substantially lighter cockpit would be capable of the same – and of impressive impulse performance as well. The packaging of a warp combatant into shuttle dimensions would make possible a tactical practice long forgotten: equipping of starships with their own organic fightercraft protection.

There were relatively few situations where Starfleet doctrine of the 2270s called for fightercraft use. Usually, these involved the shipping of hundreds of such craft aboard formations of large carrier vessels. With smaller fightercraft, stacked aboard standard starships, Starfleet could immediately come up with concepts of greater operational flexibility. The modern *Avenger* and *Miranda* heavy frigates were built to feature fightercraft 'shelves' that would allow several such craft to be carried on a regular basis; thus, small-scale planetary assault operations could be mounted at a moment's notice, or a decisive tactical presence could be left behind if the mothership was suddenly called away.

The first light warp fighter to be put to mass production was Martin DefenseLine's *Wasp* class, a truly compact craft barely nine meters long. The two crew sat in tandem beneath a single-piece canopy at bow. The narrow hull, shaped much like an atmospheric glider's, was accompanied by equally slim 8.4 m warp nacelles of Mitsuhirato SC-9 type. Each featured its own intermix chamber at the rear, leaving the aft section of the central hull to house matter and antimatter fuel, twin impulse thrusters, and the single modest shield generator of Arcadia manufacture.

Overall performance offered by these highly compact systems was best characterized by 'factor 1.5': this is how much the *Wasp* outperformed a modern medium utility shuttle in virtually every respect. A dash speed of warp 2.2 as opposed to warp 2, a sustained sublight acceleration of 610 g instead of 400 g, and the power ratios for shielding and for Type IV phaser armament all reflected the 'half again as much' prowess of the tactical craft. In tactical terms, the *Wasps* and *Merlin* shuttles thus formed a gunship/troopship pair similar to the early Bell 209/205 combat helicopter pairing in Earth's bloody internal conflicts of the 1960s.

In terms of engineering, however, little was shared among the pair. The only true commonalities lay in secondary systems such as life support, navigation and gravity control, also shared by several other designs of the era. The losing bidder in the light warp fighter program, Chiokis Corporation's *Mongoose* class, would have used *Merlin* components extensively both in the drive chain and lower hull structures. Being almost twice as beamy as the *Wasp*, though, the *Mongoose* would have been carried in significantly smaller numbers, offsetting its lower acquisition price and somewhat greater weapons load. Eight *Wasps* could be fitted onto the *Avenger* and *Miranda* shelves, or up to eighteen carried aboard a standard *Coronado* or *Coventry*. A gantry system was also proposed for installation aboard the *Coventries*, allowing the strike frigates to embark sixteen ceiling-mounted fighters *in addition to* the regular assault shuttle contingent. However, mere recovering of the craft would have required impossibly detailed orchestration, and actual tactical operations would have been a nightmare. Eventually, the fightercraft were embarked on select *Coventries* using a shelf-type stowage system.

From 2286 on, the standard combat auxiliary contingent of an *Avenger* was four *Wasp* fighters and four *Killer Bee* drone/fighter kits. *Miranda (II)* and *Theseus* vessels often carried *Killer Bees* exclusively; the drones actually offered serious competition to manned fightercraft. They never stood a chance of replacing the *Wasps* entirely, though, as Starfleet lacked the confidence to put fully autonomous AIs aboard armed drones. Instead, the *Wasps* assumed the role of drone controllers during detached operations, with up to three drones slaved to the copilot of a crewed fightercraft. At the height of the Klingon crisis, *Wasps* also were embarked *en masse* aboard through-deck cruisers. Their good aerodynamics and maneuverability made them rival dedicated impulse craft in planetary assault support tasks – so, funds allowing and tactical situations requiring, the latter were moved to proper carriers and their through-deck ship parking slots filled with dual-role *Wasps*.

Some stacking options for fightercraft and drones aboard late 23rd century starships.

Light fightercraft operations continued past the turn of the century, but mainly in exploration of a possible anti-shuttlecraft role. Other types of targets were considered too challenging for the craft by the post-Khitomer risk/benefit analysis standards. Starfleet consistently rebuffed the manufacturers' attempts at selling new light fighter designs. Foreign sales sustained development for a while, until changes in Federation weapon export policy closed down the market. The *Wasps* were withdrawn from use in 2314, the succeeding Martin *Dragonflies* in 2318 and the competing Chiokis *Meijis* in 2319. Of the thousands of light fightercraft built for attrition, only about 500 had seen service, some 200 of them aboard starships. In terms of economy, the wasted expenses had been trivial. Tactically, the presence of the fighters at least had not hindered heavy frigate operations. Part of the flight officer pool had been diverted to a strategically unproductive role, however, and was now in need of retraining and reassignment.

In recent years, organic fighter support for starships has been revigorated as a concept. The craft used in the role now are significantly heavier than the *Wasp* class, yet they still typically served aboard *Miranda* derivatives and other old, small starships during the Dominion conflict. It is possible that future starship designs will take into account the need for agile protection and detached operations, and will accommodate auxiliaries more potent than mere Class Two shuttles.

Scorpio

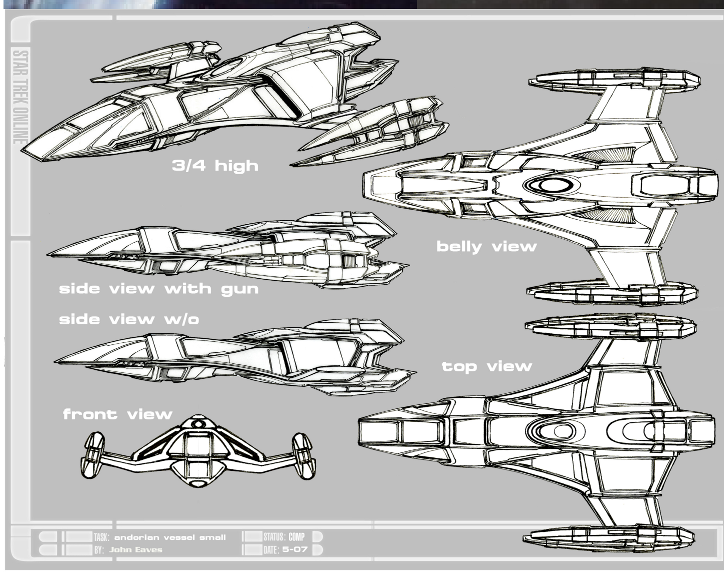
Heavy interceptor
2274-2317

Completed:	342
Length:	20.3 m 22.1 m (w/ spinal tank)
Beam:	14.3 m
Height:	5.3 m (landing gear extended) 4.4 m (landing gear retracted) 7.6 m (w/ spinal tank, landing gear extended)

	6.7 m (w/ spinal tank, landing gear retracted)
Mass:	1,180 tons 1,240 tons (w/ spinal tank)
Crew:	4
Max. speed:	w 3.9
Endurance:	2 weeks
Weapons:	2 phaser IV emitters on ventral bow 1 fwd minitorpedo tube w/ 26 photorps
Shields:	1-layer conformal forcefield
SOURCES:	(D FASA, dimensions corrected) (N FASA) (H FASA)

When the story of *Battleaxe* corvettes wound to an end in the 2270s, Starfleet lost a valued anti-assault type. Modern vessels in the corvette category were larger and more capable than the *Battleaxes*, and their successors would be larger still. They would oppose planetary invasions at the outer system perimeter, not in low orbit or down in the atmosphere. Yet as long as the Klingon threat loomed over Federation borderlands, there was a demand for multilayered defenses. In 2274, Starfleet agreed to field a torpedo-armed, short range warp interceptor type to meet the demand, most vocally expressed by the Andorian Self-Defense Force. Design was trusted on Chiokis, construction on Morena and Salazaar.

In terms of size and capacity, the *Shavipyo* (‘*Scorpio*’) patrol boat fell between smallest corvettes and largest fightercraft to date. Although a light corvette designation was initially pondered, the 342 craft that eventually saw active service did so under the heavy fightercraft identity. The defining characteristics of the *Scorpio* certainly agreed with the designation. Transatmospheric agility was ensured by conservative use of large triangular wings of 14.3 m wingspan on lower hull flanks. These gave the craft a quaintly antiquated look, which belied the high performance of the impulse package at extreme stern, or the twin sets of warp coils embedded side by side in mid-fuselage. A competent dogfighter at sublight, the *Scorpio* could dash to warp 3.7 for insystem intercepts, or reach warp 3.9 with plasma recharging of its Shuvinaaljis engines, designated LN-45 in Starfleet service.



A classic three-times-two-pair formation of Scorpios *brings a dozen torpedo tubes to bear on a Tholian intruder near Omicron Ceti. No spinal tanks are carried here. Twin cheat lines and two-tone silver-blue finish denote 1st Andorian Pursuit Group.*

Smoothly joining the engine section was a cabin for a crew of four, separated in the Andorian tradition from the rest of the universe by heavy duranium armor that was only punctured by a narrow portside entry door and a single forward viewport. Ahead of the cabin was a conical sensor and deflector array that completed the streamlining of the fuselage. Primary mission gear consisted of a ventral minitorpedo launcher and two phaser IV emitters just below the crew cabin. Support systems were neatly packaged into the wings, which held main gravitics inside trailing, fuel and retractable landing gear in middle, and IDF units and navigational sensors in leading sections, respectively. RCS clusters at trailing edge roots and below the bow added to maneuverability; a javelin-tailed dorsal fuel tank spine increased endurance when fitted.

Omitted from the tightly packed whole were heavy shield generators or broader tactical awareness instrumentation. Although the torpedo launcher packed considerable punch for a craft of this size, the phaser armament was insufficient even for self-defense, especially as field of fire was limited to forward angles only. A lone *Scorpio* would be relatively helpless, despite its powerful sting.

This in mind, the preferred tactical deployment mode was swarming. Groups of 12 craft, usually flown in formations no smaller than four-ships, were operated out of starbases ranging from SB10 along the antispinward border all the way down to SB 27. The 25 operational Groups were accompanied by three training formations and a reconnaissance unit, which operated partially probe-armed *Scorpios* alongside *Messina* scoutcraft. One Pursuit Group in five was nominally under ASDF control, as was one of the Training Groups. As it was patently impossible to deploy a *Scorpio* aboard a starship, strategic mobility of the units was extremely limited.

Although technically rather successful, the *Scorpios* did not quite meet the tactical reality of the 2270s or 2280s. Last-ditch defenses were falling in disfavor, and so were centrally commanded fightercraft formations. The *Scorpios* could not easily be adapted for networked operations, and their technologically more refined *Raptor* successors took over the defenses of strategic hot spots when introduced. In the 2290s and 2300s, the rugged older craft were moved to more wayward locations, where the infrastructure-dependent *Raptors* could not follow. As doctrinal changes continued, all heavy fightercraft operations were eventually discontinued, and the last *Scorpio* Groups were disbanded in 2317.

Meiji

Light fightercraft
2279-2319

Completed:	290
Length:	8.9 m
Beam:	4.5 m
Height:	1.9 m
Mass:	270 tons
Crew:	2
Max. speed:	w 2.3
Endurance:	1 week
Weapons:	2 phaser IV emitters below cockpit 2 phaser VP emitters flanking aft hull
Shields:	1-layer conformal forcefield
Transporters:	None
SOURCES:	(D own) (N SotSF) (H own)

The Chiokis bid for an escort fighter in 2274 was to have been an easy victory, based as it was on technological solutions proven by three years of field operations. Any vessel operating medium shuttles could swap one or more for a combat-oriented variant that mounted phaser IV and VI cannon and carried a shield generator as a permanent fixture. Service infrastructure would remain 85% common with Chiokis' *Merlin*/Type 1 shuttlecraft, mainly because the fighter itself was some 70% common by component count. The secondary phasers of the fighter would even be installable onto the shuttle as such.

None of this qualitative high ground helped against the simple quantitative advantage of the competitor, though. The Martin *Wasp* was only 2.6 meters wide, as opposed to the 4.5 meters of Chiokis *Mongoose* – just narrow enough to allow two of the Martin craft into a single shuttle shelf aboard the modernized heavy frigates. Perhaps also influencing the decision was Starfleet's fascination with the high technology that allowed Martin to pack warp 2.2 into the compact spaceframe. Compared to the advanced Mitsuhirato engine, CWD's LN-101 was admittedly conservatively massive, and even packaged in an unappealingly angular nacelle…

There was no question that the *Mongoose* was the better fighter, of course. The heavy armament alone made the one fighter count for two. When the medium shuttle cabin was compacted into a two-pilot cockpit, pressurized volume was left for numerous and sizeable systems, such as the most modern targeting and navigation sensors or secure communications. A notably more powerful shield generator could be carried aboard a *Mongoose* than aboard a *Wasp*, too. As soon as the Starfleet turndown became official, Chiokis began a marketing campaign highlighting the inherent virtues of the design.

By 2275, campaign feedback had created a refined warp fightercraft the company had named the *Meiji*. Further slimming of the spaceframe had bolstered impulse performance while leaving just enough space for the systems chosen by the so far narrow customer base. Warp speed had been hiked up to w 2.3, and the pulse phaser units were now mounted on steerable barbettes for greater field of fire. Total mass had grown to 270 tons, exceeding Starfleet criteria for heavy frigate auxiliary combatant. Yet towards the end of the decade, there was renewed Starfleet interest in the craft for a different set of applications. Certain fixed installations, mainly outposts and colonies close to the contested parts of Klingon border, but also vulnerable mining communities facing the wrath of the now relentlessly hunted pirates, were in need of additional defenses. The *Meiji* was considered a nearly ideal solution: as long as the installation to be protected had the capacity to operate *Merlin* shuttles, it could support *Meijis* as well.

Deliveries of *Meijis* to outpost defense use began in 2279. Modest twin orders of 180 and 110 craft, respectively, were a bitter pill to Chiokis which had counted on being able to secure the heavy frigate fightercraft order of much greater magnitude. Yet a higher unit price somewhat offset the corporation's financial disappointment. On the other hand, the price, in combination with the conservative technology of the craft, meant that the purchasing of further *Meiji* units was dropped from consideration during the height of escalation in the late 2280s.

The craft still played an active role in the final years of anti-Klingon operations, being embarked aboard select latest-model frigates in place of the smaller craft of the *Wasp* family. This return to the original concept allowed Chiokis to prove the validity of its design in graphic detail. The *Meijis* provided powerful fire support in the raids conducted throughout Charlie and Delta sections of the Klingon border by *Chandley* units, and kept the frigates safe from retaliation during the time their Marine contingents were operating on the surface. In the Amar raid of 2291, it was a formation of *Meiji* craft, operating at the very limits of their range, that finished the demolition of an Imperial lithium refinery after a SFI surface action team had failed in the task. The four craft, launched from aboard the special operations support ship *USS Sumter* (NCC-1898), were flown solo, embarking extra fuel in jettisonable tanks for the outward leg and taking aboard two SFI operatives each for the return leg of the mission. The craft were abandoned shortly before the border and allowed to exhaust their remaining fuel in a diversive automated flight, while two transporter-equipped heavy shuttlecraft from the *Sumter* retrieved the personnel.

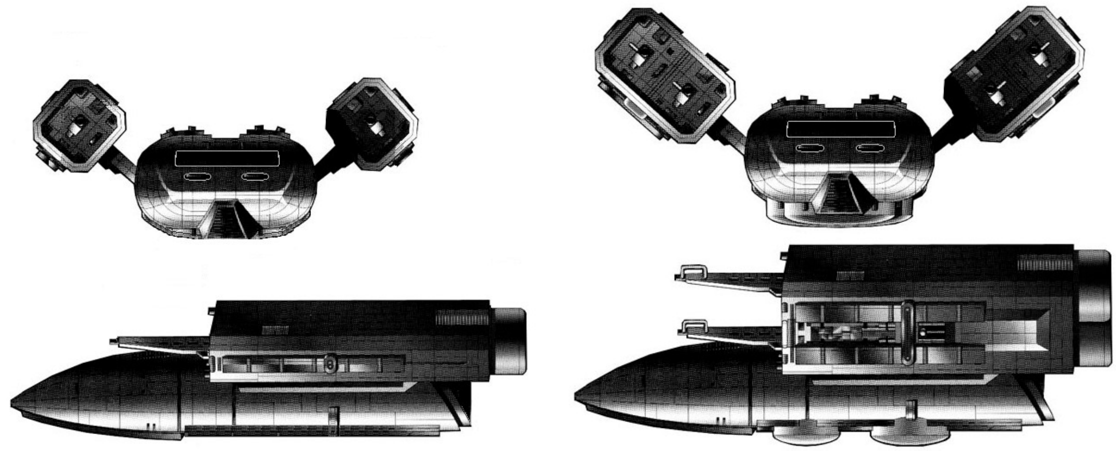
It was largely in preparation for special operations like this that some 40 *Meijis* were kept in active status until 2319. Outpost defense units were disbanded in the early 2300s as part of a policy change; succeeding protective measures were typically not implemented in these newly pacified locations. Craft similar to the *Meijis* could of course have been deployed on the outer colonization zone, where they would have suffered from fewer maintenance infrastructure shortcomings than the modern, complex *Raptor* units. Yet the *Meijis* lacked range and power for such an independent role.

Despite their ruggedness, they also still decidedly required a starship-type support environment, and would have needed extensive modifications for a more frontier-friendly set of support requirements.

Messina / Juneau / Annapolis

Scoutcraft/runabout
2277-2371

Completed:	418 total: 150 *Messina* 98 *Juneau* 170 *Annapolis*
Length:	21.3 m
Beam:	17.8 m (*Messina*) 15.3 m (*Juneau*, *Annapolis*)
Height:	8.0 m (*Messina*) 5.9 m (*Juneau*) 5.7 m (*Annapolis*)
Mass:	1,311 tons (*Messina*) 2,580 tons (*Juneau*) 2,610 tons (*Annapolis*)
Crew:	4 (*Messina*) 3 (*Juneau*) 2 (*Annapolis*)
Cruise speed:	w 3
Max. speed:	w 4.8 (*Messina*) w 4.1 (*Juneau*) w 4.7 (*Annapolis*)
Endurance:	3 months (*Messina*) 5 months (*Juneau*, *Annapolis*)
Weapons:	2 phaser IV emitters on dorsal bow (*Messina*, *Annapolis*, some *Juneau*) 2 phaser IV emitters on dorsal stern (*Annapolis*)
Shields:	1-layer conformal forcefield Navigational deflector on ventral bow
Transporters:	Normally none (*Messina*) 1 GP (2-pad); Mk IV (*Juneau*, some *Messina*) Select craft refitted with Mk V, VI and VII units 1 GP (2-pad); Mk V (*Annapolis*) All later refitted with Mk VI and VII units
SOURCES:	D TNG/DS9 (*Juneau*/*Annapolis* own) (N SotSF, own) (H SotSF, own)



The proliferation of compact high performance warp drives in the 2260s provided many starships and outposts with auxiliary craft that in fact outperformed the small starships of the preceding era. Many of these craft had trouble finding a suitable niche, though. Mere propulsive excellence did not give the small auxiliaries independence from their motherships. On the other hand, the speed and range were often wasted on missions performed from aboard starships that already possessed both qualities in abundance. Only two applications at the time called for long range, high speed craft fitting inside a starship hangar: scouting and survey/assault team support.

The sixties answer to this demand was the Class G3 shuttlecraft, a warp 2.9 vehicle of somewhat ungainly dimensions. For the seventies, Starfleet hoped for something either more compact or more potent. It soon became clear that even the new linear warp coil technology would not allow for substantial compacting, and sights were set at increased performance. Key to this would be LN-88, a novel solution built out of independent modules. Already in use on several types of small freighters in clusters of three to five, the engine had not originally been intended for small craft applications. Yet a slightly downscaled variant, the LN-88S, could easily be devised. Still bulky for a shuttle at thirteen meters and 600 tons, it would provide speed to match its menacing looks – warp four with two modules, or close to warp five with four.

The two sets of propulsion options offered two potential mission profiles. The faster, heavier craft was eminently suited for reconnaissance, the two-module one for liaison; the *Messina* and *Juneau* classes were officially defined in 2276 as scoutcraft and runabout, respectively, and production commenced in accordance with the plans of Chiokis Corporation.

An unusual load for any starship, let alone one this small: two Messinas *aboard a* Knox *frigate compensate for the otherwise limited sensing capabilities of the vessel. The assigning of* Knoxes *to exploration and survey duty during lulls of military action was among the first experiments on extending the use of 'active reserves' to civilian tasks, a practice that* *would later become the cornerstone of Starfleet doctrine. The scoutcraft could be considered 'mission modules' for the ships, and indeed palletized research gear was sometimes embarked in their place in the* Knox *or* Daran *shuttlebays. The typical mission suite for an 'active reserve'* Knox *was one* Messina*, one medium shuttle, a thirty-ton research pallet – and a twenty-ton service and support pallet for the finicky scoutcraft.*

Hull form for the two craft was nearly identical. For runabouts, the criteria had been established during the seventies already, in the form of user-requested improvements on the already well received *Questor* craft. The bow of the 7 m by 19 m by 3.5 m aerodynamic hull was dedicated to a spacious three-person flight deck with a single panoramic viewport and multiple control stations, the opposite of the *Questor* case. Behind the bow compartment was an entry foyer with two exterior doors, but without the cumbersome docking tube; instead, compact Mk IV transporters were carried. Aft of the foyer lay the main cargo/passenger area, now equipped with the most significant of the desired modifications, a loading hatch at the extreme stern. Support systems were clustered both dorsally and ventrally, with a navigational deflector under the bow and paired shield generators above the aft compartment. The nacelles were supported by short pylons of significant chord, at 45° dihedral, and resulted in fifteen meters of total beam and six meters of height – displacing six utility shuttles on a hangar deck!

The scoutcraft yielded to runabout hull demands, placing survey and analysis systems in the aft compartment (from which the loading hatch was omitted) and adding prominent sensor domes below the hull. On select craft, twin microprobe launchers were added to nacelle front ends. A fourth crew member was required to tend to the mission equipment. Twin berths just below the forward viewport were fitted with phaser IV modules on all *Messinas*. As the external dimensions were greater even than on the *Juneaus*, it was rarely that the scoutcraft were deployed aboard frontline starships. Yet it was quite possible to operate a *Messina* efficiently from a heavy frigate or through-deck cruiser hangar (after the installation of some craft-specific support gear), and both types of vessels embarked the craft one time or another. Light and medium frigates on scientific survey missions also depended heavily on such a force multiplier; border patrol frigates in turn benefited from the use of the scouts as patrol boats.

A Juneau *going to warp. The rear view showcases the access ramp and the flanking impulse engines on the sloping stern, trademarks of modern utility shuttles yet a first for runabout-sized craft. The significant improvement in utility offered by the ramp was lost again in the next two generations of runabouts, a price paid for improved propulsion.*

Starbase operations still swallowed most of the production run. Their less rigid support infrastructure allowed for a rapid re-equipping, and would no doubt have accommodated another scoutcraft swap twenty years later had the normal pattern been followed. However, the *Messinas* and *Juneaus* proved exceptionally popular and practical, and a continuation design combining the best of both worlds was fielded in 2299. The *Annapolis* craft mounted two propulsion modules, featured the aft ramp, could embark a modular sensor suite or carry passengers or cargo with equal ease, and were compatible with modern navigation networks and support systems.

Starships with markedly larger hangar bays began to appear after the turn of the century; *Juneau* and *Annapolis* deployments on *Ambassador*, *Niagara* and later starships were commonplace, although the design was somewhat cumbersome compared with the later *Kilauea* and *Danube* classes. The introduction of the latter design finally spelled the end of the *Juneau* deployments in 2371. In starbase applications, the craft had already been retired in the mid-2360s in favor of *Kilauea* units. Various civilian and foreign users still keep the class going strong, though. Stretched, chopped, re-engined and re-fuselaged versions serve in a menagerie of roles throughout the Federation and beyond.

Killer Bee / Gadfly

Light sublight attack craft / drone
2279-2314

Completed:	2,828 total: 1,422 *Killer Bee* 716 *Gadfly* 690 *Super Bee*
Length:	9.5 m (*Killer Bee*) 5.3 m (*Gadfly*) 7.4 m (*Super Bee*)
Beam:	2.3 m (*Killer Bee*, single stinger) 1.5 m (*Gadfly*) 2.5 m (*Killer Bee*, twin stinger, *Super Bee*)
Height:	2.8 m (*Killer Bee*, *Super Bee*) 1.4 m (*Gadfly*)
Mass:	103 tons (*Killer Bee*, single stinger, w/o work pod) 192 tons (*Killer Bee*, twin stinger, w/o work pod) 62 tons (*Gadfly*, w/o work pod) 199 tons (*Super Bee*, w/o work pod)
Crew:	None (w/o work pod) 1 (w/ work pod)
Max. speed:	0.80 c (*Killer Bee*) w 2.3 (*Killer Bee*, jump mode) 0.80 c (*Gadfly*) 0.85 c (*Super Bee*) w 2.2 (*Super Bee*, jump mode)
Endurance:	1 week
Weapons:	*Killer Bee*: 1 or 2 phaser V / piercing deflector stingers on ventral hull 2 phaser IV emitters on lateral pylons (optional, interchangeable with minitorpedoes) 2 fwd minitorpedo tubes on lateral pylons (optional, interchangeable with phaser IV) 2 fwd minitorpedo tubes on lateral pylons (optional, interchangeable with phaser IV) *Gadfly*: 2 phaser IV emitters on nacelle bows *Killer Bee Plus*, *Super Bee*: 2 phaser V / piercing deflector stingers on ventral hull 1 fwd phaser VIP emitter on ventral module 1 aft phaser VIP emitter on ventral module
Shields:	1-layer conformal forcefield 1 or 2 piercing deflectors on ventral stingers
SOURCES:	(D aridas sofia/Mike Rupprecht/Mark Wilson) (N Mike Rupprecht/Mark Wilson) (H own)

The introduction of organic fightercraft protection for heavy frigates and cruisers meant such a change in tactics that it took Starfleet several years to adjust. Fine-tuning of the concept had to proceed on several fronts simultaneously. One of these was the reduction of overall risk by substituting drones for manned interceptors and attack craft. The initial TED-A and TED-B series of escort drones by torpedo specialist Selenia suffered from insufficient autonomy of control systems, however; limitations imposed in the aftermath of the M-5 debacle were crippling all autonomous weapon system development.

In response to the question of autonomy, Starfleet set a requirement for on-theater remote control. The combat drones would receive commands either from suitably equipped manned supervisor craft via datalink, or then from onboard crew. A tried and true way of adding this crew was implemented: a socket for the Patterson-Massey work pod was fitted at the bow of the drone body. The resulting MaTED series received favorable evaluations and was approved for operational use in August 2276.

The MaTED drones came in two basic variants, impulse and warp jump. The former was comparable to the *Tycho* sublight fighters in many respects, but lacked aerodynamic control surfaces and featured a much more powerful impulse sled. The sled, in combination with a highly capable inertial damping system, made possible accelerations up to 790 g, and gave the craft true tactical significance even during crewed operations. The impulse nacelles were self-contained units each; at the bows were phaser IV emitters and their rather austere, short range targeting systems. The control cabin sat amidships, in a position facilitating simple plugging in without a need for the sort of wraparound latchings used on the *Tychos*. Directly abaft were the shield generator, flight control computer and life support systems. Due to the rather pedestrian AI routines, the *Gadfly* fightercraft actually wasn't very effective as a drone, and was usually flown crewed.

The warp version resembled the *Wasps* to a degree, but was flown by a single pilot and a versatile combat AI, featured a much more powerful reactor, and carried a ventral podded armament of impressive firepower, with phaser V cannon integrated to a specialized deflector system that could disrupt enemy shielding sufficiently to let the phaser blast penetrate. The ventral 'stinger' also housed a Vickers XS-I 'Haruna' warp coil assembly that could provide brief bursts of warp 2.3 when the primary weapon system was not draining all power. During normal operations, the coils would negate inertial mass to provide high sublight maneuverability. Phaser IV emitters similar to those on the *Gadfly* could be carried on lateral pylons just abaft of the pod/hull joint, with excellent arcs of fire in every direction except down.

An upgunned variant of the *Killer Bee* soon emerged, with twin stingers and a powerplant booster pack. The type was capable of carrying a phaser VIP pod between the stingers; an alternate fit was a cluster of minitorpedo tubes for three dozen new 300 mm dia. fire-and-forget, short range m/am projectiles. Targeting was by onboard systems rather than by complicated and vulnerable external arrangements, and engagement ranges of less than a hundred kilometers were assumed. The even more powerful *Super Bees* were configured with XS-II nacelles, placed farther aft than the -I units and fitting completely below the extended hull. This improved deck handling, yet did not quite allow for a greater number of craft to be stacked aboard. Eight was the operational maximum aboard *Avenger* or *Miranda* vessels, the primary platforms for the type. In 2283, modified *Texas* light cruisers began embarking even larger contingents of drones, and some were assigned to *Chesapeake* and *Achernar* vessels as well.

The upper starboard shelves of USS Antrim *groan under the weight of twin-stingered* Killer Bees*, those in the compartment closer to hangar doors being of the* Super Bee *variant. In addition, a* Merlin *medium utility shuttle and an* Aladdin *heavy auxiliary can be seen on the lower shelves. More than a percent of the operational mass of a fully stocked* Avenger *heavy frigate could consist of the warp coils of her auxiliaries. The diversity and versatility of such an auxiliary contingent would not be matched by even significantly larger 24th century starships.*

Drone operations undewent another conceptual re-evaluation soon after the operational introduction of the *Killer Bees*. The drone/fighters were good phaser combatants at close quarters, and perfect escorts for shuttles performing assault runs. In contrast, the effectiveness of these virtually sensorless craft in the independent power projection or defensive interception roles was limited, be they manned or not; atmospheric performance was also low. Mixed wings of manned *Wasps* and combat drones thus became the preferred approach in the mid-2280s. With the mothership present, just the drones would be flown; in the frigate's absence, the copilots of the *Wasps* could control the drones, which had superior agility and power thanks to omitting the 'dead weight' and fragility of the crew.

The changes in operating rules were indicative of a more general disappointment with the organic fighter cover concept. *Killer Bee* deployments aboard heavy cruiser vessels never proceeded past experimental stage. Towards the end of the 2280s, the kits were withdrawn from *Endurance* and *Soyuz* units as well. The *Gadflies*, intended for planetary assault support, usually served in a more limited fire controller and forward scout role; rather than be distributed aboard all frontline starships, they ended up being embarked almost exclusively on *Coronado* and *Advance* through-deck cruisers and *Ariel* carriers.

Neither the sterling service of the *Super Bees* in the Gorn intervention of 2294 nor the *Gadfly* operations at the Sunplain disaster zone in 2296 swayed Starfleet post-Khitomer attitudes towards fightercraft an iota. The decrease of planetary assault and system defense commitments thanks to the Klingon peace meant cessation of *all* regular escort fightercraft deployments. Starfleet stood down from fighter operations with such eagerness that by 2298, the only starships still embarking *Killer Bees* were the deep-ranging dreadnoughts and defenders. A year later, even the last *Ascensions* would be gone; the some 160 *Super Bees* aboard *Defenders* would soldier on with their motherships till 2314, but no reassignments to *Excelsior* or *Apollo* vessels were to be effected.

Space combat drones more or less died out as a Starfleet concept when the *Killer Bees* did. Among the leading reasons was the introduction of rapidly multitargeting, strip-type phaser armament that both did the job of the drones better, and promised to defeat any attempt by an enemy to utilize drones against Starfleet vessels. A number of adversary cultures still persist with drone weaponry, and Starfleet continues to study the technology accordingly. Yet it is highly unlikely that a drone/crew pod combination similar to the *Killer Bee* concept will ever again see Starfleet use.

Falcon / Raptor

Scoutcraft / heavy interceptor
2286-2337

Completed: 280 total:

	70 *Falcon* 210 *Raptor*
Length:	22.8 m
Beam:	20.4 m
Height:	5.3 m (landing gear extended) 5.1 m (landing gear retracted)
Mass:	1,270 tons (*Falcon*) 1,610 tons (1-seat *Raptor*) 1,615 tons (2-seat *Raptor*)
Crew:	2 (*Falcon*) 1-2 (*Raptor*)
Max. speed:	w 4.0
Endurance:	5 weeks
Weapons:	1 phaser IV emitter on ventral bow 2 triple nanoprobe dispensers, port/stbd of cockpit (*Falcon*) 2 phaser IV emitters on inner wings (*Raptor*) 1 fwd minitorpedo tube w/ 40 torpedoes on ventral hull (*Raptor*)
Shields:	1-layer conformal forcefield
Transporters:	None
SOURCES:	(D LA Graf "War Dragons", own) (N LA Graf "War Dragons") (H LA Graf "War Dragons", own)

It is obvious that Klingon threat was the principal driving force in the development of Starfleet technologies and tactics in the 23rd century, yet the solutions Starfleet came up with seldom resembled their sources of inspiration. The raiding battlecruiser flotilla was a uniquely Klingon concept, met on the Federation side of the border not by its peers but by packs of perimeter action ships and by lone but deadly dreadnoughts. The light Bird of Prey commerce raider had no direct counterpart in Starfleet, either. Some saw this as a fatal shortcoming, but the fact of the matter was that Starfleet could not fight this particular fire with fire. The design, construction and installation of a cloaking device on a small starship remained a challenge beyond its means.

There was, of course, a definite demand for stealth and deception in Starfleet operations also. Captured foreign cloaking devices were sometimes used in penetration missions, with varying degrees of success. Yet Klingons were distressingly adept at penetrating Romulan cloaks, and vice versa – and Starfleet was far from understanding the nuances of the technology well enough to create its own, working cocktail of characteristics. This was not as major a problem for Starfleet as its inability to see through foreign cloaks, though. Both Klingon and Romulan devices had their minor idiosyncracies, but these did not amount to true tactical weaknesses.

The earliest and most primitive cloaking countermeasure Starfleet had implemented was the dispensing of aerosols on the supposed path of cloakships, so that density variations could be observed. By the 2280s, this technology had been refined somewhat: inert soot was replaced by 'smart' nanoprobes that, if given the chance to come to contact, could cling to the target hull and keep on transmitting its location. The basic limitation of the original technology remained, though: it only worked if the position of the target was known more or less accurately to begin with, as the nanoprobes could only cover very small volumes of space. There was thus no point in using the technology blindly and passively.

The first successful active cloak-hunters were devised in the 2280s. The *Falcon* scoutcraft of Berengarian Lei&Salak Starcraft manufacture combined high pursuit speed with the ability to lie low in wait, to absorb situation data from passive onboard and active offboard sensors, and to process the data into an educated guess of enemy location and movement. The speed was provided by twin Vickers LN-98 'Kittiwake' engines, powered by an antimatter reactor and supercharged for a dash speed of warp four. The long nacelles, massing 486 tons apiece, were mounted at the kinks of a gullwing structure, and Nanchang CC-770 impulse engines at the aft wing roots. The outer sections of the wings housed antigrav repeaters for liftoff and maneuvering.

The powerful propulsive systems were incompatible with traditional stealth, so Starfleet went for more active protective measures. A Sadra-Maktis multispectral sensor countermeasure suite installed at the bow produced false images and holographically obscured the real ones. While nowhere near the effectiveness of the far larger perimeter ship or strike cruiser SCM suites in hiding the existence or presence of the craft, the system excelled at keeping the enemy from scoring hits. The *Falcon* in turn would lash out with nanoprobes fired from two triple dispensers flanking the two-person cockpit. Below the crew, a Type IV phaser provided light offensive and defensive punch in case the SCM system failed. The emitter was equally well positioned for firing forward and aft. Shields erected by the single Reflexe FS generator could repel a pulse or two from a BoP wing cannon, although a full volley would still be quite fatal.

The cramped conditions aboard were the major endurance limiter. Both the forward-facing pilot and the aft-facing tracking system operator enjoyed excellent situational awareness through curved, panoramic windows and multiple viewers, and could eject the cabin in emergencies. The most important member of the crew had no bailout option, though: the Eristaffe-Zynn main computer was thoroughly integrated to the ship structures. The system could track up to thirty potential contacts and consolidate them into a cloakship position by using onboard sensors alone. Linking to external sensors or sister craft would double the capacity. Starfleet was confident that a *Ch'ing* BoP could be exposed within fifty to sixty seconds of first indication, and a battlecruiser within two to five minutes, depending more on the power and quality of their cloaks than on their attempts at evasive maneuvering. In fact, a maneuvering opponent would now be easier to spot than a standstill one.

The craft had a single obvious shortcoming: near-prohibitive price. An interceptor equipped to *Falcon* standards would have frightened most enemies to inaction if deployed in sufficient numbers. The *Falcon* could never play that role, however. For scouting missions, seventy units could be produced during the spending spree of 2286. A structurally similar interceptor, the *Raptor*, was produced concurrently with the scoutcraft, omitting the tracking suite and featuring a much more modest SCM system to allow 210 units to be built. Two forward-firing phaser IVs were added to the wing roots, a minitorpedo launcher embedded in place of ventral sensors, and in 195 of the craft, the tracking system operator and much of the computer volume were removed and the cockpit for the remaining pilot moved aft and down and its window size reduced. The remaining fifteen had dual cockpits but lacked the tracking system. None of the changes made the craft truly affordable for the interceptor role, though.

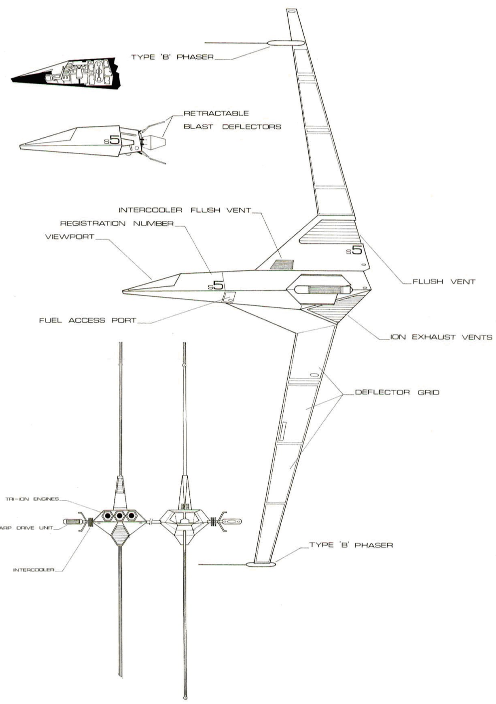
Although potent combatants at short ranges, the *Raptors* represented poor acquisition politics. To their detriment, they were technologically half a century ahead of their times. A somewhat less poetic limitation also reduced *Raptor* (and *Falcon*) usefulness: built for independent action, they were too large to fit into starship shuttlebays, up to and including the uniquely spacious ventral stern bay of *USS Excelsior* (NCC-2000). Most of the craft saw service along the Klingon Neutral Zone between 2288 and 2293, and then on the Romulan Neutral Zone from 2298 to 2327, operating out of fixed installations. The ability to challenge cloaked intruders suffered from the introduction of modern cloak-compatible shields that prevented the nanotrackers from making contact. On the other hand, fixed sensor nets were becoming more capable and, in theory, had less to do anyway, thanks to the Klingon alliance and Romulan isolation. Reassignment of the craft to frontier outposts was a difficult and expensive process, due to the extensive maintenance and support requirements of the craft. Starfleet gave up the attempt in 2337, and thus fought the border wars in the following decades essentially without the support of fightercraft.

This was by very deliberate choice, however. Even if a successor to the *Raptors* had been developed, it would not have been fielded under the 2340s-50s doctrine that placed a greater value on the life of an individual than ever before. If the only way to victory was through the brutality of craft-to-craft combat, the Fleet would choose defeat. The borderlands were expendable, the colonies there evacuable, the loss of face of no real consequence – and in the end, the Fleet heavy starships invincible, making the point moot.

Storn

Assault craft
2289-2325

Completed:	165
Length:	11.2 m
Beam:	5.2 m
Height:	8.5 m (sails folded) 24.3 m (sails extended)
Mass:	852 tons
Crew:	2
Passengers:	8
Max. speed:	w 3.0
Endurance:	3 weeks
Weapons:	2 phaser IV emitters on wings
Shields:	1-layer conformal forcefield
Transporters:	None
SOURCES:	(D Lawrence Miller, dimensions corrected) (N SotSF) (H SotSF, Lawrence Miller)



Gradual advances in small craft warp propulsion whetted Starfleet's appetite. When warp interceptors had been miniaturized enough for shipboard operations, and on the other hand endurance and firepower increased in detached applications, the next logical step was to strive and combine the two. A request for proposals was put forth in 2286 for a shipborne assault craft capable of warp 3 delivery of Type IV phaser firepower or a boarding squad. Multi-week emergency endurance and the ability to operate in atmospheres raised the stakes, until only three competitors remained. Victory went to Tamerlane Starcraft and its TS-675 '*Storn*' design, a versatile multipurpose machine that transcended its original deployment plans.

To provide the required high speed in the compact dimensions dictated, Tamerlane abandoned early on the use of conventional nacelles. Instead, a semi-open ring drive was chosen, with 2.6 m solid state excitation elements to port and starboard and two field reflectors in sails extending up and down from the hull. The sails featured four segments each, for accordion folding when the craft was to land or edge itself into a starship hangar. The powerplant was packed in the aft dorsal part of the hull, with three impulse nozzles above the reactor core. Forward of this, the hexagonal hull accommodated eight troops in extremely cramped conditions in two face-to-face rows of four. At the very bow of the 11 m hull was a control cabin for the two crew, with the pilot sitting forward beneath an acutely slanted flat-plane viewport and the navigator seated aft.

A gaggle of Storns *clings on to the mothership* USS Hornet*, while another craft hovers nearby, wings partially folded and with the apparent intent of entering the maintenance hangar of the auxiliary carrier. While other types of starship could process the assault craft, recovery and deployment from a classic hangar was a far clumsier affair than from the purpose-built external berths of a* Hornet*.*

The forward cabin was hinged so that it could swing up to allow the amidships docking adapter to pierce the hull of the vessel to be boarded, or then entirely jettisoned in an emergency escape maneuver that would leave the assault squad stranded. Not all missions called for the presence of the squad, however: interception or interdiction duty would see the aft cabin fitted with an additional fuel tank, and the two heavy Phaser IV units near the tips of the sails would become the primary firepower of the craft.

Starfleet began deploying *Storns* aboard *Coventry* class vessels in 2288, packing two in each 45 x 25 x 10 m bay for assault missions. Strike cruiser deployments followed the next year, with two craft fitting side by side in the 22 x 20 x 9 m bay and still leaving just enough room for shuttlecraft operations. While some *Chandley* frigates also embarked these craft, multipurpose or exploratory starships generally had no room onboard. Starbases and surface installations received a small number of *Storns*, yet could also operate dedicated and uncompromising interception and assault types, and generally did.

For maximum flexibility of tactical deployment, Starfleet at first suggested the use of through-deck cruisers, but then found the ideal mothership in the *Hornet* auxiliary carrier. The *Hornets* would carry ten of the assault craft in external berths for anti-piracy work, a highly successful endeavor for the 2290s – but also the last hurrah for the craft, which would see very little action past the first decade of the 24th century, and be retired from all deployments by 2325.

Mockingbird

Light scout
2290-2338

Completed:	20
Length:	50.2 m (original) 52.4 m (refit)
Beam:	16.8 m
Height:	9.0 m
Mass:	93,000 tons (original) 99,000 tons (refit)
Max.speed:	w 8.0 (original) W 9.5 (refit)
Endurance:	2 years
Officers:	3 + up to 4 specialists
Crew:	5
Weapons:	1 phaser V emitter on dorsal main hull 1 fwd light torpedo tube w/ 10 photorps on ventral main hull
Shields:	1-layer conformal forcefield Navigational deflector on ventral hull
Laboratories:	1 GP
Transporters:	1 GP (6-pad), 1 cargo; Mk V

Auxiliaries: None

Ships of historical interest:

USS Mockingbird (NCC-4630), *USS Seagull* (NCC-4647), *USS Tanager* (NCC-4632)

SOURCES: (D LUG)
(N LUG)
(H LUG, own)

As is well known, the introduction of the *Excelsior* class did not spawn an immediate or complete refit of Starfleet with the new technology. Reliance on components, systems and engineering solutions introduced in the 2270s refit programs was a common factor for most of the designs of the final decades of the 23rd century. Yet detailed plans for more advanced elements had been made during the Organian stalemate; once they found political and technological acceptance and funding in the high profile *Excelsior* and *Komsomolsk* programs, their application to lesser starship types was inevitable. Getting the new technology to work on a smaller scale was still an uphill struggle, however. The necessary if faltering first steps up the steep slope were taken with the humble *Mockingbird* class light scout.

Broadly based on the saucer of the *Excelsior*, a spectrum of common-design primary hulls was again gradually established, the fourth such family in Starfleet use. Saucer size would eventually range from Class 1D for the projected battleships, explorers and a number of fixed installations to Class 5D for small support craft. The model most suited for light scoutship use, and the one to first be perfected, was Class 4D, a two-deck, 16.8 m dia. saucer that offered dorsal and ventral connections for the mounting of m/am reactors, warp engines and secondary hulls as needed; a rear cutout for impulse systems of desired performance and size; a dorsal socket for a bridge module; and two weapons berths and eight sensor berths.

This type of hull would nicely serve a scouting vessel without requiring major secondary structures. Systems familiar from the older *Nairobi* and *Archer* light scouts could be brought aboard in sufficient quantity to give the *Mockingbird* a tactically and scientifically meaningful role. Internal laboratories would again have to be kept to a minimum and the heaviest long range instruments omitted, but modern high speed propulsion would bring short range instrumentation to bear on targets at the new deep frontier. Advanced automation would allow for crew size to be pared down even from the *Archer* standard, to as low as eight in austere mode, although space would be set aside for four researchers or intelligence specialists. For fighting, the ships could be given a balance of Type IV phasers or a single heavy-hitting Type V bank and an external torpedo assembly.

This was as far as the plans made during the forced truce had been allowed to proceed, until the mid-2280s. At this point, the program for the new standard Class 4 saucer was officially launched, and the search began for components that would equip the hull into an operational light scoutship. Type IV phasers were liberated from surplus stock, a few heavier cannon set aside in corvette procurement, sensors scraped together from left and right, and even a Mk 28 corvette torpedo launcher installed on the largish ventral bulge that housed the new scoutship's deflector and the KR05-PTA main reactor. An acutely aft-swept T-pylon structure was fitted on the dorsal strongback, and two affordable WD-1 engines mounted on its opposite tips, to an almost comical effect for all their bulk in comparison with the primary hull.

The generally uninspiring results were unveiled in 2290, with the launch of *USS Mockingbird*, NCC-4630. Standardization of hull components did not mean immediate compatibility of the plugged-in systems, and the inaugural vessel suffered from many teething troubles. Yet she was a prototype in the most abstract sense only: alongside her, five other scouts of the class had already been launched, and keels for all fifteen of the remaining production run were laid down long before the *Mockingbird* embarked on her first test flights. Starfleet was determined to make best possible use of the opportunity for mass production, and considered an approach similar to the one it was taking with modern corvettes. A new batch of twenty light scouts would be fielded as soon as the current one reached maturity, and a new one after that, with incremental upgrades. The initial shortcomings of the "early birds" thus didn't matter much. The important thing was that the future battlefield of the inevitable Klingon war be kept well stocked in reconnaissance assets, and frequently replenished in case of losses.

This fine and commendable doctrine came to a sudden end with the Khitomer peace. No scout losses had been suffered yet, and now it seemed that none were immediately forthcoming. Investment in a second batch of *Mockingbirds* was indefinitely postponed. Instead, the existing vessels, plus the ones under construction, were subjected to a performance audit, and several improvements were ordered on their sensor suites, computing systems and the ability to perform scientific rather than military reconnaissance.

Defense Command concentrated on modern scouts of higher quality, better versatility and greater size, to better cope with the requirements of the peace. It fell on Exploration Command to take the *Mockingbirds* under its wing – a welcome turn of events, as this division of Starfleet now had greater resources to spend on the task. *Mockingbirds* quickly began to achieve exploratory fame. Even as relations with the Romulans took a nose dive, the suitably inoffensive *USS Tanager* (NCC-4632) was able to exploit a previously secured permission to map the Retiklon Cluster in 2292. *USS Seagull* (NCC-4647) finished a similar solo survey in the ironically more welcoming direction of Klingon space in 2299, returning with data on no less than five unclaimed and uninhabited Class M worlds ripe for picking.

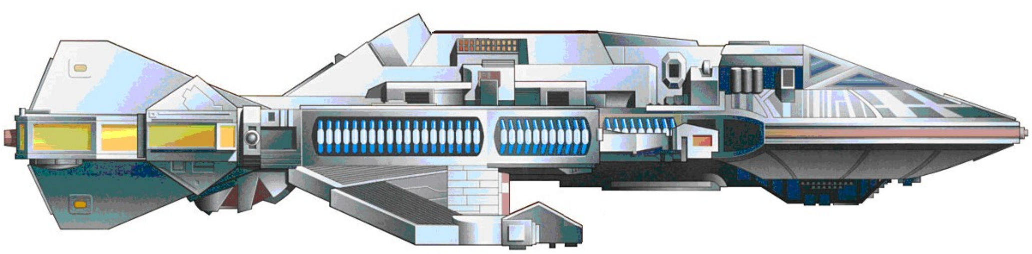
Hobbled by its substandard warp engines and modest endurance, the class was nevertheless deemed unsuitable for rescuing Starfleet from its new predicament: the urgently needed scientific assessment of the Khitomer Treaty Exploration Zone, a vast expanse of previously inaccessible space. Even the large *Amerinds* had to bow in face of the daunting task, and then to bow out: twin-engined medium scouts more resembling light cruisers were constructed in their place. For the new century, the *Mockingbird* flock was given assignments close to home space, often in concert or competition with the *Antares* corvettes that had paralleled their construction doctrine and technological solutions. Also, in renunciation of that doctrine, the original group of scouts was given a desperately needed performance boost with the installation of multiphasic WF-6 engines in 2301.

The attractive new silhouette finally established the class as a worthy member of the *Excelsior* family, paving way for a number of scout, transport and surveyor designs with *Excelsior*-influenced primary hulls and propulsion systems. By 2340, Starfleet had finally been built anew to the *Excelsior* standard – and it was again time for a new generation of starships. The last song of the *Mockingbird* had already been sung, though. The succeeding *Moscow* design was a heavier unit with a better claim to the full starship title, and struggled to find a working niche in an environment saturated with high performance small craft; the next design down the line, the *Paladin*, had to settle for special operations scraps. In many respects, the *Mockingbird* was the last of the light scoutships, closing the book on adventures begun with the *Archer* class.

Peregrine

Light courier / fightercraft
2330-2367

Completed:	213 total: 50 light couriers 160 light couriers/interceptors 3 special operations craft
Length:	23.2 m
Beam:	25.4 m
Height:	5.2 m (landing gear retracted) 6.2 m (landing gear extended)
Mass:	1,240 tons (courier) 1,290 tons (courier/interceptor)
Crew:	1-2
Passengers:	2-4
Max. speed:	W 5.0
Endurance:	4 months
Weapons:	Wingtip phaser V emitters 1 fwd minitorpedo tube w/20 photorps (interceptor only)
Shields:	1-layer conformal forcefield Navigational deflector on dorsal bow
Transporters:	1 emergency evacuation (2-pad); Mk VI (some vessels)
SOURCES:	D TNG, DS9, VOY N DS9 (*Oku'day* own) (H own)



The *Ju'day* transatmospheric, multiphasic transport introduced by the Bolian manufacturer Ardep in the 2320s immediately proved so versatile that civilian and military sales across the Federation were assured. However, the clientele soon specified a need for a smaller vessel, one capable of small-scale VIP and priority freight runs yet still at speeds comparable to those of the larger transatmospheric transports. Ardep was candid about not being able to offer performance beyond that of the existing Starfleet light couriers. However, multiphasic improvements did allow this performance to be packaged in a much more compact form. Instead of riding on a warp sled fifty meters long, the courier could be a self-contained unit capable of atmospheric operations, very similar to the *Ju'day* save for scale.

The *Oku'day* light yacht, fielded in 2326, was barely the size of a scoutcraft. At a bit more than 23 meters of length and some 25 meters of beam, she consisted of little beyond two 280 ton Chasin-Ardep warp engines with six broad and flat coils each, two Merak Model 23 impulse engines, a pair of wings and a narrow pressure compartment eight meters long and two meters tall and wide. At the bow of the pressure hull was the control cabin, with five small but strategically placed flat windows for a reasonably good all-around view, and side-by-side seating for the flight crew of two. A single pilot could control the craft if needed; the maximum number of people carried was two crew plus four passengers, the latter accommodated in an amidships compartment that held foldaway bunks plus a hygiene center. More normally, the compartment was used to store cargo, while the crew berthed in the control cabin. Between the control cabin and the passenger/cargo area were twin pressure doors that sealed off a utility area with storage lockers, support systems access and a dorsal airlock hatch. This hatch was but a secondary accessway, the main passage being down a planetfall ramp stowed below the passenger/cargo compartment.

Primary power came from an antimatter reactor aft of the passenger cabin, inside the pressure hull, with primary plasma leads branching off to port and starboard, and expanders for the secondary loop angled aft. Impulse accelerators of the familiar triangular Merak design were flanked by IMRF repeaters, providing the *Oku'day* with superb impulse and warp agility. Auxiliary power systems consisted of batteries arranged in the bow compartments surrounding the control cabin. These were accompanied by a selection of navigational sensors and communications gear, plus a deflector on dorsal bow, but there was also room and power for user-selectable extras. Naturally, at the top of the wish list of most clients were weapons.

Starfleet quickly saw the advantages of the *Oku'day* over its closest comparable designs, the *Tai* and *Sait* modular couriers. Despite the extremely cramped interiors, the *Oku'days* could also perform some general liaison duties, enjoying a marked top speed advantage over all Starfleet runabout designs. Furthermore, the provision for weapons could serve Starfleet interests in local defense and law enforcement duties. In 2330, fifty of the light starcraft were purchased, under the *Peregrine* class light courier designation. In addition to medium range navigational sensors, the bow compartment held secure commlinks, self-protection jammers and a combat-strength Halle-Mansfeld BFF shield generator. Of the four wing mounts available, the tip stations were fitted with Type V phaser emitters, while the wing root ones were left empty.

A colonial starport at Salva II hosts three Oku'day *variants, protected from the harsh winds by forcefield bubbles. To the left is a civilian craft of austere equipment standard, unmarked like many vessels in the outer colonization zone tend to be. The middle craft carries wingtip sensors and grapple guns, and appears to be a prospector vessel serving Salvan mining enterprises. Some distance away sits a Starfleet* Peregrine *courier, distinguishable by its added impulse engines even through the static-speckled tarmac shield.*

Positive operational experiences throughout the medium and outer colonization zones led to a further purchase of 163 units in late 2351. About half of the second-batch vessels were later configured specifically for a trefoil courier/defense/attack mission, complete with pursuit sensors and a lightweight minitorpedo launcher at the bow. Cabins now featured modern instrumentation, and touchball controls were replaced by flat-panel interfaces and advanced combat autopilots. All second-batch craft also received additional Merak Model 21 impulse units outboard of the primary engines – an option that only gained in commercial popularity after Starfleet had first ordered it. In fact, Starfleet's adoption of the design promoted civilian sales in general, and Ardep soon became the primary provider of liaison vehicles and light transports in the coreward and spinward colony zones.

Starfleet officially abandoned the *Peregrine* class in 2367, although in practice the courier mission had been dropped half a decade earlier, along with direct Starfleet involvement in colonial affairs. The craft in Starfleet service between 2362 and 2367 operated almost solely in the defensive interceptor or attack-trainer role. Tactically highly useful, yet technologically rather outdated, they prompted the development of a dedicated modern fightercraft. The *Kestrel* attack fighters, described in detail later, had no secondary role as light couriers. Instead, reconnaissance or police operations were part of the alternate *Kestrel* mission profile; some of the *Peregrines* ended up serving in such roles for their final years as well.

A comparison between original 2330s Oku'day *controls and a 2350s* Peregrine *cabin showcases the major advances in Federation interface technology. A completely hands-off cockpit is next on the wish list of small craft manufacturers and purchasers, although holographic controls are likely to be an intermediate step. Interestingly, the* Oku'days *have a full set of manual electromechanical backup controls for atmospheric operations. Most starcraft would be completely uncontrollable in atmospheric entry without a flight computer, and manual backups are thus extremely rarely provided. The* Oku'day *is passively stable in most flight regimes, and the backup controls access the RCS thrusters and gravitics almost directly, via a simple control logic circuit only.*

While Starfleet generally disposed of its old *Peregrines* by scrapping them, several were merely disarmed before resale. A handful of these, as well as some originally civilian units, later found their way to the hands of Maquis insurgents, and proved quite deadly in low-intensity warfare in the Cardassian Demilitarized Zone. Armed with two to four wing-mounted disruptors and sometimes also a bow torpedo launcher, formations of these craft could deliver heavy punishment on poorly defended orbital and surface targets, and easily escape to warp.

Strict limitations have now been placed on sales of *Oku'days* (which no longer remain in commercial production) and comparable craft. However, there is no stopping the proliferation of compact high speed vessels of this kind, capable of outrunning many kinds of pursuit and operating from austere forward bases and hideouts. For now, all Starfleet can do is rethink its threat scenarios. No countermeasure has been found so far against hit-and-disperse raids by such craft, except for pursuit by multiple similarly nimble warp vessels. This conclusion will probably ensure continuing Starfleet interest in craft of this category.

Kilauea

Runabout
2339-

Completed:	110
Length:	19.0 m

Beam:	9.4 m
Height:	5.0 m
Mass:	930 tons
Crew:	2
Passengers:	12
Cruise speed:	W 4
Max. speed:	W 4.8
Endurance:	9 weeks
Weapons:	Normally none Fuselage hardpoints provided for 2 phaser IV emitters
Shields:	1-layer conformal forcefield Navigational deflector under bow
Transporters:	1 GP (2-pad); Mk VI
SOURCES:	D TNG "Skin of Evil" (N own) (H own)

The time of the LN family of warp engines was far from being over when the WF engines of *Excelsior* descent took over the high performance starship propulsion market. The LN engines would continue to be utilized well into the 2330s, seeing use aboard *Renaissance* and *Mediterranean* vessels and their even later outgrowths. Yet the WF series did steadily increase its market share, and by the 2330s already included lightweight models suited for liaison craft use.

Positive experiences on the *Juneau* long range runabouts encouraged Starfleet to order a modern WF-engined successor, now both for starbase and starship liaison duties. The compact 12 m, 420 ton WF-9 offered sufficient performance for an equally minimal spaceframe. At just 19 meters of total length and, more importantly, less than 10 meters of beam, the *Kilauea* runabout could fit within the shuttlebays of explorers with ease. Yet significant capabilities, quite on par with the *Juneau* ones, could be built into the small craft. A separate cabin for two crew and forward and aft passenger compartments for up to twelve people provided good comfort and a high level of protection against threats and environment. Communications systems were virtually starship level, and navigation sensors were comparable to courier ones. Instrument layout in the *Kilauea* control cabin was later commonalized with Type 7 and 9 shuttles for maximum practicability in explorer auxiliary operations.

Some aspects of the craft were still short of ideal. A centrally mounted powerplant hindered access between the forward habitat area and the aft lounge, and made it virtually impossible to include a large cargo hold. Ingress was via two side doors on the forward habitat compartment, while the aft area only had a panoramic aft window. Plans to create a cargo version complete with a rear hold similar to that of the *Juneaus* or the Type 9 shuttles were repeatedly shelved. Yet the types of payload the runabout did carry enjoyed unprecedented access to all types of destinations. A two-pad Mk VI transporter was provided, and the craft had excellent atmospheric handling and landing qualities despite the low mounting of the rather massive WF-9 units. In emergencies, nacelle jettison would be a simple operation, and the craft had flight control protocols to keep her stable in nacelleless mode as well.

The unfortunate aftermath of a ballistic impact. Contact velocity in this 2364 incident at Vagra II was close to six kilometers per second, sending the spaceframe halfway into igneous rock despite full inertial masking at impact moment. Both crew aboard survived with minor injury only. Cause of the accident was believed to be remote tampering by alien intellect, although forensic evidence was evaporated in subsequent orbital bombardment of said hostile lifeform.

The craft carried little or no armament, and their onboard computing systems were quite insufficient for scientific study. Nor were there provisions for extra or swappable sensors. A *Kilauea* thus wasn't a multipurpose vehicle, although few earlier liaison craft had enjoyed the flexibility or the nearly warp 5 performance. On certain types of assignments, *Ambassador*, *Niagara*, *Nebula* and *Galaxy* vessels carried the craft as standard auxiliaries in the 2350s and early 2360s, making them independent of courier services within ten lightyears of starbases or outposts.

Yet the *Kilaueas* weren't a perfect solution to starship auxiliary duty. In many ways, their performance was excessive and their bulk in comparison with warp 2 shuttles unjustified. The luxury courier role was often better handled by dedicated interstellar courier ships, even if these could not be stored or handled shipboard. More mundane interstellar runs could be performed by heavy shuttles, lately of Type 9 with GN series warp engines. Since the most recent variants of Type 9 are capable of sustained warp 4, they pose serious competition to the *Kilaueas* in the starship auxiliary role. Subsequently, most *Kilaueas* have been reassigned to starbase liaison duty, and only a handful continue to serve aboard frontline explorers.

The cavernous main shuttlebay of USS Yamato *holds two* Kilaueas *side by side, with Type 9 cargo shuttles to the left and a row of Type 7 medium shuttles on the background. Commonalities in design are obvious, even though each auxiliary sports engines of different type.*

Aerie

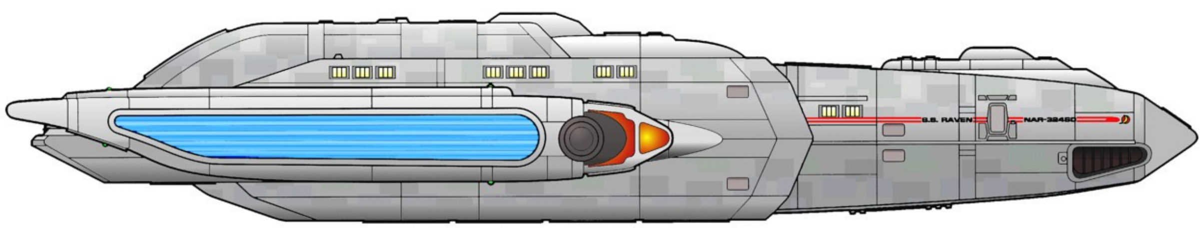
Prospector
2348-

Completed:	120
Length:	90.3 m
Beam:	58.9 m
Height:	14.6 m
Mass:	177,000 tons
Crew:	3-12
Cruise speed:	W 5
Max. speed:	W 6.2
Endurance:	5 years
Weapons:	None
Shields:	1-layer globular forcefield Navigational deflectors on port/stbd bows
Laboratories:	2 mineralogy/geology
Transporters:	1 GP (3-pad); Mk VI

Craft of historical interest:

SS Raven (NAR-32450)

SOURCES:	D VOY (N Decipher, Armada II computer game) (H Decipher, Armada II computer game, own)



Two factors conspired in the late 23rd century to limit Starfleet's role in the field of prospecting. In the 2280s, peaking of the Klingon crisis made it withdraw its prospector units from disputed territories. Soon thereafter, breakthroughs in dilithium recrystallizing all but collapsed the demand for the natural commodity, at least in starship propulsion applications.

Withdrawal of Starfleet resources from the prospecting business meant hard times indeed to private prospectors and small to midsize corporations. To be sure, there remained a host of precious minerals, pharmaceuticals and other chemicals to be hunted. Few of these were as lucrative or as easily locatable as dilithium, though. An entire industry came close to collapse in the first decades of the 24th century. Unlike was the case in Earth's final oil crisis in the 2020s, however, the society could make do without the industry. In fact, the synthesis techniques that had nearly killed prospecting would soon bring general prosperity that once again made practical the profession of the private resource hunter.

The successful prospector ship of the 2330s was quite different from her 2250s-60s sisters, despite still being a high endurance, medium speed, low crew requirement vessel capable of planetary landings. Emphasis now was on a broad sensor suite capable of detecting a diverse selection of non-emitting resources, and on versatile onboard laboratories suited for *in situ* analysis of the most complex of findings. The required higher expertise (along with the new economic reality) sculpted a new kind of prospector as well, often a highly educated, highly driven individual seeking recognition more than financial gain.

Individualism clashed with one aspect of the prospecting field, however. With the core space already thoroughly mapped, resource hunters would have to penetrate to relatively deep space, where single-person prospecting craft had low odds of success. A hefty degree of government sponsorship was required to mount a successful expedition now, and the government expected a return for its investment. In 2340, a set of minimum requirements for prospecting vessels was established; concurrently, shipbuilders across the Federation were contacted for offers.

Star Fleet Division presented a package that for once met the commercial expectations – if only by virtue of the government dictating the said expectations. In essence, the bow structures of a *Deneva* light transport were merged to a survey payload housed within a new four-deck midhull section. Low-power Halland B navigational deflectors on lower bows replaced the original centerline Edan unit. A wholly new life support system was also installed on the lowermost deck, along with assorted stowage and utilities, and a new forward landing leg and tractor beam emitter in an underfloor compartment. The starboard docking port was replaced by an (exceptionally awkwardly placed) surface access hatch. The vessels retained a three-pad transporter system on the former top deck, but the flight control facilities were moved one deck up into an all-new superstructure with three broad space windows forward and sensors atop and abaft. In place of the *Deneva* bridge area were berthing spaces for part of the maximum crew of twelve.

The midhull structures were far more distinct from their transport forebears. Propulsion was by two FN-14 engines, welded to a single slablike, perfectly horizontal pylon box that extended through the equally boxy hull. The structure could easily take the stresses of planetary landings, and also mounted the impulse and gas-heating propulsion systems and gravitics needed in such operations. A sturdy, retractable landing skid was also fitted on each pylon half, with a third beneath the forward secondary hull. The somewhat stubby bypass-flow warp core was fitted vertically in the midpoint of the box, accompanied by three armored fuel tanks both forward and aft.

The warp core and its power utilities extended a deck and a half above the pylon box, and a deck below. The upper decks held various support systems, the lower deck in turn supplies and workshops. Below the lower deck pressure floor were spaces for e.g. tractor beam machinery and antimatter jettison systems. A further pressure bulkhead separated the engineering area from an amidships bay for the main flight computer – a single large and fast E-Z optical unit to optimally support the research activities. The lower deck aft of the core was dedicated to the prospecting function, with smallish equipment holds and a cluster of assay laboratories. Above these, the single rear shuttlebay was given a low ceiling yet a wide accordion-type space door, optimal for supporting light shuttlecraft operations and carrying a broad variety of survey gear. This allowed the ship to perform prospecting operations from orbit via her auxiliary craft, while also enabling her to efficiently load and offload samples and equipment while on surface. For the latter, an integrated lift and tractor system was installed on the deck below the shuttle landing area.

Another starport comparison shot allows for the identification of an Aerie *surveyor in faded Starfleet markings and two* Aberdeen *colonization vessels in the green livery of Alithonas SHG. The latter lack some of the sensor emplacements of the* Aerie*, and also feature additional egress doors on the lowermost deck and portholes around the uppermost one. Not visible to the exterior is the removal of the bulky main computer core from the colonizers, the main step in providing increased internal volume for the up to a hundred passengers.*

The resulting vessel wasn't an all-around commercial success story. The *Aerie* class originally operated under Exploration Command auspices but was soon transferred to the Federation Science Council and re-registered with NAR codes. Sixty systems were built for FSC as well, bringing the total number of operational ships to 140. The rest of the production went to the private sector with Armada BLK warp engines, under the overall class name *Rio Tinto*. In addition, some 120 vessels were manufactured to this propulsive standard but with much simplified interiors and pressed to duty as *Aberdeen* light colonizers, a fairly popular competitor to the older *Osprey* and the later *Erewhon*.

Aerie operations in the 2350s and 2360s closed many gaps in *Oberth* coverage, helped by the higher speed of the design. The *Aerie* sensor payload was significantly lighter, of course, and the type was mainly favored in missions calling for extended surface operations. Apart from deep space mineraological or biological prospecting, the surveyors engaged in anthropological and general ethological research, archaeology and migration studies. On the latter fields, their sorties greatly expanded Federation knowledge of the local star empires of yore, enabling later missions to finally track down the original Romulan migration patterns, the near-mythical Iconian homeworld, the elusive Duthulhiv, and scores of other enigmas of the past.

Five of the FSC-controlled ships fell casualty to extended missions of this nature: the five-year endurance and operational independence of the vessels enabled them to get rather thoroughly lost in the vastness of barely charted or uncharted space. In theory, mission sponsors set strict limits to the risks to be taken. In practice, flight plans were seldom followed for more than a few months, as there was no stopping a 'mystery hunter' who had sensed the stale scent of his or her ancient prey.

The private prospectors pursued no safer a lifestyle, yet only two have been lost to date, both to landing mishaps in highly demanding conditions. The vessels have belatedly gained the grudging admiration of the prospector community, being more rugged and forgiving than their similarly sized purely commercial competitors. No further production is expected, but the remaining vessels have at least six decades of estimated service life left – a rather significant improvement over preceding designs.

Kestrel

Fightercraft
2362-

Completed:	2,242+
Length:	17.1 m
Beam:	16.4 m (outer wings extended) 12.9 m (outer wings stowed)
Height:	5.6 m (outer wings extended) 3.2 m (outer wings stowed)

Mass:	1,620 tons (w/o weapon pods) 1,740 tons (5 torpedoes, 2 Type VI phaser pods)
Crew:	2
Max. speed:	W 5.3
Endurance:	5 weeks
Weapons:	1 phaser V emitter on ventral bow 1 phaser V emitter on dorsal amidships 2 phaser VIP emitters on warp cowlings p/s (optional) Bow tube for up to 16 minitorpedoes (attack type) Two ventral bays for up to 4 torpedoes (antiship type) Fuselage hardpoints provided for 3 weapons pods
Shields:	1-layer conformal forcefield
Transporters:	1 emergency evacuation (padless); Mk VI
SOURCES:	D DS9 (N own) (H own)

While the border wars of the 2350s resulted in few if any changes in Starfleet doctrines and major equipment, some refinements were made for example in the field of small craft operations. The withdrawing of corvettes from colonial protection duty had left frontier worlds ill prepared to cope with even light raiding forces. Such raids were a distressingly common part of Cardassian strategy. And whereas even a large number of corvettes couldn't do much about a heavy assault by several destroyers or cruisers, the Cardassians often also sent strike teams on light vessels to harass low-population UFP colonies, counting on the impossibility of rapid response by the thinly spread Starfleet starship forces.

Furthermore, field commanders of Marine units were concerned that the insufficient starship resources would deprive surface forces of orbital support. Some sort of force multiplication on low level was needed, of a type that could be effected more swiftly than the major shipbuilding programs.

One answer to the quandary was obvious, yet almost all parties initially refused to see it: armed small craft could be permanently and inexpensively be deployed to deter light raids, and to provide surface teams with fire support. For the colonists, the permanent deployment aspect was intolerable. For the Marines, inexpensive atmospheric craft meant fatal exposure to enemy fire, as well as being tied down to the speed of the craft instead of being free to use transporters for rapid tactical movement. And for Starfleet in general, the word 'fightercraft' was synonymous with atrocities of past wars, with cannon fodder tactics and fighting from a position of weakness.

Yet several things had changed since the last massed use of fightercraft. By the 2360s, a light combat spacecraft could be given potent shielding, precision-fire phaser armament and sufficient atmospheric, sublight and even warp speed for survival. For colonial operations, the craft could be made more appealing by building in modular features and secondary mission options. And a fightercraft of the 24th century could be made virtually self-sufficient, requiring only a rudimentary frontline refueling base. As light Cardassian offensives continued past the end of the 2350s, Starfleet was given the go-ahead to convert its *Peregrine* couriers to offensive-defensive fightercraft, and to procure a small number of modern successors.

Following the *Peregrine* courier/fighter guidelines, the *Kestrel* class of fast attack craft featured Fkaadja's newest-standard F-500 broad, flat warp coils, powerful Tumanskii impulse engines, full atmospheric flight and landing capacity boosted by aerodynamic shapes and sub-impulse thrusters, and a small cockpit equipped with advanced crew support systems, including a compact replicator. The overall configuration was based on two booms housing warp coils and mounting impulse engines at the rear; a central section housing the crew on a longitudal and the quadruple-chambered warp powerplant on a transverse superstructure; and two canted trapezoid wings similar to the *Peregrine* ones, containing cooling machinery, shield generators and fuel and joining the other parts together.

The central section bow featured a deflector and navigational sensor assembly on the upper surface. Two possible uses could be provided for the spaces underneath: in the ground attack variant, a minitorpedo launcher with magazines for 16 shots dominated the volume, and had a prominent bow muzzle, while in the antiship version the volume was filled with fire control equipment.

Aft of this, the cockpit had the crew of two sitting side by side, with adequate visibility provided through the forward part of the reinforced canopy. There was room for two more personnel or assorted cargo behind the pilots in the basic model, but this room would typically be filled in by augmentation packages in improved models or by end users. Typical packages included additional processing systems for fire control, an improved shield generator, and life support endurance boosters. This complicated service access to machinery already installed behind the cockpit; ingress and egress as such was not hindered, as this was via gullwing hatches aft of the transparent canopy part.

The quadruple-chambered warp powerplant straddled the central hull and booms, and the plasma feeds went through the wings to the inboard warp coil assemblies. Secondary EPS circuits extended to the inner wings to power the landing gravitics and the optional countermeasures or sensors on the outer wing sections. These were power-hinged upward for landing and compact stowage; they would be extended for maneuvering both in and out of atmospheres.

These extremely fast, remarkably compact ships could reach warp 5.3 or maintain warp 4 for several days. The warp cowlings served a double function: inboard of the coils, there were ventral doors providing access to weapons bays inside the cowlings. Full-sized photon torpedoes could be carried there in the antiship variant of the craft, or ground ordnance could be loaded into the attack variant which lacked the fire control systems for managing the larger torpedoes. A third weapons hardpoint was available at ventral centerline; although this was intended mainly for a reconnaissance sensor package, anything from particle accelerators to heavy phasers could be bolted on with a little ingenuity. Also, there were Type VI phaser emitters on the forward corners of the cowlings, typically firing at pulsed mode for devastating direct attack capacity.

A formation of Kestrels *swoops towards a Dominion cruiser, supported by two* Miranda *light cruisers. In impulse combat, attack craft were an indispensable companion to elderly starship types throughout the Dominion conflict, providing protection through counterstrikes and screening maneuvers that often broke the targeting locks of Jem'Hadar capital ships. The old warhorses in turn carried the fighters to battle, and opened way for their attacks with standoff torpedo volleys.*

The *Kestrels* saw service as starbase and colonial patrol/reconnaissance craft and civilian police vessels. In times of war, the ships were intended to be used as insystem and planetary attack craft, using their steerable nose and back phaser V emitters for self-defense, their forward phaser VI mounts for hitting soft targets, and the contents of their weapons bays for inflicting damage on hardened planetary or spaceborne targets; advanced flight training was also practiced on these craft in preparation for the mission. As many as seventy were provided for civilian-commercial users, armed with the self-defense phaser V turrets only. But in 2370, some ships of this class found their way to the group of disgruntled colonists calling themselves the Maquis. Organized against alleged Cardassian hostility towards colonies near the Cardassian border zone established in 2369, the Maquis gathered an arsenal of light and medium ships equipped with anything they had access to. Phasers, missiles, mini- and microtorpedoes and even Type VIII cannon were available through former Bajoran resistance fighters, Ferengi traders, Breen privateers – and Starfleet officers. Several of these dissatisfied officers joined the movement, providing tactical training, organizing weapons transactions and helping arm the small craft to provide guerrilla warfare weaponry for the Maquis.

Heavy Klingon, Romulan or Breen disruptors could also be fitted to the hardpoints, the engines tinkered with, the shields remodulated, and the Maquis eagerly tried their mettle on all this. Accompanied with Bajoran light craft, the interceptors mounted several attacks on Cardassian warships during 2370-72. An attempt was also made to use modified *Kestrels* to attack a Cardassian planetary outpost suspected of being a supply post for an upcoming Cardassian attack, but this was successfully prevented by swift Starfleet action. Less successful were the Starfleet attempts to infiltrate the organization, where more than twenty agents were exposed or 'went native'. Direct military confrontation was attempted by Starfleet when political situation changed with Cardassia's downfall, leading only to the disabling of two Starfleet starships and minimal damage to the Maquis organization.

The Maquis continued military operations out of bases in the Badlands anomaly region until hunted down by the allied Cardassian and Dominion forces in 2373. While the movement has officially now been abandoned, the stubbornly independence-minded survivors still have stern backing from the nearby colonies, among coreworld idealists – and, it is suspected, within Starfleet.

The *Kestrels* have also fought to serve the Federation, taking part for example in the massive fleet action to retake station DS9 from Dominion and Cardassian forces in early 2374. In this role, their main weaponry consisted of antiship torpedoes, and both the phaser V and VI emitters became superfluous. They still saw use in planetary assault, however. A typical role for the craft was impulse escort of planetary assault formations, followed by close support of the assault forces themselves, although some fleet outrider duties at medium warp speeds could also be handled by the versatile fighters.

Starfleet had originally procured just 200 of the craft, but readily completed two thousand more in 2373-75 as the Dominion threat escalated. The high-volume production could barely cope with attrition, though, as the *Kestrels* weren't up to the task of confronting Jem'Hadar attack ships, even in 3:1 engagements.

Currently, Starfleet is planning on bringing *Kestrel* strength up to 600 craft. The basic design warrants no major changes, at least not in the planetary assault mission. For interception of small starships, a much more potent class is clearly needed, and mere glorified starship auxiliaries cannot be used as the basis.

Tempest

Fightercraft
2365-

Completed:	411+
Length:	26.2 m
Beam:	7.5 m 10.1 m (w/ combat module)
Height:	7.4 m (nacelle extended) 5.3 m (nacelle retracted) 8.4 m (w/ module, nacelle extended) 6.3 m (w/ module, nacelle retracted)
Mass:	1,346 tons 1,862 tons (w/ module)
Crew:	4
Max. speed:	W 5.7 W 5.0 (w/ module)
Endurance:	10 weeks
Weapons:	4 phaser VIP emitters on bow 4 fwd phaser VIP emitters on weapon module pylons 4 aft phaser VIP emitters on weapon module pylons 1 fwd minitorpedo tube w/200 torpedoes on weapon module centerline
Shields:	2-layer conformal/globular forcefield
Transporters:	1 emergency evacuation (2-pad or padless); Mk VII
SOURCES:	(D Jim Martin *Defiant* pre-design) (N own) (H own)

The grudging acceptance of the *Kestrel* class for limited attack roles did not mean that experts in all Starfleet arms now believed in the level of protection offered by modern technology. On the matter of offensive fightercraft use against spatial adversaries, even the staunchest proponents admitted that heavier shielding was an absolute necessity. Yet advances in offensive technologies, especially pulse phaser and small-caliber torpedo armament, made fightercraft applications extremely attractive. In 2362, simultaneously with the *Kestrel* program, Starfleet initiated the design of a fightercraft capable of trading blows with starships – fully knowing that the challenge might be too great to ever be successfully met.

The *Tempest* strike fighter was a valiant attempt. Using medieval knights as their inspiration, experts at Martin designed a ‘rider/mount’ combination mating a powerful shield and weapon platform onto a fast, sleek warp and impulse starcraft. The former would ride to battle only for missions of extreme risk; the latter would have multiple roles even without the combat module, ranging from perimeter patrol to reconnaissance.

The core of the *Tempest* measured some 26 meters in length but had a hull only 7.5 meters wide. With the single ventral F-400 nacelle retracted, the tops of the *Kestrel*-like Tumanskii impulse/sub-impulse engine assemblies nicely cleared most shuttlebay ceilings at 5.3 meters. The small cross-section was achieved by tucking the two sublight propulsion units and the nacelle in around the narrow ‘panhandle’ stern, leaving just the bow to flare out into an aerodynamically smooth pressurized shape. The forward section housed the crew in a centrally mounted cabin, the four Type VI pulse phaser emitters cowled into the bow flanks, and the shield generator directly behind the cabin. Amidships hid the main reactor, strongly armored and ready to feed primary stage plasma to the shield generator forward, to the sublight propulsion units above and aft, and to the warp nacelle below.

Onto a further interface directly atop the reactor section would clip the combat module, an arch straddling the impulse units and curving down to pulse phaser pods mounting no less than eight of the Type VI units. On module centerline lay a minitorpedo launcher, beefing up its up to 200 projectiles of 300 mm diameter and 700 mm length with antimatter from the reactor section, and spitting them out at a devastating rate of fire. In addition, each wing of the arch housed a Sylvanesti shield generator for erecting an additional globular forcefield around the craft. A communications and datalink array atop the module helped coordinate operations with fellow *Tempests*, lesser craft, starships or external aids of other types.

Motie Mauler*, a fully armed* Tempest *from* USS Pournelle *(NCC-73602), rides shotgun to light transport* Dinai *(NDV-4623), the nacelle already retracted up and aft in preparation for atmospheric entry. Unlike the dedicated* Kestrel *attack craft,* Tempest *omits aerodynamic surfaces and outriggered gravitics, and is thus a trickier beast to handle "down in the soup".*

The 'horse' part of *Tempest* performed well without the burden of the combat module 'rider', too. Top speeds of warp 5.7 were expected to be commonly reached, even if single-nacelle maneuverability remained meager at best. The craft possessed sufficient sublight muscle to stay apace with *Kestrels*, although again there were agility issues due to the long hull and the aft-mounted nozzles. Two of the four crew, sitting forward behind narrow but well-placed portholes, were dedicated to navigation and targeting. One served as tactical analyst and one as flight engineer, seated farther back. Interior access to the lateral spaces and aft into the shielding and power systems was possible via protected access tubes; stores could be stowed there for extended missions, up to ten weeks in length.

These formidable craft were introduced slowly and hesitantly, not because of technical problems but because there was significant doctrinal resistance to their mode of operations. Striking at starships was still considered a desperation move, and such desperation was unthinkable in the afterglow of the past victories. Practical considerations first suggested operating *Tempests* from the large hangars of explorers and strike carriers only, but this made very little sense in terms of the mission profiles of these starships. A cruiser or a frigate would benefit far more from the presence of the fighters, even if this meant disembarking most of her shuttle complement. Interestingly, the first *Tempest* deployments took place aboard the lithe *Bradbury* corvettes, whose hangars could just barely accommodate two of the craft side by side. The *Tempests* would have to be eased in stern first; the combat modules would slide onto the craft from behind on ceiling rails and clamp on, but not without the hands-on help of at least two deck crew. In practice, the flight engineers and pilots of the craft would take to that task themselves.

The Dominion War saw many a *Kestrel* launched on hopeless missions, and many a field commander calling for better protected and armed replacements. Some 400 *Tempests* were indeed produced during the conflict, but most of these did not reach the battlefields in time. Outclassed in agility by their primary prey, Jem'Hadar attack ships, they turned out to be less than ideal space combat weapons after all, and were mainly used in planetary assault support. Their pulse phasers were devastating weapons in such warfare, delivering more than thrice the firepower of a fully armed *Kestrel* and easily shredding the shields of surface troops and vehicles. They also proved themselves as recovery craft, whisking to safety downed pilots or surrounded ground units; their dual shields and emergency transporters could be operated in concert by experienced crew, and there was surprising capacity for accommodating refugees onboard.

In planetary assault missions, many *Tempests* were flown without their 'riders'. From 2375 on, new shield generators were installed to compensate for the preferred weapon of the Jem'Hadar, the frighteningly penetrating phased polaron beam. These more or less negated the need for the additional globular shielding, which in any case was not easily modifiable to withstand polaron beams. Combat experiences overall were so positive that current efforts concentrate on adding to the firepower of module-less *Tempests*. Succeeding designs optimized for the assault role, such as the *Valkyrie*, or for escort and interception, such as the *Scarab*, are also emerging. In good and bad, the manned fightercraft or light gunboat seems to be back in Starfleet arsenal for the foreseeable future.

Danube

Runabout
2366-

Completed:	209+
Length:	23.1 m
Beam:	13.7 m
Height:	5.4 m
Mass:	1,956 tons (original, standard habitat module) 1,982 tons (upgraded, full torpedo module load)
Crew:	2 (original) 3 (upgraded, tactical missions)
Passengers:	18 (standard habitat module) up to 60 (troop transport/cargo module)
Cruise speed:	W 4 (original) W 5 (upgraded)
Max. speed:	W 4.7 (original) W 5.4 (upgraded)
Endurance:	2 months
Weapons:	2 phaser VI emitters flanking the cockpit 2 phaser VI emitters on nacelle ends 2 phaser V emitters on aft cabin Hull modules for up to 2x4 torpedoes or 3x8 mines available Ventral launcher for 20 microtorpedoes available Dorsal fwd module for phaser VI available
Shields:	1-layer conformal forcefield
Transporters:	1 GP (2-pad); Mk VII
SOURCES:	D DS9 (N Omnipedia) (H Chronology)

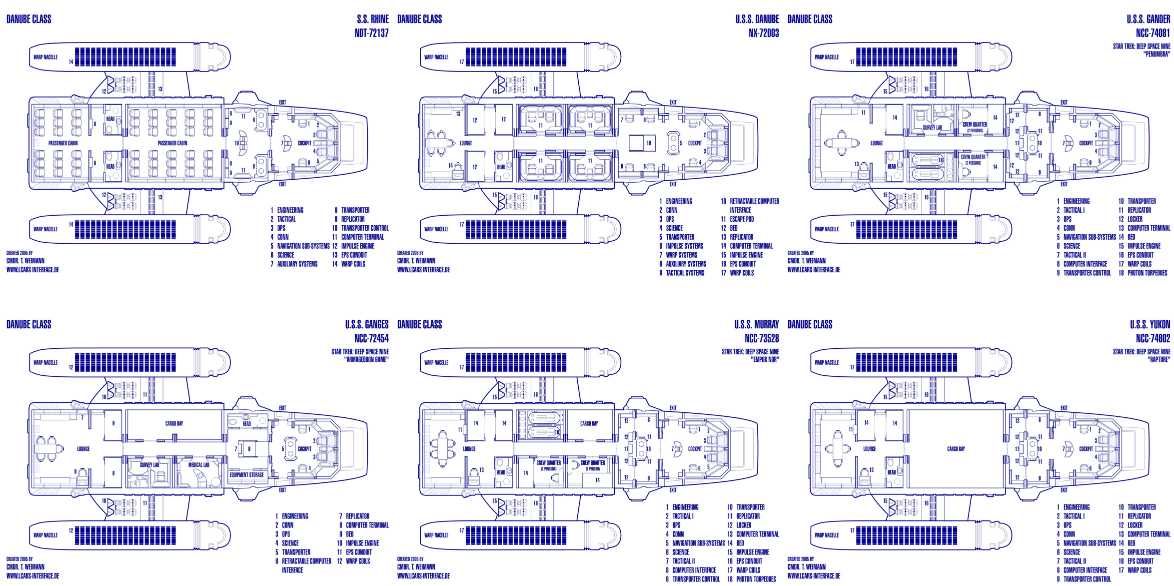
The generation of starships based on warp technology first introduced in the *New Orleans* class was no different from its predecessors in generating spinoff technologies for use in small craft and shuttles. The GN coil system was gradually refined into an efficient shuttlecraft warp drive, and utilized in the Type 8 and 12 light, Type 7 medium and late-model Type 9 heavy shuttles. However, a natural intermediate step in the miniaturization process was the creation of an engine for use in runabouts. Such an application posed few challenges, as runabouts did not require the cruise performance or top speed of couriers.

On the other hand, Starfleet in the fifties did not really require runabouts. There was virtually no growth of the liaison craft fleet during the border war years. Withdrawal of colonial liaison forces, combined with the increased presence of starships in the outer colonization zone, left little for warp four craft to do. Leeding, the primary contractor for GN engines, tried in vain to push for a warp 4.7 sled design that would carry a Shintoi lifting body hull with seating for up to 30 passengers. The military had no use for such a space bus, the inter-colonial traffic had largely ceased, and starship liaison needs beyond shuttle operations were perfectly met by the *Kilauea* class.

The situation changed rather drastically with the onset of peace. The former battlefield between the 40 ly colonization zone and Cardassia Prime was strewn with politically ambivalent systems in a state of disarray, and Starfleet had to tread carefully there. No major exploration programs involving fleets of starships could be initiated in the region. Yet the sectors around Kalandra and Bajor were rife with targets of scientific interest, targets whose proper surveying would also help develop the economies of the local systems. Starfleet chose not only to deploy *Oberth* surveyors farther out than usual, but also to order the development of new exploration hardware, including a wholly new exploration-oriented runabout design. Leeding was ready with the GN-208, and dropped Shintoi from the partnership at a moment's notice.

The first *Danube* class exploration support runabout floated off the production lines in 2365. The craft met Fleet Requirement 2364-12-B448X for a versatile outpost auxiliary, yet was for all practical purposes an off-the-shelf item dating back to a detailed independent study by the ASDB in 2363. Leeding's input, a pair of GN-208 mod 2 warp coil assemblies, was mounted on curved supports; the carefully cowled propulsive compartments beneath the support trusses also held ramscoops, impulse engines and their fuel tanks. The warp powerplant was carried longitudally atop the craft, so that the engine assembly as a whole formed an arch-like frame that embraced various modular crew and cargo compartments. Although modeled on the original warp sled concept, the configuration was not separable. Rather, the hull itself featured detachable sections of differing functions.

The control compartment at the bow was an outgrowth of the original Shintoi design work, with deeply inset windows and overhead systems compartments. Only two flight crew were required, although the flight deck offered seating for two mission specialists. Directly adjoining the flight deck was a two-person transporter, as well as two doorways with forcefield airlocks to give access out of the craft. Aft of the flight deck was a smaller general-purpose compartment often utilized for storage, but with dataways and power connections for mounting varied hardware. Most science missions would require extensive instrumentation, and their controls and computing systems would be housed here; several of the more involved configurations in fact called for full-height racks mounted on floor rails, nearly filling the space.



This picture only shows half a dozen of the scores of possible interior configurations of Danube *runabouts.*

The aft bulkhead of the room was also the aft end of the forward hull module, which could be separated in an extreme emergency (indeed, it shared many components with prominent lifeboat designs of the day). The door in the middle of the bulkhead could be fitted with a corridor extending to the rear of the vessel. Here, a berthing compartment provided bunks for four, plus a replicator, a computer workstation and a dining table. As the runabout was intended to serve as a base for medium-duration detached operations in addition to its basic liaison mission, the extra crew comforts were deemed necessary in nearly all interior configurations.

For various missions, the midsection of the craft could be fitted with different modules, turning her into a veritable Vulcan field tricorder. These containers could attach around the central corridor, forming an array of U cross section; side doors on the corridor would give access to modular cargo holds, passenger compartments, laboratories, power generators or extra living quarters. Typically, four small modules were carried, although double-length and double-width packages were also available, the latter also in a configuration that eliminated the need for the central corridor element. For personnel or bulk cargo transfers, a full-size module also existed, filling all the module berths at once.

Among the original module options were a torpedo drop-launcher with magazines for eight full-sized photon torpedoes (four torps per each magazine module, plus a guidance module and a power module); a relay buoy layer (sixteen buoys per module, plus a control/test module); and a minelayer (eight anti-ship mines of varying types per module, plus a control module). From 2373 onwards, drop-launcher modules compatible with quantum torpedoes also became available. Further equipment could be mounted atop the hull: two different sensor/communications packages and a towing/repair kit were available, with associated hull modules for power and control. All craft were also equipped with pop-out microprobe or microtorpedo launchers below the cockpit, requiring no adjoining hull modules and thus adding to the offensive power of the ship without extra cost. There were also various equipment berths available for customizing: some users opted for a dorsal phaser VI emitter atop the crew compartment, while others chose extra sensors on the upper aft hull, or an additional tractor beam emitter below the crew cabin.

Efficient weapons control necessitated the installation of an additional tactical station to the cockpit, mounted on a mid-floor pedestal; some 40% of the later models were provided with this feature, plus increased-capacity computers, to improve their battleworthiness. Passive protection was also increased, consisting of window shutters, additional internal pressure walls, improved firefighting automation and upgraded shields that could withstand the phased-polaron fire of Dominion attack vessels.

The extra armament modules were in fact rarely carried, however, since the craft already mounted two potent phaser VI emitters on small fins flanking the bow compartment, plus two more phaser VIs on nacelle forward ends and two phaser Vs on aft hull. These had an excellent field of fire forward, to the sides, aft and up, but the lower aft sectors were blocked by the engines and the hull. This problem could be overcome by the extreme maneuverability of the ships, however: the impulse engines were fully vectorable, and RCS clusters were mounted on various hull corners.

The *Danube* class craft were initially named after terrestrial rivers, although naming conventions have now branched off to Bolian mountain ranges and the hundreds of Vulcan names for various winds on that planet. This is merely an official suggestion, however; the fact that runabouts (like most support craft) often get named by the commanders of the starbases or other installations that employ them for liaison and SAR duty has created additional diversity. As usual, Starfleet provides a centralized database for coordinating the naming while offering maximal flexibility for the operators.

Especially valuable to small frontier outposts with no large starships available for exploration or defense needs, the craft often transcended their passenger/cargo carrier mission. The design was significantly upgraded in 2372 to incorporate the above passive protective measures as well as improved transporters for the widening range of runabout applications. In addition to the original 130 units, some eighty craft of the modernized standard have been built to date, with no end in sight. There are enough Earth rivers, Bolarus mountain ranges and Vulcan winds to support hundreds more, if need be!

Talon

Scoutcraft
2373-

Completed:	76+
Length:	24.1 m
Beam:	15.9 m
Height:	4.9 m
Mass:	2,510 tons
Crew:	1-2 + 1-2 mission specialists
Cruise speed:	W 5
Max. speed:	W 6.1
Endurance:	6 weeks
Weapons:	2 phaser VI emitters flanking the cockpit 2 phaser VI emitters on engine cowlings Launcher for 6 torpedoes or 18 minitorpedoes available
Shields:	1-layer conformal forcefield Navigational deflector on lower fwd hull
Transporters:	1 GP (1-pad); Mk VII
SOURCES:	D ST:INS (N LUG) (H LUG)

The Fleet Requirement to deploy the *Danube* runabouts did not come as a surprise to ASDB. The bureau had long foreseen a growing need for relatively heavily armed and protected, medium-warp vessels that could give frontier outpost and starbase commanders greater control of the surrounding space. The runabouts met some aspects of that need, and clearly provided an optimal spectrum of features for an operator who had no other vessels at his disposal. However, certain border space operations called for a more heavily protected, faster and stealthier vessel, one that would stand in for starship long range sensors in probing regions of unrest.

The Fleet Requirement for the reconnaissance craft was less public than that for the *Danubes*. Nevertheless, all ASDB resources were made available for the project. Those resources had grown formidable indeed during the past three decades, and by 2367, a prototype scoutcraft was prepared for impulse and low warp flight tests at Arcturus. The impulse engines, rather oversized on the prototype already, would soon be changed to an even more powerful design; the aerodynamics of the forward hull would also be refined. But in most respects, the virtually designed and tested vessel was ready for service from the moment the first real tests began.

The scout's main powerplant was located atop the main hull, as with several other modern small craft designs. However, this time the central hull sections below the powerplant spine were not reserved for accommodation or carrying of multipurpose hardware. Instead, they housed well protected armored fuel tanks – and a pair of plasma rechargers. Supercharged plasma, fed into a set of DDK-Ashanti coils carefully protected within lateral cowlings, would propel the craft to warp 6 and perhaps beyond, still with a minimal emission footprint. The impulse engine emissions were shrouded with similar efficiency.

A narrow corridor flanked with bunking for a maximum of two permanent crew and four passengers did extend from the forward control cabin to the aft boarding hatch. In addition, standard dorsal and ventral hatches were available for docking access. Furthermore, the corridor offered direct maintenance access to all systems for the flight engineer, throughout the flight envelope. The control cabin in turn was optimized for operations by a single pilot, with full AI assistance.

The ventral equipment bays were to hold a range of exchangeable sensor pallets. Within the engine cowlings resided the permanent, medium range passive and active sensors. Onboard analysis facilities were more powerful than aboard any previous or contemporary craft of this size range, yet still not sufficient for realtime evaluation of the full influx of sensor readings. Every effort was made to create a secure datalink; failing this, the craft could clandestinely deploy recorder markers.

Basic weaponry was available in the form of six short phaser VI strips and optional underbelly launchers for light torpedoes (with a magazine for up to six shots) or minitorpedoes (up to 18 carried). The low-emission targeting scanners and modest fire control systems meant the craft was far from a potent combatant, at least when compared with modern interceptors. Still, the combination of power, speed and stealth provided the craft with virtual impunity from conventional threats.

Despite these ominously military capabilities, the scoutcraft also had some qualities useful in expanding the range of a scientific survey team. Unlike a runabout or a heavy shuttle, the scout was quite at home within an atmosphere, inside dangerous radiation zones, or if needed, underwater. Her onboard analysis facilities were admittedly of a fixed and inflexible type, yet still an order of magnitude more powerful than those a runabout would carry. Basically, though, scientific studies formed a vanishingly small part of the operational profile of the new scoutcraft.

A 2368 official launch of series production for the craft also included the traditional assigning of a name for the class. This time, it was to be a somewhat awkward affair, as the intelligence community had already assigned a number of less than politically correct names to its new tool, and some of them had already leaked to the public. The last in a short and rapid succession of 'final' official names was *Talon*. Even though the name stuck, this did not alter the fact that most *Talons* remained unnamed and often also unregistered.

At the time of this writing, the existence of sixteen *Talons* has been confirmed, although at least thrice that many are suspected to have been built during the war. Several variants of this high performance design have also been tentatively identified. Production is known to continue at a low rate.

Orca / Valkyrie / Valor

Fightercraft
2374-

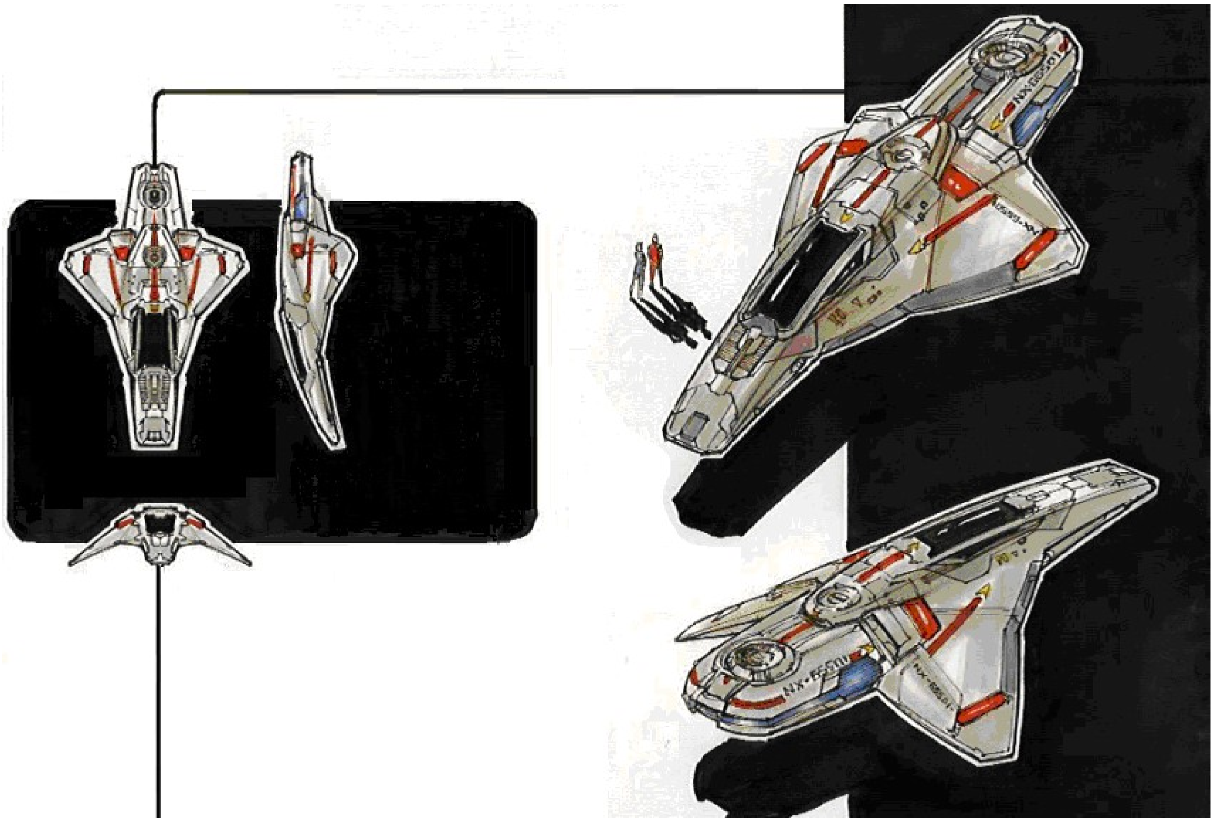
Completed: 572+ total:

	122 *Orca* 340 *Valkyrie* 210+ *Valor*
Length:	19.4 m (*Orca*) 18.1 m (*Valkyrie*)
Beam:	13.5 m (*Orca*) 15.6 m (*Valkyrie*)
Height:	6.3 m (*Orca*) 5.1 m (*Valkyrie*)
Mass:	1,130 tons (*Orca*) 1,620 tons (*Valkyrie*) 3,740 tons (*Valor*)
Crew:	1-2
Max. speed:	W 6.0 (*Orca*) W 6.2 (*Valkyrie*) W 7.0 (*Valor*)
Endurance:	5 weeks
Weapons:	<u>*Orca*:</u> 1 phaser V strip on bow 2 phaser V strips on wings 2 fwd microtorpedo tubes w/ 26 photon microtorps flanking bow Ventral hardpoint for 1 or 2 torpedo modules w/ 10 minitorpedoes each <u>*Valkyrie*:</u> 1 phaser V strip on bow 2 phaser VIP emitters on wings 1 fwd ventral torpedo tube w/ 10 (standard) or 20 (optional external magazine) photon or quantum minitorpedoes 1 aft mine dispenser w/ 10 gravitic mines (added in 2377) <u>*Valor*:</u> 2 phaser VIP emitters on bow 2 phaser VIP emitters on nacelle fwd ends 1 fwd ventral torpedo tube w/ 10 (standard) or 20 (optional external magazine) photon or quantum minitorpedoes 1 aft mine dispenser w/ 10 gravitic mines (added in 2377) Various field refits with Hur’q weaponry performed in 2377
Shields:	1-layer conformal rotating forcefield Navigational deflector at bow
Transporters:	1 emergency evacuation (padless); Mk VI
SOURCES:	(D Invasion computer game/Tarlochan Randhawa) (N Invasion computer game/Tarlochan Randhawa) (H Invasion computer game/Tarlochan Randhawa)

At the start of the Dominion conflict, relatively few construction programs were launched, as Starfleet had scant knowledge of the strategic and tactical requirements for facing the Jem'Hadar. Yet from the first weeks of the conflict already, it became clear that the prime requirement was to be quantity and immediate availability – so badly had the strength of the beachhead force now nesting at Cardassia been underestimated. Lacking the ability to conjure entire starships out of vacuum in the time allotted, Starfleet decreed the design and construction of tactical fightercraft to meet the strategic need of the day.

To avoid wasting time, ASDB launched a series of parallel programs, with each design team concentrating on a different way of improving the fighting abilities of the modern *Talon* scoutcraft. Two of the designs would retain the internally mounted warp engine concept, while several others would add successively larger and more potent powerplants, nacelle-mounted drives and heavy weapons to the common central spaceframe.

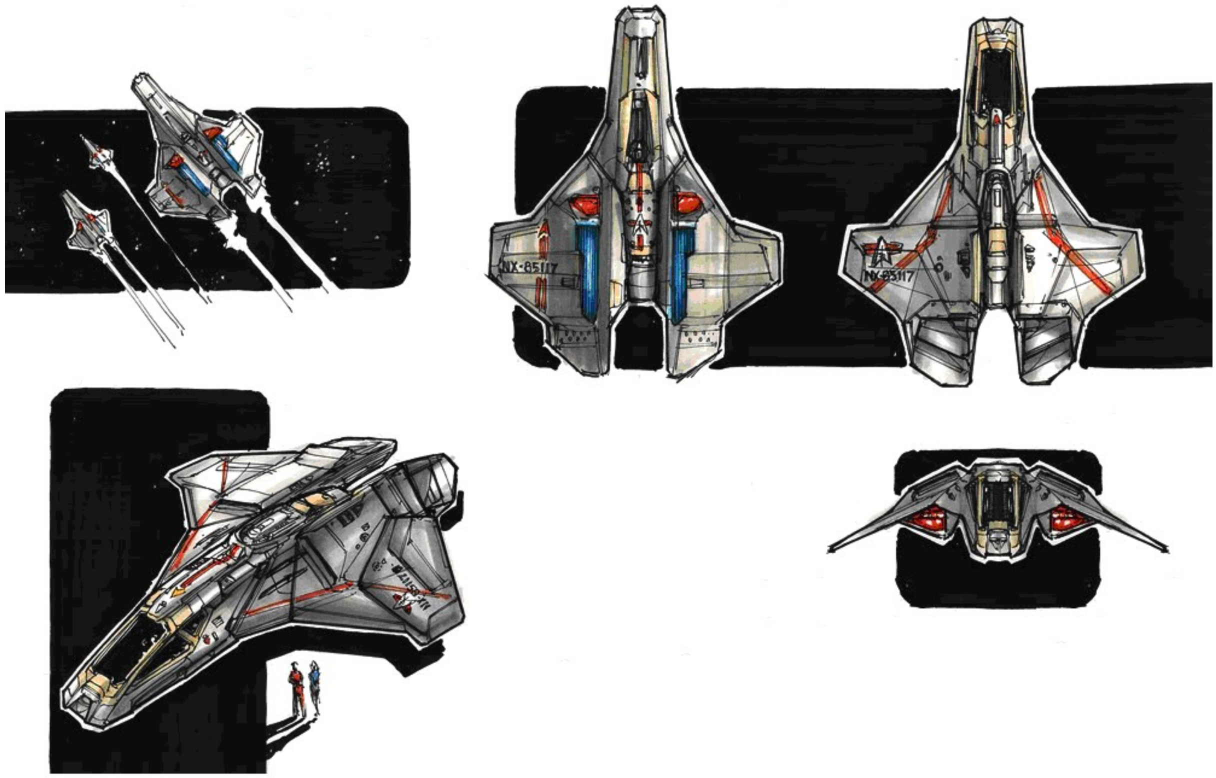
The first version to be produced was created by a merciless process of cutting and trimming. The *Orca* fightercraft retained familiar bow features such as the overnose Arkenis deflector dish (somewhat compacted), angled-windshield cockpit (elongated for accommodating a weapons officer and more extensively glazed for situational awareness) and dorsal docking hatch, but the side cowlings and ventral equipment bays were left ashore. The arrowhead shape narrowed down to a minimalist stem just aft of the docking hatch, exposing the DKK warp engine with wraparound field windows, dorsally projecting IMRF crystal and centerline m/am reactor core. Impulse engines were perched atop the hull, flanking the docking hatch which also marked the aftmost section of the craft accessible by internal means; there were no bunking spaces or other internal amenities, and all the volume of the remaining winglike cowlings was dedicated to fuel (replenishable with lateral ramscoops) and shield generators. Twin microtorpedo launchers flanked the nose; there were three short phaser V strips covering mostly the forward angles.



The Orca*. Very little of the original* Talon *visually remains in this trimmed-down development, but adherence to the underlying technological solutions helped Starfleet field the fightercraft on short notice – unfortunately with some performance shortcomings.*

The *Orca* proved to be superbly agile for close combat, but no better shielded than the older *Kestrel* craft, and suffered mightily in its first operational engagements at Bor Manya and Kendra VI. It was quickly relegated to training duties only, and the definite *Valkyrie* craft was fielded in its stead.

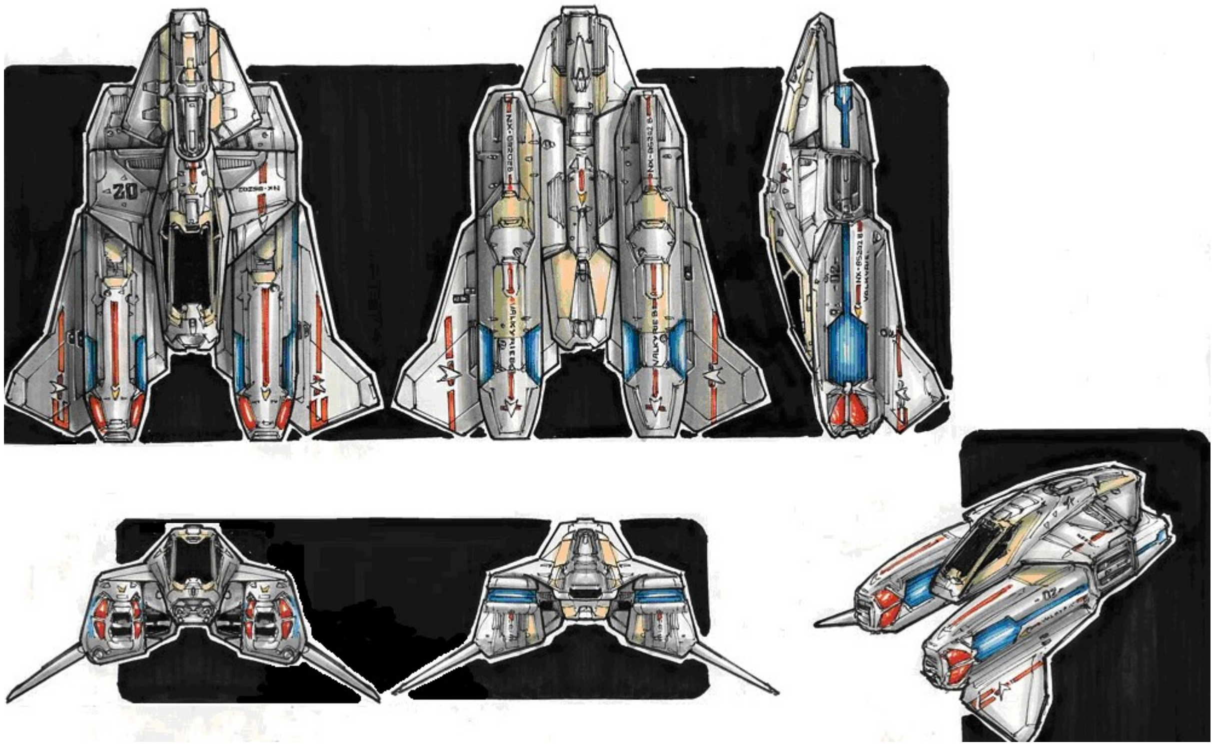
This heavier fightercraft was also based on trimming down the *Talon*, but retained more of its initial bulk, reallocating rather than removing. The bow was remodeled, with a smaller deflector in a shorter bow fairing but with an undernose Type V phaser cannon plus an underbelly warp launcher for twenty heavy projectiles of various sorts. The warp engines with their close-tucked ramscoops were ventrally exposed with the removal of all the former spying gear, and the original scout impulse engines gained in prominence and power. The wings held Type VI pulse phasers on their outer segments, fuel and shield generators on the inner fairings. Despite the larger overall volume (but shorter length due to the remodeled nose), there were even fewer internal spaces than in the *Orca* version, as the centerline was now occupied by the main powerplant. A minelaying chute was also added, in place of the original aft entry hatch.



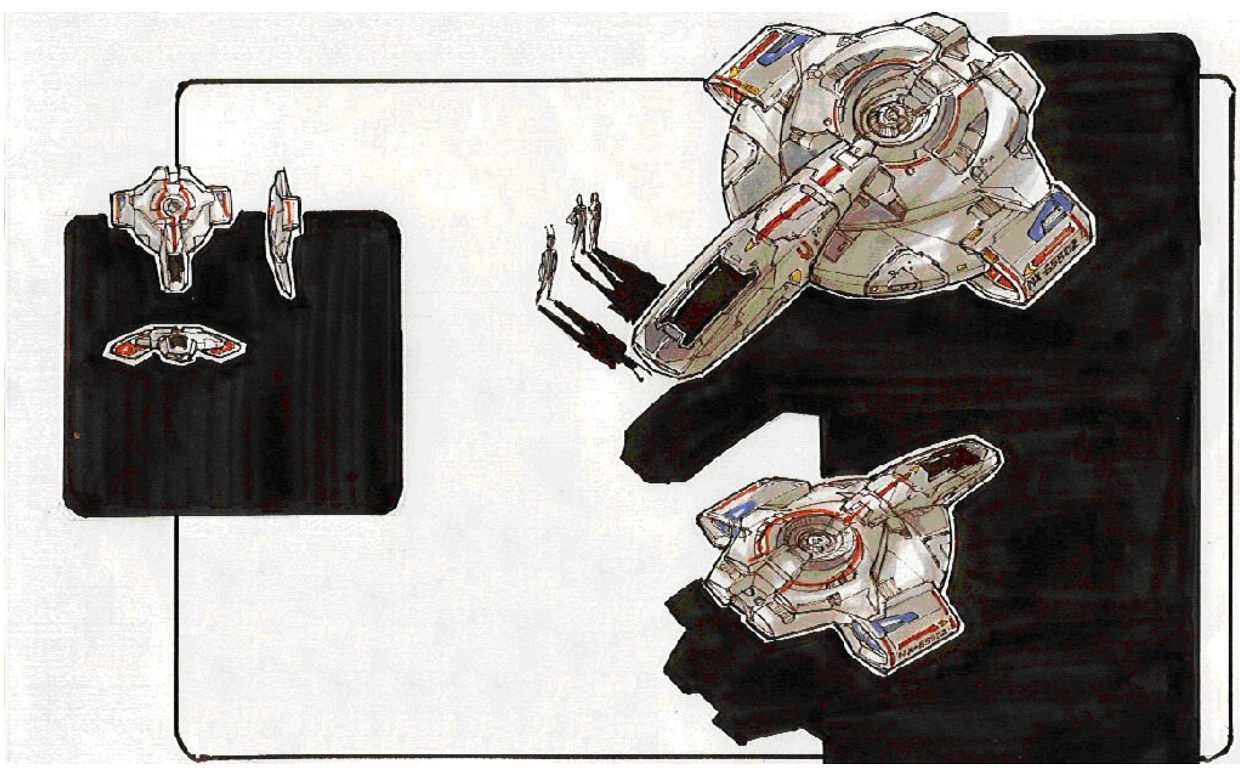
The Valkyrie. *Very similar to* Talon *in both overall size and shape, the craft nevertheless carried barely half the bulk of the reconnaissance-oriented forebear.*

Alas, this version was not completed in time to see significant action in the Dominion War. The first examples appeared in 2375, and served mainly in attack duties from which the vulnerable *Kestrels* were being retired en masse. There would have been some demand for the *Valkyrie* in the escort fighter role as well, especially considering its superior warp capabilities in comparison with *Kestrel*, but production volumes were limited, and barely adequate craft had to serve in each of the respective roles till the end of the conflict.

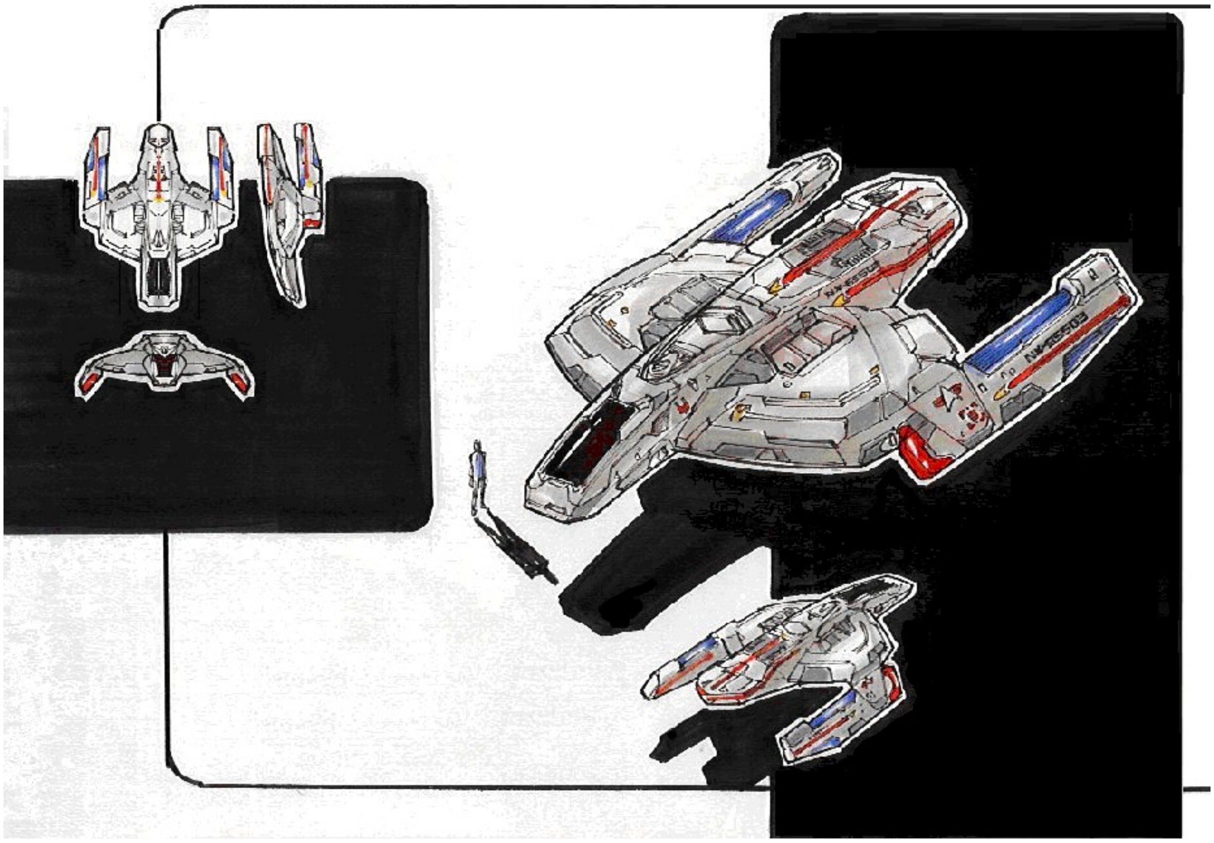
Immediately after the war, other branches from the original design tree began to bear fruit. Giving the common central hull a pair of externally nacelled heavy LF-60 engines for unprecedented warp 7 performance and trimming off the entire stern resulted in the *Valor* heavy fighter. Two competing designs for high speed fighters or gunboats, the *Gryphon* penetrator with cowled GN-90 engines reminiscent of the *Defiant* escort design, and the *Scarab* interceptor with more prominently outriggered LF-74 nacelles, were no match in terms of compactness, despite a slight performance edge (better shielding in the *Gryphon* case, better speed and agility for *Scarab*, with corresponding deficiencies), and were not adopted for mass production.



The Valor. *All that remains of the original now is the bow and cockpit area, and the immediate lateral spaces for support systems. The massive high performance, long endurance nacelles come to the fore, literally as well as figuratively.*



The Gryphon. *Conceptually something of an enlarged Type 10 shuttlecraft or massively downscaled* Defiant *escort, with a crew of three, this heavily armored type has not found its niche in modern Starfleet, at least not as of this writing.*



The Scarab*. This long range escort fighter or system defense interceptor is propulsively superior to the* Gryphon*, and if necessary operable by a crew of just one even though four to six is a more typical complement.Current escort needs do not support mass production for the moment.*

In 2377, *Valkyrie* and later also *Valor* craft deployed on *USS Typhon* encountered bellicose forces apparently associated with the ancient Hur'q. In lack of starship support, fierce small craft fighting ensued, and a few weeks into the conflict, several *Valkyrie* and *Valor* craft were modified with captured weaponry. Ever-innovative engineers provided top Red Squad pilots with every advantage imaginable, ultimately including all-new warp engines confiscated from the Kam'Jatae opponents and bolted on to *Valor* hulls. As production of *Valkyrie* and *Valor* has ceased, speculation abounds on whether this "Mk III" design of superior performance will be adapted as the next production model, or whether mere conversions of *Valor* will suffice. Other postwar interest in fightercraft is predictably waning, and there are no major projects currently under serious study.

An action shot of a baseline Valkyrie *and a heavily field-modified* Valor.

III Shuttlecraft, shuttlepods and other auxiliary craft

Ever since the earliest days of space exploration, there has been a need for small craft that can move personnel and material between planetary surfaces and orbiting spacecraft. Few starships are capable of landing by themselves; those that cannot have virtually all been equipped with shuttles or shuttle-compatible docking systems. Even after the introduction of transporters, few starship types have been constructed that completely lack shuttle capacity. Exploration ships especially maintain large shuttle fleets, featuring spacious hangars and carrying many different types of auxiliaries.

Shuttlecraft

Until the Romulan wars, most Earth starship auxiliaries were simple surface-to-orbit craft with atmospheric maneuvering capacity but virtually no interplanetary, let alone interstellar capabilities. With the founding of the UFP Starfleet, the situation changed, and a classification system for various shuttle types was adopted. In its final form, it encompassed the following classes, not all of which are necessarily logically classifiable as shuttlecraft:

Class A: light intership/transatmospheric craft
Class B: heavy intership/transatmospheric craft
Class C: special environment craft
Class D: light interplanetary craft
Class E: heavy interplanetary craft
Class F: light interstellar craft
Class G: heavy interstellar craft
Class H: independent interstellar craft

Note that Class C should not be confused with the contemporary starship designation pertaining to unmanned cargo pods, nor Classes F and G with those of manned freighters and droneships, respectively. The classification scheme for shuttles was a separate construct from the starship classification and registration system. Nevertheless, the starship designations Class S (technology testbed) and Class T (training) have been applied to shuttlecraft as well.

The system was sometimes of rather limited use, since advances in technology soon elevated most shuttles first to categories D and E, then to F and G. Within each class, there were various ‘types’, ‘marks’ or ‘makes’ of shuttles, which made identification by class designation rather imprecise. Classification of this kind was finally abandoned in the 2270s, as the proliferation of compact warp drives and weaponry made it possible to equip craft of virtually any size with ‘Class A to G’ capabilities. In this chapter, shuttles will be listed in chronological order, but the classification in the old system will be included in the data charts of older shuttlecraft. In addition, a selection of alternate and colloquial names will be provided, since the reader is just as likely to encounter some of these names as the ‘official’ designations in reference materials.

Current classification simply divides the craft into light, medium and heavy shuttles, gives a unique type number to each design, a chronologically sequential mark number to each sub-design within the type, and shunts many previous light shuttlecraft to the category of shuttlepods. Even this is by no means an intuitively clear system, however, since the type numbers aren’t necessarily chronologically arranged.

Despite the extensive standardization of Starfleet shuttle maintenance and replenishment gear, it is still common to design specific auxiliary types for each starship class or grouping. Small ships tend to receive multi-purpose, somewhat compromise-ridden designs, often utilizing the kind of hardware solutions typical of the mothership. Larger starships carry a wider variety of more specialized types, ranging from light ‘flying boxcars’ like the current Type 6 and 8 light shuttles to complex high speed craft like the Type 12 light shuttle, or huge landers like the Type 27 atmospheric barge.

Class D1 Light Atmospheric/Spatial Shuttle

2136-2179

Alt. names:	SP-36
Completed:	1,852
Length:	6.1 m
Beam:	2.2 m (wings folded) 4.5 m (wings extended)
Height:	1.7 m
Mass:	tons
Crew:	1
Passengers:	4-5
Cruise speed:	Sublight
Max. speed:	Sublight
Endurance:	12 days
Weapons:	Normally none 2 light plasma cannon (various) on bow and lower hull flanks (optional) 2 Type D phase cannon (20 GJ / 60 MW) on lower hull flanks (optional) Lateral missile racks (optional)
Shields:	None
Transporters:	None
SOURCES:	D ENT

(N own)
H ENT (own)

Three technologies revolutionized Earth-to-orbit access in the 21st century. Semi-Newtonian reaction propulsion came first, courtesy of purely indigenous innovation (even if great effort was sometimes needed to forget the notorious identity of the innovators). Advanced gravitics gradually followed, although the conceptual leaps from simple inertia dumping to controlled gravitic polarizing required extraterrestrial input to happen. Finally, mastery of subspace fields allowed the creation of true impulse engines, capable of sustained thrust across a broad range of specific impulses and accelerations.

The hypervelocity exhaust of an impulse engine was not very practical in lower atmospheric operations, but even a smallish vehicle could be equipped with this drive, and would then become a capable interplanetary craft. On the other hand, gravitics would best benefit small craft as well. By the end of the century, the combination of technologies had transformed Earth's insystem fleet, as large spacebuses gave way to hordes of shuttlecraft generally massing less than fifty tons. Such vehicles needed little in the way of starport support, and could be extensively customized for a variety of roles. As a result, there was if possible even less commonality and standardization in Earth's sublight craft than in her warp fleet at the turn of the century.

One of the first measures taken by Starfleet was to standardize its auxiliaries and liaison vessels. Varioflight immediately grabbed the lion's share of the auxiliary contracts with its range of composite lifting body designs. The SP-90 light transatmospheric pod was produced in the hundreds, and embarked on *Messier* and *Cosmos* exploration vessels as well as assorted transports and support ships. The succeeding SP-05 made an even greater market impact, with a thousand craft produced by 2110. Most served in liaison duties on Earth and Mars, although again a handful were delivered to exploration ships when these came within practicable replenishment range. Yet ultimately, it was the SP-36 variant that in the 2130s went to interstellar fame through its deployments aboard Earth's first deep space exploration and power projection vessels.

Built to match the mission profile of its motherships, the SP-36 was the first auxiliary-sized craft to mount a full impulse drive capable of independent interplanetary flight. Such a 'minimum spaceship' had so far been an elusive goal, the projected benefits never quite matching the costs of miniaturization. Yet Earth's plans for political independence required a potent auxiliary for a potent fighting vessel, and risks were taken. The massive SEMT accelerator coil and GE microfusion reactor were packed so tight and tuned so near the limits of their performance that an emergency jettison mechanism was deemed necessary. The classic Varioflight stern airlock had to be relocated; moved amidships and tilted 90 degrees, it now mated to other spacecraft via a dorsal docking adapter. Practical ground access thus required exposing the entire cabin interior to outside atmospheric conditions by opening a portside gullwing door.

The cabin featured short term life support and seating for five to six people, although a single pilot could operate the craft, and a crew of three was the preferred team for week-long exploratory forays. Assorted equipment could, with some difficulty, be substituted for passenger seats. Correspondingly, the airlock could be removed to increase internal capacity, an option utilized in non-auxiliary applications only. With its pop-out wings, the SP-36 was capable of extended atmospheric operations, and served UESF as a high-tier planetary liaison craft. It was rather too narrowly optimized for the auxiliary mission to attain wider popularity planetside, though. Bulky, armored and full of sensor and support systems, it lacked the grace of a skimmer or a flitter, and indeed featured only minimal gravitics as a landing and hovering aid.

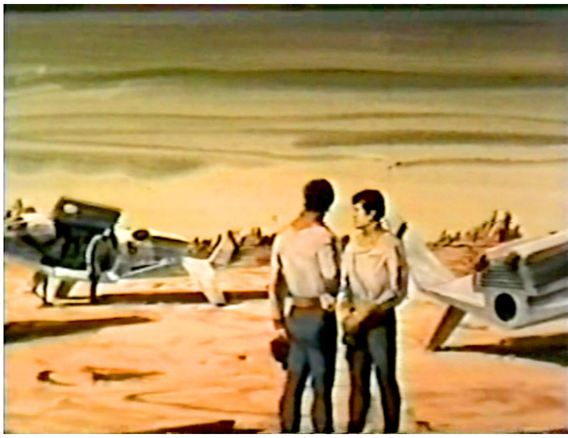
The design nevertheless met the maintainability and durability standards UESF had set for its interstellar exploration program. The risk of hypermodern, tightly packed technology was offset by multiple redundancies. Generously overengineered computing and power distribution frameworks allowed for last-minute addition of systems the early 2130s engineers could only have dreamed of. By 2150, the craft were operating from aboard *Triton* cruisers with nose plasma cannon and lateral missile racks; by 2155, pods flying from *Enterprise* vessels all had phase cannon armament and augmented combat aerodynamics. The 'glorified turbolifts' had evolved into veritable Vulcan field tricorders capable of close fire support, troop insertion and extraction and detached survey mission support.

Still, SP-36 in the fifties was hopelessly outdated in almost every respect. Heavier armoring, more practical impulse drives and more agile gravitics were being introduced for all Starfleet auxiliaries, and there was little practical chance of upgrading the SP-36 any further. Although surface installations retained various models of the type into the late 2170s, shipboard service in practice ended by 2156, when the pods still persisting aboard *USS Union* were swapped for the Martin-built SP-50 during a minor predeployment overhaul of the cruiser.

Class A3 Light Atmospheric Shuttle

2176-2207

Alt. names:	LSA(P)-19 'Little Sioux'
Completed:	2,425
Length:	6.0 m
Beam:	4.3 m
Height:	2.0 m
Mass:	1.6 tons
Crew:	2
Passengers:	2
Cruise speed:	Sublight
Max. speed:	Sublight
Endurance:	2 days
Weapons:	2 laser emitters (200 nm/5 MW) on wingtips 2 hull hardpoints for missiles
Shields:	None
SOURCES:	(D Matt Jeffries for War of the Worlds) (N own) (H own)




Towards the end of the 22nd century, the increasing capabilities of the transporter were eating away the resupply role of shuttlecraft, and improved sensors reduced the need for *in situ* survey shuttles. As the result, more and more interest was directed at perfecting a liaison shuttle that would concentrate on moving personnel between ships, or between the starship and a surface location, at a speed competitive with the swiftness of transporters.

There were several obvious targets for improvement, some of them contradictory. Ingress and egress had to be made rapid and comfortable, calling for large access hatches and efficiently arranged seating. On the other hand, atmospheric agility and ease of handling in hangars called for as compact a design as possible. Solutions gravitated towards small, bulletlike craft with their entire forward hull dedicated to passenger accommodation and accessible via large gullwing doors. Propulsion was of microfusion type, with full-size wings for aerodynamic lift and with minimal gravitics for coping with accelerations. Interplanetary performance was downplayed for the time being.

The most popular type built on this formula was the *Little Sioux*, the smaller of Yondercraft's contributions to the Starfleet exploration effort. With a minimal deck footprint of six by four meters, and a mass of just 1.6 tons, the craft could be carried in significant numbers aboard frontline starships. While wing folding was no longer an option due to the winglet tips forming the aft part of the three-point landing gear, a packing density similar to that of mid-century shuttlepods could easily be achieved by alternate nose-tail parking.

The *Little Sioux* was propelled by two atmospheric jets on the upper corners of the engine section, and by a single Tumanski impulse engine at lower tail. Radiators for the fusion pile covered the tail in between the three propulsion elements. Gravitics assisted in vertical or short takeoff and landing. Lifting capacity was modest, allowing for two pilots and two passengers seated in pairs behind a single broad portside gullwing door. Once airborne, the *Little Sioux* could perform formidable aerobatics, however, and could be lightly armed with lasers and missiles for aggressive reconaissance or basic interception or fire support tasks.

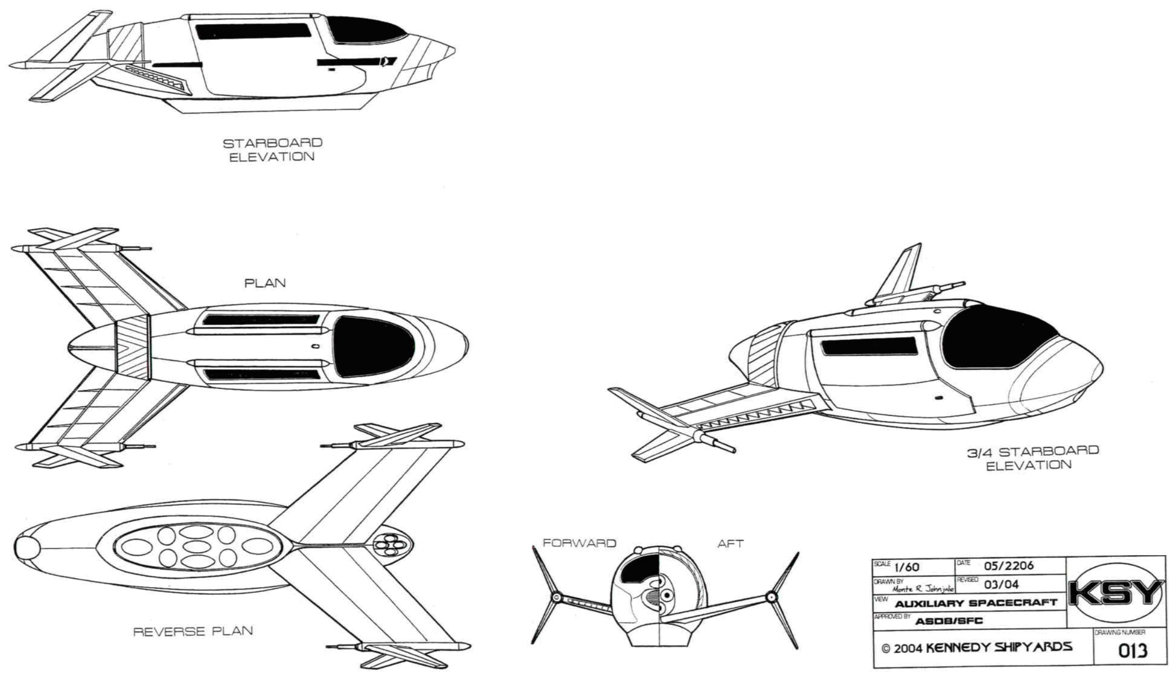
In space, the *Little Sioux* was an underperformer. Life support only allowed for two-day trips, which didn't translate to practical interplanetary ranges with the impulse performance and fuel reserves of the craft. There was no shielding for high speed operations or against unusual radiation environments, and the craft could sometimes get uncomfortably hot in direct starlight unless the heat exchange surfaces were properly oriented. Yet none of this mattered much in the primary role of the light auxiliaries, and the craft achieved popularity as Class A3 starship personnel mover and general liaison. Thousands were built for planetside applications as well, as the craft was superbly affordable in manufacturing and maintenance alike.

Gradual improvements on the basic model emerged during the three decades of service, but Starfleet largely skipped over all of these when in the 2200s going for the Class A6 *Sauk*, arguably the ultimate in this line of shuttlecraft development.

Class A6 Light Atmospheric Shuttle

2196-2249

Alt. names:	LSA(P)-44 *Sauk* class '*Shook* class'
Completed:	1,295
Length:	8.8 m
Beam:	4.5 m
Height:	2.1 m
Mass:	2.1 tons
Crew:	1
Passengers:	4-5
Cruise speed:	Sublight
Max. speed:	Sublight
Endurance:	8 days
Weapons:	2 laser emitters (200 nm/10 MW) on wingtips (later replaced by phaser III) 4 hardpoints for missiles
Shields:	Navigational deflector under bow
Transporters:	None
SOURCES:	(D Matt Jeffries for Phase II) (N own) (H own)



The sleek Class A6 light atmospheric shuttle was the direct descendant of the lifting-body, lifting-wing personnel and utility craft of the 22nd century, and in many ways the culmination of that technology. The mechanisms and software that kept the aerodynamically highly unstable and thus highly maneuverable craft under control were on the verge of transcendence. As the A6 (also called *Starswift* by the manufacturer, and LSA(P)-44 in the systematic Starfleet listing) completed its test flight series in early 2196, engineers were already tackling the problem they curtly defined as "flying a brick through an aerobatic routine".

Indeed, the limitations of the aerodynamic form were well recognized on the issues of utilizable volume, accessibility and footprint. It would have been difficult to accuse the *Starswift* of low utility value, though. In its basic configuration, the tiny craft could carry six people between an orbiting starship and a planet of 1-2 Earth gravities. Trititanium-aluminum alloy was used for the tubular pressure hull, which seated the pilot in the front, four passengers or palletized cargo in the middle, and a sensor operator/passenger in a rear seat. Wide gullwing doors opened on both sides for excellent access, while the pilot had superb view from behind a bulbous cockpit window.

Antigravs were provided for landing, while main propulsion was by a microfusion pile powering either jets of atmospheric gases or rockets feeding from an onboard tank. The pile took up most of the aft hull, along with the cylindrar fuel/propellant tank. RCS nozzles were located on wingtip pods, although main attitude control was by antigravs.

Four color schemes belie the presence of four starships, as liaison craft line up on the tarmac of Starbase 11. In the early 23rd century, regulations still called for shuttlecraft rather than transporters when a Captain's party was to attend a planetside function. The actual risks of personnel transport were mostly history at the time of this line-up in 2237, but tradition lingered well past the retirement of the A6.

The wings extended from the rear hull to provide atmospheric lift, with winglet control surfaces at the tips. The wing leading edges also housed engine coolers. For defensive needs, rapid-fire laser units were mounted on the wingtips. Main sensors were located under bow and stern in special cutouts; the forward cutout also featured a low-power deflector, the aft one a palletized jammer suite for self-protection. For combat missions, four missiles could be mounted underwing.

Type 6 shuttles were officially designated the *Sauk* class, following the contemporary theme of North American tribal names, but the harrowing flight characteristics readily explained the more usually used name '*Shook*'. The craft were deployed aboard light and heavy cruisers to replace antiquated A3 and A4 ('*Little Sioux'* and '*Big Sioux*') atmospheric craft. Due to their limited spaceborne performance, they were almost exclusively used as alternatives to transporters when deploying landing parties on planets featuring transporter-disrupting phenomena. Typically, a *Horizon* cruiser would carry two of these craft in addition to Class B and C craft, although a dozen could easily be accommodated aboard – more if the wings were removed for stowage, a nontrivial operation calling for at least an hour of reassembly.

The rapid development of multi-purpose shuttles soon led to the abandoning of this special type, and also the whole classification system. Most units had been withdrawn by early 2249. Some examples of these robust shuttles still serve as space-certified hovercars in many worlds, though, and are sought-after collector items.

Class B5 Heavy Atmospheric/Spatial Shuttle

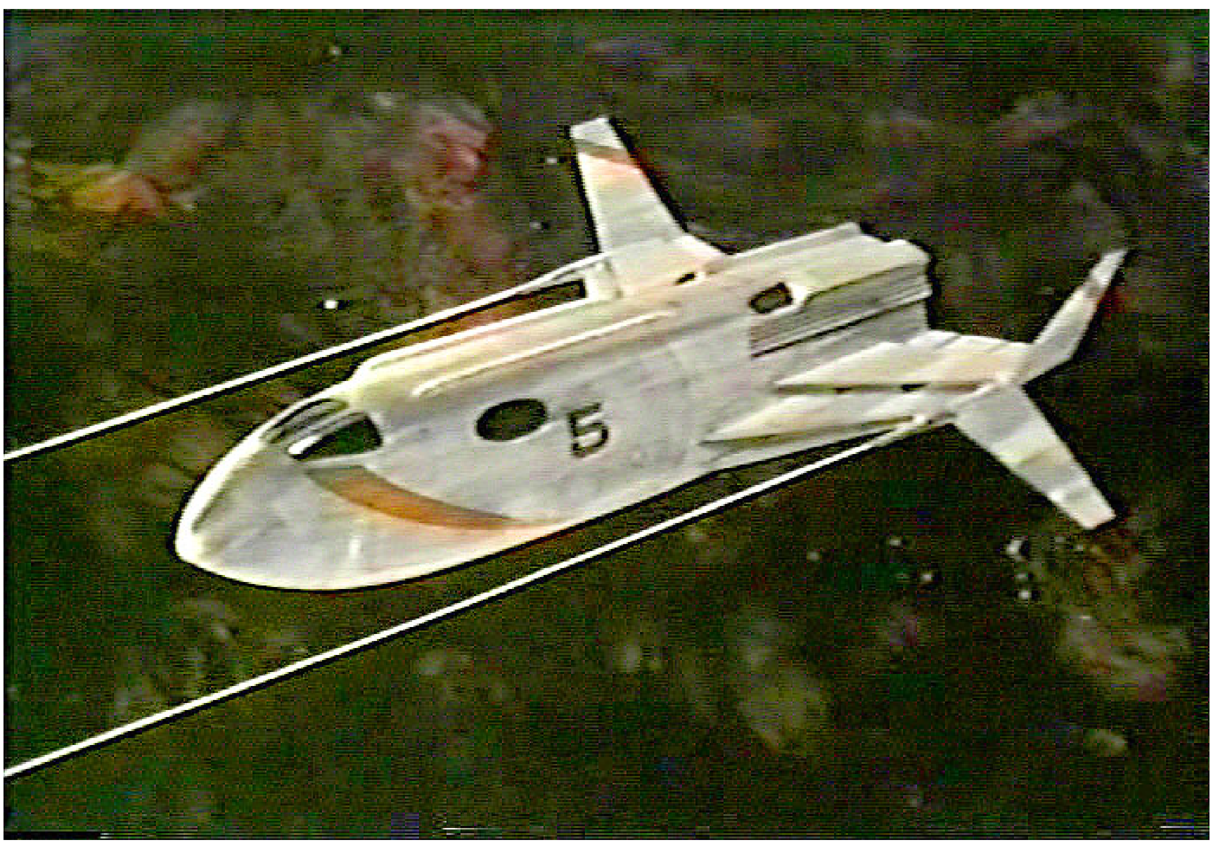
2197-2259

Alt. names:	HSA(P/C)-20 '*Chippewa* class' 'Heavy Howler'
Completed:	120
Length:	12.2 m
Beam:	8.6 m
Height:	4.1 m
Mass:	13.1 tons
Crew:	2
Passengers:	6-10
Cruise speed:	Sublight
Max. speed:	Sublight
Endurance:	16 days
Weapons:	2 laser emitters (200 nm/40 MW) on wingtips (later replaced by phaser III)
Shields:	Navigational deflector under bow
Transporters:	None
SOURCES:	(D Matt Jeffries for "War of the Worlds")

(N own)
(H own)

A companion design was fielded for the Class A6 light shuttles in 2197, intended almost exclusively for deployment aboard the *Horizon* and *Advance* heavy cruisers. No lesser vessel could have embarked the heavy Class B5 cargo hauler, nor would they have needed its capabilities. The winged bullet design generally resembled the A6, but at notably larger scale. The shuttle offered seating for 6-10 passengers, two tons of water-equivalent cargo, or a combination thereof, depending on the seating configuration. A separate flight deck could be provided for the flight crew of two by installation of a modular bulkhead, but this was seldom the choice of shuttle crews. However, a permanent bulkhead separated the aft compartment which featured a toilet, an equipment locker and an airlock with top and bottom hatches.

Aft of the pressurized compartments was the fusion pile, powering atmospheric jets on the upper aft corners or impulse engines with a linear nozzle arrangement at extreme stern. Fuel was stored within the winglet-tipped wings, which also contained cooling inlets and internal mountings for various sensors. The underhull landing antigravs also had repeaters in the wings. For storage in starship hangars, the winglets folded up against the wings, and the wings against the hull, so that four of the craft could fit within a *Horizon* hangar. Two was the standard contingent, however, leaving room for a reconnaissance cutter. Later starship designs would still make use of the design, supplanting quality with quantity: the early *Mirandas*, *Suryas* and *Coventries* carried four B5 craft in peacetime, only embarking more modern types when needed, while *Coronados* often featured six standard models and two special assault variants.



An action shot of Shuttle 5 from USS Meteor *(NCC-1012) exhibits the wingtip phaser III emitters of the type. The white/dayglo finish is typical of the 2210s; twin forward windows and oval side portholes help distinguish the type from the smaller A6 at a glance.*

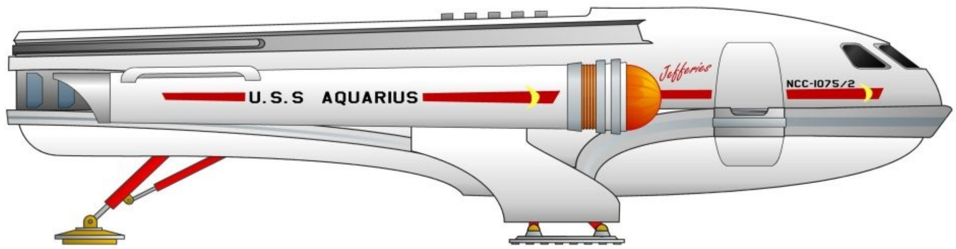
The B5 could be configured for orbital mapping, planetary surveys or simple freight hauling, and was the vehicle of choice for landing parties that were planning to extend their stay beyond one day. Even though far less nimble than the corresponding Class A craft, the heavy shuttle offered a proper airlock, a gullwing cargo door to port side and a narrower passenger door to starboard, and enough internal room to avoid the cramps inevitable aboard smaller craft on long missions.

Advancing technology was overtaking the craft already, though. The aerodynamic design was becoming unnecessary, given the recent advances in compact gravity generator, propulsion and deflector technology; the bullet hull was highly wasteful of useable interior volume, and a boxier alternative was being sought. In 2249, the last Class B5 (officially '*Chippewa* class', but more often known as the 'Heavy Howler' due to the characteristic combination of engine and aerodynamic noise) atmospheric shuttles were drawn from starship service in favor of either the smaller Class F or slightly larger Class G 'flying boxcars'. Active service continued in planetary assignments, though, and the type was the mainstay of outpost operations well into the 2250s.

Class G1 Heavy Warp Shuttle

2210-2274

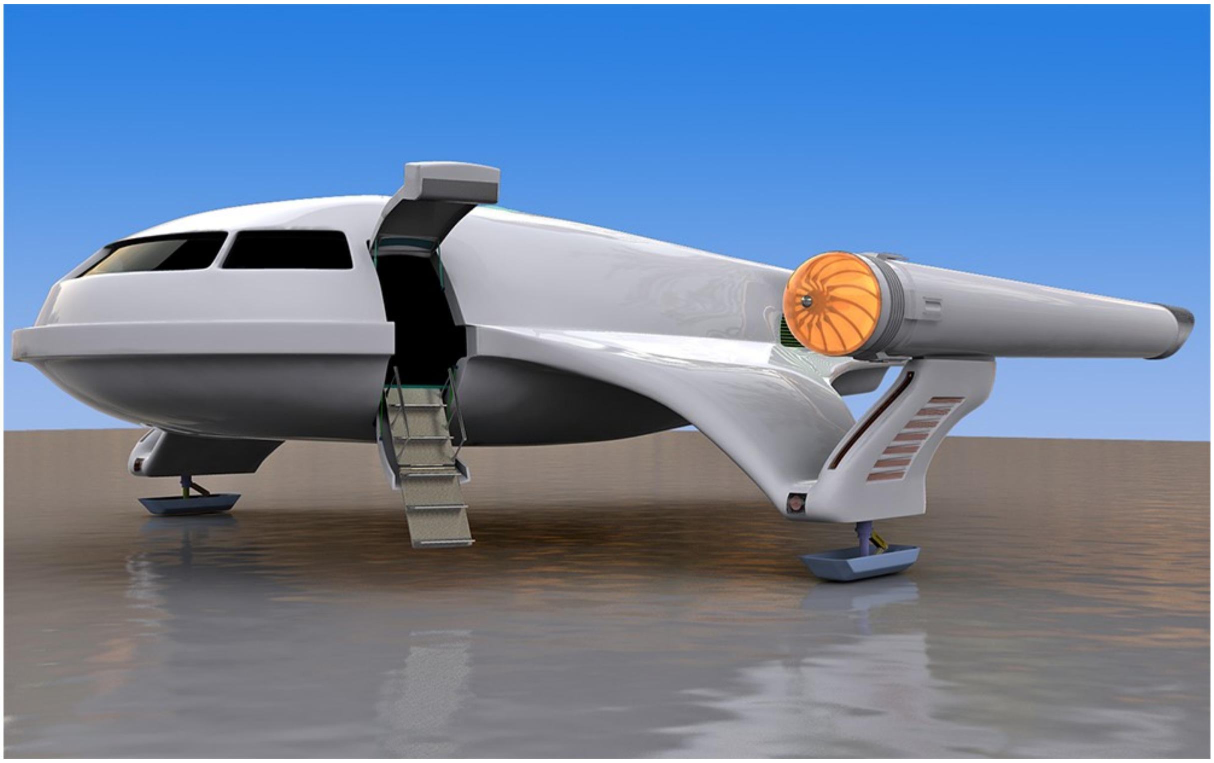
Alt. names:	HSI(U)-1 HSI(U)-1B HSI(PT)-1 'Banshee' *Comet* class
Completed:	203
Length:	15.3 m
Beam:	11.5 m
Height:	3.5 m (landing gear retracted) 3.8 m (landing gear deployed)
Mass:	103.7 tons
Crew:	3
Passengers:	3-7
Cruise speed:	w 1
Max. speed:	w 1.6
Endurance:	2 weeks
Weapons:	None (G1, G1B) 1 phaser III emitter on dorsal midhull (G1S)
Shields:	Navigational deflector under bow Optional 1-layer globular forcefield
Transporters:	None
SOURCES:	(D Matt Jeffries TOS predesign) (N own) (H own)



The first warp-capable starship auxiliary craft could have been expected to revolutionize Starfleet operations and the tactics used. Indeed, nothing less was the goal when VXT set out to design and construct the *Comet*, later to become the Class G1 heavy shuttlecraft. By itself largely an operational and technological underperformer, this shuttle would spawn two distinct lineages that would each improve on one aspect of the design's dual strengths of speed and compactness.

Key to warp power lay in combining new coil materials with an ion cascade powerplant, a technology the engineers were still struggling with. Only 'medium' applications were achievable with the state of the art, but Starfleet considered it reasonable to attept the construction of an auxiliary that would dedicate more than half the interior to power generation. Pleshun was given access to data on alien engineering solutions regarding ion powerplants, and was able to devise a reactor 24.8 tons in empty weight and approximately two by three by ten meters in size. VXT worked from these parameters to create a flattened-teardrop hull where the powerplant would occupy the aft three-fourths of a fifteen-meter hull. A broad cabin at the bow had seating for up to ten people, including two pilots and an engineer. Gullwing doors were provided on both sides, and a wide windshield-type viewport forward. There were no airlocks, cargo holds or other complications in the design, which was aerodynamically very clean and stable.

Ion power was translated to FTL propulsion via DB-20 nacelles, outriggered as in the old *Montcalf* runabouts on pylons whose downward kink served as the forward landing supports. An extensible aft leg completed the landing gear. Sublight propulsion comprised twin sets of nozzles on the trailing edge of the hull, venting out the exhausts of the main powerplant through impulse-type accelerators. No fusion reactor was carried, and batteries were of moderate performance since they were not needed for starting the CID reactor.



An early Comet *prototype resting on the tarmac of VXT factory starport hides her broad shoulders in side view. Another example in test paint streaking across the sky reveals the true extent of a* Comet's *deck footprint, and explains why the type was not an immediate solution to Starfleet's auxiliary craft needs. Also noteworthy are the clumsy gullwing hatches high above the ground, incompatible with the loading and offloading of landing party mission gear or bulky cargo, let alone small vehicles. The succeeding G3 design would handle all three with ease.*

The *Comet* was a more or less immediate engineering success, reaching warp 1.6 with ease. The practical performance of this bulky vehicle as a starship auxiliary was another matter. Only single examples could be carried by any given ship, usually at the expense of all other auxiliary contingent. In simple orbit-to-surface missions, the shortcomings of the low-ceiling, high-mounted cabin compounded the unwieldiness of the massive vehicle. However, Starfleet was determined to see a new era ushered in. The *Comet* would be the first step in an inevitable path of evolution; the type was pressed to active service as the Class G1 heavy shuttle, and crews of two dozen cruisers began honing their skills in flying a warp-capable vessel from a starship hangar.

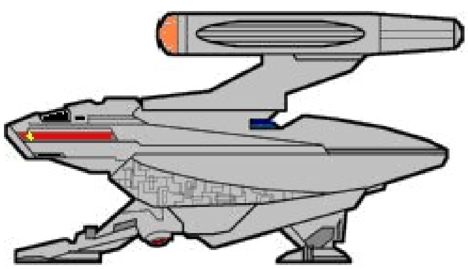
Rapid development of CID systems soon allowed for miniaturization, and for hull shapes more conductive of auxiliary operations. On the other hand, dilithium-regulated antimatter power was evolving as well, and became the favored means of propelling runabout-sized liaison craft. The heritage of Class G1 was thus split in two, spawning the similarly powered medium and light warp auxiliaries and the similarly shaped true interstellar craft. Two direct modifications emerged as well: the lengthened G1B survey cutter with a dorsal observation pod, and the G1S scout armed with a Type III dorsal phaser. Both saw starship service from the 2230s to the early 2260s, but in a constantly diminishing capacity as the smaller successor designs gained in capabilities.

The last G1 craft ceased flying from aboard *USS Indus* in 2274, and adopted local patrol and law enforcement roles outside the UFP – testament to the realization that cascade ion power was a dead end, ill suited for the smallest and largest applications, of pedestrian performance on medium craft, and unnecessary for a civilization in possession of major natural dilithium resources.

Class G2 Heavy Warp Shuttle

2215-2278

Alt. names:	HSI(U)-2 *Greyhound* class
Completed:	276 total: 142 Mk I 22 Mk II 63 Mk III 49 Mk IV
Length:	13.6 m
Beam:	7.3 m
Height:	6.9 m (landing gear retracted) 7.3 m (landing gear deployed)
Mass:	63.4 tons
Crew:	2
Passengers:	12
Cruise speed:	w 1
Max. speed:	w 1.5
Endurance:	2 weeks
Weapons:	None
Shields:	Navigational deflector at bow Optional 1-layer globular forcefield
Transporters:	None
SOURCES:	(D FASA) (N FASA) (H FASA, own)



The three practical shortcomings of the pathfinding *Comet* warp shuttle were obvious to Starfleet from the very beginning. The solution readily presented itself as well: the cost, horizontal footprint and mass of the craft would be halved by omission of one warp nacelle. Whether such a craft would retain sufficient performance to work as a starship auxiliary was never truly in question. Yet whether one could be designed to conform to operational demands was debatable from the very beginning.

Conceptual studies by VXT confirmed what common sense already suggested: a centerline mounting would leave the craft without utilizable payload volume. Furthermore, installing the ion cascade powerplant ahead or astern of the warp coils would result in a vehicle of impractical length. As the warp propulsion aspect of the *Comet* design was deemed more important than the ability to operate from aboard starships, Starfleet soon agreed that it would be best to concentrate on creating a compact and affordabe warp transport for surface and starbase applications, and to leave the revolution of warp-capable starship auxiliaries for the next generation of craft. The single-nacelled *Greyhound* was thus adopted as the Class G2 warp shuttle in a form that was inherently incompatible with most starship hangar decks.

Mounting the warp coils above the hull solved the footprint problem, maximized payload volume, and trivialized the issue of ingress and egress. The *Greyhound* was configured with the DB-20 riding on a dorsal pylon that also housed the impulse propulsion system, and with the CID powerplant at the pylon stem. The control cabin was mounted ahead of the reactor, giving the single pilot an excellent view forward and down, and the single aft-facing engineer an equally direct access to the power systems. The payload of 10 tons of water-equivalent cargo or 12 passengers was carried in the wide lower part of the craft, entering through a forward door beneath the cockpit. The forward leg of the tripod landing gear doubled as the ingress ramp when deployed; a trio of lift engines was arranged in the reverse pattern, with two in front straddling the forward leg and one between the aft pair of legs.

The stack reached a total height of 7.7 meters, making operations from aboard even the largest starship hangars cumbersome. Also, the high mounting of the warp coils and the reactor presented some stability problems at landing. On the other hand, the horizontal footprint of 12.8 m times 7.3 meters was quite reasonable for a craft of such performance. Warp 1.5 could be achieved without field gradient hazards to the crew or the cargo, and impulse performance was found perfectly acceptable.

For some fifteen years, the G2 enjoyed primary warp liaison vessel status and also saw planetary assault service, evolving into four variants: the original Mk I received improved passenger interiors to become Mk II, lost these but gained armoring to become the Mk III assault type, and had the holds reconfigured for maximum cargo capacity in Mk IV. It was only in the 2230s that advancing technology provided the means for further compacting of ion power drives and allowed the production of boxy high volume craft such as the ones adopted as Class F2 and G3 utility shuttles. The former offered no propulsive advantages over the *Greyhound* but had vastly improved utilizability as a starship auxiliary, while the latter outperformed the single-naceller so significantly in every respect that it swiftly took over the starbase and surface assignments.

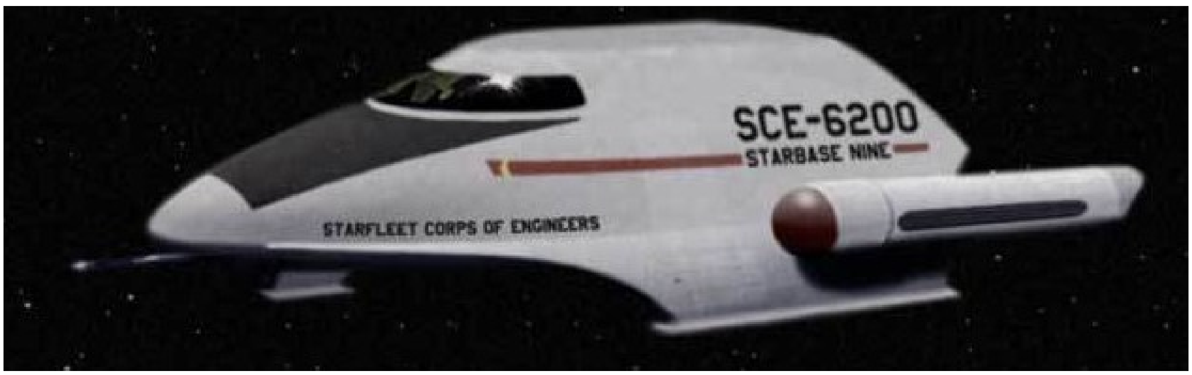
The *Greyhounds* persisted much like the *Comets*, serving in secondary roles till the late seventies. The complexity and cost of the pathfinding technology precluded long post-Starfleet careers, though. Only the Mk IV saw small goods delivery service in UPS colors until superseded by commercial dilithium-powered designs.

Class F1 Medium Shuttle

2224-2285

Alt.names:	MSI(U)-1 ‘Heavy Lander’
Completed:	693
Length:	11.6 m
Beam:	6.4 m
Height:	3.6 m
Mass:	112.3 tons
Crew:	2

Passengers:	10
Max. speed:	w 1.6
Endurance:	9 weeks
Weapons:	2 phaser IV emitters forward of the cockpit
Shields:	1-layer globular forcefield Navigational deflector on bow
Transporters:	None
SOURCES:	D TAS "Mudd's Passion" (N own) (H own)



A decade into Class G warpshuttle operations, miniaturization of the involved technologies was well underway. By 2220, the propulsive performance of G1 and the logistical worth of G2 were being squeezed into a slightly more compact, significantly more conveniently laid out form. Thanks to the improvements, warp-capable auxiliary craft would finally begin to be embarked on frontline starships. While a lot remained to be done before a truly optimized auxiliary could be fielded, Starfleet confidently started mass production of Class F1, a pleasant-looking construct of both aero- and warp-dynamic merit.

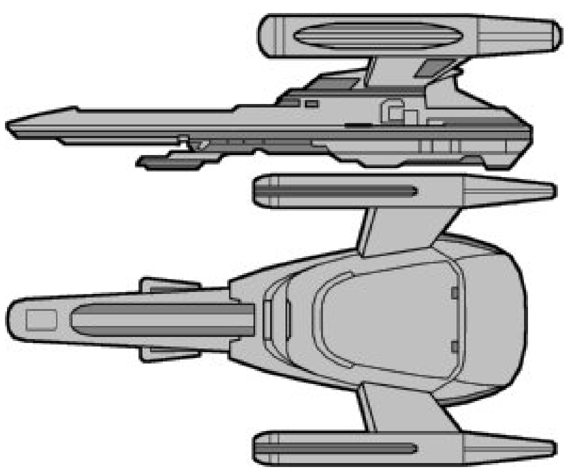
Unlike the Class G warpcraft, F1 was supposed to perform the tedious but vital task of hauling crews and supplies from an orbiting starship down to a target planet and back. Indeed, despite the presence of a warp drive, the project was primarily intended to result in a lander, not a warp-optimized scout or liaison. While a lighter counterpart design was cancelled early on, the 'Heavy Lander' designation stuck with F1 – not in an entirely complimentary way, considering the difficulty of easing the weight of the warp coils onto a planetary surface.

Key to the design was a one-and-a-half-deck configuration where equipment was stowed both below main floor and in front of and behind the cabin. This cut down on total length, allowing the craft to be stowed in quantity and moved around on starship landing decks, still without increasing the height to an unmanageable degree. A length of 11.6 meters (including a high-power deflector and FTL sensor dish that folded open from a bow boom) was still too much to be handled by the standard shuttle elevators and turntables of the time. However, it was at least within the realm of possibility that new lifts in this size range be installed on most vessels, whereas a lift retrofit accommodating the Class G heavyweights clearly was an unrealistic prospect.

The 50-ton warp nacelles sat low for stability under gravity and for ease of maintenance, yet well protected from ground contact by a three-point skid landing gear. A top speed of warp 1.6 could be maintained by the PB-698 engine and the DH-4 ion cascade powerplant which also fed the impulse engines at extreme stern. The curved nose of the craft housed crucial flight instrumentation and modular sensing gear behind a wide sensor-transparent, anti-glare cover, although the space could alternately be configured for utility or casevac duties by removing any less than vital instruments. Overlooking the nose was a wide, low windshield-type viewport that provided good visibility forward, up, to the sides and even down, thanks to the well thought out curvature of the protruding bow. Two crew sat behind the windshield; behind the portside seat was a ladderway down to a side embarkation hatch, behind the starboard one a compact galley. The aft part of the deck, situated above the powerplant, could be configured for high-standard habitation. Alternately, up to seven people could be seated for short-term missions.

Obviously, loading of outsize items onto the raised deck of the F1 was not practical, so Starfleet kept studying even more simplified designs, boxier hull forms and squatter, easily ground-accessible layouts. Thankfully, giving warp propulsion to dedicated cargo haulers was not a priority matter, and the F1 soon proliferated across the exploration and defense fleets alike, proving to be a mediocre lander at best, but an ideal liaison craft for shipboard applications. Its smoothly curved silhouette remained a familiar sight throughout the 2260s on any but the most privileged frontline vessels as well.

However, technology kept improving, and the promise of even more compact auxiliaries made Starfleet postpone and then abandon the fleetwide lift size increase. Class F craft were indeed soon drastically reduced in size, resulting in the F2/F3, F4 and F5 types until a further step of miniaturization allowed the capabilities of all three to be compacted into just one design. By that time, the still perfectly serviceable F1 craft were being retired en masse. Few buyers emerged for the by 2280s standards awkwardly configured shuttles, and most were scrapped by the turn of the century.



A divergent path was taken by the Galactic Trailways Corporation, which in 2268 chose to equip F1 hulls with the large DB-20 engines familiar from the *Greyhound*. At raised positions, and in combination with a modern powerplant, the veteran coils gave greatly improved performance up to warp 3. The sensor spaces at the nose were replaced by a slim and flat basic navigation array, allowing the installation of forward portholes to the lower deck as well. Up to 16 passengers could be accommodated aboard the variant, which acquired the commercial name *Pulsar*. Starfleet Training Command made some use of the type, modified with various Fleet issue systems and in the Mk II version even re-equipped with side-mounted phaser emitters. The type lacked compatibility with all starship designs but was operable from most outposts.

Class F2 Light Shuttle

2231-2268

Alt.names:	MSI(U)-2 'Matchbox'
Completed:	993
Length:	11.6 m
Beam:	6.4 m
Height:	3.6 m
Mass:	112.3 tons
Crew:	2
Passengers:	6
Max. speed:	w 1.1
Endurance:	9 weeks
Weapons:	2 phaser IV emitters forward of the cockpit
Shields:	1-layer globular forcefield Navigational deflector on bow
Transporters:	None
SOURCES:	D STXI (N own) (H own)

Starfleet's earliest efforts to procure a lighter counterpart to the F1 officially stumbled on problems of miniaturization. Yet lack of vision could be cited as well, for the light shuttle had rather lenient design requirements: it was intended to haul no more than eight people from orbit to surface and back while also possessing the ability to take them to minimum warp. Contractors struggled on trying to mount a warp drive onto a smaller version of the aerodynamically smooth and graceful F1 design, attempting for example a design where a single nacelle was ventrally embedded and the passenger compartment straddled the engine, with four seats per side, while a forward cockpit featured a classic rounded nose. Deck footprint issues flunked most such designs outright, yet the utilizability of the interiors was of low 22nd century standards as well.

A complete paradigm change on lander design had to be forced on Starfleet in the final design competition of 2229. Pitted against each other were the VXT lifting body craft with twin PB-424 engines on the upturned winglets – and a graceless Chiokis flying brick with its PB-730 engines nonchalantly utilized as landing pontoons! Yet the flyoff of the two craft favored the aerodynamics-free design that used sheer maneuvering power, gravitics and deflector fields to bend the atmosphere to its will. The Chiokis C31 design became the long-awaited MSI(U)-2 personnel and liaison craft, and rounded aerodynamic shapes were abandoned for good.

The MSI(U)-2 'Matchbox' packed her ion cascade powerplant in the aft third of the hull, channeling power along protected conduits on pylons that branched out laterally from hull centerplane and then kinked down twice to meet the nacelles. Impulse systems fed directly from the main powerplant, their coils and vents cowled at the stems of the warp engine pylons.

A single portside door opened to the level-floored main cabin. A two-crew cockpit to the left of the door could be separated from the main space with telescoping doors if necessary, but typically only some privacy curtains were installed. Underfloor spaces held key subsystems that could be accessed either externally from the ground, or internally in flight through floor hatches. Additional support systems and communications gear was stowed on the roof. A forward flat-plate window provided for manual flying, but offered no side or ground vision; piloting was mostly done via instrumentation and synthetic views. Workload on the early models was high, but constant upgrades soon allowed single-pilot operations.

Special models were also added to the inventory, as the small deck footprint of the design made it possible for a single starship to carry multiple subtypes for multiple tasks. Exploration versions featured extra stowage and more rugged landing gear (most later models had three-point underhull pads in place of the quadruple nacelle pad arrangement of the first production batch), casevac craft carried medical gear and integrated stretcher/operating table arrangements, and there was even a dedicated flying workshop called *Tesla* for repair work, featuring an airlock and external manipulators.

Two light shuttles abandon the doomed USS Kelvin *(NCC-O514) in 2233 and begin their long voyage to safety. Warp propulsion drastically increased the odds of survival for those fortunate enough to fit into the warp shuttlecraft their starship might be carrying. Yet only certain special missions saw starships embark more than half a dozen of such craft, leaving most survivors in traditional sublight survival craft unless a warp towing scheme could be implemented.*

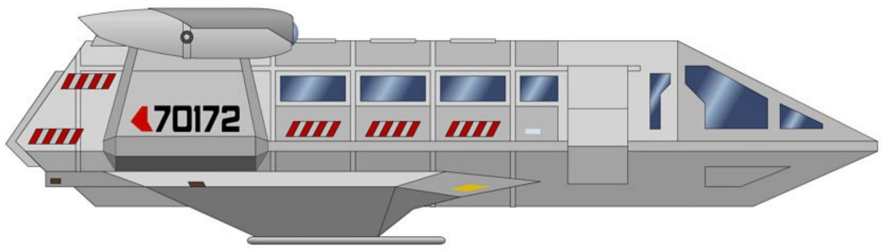
The Class F2 shuttle was gradually replaced by the more elegant F3, also a Chiokis product. By the late sixties, the F2 was all but gone, and Starfleet surplus yards filled with terminally fatigued hulls – and minimally worn warp engines, standing testimony to the limited role of warp travel in light starship auxiliary operations.

Class B8 Heavy Atmospheric/Spatial Shuttle

2237-2279

Alt. names:	HSA(P/C)-25 Type 25 *Rhino* class
Completed:	2,219
Length:	14.7 m
Beam:	11.6 m
Height:	3.8 m
Mass:	16.7 tons
Crew:	3

Passengers:	10-36
Cruise speed:	Sublight
Max. speed:	Sublight
Endurance:	21 days
Weapons:	None
Shields:	1-layer globular forcefield Navigational deflector under bow
Transporters:	None (standard) 1 or 2 GP (2-pad) or 1 small cargo installable for special missions; Mk II or III
SOURCES:	D STXI (N own) H STXI (own)



The Chiokis line of angular auxiliaries soon grew to include several models of medium warp shuttles, all of them too unwieldy to serve as general starship auxiliaries. Carriers and strike vessels embarked such craft on a regular basis, but it was difficult to find an operational role for them. Delivery of supplies was better handled by conventional barges or fast, non-embarkable couriers. On the other hand, insertion of troops or survey teams did not really call for the sort of mediocre warp drive that the Chiokis craft could carry. Hence, atmospheric barges persisted – but modern technology could at least allow them to discard their confining aerodynamic shells and concentrate on utilizable volume.

In 2237, Chiokis homed in on the ideal military barge, with straddling shots from the slightly too small C36A and the overtly clumsy C37. The 15 m long, 17-ton C37C *Rhino* was aerodynamically semi-stable at supersonic entry, could fly more or less straight at the transonic and subsonic regimes on her two high-mounted fusion-heating engines and low-mounted wings, and would rely on gravitics to achieve proximity maneuvering and a soft landing. Commonalized flight controls kept the bulky barge controllable by two pilots, although one would suffice in an emergency and a third would be required for loadmaster on most missions. The control cabin could be separated from the cargo area by a variety of door and bulkhead configurations, one of which included a miniature airlock to allow the cargo section to be kept unpressurized throughout the mission.

There were four access routes into the cargo area. Personnel ramps on both sides were the primary means of ingress and egress in normal operations. Bulky cargo could be brought onboard through a ventral hatch, although the minimal clearance offered by the four landing legs meant that such loading would usually have to take place in hover, or on special scaffolding. The hatch was more commonly used for gravidrop or paradrop delivery of troops or supplies, and was provided with a matching gravitic crane on the ceiling. Finally, there was an aft maintenance accessway that could double as an airlock, with supply lockers and sanitation spaces on both sides, plus a collection of emergency exit blowaway panels to ensure that even the maximum number of embarked personnel could leave the craft in a matter of seconds.

This early model Type 25 is distinguished by the single-piece cockpit side windows and lack of portholes aft of the side doors.

Up to 36 fully equipped combatants or 18 litter patients could be accommodated, although the flexibly configurable interior more typically left room for equipment and rapid egress. A dozen people could ride in great comfort and enjoy an outside view through six large and two smaller lateral portholes. The flight crew had large triangular side windows to help in maneuvering the craft in confined spaces, and a multi-segment forward viewport with armored shutters; situational awareness still largely hinged on display screens.

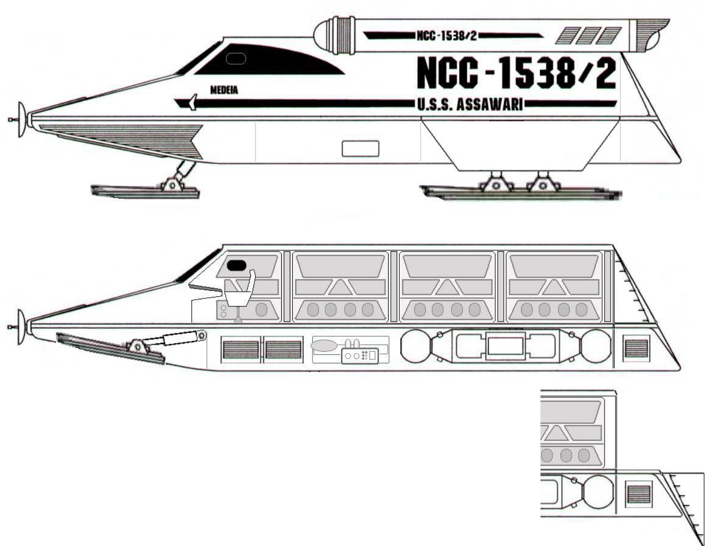
Adopted as a Class B8 auxiliary, the barge quickly achieved backbone status both as a support craft for medium and large starships, and as a liaison and transport vessel for outposts and installations. Despite falling below the shielding and armoring levels of a typical hopper, it also often ended up serving in battlefield transport roles. For four decades, the type remained a frontline troop transport asset, competing evenly with clumsier heavy assault barges. By the late seventies, though, miniaturization enabled warp-capable general purpose shuttlecraft to deliver comparable numbers of troops with much greater flexibility: two such craft could be shipped for the same deck footprint, and could move their loads with greater speed and agility while offering the output of a warp powerplant for support weapons and shielding. The *Rhino*, or Type 25, was finally retired in 2279 and relegated to reserves en masse.

Class G3 Heavy Shuttle

2251-2277

Alt. names:	HSI(U)-3 *Tigris* class
Completed:	212
Length:	17.2 m
Beam:	5.8 m 6.3 m (w/ typical side sponsons)
Height:	3.7 m (landing gear retracted) 4.0 m (landing gear deployed)
Mass:	126.3 tons (basic equipment load)
Crew:	2
Passengers:	6-12
Cruise speed:	w 2

Max. speed:	w 2.9
Endurance:	8 weeks
Weapons:	Normally none Bow lateral mounts available for 2 lasers or phaser III or IV emitters
Shields:	Navigational deflector under bow Optional 1-layer globular forcefield
Transporters:	None
SOURCES:	D TAS “Slaver Weapon” (Mark Wilson, own) (N own – SotSF Class 3 and *Tigris*) (H own)



The 2230s had brought sharp contrast between the troop transport barges and the agile warp auxiliaries. Hybridizing the two seemed anathema to both concepts: there appeared to be little doctrinal need for a compact troop barge or a spacious warp liaison boat. Yet the technological breakthroughs of the 2240s made it plausible and tempting to offer a bit more space and endurance, a bit less deck footprint, and a lot of additional power for the high end of starship auxiliaries.

The Arbin&Lidde craft that would be adopted as the Class G3 showed little in the way of advanced equipment or design to the outside. A long coffin shape about two thirds the width of the Class B8 hull supported two PB-820 or PB-821 warp nacelles on its upper corners, and featured full-width aft access, suggesting an emphasis on bulk cargo handling. To facilitate this, power generation and propulsion hardware was housed within the lower half of the craft, providing a level (if inconveniently high) floor for ease of loading and offloading cargo. The constant cross section cabin could be segmented into up to four functional compartments by extending collapsible bulkheads from the walls. Behind the aftmost of these airtight curtains, the upper part of the stern section was hinged to act as a combined ramp and elevator for personnel and cargo transfer.

The underfloor assembly also featured large fuel tanks, a pair of plasma rechargers and a proper mass reduction crystal. Through these improvements over previous warp auxiliaires, warp performance was significantly increased, with warp 2.9 available for brief moments, and warp 2 cruising assured in all conditions. Life support was boosted to match, providing up to two months of safe operations for two crew and six passengers – or up to twelve if comfort did not count! Spartan fold-out bunks and seats in the walls, combined with the partitioning bulkheads, did in theory provide sufficient accommodation standards for such extended missions, although more typically the craft would be fitted with dedicated comforts that would hinder generic cargo missions.

Only the principal power and propulsive systems as well as the main elements of the life support system could be stowed underfloor. An extended nose cone was introduced to accommodate the rest. A versatile selection of navigation sensors was provided there on a permanent basis; specialized mapping and surveillance sensors or twin energy weapons could be added to the suite as needed. For detached science operations, the craft could be fitted with laboratory/data-gathering pallets carried inside the cabin, and side sponsons could be mounted for external carriage of instrumentation or weaponry. Routine tasks still centered on cargo hauling and long range deployment of away teams, however, since the shuttle was the most compact craft capable of such missions.

These potent craft were embarked only aboard the largest of starships. Heavy cruisers, mainly the *Constitution* variants dedicated to exploration, were able to carry one at best; some heavy frigates could accommodate two. Certain *Achernar* class cruisers experimented with carrying two craft as well, but this meant using G3 exclusively, as there was no room for handling other auxiliaries when two heavy shuttles were stowed in the landing bay. Stowage on the lower hangar deck was naturally out of the question, due to lift size limitations.

A look into the cavernous interiors of a G3 through the full-width rear opening. Only the cockpit area is partitioned off in this case; the rest of the collapsible bulkheads can be seen stowed on cabin walls, while the aftmost one (with transparent midsection) is still rolling into the stowed position in this shot. Two 'jump seats' (six provided per section) and one bunk (four per section) can be glimpsed stowed as well.

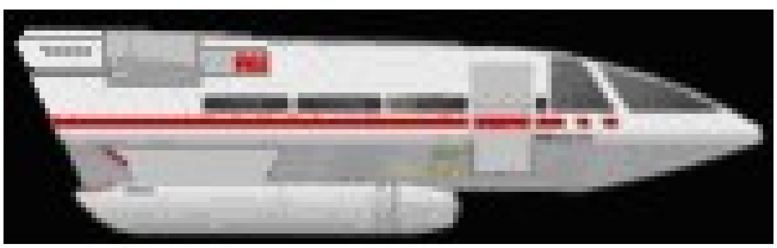
Starbases quickly adopted these craft for liaison duties, however, as hangar space was not a limiting factor there. While the shuttle could hardly be considered an independent interstellar vessel, it was very practical in connecting widely dispersed outposts within a star system, or hauling personnel and cargo across the Kashishowa perimeter in warp-hostile systems. Also, the intelligence community dabbled in the merits of the craft in operative insertion missions.

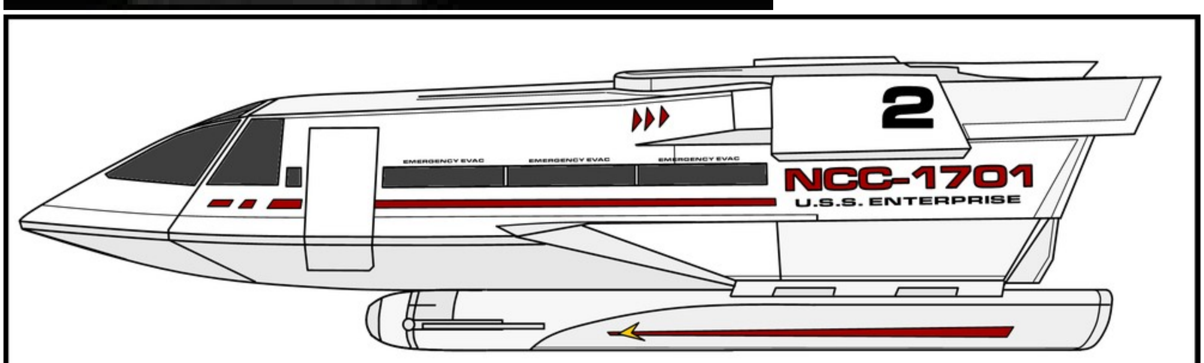
Despite the wide usership, no colorful nicknames emerged for the type, although sometimes the designation *Tigris* class was applied to the craft when they acted in detached scientific survey roles. The class never ruled sovereign in its primary cargo hauling and long range away team deployment mission, and quickly got replaced by the more refined G4 in the 2260s. On the other hand, its secondary tasks were only partially relegated to this type; the older craft had never made itself invaluable enough to call for immediate filling of the vacuum left behind. Still, the users of this craft remember it as a dependable and for its time well-muscled workhorse.

Class G4 Heavy Shuttle

2257-2279

Alt. names:	
Completed:	429
Length:	13.8 m
Beam:	5.2 m
Height:	3.8 m
Mass:	104.2 tons
Crew:	2
Passengers:	6-22
Cruise speed:	w 2
Max. speed:	w 2.9
Endurance:	8 weeks
Weapons:	None
Shields:	Navigational deflector under bow Optional 1-layer globular forcefield
Transporters:	None
SOURCES:	D STXI (N own) H STXI (own)





From outside appearances, the Chiokis Class G4 heavy shuttle design was just an inverted version of the preceding and still competing Arbin&Lidde Class G3 craft. The PB-850 nacelles on stub wings on the lower corners were not markedly more powerful than their predecessors, nor did they offer improved endurance.

There were important changes pointing towards the future of starship warpshuttles, however. The ion cascade powerplant was further compacted and mounted on the roof of the craft, while impulse engines moved to sponsons at the upper corners of the stern; fuel was stored in flat lateral tanks. As the result, the full-length flat floor now resided much closer to ground level, regardless of whether the craft rested on its engine nacelles or the four landing pads. Added ingress/egress options now became available: there were side doors just aft of the cockpit, with folding ramps reaching ground level. The stern again consisted of a powered ramp that would hinge down for loading or offloading of bulky items or small vehicles, but additionally featured two assault doors for rapid egress of personnel without the need to lower the ramp. The doors were ideally positioned and tilted for both exo- and endoatmospheric gravidropping, too.

Internally, the cockpit area got more ergonomic, and the extended nose gave way to a smoothly contoured bow with six large, unshuttered windows. Protection against small arms fire, debris or shrapnel could rather be obtained by carrying a forcefield generator in an underfloor compartment, in exchange for some fuel. A navigational deflector beam emitter was always carried under the bow, next to an array of sensors and landing lights. There was no provision for weaponry in this type, although non-modular phaser turrets were sometimes added for dedicated special operations craft.

Cabin interior in the new type could be partitioned off, although not as flexibly as in the Arbin&Lidde craft. Only the cockpit area was separated by a permanent bulkhead. The payload cabin featured long, narrow portholes and fold-out seats and bunks, but not in the sort of diversity and quantity as installed in the G3, which had been designed more with independent survey and VIP transport sorties in mind.

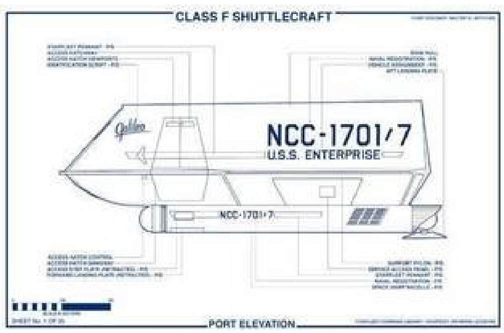
The G4 saw service as a starship auxiliary more often than the somewhat longer and clumsier G3. Such operations paved way for the merging of F and G capabilities in the 2270s; for the time being, G4 and F3 served side by side on the largest starships, while an intermediary type, the F4, was introduced by Chiokis to help out the aging F1 aboard smaller vessels.

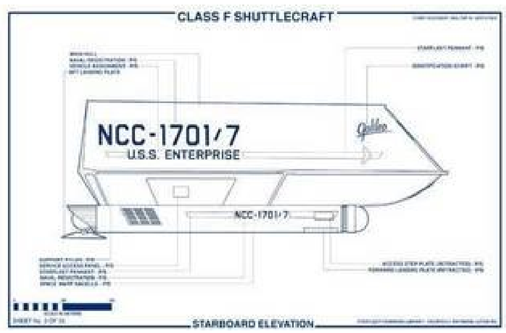
Class F3 Light Shuttle

2260-2272

Alt. names:	LSI(U)-3 S3 ‘Crate’ ‘Flying Brick’
Completed:	820
Length:	6.2 m
Beam:	4.0 m
Height:	2.1 m (landing gear retracted) 2.2 m (landing gear deployed)
Mass:	72.4 tons

Crew:	1
Passengers:	6
Cruise speed:	w 1
Max. speed:	w 1.5
Endurance:	2 weeks
Weapons:	None
Shields:	Navigational deflector under bow Optional 1-layer globular forcefield
Transporters:	None
SOURCES:	D TOS N TOS (own) (H own)





When Starfleet underwent a wave of modernization in the 2250s, corresponding upgrades of the shuttlecraft fleet dragged behind. The fleetwide introduction of second- and third-generation transporters had been expected to decrease the need for auxiliary craft drastically, and the older craft were considered capable of serving through the transition period. The operational shortcomings of the transporters soon became rather obvious, upsetting these projections. Yet only the introduction of duranium-tritanium compositing techniques made it economically viable to provide all ships of the expanding fleet with new auxiliaries.

A boxlike hull, two lightweight 45-ton PB-750 warp nacelles on the lower corners of the box, a two-ton SPCR-48 ion cascade powerplant packaged into the stern, a basic RCS system of small thrusters and gyroscopes, and minimal sensors and communication gear – the ingredients for the Class F3 light shuttle were simple enough. The duranium-tritanium hull in all its simplicity was an excellent load-carrying structure, an adequate atmospheric lifting body and an optimally shaped crew/small cargo compartment. Three-point landing gear was available for use in difficult terrain, but seldom necessary: the duranium-titanium pylon assemblies could easily support the full weight of the relatively light craft on even surfaces.

A navigational deflector was installed in the centermost of three equipment bays under the bow. A low-power shield generator could also be fitted in the aft systems compartment for operations in regions of high mass density. No combat shields were available for craft this small at the time, nor was any weaponry permanently carried. Various phaser mounts could be jury-rigged to the bow equipment bays with enough engineering ingenuity, however.

Pilot workload was low, thanks to the touchball controls that allowed effortless one-hand flying and operation of all key systems. Goosenecked or hinged retina projection displays were originally installed for additional info feed, but later replaced by simple flat-panel info screens.

Instrumentation not related to actual piloting was minimal, consisting of simple magnetometers, proton spectrometers and subspace gradiometers for rudimentary mapping use. Special survey packages displacing up to 70% of passenger space were available, but installing them into the cabin was an awkward affair due to the narrow doorway. Subspace communications were limited to a single narrow-band transceiver with 2 ly range.

Thanks to the wonderfully compact yet capable design, the Class F3 shuttle (no official class name given, although unofficial ones were a legion) soon became the standard starship warp auxiliary. These craft were mass-produced and widely deployed aboard starships between 2262 and 2272. Large cruisers sometimes carried as many as four, despite having transporters and carrying other, more specialized auxiliary craft. The lack of a cargo door in the F3 usually meant that dedicated heavy shuttles had to be carried as well. The small doorway and absence of proper weapon hardpoints also precluded planetary assault missions, but the cruisers weren't tasked with these anyway. If need be, a *Benares* class hopper or four could be embarked for assault, keeping up the tradition of multiple narrow-scope auxiliary types even when the F3 already paved way towards true multifunctionality.

The admirable low-warp performance and reliability of the Class F3 craft led to their use in demanding detached exploration operations, even though the life support systems were primitive by today's standards. Current Starfleet operational rules would limit the operations of such craft to a maximum of two days, but several multi-week missions were performed in the mid-23rd century.

Class F4 Medium Shuttle

2264-2276

Alt. names:	MSI(U)-4
Completed:	340
Length:	8.4 m
Beam:	5.4 m
Height:	2.8 m
Mass:	89.2 tons
Crew:	1
Passengers:	7-9
Cruise speed:	w 1
Max. speed:	w 1.6
Endurance:	2 weeks
Weapons:	None
Shields:	Navigational deflector under bow Optional 1-layer globular forcefield
Transporters:	None
SOURCES:	D TAS “Mudd's Passion” (N own) (H own)

By 2264, the cargo-carrying shortcomings of the light basic Class F3 were well acknowledged. Although transporters still were the principal means of moving equipment to and from planetary surfaces, and although shuttlecraft hardly offered sufficient range and speed for independent cargo operations, there would always be a need for moving objects larger than a standard humanoid – say, crucial spares or ground action weapons – in transporter-hostile conditions.

The only real requirement for the cargo auxiliary was an access door of 200 by 140 cm or better. Thus, it was simple enough to apply basic Class F3 components in somewhat increased quantity or dimensions. The hull box was stretched to 8.42 by 5.30 by 2.41 meters, the nacelles lengthened by 1.2 meters for carriage of extra fuel (but not extra field coils, so mass increase with respect to F3 was minimal), and one impulse nozzle added to the original eight. All nozzles could be individually shuttered to facilitate outdoors stowage of this Class F4 craft, a strongly discouraged procedure for the tenderer F3. Four landing pads were used, in hull corners inboard of the nacelles in the style of the corresponding G craft.

Only a minor performance increase was attempted, as the F4 was intended to provide utility services at low cost, not to compete directly with the fast and long-ranged G3. Warp 1.6 could be coerced out of the engines mainly thanks to improved intercooling capacity – the longer nacelles also provided 120% more radiator surface area.

Actual service life of the type proved to be short. First starship deployments came in 2267, but not in support of the F3s as originally envisioned. Instead, the craft were paired with the older F1, the complex multi-level layout of which was even less suited for bulky cargo handling. There was understandably very little interest in the utility shuttle beyond the odd cargo run. The craft were seen as nuisances that took up deck space, and there were increased demands for a proper utility type, one that would replace F3, F4 and the old F1 at one stroke.

For the technology of the 2270s, this certainly wasn't an impossible goal. And ultimately, the engineering concepts that solidified into this single all-purpose type did so in a form that resembled the F4 more than anything else.

Class C2A/C2B and Type 30 Aquashuttle

2265-2318

Alt. names:	AQS-2A/B ‘C-monster’ *Seahay*/*Seabee* class
Completed:	103 total: 40 Class C2A 42 Class C2B 28 Type 30 refitted from Class C2B and 21 built
Length:	16.2 m (C2A/B) 17.4 m (Type 30)
Beam:	10.4 m
Height:	4.1 m
Mass:	246.2 tons (C2A) 247.0 tons (C2B) 340.8 tons (Type 30)
Crew:	2
Passengers:	2-6
Cruise speed:	w 1
Max. speed:	w 1.9 (C2A/B)) w 3.0 (Type 30)
Endurance:	2 weeks (C2A) 4 weeks (C2B, Type 30)
Weapons:	2 phaser IV emitters forward of the cockpit (C2A/B only)
Shields:	None (original) 1-layer globular forcefield (upgrade 2273, Type 30)
Transporters:	None
SOURCES:	D TAS “Ambergris Element” (Howard Weinstein “Deep Domain”) (N own) (H own)

For exploring the oceans of newly discovered planets with maximum efficiency, Starfleet in 2261 ordered from Bruce-Partington SCW the development of a special environment craft utilizing some Class G3 components coupled with a streamlined hull and magnetohydrodynamic underwater propulsion. The challenges of combining the contradictory requirements of a short-range warp spacecraft, a transatmospheric vehicle and a submarine into a single spaceframe were immense.

Nevertheless, after four years of development, two designs emerged: one for starship and one for research outpost use. Both were classified under the letter C, as Types 2A and 2B. The initial unflattering nickname ‘C-monster’ eventually got moderated as oceanic exploration personnel gained an appreciation of the very special proficiency of these craft.

Class C2A shuttles were deployed aboard exploration starships only in special cases, i.e. when exploration of a water-covered area was expected to be part of the starship’s mission. This was understandable, since a single craft would occupy the entire landing deck and more or less preclude the use of all other types of auxiliaries. The C2A craft were capable of carrying six research crew, and generally required two pilots to operate – one for atmospheric entry and one specializing in underwater piloting – although pilots eagerly competed for double proficiency. The C2B usually operated a smaller researcher contingent, having a more restrictive internal arrangement typically optimized for local conditions and research needs.

Propulsion was fourfold. To expedite systemwide operations from a single base of operations, both types were equipped with PB-900 series warp nacelles. Although major nuisances for their aero- and hydrodynamic drag and more than 100 ton mass, they offered warp 1.9 performance, enough for short interstellar sorties if need be. For atmospheric entry maneuvering, small impulse units were housed astern, and a full range of thrusters provided in the catamaranlike, downcanted sides of the hull. The shape of the main body provided aerodynamic lift in a nose-up attitude, and also enabled the shuttle to skim on surface effect across the oceans with minimum energy expenditure. In these modes, the impulse engines were turned off; the thrusters were augmented by magnetic drives in sea-skimming mode. As the craft settled into water and entered diving mode, the magnetic drives became the primary propulsion method.

Even though the atmospheric system could be tied to emergency water displacement and flotation systems, no physical ballast was needed for normal diving. The craft had a very slight positive buoyancy in moderately saline water; in horizontal cruise diving, this was offset by the hull shape which created a downward force vector, as well as by trimming gravs, and at slow diving speeds, main gravs were used to hold the craft down. Landings on dry land or flight decks were controlled by the same main gravs, on reverse mode. The duranium-titanium hull required no special landing pads on approximately level ground, although quadruple pads could be deployed from under the main hull in difficult landing conditions.

The partially wrecked Cousteau *(NCC-1701/20, representing the Type 30 upgrade) is recovered from the inhospitable shores of Akkalla on SD 7829.3. Remarkably resilient to damage, the ‘C-monster’ saw use not only in oceanographic and biological research, but also in assorted rescue and insertion/extraction missions.*

The passenger compartment formed a sleek protrusion atop and below the catamaran-like hull. Two wide curved windows provided excellent underwater view both up and down, although sonar and mass-pointer information played through traditional retina-projection displays was essential in the murky conditions common in most bodies of water explored. Perfect situational awareness was important for aquashuttle pilots above the surface as well. Mere negotiating of shuttlebay doors with the sluggish giants was a challenge requiring more than a passing familiarity with autopilot overrides. In atmospheric handling, an inconvenient nose-up attitude had to be adopted to keep the craft under aerodynamic control. Final approach and water contact could be tricky as well, due to the dynamic nature of the landing surface.

Only a synthetic view down was available to the forward stations, however; the lower part of the cabin was partitioned off into a separate observation crawlspace. Numerous floor hatches on the upper deck could be opened for desired crawlspace access, although normal passage was through the sternmost openings that also served general ingress and egress. The 2A model featured small single-person airlocks with simple inner forcefield curtains and outer mechanical doors. Class C2B introduced a single large airlock with a proper all-mechanical system for reliability and ease of maintenance. The 2B variant always carried a variety of watersuits, while Class C2A usually relied on simple masks, airsacks and life support fields. The C2B sacrificed some thrusters and impulse fuel tanks for a greater range of underwater sensors and tools. Both types had a pressure limit of 60 MPa, translating to a maximum diving depth of 6000 meters on a typical Class M planet. Dedicated submarines were required in deeper waters, like the 44.2 km Divider Trench on the southern hemisphere of Pacifica.

Modular mounts for phaser III or IV units were initially provided on both types. In addition, underwater probes, stun darts and autonomous harpoons could be carried. A deflector shield was introduced in 2273 both for the existing craft and for the upgraded Type 30, of which 28 were manufactured from existing C2B hulls and 21 more built from keel up. Typical of the 2270s refitting spree, Type 30 mounted LN-46 improved linear-excitation warp engines in neat lateral cowlings and a new twin-chamber reactor in an extended aft hull, and was capable of warp 3.0 top speed. With navigational sensors substituted for the phaser mounts, the type was suited for semi-independent interstellar missions. As the craft retained the 10.4 m beam of the original design, though, it could be operated from aboard starships as well.

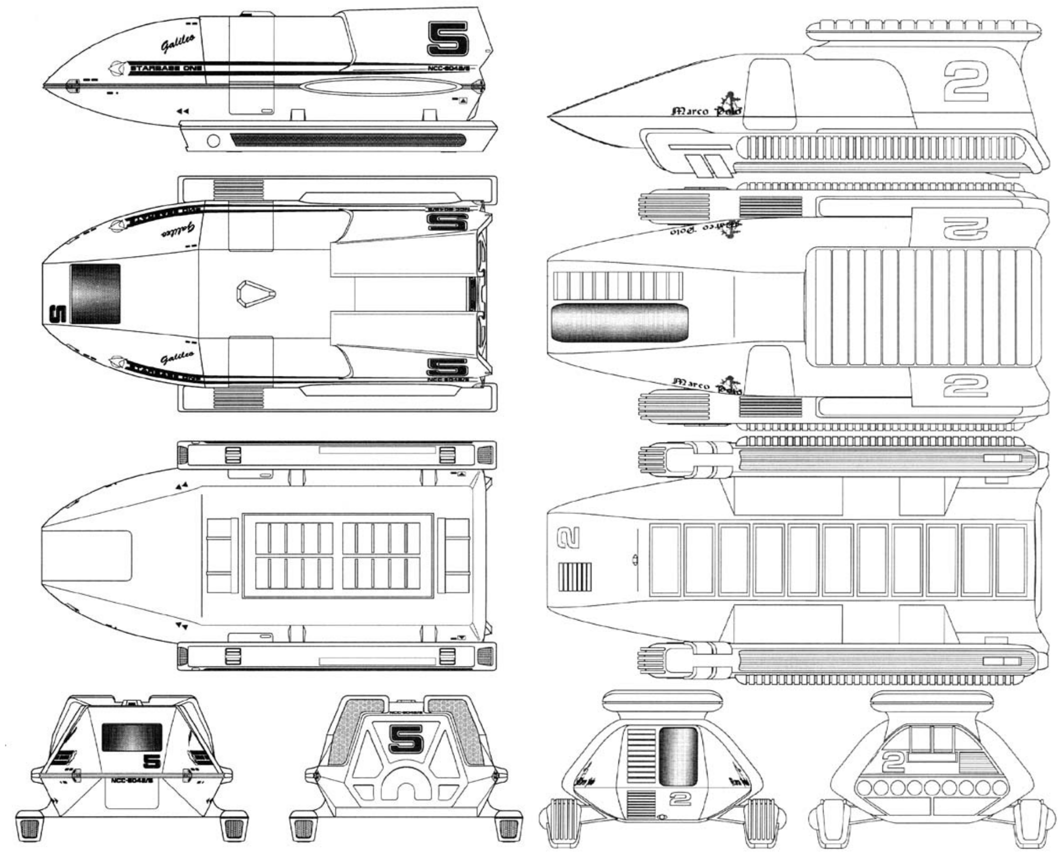
A typical deployment for Class C2B craft was on a research outpost circling a waterworld, although some planetside outposts also obtained these craft instead of dedicated submarines – after all, the sea-skimming and rudimentary flight and spaceflight capabilities of the type were a major bonus for planetwide exploration. The boosted Type 30 could perform the same mission profile from more distant bases if needed. The lower endurance and degree of sophistication of Class 2A made it the chosen starship auxiliary during the first decade of operations, until wear and tear prompted transition to the newer Type 30 units.

The 2B craft seldom visited more than one planet in their lifetime, while the 2As were circulated between various outposts and starships, and also visited planets outside Class M parameters. The craft were especially useful in the thick atmospheres of midsize Class I and J gas planets, exploring these depths for possible gas mining operations. After the turn of the century, operations of both the older types had been spun down and Type 30 craft ruled sovereign, having found more spacious homes aboard the new *Excelsior* and *Apollo* cruisers. The versatility of the shuttle-submarines proved their ultimate undoing, though: by dropping the warp and impulse propulsion aspects, Vulcans had been able to miniaturize the remaining capabilities into a shuttlepod hull dubbed the *Ballard* class in Starfleet use. This category of craft would form the core of Starfleet underwater exploration effort in the 24th century; the ‘C-monsters’ would all be sold forward to civilian operators by 2319.

Type 1 Medium Shuttle

2271-2358

Alt. names:	MSM(U)-1 *Merlin* class MSM(AU)-1 *Martel* class MSM(S)-1 *Marco Polo* class
Completed:	870 total: 730 MSM(U)-1 92 MSM(AU)-1 48 MSM(S)-1
Length:	7.6 m
Beam:	4.4 m
Height:	2.5 m (standard and assault variant) 2.8 m (survey variant)
Mass:	124.8 tons (standard) 181.1 tons (assault variant)
Crew:	2 (standard and assault variant) 4 (survey variant)
Passengers:	10 (standard) 6 (assault variant) None (survey variant)
Cruise speed:	w 1.1
Max. speed:	w 2.0
Endurance:	6 weeks
Weapons:	Normally none Nacelle hardpoints available for 2 phaser III or IV emitters
Shields:	Navigational deflector on top of hull (standard and assault variant) Navigational deflector on ventral bow (survey variant) 1-layer conformal forcefield (assault variant)
Transporters:	None
SOURCES:	D STV:TFF (*Marco Polo* Eric Kristiansen) (N own, Eric Kristiansen) (H own)



The Type 1 medium utility shuttle was a direct descendant of the latest Class F and G designs of the previous decade, and the first to abandon the confusing class letter system. Despite maintaining the compact dimensions of Class F, the basic hull form was economically refined to improved lifting-body shape resembling the G4. Also, engine systems were packaged more efficiently: impulse engines into two slightly protruding cowlings, fuel into lateral sponsons, and the main reactor snugly into an underfloor compartment. This all left room for a rear exit equipped with a powered ramp/hatch, and enabled the loading and offloading of outsize cargo, as well as quick disembarking of landing parties in combat situations.

Warp performance was increased to maximum warp 2.0, stretching the power output capacity of the tiny onboard reactor to the utmost. The 60-ton LN-101 engines of CWD manufacture represented true linear-coil technology in every respect, including the full plasma recycling loop that made the craft both more economic and stealthier. A corresponding downscaling of ramscoop systems was effected, since there would have been little point in increasing the propulsive endurance of the craft beyond the six-week limit of the onboard life support systems.

Pilot awareness was increased with the addition of virtual-focus perimeter sensors, feeding ‘third-person’ imagery that greatly assisted in maneuvering in cramped spaces. The multiple cockpit windows of previous classes were joined into a single wide-angle window, and the mechanical shutters replaced by a simple electrochemical shading system. The navigational deflector system was moved from bow to a rooftop mount, and the ventral lift gravitics were liberated of their former mechanical shutters; the resulting changes in profile were quite minimal.

Starships earlier equipped with the F1 or F3 designs and their accompanying aft-loading cargo hauler counterparts converted gradually to an integrated fleet of Type 1 craft in the early 2270s. In many cases, any heavy shuttles aboard were simply offloaded since the improved cargo doors, range and speed of the medium craft made them redundant. While the confessed aim of the Type 1 project had been to replace as many different types of starship auxiliary as possible on one stroke, special variants of this type were in turn now introduced. Combat shields were an option for a special assault variant, eating considerably into the cabin volume and increasing total mass. Two phaser III or IV units could be attached to the nacelle front ends for special operations, a capacity eventually extended to standard utility models as well. Two such craft put one *Rhino* assault barge out of work; no *Rhinos* were shipped from 2270 on. The manufacturer promoted the name *Martel* for the attack craft, in distinction from the *Merlin* utility type.

While only dedicated strike vessels carried the assault variant, a special survey auxiliary was fielded aboard various cruisers and frigates on exploration or patrol missions. The *Marco Polo* model featured a reshaped forward hull where the starboard pilot's station was replaced by a sensor array, the viewport changed to a long vertical slit, and the rooftop decorated with a large subspace antenna; the navigational deflector was moved to beneath the bow. Additional sensors were clustered astern, and the aft ramp omitted altogether. A crew of three was needed in addition to the pilot to operate the sensor gear in missions ranging from covert surveillance to planetary resources mapping.

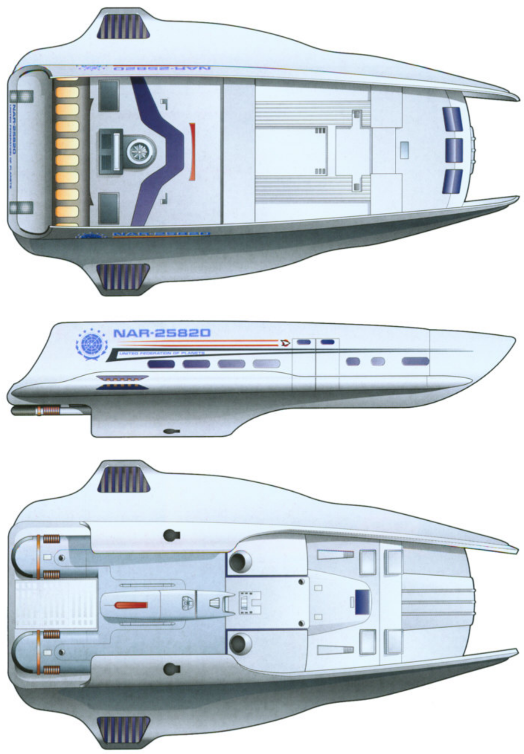
In the 2340s, the Type 1 craft were joined and later largely succeeded by Types 5 and 6. Some of the older shuttles still continued as secondary starbase or outpost auxiliaries, however. A number were refitted with LN-208 engines that reintroduced large ramscoops for improved propulsive endurance, but few received corresponding upgrades in life support systems. In the late fifties, non-Starfleet operators eagerly purchased the retiring craft for general utility applications. Their technology is still far from outdated, and the large production numbers (nearly 900 craft completed) also provide longevity for the type.

Type 20/27 Atmospheric Shuttle

2273-

Alt. names:	MBA-20/27 *Lifter* class
Completed:	420 total: 300 Type 20 120 Type 27
Length:	26.1 m
Beam:	12.0 m
Height:	7.3 m
Mass:	72.4 tons (Type 20 standard) 81.0 tons (Type 20 ground assault variant) 298.2 tons (Type 27 standard)
Crew:	3
Passengers:	6-48
Cargo:	120 tons (Type 20) 100 tons (Type 27)
Cruise speed:	Sublight (Type 20) W 1.4 (Type 27)
Max. speed:	Sublight (Type 20) W 2.6 (Type 27)

Endurance:	1 week
Weapons:	None
Shields:	Navigational deflector on ventral midhull 1-layer conformal forcefield (ground assault variant and general upgrade in 2321)
Transporters:	1 emergency evacuation (2-pad); Mk III (original) 1 emergency evacuation (6-pad); Mk VI (upgrade in 2342) 1 GP (2-pad) Mk VI (some Starfleet craft)
SOURCES:	D ST6:TUC, ST:GEN (N own) (H own)



Despite the maturing of transporter technology, both Starfleet and various civilian operators still needed heavy atmospheric shuttles for ground-to-orbit movement of passengers and cargo. In the mid-2270s, after two fruitless requests for proposals from civilian contractors, Starfleet decided to develop a modern version of the venerable *Rhino* class (from 2275 on dubbed "Type 25") ground-to-orbit barges which were showing definite signs of geriatric troubles. New technology allowed for much more efficient packaging of both impulse and thruster systems; also, compact transporters could now be installed in the larger auxiliaries for emergency evacuation purposes. Most importantly, the gravitic landing techniques refined for use in starship auxiliary craft could now replace the clumsy and primitive gas-heaters used for lifting the *Rhinos* off the ground.

A conservative Shintoi lifting hull was chosen as the basis of the design. A single deck with a level floor extending from the very bow to the aft engine block enabled a variety of internal configurations to be used. For passenger transport duties, eight rows of six seats were usually installed, although luxury interiors for 12 persons were also used for ferrying Starfleet command personnel or civilian dignitaries. Doorways were provided on both sides of the cabin, with ground access ladders folding out from the lateral airfoil segment the doorway intersected. A wide 2.2 m by 3.6 m cargo door was installed on the cabin ceiling, allowing the loading of large machinery or palletized cargo via offboard means. Combi versions were also frequently used, with 6-18 seats provided in a partitioned-off pressure compartment at the stern and cargo stored forward under the loading door.

Apart from the main fusion reactor and the ten-nozzled impulse engine, all major machinery was installed below the main deck floor. Most of the lower mid-hull was dedicated to fuel tanks and support systems. Short-span wings ran the length of the hull, their aft segments housing lift engines combining fusion heating of air and direct gravitics, compact and elegant compared with the huge lifting rockets of the *Rhino* design. Additional, more conventional lift nozzles were provided under the forward mid-hull and laterally amidships. Emergency transporter emitters were fitted on both sides of the lower forward heatshield, and an enclosed navigational deflector housed centrally under the bow. The sides of the lower hull were protected by aerodynamic cowlings, but the deflectors provided additional protection and manipulated the primary airflow for optimal atmospheric performance.

A crew of three was needed to pilot the craft in normal operations. The flight deck was separated from the main deck only by a thin pressure wall and a simple set of doors. Three large windows provided excellent view forward and up, while virtual-focus perimeter sensors were now standard and allowed for full crew awareness in docking and landing.

Some 220 of these *Lifter* class ('Type 20' in the new system that hoped to distinguish broad mission categories by the first digit of a two-digit code) craft were distributed to various UFP space transport services between 2275 and 2284. Additional units were ordered by Starfleet for starbase support duties, and some 40 craft configured for ground assault support, complete with shield generators installed within the cabin. The latter were deployed exclusively aboard carriers, since cruiser or dreadnought hangars were far too cramped for the bulky craft.

In the early 2320s, Starfleet began deploying the Type 20 atmospheric craft aboard its large explorer starships. At around the same time, suitably compact technology was developed to allow the introduction of Type 27, a warp-capable variant that otherwise was basically identical to the original. Thanks to the new main power source, mass increase from the ventral mounting of warp coils could be totally compensated for, and impulse acceleration actually improved as the result. Since the reactor ate into cargo hold volume, though, maximum load went down by almost ten percent.

By 2350, more than 130 of the heavy lifters were in deep space duty aboard explorers and modern heavy cruisers, although only one or two per starship were carried. The craft were typically of Type 20, and mainly used as personnel and cargo transports for colonization or evacuation missions. The type still serves in this role, with completely overhauled computer systems and engines, and is supposed to soldier on at least until the mid-2380s. The niche for barges where no cargo or passenger room is needlessly sacrificed for FTL propulsion still exists both in Starfleet and civilian applications. The supposedly more advanced Type 27 has succumbed to modern competition due to its quickly outdated propulsion systems, though.

Type 31 Aquashuttle

2274-2348

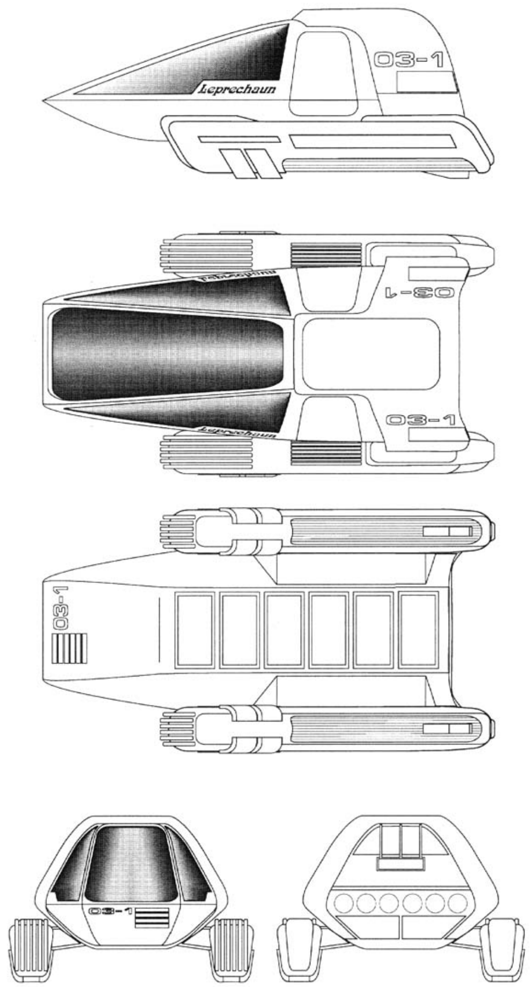
Alt. names:	AQSP-31 *Ballard* class
Completed:	54
Length:	m

Beam:	m
Height:	m
Mass:	76 tons
Crew:	2
Passengers:	2
Max. speed:	w 1.2
Endurance:	4 weeks
Weapons:	2 phaser IV emitters on dorsal hull
Shields:	1-layer globular forcefield
Transporters:	None
SOURCES:	(D FSIC/Mark Wilson) (N Mark Wilson, own) (H own)

Type 2 Light Shuttle

2283-

Alt. names:	LSM(P)-2 *Leprechaun* class
Completed:	180
Length:	7.4 m
Beam:	3.7 m
Height:	2.2 m
Mass:	66 tons
Crew:	2
Passengers:	2
Cruise speed:	W 1.2
Max. speed:	W 2.0
Endurance:	8 weeks
Weapons:	None
Shields:	1-layer conformal forcefield
Transporters:	None
SOURCES:	(D Eric Kristiansen) (N Eric Kristiansen, own) (H own)



As the Type 1 utility craft asserted their role as jack-of-all-trades auxiliaries, there were concerns among both manufacturers and operators that Starfleet would stop procuring special types of shuttlecraft. The somewhat out-of-proportion alarm took the form of many requests for such types, including special environment craft, tactical craft and various sensor platforms. After a swift analysis and selection process, Starfleet could inform the concerned parties that at least two types would get the go-ahead at earliest convenience. A heavy, long range shuttle would be part of the inventory soon enough – and a light personnel mover would be offered as an alternative to transporters for missions of rapid insertion and extraction.

This latter type may be seen more as a response to manufacturer concerns than as a true operative requirement. The time to prepare a Type 1 for launch was certainly not excessive, nor did the type's signature make it unsuitable for tactical insertion work. Moreover, the special type ultimately offered, the *Leperchaun* by Chiokis, had basically the same deck footprint as the company's *Merlin*. Yet this 'light' shuttle at least lived up to its name by having a total mass of only 66 tons for a top speed of full warp two.

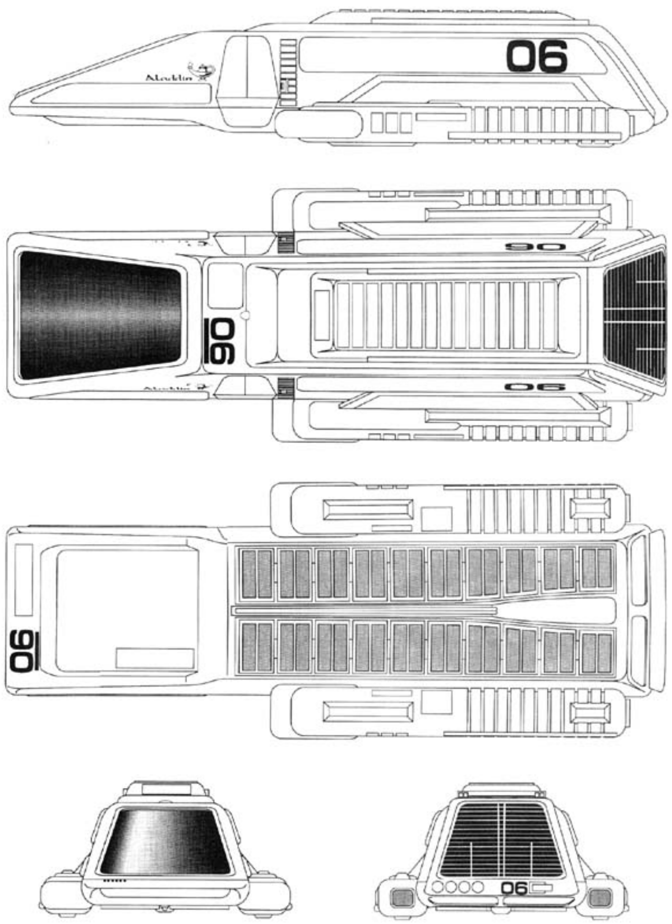
Two relatively awkward side entry doors over the nacelles allowed the two crew and two passengers in and out of the spacious craft. Six-element gravlifts gave good maneuverability at landing and takeoff and in ground effect flight, and a six-nozzle impulse drive combined with an aerodynamically sleek nose catered for good linear velocity and sonic boom reduction in horizontal atmospheric flight. These qualities were put to use mainly in classic reconnaissance work, perhaps more in demand during the tumultuous 2280s than usual. It was typical for a frigate or a cruiser to swap one of its *Merlins* for a *Leperchaun*, and for through-deck cruisers on special intelligence missions to stock several of the light craft.

However, user experiences very quickly tilted the opinion in favor of generic utility types, and most *Leperchauns* vacated the frigate and cruiser decks by the mid-2290s already. They found more use planetside, becoming VIP transports of sorts for outposts that operated multiple shuttles and regularly moved personnel across planets or interplanetary distances. Aspirations of greater importance remained, and Chiokis as well as competing manufacturers kept on devising means of giving faster response time, greater speed and a greater range of available onboard equipment to light shuttlecraft. Ultimately, Type 12 would come to feature all these abilities and complement the contingent of utility types on 2370s starships.

Type 3 Heavy Shuttle

2288-2363

Alt. names:	HSM(U)-3 *Aladdin* class
Completed:	396
Length:	15.3 m
Beam:	5.7 m
Height:	3.0 m
Mass:	162.4 tons
Crew:	3
Passengers:	6-14
Cruise speed:	W 1.2
Max. speed:	W 2.1
Endurance:	8 weeks
Weapons:	Normally none Nacelle hardpoints provided for 2 phaser IV emitters
Shields:	1-layer conformal forcefield
Transporters:	None (original) 1 emergency evacuation (2-pad); Mk VI or VII (upgrade 2358)
SOURCES:	(D Eric Kristiansen) (N Eric Kristiansen, own) (H own)



When the large Class G4 shuttlecraft were withdrawn from service aboard starships in the late 2270s, a successor type was not immediately available. After all, the withdrawal had been largely as the result of the unwieldy deck footprint of the older type, not due to a performance shortcoming or an outdated aspect of engineering. Modern starships were little better than the 2240s ones in terms of auxiliary craft handling facilities, and the role of large, long range transport shuttles was still a niche one.

Yet even small niches warranted filling eventually. The direct heir to G4 was built with the principal limitations of the predecessor in mind: the Type 3 heavy shuttle was ten centimeters narrower and trimmed a whole meter from total height when landed, essentially without sacrificing any payload volume. Bow instrumentation was further compacted and distributed under the forward cabin floor and above the main hull box. The concept of a continuous aft payload volume was retained, with a flat cargo floor extending to a powered aft ramp with a pair of assault doors, and with collapsible sectioning bulkheads to divide up the volume as needed. The bow cabin was separated by a more permanent bulkhead just aft of an entry foyer which featured a portside boarding hatch, a starboard sanitation compartment, aft access to the payload area, and forward door to a three-person cockpit.

The pilot and copilot faced forward under an acutely slanted windshield that had almost 8 m^2 of adjustable-transparency area. To starboard was the cargomaster station from which various onboard systems could be monitored and controlled. This was readily configurable for the operating of modular payloads in the cargo area, including just about anything from sensor packages to probe racks to individually packed gravitic mines. Passenger count was somewhat reduced from G4, though, as the life support systems could only be compacted so far before capacity was lost: fourteen people in the aft compartment was the maximum permitted load for the up to eight-week missions. Extension packages could of course be carried to provide life support for much longer missions, but at the expense of passenger space and comfort, and long sorties were typically flown with at most five people aboard.

Speed was another aspect downgraded from G4, as the closely tucked engines were run at relatively modest power levels and only rated for warp 2.1 top speed. In practice, it was possible to crank up the propulsion system to warp 2.9, provided that power to shielding was increased as well and no personnel needlessly prolonged their stay in the aft compartment – a useful feature for the scouting missions that Type 3 often ended up performing.

The heavy shuttle was usually only seen singly, aboard those frigates and through-deck cruisers with enough deck space to comfortably operate the type. Even *Constellation* cruisers typically settled for more compact types, as two Type 1 craft could be stowed in place of a single Type 3. It was only with the introduction of *Excelsior* and *Apollo* cruisers for frontline exploration duty that Type 3 began to see widespread use. Up till the 2360s, the craft remained a primary heavy cargo mover for the largest exploration starships, receiving all-new impulse engine accelerator coils in 2340 and onboard emergency transporters in 2358. Transition to Type 9 was smooth enough, although many crews grumbled about the primitive and complex flight controls and navigation systems that never were properly updated during the seven and a half decades of operations.

The 'official nickname' for the design was *Aladdin* class. As with the supposed '*Tigris* class', though, nicknames never truly caught on in the user community – perhaps because heavy shuttles have typically been considered standby hardware, only to be broken out for infrequent special missions. The somewhat more somber practices prevalent in Starfleet today have ensured that the successor Type 9 remains anonymous officially as well as unofficially.

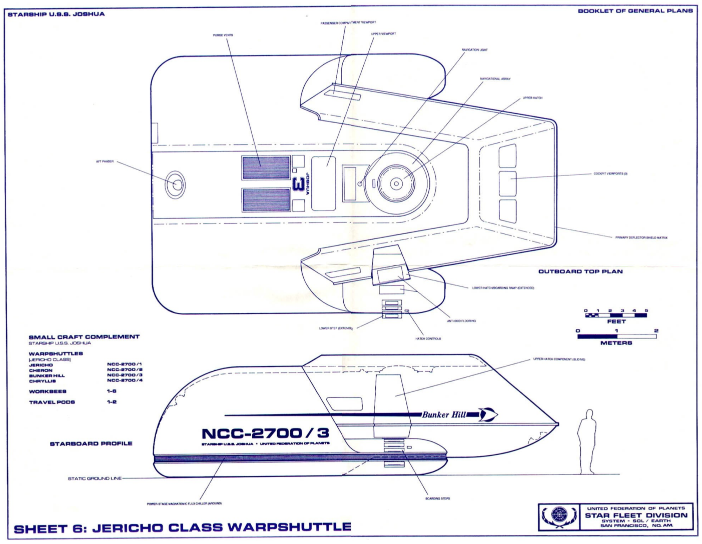
Type 4 Medium Shuttle

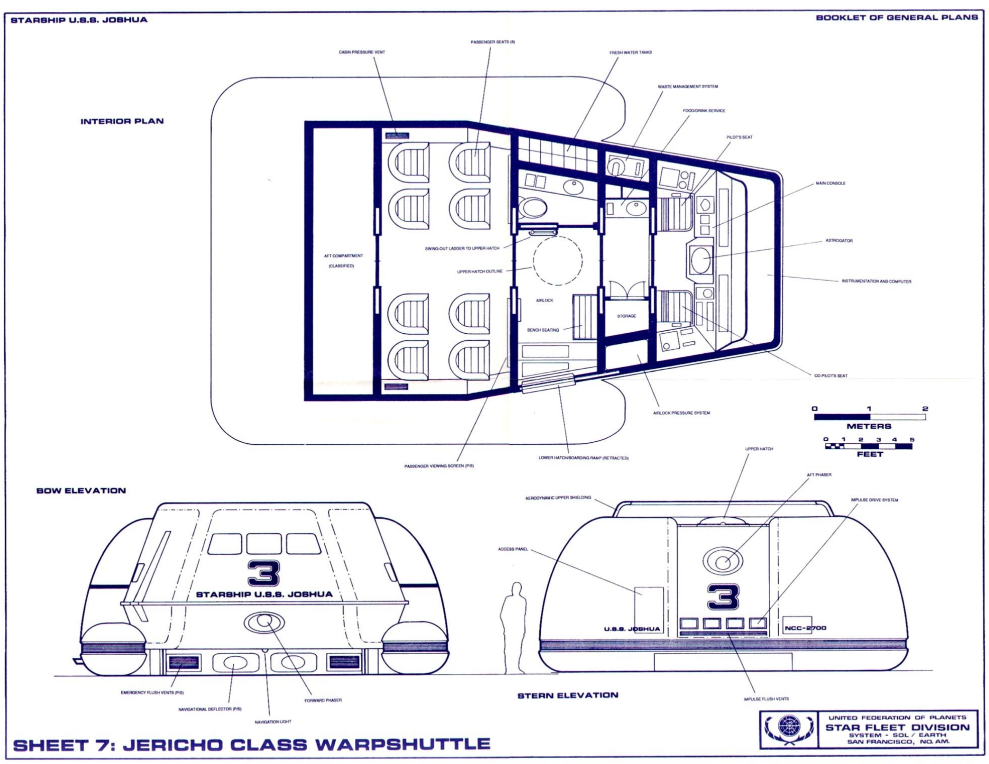
2329-

Alt. names:	*Jericho* class MSM(P/U)-4
Completed:	525
Length:	10.3 m
Beam:	6.4 m
Height:	3.1 m
Mass:	5.7 tons plus nacelles
Crew:	2
Passengers:	8
Cruise speed:	W 1.7
Max. speed:	W 2.0
Endurance:	8 weeks
Weapons:	Phaser IV emitter on ventral bow Phaser IV emitter on dorsal stern
Shields:	1-layer conformal forcefield 2 navigational deflectors on ventral bow

Transporters: None (original)
1 emergency evacuation (1-pad); Mk VI or VII (upgrade 2358)

SOURCES: (D Shane Johnson)
(N Shane Johnson, own)
(H own)





For more than half a century, the Type 1 medium shuttle offered the best possible balance of features for a starship general utility auxiliary. There was little hope of coercing more speed out of a craft intended to fit on a hangar deck, and little need to carry greater quantities of cargo or passengers or to embark more diverse onboard equipment.

For certain applications, however, special craft still were a necessary evil. Administrative auxiliaries, small craft specializing in transport of key personnel and their immediate belongings, did continue to evolve. This was partially due to the fact that such craft would operate from starbases and outposts more often than from aboard cramped starship hangars. Slightly more performance and luxury could thus be packed into the craft, and limitations on external dimensions could be relaxed. Conversely, many of the modern starships could embark these larger shuttles and runabouts, even when there was no actual desire to field such types for regular shipboard use. This in mind, Star Fleet Division in the 2310s and 20s produced a range of designs capable of carrying up to ten passengers in comfort that included individual seating, onboard galley and shower and toilet facilities, a separate luggage compartment, and a full airlock. These utilized WF series warp engines capable of multiphasic operations, and generally enjoyed a sustained cruising speed of warp 1.7.

The model chosen for deployment aboard large frontline starships was in 2329 designated Type 4 medium shuttle, also known as the *Jericho* class. This 5.7 ton hull mass craft was configured for two crew and eight passengers, accommodating these in a separate side-by-side control cabin forward and a single-aisle, two-row compartment amidships, with an airlock in between opening starboard (via standard planetfall door) and up (via FI2/L standard light docking hatch). To port of the airlock was a sanitary space, and forward of it an entry foyer to the control cabin with a compact galley to port and an equipment locker to starboard. Aft of the passenger space was a broad luggage compartment, separated by a centerline door. These accommodations were all enclosed in a traditionally boxy pressure hull little different from the Class F or Type 1 shape, with conservatively small viewports.

Outside the pressure hull extended a propulsive section of more flowing shapes. The WF-23 nacelles were faired smoothly so that only their forward ends protruded from under the broad shoulders of deuterium tanks. The warp core was located between the nacelles, with antimatter ejection hatches and plasma expander panels in a shallow centerline indentation that ran from the dorsal docking hatch all the way aft and down. In this indentation were the antennas of the versatile communication system, the four nozzles of the impulse drive, and the up- and aft-facing phaser IV emitter that provided major defensive firepower. A similar emitter was located at the lower bow, and there were twin navigational deflectors underneath it. Shielding was of exceptionally good, cutter or runabout standard. The personnel to be ferried in this manner thus enjoyed a level of protection unprecedented in small auxiliaries.

Typical assignments for Type 4 were *Ambassador* explorers, *Excelsior* and *Apollo* cruisers and *Joshua* command ships. Smaller vessels in the cruiser category seldom embarked the craft, due to their somewhat excessive beam, similar to that of a scoutcraft or an assault shuttle. Star Fleet Division strove to address such concerns, pursuing engine technologies that would allow further compacting while retaining the overall configuration of laterally faired power and propulsive systems. The results would ultimately be adopted as the Type 7 medium shuttlecraft, a slightly more utilitarian and significantly less beamy liaison design that still could meet the requirements of an administrative auxiliary. The *Jericho* type was withdrawn from starship service in the 2360s, but continues a successful career as starbase support craft and VIP transport.

Type 5/6 Medium/Light shuttle

2353-

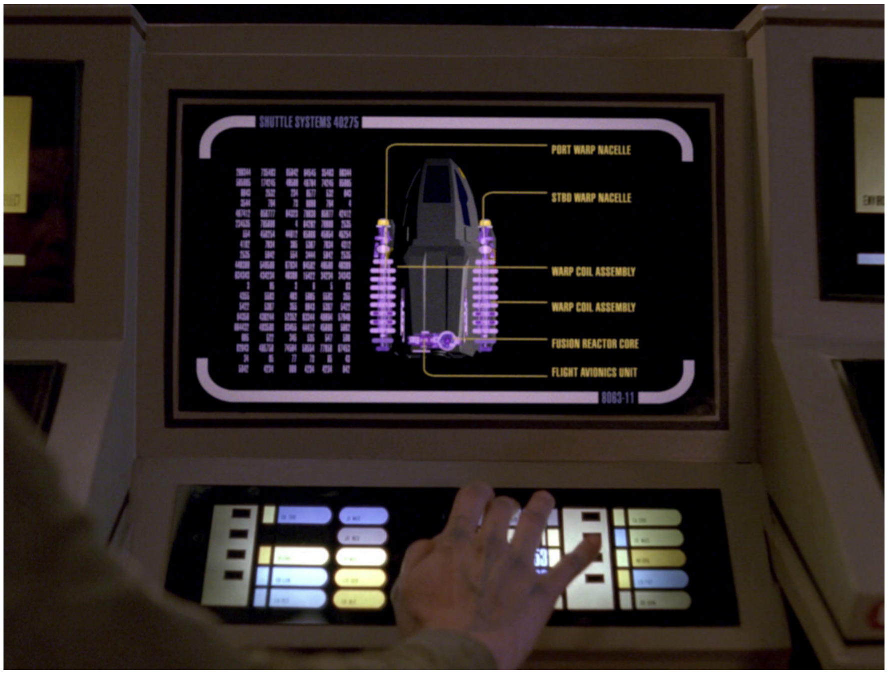
Alt. names:	MSM(P/U)-5 / MSM(U)-5A / LSM(P/U)-6 “Shoebox” “Widowmaker”
Completed:	9,342
Length:	7.6 m (5/5A) 6.0 m (6)

Beam:	4.3 m (5/5A) 4.4 m (6)
Height:	2.7 m
Mass:	73.7 tons (5/5A) 63.4 tons (6)
Crew:	2
Passengers:	6-10 (5/5A) 4-6 (6)
Cruise speed:	W 1.2
Max. speed:	W 2.0
Endurance:	8 weeks
Weapons:	Normally none Nacelle hardpoints provided for 2 phaser IV emitters
Shields:	1-layer conformal forcefield
Transporters:	None (original) 1 emergency evacuation (1-pad); Mk VI or VII (upgrade 2356)
SOURCES:	D TNG N TNG (H own)

Advances in material technology and warp propulsion were incorporated in the Type 5 and 6 shuttlecraft. Basically, they retained the spaceframe of the venerable Type 1, but pure duranium structure reduced weight and increased strength. Structural integrity fields could be applied over nacelle assemblies, and more power was available for weapons mounts or other special gear. Type 5 retained the Type 1 external contours, but added a larger window for the control cabin, made possible by new materials. Type 5A added side windows for the aft cabin as well. Type 6 was shortened to 6.0 m length so that it could be carried in greater numbers – an old *Miranda* hangar, previously housing just three medium shuttles plus one heavy and one light craft, could now effortlessly carry seven Type 6 craft plus one heavy shuttle.

Warp coils in Type 6 were out of necessity repackaged to stubbier nacelles that also omitted nacelle ramscoops, saving some ten tons of weight. Warp 1.8 could be coerced out of the shortened engines nevertheless, and two-month endurance was provided by standard fuel tanks. Yet operational evaluations soon led Starfleet to go for a Leeding offer of all-new FF-22 engines that quite matched the performance of the LN-101 in the smaller dimensions desired. Packaged in hexagonal nacelles with eight full-diameter coils and two end constrictors each, these engines featured modern annular ramfield generators and a truly miniature acquisition window, leaving space for a retractable phaser IV mount and a medium range navigational scanner that directly exploited the ramfield for FTL scanning.

Miniaturization allowed for the installation of other useful extra features including a ventral equipment bay, internal partitioning forcefields, integrated charging stations for personal life support systems and weapons, and a rack of miniature marker buoys. In later models, space in the ventral bay was used for the installation of emergency transporters. These, as well as the optional weapons, prompted the addition of search and targeting sensors in two pallets directly above the forward viewport.



The modernized central console is shown displaying warp drive components, including the main fusion reactor offset to starboard at lower stern.

After 2361, flat-panel interfaces replaced the conventional touchball controls, robbing the pilots of some of the glamour of shuttle flying: tactile feedback was diminished, and the intricacies of full six-degrees-of-freedom control were relegated to the computer. Piloting a shuttle was now little different from running a hovercar, or so the frequent complaint by ace shuttle pilots went. Alarmingly, accident rates of Type 6 soared as hotshot pilots attempted manual-override approaches and landings. Disciplinary action and modifications to the control laws of the override mode solved this problem, only to reveal that there still was a statistically significant handicap to the design. Apparently, the shortened hull wasn't as aerodynamically stable as hoped. The continuing control problems in adverse weather approaches led to Type 6 receiving the infamous Tsibliyev award of the Flight Control School cadets six times in a row; the type thus became the latest in the long series of craft to carry the"Widowmaker" nickname. The last time the title had been held by a light shuttle had been in the early 23rd century.

Both Type 5 and 6 craft were carried on almost all starships, although the more compact Type 6 fit better to the confined spaces of some smaller types. These shuttles still serve as the primary auxiliary craft of most starships. Type 5 suffers from having failed to receive an engine refit, however, and is unlikely to get one in the future, either. Retirement of the type is expected before 2380, as more modern designs have been created both for general use and special missions. Type 6 still offers a good overall balance of performance and economy for most starship auxiliary duties, and may continue service beyond that date.

Type 7A1/A2 Medium Shuttle

2357-

Alt. names:	MSM(P)-7A1 / MSM(P/U)-7A2 “Turtle”
Completed:	465 total: 141 A1 324 A2

Length:	11.5 m
Beam:	3.9 m
Height:	7.1 m
Mass:	108.6 tons
Crew:	2
Passengers:	6-10
Cruise speed:	W 1.75
Max. speed:	W 2
Endurance:	12 weeks
Weapons:	Normally none Fuselage hardpoints provided for 2 lateral phaser V emitters
Shields:	1-layer conformal forcefield
Transporters:	1 emergency evacuation (1-pad or padless); Mk VII
SOURCES:	D TNG (N TNG TM) (H own)

The Type 7 advanced shuttle was created to provide starbases and modern large starships of the *Galaxy* generation with longer reach of auxiliary operations. The design builds on the solutions utilized in the popular Type 4, yet improves upon it to offer high sustained warp speed up to warp 2, as well as ramscoops for extended range – still at a fraction of the bulk and operating costs of a full runabout or yacht. Atmospheric handling is superb in comparison with the more angular predecessor design, and the interior can be more readily configured for extended four-person operations. Heavy weapon mounts up to phaser V standard in modules flanking the cockpit area are available, as are various internal and external sensor bays. Onboard computer systems are of high quality and capable of serving as detached analysis centers. Modern light transporter systems have been installed to all craft built after 2368, while earlier specimens may carry older transporter systems on individual basis. All this is contained in a hull massing under ten tons.

Propulsion systems feature two ten-segment GN-202 warp nacelles, a 2200 mc underfloor warp core, one or two antimatter pods located forward of the core, two matter tanks flanking the aft hull above floor level, plus an impulse drive system utilizing a curious door-mounted nozzle installation. RCS stations are mounted on forward hull rim and aft hull quarters. A warp endurance of six weeks is provided with the two-pod configuration.

Space is available for a full ten-person away team if necessary, although the cabin is usually configured for two crew and four passengers. In the A1 version of the craft, dedicated for personnel transport, entry ramps are provided at both bow and stern; the latter entrance is equipped with full airlock facilities. The general utility A2 version omits the bow ramp. Depending on the exact model, a starboard cargo door may be fitted, or such doors installed on both sides, allowing for the loading of outsize cargo*. Floor panels offer access to equipment bays housing the gravity generators and the optional phaser V mounts. Finally, a dorsal emergency hatch features the standard Starfleet emergency docking adapter also found aboard other large shuttle vehicles as well as couriers, runabouts and various starships.

The interior of both models can easily be configured for a variety of uses: for example, the installation of a cockpit pressurization curtain facilitates external access to the main cabin/cargo compartment regardless of environmental concerns. A VIP kit is also available for the central cabin, featuring extra decor and a combined sleeping and work area for two, as well as a replicator and a personal comm panel. Aft of the main cabin is a small foyer offering sanitation facilities, storage space and access to the underfloor equipment bay housing the warp core. The foyer is flanked by main propellant tanks. At extreme stern, the airlock provides stowage for two environmental suits.

The cockpit is provided with a window complete with electrochemical shuttering; so are those walls of the cabin not blocked by a cargo door. The bow ramp can be replaced by a simple window panel in the A2 models if no special module is required there; this is the preferred configuration for many surface-to-orbit liaison craft. Virtual-focus cameras naturally offer a good all-around view for landing and docking. Touchball controls were still provided for the two pilots as an optional method of control input in the early models, although recent craft have been built with strictly flat-panel interfaces.

Unfortunately, the Type 7 shuttles suffer from two problems. First, the higher-performance impulse and warp propulsion systems take up a lot of space at the rear of the craft, precluding the installation of a wide stern ramp. The side utility doors are somewhat awkward, since they are obscured by the nacelles and require a complex folding ramp system to clear the obstacle. They also provide little protection for disembarking troops in combat situations. Thus, the craft cannot fully meet the tactical needs of starships, and lighter, less well protected and armed low-endurance models which nevertheless possess proper stern ramps have to be carried instead.

Also, the advanced warp coil system of the Type 7 shuttle is so tightly integrated that shipboard repairs or component replacement become extremely difficult, unless the mothership possesses advanced service facilities. Thus, small ships are usually provided with light shuttlecraft only, and the some 400 examples of the medium Type 7 are mainly deployed aboard explorers, heavy cruisers and various outposts and starbases.

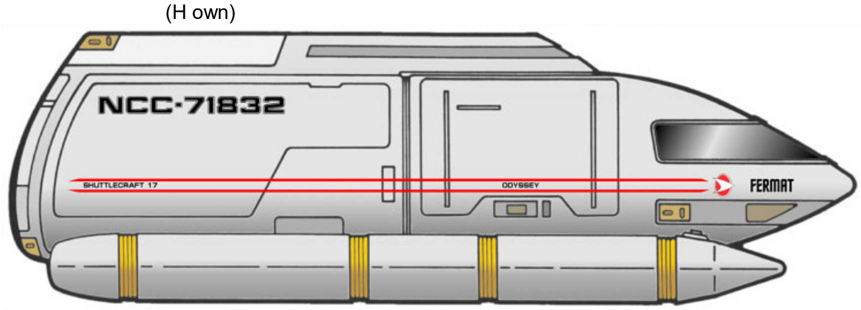
* The original Type 7 configuration never reached production status, and no Type 7B or 7C exists or is projected, so the letter code is generally omitted in connection with this shuttle type. Variants A1 and A2 are thus usually specified as “mark 1” and “mark 2”.

Type 9/9A/9B Heavy Shuttle

2359-

Alt. names:	HSM(C)-9
Completed:	283 total: 120 Type 9 580 Type 9A 583 Type 9B
Length:	17.0 m
Beam:	6.8 m
Height:	5.3 m (Type 9//9A) 5.2 m (Type 9B)
Mass:	112.8 tons (Type 9/9A) 132.9 tons (Type 9B)
Crew:	3
Passengers:	20
Cruise speed:	W 2
Max. speed:	W 2 (Type 9) W 2.2 (Type 9A)

	w 4 (Type 9B)
Endurance:	6 weeks (Type 9/9A) 18 weeks (Type 9B)
Weapons:	Normally none Nacelle hardpoints provided for 2 phaser V emitters/strips (Type 9A/B)
Shields:	1-layer conformal forcefield
Transporters:	1 emergency evacuation (2-pad); Mk VII or VIII (Type 9/9A) 1 GP (2-pad or padless); Mk VII or VIII (Type 9B)
SOURCES:	(D TNG TM) N VOY (H own)

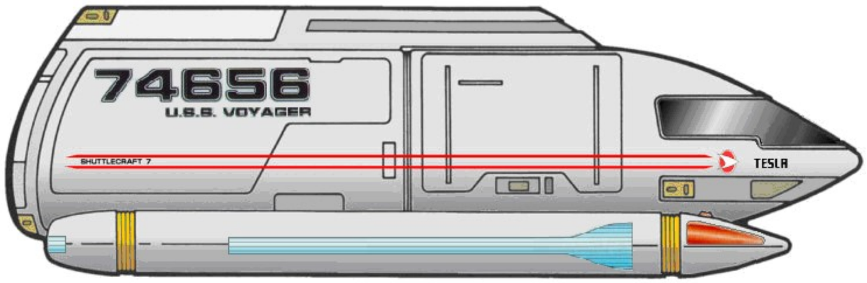


The unsuitability of Type 7 shuttles to the carriage of bulky cargo did not really present a problem for Starfleet. Ever since the early 2350s, a type of cargo shuttle had been under development in parallel with Types 5 and 6, with large side and stern hatches. This craft featured aspects of both Type 5/6 and 7 designs, combining FF-24 series nacelles of hexagonal cross section with an aerodynamically smooth hull. However, this vessel was not optimized for the deployment of away teams or routine liaison and replenishment flights between starships. The Type 9 heavy shuttle as it appears today is a dedicated heavy-lifting craft capable of carrying large machinery, including surface vehicles and habitats.

The forward half of the craft is similar in configuration to the forward two-thirds of a Type 7 shuttle. A two-person cabin with side-by-side seating, touchball controls, full interstellar navigation gear and a large electrochemically shuttered window can be separated by a bulkhead from a cargo/passenger cabin that is equipped with two side hatches, of the fold-down type familiar from Type 7. Underfloor are several subsystems, but not the main powerplant. This time, the m/am core is housed on the roof of the shuttle, in an arrangement very similar to that of the *Danube* runabouts. Plasma leads down to the nacelles go along the aft wall of the passenger cabin, with a small airlock and a workstation for a loadmaster in between them.

Beyond the airlock lies a cavernous cargo hold, the floor of which is some 80 centimeters lower than the floors of the forward compartments. Variable gravity facilitates easy loading and offloading of equipment, or the rafting down of wheeled or hovering vehicles. A ramp door the size of the entire aft wall gives exterior access to the hold.

Between 2359 and 2361, some 120 shuttles were constructed to this configuration, and deployed routinely aboard explorer-size starships, plus aboard lesser vessels on a mission-by-mission basis. In 2361, a modified craft (Type 9A) was created, with a 35% increase in lifting capability provided by uprated impulse engines. Also, hardpoints for Type V phasers were added, and computer systems modernized. Given the ever-increasing strength of the starship fleet and the needs of the border conflicts, five hundred and eighty craft of this definitive model were added to the force.



In 2370, the Type 9B modification introduced new, sleeker CWD-built GN-206 nacelles, adding larger ramscoops similar to the Type 8 light shuttlecraft units and also significantly increasing the speed and range of the craft. Speeds up to warp 4 can be reached on light load. These craft omit the port cargo hatch and have flat-panel controls instead of touchballs. They also carry shield generators of increased performance. Whenever an away team has to be left behind for an extended period of time, a Type 9B shuttle is the craft of choice to provide both independent mission capacity and interstellar access to the mothership.

Production of Type 9B was expected to reach 740 craft, but was halted at 583 units in 2374 in favor of a modern successor. The Type 14 heavy cargo shuttle is similar in configuration, yet features folding aerodynamic surfaces and further improved warp performance and range. This type will in time be fielded aboard all modern deep space explorer and cruiser starships in place of Type 9, which will be relegated to duties closer to home. So far, however, procurement of Type 14 has been slow, and Type 9 continues service across the Fleet.

Type 8 Light Shuttle

2365-

Alt. names:	LSM(P)-8
Completed:	2,480+
Length:	6.6 m
Beam:	4.4 m
Height:	2.8 m
Mass:	83.6 tons
Crew:	1-2
Passengers:	6
Cruise speed:	W 2
Max. speed:	W 2.4
Endurance:	10 weeks
Weapons:	2 phaser III strips on nacelle bows 2 phaser III strips on pylons Fuselage hardpoints provided for 2 lateral phaser IV strips
Shields:	1-layer conformal forcefield
Transporters:	1 emergency evacuation (padless); Mk VII or VIII
SOURCES:	D VOY (N VOY) (H own)

The medium shuttle of Type 7 was suited mostly for use from aboard large vessels with advanced support facilities. To equip its lighter starships with modern multipurpose shuttlecraft, Starfleet in 2364 ordered an extensive revamping of the Type 6 design. All-new engines were to be mounted to a Type 6B hull, on modified and considerably strengthened pylons. Significant advances in technology could now be exploited: each GN-204 engine nacelle featured a modern lightweight ramscoop system, providing greatly extended range. The powerplant was also upgraded, and new cowlings installed to accommodate the changes. Thanks mainly to plasma handling breakthroughs, warp performance was brought up to warp 2.4 dash speed and warp 2 cruising, without having to sacrifice internal volume or resort to large, complex and tightly integrated systems of the Type 7 kind.

In addition, forward hull contours were altered for better atmospheric handling, utilizing lessons learned from the Type 7, and the window slightly reshaped. Inside the cockpit, flight controls were simplified and computer systems upgraded. Defenses were improved by adding four Type III phaser strips for all-around coverage. The upgrade proved a considerable success, and some 480 newbuilds have been fielded to date and a thousand more intended to follow. Some Type 6 craft are also projected to receive the new nacelle type and some hull streamlining, but not the new powerplant nor the full bow revamping. This is expected to yield warp speed improvements up to warp 2.2 at somewhat lower cost.

The Type 8 craft is now in service aboard all modern small starships including e.g. the *Bradbury* heavy corvettes, *Nova* surveyors and *Intrepid* light cruisers. Aboard older small ships, the craft often serves in mixed wings with Type 6 light shuttles.

Advanced equipment is available for the craft. Strip-emitter Type IV phasers can be installed in berths flanking the cabin, far outperforming the point-emitter units of earlier models. Navigational AI is improved to the point of being capable of handling combat maneuvers and complex docking tasks. One crew is thus sufficient now for most types of missions. Despite the proven reliability of the design, emergency transporters are regularly carried aboard Type 8, as are two environmental suits and full surface survival gear.

Plans for a similar revamping of the medium Type 5/5A were put on hold in 2368, as it was found there was no specific need for the extended-length cabin in standard applications.

Type 10 Light Shuttle

2374-

Alt. names:	LSC(P)-10 “The Tank”
Completed:	66+
Length:	9.6 m
Beam:	5.8 m
Height:	3.4 m
Mass:	18.9 tons
Crew:	2
Passengers:	2
Cruise speed:	W 2
Max. speed:	W 2.2

Endurance:	5 weeks
Weapons:	1 phaser IV strip forward of the cockpit 2 phaser IV strips on nacelle cowlings
Shields:	1-layer conformal forcefield Navigational deflector below cockpit
Transporters:	1 emergency evacuation (padless); Mk VIII
SOURCES:	D DS9 (N DS9 TM) (H own)

The Type 10 light combat shuttle was created for use aboard the *Defiant* class escorts, intended for high-risk landing operations in combat situations where the standard Type 18 shuttlepod would not suffice. To this end, it features heavily shielded warp engines and an impulse system exceptionally powerful for a shuttlecraft, all clustered at the upper aft hull for best possible protection. The lower forward hull is heavily armored and shielded, and incorporates a deflector dish for extra protection (a rare sight indeed in a low-warp craft like this). The main cockpit window is tilted back so that only weapon fire from almost directly up is likely to hit it. Finally, the only exit door lies at the stern, protected from the sides by the warp engine cowlings.

The heavy armoring naturally comes with a heavy price. Total mass of the craft is nearly 20 tons, and personnel capacity is limited to two crew and two uncomfortably squeezed-in passengers. On the other hand, versatile systems ranging from emergency transporters to Type IV phaser strips and a stern-mounted tractor beam are available. A more capable, much larger variant is being considered for production to meet the need for a proper planetary assault auxiliary for the strike carrier fleet; the Type 10 light combat shuttle as such suffers from severe limitations on its external dimensions, having to fit into the tiny impromptu shuttlebay of the *Defiant* class. Considering these limitations, the shuttle is an engineering triumph, but mass production for other ship types is highly unlikely.

Type 12 Light Shuttle

2370-

Alt. names:	LSM(PS)-12 “Speedboat” “MOB boat”
Completed:	714+
Length:	8.5 m
Beam:	4.6 m
Height:	2.3 m
Mass:	84.2 tons
Crew:	1-2
Passengers:	2
Cruise speed:	W 2
Max. speed:	W 2.8
Endurance:	6 days
Weapons:	1 phaser IV strip on ventral bow 2 phaser IV strips on nacelle pylons 2 phaser III strips on nacelle bows

Shields: 1-layer conformal forcefield

Transporters: 1 emergency evacuation (padless); Mk VIII

SOURCES: D VOY
(N Rick Sternbach)
(H own)

Created specifically for missions requiring rapid response, speed and maneuverability instead of crew carrying capacity, the Type 12 serves aboard many modern ships as the "launch" or "speedboat" of the vessel. The small, streamlined shuttle can be housed inside a cargo bay or drop-launch berth and requires minimal maintenance or pre-launch checks. Still, its modern warp engines can propel it to warp 2.8 if necessary, and phaser IVs and advanced sensors are carried in permanent mounts instead of modular additions. Transporters are standard gear as well. The design has also been dubbed a "MOB boat", since this rapid-response craft is frequently deployed to extract stranded away teams from dire situations.

The high top speed of the craft requires the addition of a good-sized navigational deflector to the bow. At high speeds, two crew are usually needed for proper handling, despite the application of navigation AI routines similar to those used aboard Type 8 craft. Also, fire support missions against planetary and orbital targets are postulated for the well-equipped craft, and require a crew of two as well. Embarkation is via a set of doors astern, between engine support booms; the outer two-section doors provide a planetfall ramp, while the inner pocket doors turn the space in between into a cramped airlock if necessary. Forcefield compartmentalization is the more usual procedure for dealing with hostile or absent atmospheres, however. Furthermore, standard equipment includes a versatile padless transporter that simplifes spacewalk access.

A ventral view of a Type 12 at speed reveals the ejection mechanism for the 'pancake' underfloor warp core, flanked by compact transporter emitters. Miniaturization is also evident in the twin impulse drives at warp engine pylon trailing edges and the narrow yet potent phaser strip below the bow.

Starfleet plans to deploy the type aboard nearly all hangar-equipped starship designs within the decade. Some modern ships are to be provided with drop bays for even faster deployment. Also, the drop bays would vacate the shuttlebay for more capacious medium shuttle types, many of which have external dimensions similar to Type 12. Despite the higher performance of Type 12, carrying it would not be reasonable if it meant losing even one hangar slot that could be used by a Type 8 light shuttle.

Type 11 Medium Shuttle

2374-

Alt. names: MSM-11

Completed: 48+

Length: 16.2 m

Beam: 8.7 m

Height:	3.9 m
Mass:	112.1 tons
Crew:	2
Passengers:	4-10
Cruise speed:	W 4
Max. speed:	W 5.4
Endurance:	7 weeks
Weapons:	1 phaser IV strip on dorsal bow 1 phaser IV strip on ventral bow
Shields:	1-layer conformal forcefield
Transporters:	1 GP (2-pad); Mk VIII
SOURCES:	D ST:INS (N Sternbach) (H own)

All modern explorer ships are slated to receive a brand new liaison craft design between 2375 and 2378. Initial experiments with operating runabout-sized craft from starship hangars proved that a niche for a small number of such heavy auxiliary craft still exists in frontline operations. However, *Danube* runabouts as such are too complex and unwieldy to be carried aboard starships, and a simplified, more compact craft was designed in 2374 for these needs. The Type 11 medium shuttle design represents a bridge of sorts between the runabout and shuttle categories, despite being intended solely for use as a starship auxiliary.

The new shuttle features an LF-207 warp propulsion system capable of sustained warp 4, and carries Mk VIII transporters, tractor beams and phaser V emitters as standard gear. Hull form derives from lessons learned in four years of Type 12 light shuttle operations, and mounts the warp nacelles farther aft than in previous designs. Seating for two crew and up to four mission specialists is provided in the forward cockpit, and a full ten-person away team can be effortlessly carried by making use of a cabin aft of the centrally mounted, highly capable transporter machinery. Drawbacks include a still relatively large bulk, as well as lower performance-to-weight ratio for the warp propulsion system than in smaller shuttles. Also, criticism has been directed at the insufficient dimensions of the exits, limited to dorsal and ventral hatches and an aft door only 2.1 m high and 1.1 m wide. The installation of a larger door is precluded by the stern-mounted, exceptionally powerful impulse units that flank the doorway.

There is significant fighting potential in the Type 11 design, not just in the form of its multiple potent phaser strips and their advanced fire control, but also in less openly offensive systems. A shuttle from USS Enterprise *(NCC-1701-E) demonstrates here the use of the aft tractor beam emitter for firing a disruptive tetryon pulse. The combination of the tractor beam and the large impulse engines in evidence in this view is also a formidable weapon by itself.*

Because of the limitations, the design is not supposed to replace the standard heavy shuttles of Type 9A/B in starship duty, but rather serve in the general medium liaison role. A dedicated cargo variant of the Type 11 design is on the drawing boards, with an extended hull and large side and/or aft doors. However, development has met with problems, and prototype stage is not expected to be reached before late 2377. An entirely different craft with a boxy aft cargo hold and deployable aerodynamic surfaces, the Type 14, may end up taking the general cargo role aboard most vessels, even though it is primarily intended for the transportation of modular habitats, bulky survey gear and surface vehicles for long-duration away mission teams.

Diversification of Type 11 roles beyond starship and starbase liaison duty is not yet in sight, although one would assume that special operative insertion and extraction, medical evacuation and reconnaissance roles be adopted to comply with immediate post-war requirements.

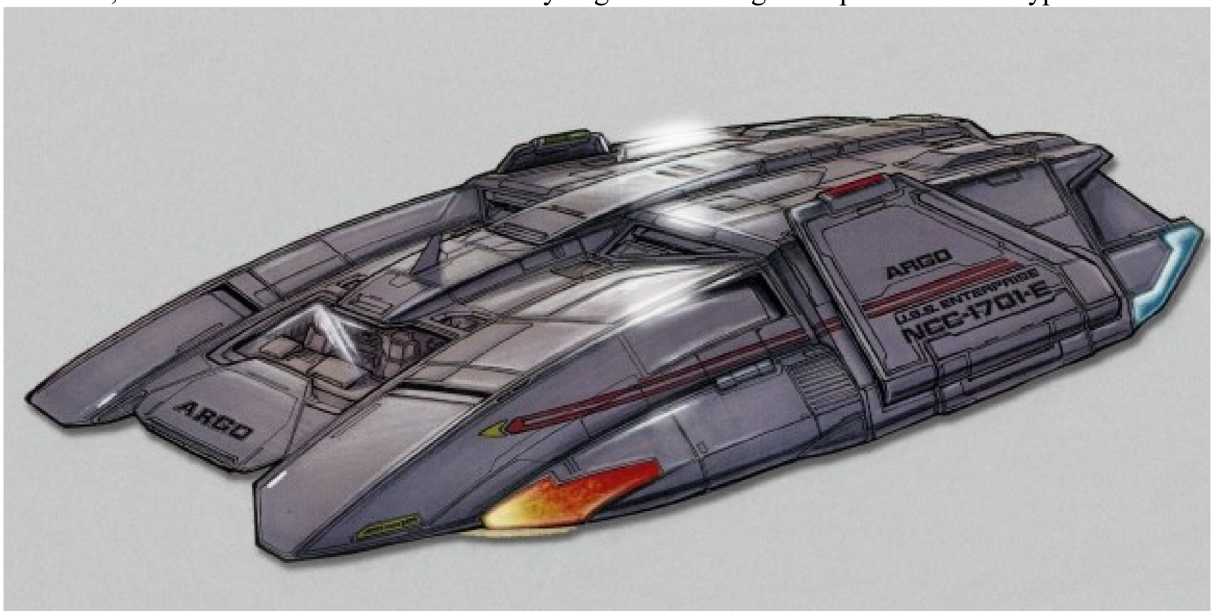
Type 14 Heavy Shuttle

2375-

Alt. names:	HSM(C)-14
Completed:	50+
Length:	20.1 m
Beam:	m
Height:	4.0 m (wings folded) 7.4 m (wings extended)
Mass:	145.3 tons
Crew:	2
Passengers:	4 (standard) 24 (troop configuration)
Cruise speed:	W 4
Max. speed:	W 4.4
Endurance:	7 weeks
Weapons:	None
Shields:	1-layer conformal forcefield
Transporters:	1 GP (2-pad) Mk VIII
SOURCES:	D ST:NEM (N own) (H own)

The main driving force behind the introduction of Type 14 heavy cargo shuttles was the need to support ground action teams in medium duration military and scientific operations. Much as Starfleet would have liked to believe that starship presence sufficed for covering most away action, there still remained many a support task that could not be handled by orbital transporters, sensors or weapons – especially in a time of military crisis. From 2372 on, the Type 9A and B heavy shuttles and assorted runabouts had to double as assault barges in high-risk troop insertion missions. The latter at least enjoyed relatively good shielding. The former were torn to pieces by light ground defenses.

Pressures of the Dominion war were not the only reason behind the creation of Type 14, however. For some time, science teams deployed on explorers had expressed dissatisfaction at having to use shuttles sized for considerably smaller starships. Thanks to studies conducted to meet their demands, Starfleet could in 2372 immediately begin final design and production of Type 14.



Key improvements are aimed at various aspects of survivability. Twin shield generators are carried in the bow section, which now features a sharply canted windshield that is well protected from ground fire. Stealth in atmospheric entry and agility in maneuvering are increased by adding fold-out aerodynamic surfaces. Warp performance is boosted by adopting LF-227 coils, faired directly to the hull and equipped with relatively large ramscoops.

Cargo capacity remains basically similar to Type 9, however. A slightly wider aft compartment caters for a respectively broader selection of vehicles or equipment to be carried. Cabin space is only slightly increased by the addition of three meters to total length. External height is actually reduced, as power systems, fuel and other machinery have been moved from the roof to amidship fairings above the warp coils, and the coils in turn tucked closer to the hull. There no longer are side hatches available for cargo operations, but onboard mechanical and gravitic cargo handling systems have been improved in compensation. The cargo area can be rapidly configured for 20 additional passengers, but less emphasis is based on this functionality than previously, and the pop-up seats are reputed to be quite a bit less comfortable than their Type 9 predecessors.

Currently, Type 14 is being distributed to explorers and some heavy cruisers, but only modest numbers have been built. Much like Type 11, the heavy shuttle suffers from some inherent design limitations and excesses, and may require further refining to become a practical starship auxiliary. The characteristics of the upcoming cargo version of Type 11 are likely to define the path the Type 14 redesign will take.

Shuttlepods

After the old shuttle classification system was abandoned in the 2270s, the until then liberally applied name ‘shuttlepod’ was clarified to denote the smallest starship auxiliaries only.

This category includes simple transatmospheric craft, intership boats without landing capacity, general-purpose pods with landing and interplanetary capacity, and even some later advanced designs with warp propulsion. The common factor is availability of impulse propulsion, a capability lacking from assorted inspection and work pods of even smaller size. Also common to all shuttlepods is a primary liaison mission, even if certain designs transcend such vocational expectations by possessing advanced tools, sensors or even armament.

All craft in this category are less than 2 tons in hull mass, although subspace coil mass for the impulse and sometimes warp propulsion systems naturally represents a considerable addition.

Type 10/11 Shuttlepod
2291-

Alt. names:	
Completed:	
Length:	m
Beam:	m
Height:	m
Mass:	
Crew:	1
Passengers:	1-2
Speed:	
Endurance:	7 weeks
Weapons:	
Shields:	1-layer conformal forcefield
Transporters:	None
SOURCES:	D ??? (N) (H)

Type 12/13 Shuttlepod
2328-

Alt. names:	
Completed:	
Length:	m
Beam:	m
Height:	m
Crew:	1
Passengers:	1-2
Speed:	
Endurance:	7 weeks
Weapons:	
Shields:	1-layer conformal forcefield
Transporters:	None
SOURCES:	D ??? (N)

	(H)

Type 15/16 Shuttlepod

2359-

Alt. names:	
Completed:	1,244 total: 839 Type 15 405 Type 16
Length:	3.60 m (Type 15) 4.81 m (Type 16)
Beam:	2.42 m
Height:	1.76 m
Mass:	3.11 tons (Type 15) 3.22 tons (Type 15A) 4.50 tons (Type 16)
Crew:	1
Passengers:	1-2
Speed:	0.005 c (Type 15) 0.008 c (Type 16)
Endurance:	5 weeks
Weapons:	2 phaser IV emitters on nacelle bows
Shields:	1-layer conformal forcefield
Transporters:	None
SOURCES:	D TNG (N TNG TM) (H own)

Content of text depends on what the previous model should look like…

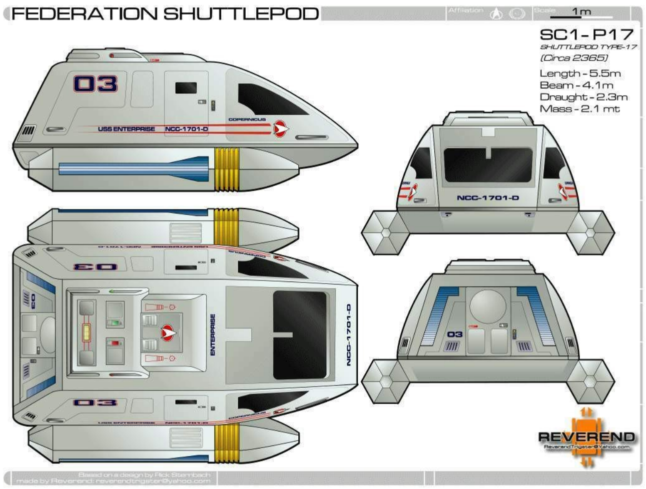
Type 16 in this interpretation is indeed longer, contrary to the TNG TM picture, and has longer nacelles. Performance figures in TNG TM are nonsensical anyway, and supposedly Type 16 is the higher performer (since the added mass doesn't increase payload or anything).

Type 17 Shuttlepod

2362-

Alt. names:	
Completed:	78
Length:	5.5 m
Beam:	4.1 m
Height:	2.3 m
Mass:	7.1 tons
Crew:	1
Passengers:	1-3

Speed:	0.01 c / W 1.0
Endurance:	7 weeks
Weapons:	None
Shields:	1-layer conformal forcefield
Transporters:	None
SOURCES:	(D Rick Sternbach Type 6 shuttle study model) (N TNG TM) (H own)



The exercise of stretching Type 15 to Type 16 dimensions opened up intriguing possibilities for new internal gear. Among the forerunners was a powerplant large enough for warp propulsion. In 2361, Lei&Salak made the first serious proposal for a warp speed auxiliary of shuttlepod size, based on FF-24 engines and a hull combining Type 16 structural solutions with greater beam and a new, aerodynamically and ergonomically advantageous bow. Starfleet eagerly accepted the proposal, and five prototypes were ready for testing by the end of the year.

The craft that would become Type 17 mounted her warp core in the aft half of a hull 5.5 meters long, flanking it with fuel tanks and adding two impulse nozzles astern. Between the nozzles loomed the ominous round endcap of a core ejection system, making graphic the risks involved in the compact configuration that was virtually inaccessible to maintenance in flight. Replenishment umbilicals were clustered practicably astern, but several key subsystems were installed atop the hull in a cowling that was slightly more difficult to reach. Crews had better reasons to complain, however: ingress was via two side hatches barely one meter high, and involved stepping on the nacelles and crawling over the aft couch to reach the two forward pilot seats. Since single-pilot operations were a Starfleet requirement anyway, the very first modification requested by the would-be purchaser was the allocation of one forward seat for a passenger and rearrangement of aft seating for better access while still retaining full 1+3 seating capacity.

The craft was provided with basic shielding and navigation sensor systems, but featured no armament nor hardpoints or sockets for its later installation. The inflexibility was not considered a fatal shortcoming in the shuttlepod mission, and Starfleet ordered 80 units to be completed in the first batch. Yet the organization was quickly disenchanted with the meager warp 1.0 performance and problems with cabin utilizability: only fifty craft were ever deployed, chiefly on modern medium starships already sporting the compatible umbilical systems.

Type 17 was a good conceptual lesson for Starfleet. The advantages of warp propulsion on a compact starship auxiliary would not manifest best in simple liaison missions, not unless the liaison pod were capable of warp 2 at the very least. Instead, a rapidly deployable and compact platform for basic reconnaissance and defense would be a practical asset for small starships that had difficulty operating a complex craft like a full warp shuttle. Type 17 was thus abandoned in favor of a design that would emphasize field-ruggedness and a maximally flexible modular installation of weapons and sensors.

Type 18 Shuttlepod

2369-

Alt. names:	
Completed:	359+
Length:	5.0 m
Beam:	3.5 m
Height:	1.8 m 2.0 m (w/ microtorpedo module)
Mass:	9.8 tons (w/o modules)
Crew:	1
Passengers:	1
Speed:	0.012 c / W 1.2
Endurance:	7 weeks (standard) 14 weeks (w/ extension module)
Weapons:	None (standard) Fuselage berths provided for 2-6 phaser IV emitters Modular dorsal launcher, 2 fwd tubes w/20 microtorpedoes (optional)
Shields:	1-layer conformal forcefield
Transporters:	None (standard) 1 emergency evacuation (padless); Mk VIII (optional)
SOURCES:	D DS9 (N DS9 TM) (H own)

The shuttlepod design amending all the flaws of of Type 17 required some five years of additional development work. Early on, the R&D division of Lei&Salak decided on an external skirt of instrument berths that would expand the basic Type 16 hull without actually increasing the pressurized internal volume. Two side-by-side berths at the bow could receive weapons or sensors, while two slightly larger ones at bow corners and a further pair flanking the midhull were plumbed and wired for the carriage of anything ranging from extra fuel or consumables to deployable probes or sample containers. Aftmost within the cowlings were the subspace coils, capable of both simple mass reduction and warp 1.2 propulsion.

As with Type 17, most of the hull interior was taken up by the warp core and associated systems, including impulse propulsion. The forward cabin had side access hatches on both sides for one pilot and one mission specialist or passenger, duplicating the meager liaison capabilities of Type 15 while introducing the all-new light combatant and scout mission. Up to three pairs of phaser IV emitters could be plugged in, on the lateral berths and one of the bow sockets - the other one being left for fire control computing and the corner berths for targeting systems. In addition, a dorsal module could be attached, providing extended life support (an option rarely chosen) or a twin-barrel microtorpedo launcher (eagerly requested by frontline commanders, even if seldom seeing practical use).

The process of Starfleet acceptance was somewhat more prolonged this time, the experiences of Type 17 still fresh in the minds of the Fleet evaluators. Yet the new craft proved favorable in all respects, and soon emerged as the de facto replacement of Type 15: some 360 craft have been delivered to date, and production is expected to resume after a brief pause forced by the 2274-75 bombardments of the Amikos and Latosia facilities of Lei&Salak.

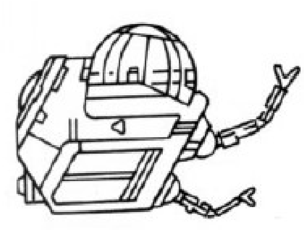
Starbase auxiliary craft

In addition to the shuttles and shuttlepods fielded aboard starships, Starfleet operates a variety of craft that mainly serve starbases and other fixed installations and are seldom seen in starship hangars. These range from tiny utility pods to the various transatmospheric shuttles, towships and pilot cutters zigzagging busily around starbases. Some primary types are listed here, although Starfleet also uses a wide variety of civilian designs not included in this list. The craft in this chapter are again listed in chronological order.

Class B Work Pod

2079-2098

Alt. names:	WP-174
Completed:	35
Length:	3.40 m (manipulators stowed)
Beam:	4.21 m
Height:	3.22 m
Mass:	4.80 tons
Crew:	2
Speed:	0.00005 c
Endurance:	2 days
External tools:	Two forward-mounted manipulator arms One anchoring arm
Tractor beams:	None
SOURCES:	(D SFC) (N SFC) (H SFC)



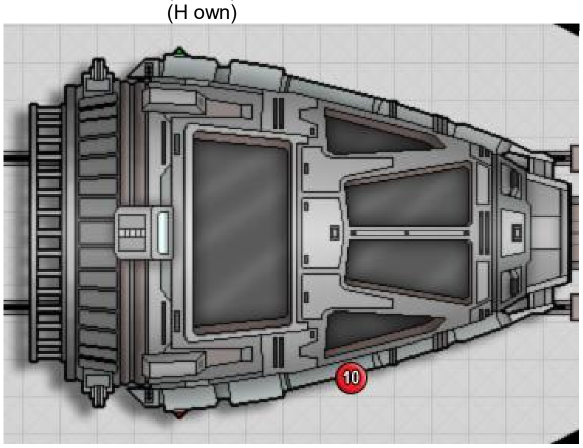
The first standardized orbital work pod design in UESF use deserves a special mention in this work, despite having been built in low numbers.

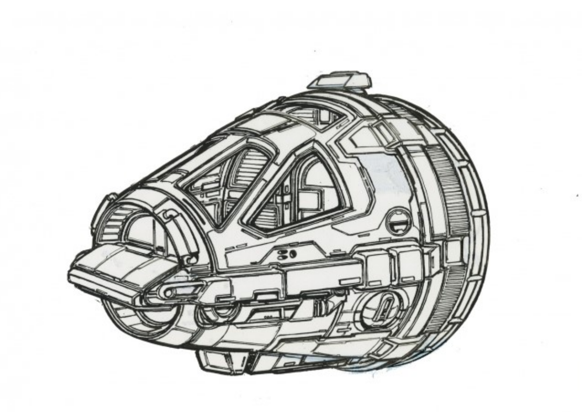
WP-174

Class B1 Work Pod

2129-2168

Alt. names:	IP-27
Completed:	380
Length:	??? m
Beam:	??? m
Height:	??? m
Mass:	??? tons
Crew:	2
Speed:	Manouvering thrusters only
Endurance:	2 days
External tools:	Two laterally mounted manipulator arms Modular installation for welding tools, sensors and samplers at bow
Tractor beams:	None
SOURCES:	D ENT (N own) (H own)





For their crew-attended manipulation needs, Earth orbital dockyards in the 20th century made use of relatively clumsy conversions of small surface-to-orbit spacecraft, essentially just cutting further portholes into these ballistic pods and bolting on some manipulator arms and spotlights. A range of dedicated designs finally emerged in the early 21st century, lacking bulky reentry heatshields and parachutes but incorporating more versatile tools, lighting rigs and situational awareness systems. There were few modifications to their basic structure for the next hundred years, and the first noteworthy improvement was the IP-27 Class B pod designed in 2129 for carrying aboard interstellar starships.

The small pod was primarily configured as a spatial personnel transfer and inspection craft, with an ergonomically sized rear docking hatch, comfortable seating for one to four people, plus locker space for small cargo. Yet out of the operational necessity of deep space assignments, IP-27 also featured a pair of laterally stowed manipulators and a bow attachment point for repair and inspection tools, thus doubling as a work pod for her mothership. Two crew would operate the capsule in this role, although two more could be carried as passengers. Both pilots had seats oriented with floor-normal artificial gravity; the conical shape of the cabin allowed for forward and lateral vision through four viewports and dorsal inspection through a wide overhead port. There were illumination fixtures both above and below the craft, the latter at the end of an extensible and steerable arm. Simple radar provided proximity awareness.

While more capable “space forklifts” continued operations on Earth’s various orbital outposts, it soon became obvious that the compacting and integrating work performed on the multipurpose IP-27 was providing the best bang for the buck. Other manufacturers soon began offering comparably small pods, sometimes with modular engine packages for heavier manipulation tasks. Production of IP-27 was terminated in 2142, and the last units were replaced by 2168. Most were quite worn down; some had even served in exotic combat assignments during the Romulan War, disabling buoys and satellites, infiltrating floating outposts and sometimes breaching enemy hulls at the desperate last stages of engagements where neither side would consider surrender or retreat. Postwar repairs of Earth’s tattered and torn space assets kept repair pod manufacturers in steady business and ensured swift replacement of the IP-27.

Class B4 Inspection Pod

2210-2282

Alt. names:	
Completed:	534
Length:	7.20 m
Beam:	3.76 m
Height:	2.81 m
Mass:	2.28 tons
Crew:	0-1
Passengers:	1-6
Speed:	Maneuvering thrusters only
Endurance:	2 days
External tools:	None
Tractor beams:	None
SOURCES:	(D Phase II / Mike Minor) (N own) (H own)

In all industrial cultures, construction and assembly work has from the very beginning of the space age relied on extensive automation and precise virtual visualization of the items under work. Yet orbital construction facilities have always had a need for nimble pressurized pods in which engineers can zip around their handiwork and see both the minutest details and the ‘big picture’ with their own naked eyes. Besides sheer vanity, such pods also serve the important function of transferring people from a pressurized location to another with minimal effort and infrastructural needs. Such spatial taxi cabs are by necessity much simpler constructs than transatmospheric shuttlepods or interplanetary shuttles, yet they share one important quality with these types: the desire for passenger comfort.

While work pods may be optimized for lengthy work shifts, becoming ‘extended spacesuits’ for their users, or perhaps be designed with quick embarking and disembarking in mind, inspection pods have to simultaneously provide both capabilities for multiple personnel, while also offering large viewports for visual inspections and for maneuvering in tight spots. Yet fairly few other demands are placed on the design, and the inspection pods of Starfleet assembly yards have traditionally been of low overall performance and simplistic, boxy construction.

A typical example would be the C6 pod of the 2210s, mass-produced by Patterson-Massey for Starfleet applications on basis of its commercial UE-4490 series. Equipped with a standard docking adapter astern and a three-faceted, flat-plate viewport forward, the cabin could hold up to six personnel on benches along the side walls. Full gravity was provided onboard, while external AG repeaters could gently attach the vehicle to any nearby surface or push it away from one. Main propulsion was with powerful reaction drives at the four corners, however, giving up to 120 g acceleration or enough thrust to push major structural elements around. A manual control interface to starboard allowed onboard personnel to control the craft, but route point input or full automation could be employed on simple taxi duty.

A small number of the half a thousand pods completed were later equipped with manipulators or external tools. Inspection pods had diverged from the work pod optimum by then, however. They were not nimble enough for precision assembly tasks, and interiors had to be significantly reworked to provide the operator with sufficient control and vision at the same time.

Class D6 Work Pod

2229-2278

Alt. names:	
Completed:	2,000+
Diameter:	2.41 m (manipulators stowed)
Height:	2.64 m
Mass:	0.84 tons
Crew:	1
Speed:	Maneuvering thrusters only
Endurance:	2 days
External tools:	Ten manipulator arms w/ end tool racks
Tractor beams:	None
SOURCES:	(D Matt Jeffries, aridas sofia) (N own) (H own)

At the very lowest end of the scale for maintenance spacecraft, the Class D pod was in essence a heavy, rigid spacesuit, albeit endowed with more manipulators and tooling than just the two cybernetically boosted arms of the operator. Between the 2230s and the 2270s, the most popular type in Starfleet use was the D6 model, a design fitting into the standard launching chutes of starships, even if leaving the vision dome and a ring of dexterous manipulators to protrude outside the starship hull. The central cylinder would lie horizontally in the chute, with the lowermost cluster of propulsion units swinging out of the way to allow the operator to crawl in.

The basic D61-10 variant featured ten tentacle-type manipulators, each with an adjoining miniature airlock that would store end tools and (after proper heating and decontamination) allow the operator direct access to delicate items brought in by the manipulator arm. There was no separate anchoring arm, beam or gravitic grapple, stationkeeping being left to the thruster system and any spare manipulator tentacles.

As a typical cruiser or frigate design featured four chutes next to the shuttle hangar area, two were typically occupied by a Class D repair pod; one would contain a special sensors pod (itself typically a variant of model D6, found both in crewed and uncrewed variants) and one would be left free for deploying the wide range of payloads stocked aboard. Chute launch gave extremely rapid reaction capability for time-critical repair and containment work – an operator could dive into the pod without prior preparation, hitting a starter button while entering and performing a clean ejection just four seconds from the securing of hatch seals. Chute venting systems could give optional initial delta-vee, but “swim-out” launching was far more typical.

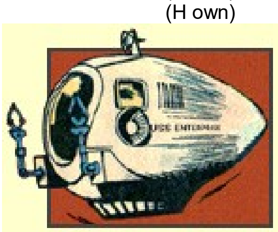
Two-day endurance assumed standard life support conditions (i.e. no onboard fires or toxic releases) and moderate use of maneuvering propellant, a crucial resource when gravitic propulsion was lacking. In theory, a hibernation mode was available, with onboard medication to keep the occupant alive for up to eight days without food or water and a minimum of breathing air. Standard beacons were provided to assist recovery of an incapacitated pod. There are some survival stories of ingenious use of personal items for gaining the attention of another vessel, made possible by the access airlocks. At times, the D6 even saw combat use of sorts, with the user’s hand phaser drawn by a manipulator limb!

Use of chute-launched pods dwindled in the 2270s, and standardized launch chutes were eliminated from most starship designs introduced after 2275; various scientific airlocks, garbage chutes and the like naturally persisted. The D6 still got a range of less well known successors for use aboard older ships, but none of these models remained in use for more than a decade, and none survived past the turn of the century.

Class B6 Work Pod

2232-2268

Alt. names:	
Completed:	970
Length:	3.22 m
Beam:	1.58 m
Height:	2.05 m
Mass:	2.02 tons
Crew:	1
Speed:	Maneuvering thrusters only
Endurance:	2 days
External tools:	Two laterally mounted manipulator arms Modular installation for welding tools, sensors and samplers at bow
Tractor beams:	None
SOURCES:	D Gold Key comic #33 “The Choice” / Alberto Giolitti (N own) (H own)

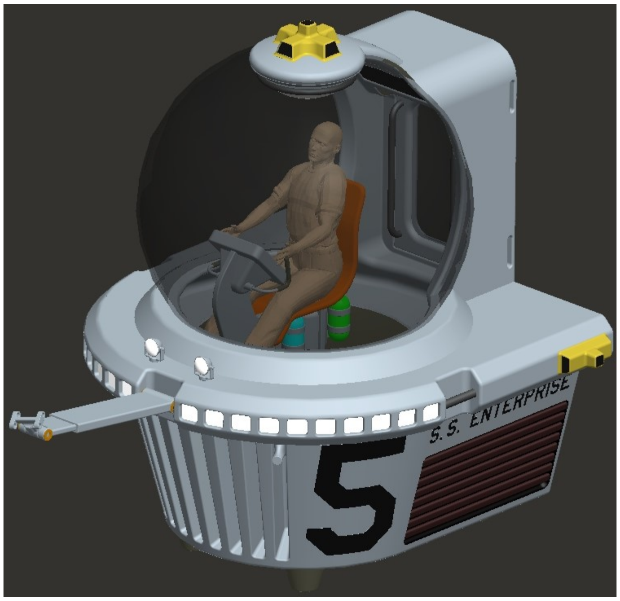


A heftier companion for the “augmented spacesuit” pods of the D6 type
Bow entry door, space for two. Ventral carousel for tooling, similar to B7 bow slots.

Class B7 Work Pod

2245-2279

Alt. names:	
Completed:	2,000+
Diameter:	21 mm
Height:	24 mm
Mass:	0.96 tons
Crew:	1
Speed:	Maneuvering thrusters only
Endurance:	1 day
External tools:	1-3 heavy manipulator arms and 10 fine manipulators
Tractor beams:	None
SOURCES:	(D Matt Jeffries) (N own) (H own)



The most important work pod that Starfleet standardized on after the classic B6 was the ???? by ?????, dubbed B7 in the official sequence of types. This craft retained the handling characteristics of the B6,

with lots of precision arms in the front slots, and three attachment points for heavy duty arms.

Class B7 was produced in two main variants, one with a physical operator cabin featuring an aluminum sphere and a hinged aft ingress/egress hatch, the other with a forcefield sphere of the same dimensions. The former offered a true shirtsleeves operating environment, while regulations called for the use of a spacesuit with the latter. The ease of dropping the forcefield (after proper precautions were taken) and leaving the craft made the latter type popular with operators who wanted direct hands-on access to their tasks.

Class C8 Inspection Pod

2230-2282

Alt. names:	Travel pod
Completed:	647
Length:	4.29 m
Beam:	3.18 m
Height:	2.72 m
Mass:	3.02 tons
Crew:	0-1
Passengers:	1-5
Speed:	0.00005 c
Endurance:	2 days
External tools:	None

Tractor beams: None

SOURCES: D TMP/Andrew Probert
(N own)
(H own)

Hiemdahr?

Type 9 Work Pod
2249-2278

Alt. names:

Completed: 2,000+

Length: m

Beam: m

Height: m

Mass: tons

Crew: 1-2

Speed: 0.00005 c

Endurance: 2 days

External tools: Two manipulator arms w/ end tool racks

Tractor beams: None

SOURCES: (D perhaps Glen Stewart from IDIC Page?)
(N own)
(H own)

Genchi manufacture

Type 10 Work Pod
2259-

Alt. names: workbee

Completed: 35,000+

Length: 4.11 m

Beam: 1.92 m

Height: 1.90 m

Mass: 0.68 tons (typical)

Crew: 1

Speed: 0.00015 c

Endurance: 2 days

External tools: None; wide variety of modular accessories available

Shields:	None; wide variety of modular accessories available
SOURCES:	D TMP/Andrew Probert (N own) (H Ed Sharpe, DS9:TM)

The Type 10 work pod, originally of the Patterson-Massey PFD-200 series, is one of the great success stories of Starfleet history. By the late 2250s, Starfleet's shipyard facilities were being served by a bewildering range of general service work pods of differing vintages and design lineages. This was the result of the policy of local design/acquisition for support vessels assigned to starbases and shipyards since the foundation of Starfleet. While most of these craft were variations on a theme due to the limited nature of their remit, the designs in use still represented surprising variance.

The decision in 2258 to draw up a standard small, general purpose work pod with modular tool packs was taken for two main reasons. First, this would standardize the parts and systems throughout Starfleet's support facilities. New construction techniques would allow large numbers of work pods to be produced to a common design; the reasons behind the local acquisition policy (difficulty/expense of long range transmission or transportation, regional shipbuilding traditions, and support of local manufacturers) had disappeared or been diluted by the turn of the century. Secondly, the exceptionally small size of the work pod and many of its associated tool packs would allow the new Type 10 to be carried aboard starships in quantity, permitting field repairs to an extent not previously thought possible. A few starships did already embark Type 9 work pods of Genchi manufacture, but the majority had clumsy inspection pods at most, and thus relied on tenders and starbases for any repairs which could not be carried out by personnel in spacesuits.

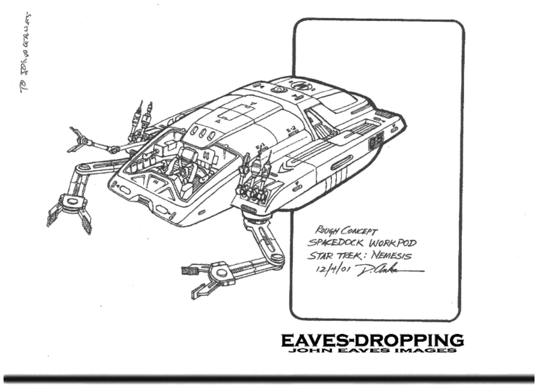
The design was rapidly finalized and the first Type 10 work pod came into service on 21st February 2259, at the Utopia Planitia fleet yards. The angular, polygonal pressure shell was designed to be self sufficient for up to 10 hours (more modern variants have extended this to 15 hours). Power was provided by fuel cells and a microfusion reactor with an endurance of 50 hours (now 76.4 hours), allowing the work pod to be used for multiple operational runs before being refuelled and recharged. The pilot's compartment is equipped with variable gravitational controls, although many prefer to work in null-g or close to null-g. Most find this less disorienting, especially when working on large structures and ships or in low orbit. The communications suite is also well equipped; twenty-five separate channels are provided, allowing for the maximum co-ordination on extensive engineering works. Any of these channels may be used as an emergency beacon frequency; since 2271 the health of the pilot is monitored by onboard computers. In the event that any of these life-signs moves significantly out of normal, the emergency beacon will be activated and the workbee will return to its dock.

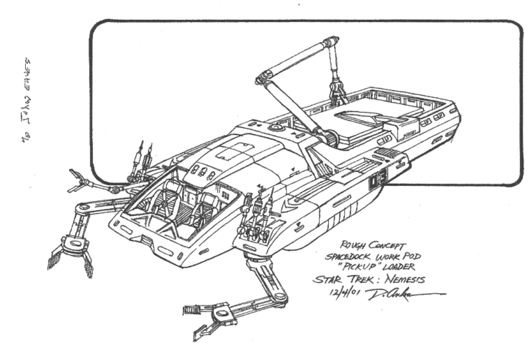
The workbee tool packs were based on surveys of the most commonly used and needed tool systems for exterior repairs, and introduced accordingly. The basic repair pack was the first to see use, together with the cargo tow pack. Other, more complicated and specialised tool packs were introduced over the next few years. By 2265, the Type 10 work pod (now up to model number 240, and already being produced by scores of others besides Patterson-Massey) was equipped with virtually all the tools that were available to previous models; other tool packs continue to emerge to this day, often specialised rigs whose replicator patterns are designed locally and then approved and distributed by Logistics Command. By 2267, the type already was the standard work pod unit used by the UFP Starfleet; only a scattering of specialised units remained in a few yards and starbases.

The exact numbers of Type 10 work pods that have been produced is almost impossible to estimate, especially as the advent of replicators has allowed the onboard construction of workbees and small shuttlecraft. Today, almost every Starfleet vessel carries at least two workbees, sometimes many more; tenders may carry as many as twenty. In addition, the vast fleet yards of the UFP employed as many as 1,500 at a time during the crash building programmes of the Dominion War.

The basic Type 10 has been uprated many times; only the external shell remains of the original design, the other systems having been swapped out so many times that the continued use of the Type 10 designation is really rather misleading. Nonetheless, it appears certain that the type will remain in service into the early 25th century at least.

Workbee (TNG)
Workbee (VOY)





Workbee (ST:NEM)

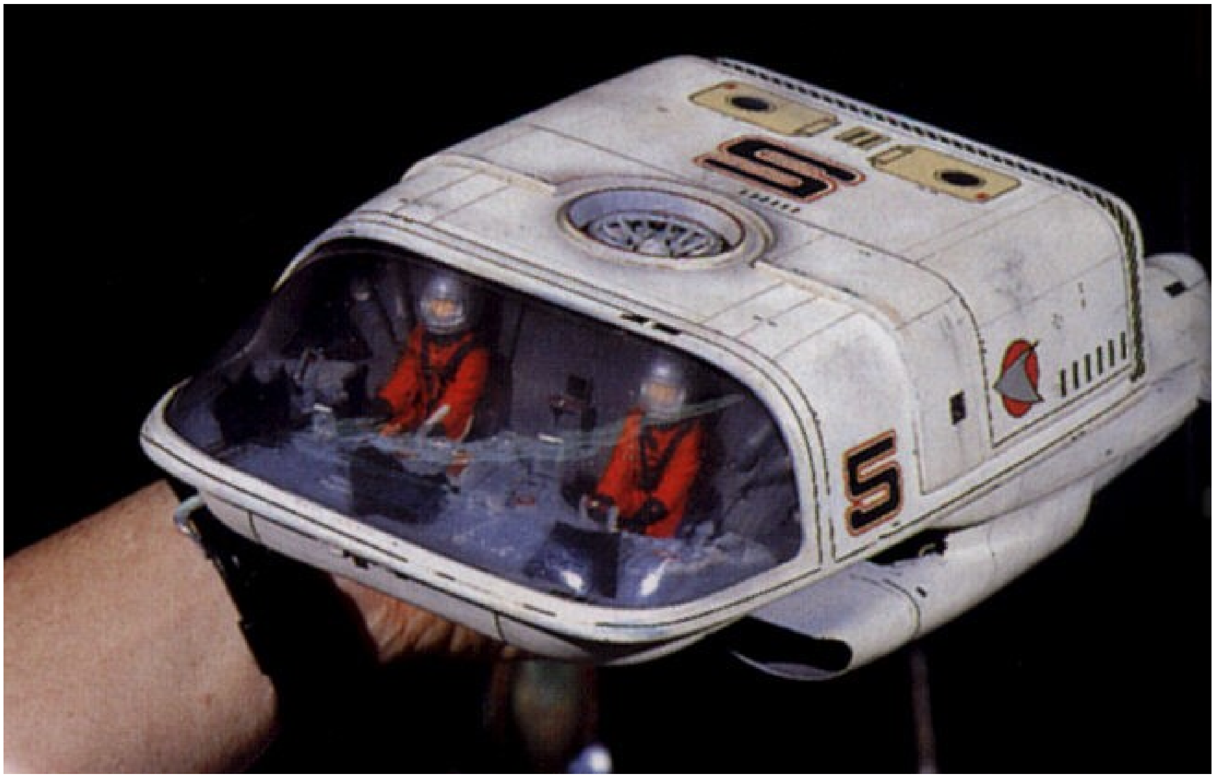
Inspection pod (TNG era own)

Type 401 Harbor Tug

2266-

Alt. names:	*Clydesdale*
Completed:	1,650 total
Length:	m
Beam:	m
Height:	m
Mass:	tons
Crew:	2
Speed:	0.15 c max.

Endurance:	12 days
Weapons:	None
Shields:	None
SOURCES:	D ST3:TSfS/Bill George (N Jackill III) (H own)



Harbor tug (TNG era own)

Pilot cutter (TOS era own)
Pilot cutter (TNG era own)

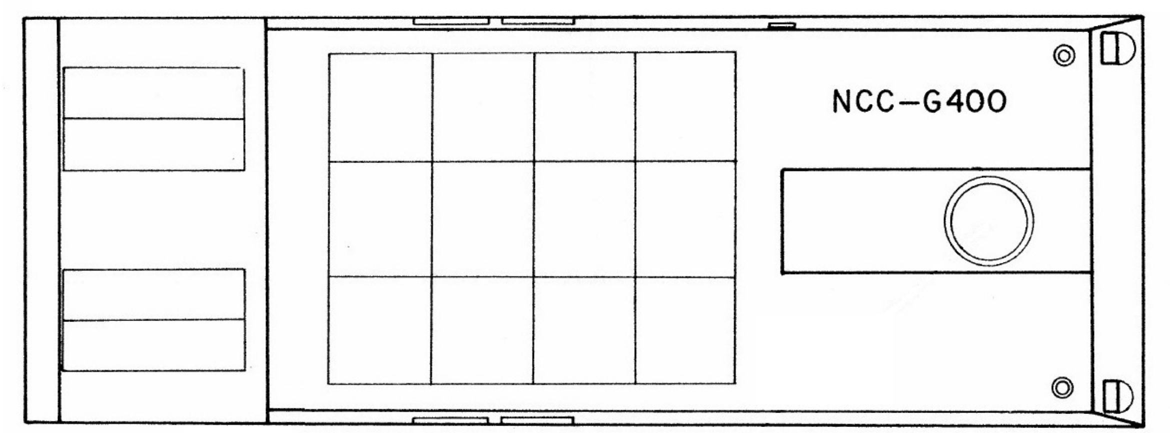
Insystem auxiliaries

In addition to the shuttles and shuttlepods fielded aboard starships, Starfleet operates a variety of craft that mainly serve starbases and other fixed installations and are seldom seen in starship hangars. These range from tiny utility pods to the various transatmospheric shuttles, towships and pilot cutters zigzagging busily around starbases. Some primary types are listed here, although Starfleet also uses a wide variety of civilian designs not included in this list. The craft in this chapter are again listed in chronological order.

Voltara

Cargo drone
2229-2288

Completed:	70
Length:	64.5 m
Beam:	23.5 m
Height:	13.5 m
Mass:	4,800 tons (standard) 5,000 tons (crewed versions)
Officers:	None (standard) 3 (crewed operations)
Crew:	None (standard) 9 (crewed operations)
Cargo:	10,500 tons
Max. speed:	0.75 c
Endurance:	5 years
Weapons:	None (standard) 2 phaser III emitters on dorsal bow (high security models)
Shields:	1-layer conformal forcefield Navigational deflector on ventral bow
Transporters:	1 or 2 GP (6-pad), 4 light cargo; Mk I All Starfleet units upgraded to Mk III in 2249-51
SOURCES:	(D Daniel Biringer) (N Daniel Biringer) (H own)



One of the most prominent sublight cargo drone propulsion systems in the 23rd century was the magnetic gradient engine. Useful in operations around Type 3 or 4 stars and for landing and takeoff at most types of habitable planets, magnetic propulsion gave steady if somewhat 'weather-dependent' thrust at minimal fuel cost. Incidentally, it was also ideally suited for the sort of duonetic environment that reduced warp and impulse drive performance and hampered transporter operations. Obvious roles in supplying installations, expeditions and fledging colonies in star systems of this type thus existed. Ordered by Starfleet Logistics Command, the *Voltara* (NCC-G400) was designed to cater for them all.

In its basic configuration, this advanced drone was a simple box 64.5 by 23.5 by 10.0 meters in dimensions, capable of taking aboard small cargo through twin stern airlocks, pumping in fluids to onboard tanks, and carrying significant loads externally. Its four inboard engine pods were mounted in the corners of the lower deck. A navigational deflector and sensor array sat at bow, and some support machinery at stern. Yet the space requirements of this type of machinery were minimal, and most of the deck was dedicated to cargo, with liquid tanks on both sides and a small control room for crew-supervised operations at forward center. Two pads for the centralized transporter system allowed internal shuffling of cargo, including outsize pieces. There was a turbolift system as well, with a vertical shaft going up from the control room and an open horizontal rail extending aft along the cargo hold centerline.

The next deck up formed the second open cargo area, served by a third transporter pad and quickly configurable to a variety of needs. The forward one-fifth, provided with viewports, might become a lounge area if the drone were to ferry passengers; the side tanks might hold anything from foodstuffs to industrial waste fluids; and the centerline spaces could be sectioned off or combined into a fabricator flats that would turn the drone into a flying manufacturing center.

Fixed facilities on the forward half of the third deck up included a bow-mounted personnel transporter platform and thirteen individual holds, each configurable into a passenger cabin if needed. The aft half held the cargo transfer airlocks, the larger two capable of receiving a container five meters on the side, the smaller four ideally suited for work pods and other small craft. Above this deck was a superstructure 19 m long and 5 m wide, holding the flight control computer and a dorsal sensor dome. On some variants, this was surrounded by facilities for extended crew-supervised operations, allowing the installation of diverse gear such as laboratories, sensors, airlocks and stores for construction and maintenance work, or self-defense armament.

The exterior surfaces were provided with clamps for further five-meter containers, 21 on the ventral side and up to 18 on the dorsal (reduced to 12 if the wide superstructure were shipped). Spatial operations with external and fluid cargo only were typically uncrewed; personnel would only be needed for transferring the cargo, often with work pods carried onboard in the four small airlocks. Planetary supply missions in turn typically involved internal cargo only, leaving the drone capable of landing on a prepared surface.

Seemingly overengineered for any specific application, the standardized drone was still so inexpensive to manufacture that it could be fielded in great numbers and applied on basically any job at hand. Few users ripped out the useful internal divisions altogether; conversions to pure fluid or bulk tankers were rare. Even the simplest supply barges sometimes saw crewed operations. Logistics Command ended up procuring seventy vessels (NCC-G400-469), all of the most complete equipment standard available. Nominally complementing the recently aquired *Sherman* warp drones, the *Voltaras* played an important evaluation and training role as Starfleet adopted this new type of logistics operations. Up to 200 hulls of *Voltara* type were subsequently manufactured for actual commercial use.

Yet the increasing technological sophistication of drones and barges eventually outmoded this model of operations. In addition to all the bells and whistles of a *Voltara*, a modern sublight cargo drone of the 2260s would come to sport full impulse engines and atmospheric and rough-field capabilities. A counterpart from the 2280s could have miniature warp drive on board as well. Simple magnetic propulsion remains in use on 'big and dumb' applications such as insystem ore or deuterium carriers. Multipurpose drones have not featured this mode of propulsion for the better part of a century, however.

Appendix A: Of Ship Statistics

Most of the ship entries in this book are accompanied by a statistics chart. Such a chart lists various properties of each starship class, but by necessity, the results are somewhat averaged over the often widely varying properties of subclasses or upgrade standards or even individual ship configurations. When a subclass or variation of the basic design differs sufficiently from the main class, it is either given its own entry, or its properties given in parentheses within the main class entry.

Let's examine a typical statistics chart, in this case that of *Northampton* class strike frigates.

1)	**Northampton**		-class name
2)	Strike frigate		-ship type/mission class
3)	2272-2321		-service years
4)	Completed:	7 total: 3 strike frigates Mk I 1 special operations frigate Mk II 3 strike frigates Mk III	-number of ships completed to date
5)	Length:	300.2 m (nacelles lowered for transport) 267.2 m (nacelles raised)	-dimensions in meters
6)	Beam:	150.2 m	
7)	Height:	75.0 m (nacelles lowered for transport) 73.8 m (nacelles raised)	
8)	Mass:	754,600 tons (Mk I, III; Mk II, estimated)	-mass in tons (10^3kg)
9)	Cruise speed:	w 6 (nacelles lowered for transport) w 8 (nacelles raised)	- basic performance figures
10)	Max.speed:	w 8.0 (nacelles lowered for transport) w 10.0 (nacelles raised)	
11)	Endurance:	5 years	
12)	Officers:	30 (Mk I, III) Unknown (Mk II)	-complement
13)	Crew:	295 (Mk I) Unknown (Mk II) 298 (Mk III)	
14)	Weapons:	4 phaser VII emitters in 2 twin banks on dorsal primary hull 2 phaser VII emitters in twin bank on ventral primary hull 3 fwd medium torpedo tubes w/ 40 photorps in aft ventral primary hull extensions (Mk I) 3 fwd medium torpedo tubes w/ 60 photorps in aft ventral primary hull extensions (Mk II, III)	
15)	Shields:	3-layer forcefields Navigational deflectors on engine booms Secondary navigational deflector on ventral primary hull	
16)	Laboratories:	None	
17)	Transporters:	6 GP (6-pad), 4 assault / emergency evacuation (20-pad), 2 cargo; Mk IV All ships brought to Mk V standard in 2284-86	

18) Auxiliaries: 6 assault shuttles, 4 work pods (Mk I, III)
Unknown (Mk II)

19) Ships of historical interest:

USS Bremerton (NCC-2316)

20) SOURCES: (D FASA)
(N FASA)
(H FASA)

Explanation on various entries in the chart:

1) Class name is normally the name of the first ship to be commissioned for the class. Sometimes preproduction vessels differ sufficiently from the production models to justify naming the class after the first production vessel instead of the first ship commissioned under the common class name. For example, *USS Constitution* was commissioned several years after the precursor vessels *USS Constellation* and *USS Republic*, but the latter names were not adopted since they represented experimental conversions that differed considerably from the *Constitution* production standard.

The *Northampton* was the first of her class to be laid down, launched and commissioned, a hat trick of scheduling actually rather uncommon in starship procurement.

2) The designation system for ship types largely stays constant throughout the years covered in the book. However, new designations are at times created to accurately describe new mission profiles, while others die away, and some designations get a new meaning with passage of time. For a complete list of ship types (also known as 'mission classes', not to be confused with ship classes), see Glossary. Also note that foreign designations for Starfleet vessels may differ considerably from the official ones, even when there is good general semantic compatibility – Klingons classify many Starfleet scouts as destroyers, heavy cruisers as battle cruisers and explorers as battleships, for example. It is also usual for civilians to use the prefix 'star' for full starship types (e.g. 'star cruiser', 'star explorer', 'star destroyer'). This is *not* standard practice in Starfleet, however.

The *Northampton* represents a category of starships dedicated to planetary assault operations, earning the 'strike' prefix, and her size combined with mission-inflexible equip equates her with the 'frigate' category, at least its heavier end from the late 23rd century.

3) For years of service, two years are given: the year of commissioning of the first production-standard ship (the 'class ship') for service in the UE or UFP Starfleet, and the year of decommissioning of the last ship of the class. In case of especially distinct variants, two or more sets of variant-specific service years are sometimes given. A continuous string of upgrades is not divided in this manner, however.

The author understands that the history of a ship class is more complicated than this; however, for simplicity's sake, further details and important dates are only given in the main body of the entry in question.

4) The figures on completed ships are divided into subclasses or construction batches if necessary. For brevity, all ships in a given class are not listed in detail – see entry 15 for further information. A plus (+) sign after the figure means there was an undisclosed number of confirmed orders for more ships at the time of the writing.

It should be noted that (apart from some early designs in the first chapters of each part of this work) only ships built for UE or UFP Starfleet are counted here, even when the design also sees widespread civilian use. The distinction is especially important in case of transport or auxiliary cruiser designs, for which Starfleet use typically represents just a small fraction of total numbers built.

Of the *Northamptons* built, two subclasses were operated by Starfleet's Defense Command, while a single ship of a slightly different design saw Starfleet Intelligence use. The subcategories are based purely on design differences rather than operator identity ones, however.

5-7) Ship dimensions are given for the main class. If subclass or variant dimensions differ from this, they are given separately and the variant noted in parentheses. The term 'height' is used instead of the traditional naval 'draft', since the latter would be as anachronistic and illogical as the term 'displacement' would be in mass measurements.

For the *Northampton*, two dimensions are provided in length and height, due to her variable geometry design.

8) Mass is given for a ship fully equipped for her primary mission, fueled and crewed, with IMRFs at idling level. No cargo is assumed carried; if necessary, cargo capacity is separately given. This work does not follow the previously common convention of excluding the mass of the warp coils from the ship mass, and may thus appear confusing in relation to 23rd century and earlier reference works.

It should be noted that the figures are always approximate, since in practice no two starships sail out with the exact same configuration or gross weight. Furthermore, the mass of modern starships varies considerably throughout a mission, thanks to mass-reducing subspace fields. It has been suggested that future starships be of zero idled mass for more efficient sublight propulsion and take-off/landing operations. For now, partial mass reduction and localized antigravity application are more efficient than total mass masking.

9) Performance figures are a complicated issue. Usually, 'cruise speed' means the speed that can be sustained for days, weeks or months, and is operationally used for interstellar cruising. However, for several small ship types, the term is meaningless, since they do not 'cruise' at warp speed, but use their maximum speed whenever engaging their warp engines. Also, some deep space exploration vessels tend to cruise at speeds far higher than the given optimal-efficiency 'cruise speed' figures due to the immense distances they have to span.

10) 'Maximum speed' is even more complicated. It is theoretically possible to squeeze very high warp speeds out of even moderate-performance coils if enough energy is pumped into them. 'Maximum speed' usually gives the speed beyond which the coils or other parts of the engine system begin to suffer irreversible damage from the high energy levels – the first threshold is normally the durability of delicate power system components like dilithium, followed by the durability of the coils themselves, then by ship integrity and finally by theoretical warp engine performance limits.

The term 'Maximum sustainable speed' should only be used in conjunction with an estimate of how long such speeds can be sustained – usually, this refers to 12 hours, but sometimes to time intervals as short as two minutes. Modern warp engine designs can theoretically approach Eugene's limit of warp 10 indefinitely, if enough power is supplied and warp coils or dilithium crystals do not disintegrate too soon. The current official record for Federation starships is the *USS Enterprise* (NCC-1701-D) flight recorder reading w 9.9999923 registered in SD 41263.2 during engine tests, just before the ship reverted to non-warp propulsion methods. Recorder data is incomplete, though, and other equally anomalous readings suggest the ship actually never exceeded warp 1.5 in the tests.

Note the change from the old 'convenience scale' of [speed=warp factor cubed times c] to the newer 'law of nature' with nine natural power minima and the warp 10 conceptual limit, effected after 2304. New research, partially augmented by reports from time travelers, indicates that there may exist further power minima at very high input power levels, but the complex structure of the power curve at these extreme levels is not yet fully understood. Perhaps another change of warp scale is due in the future? In this work, figures are in format wX, where X is the speed in warp factors of the old scale, or in format WY, where Y is the speed in warp factors of the new scale.

Note also that the maximum speed given for solely impulse-powered ships is the total delta-v of their fully fueled propulsion systems; in practice, such a ship can at most achieve half the given speed, allocating the other half of her delta-v for deceleration. However, proper use of gravitic technology in connection with gravity-well maneuvering may affect the figures considerably, and the given delta-v should be taken as a lower approximation for maximum performance only.

11) Endurance figures assume no fuel replenishment with tankers or in starbases, unless otherwise specified. With various impromptu refuelings often supplementing ramscoop replenishment, deep space exploration vessels may enjoy more than triple the endurance given – in turn, local defense ship types do not profit significantly from ramscoop replenishment, but they seldom operate without tanker support. Few missions of any kind last more than five years without major replenishment in starbase facilities. The use of cryogenics or other stasis techniques may also radically alter endurance. To convert endurance times to maximum endurance distances, one may use the rule-of-thumb that 23rd century and newer craft can travel an average of 1,000 ly per year, while 21st and 22nd century ships travel 500 ly/y on the average.

12-13) Crew complement is primarily given for the main class, and is usually the median or average of all the complements used during actual operations of the main class. More detailed information is given in parentheses. Still, the figures should be taken as very rough averages. Note the trend of decreasing crew size per ship volume as computer systems are upgraded and accommodation standards increased; especially interesting are exceptions to the trend. Complement is divided into 'Officers', from Ensign grade up, and 'Crew', including enlisted and NCO rates. However, a large complement of cadets, civilian specialists and researchers or family members is often carried along, and generally added to 'Crew', in parentheses. Also, as life support systems are generally built with 1,000% redundancy, e.g. a ship of 450 crew can theoretically accommodate at least 4500 people until consumables exhaustion, internal volume allowing.

14) Weapon systems are listed according to standard Starfleet categories. Individual weapon systems are not identified by brand name or manufacturer; <u>lasers</u> and <u>particle cannon</u> are given general power figures, while <u>phasers</u> are given Roman numbers in the following scheme:

type	**description**
I	handheld unit for concealed carriage and self-defense
II	high-powered handheld unit for general use
III	riflelike unit for heavy ground duty, also available in vehicle/craft mounts
IV	artillerylike unit for heavy ground duty, also available in vehicle/craft mounts

V	artillerylike unit for heavy ground duty, also available in craft, ship mounts
VI	light shipboard unit, aka ‘corvette phaser’ (earlier ‘frigate phaser’)
VII	medium shipboard unit, aka ‘frigate phaser’ (earlier ‘cruiser phaser’)
VIII	medium shipboard unit, aka ‘cruiser phaser’ (earlier ‘dreadnought phaser’)
IX	heavy shipboard unit, also available in ground-defense mounts
X	heavy shipboard unit, also available in ground-defense mounts
XI	heavy ground-defense or station-based unit

If followed by letter P, the unit is optimized for pulse-firing mode that allows for higher momentary power output without overheating.

Projectile weapons are divided into rockets (sublight unguided weapons with specified warhead type), missiles (sublight guided weapons with specified warhead type) and (photon) torpedoes (warp guided weapons with antimatter warhead unless otherwise specified). The systems for classifying these weapons are not directly based on performance, and are normally omitted here for simplicity. In case of photon torpedoes, the division to microlaunchers for small craft and light, medium and heavy launchers for starships is often made, although the latter three are in practice largely compatible with a common selection of ordnance.

15) Shield types are divided into EM shields (field strength given in Tesla equivalents) and graviton-based forcefields (type and configuration given). Forcefield systems are not given field strength, since such figures would be meaningless – shields adapt to incoming energy according to energy type within the limitations of the ship’s power or energy supply, whichever limits the output first, and their power functions have a highly complex time dependence.

16) A starship’s scientific capabilities are even more difficult to sum up than her defensive strength. For example, the spectrum of sensors aboard the ships is broad and constantly changing, making it impossible to list all the instrumentation available. To give at least some indication of the scientific potential of a ship, this entry lists the dedicated laboratories available onboard for data analysis and experimentation. A general purpose laboratory provides facilities for containment and analysis of a wide range of samples, for standard chemical and physical synthesis processes, and for engineering experimentation, and comes equipped with versatile expert systems; it thus is a veritable flying university in compact form. Special purpose laboratories are still often needed e.g. in complex biological studies, in coordination of planetwide survey operations, or in dealing with highly energetic or unstable materials. Even ships without laboratories can gather significant scientific data and either process it with their computers or store it for later analysis by other facilities.

17) Transporter systems are highly standardized across the Federation. Only the generation (‘mark’), number and configuration of systems are thus given. The standard range is 10 km for emergency transporters, 8,000 km for medium transporter modules and 40,000 km for starship modules unless booster relays are used, while actual performance is highly dependent on local conditions. Currently, standard Federation transporters are in their seventh generation, although Mk VI and even Mk V units are still in common use in civilian and older Starfleet vessels, and Mk VIII units are in experimental use aboard some new cruisers.

18) Maximum shuttlecraft carrying capacity is given in the form of true operational auxiliary craft complement. Significantly more craft could probably theoretically be squeezed in, but not serviced or efficiently operated. Specific auxiliary craft types are listed according to standard Starfleet category system, when applicable.

19) Historically significant ships of a given class are listed here with their registry numbers. E.g. years of service or lists of commanding officers are not given, however – detailed individual ship histories are available through other sources.

20) For those of you who for some reason wish to distance yourselves from the Trek universe: the degree to which the information agrees with things seen or heard in Star Trek episodes or movies is coded here. Letters D, N and H code properties of the ship; a letter is followed by the source for that property. If any of the sources is in parentheses, that source is not ‘canonical’. If the letter itself also is in parentheses, there is no ‘canon’ source at all for that property (which, of course, does not mean the property hasn’t been well thought out or lacks aesthetic or engineering merit...).

D means the design or visual appearance of the ship. As Star Trek is principally a phenomenon of the visual media, this is the aspect of ‘canonicity’ most important to a starship fan. Only sightings of actual models, screen readouts, blueprints, voiced-out descriptions or comparable material in episodes or movies qualify as ‘canon’. However, if a ship was barely glimpsed in an episode yet the corresponding model is carefully and correctly presented in ‘noncanon’ source material, the latter presentation naturally qualifies as ‘canon’.

Ship statistics, other than external dimensions or number and positioning of weapon emplacements, are almost invariably derived from ‘noncanon’ sources. Mass figures generally are determined by taking the mass suggested in the given ‘noncanon’ source (usually based on volumetric analysis and assuming realistic material densities) as the mass of the hull, and adding some hundreds of thousands of tons for each nacelle (assuming superdense coil materials). The main body of the text typically gives warp coil mass for each engine type; a simple deduction then should reveal the mass figures suggested by ‘noncanon’ sources…

N means the name for the class. Information from episodes or movies that indisputably combines a design with a class name is naturally accepted as ‘canon’, but an extension is made with the most current version of the ST Encyclopedia, the naming schemes of which are also accepted as ‘canon’ until otherwise proven. It has so far mostly been the case that names given in the Encyclopedia are indeed in agreement with onscreen material, even if this consists of obscure background ‘Okudagrams’ only. The assumption is made that Starfleet names its ship classes in the manner the United States Navy currently does, that is, using the name of the first completed ship as the class name. Exceptions abound, though, often reflecting the desire of the source material writers to imitate the exceptions common in the real world.

H means class history, namely the service years. Very seldom is ‘canon’ info given on this; but if an episode or movie makes it clear in what historical situation the first ship was launched or the last destroyed or retired, then the date for that situation, as given in the current ST Chronology, qualifies as ‘canon’. The details of the actual history of any class are usually about 95% pure imagination and at most 5% dull ‘canonical’ facts.

Appendix D lists the abbreviations and acronyms used for the various sources. Lamentably, many of these are long out of print and only accessible to the author or the interested reader in partial form via internet.

Appendix B: Glossary

AC

Anti-cloak. Describes sensors, weapons and tactics used for exposing and defeating opponents protected by a cloaking device.

ACB

See Annular Confinement Beam

AG

See Artificial Gravity

Advanced Starship Design Bureau

A subdivision of Starfleet Technologies Command, dedicated to research and development of starships and associated technology. One of the many bureaux of Starfleet Research and Development, and responsible for many famous pathfinder projects, including the *Galaxy* class of explorers. In general, non-revolutionary starship design is handled by various bureaux of the Engineering Division, which is also responsible for most of the actual construction of hardware as well as its maintenance. Starfleet Corps of Engineers also constructs and maintains orbital and planetary starbases, outposts and other installation, with occasional input from the ASDB.

Annular Confinement Beam

A sheath-like field facilitating the undisturbed phasing of matter within to various levels of subspace. Low-energy versions envelop the targets of transporter operations for safe phasing; high-energy versions maintain coherence on projected-energy weapons like phasers or lasers when these are accelerated to FTL speeds.

Artificial Gravity

An essential element of spacecraft life support systems, artificial gravity is typically created by streaming spin-created gravitons through a waveguide net built into starship interior floors. Inertial damping is closely related to AG, and the two jointly protect the crew from acceleration forces, as well as from detrimental long-term effects of weightlessness.

Attack Cruiser

Variant of cruiser dedicated to offensive operations and planetary assault, often sacrificing endurance and research capacity for high cruise speed and heavy weaponry. Also called strike cruiser in late 23rd century. Applied e.g. to variants of ***Caracal*** and ***Mann*** classes. Designation not currently in use in Starfleet.

Auxiliary

1) Common name for starships dedicated to supporting various starship operations but not directly taking action. Ship types include e.g. tanker, tug and tender. Term used in conjunction with patrol

combatant, mobile combatant, and support combatant in Starfleet system of categorizing military-application starships.

2) Common name for small craft embarked aboard and utilized by starships for various tasks. Craft types include work pod, shuttlepod, shuttle, plus various tactical craft and other special-purpose craft. See part III of main text.

Auxiliary cruiser

Starship of typically commercial or otherwise limited-performance origin pressed to cruiserlike duty. Auxiliary cruisers are a low-cost way of boosting specific aspects of Starfleet cruiser strength, and have been used for survey, escort and patrol duty. Certain ship classes have also been constructed specifically with auxiliary cruiser duty in mind.

ASDB

See Advanced Starship Design Bureau

Battle Cruiser

Variant of cruiser purely dedicated to offensive operations, carrying heavy armament more typical of larger ships and thus making significant sacrifices in other fields. Designation no longer used in Starfleet, but applied to a variety of foreign designs, especially Klingon vessels. Previous Starfleet classes include ***Advance***, ***Albion***, ***Menahga***, ***Mitannic***, ***S'Harien*** and ***Andernach***, as well as some experimental designs.

Battleship

1) Dedicated defensive and offensive starship significantly larger than cruiser size. Usually possessing shielding and armor capable of withstanding the full firepower of ships of similar or lesser design for extended periods of time, as opposed to cruisers or other small vessels which must rely on speed and maneuverability for protection. In 24th century, the largest starships have been of explorer category. Starfleet has yet to build a true battleship in the galactic sense of the word, similar in size and capacity to the Dominion or old Orion designs.

2) Designation also briefly applied to lesser Starfleet vessels, like the two-nacelled heavy patrol combatants of ***Excelsior*** class in late 23rd century, in parallel to designations dreadnought and defender used for three- and four-nacelled heavy patrol combatants, respectively. All these vessels must be considered extensions of the cruiser family, however, and not true battleships.

Carrier

1) A starship intended to support small craft operations, also known as shuttlecarrier. Widely utilized in Romulan war and the early 23rd century; built in low numbers during the military buildup in the late 23rd century; largely replaced by multi-mission ships with capacious shuttlebays in the 24th century. Generally of low warp performance, but carrying heavy defensive armament. Classes include ***Titan***, ***Valkyr***, ***Ariel*** and ***Fredrikstad***.

2) Ore carrier or cargo carrier. A large drone for moving significant amounts of ore or cargo inexpensively between star systems. Seldom built as definite ship classes – instead, unique

configurations of cargo pods are used for each mission. Largest ships are kilometers in length. Seldom armed or permanently manned, but capable of carrying passengers in special pods or habitat compartments.

Cascade Ion Drive

Any reaction or warp drive utilizing a polaric ion cascade system as the means of extracting power from the antimatter powerplant. UESF experimented on this potential competitor for dilithium technology in the early 22nd century (see ***Daedalus*** class), and experiments were carried on by UFP Starfleet until the 2268 ban on all polaric ion testing. No large scale operational applications ever emerged, although several foreign powers not signatory to the treaty are known to operate power systems of this type. Not to be confused with ion drive, a generic designation for a number of reaction drives.

CID

See cascade ion drive.

Class

1) Ship class. All starships of the same design belong to the same ship class. The class is usually named after the first vessel that is completed to the final production standard. When members of a class are modified significantly (usually meaning major spaceframe alterations), they become members of a new class or subclass, named either after the first converted ship or, more usually, after the first ship built to the modified configuration from keel up. Modifications in the 22nd and 23rd centuries often resulted in subclass rather than class designations, but in the 24th century, subclasses have been largely abandoned since there are minor differences between all starships – if the earlier practice were continued, all starships would form single-ship subclasses of their own. Click here to see a complete listing of ship classes in Starfleet service between 2161 and 2375.

2) Mission class. All starships with a similar mission profile belong to the same mission class. While most Starfleet ships are multi-mission capable, the primary mission or spectrum of missions dictates the mission class. For example, a small defense-oriented ship belongs to frigate class, while a very large multi-purpose ship belongs to explorer class. Sometimes, the more informal expression ship type is used instead of mission class. Click here to see a complete listing of mission classes in Starfleet service between 2161 and 2375.

3) Activation class. In the 22nd and 23rd centuries, the UFP categorized its ships into stardrive and sublight activation classes. For stardrive vessels, the frontline active-service Starfleet ships of each mission class were designated Class One ships, while the older designs as well as some support units were given Classes Two to Six, in decreasing order of sophistication. Civilian or reserve types were given subsequently lower designations. Sublight interplanetary craft were similarly classified. In case of major UFP-wide crises, ships would be brought to active Starfleet service in this order.

Class Seven vessels have been activated in significant numbers only four times in UFP history - in the evacuation of Bayard’s planet in 2217, in the restoration of Qo’noS in 2293-2327, and during and after the Cardassian war in 2355-65 as well as the Dominion war in 2373-78. None of the crises so far has been severe enough to require activation of Classes beyond Eight.

4) Being a thorough organization, Starfleet categorizes virtually every part of its equipment according to various criteria. It is more likely than not that the device you are using to read this work, and indeed this work itself, belongs to some 'class' or another in Starfleet records. Be careful not to confuse such classifications with the three major classification systems of starships.

Clipper

High speed starship, usually intended for liaison tasks. Originally colloquial designation primarily referring to vessels utilizing unconventional warp propulsion systems such as ring-type coils.

Cloaking Device (classical)

Device for rendering a ship or other object invisible to a wide spectrum of sensors. Cloaking devices work by bending as much of the incident radiation as possible around the ship so that it will appear undisturbed by the presence of the ship, as well as by monitoring all emissions from the ship itself and modulating and distributing them for minimum observability. Sufficiently energetic or field-noninteractive radiation (including for example tachyon beams) will naturally penetrate the cloak, and there are many types of emissions that cannot be masked effectively. Passive camouflaging techniques (emission sinks, radiation absorbers, use of local 'terrain' and appropriate maneuvering for protection) will therefore have to be used to ensure invisibility.

Cloaks become ineffective if high-energy devices like phaser or disruptor weapons or combat shields are activated inside them. Also, even if the energy signatures of these devices can be masked, their use in combat will immediately reveal the ship's position. Thus, most captains in combat decloak before firing their weapons or raising combat shields, then recloak if situation warrants. In one-on-one battles against opponents with slow-reacting defenses, some cloakship captains have been known to fire their weapons from under cloak, disregarding the momentary exposure and the strain the firings place on the cloaking device. Typically, such tactics require specialized technology. Against rapidly reacting opponents, ships can usually recloak only if they are numerically superior.

Cloaking Device (phasing)

Device for removing the interactions between a ship or other object and its environment though shifting its temporal phase, effectively making it both invisible and intangible to non-phased observers. Forward-phased objects can still observe non-phased and backward-phased targets through slightly weakened fundamental interactions, whereas observations in the opposite direction are impossible. Like all phasing processes, phasing cloaks can be disrupted by anyon-chroniton interactions – but unlike shields, phasers or transporters, phasing cloaks generally are immune to duonetic interference, due to the significantly higher degree of phase-shifting involved.

Command Cruiser

Variant of cruiser dedicated to coordination of multi-ship operations or other large scale military maneuvers, often carrying reduced armament yet improved C^3I systems and facilities in comparison with similarly sized cruisers of other types. Also considered a subtype of command ship. Command cruisers formerly in Starfleet service include ***Unity*** and ***Balson*** classes, as well as variants of e.g. ***Caracal*** and ***Excelsior*** classes. In the 24th century, need for spaceframe modifications in the command role has been drastically reduced, and no dedicated command cruiser classes have been introduced since the 2290s.

Command Ship

Starship dedicated to coordination of multi-ship operations or other large scale military maneuvers. Currently, thanks to increasing fleetwide integration of command and control systems, the task can be handled by ships of various types; the largest vessel in the task force is usually selected as the command ship. However, dedicated command ships were produced in low numbers in the 22nd and 23rd centuries, including e.g. ***Capitol***, ***Macintosh***, ***Ford*** and ***Etna*** classes. These classes were conversions of spacious transport ships, and thus auxiliary cruisers rather than primary combatants. They were included in the patrol combatant category, though, for being primarily employed as forward headquarters in support of extended patrols or expeditionary deployments of combat fleets.

Corsair

Small warp-capable ship or craft dedicated to commerce interception. Originally colloquial designation for a number of dedicated or adapted types operated in the late 23rd century for disruption of enemy commerce. Parts of the mission profile later condemned as unlawful and discontinued, along with the designation. Known or suspected classes include ***Leonardo***, ***Carbonare***, ***Rogge***, ***Greer*** and ***Firestone***.

Corvette

Small warp-capable ship dedicated to local patrol, law enforcement and community service missions. Sometimes landing-capable, not dependent on starbase facilities for support; originally rarely carried torpedo armament. Classes include ***Pointer***, ***Hunter***, ***Thunderbolt***, ***Procyon***, ***Daring***, ***Juliet***, ***Saber***, ***Bradbury*** and ***Ukora***, with numerous subclasses or subvariants. See also part II of main text.

Courier

Small high performance warp-powered ship or craft dedicated for rapid delivery of diplomatic packages, messages and passengers. Classes include ***Athens***, ***Centaurus***, ***Antares***, ***Condor***, ***Peregrine*** and ***Loki***. See also part II of main text.

Cruiser

1) Medium multi-purpose starship. Sub-designations include battle cruiser, command cruiser, heavy cruiser, light cruiser, medium cruiser, attack/strike cruiser, and through-deck cruiser. The largest Earth or UFP exploration vessels until early 24th century. Later relegated to lesser duties with the introduction of large numbers of explorer starships.

2) Auxiliary cruiser. Conversion of an originally civilian type (transport, starliner) into an auxiliary vessel by the adding of mission gear such as weaponry. Subtypes include exploratory cruiser, escort cruiser, and patrol cruiser. Typically utilized in times of dire crisis, such as the Romulan and Dominion wars and the Klingon cold war era.

3) Pleasure cruiser. Civilian starship type optimized for maximum comfort during interstellar voyages. Not to be confused with Starfleet-operated cruisers or auxiliary cruisers, although pleasure cruisers can be pressed to auxiliary duty in activation classes of 7 or lower.

Cryosleep

Suspended animation technique based on slowing down of metabolism via body temperature reduction. Seldom used in Starfleet applications, save for certain medical emergencies; common in 21st and 22nd century interstellar colonization applications, and also used e.g. by Klingons for efficient transport of infantry or labor forces well into 23rd century. Currently superseded by temporal stasis techniques.

Cutter

1) Designation traditionally used for all port authority vessels, rescue craft and law enforcement vessels, regardless of type or size. In Starfleet practice usually applied to ships up to corvette size.

2) Designation used for certain starship auxiliaries prior to the mid-23rd century, superseded by or absorbed into the generic designation shuttlecraft, or in some cases runabout.

Deep Space

Space outside the treaty boundaries of the United Federation of Planets. This includes for example several enclaves surrounded in all directions by UFP space, but excepted from membership because of Prime Directive considerations or political animosity.

Deep Space Station

Fixed installation operated by Starfleet outside Federation space. These support both Starfleet and civilian space travel and commerce in areas otherwise devoid of Federation facilities. Many deep space stations are actually operated under joint command with local authorities, and some feature local equipment instead of the usual Class I-III towable starbase hardware. Currently, Starfleet maintains 9 DS stations, designated DS3-7 and DS9-12. DS stations 1, 2 and 8 of this generation have gained starbase status with UFP annexations and new member acquisitions. Most earlier DS stations have also been absorbed to the main body of starbases, including the R and K series from mid-23rd century and the T series from early 24th century.

Defender

Dedicated large defense starship heavier than cruiser. Designation parallel to dreadnought, applied to two ships of Denebian manufacture, *USS Deneb* (NCC-2002) and *USS Inaieu* (NCC-2003). Their sister designs were considered battleships of ***Defender*** class, however. The defenders had four nacelles instead of the traditional three of dreadnoughts, and were utilized as high endurance border patrol combatants.

Destroyer

Dedicated medium defense starship intended for destroying enemy capital ships and installations. Designation almost indistinguishable from frigate in technical aspects. However, frigates perform a variety of offensive and defensive duties, while destroyers were originally intended for offensive use only and even now rarely see peacetime use. Classes include e.g. ***Djartanna***, ***Iceland***, ***Cavalry***, ***Marshall***, ***Minuteman***, ***Placido***, ***Kovaris***, ***Saladin***, ***Detroyat***, ***Larson***, ***Cochise***, ***Zodiac*** and ***Freedom***, with a multitude of subclasses. Standard destroyer mission profile currently includes anti-ship and anti-installation offensive and fleet escort.

Dreadnought

Dedicated large defense starship heavier than cruiser. Designation applied to e.g. ***Federation***, ***Ascension*** and ***Kirov*** classes in 23rd century. All dreadnought designs featured three warp nacelles and heavy phaser and torpedo armament, and were utilized as command vessels, system defense fortresses or high-endurance border patrol combatants. Limited offensive missions also planned and performed although not officially sanctioned. Starfleet use of designation discontinued in 24th century.

Drone

Unmanned space vessel, either remotely piloted or equipped with autonomous control systems. Widely utilized in transport of hazardous material or performing of risky observation or repair missions. Also used for hauling low-priority cargo. See also carrier and probe.

Escape Pod

See Lifepod

Escort

Defense starship used for convoy protection. Designation generally used only as a mission description of various starship types, not as a ship type, yet also including the dedicated ***Remora***, ***Hellespont*** and ***Chimera*** classes. Also applied in late 24th century on the experimental ***Defiant*** class for counter-intelligence reasons. Normally, deep space escort duties are handled by ships of light cruiser or frigate category, although destroyers and perimeter ships have at times been pressed to this duty as well.

Escort cruiser

Dedicated convoy protection vessel typically converted from a civilian design; variant of auxiliary cruiser. Designation applied on numerous classes during the Romulan war and the late 23rd century Klingon conflict.

Exploratory cruiser

1) Dedicated exploration vessel typically converted from a civilian design; variant of auxiliary cruiser. Designation applied e.g. on ***Daedalus***, ***Castor*** and ***Lng'we Chi*** classes. See survey cruiser.

2) Large multi-purpose starship biased towards exploration operations. Designation applied e.g. on ***Enterprise*** class and ***Tikopai*** subclass of heavy cruisers, vessels significantly more capable than auxiliary cruisers. See individual ship entries for proper division between the two meanings of the designation, typically dictated by acquisition politics.

Explorer

Very large multi-purpose starship. Largest and most versatile actual starship type in Starfleet, although smaller than some terraformers or ore carriers. Current classes include ***Galaxy*** and ***Nebula***, while older explorers of ***Ambassador*** and ***Niagara*** classes, as well as the pathfinder

Excelsior class, have been redesignated as heavy cruisers. Starfleet fielded the first explorers in early 24th century, and continues development of these large, independent vessels even though the general trend in the late 24th century is again towards large numbers of specialized small starships. Standard explorer mission profile includes independent exploration, power projection, fleet command duties and diplomatic representation.

Fast

Designation definer historically used interchangeably with light, to put a positive spin on the lack of heavy equipment aboard. In Starfleet, applied e.g. to the ***Ianar*** class of frigates and ***Odysseus*** class of cruisers that factually featured significantly faster propulsion technology than competing designs, yet also to the ***Daran*** and ***Remora (II)*** designs that enjoyed no such propulsive advantages.

Fleet

1) Large operational units of defense starships, usually 100 ships or more in size. Starfleet normally does not maintain fleet organization in peacetime, but quickly assigns a predetermined selection of dedicated combatants and auxiliaries, as well as multi-purpose vessels, into the number of fleets the crisis at hand requires. These fleets generally feature two or more explorer class command vessels, their cruiser, frigate and destroyer escorts, reconnaissance units, planetary assault groups and logistical support groups. Desired task forces can rapidly be formed, either in a balanced mix of types, or in flotillas of a single ship type.

During the early 23rd century, Starfleet operated three to six fleets for defense against the Klingon threat; the 3rd Fleet was elemental in the blockade of Axanar, while the 5th Fleet participated in the Ghioghe expedition. The Klingon conflict intensified throughout the century, and up to ten fleets were formed by the 2280s. After Khitomer, the fleets were demobilized, and only units of task force size were utilized between the signing of the Khitomer treaty and the declaration of the Cardassian war. The largest deployment of defense and expeditionary fleets in Federation history was the first UFP-Dominion war, where 14 fleets were organized for both offensive and defensive missions, comprising some 3,900 Starfleet ships in all. The losses were heavy, especially in 7th and 19th Fleets and the Klingon-augmented 9th Fleet, and current organization only supports 12 fleets. These are being gradually demobilized as of 2375.

2) Abbreviation of Starfleet. Also sometimes refers to specific local defense or exploration fleets of UFP members, or space forces of foreign powers and threat forces.

Fleet Coordination Ship

Starship dedicated to coordination of fleet and flotilla operations. Designation applied in the 23rd century to e.g. ***Hermes*** and ***Constant*** classes of converted destroyers, vessels smaller but significantly better armed than classic command ships. These types carried the parallel designation of scout, and were utilized in that role on occasion.

Frigate

1) Dedicated medium defense and escort starship, larger than corvette but smaller than destroyer. Often capable of transatmospheric operations. Designation used until late 22nd century (and reflecting 20th century Earth naval usage). Classes include ***Drexler*** and ***Lincoln***.

2) A common designation for defense and escort starships ranging from light frigates (small patrol and escort ships typically lacking torpedo armament) to heavy frigates (versatile multipurpose ships similar to light cruisers), used in late 23rd and early 24th century (and reflecting Earth naval usage until 19th century). Light and medium classes include ***Loknar***, ***Daran*** and ***Ianar***, with numerous subclasses. Heavy classes include ***Surya***, ***Coventry*** and ***Miranda***, with numerous subclasses.

3) Dedicated medium defense starship, typically carrying mission gear in switchable modules. Designation used since mid-24th century. Classes include ***Renaissance***, ***Springfield*** and ***New Orleans***.

When optimized for planetary assault support, these vessels are often designated strike frigates. Ships initially designed as frigates but later adopted for other missions are sometimes classified as e.g. medical frigates or survey frigates, creating an apparent contradiction in terms. Still, such designations are more informative than mere 'medical ship' or 'surveyor' in these cases, since the modified frigates usually retain at least the main phaser armament and thus have significant defensive capabilities. Examples include ***Soyuz*** class as well as several less drastic modifications of ***Miranda*** and ***New Orleans*** frigates.

FTL

Faster than light. Pertaining to drive, sensor and communications systems capable of speeds higher than 299,790 km/s in the absolute subspace frame. See warp drive.

Heavy Cruiser

Medium multi-purpose starship with heavy torpedo and phaser armament and shuttlecraft capacities. More capable overall than light cruiser, superior to scout in exploration capacity and to destroyer or frigate in offensive and defensive power. Classes include ***Triton***, ***Enterprise***, ***Horizon***, ***Baton Rouge***, ***Constitution***, ***Excelsior***, ***Apollo***, ***Ambassador***, ***Niagara***, ***Akira***. Standard heavy cruiser mission profile includes deep space exploration and power projection, although the ships are well equipped to handle lesser research and defense roles as well.

Heavy Frigate

Medium starship similar to the multi-purpose light cruiser, but more optimized towards a defense mission. Designation chosen for ***Miranda***, ***Surya*** and ***Coventry*** classes and their later derivatives mainly for political reasons.

IDF

See Inertial Damping Field

Impulse Drive

Reaction drive based on non-Newtonian acceleration of fusion byproducts and/or other propellant. When coupled with a mass-reducing effect, impulse drive can propel starships to high relativistic speeds with minimal propellant expenditure. Impulse drive is a typical early application of gravity-manipulation technology, often co-developed with inertial damping fields and structural integrity fields.

Ion Drive

Reaction drive based on electromagnetic acceleration of inert propellant. When coupled with a mass-reducing effect, ion drive can propel starships to medium relativistic speeds. Starfleet has not used ion drive as a primary or secondary drive system on its major starships, but certain reaction control systems are based on this principle. A wide variety of techniques exist for implementing a drive of this nature. See also Cascade Ion Drive.

IMRF

See Inertial Mass Reduction Field

Inertial Damping Field

A forcefield/graviton -based system for countermanding the effects of inertia on starship components (especially the crew). Vital in enabling the ships to withstand the huge accelerations of impulse and warp engines. First used by Earth in late 20th century, and applied to almost all space technology in the UFP. Closely connected with artificial gravity systems.

Inertial Mass Reduction Field

A subspace field for reducing the inertial forces imposed by the mass of a starship. While an IDF protects components of a ship from differential inertial shear, an IMRF lowers the mass of the entire vessel, allowing it to perform sublight accelerations otherwise impossible for a ship of a given mass. In modern 24th century vessels, IMRF is usually projected by subspace coils included in the impulse engines. Older vessels typically utilize separate field-manipulation crystals that deflect impulse power to stabilize the primary warp field at low intensities, and thus allow it to be used for inertial mass reduction.

Interceptor

A combat-capable small craft optimized for interception of other small craft even if also capable of offensive missions against starships and installations. From 23rd century onwards, typically warp-capable.

Interdiction ship

Fast small starship for rapid deploying and supporting of planetary combat forces of company strength. Features medium phaser and torpedo armament for bombardment and limited space combat, plus sufficient transporter and shuttlecraft capacity for deploying the fighting force. Only ***Kolm-An*** class constructed for Starfleet use in late 23rd century; concept occasionally utilized by foreign forces.

Laser

Secondary weapon on UE and early UFP Starfleet ships in the late 22nd and early 23rd centuries. Based on the stimulated emission effect, the weapon produces a coherent electromagnetic beam that can focus high energies on the target. Both shipboard and handheld variants were in widespread use from their introduction in the Romulan war era until the onset of phaser technology. Current shielding technology has largely negated the threat posed on Starfleet vessels by lasers, although military applications of high-energy shipboard lasers in less advanced navies and in low-level conflicts are still common. There are also multiple infantry and civilian applications.

Lifepod

Small jettisonable compartment of a spacecraft, equipped with independent life support and low-power propulsion systems and usually with landing capacity. Also known as escape pod or lifeboat. Starfleet uses a wide range of designs, ranging from one-man pods to sixty-person lifeboats. In the 22nd and 23rd centuries, lifepods for the full complement of crew and passengers were seldom incorporated into designs since there was little hope of the occupants surviving until help came – instead, large jettisonable hull sections of aerodynamic shape were used, while a minimal number of lifepods augmented evacuation of the sections to be abandoned (see Ship Separation).

In early 24th century, propulsion system advances enabled more timely rescue operations, and ships were given 100% lifeboat capacity. Large designs also featured 35% and later 50% overcapacity in case some lifeboats became inaccessible or inoperational. Advanced designs featured the ability for small lifeboats to combine into large gaggles for improved survival. Dedicated propulsion and life support units could be attached to the gaggles to facilitate long journeys home, even though towing by shuttlecraft remains the primary mode of lifepod motion. An individual pod usually provides fourteen days to one month of life support, while a complete *Galaxy* class gaggle may theoretically sustain life for a full year for 50% of the occupants. Stasis technologies may extend these figures, barring regrettably frequent technical failures of the delicate instrumentation.

Light Cruiser

Fast medium multi-purpose starship with medium torpedo and phaser armament and shuttlecraft capacities. Falls between heavy cruiser and scout in exploration capacities, and heavy cruiser and destroyer or frigate in defense capacities. Normally sacrifices defensive and/or research gear for higher speed, lower operating costs and smaller crew requirements. Typically single-hulled, usually carries integrated systems instead of frigate-style pods. Classes include ***Texas***, ***Venture***, ***Mann***, ***Ranger***, ***Amchitka***, ***Kearsarge***, ***Anton***, ***Chesapeake***, ***Wambundu***, ***Cheyenne***, ***Griffin*** and ***Intrepid***, with subclasses, as well as 'lightly equipped' variants of large cruisers, e.g. ***Caracal*** class.

Some light cruisers were in the late 23rd century called heavy frigates for reasons of acquisition politics. Certain parallels also exist between the capabilities of mid-24th century frigates and light cruisers. The current trend is to designate all medium multi-purpose starships as light cruisers and to give them as much modularity as possible.

Standard light cruiser mission profile includes colonial support, convoy escort and border patrol duties, as well as some limited scouting and exploration operations and courier duties. Due to relative inflexibility of design, light cruisers often perform a narrower mission spectrum than their heavy counterparts, especially in times of crisis.

Light Frigate

Light defense and patrol starship with laser or phaser armament, primarily used for traffic control and protection duty. Originally seldom armed with torpedoes or equipped for heavy ship-to-ship combat, or deployed in deep space. Still better adaptable to these missions than corvette, due mainly to longer range and greater speed. In many cases interchangeable with escort or light destroyer.

Lightsail

Sublight drive based on momentum transfer from stellar or artificial EM radiation. When coupled with gravitic technology, can efficiently propel spacecraft to high relativistic speeds. Rarely used as a secondary drive for vessels possessing warp drive, but a typical primary drive for fledging space powers in insystem and short range interstellar operations. Also applicable as an emergency drive system for distressed vessels.

Marines, Starfleet

Organization providing Starfleet with large numbers of specialized ground combat personnel, comparable to the historical Marine and Army branches of Terran armed forces. As this personnel has no role in peacetime Starfleet operations, Marine deployments are strictly limited to the state of declared war between the UFP and a carefully specified threat. In such situations, Marines are deployed using standard defense/multipurpose Starfleet ships, dedicated Marine operations ships and other suitable transports.

The standard role of the Marines is to augment local ground defense forces and to retake UFP ground positions from threat forces in situations where direct starship-based power projection is unadvisable. Offensive operations against foreign targets are normally a minor part of the Marine manifest, and have been undertaken mainly in the Cardassian and Dominion wars. So-called special operations under Starfleet Intelligence have to be sanctioned by the Federation Council, and are rarely performed by Marine units – the Intelligence and Security branches possess dedicated teams of their own for the task.

As conceived in 2161, Starfleet Marines were a relatively independent force in charge of a wide variety of planetary defense duties. A major reorganization of Marine forces in 2327 led to the adoption of standard Starfleet rank and rate system, as well as streamlining of upper-echelon command. Joint command with Starfleet Security now provides the main framework of Marine operations coordination, and joint training and operations are also being developed. The force still remains proud and tradition-minded, down to its anachronistic name.

Medium Cruiser

Multi-purpose starship with medium torpedo and phaser armament and shuttlecraft capacities. A complementary designation seldom applied, usually simply interchangeable with cruiser. Classes include ***Armstrong***, ***Rochester***, ***Taurus***, ***Andor***, ***Ishtasse***, ***Odysseus***, ***Constellation***, ***Reigate***, ***Hokule'a***, ***Prometheus***, with numerous subclasses.

Microtorpedo

A torpedo weapon of extremely compact dimensions, capable of being carried aboard and launched from small craft. Standardized projectiles are of 30 mm diameter and up to 150 mm length, and dozens of different models and warhead types (including probe-type payloads) are available. See Minitorpedo.

Mine

Auxiliary weapon used for area denial and ambushing. Mines exist both in planetary and spaceborne variants, and are usually made difficult to spot by using sensor-absorbing materials or cloaking devices. Typical warheads include thermonuclear, antimatter and gravitic charges and phaser or disruptor emitters, although various other types including verteron dispensers and subspace displacers are also in use. Most mines feature advanced sensors and algorithms for identifying and prioritizing targets, and various propulsion systems for engaging them at optimum range.

The Seldonis IV conventions place strict limits on Federation use of spaceborne mines, and prohibit area denial/ambush weapons from planetary use altogether. The conventions are ratified by a number of foreign powers as well, although with individual reservations. Separate treaties exist for limiting the types of warheads allowed, and bans on e.g. subspace-damaging, metagenic and polaric-ion cascade weapons are generally and interplanetarily accepted due to the uncontrollable effects of these types of weaponry.

Minitorpedo

A torpedo weapon of compact dimensions, capable of being carried aboard and launched from small and medium craft. Standardized projectiles are of 300 mm diameter and up to 850 mm length, and dozens of different models and warhead types (including probe-type payloads) are available. See Microtorpedo.

Missile

1) Primary weapon on UESF ships until the mid-22nd century. Refers to a variety of self-propelled, guided sublight projectile weapons, normally with either thermonuclear or kinetic-kill warheads. Separate from unguided rocket weapons. Largely replaced by warp-capable torpedo weapons. Handheld missile weapons are rarely used in Starfleet, due to the effectiveness of current shielding against such threats.

2) Any self-propelled, guided projectile weapon, sublight or otherwise, launched from a planetside facility or vehicle.

Mobile Combatant

Common name for offense- and defense-oriented starships with the mission profile of actively engaging enemy forces and performing assaults. Starships of strike cruiser or destroyer type are exclusively mobile combatants, while other variants of cruiser, as well as frigates, are employed in this role when needed. In contrast with patrol combatant, support combatant and auxiliary in Starfleet's system of categorizing military-application starships.

NCC

Letter prefix in UFP Starfleet vessel registries. Specifies the operator of the ship, and is immediately followed by the registry number of the ship. Current usage has letter N signifying UFP registry, and CC signifying active Starfleet forces. Other prefixes include NX (UFP Starfleet Experimental), NSP (UFP Vulcan Merchant Marine), NLA (UFP Andorian Self-Defense Fleet) etc. Foreign operators are also assigned a registry prefix in the Federation scheme for traffic control purposes.

Not to be confused with the earlier UESF registry scheme where N would stand for Naval/Starfleet and the letters following it would specify the ship type. Thus, e.g. NCC would specify a cruiser and

NX would denote an explorer. This scheme was abandoned by Earth naval forces in 2162 and replaced by the common UFP Starfleet system.

NTR

See Nuclear Thermal Rocket Drive

Nuclear Thermal Rocket Drive

Reaction drive based on heating of propellant by fusion or fission reactions. Typical early sublight drive system for fledging space powers, e.g. 20th and 21st century Earth, requiring no knowledge of gravitics or subspace theory, but usually soon replaced by impulse drive.

Particle Cannon

Primary or secondary weapon on Earthfleet and early Starfleet ships. Refers to a variety of devices capable of accelerating charged or neutral matter or antimatter particles to lethal, relativistic speeds. Used in conjunction with plasma and laser weaponry, until replaced by phaser technology in early 23rd century. Particle cannon were extremely energy-hungry and thus usually only suited for use aboard the largest vessels. Handheld particle weapons were originally rarely used, due to their impractical bulk and the effectiveness of even rather crude shielding against such threats.

Introduction of phasing and ACB technology increased the effectiveness of particle weapons both in portable and shipborne applications in the mid-22nd century, gradually leading to the development of phasers. Phasing also made it possible to permeate a live target, enabling the application of a stunning/neural disruption charge via particle beam, and thus creating a new niche for handheld particle weapons. The improved particle weapons were between 2150 and 2250 also commonly known as phase weapons.

The 2150s classification system for phased particle cannon was in use until the end of the century, and is briefly outlined here:

Type A: 125 to 500 GJ excition level, peak power 500 GW, overcharge up to 5 TJ
Type B: 80 to 125 GJ excition level, peak power 200 GW, overcharge up to 2 TJ
Type C: 40 to 80 GJ excition level, peak power 100 GW, no overcharge option
Type D: up to 40 GJ excition level, typical vehicle mount weapon
Type E: up to 1 GJ excition level, typical handheld weapon

In the early 23rd century, new phase cannon types were added, complicating and confusing the systematic nature of the scheme. These included the following:

Type F: up to 20 GJ, pulsed stun charge channeling, typical handheld weapon
Type G: 20 GJ / 100 GW, pulsed stun charge channeling, typical vehicle mount weapon
Type H: 500 GJ / 700 GW
Type I: 800 GJ / 900 GW
Type J: 500 GJ / 900 GW
Type K: 700 GJ / 1,000 GW
Type L: 800 GJ / 1,200 GW
Type M: 900 GJ / 1,400 GW

As ‘type’ thus in practice became to denote a specific weapon model, the scheme was dropped as overdetailed – just in time for the introduction of improved phaser weaponry.

Patrol Combatant

Common name for defense-oriented starships with the mission profile of patrolling a given area of space against intrusion. Starships of corvette, perimeter ship, dreadnought or defender type (see also battleship) are proper patrol combatants, while various other starship types like light cruisers and frigates can be assigned this mission profile as well. Other military-oriented starship categories beside patrol combatant include mobile combatant, support combatant, and auxiliary.

Patrol Cruiser

Dedicated anti-intrusion patrol vessel typically converted from a civilian design; variant of auxiliary cruiser. Designation applied e.g. on patrol variants of ***Independence*** and ***Sydney*** classes of transports.

Perimeter Ship

Defense-oriented small starship dedicated to long duration border patrol missions. Designation used in the mid- to late 23rd century for ***Kiaga***, ***Agilis***, ***Akula***, ***Engage*** and ***Kirsanov*** classes, but largely abandoned in the 24th century with the introduction of numerous frigates for border patrol duty. Also called perimeter action ship.

Phase Cannon

See Particle Cannon.

Phaser

Directed-energy/particle weapon in common use in Starfleet and various other UFP and foreign organizations. Based on rapid nadion effect, the phaser generates a wide-band particle beam that utilizes both EM and subspace components. Large shipboard phasers can produce lightspeed or (with the help of ACB subspace sheaths) faster-than-light beams, whereas handheld variants are limited to significantly lower speeds but feature a wide variety of settings that transcend their status as mere weapons. Phasers have been available to Starfleet since the early 23rd century, having gradually evolved from particle cannon weaponry.

Photon Torpedo

See Torpedo.

Plasma Cannon

Projectile weapon in common use in early UFP Starfleet and preceding Earth vessels. Based on generation, containment and directed release of ionized matter, the plasma cannon were a strictly sublight weapon, typically complemented by laser or particle cannon weapons in military applications. Unlike these weapon types, however, plasma cannon did not benefit from phasing or subspace sheathing technologies, and were largely outdated by the mid-22nd century already.

Plasma Torpedo

Command-guided high energy variant of plasma cannon projectile, accelerated to medium FTL speeds with the help of an externally generated ACB subspace sheath. The weapon has limited inflight steering capacity and low speed compared with ACB-sheathed lasers or phasers, and ties down the firing platform to maintaining the ACB, but is devastating when used against proximal or poorly maneuvering targets. Starfleet has not made use of the weapon apart from brief testing in the 2290s, but for example Romulan and Cardassian forces continue to utilize the technology in the late 24th century. Also called plasma mortar.

Prime Directive

The principal guide for practical application of Starfleet policy on field operations involving interaction with extra-UFP civilizations, as per Starfleet General Order 1. The directive states that Starfleet is not to interfere with the natural development of isolated civilizations in any way, and is to protect such civilizations against external influence by any means necessary, even at the cost of lives of Starfleet personnel. The directive does not apply to civilizations already under extensive alien influence, and thus excludes systems that have progressed to the stage of interstellar commerce and the use of warp drive or equivalent means of interstellar travel. However, the directive *is* applied if the alien influence is singular and disruptive and it is possible to eliminate it completely without causing further damage to the society. Thus, alien forces enslaving or exploiting a society can be dissuaded from doing so, if the society is thus returned to its natural path of development.

The directive may never be applied to pass judgment on what is the natural course of development for the society in question. Thus, any inborn troubles within a culture are to be left as they were – Starfleet can never interfere with an imminent nuclear war or planetwide succumbing to narcotics, genetic engineering or alteration of physical or mental form of the species, if it is not caused by clearly definable external influences. Such influences include interstellar communications and commerce; but even a society that has learned its use of cybernetic implantation through alien contact may not generally be forced to abandon this inevitably tragic form of racial suicide.

The directive specifically applies to Starfleet personnel only, but Starfleet is often empowered to enforce the directive upon civilians through the fact that said civilians can be considered a singular, disruptive alien influence.

The exact wording of the Prime Directive has been amended sixteen times in Federation history. The current formulation is available via the nearest UFP Consulate infolink.

Probe

Robotic craft intended primarily for exploration are generally called probes instead of drones, and range in size from microprobes less than one meter long to starship-sized long-range probes capable of crossing the galaxy in their decades-long high-warp missions. Most exploration starships carry probes that can be launched from photon torpedo tubes - these currently fall into nine classes, with either sublight or warp propulsion systems and various sensor suites. Contrary to many other systems, the classification system of shipboard probes is not based on increasing or decreasing capacities.

Quantum Torpedo

A torpedo weapon carrying a warhead based on tapping of the underlying zero-point energy of the universe. This allows for very powerful yet extremely lightweight warheads with carefully controlled yield, and lessens the problems of collateral damage inherent even in light versions of the photon torpedo.

Rocket

1) Reaction drive based on Newtonian ejection of propellant, with possible non-Newtonian boosting. Chemical or nuclear reactions within the fuel or external heating by fission or fusion reactions (see Nuclear Thermal Rocket Drive) or other outside energy sources can be used to excite the propellant, or kinetic energy can be added by electromagnetic fields (see Ion Drive) or gravitics (see Impulse Drive). Typical secondary drive for starships utilizing warp drive, although by no means the only possible sublight drive system.

2) Secondary weapon on some UESF and early UFP Starfleet ships. Refers to unguided sublight projectile weapons, used in two main roles: with kinetic-kill warheads for close-in defense, and with thermonuclear or merculite warheads for saturation attacks against starships or installations at medium range. Separate from guided missile weapons. Currently not in Starfleet use, although an important part of the arsenals of various civilizations. Handheld rocket weapons are rarely used in Starfleet, due to the effectiveness of current shielding against such threats.

Runabout

Small liaison vessel capable of low to medium warp speeds, carrying 5-20 people or 2-5 tons of cargo. Usually lightly armed and capable of planetary landings, also utilized for deploying small research or tactical teams. Classes include ***Hubble***, ***Questor***, ***Juneau***, ***Kilauea***, ***Danube***. In some cases, the historical designation cutter is used instead for vessels of this description.

Salazaar Fleet Builders

Andorian shipbuilding agency responsible for several light to medium combat types in UFP Starfleet arsenal.

Scout

A small to medium, fast research and reconnaissance starship. Features medium phaser armament and extensive sensor and research gear, with optional shuttlecraft facilities. Typically omits or downplays torpedo armament, but may feature dedicated probe launchers.

Until the Romulan war, applied mainly to small military reconnaissance craft or ships with high speed and minimal armament or shielding. Between the founding of the UFP and the early 24th century, applied to a wide variety of vessels, including small one-or two-man reconnaissance craft, science platforms, military sensor picket and fleet coordination platforms, and small and medium, slow and fast starships in a highly inconsistent manner.

Designation finally refined in 2324 to the current form, with lightly armed, slow pure science platforms now designated surveyors. Small reconnaissance craft are known as scoutcraft. The role of dedicated military sensor and coordination ships has all but disappeared in the 24th century.

Older scout classes include e.g. ***Placido*, *Podish*, *Hale*, *Bode*, *Sawyer*** and ***Archer***. More modern ships under scout designation, typically cruiserlike in dimensions, include ***Challenger***, ***Rigel*** and ***Andromeda***. Numerous adaptations of other starship classes or designs (especially destroyers and frigates) have also served as scoutships, and include e.g. ***Tuverlind***, ***Hermes***, ***Nelson*** and ***Amerind***.

Scoutcraft

A small, fast reconnaissance vessel with a crew of 1-5. Lightly armed and intended purely for short-range reconnaissance duty. Not to be confused with starship-sized scouts.

SFB

See Salazaar Fleet Builders.

SFD

See Starfleet Division.

Ship Separation

Standard mode of protecting starship crews from catastrophic failure in a major component of the ship. Most Starfleet designs feature a jettisonable aerodynamic hull, currently almost invariably of saucer shape, that houses most crew facilities and at least one command center. In case of failure to other ship components, the saucer is severed from the rest of the ship and acts as a large lifepod. The saucer can perform controlled planetary landing or remain in orbit, normally sustaining life for at least a year for 100% of the occupants. Ship separation is thus preferred to lifepod ejection, since the latter offers markedly lower survival odds both in immediate landing and prolonged orbital stay.

Some starship designs are capable of repeated separation and redocking of one or more of their major components. For example the ***Galaxy*** class saucer can be separated even at high warp to propel part of the crew to safety while the rest of the ship engages in dangerous activity. Operationally, such ship separation is rarely viable except for catastrophic failure situations.

Shuttle

Auxiliary craft usually carried by starships for ground-to-orbit transportation or detached operations. Also used for starbase liaison duties. Since mid-23rd century, shuttles are normally warp-capable, but limited to warp 2 or 3. Most can be fitted with weapons and light transporters. Heavy cargo shuttles and special-environment shuttles are carried alongside light and medium personnel shuttles aboard larger vessels. Dedicated ground assault shuttles exist for special military applications. Also, heavy atmospheric transport craft without warp drive are carried aboard the largest starships and transports and often referred to as shuttles. See part III of main text.

Shuttlecarrier

see Carrier

Shuttlepod

Very small auxiliary craft used for ship-to-ship or ground-to-orbit transportation, free-space maintenance and repair work, and detached operations of very limited scale. Usually not equipped with warp drive.

SIF

See Structural Integrity Field

Starbase

Starfleet replenishment facility. A wide range of starbase types with different capabilities are utilized: the smallest Class I bases feature minimal defensive systems, antimatter and deuterium refueling tanks and communications gear plus rudimentary repair equipment; Class II features research facilities and/or starship crew support systems plus equipment for more comprehensive damage repair; Class III introduces increased defense capabilities, including photon torpedoes, and offers hangar facilities for small craft larger than simple shuttles; Class IV offers full repair capabilities with hangars for small starships; Class V features hangar spaces for medium starships; and Class VI offers hangars for starships up to explorer size. Classes I-III are often towed in place, while IV-VI are constructed in situ. Currently, over 700 facilities are in operation, 25% of these Class IV or larger.

Most in-system starbases feature a planetary surface component offering a variety of services; the orbital component of many such starbases is of Class I only, accompanied by separate dockyards and extensive surface facilities. On the other hand, deep space stations and research and trade outposts are often based on Class I-III hardware, and seldom feature planetside components.

Stardrive Vessel

Formal name for ships equipped with interstellar drives but not necessarily included in the starship category. Seldom used outside Starfleet activation records.

Starfleet, UE

The primary exploration and defense organization of United Earth 2089-2161.

Starfleet, UFP

The primary exploration and defense organization of the United Federation of Planets. Starfleet was created in 2161 by decree of the newly founded UFP to protect the integrity of the Federation and the safety of its members and to expand the knowledge of the member cultures. Originally featuring ships and equipment adopted from the space navies of all the members, Starfleet currently utilizes highly commonalized equipment built around the Federation, and accepts individuals from all the member cultures into its training programs.

Starfleet currently operates some 3,500 first-line exploration and defense vessels (Activation Class One in 23rd century parlance - see class) and thousands of support vessels of different types. The ships are deployed on a network of starbases, and the Starfleet charter explicitly forbids extended deployments of Starfleet forces near member planets, to protect them from ‘gunboat diplomacy’. The ships usually perform solo missions five to ten years in duration in deep space, although deployments of task forces for short-duration defensive or other special missions are not uncommon.

The ships are the most visible part of Starfleet; other forms of Starfleet presence include the starbases, deep space stations, research and trade outposts, security and liaison forces of UFP embassies and consulates, and various research teams or individual researchers co-operating with member cultures.

Starfleet internal organization under Starfleet Command includes Fleet Operations (at one point divided into Defense and Exploration Commands, although no such distinction is currently made), Base Operations, Logistics Command, Starfleet Security, Starfleet Intelligence, Starfleet Medical, Starfleet Research & Development, Starfleet Marines and various other departments. The exploration and defense forces are organized according to a strict military hierarchy, while the organization of other departments is often far more complex. For a general outline, see Appendix C.

Starfleet personnel are trained in Starfleet Academy. Additionally, Starfleet provides courses in other institutes of learning throughout the UFP. Starfleet also co-operates with local space forces and other authorities in matters of local defense or space operations support – and for example the Federation Customs Service relies heavily on Starfleet equipment, personnel and training in performing its duties. Civilian organizations like ACI, DI, NAR, NUMA, UESPA and VSI have historically participated in Starfleet operations by leasing ‘starship time’ aboard Starfleet vessels. In the early 23rd century, Starfleet returned the favor by leasing large numbers of civilian ships for exploration support operations, as its own forces were tied up with the Klingon threat.

Starfleet Academy

The primary training center of Starfleet. Located in San Francisco, Earth, the facility houses various training functions including

* Starfleet Officer Training Program (responsible for the training of commission-ed officers for Starfleet Active Forces and Reserve; 4-year course leading to commissioning to the rank of Ensign, various courses for commissioning individuals of previous naval training into Starfleet officers)

* Starfleet Crew Training Program (responsible for the training of enlisted personnel; 0.5-year program leading to the rate of Crewman Apprentice, 2-year program to the rate of Petty Officer Third Class)

* Starfleet Personnel Training Program (which gives final Starfleet training to medical doctors, scientists, jurists and various other specialists joining Starfleet, as well as co-operating with SOTP and SCTP in familiarizing members of other naval organizations with Starfleet; 0.5-2-year programs for specialists, normally leading to either Petty Officer rate or Ensign or Lieutenant (j.g.) rank).

Only the SOTP is completely located in San Francisco; other programs are partially distributed across the Federation, taking full advantage of civilian educational services, and are coordinated from the San Francisco headquarters.

Academy training invariably includes training assignments aboard space vessels and outposts; all SOTP members receive training aboard starships. It is possible to attain a higher than nominal graduation rank by excelling in duties or studies during training, although the standard reward for excellence is a decoration or a citation – possibilities for performance beyond the call of duty in starship or outpost deployments or in other Academy facilities are endless. Starfleet also offers advanced training to graduated officers and crew, leading to (and sometimes being required for) further promotion opportunities.

Each training program features various fields of specialization:

* Command line (including courses in command, spacecraft operations and piloting, tactics, diplomacy, law, training of personnel, psychology, history and philosophy)

* Engineering line (courses in general engineering, spacecraft operations, natural sciences, as well as various fields of engineering specialization)

* Logistics and adminstration line (courses in logistics operations, economics, psychology, as well as special fields)

* Military line (courses in ground combat operations, weapons, tactics, as well as special fields)

* Sciences line (courses in natural sciences, research equipment operations, history, philosophy, as well as special fields – usually, special training has been acquired from civilian or other Starfleet institutes before STP training)

* Security line (courses in security operations, weapons, tactics, law, psychology, as well as special fields)

* Services line (courses in spacecraft operations, as well as special fields)

In addition, physical education, linguistics and general training on operation of Starfleet equipment plus rudimentary ground combat and humanitarian support training feature heavily in all programs. SOTP participants are required to choose at least three programs, while SCTP participants have to take one or two. Command line is the most popular, followed closely by Services – the former opens the road to the most favored positions aboard starships, while the latter virtually ensures deep space assignments at some point of the career due to the Starfleet practice of rotating starship crews extensively between exploratory cruises.

Only command-line graduates are entitled to the red (earlier gold) uniform of command-qualified personnel; their assignments usually begin in the form of flight controller duty aboard starships or smaller vessels, and lead to eventual command positions. Graduates from other lines wear either a yellow (earlier red) or a blue uniform, the latter separating staff specialists and staff officers from other personnel. Color coding of service branches and fields of speciality was introduced in the 2270s but discontinued in the 2350s.

Starfleet Division

Earth starship building agency directly associated with Starfleet and involved in several notable medium and large combat and exploration starship projects.

Starship

Common name for Starfleet exploration and defense vessels with warp drive, from corvette size up. Also in some occasions applied to some independent small warp-capable craft like runabouts. Seldom applied to other warp-powered ships like transports or tenders. Term introduced for official use in the founding articles of Starfleet in 2161, and applied to all large warp-powered Starfleet vessels after 2238. Originally used in parallel with the more general term spaceship.

Stasis

Suspended animation technique based on timeflow manipulation. Mostly used in Starfleet for enhancing odds of crew survival during drive system failures or other transit-prolonging emergencies; also included in modern lifepod designs. Potential combat applications in enemy immobilization and spatiotemporal fragmenting have led to inclusion of stasis restrictions in several temporal weapon limitation treaties, none of which is universally ratified at the moment.

STL

Slower than light. Pertaining to drive, sensor and communications systems only capable of speeds lower than 299,790 km/s. See sublight vessel.

Strike Carrier

Medium starship dedicated to planetary assault operations, carrying large contingents of assault shuttles and other auxiliaries. 24th century successors to through-deck cruisers of 23rd century. Starfleet classes so far limited to ***Steamrunner***, although designation also applied to a wide variety of foreign designs.

Strike Cruiser

Variant of cruiser dedicated to offensive operations including planetary assault, usually lacking in exploration capacity. Also called attack cruiser. Applied e.g. to ***Belknap***, ***Impervious*** and ***Excel*** classes. Designation and mission abandoned in Starfleet in 24th century, but still applied to a wide variety of foreign designs.

Strike Frigate

Variant of frigate dedicated to planetary assault operations, often carrying large contingents of ground troops and employing assault shuttles or transporters to deploy them. Applied to ***Coventry*** (shuttlecraft) as well as ***Chandley*** and ***Northampton*** (transporters) classes in the late 23rd century, and after a long dormancy to ***Iwo Jima*** class in the late 24th.

Strike Transport

Variant of transport dedicated to planetary assault operations, carrying large contingents of ground troops, vehicles and/or ordnance and supplies and employing landing barges or direct planetfall to deploy them. Applied to a number of transport classes adopted from civilian use, as well as to dedicated vessels such as ***Phobos*** and ***London*** classes.

Structural Integrity Field

A forcefield-based system that strengthens starship structures to a degree impossible to achieve through the use of physical matter. Originally intended to supplement mechanical support structures; first used to extensively supplant them on *Ambassador* and *Apollo* class starships in the 2310s.

Sublight vessel

Formal name for spacecraft not capable of faster-than-light speeds. Sublight ships and craft have limited value in Starfleet service, save for some minor auxiliary duties.

Support Combatant

Common name for offense- or defense-oriented starships with the mission profile of performing military operations other than direct ship-to-ship combat. Starships of shuttle-carrier or command ship type are the most prominent support combatants; ships primarily employed in planetary assault role, including through-deck cruisers and later strike carriers as well as strike transports and strike frigates, are also included in this category. Other military-oriented starship categories beside support combatant include mobile combatant, patrol combatant, and auxiliary.

Survey Cruiser

Subtype of auxiliary cruiser, intended especially for long voyages of interstellar exploration. Also sometimes known as exploratory cruiser, but see this entry for alternate meanings. Designation applied to e.g. ***Cosmos***, ***Daedalus***, ***Libra*** and ***Castor*** classes but largely abandoned by the 24th century, as sufficient exploration capacity on all starships was made a priority in Starfleet.

Survey Frigate

Somewhat euphemistic designation used on ***Soyuz*** class of military signal-intelligence starships. Later adopted by other variants of the ***Miranda*** heavy frigate family, having longer range and more capable research facilities than other frigates and sacrificing torpedo armament for added sensor and datalink capacity. Designation still in sporadic use due to the limited survey capabilities of standard frigates.

Surveyor

Research starship with very limited defensive capabilities. Used for a variety of *in situ* scientific tasks, often as a platform for extended surveys of star systems or astronomical phenomena. Normally features phasers for self defense, but seldom carries torpedoes or shuttlecraft. Primary general purpose surveyor classes include ***Oberth***, ***Garneau***, ***Surak*** and ***Nova*** and their numerous subclasses, although there are several surveyor classes with shorter production runs and typically more specific equipment and missions. Designation adopted in 2324 to differentiate science platforms from small multi-purpose exploration vessels; previously both had fallen under designation scout.

Task Force

A small contingent of starships formed for specific missions. Since many starships operate independently, and have multi-mission capacities, Starfleet Task Forces often feature one to three multi-mission ships and a few smaller ships configured for the specific mission in question. A typical Task Force features one to three medium to large multi-mission ships (cruisers, explorers), one to three small multi-mission ships (scouts) and one to five special-mission craft (surveyors, frigates, transports, hospital ships etc.). Defense-oriented Task Forces usually feature two to four large to medium defense or multipurpose ships (battleships, explorers, cruisers) and two to four small defense ships (frigates, destroyers). Task Forces are usually created at a moment's notice from ships within range of the mission target, and are not maintained for more than a few months at a time. See also fleet.

Tender

Auxiliary vessel specifically designed for deep space replenishment of starships and other vessels. Towships of ***Ptolemy*** class are classified as Tug/Tenders, yet the very similar ***Doppler*** class lacks the tender capabilities and is accordingly designated. In turn, many tender ships not classified as tugs, like the ***Beowulf*** class, still possess some warp towing ability.

Terraformer

A vessel capable of altering planetary geology and/or meteorology in large scale. Large geo- and meteoro-terraformers were built for specific missions in the 22nd and 23rd centuries, but increasing capabilities of regular starships have led to moving of many terraforming duties to powerful multi-purpose ships like explorers instead. ***Ambassador*** and ***Nebula*** classes have been extensively used for terraforming in the 24th century. Dedicated terraformer classes, typically built in low numbers, include ***Roger Moses***, ***Kerala*** and ***Strata***.

Terraforming

Altering planetary conditions to make the planet habitable to Terran-type life. Terraforming technology has been available to the UFP from its founding date, but fast terraforming techniques in the time scale of decades have only been in use for a century, mainly thanks to advances in protomatter technology. Starfleet performs and coordinates terraforming through Terraform Command. It is estimated that almost 5% of the planets in our galaxy have already been terraformed by ancient civilizations into Class M worlds, so terraforming is not necessary for the creation of viable colonies. Yet research continues in search of faster and safer methods.

Through-deck Cruiser

A special designation for variants of late 23rd century cruiser designs with enlarged flight decks. Intended both to fight as cruisers and to support tactical craft operations in planetary assault missions. Classes include ***Coronado*** and ***Aleo***. Designation later abandoned, the role taken over by standard defense starships equipped with standard-size shuttlebays. See also strike carrier.

Torpedo

General name for warp-capable guided projectile weapons, in contrast to sublight-only guided missiles. The standard torpedo warhead in Starfleet service is a deuterium/antideuterium mass, its annihilation releasing large amounts of energy – a torpedo thus armed is a photon torpedo. Other warheads include zero-point energy taps used in quantum torpedoes, or thermonuclear devices routinely used in the early 23rd century. Starfleet currently has six main types of photon torpedoes in its inventory, classified according to range and capabilities, as well as two types of quantum torpedoes. Also available are tricobalt and other nuclear warheads for demolition purposes, as well as delivery systems for a variety of chemical, biological and other agents.

The highly standardized current types of projectiles are of 760 mm by 450 mm cross section and are compatible with light, medium and heavy launcher types at maximum lengths of 1200, 2100 and 3400 mm, respectively. Projectiles of smaller dimensions are classified as mini- or microtorpedoes, and are also standardized to some degree.

Tractor Beam

Device for exerting non-Newtonian forces by using a combination of gravitic and subspace technologies. Based on subspace suspension of gravitons, the device is closely related to shields and can typically be configured for a variety of attracting, repelling and deflecting modes. A typical starship tool for towing or debris clearing, also applicable as a weapon or geological or meteorological manipulation tool.

Transport

Starship or other vessel dedicated to transporting cargo or passengers. Starfleet has operated various manned and unmanned types, usually featuring warp engines of the current military standard fitted to special-purpose high-volume hulls. Transports range in size from small two-or three-crew ships to huge starliners capable of carrying tens of thousands of people if needed. Not to be confused with cargo carriers, a term commonly used for sublight bulk cargo drones.

Transporter

Teleportation system based on transformation of matter into phased state for transmission to destination. Standard units, available for Starfleet shipboard use since the late 2130s, transmit the phased matter stream at lightspeed to an unboosted range of at most 60,000 km, while systems utilizing subspace transmissions can achieve FTL speeds and ranges of several lightyears, but feature risks considered unacceptable by Starfleet.

Transporter systems are highly standardized across the Federation, ranging from Mk I units of the 22nd century to Mk VIII units currently in experimental use aboard frontline starships. Transporters can be installed aboard most interstellar and interplanetary craft down to shuttle size, and are the primary means of ship-to-surface or ship-to-ship deployment aboard all current starships.

Transwarp Drive

Common name for drive systems capable of higher speeds and efficiencies than the warp drive currently in use throughout the Federation. Promising venues of research include deep subspace immersion, new power regulation methods, dimensional rift techniques and time manipulation, all of which have been witnessed in use by alien species or entities. Yet, no practical drives of these types are available to Federation at the moment.

Tug

1) A warp-powered ship specifically designed to extend her warp field around objects that can thereafter be towed at warp speeds. Mainly used for carriage of transport pods, and towing of

disabled starships or other equipment lacking motive power. Classes include e.g. ***Ptolemy***, ***Ohio***, ***Doppler*** and ***Fisher***.

2) A craft or drone designed to propel ships or equipment lacking motive power. Formerly often used for maneuvering ships within and in the vicinity of docking facilities, but currently all but abandoned in favor of tractor beam guidance.

Type

1) Parallel to mission class (see class), Starfleet sometimes uses the expression 'ship type' when referring to the primary mission profile of a starship design. Thus, ***New Orleans*** class ships are either of 'frigate class' or of 'frigate type'.

2) When categorizing foreign spacecraft, Starfleet uses 'type' to refer to the design variant or production standard of a ship of a certain class. For example, Cardassian *Galor* (= ship class) destroyers (= mission class) include the torpedo-equipped Type 3 (often confusingly called a cruiser by the Cardassians) as well as the phaser-equipped Type 2 and the original low-powered Type 1. Likewise, Romulan *D'eridex* warbirds include Types A1, A2 and B. Such designations are not normally used on Starfleet vessels. Also, as intelligence is gained on foreign vessels, it is often found that there exists a specific indigenous subclass or class name for the various types, and the use of that name is then usually adopted in Starfleet as well. Thus, the elderly Klingon Type D11 large Bird of Prey is currently known by its Klingon name *B'rel*, while Type D7C is now known to be *K't'inga* class and the original Type D7 actually consisted of two main subclasses, *Klolode* and *Akif*.

3) Starfleet routinely categorizes its equipment so that 'type' specifies the application for which the equipment is intended while 'mark' refers to the version of the device in that category. For example, Type 3 phasers are high-powered, riflelike units with a great variety of settings; Type 3 Mark III units were in use in the 2260s whereas Type 3 Mark XII is the current standard unit distributed to starships.

UE

See United Earth

UEDP

See United Earth Defense Pact

UESF

See Starfleet, UE

UESPA

See United Earth Space Probe Agency

UFP

See United Federation of Planets

United Earth

Formal name for the planetary government of Earth from 2115 onwards; sole government of Earth from 2150 onwards. Also, an instrument of international cooperation from WWIII onwards, lending its name and often rather informal sponsorship to a variety of international organizations.

United Earth Defense Pact

International space defense organization of Earth 2069-2089.

United Earth Space Probe Agency

International space exploration agency of Earth from 2069 onwards.

United Federation of Planets

Community of some 150 members consisting of humanoid and nonhumanoid races and alliances in the Alpha and Beta Quadrants of our galaxy. Led by an elected Council of members, presided by an elected President, and promoting common trade, research and defense of its members, the UFP has attained a superpower status in a volume of some two billion cubic lightyears since its founding in 2161. The defense and exploration organization for the UFP is Starfleet.

USS

UFP Starfleet Starship. Acronym preceding the names of Starfleet starships, painted on ship hulls along with the ship's registry number. Commonly abbreviated as 'United Starship' in verbal communication, although the expressions 'United Spaceship' and 'Federation Starship' are also frequently used.

Warp Drive

Primary FTL propulsion method used by the UFP and most of the known spacefaring societies. Currently believed to allow for nine stable FTL speeds, up to 1,516 times the speed of light in neutral subspace conditions. Research on faster methods continues.

Warp Sled

Designation for a variety of spacecraft whose only function is to propel other, sublight ships and craft to warp speeds. Seldom used by Starfleet save for the ***Tai*/*Sait*** class of couriercraft.

Workbee

An informal name for work pod.

Work Pod

General name for manned sub-impulse craft used for construction and service tasks in space. Work pods are often carried by all kinds of starships, although the more capable shuttlepods sometimes replace them. A variety of external tools and modules are carried by the work pods to facilitate a multitude of tasks.

Appendix C: Starfleet Organization – General Outline

Appendix D: Abbreviations from Outside

DS9	Star Trek: Deep Space Nine, 1993-2000
DS9 TM	Star Trek: Deep Space Nine Technical Manual (Herman Zimmerman, Rick Sternbach, Doug Drexler, Pocket Books, New York 1998)
ENT	Star Trek: Enterprise, 2002-2005
FASA	"Freedonian Aerospace Association", a RPG company responsible for numerous ST publications
FSCC	Federation Shuttlecarrier Comparison Chart (Mark Wilson, Federation Frontiers)
FSRC	Federation Starship Recognition Chart (aridas sofia and Todd Guenther)
LUG	Last Unicorn Games, a RPG company responsible for numerous ST publications, also quoted for some unpublished works
SFB	Starfleet Battles, a RPG company responsible for numerous ST publications
SFC	Starfleet Chronology (Stan & Fred Goldstein and Rick Sternbach, Wallaby/Pocket Books, New York 1980)
SotSF	Ships of the Star Fleet, Volume One (Todd Guenther, Mastercom, Boston 1991)
SotSF2	Ships of the Star Fleet, Volume Two (Todd Guenther, Mastercom, Boston 1991)
ST:TMP	Star Trek: The Motion Picture, 1979
ST2:TWoK	Star Trek 2: The Wrath of Khan, 1982
ST3:TSfS	Star Trek 3: The Search for Spock, 1984
ST4:TVH	Star Trek 4: The Voyage Home, 1986
ST5:TFF	Star Trek 5: The Final Frontier, 1988
ST6:TUC	Star Trek 6: The Undiscovered Country, 1991

ST:GEN	Star Trek Generations, 1994
ST:FC	Star Trek First Contact, 1996
ST:INS	Star Trek Insurrection, 1998
ST:NEM	Star Trek Nemesis, 2002
STIX	Star Trek, 2009
ST:ID	Star Trek Into Darkness, 2013
STO	Star Trek Online, networked computer game
TAS	Star Trek: The Animated Series, 1973-74
TNG	Star Trek: The Next Generation, 1987-1994
TNG TM	Star Trek: The Next Generation Technical Manual (Rick Sternbach and Michael Okuda, Pocket Books / Boxtree, London 1991)
TOS	Star Trek (The Original Series), 1964-1969
VOY	Star Trek: Voyager, 1995-2002

A Word or Two from the Author

Although I have already ranted at some length about the choices and methods I have used in compiling this work, the reader no doubt finds my thought processes obscure to the extreme after having read this far. Many a thing about the way I treat my source material looks arbitrary on the surface. However, I hope to convince you that nothing has been left to chance. All the implausibilities, contradictions, misspellings and bouts of utter weirdness are there by design. In anticipation of the protests, I have assembled a sort of FAQ here, so that we at least can agree on what we disagree about.

First of all, why don't you include my favorite source here?

Probably because it is too far down the hierarchy. Of course, it may also be that I haven't had access to that source yet.

Hierarchy?

You already know I give priority to 'visual canon'. Material that contradicts this is ruthlessly excluded. In turn, material that speculates on and expands visual canon in a non-contradictory way is embraced. Publications that feature the greatest ratio of canonical versus original material are thus preferred when I compile this Guide, and it is canon *plus the acceptable original content of these publications* that then serves as 'effective canon' in similarly judging the suitability of the next-level publications.

For example, I have found 'Ships of the Star Fleet' by Todd Guenther to be an excellent compilation of fan interpretations of TOS visual canon, and other fan works also eagerly reference this publication. However, most such works, including e.g. Jackill's manuals, feature a lower visual canon content and a higher content of original material, which places them lower in the hierarchy – even when they feature no contradictions and seamlessly and creatively expand the Trek universe. So visuals from aired material count as 'first-order material', SotSF and the assorted Paramount/Pocket Books technical manuals as 'second-order material', and most of the other works as 'third-order material'.

But why then would you include all those FASA ships? They sure aren't visual canon!

Well, some of them are – see e.g. *Lotus Flower* – but the ratio of canon to original is indeed very low. However, I will accept third-order material (usually in order of seniority and/or of popularity among fandom, these often being the same thing) when I find it beneficial for maintaining 'realism' in this fictional universe.

There's a somewhat insidous aspect of second-order canonicity to those third-order entries you refer to. You see, by embracing SotSF, I have also taken in its views of a 1,600-ship TOS movie era Starfleet. Table 1-1 in that publication tells me how many ships of each mission class served in the Fleet in the 2270s through 2290s. There are gaping holes in that table if only canon and SotSF classes are used. Thus, I have taken just enough FASA, SFB, LUG or similar material to fill these gaps (the role-playing games are great for providing visual additions), and ditched the rest. This I find preferable to just plain inventing 'gapfiller classes' out of thin air. Similar gapfilling goes on even outside the scope of SotSF, as I assume that certain aspects of the Star Trek universe will stay consistent across all eras. Third-order material allows me to populate the ENT, TNG and in-between eras with enough corvettes, destroyers and other canonically seldom mentioned mission classes to keep up a consistent Starfleet.

So what about ships from novels, eh? Trek novels aren't illustrated!

No, they aren't – save for the *graphic* novels, which sometimes feature nice ships that I count as third-order canon, or the cover art, which oftentimes doesn't match the textual contents at all.

Which is why I extremely seldom accept a 'novel ship' unless I already have a canon or at least second-order visual to go with it. Fortunately, the Star Trek universe is littered with visuals that lack corresponding textual descriptions. There are numerous Paramount-solicited 'conceptual designs' and 'study models' around, some of these glimpsed in a minor uncredited role on screen, some merely faithfully reproduced in second-order publications. There are also true shooting models that were never assigned a canon identity by Paramount. Coupling these with a ship lovingly described in a nonvisual medium such as a novel is great fun.

Sometimes a captivating written description forces me to adopt or adapt a lower-order visual to go with the text. In such cases, FASA and its ilk are often of great help. In some rare cases, I'm forced to create a visual identity from scratch for a textual starship that I find irresistibly good and important to the Star Trek universe – examples include the *Deneb* and *Chesapeake* classes, rather crucial to the masterpieces of Dianes Duane and Carey.

Oookay… But what's with 'Spaceflight Chronology'?

Well, yes, good point. Here I give *de facto* 'second-order' status to a work that features very little canon material and lots of rather ugly graphics. This is only because there used to be no other source for the early days of Earthling starflight, not until ENT premiered. And even with the canon of ENT now available, there is no other published work that would elbow itself in and take the 'second-order' place from SFC. Just bear with me when I give preferential treatment to this senior publication, even when it necessitates some pretty extreme creative reinterpreting.

So, to make sure… You place no value whatsoever on whether the words 'official' or 'approved by Paramount' are included in the blurb of a publication or not?

Nope. Most of this officially approved stuff is good – but some unofficial material is better, and at times even more faithful to canon than the official books are!

Right. Moving on. Justify your excessive mass figures.

You take that back! I'm fit as a fiddle!

As for my starship mass figures, I give utmost credence to the precious few canonical datapoints we have on the issue: Scotty's "Nearly a million gross tons" for *Constitution* in TOS "Mudd's Women", and Janeway's "700,000 tons" for *Intrepid* in VOY "Phage". Some tend to dismiss at least the former, both because most fan material contradicts this lone utterance, and because a ship of *Constitution* size would be inordinately dense if massing that much. I cannot dismiss canon that easily, though. Thus, I have assigned this superdense material to that part of a starship that is most alien to us – the warp engines. If a single PB-31 nacelle masses 250,000 tons apiece, then a *Constitution* otherwise built of realistic materials masses close to 700,000 tons and thus agrees with Scotty's expert opinion.

Keeping those density figures for warp nacelles and starship hulls, respectively, and applying volumetrics, I can rather easily reconcile between the high-end TNG TM and DS9 TM mass figures on one hand, and the well-known low-end fan and RPG estimates on the other. The latter simply refer to hull mass *sans* these exotic engines! It is also rather endemic in naval history to give crucial ship statistics in oddball ways (say, ship length given only at waterline, or displacement defined differently depending on the type of cargo onboard). Thus, the idea of engineless mass figures just adds a hint of pseudorealism to this Guide…

Rest assured, I have the masses of various warp nacelles tabulated by volumetrics, using a density derived from a LN-64 mass of 300,000 tons as the basis for all post-TOS designs, and a somewhat lower density for pre-TOS ones (to honor certain fan concepts of different technologies in use, and a different percentage of coil material in given nacelle volume, in that earlier era). For an exact fit with the DS9 TM mass figures, which I generally opt to take as authoritative despite the authors' admittance that the work was somewhat rushed, I sometimes make assumptions about the percentage of nacelle volume actually occupied with coil material. Generally, though, simple volumetrics are sufficient. Total masses thus almost always consist of the second- or third-order fan publication mass figure plus this tabulated nacelle mass.

Almost? There's something funny about your FASA figures. And not just the masses.

Yes. FASA ships typically consist of a *Constitution* saucer and nacelle(s), liberally rescaled, plus an original secondary hull and pylon structure. As the artwork usually is small and of low resolution, allowing or even necessitating some creative interpreting, I have taken the liberty of 'un-rescaling' all the FASA ships to match either the real dimensions of the familiar saucer and nacelle, or then a putative alternate hull and engine design some 50 % the size of the original. Reducing the multitude of FASA saucer and engine sizes to just these two options strikes me as logical from the engineering standpoint. The 50 % alternative also nicely agrees with certain other canon and fan designs – such as the engines seen on *USS Huron* in TAS "Pirates of Orion", or the ones moving certain RPG light cruisers around at warp speed.

This rescaling naturally affects the FASA mass figures, too. Sometimes the effect is so small that I merely assume the dimensions were 'printing errors' which I then correct, yet the mass was already true down to the ton. Sometimes an actual mass correction is required, though, and a scaling factor derived from the dimension corrections is used. Sometimes the FASA masses make no volumetric sense even with the original dimensions, in which case I am forced to introduce more consistent figures of my own. Usually I find creative workarounds, though (such as assuming there is a surprisingly massive piece of special equipment aboard, for example).

This scaling logic often necessarily extends to the numbers of onboard transporters, shuttlecraft, weapon systems and crew, too. Again, some workarounds are explicit in the entires, some implicit. It may in general be fun to compare the Guide to the corresponding RPG fact sheets…

So, to sum up, you just twist everything to fit your own interpretation of Star Trek?

In a nutshell, yes.

Objectively thinking, this work is another example of third-order material, and in practice a competitor to the other third-order interpretations of Star Trek. Since it excludes so much of the material on that hierarchial level, it must be considered to represent an alternate universe of its own, incompatible with the other third-order ones. Yet it strives to be fully compatible with both its second-order targets of idolatry, and its canon fundaments.

Still, respecting the letter of the second- and first-order sources does not amount to doing justice to their spirit. The authors of, say, SotSF or ST:TNG are artists who have their own well-developed interpretations of what Star Trek is about. No doubt they will find this work incompatible with their views, in part or in whole. It is my humble hope that this does not diminish their enjoyment, would they happen to stumble upon this work, nor prevent other kinds of Star Trek enthusiasts from having a fun few days disseminating, dismantling, dismissing or discussing the Hobbyist's Guide to Starfleet.

Faithfully yours,

Timo Saloniemi

EDWARD CLASS COLONIZER/TERRAFORMER FROM BIRTH OF THE FEDERATION COMPUTER GAME

???? series

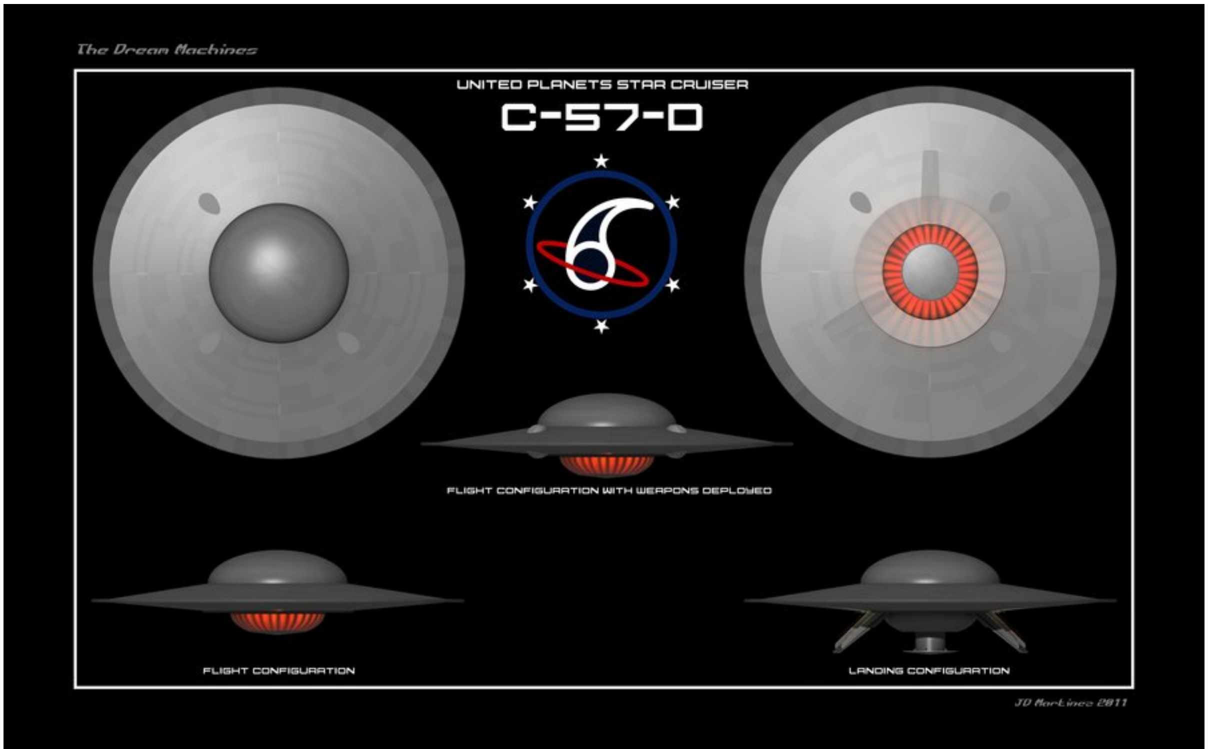
Police cruisers
2144-2288

Completed:	40
Diameter:	45.0 m (C-57) 20.3 m (Kzinti)
Height:	20.8 m
Mass:	200,100 tons
Officers:	3
Crew:	16
Max. speed:	w 2.9
Endurance:	12 months
Weapons:	4 phaser IV emitters on dorsal hull
Shields:	1-layer globular forcefield
Transporters:	1 GP (2-pad); Mk II

Ships of historical interest:

USS Typhon (C-57D)

SOURCES:	D TAS “Slaver Weapon” (Forbidden Planet) (N Forbidden PLanet) H TAS (own, Forbidden Planet)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