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MAIN PROPULSION AND SUBSYSTEMS

Engine Type: Constitution.

The original twelve ships of the Constitution class heavy cruiser were fitted with two Cochrane Warp Dynamic's PB-31 Mod 3 Dilithium-energized antimatter circumferential warp drive units, commonly known as the FWC-1 Model No. SW40/5-3KT. These were self-contained units; they had no need for linear intermixing chambers, and all of the propulsion drive unit and the matter/antimatter storage system were kept in the nacelle casing. On all vessels these units could be detached in case of a warp field imbalance, leaving the ship to run on impulse power.

The impulse engine installed in the vessel was a Scarbak Propulsion Systems SBA Subatomic unified energy impulse drive, or Ref No. FIB-2 Model No. 1P186E/2-IR.

The reaction control system for this class was the Dennison Westinghouse SC44B chemical combustion precise control package. These provided course correction as needed.

Engine Type: Enterprise.

The first eight ships of the Enterprise class were fitted with the Cochrane Warp Dynamic's LN-64 Mod 3 Dilithium-energized antimatter linear warp drive Ref No. FWG-1. The intermix chamber assembly used with the engines was mounted within the secondary hull. The assembly stretched 145 ft aftwards down the uppermost level of the secondary hull. The vertical intermix chamber extended from the matter/antimatter storage units, which were placed at the lowest level of the hull up through the connecting dorsal and into the impulse deflection crystal in the primary hull. With these engines the Enterprise NCC1701 attained an unverified warp speed of 17.863 while on trials in 2268.

The tandom impulse system used for the class was the RSM subatomic unified energy impulse units constructed by Scarbak Ref No. FIE-2. In addition, four QASR particle beam maneuvering thrusters were added to the secondary hull just behind the connecting dorsal between the support pylons for the engine nacelles. These units provided close quarters maneuvering. Placed on key areas around the primary and secondary hull were the "Trentis" pulsed laser reaction control system.

Engine Specifications: PB-31 (FWC-1).

Nacelle	Length	- 153.8m.
	Draft	- 18.8m.
	Beam	- 19.2m.
Power output		- 360 megawatts. Dual Nacelles.
Speed Dual units		- Warp 5-7.
Acceleration		- Rest - Onset Critical Momentum:.....30.30sec.
		Onset Critical Momentum - Warp Engage:.....3.91sec.
		Warp 1- Warp 3:.....1.12sec.
		Warp 3 - Warp 5:.....0.76sec.
		Warp 5 - Warp 7:.....5.52sec.

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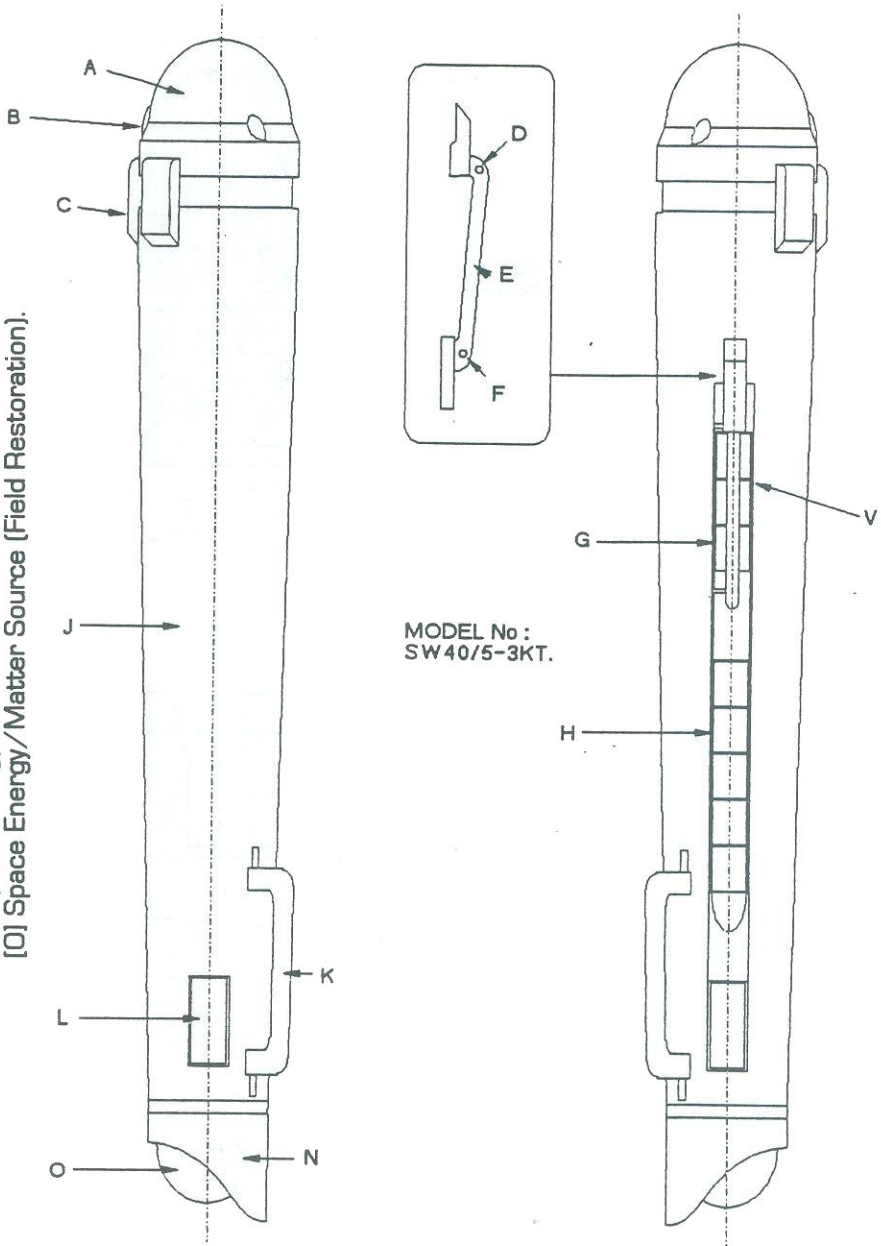
Key for SW40/5-3KT: PB-31 Warp Engine.

[A] Space Energy/Matter Sink (Acquisition).
[B] Space Energy Field Sensor (3).
[C] Magnatomic Flux Constriction-First Stage.
[D] Inlet Flow Sensor.
[E] Control Reactor Loop (Primary Power Stage).
[F] Outlet Flow Sensor.
[G] Power Stage Magnatomic Flux Chiller (3).
[H] Main Energy Stage Magnatomic Flux Chiller (5).
[I] CLASSIFIED
[J] Main Propulsion Housing (Nacelle and Deflector Shield).
[K] Final Stage Intercoolers P/S.
[L] Final Stage Magnatomic Flux Chillers P/S.
[N] Space Energy/Matter Matrix restoration Cowl.
[O] Space Energy/Matter Source (Field Restoration).



Engine Specifications: SBA (FIB-2).

Length - 5.2m.
Width - 4.5m.
Height - 2.8m.
Weight - 2880mt.
Total power output - 40 megawatts.

Four units made up the SBA impulse engine; these were placed in the housing behind the engineering room.

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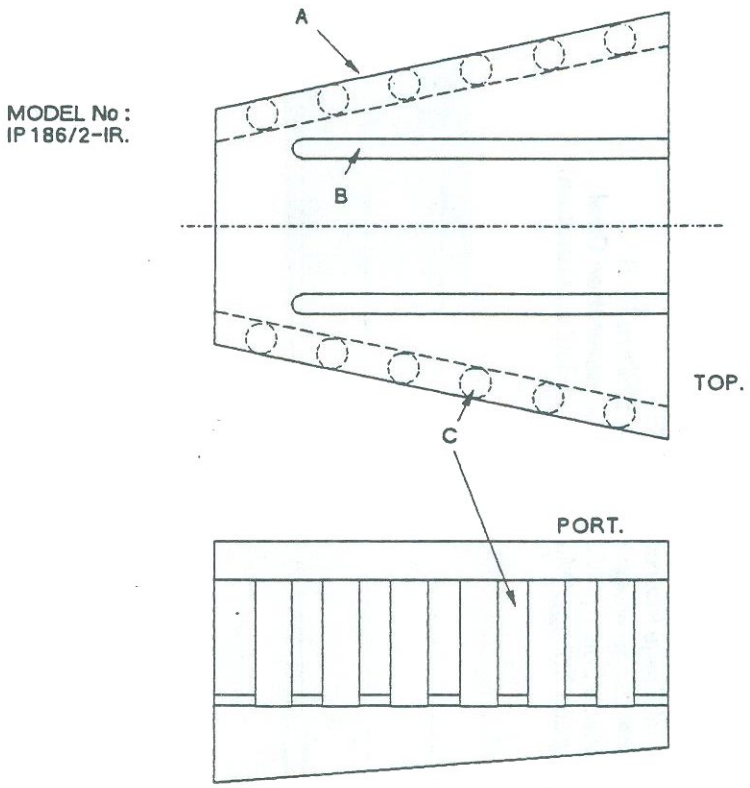
Key for IP186/2-IR: SBA Impulse Engine.

[A] Twin Unit Housing.
[B] Field Flux Dip Construction.
[C] Magnatomic Flux Circulation Tubes (12).
[D] Fuel Hooper Feed Chute.
[E] Flux Recirculation Tubes To Heat Exchangers (5).
[F] Firing Chambers (2).



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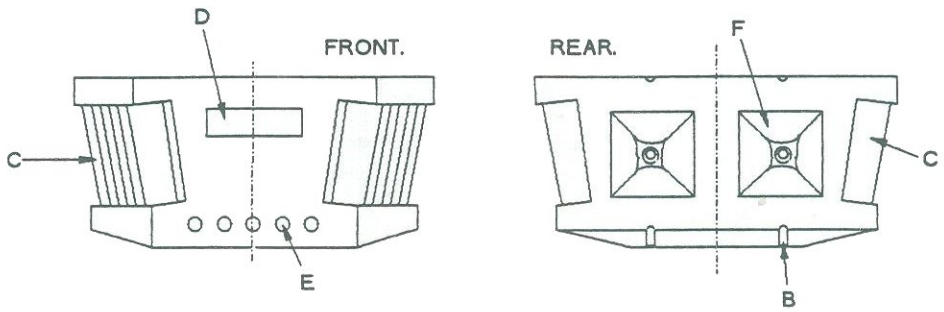

Engine Specifications: LN-64 (FWG-1).

Nacelle	Length	- 154.8m.	
	Draft	- 18.3m.	
	Beam	- 12.6m.	
Power output		- 680 megawatts. Dual Nacelles.	
Speed Dual units		- Warp 8-12.	
Acceleration		- Rest - Onset Critical Momentum:	8.51sec.
		Onset Critical Momentum - Warp Engage:	1.12sec.
		Warp 1- Warp 4:	.78sec.
		Warp 4 - Warp 8:	.67sec.
		Warp 8 - Warp 12:	2.13sec.

Engine Specifications: RSM (FIE-2).

(Engine external dimensions are still classified).
Total power output - 80 megawatts.
In case of intermix shutdown there were five fusion reactors which supplied power to the impulse engines. These units could be ejected from the ship in the unlikely event of overload or meltdown.

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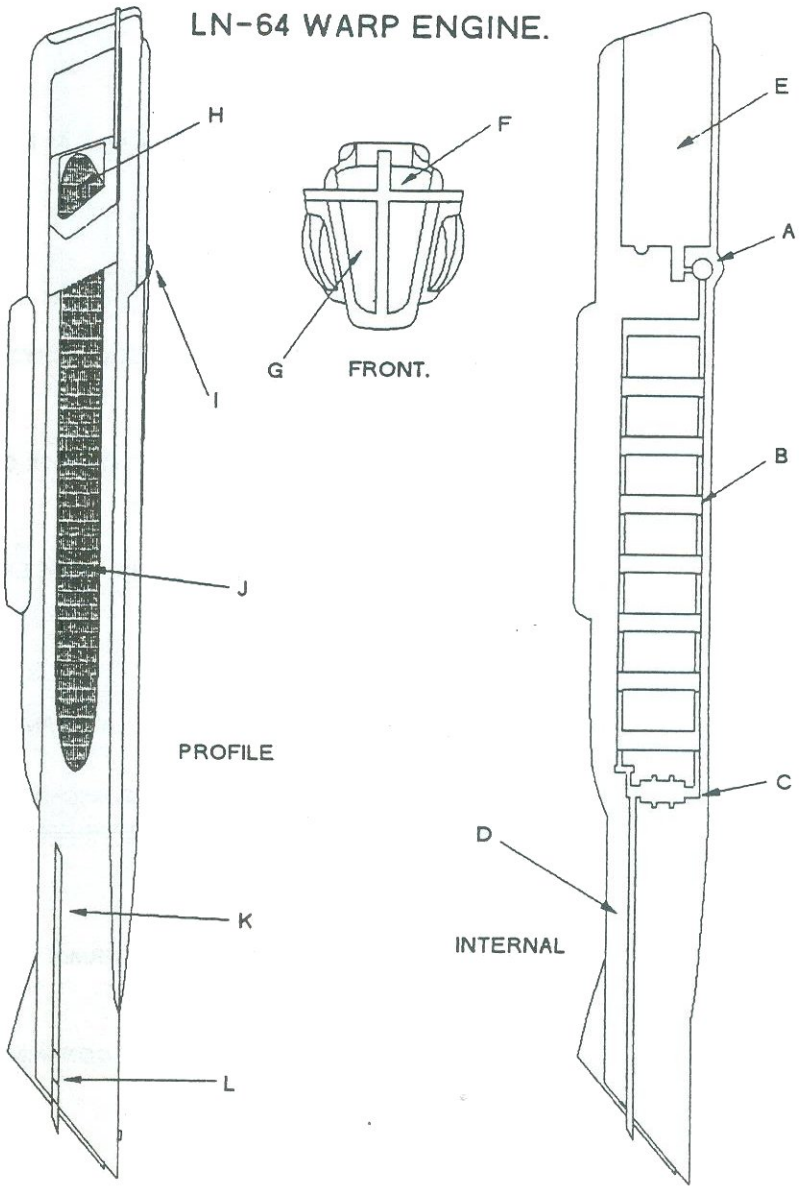
LN-64 WARP ENGINE.



Key for LN-64: FWG-1 Warp Engine.

[A] Sterling Magnatomic Amplification Crystal.
[B] Warp Engine Propulsion Shaft.
[C] Sterling Magnatomic Amplification Cylinder.
[D] Intercooler Assembly
[E] Space Energy Wave Matter Collector (Matter Acquisition)
[F] Inlet Flow Sensor
[G] Space Energy/Matter Sink (Acquisition)
[H] Magnatomic Flux Constructions First Stage
[I] Magnatomic Amplification Crystal
[J] Power Stage Magnatomic Flux Chillers (Outboard).
[K] Final Stage Intercooler
[L] Reaction Control Thrusters

Plasma Formation: Sterling 10 Sol Magnatomic Amplification Crystal.

Antiplasma Formation: Sterling 10 Sol Magnatomic Amplification Cylinder.

Matter Acquisition Sink: Space Energy Wave Matter Collector.

Flux Constrictors: Feli 5038 Dilithium-Charged Refraction Rods & Magnatomic Carrier Coils.
Inboard Power Stage Flux Chillers: Feli 121 Dilithium-Charged Refraction Rods & Magnatomic Carrier Coils.

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Outboard Power Stage Flux Chillers: Feli 723 Dilithium-Charged Refraction Rods & Magnatomic Carrier Coils.

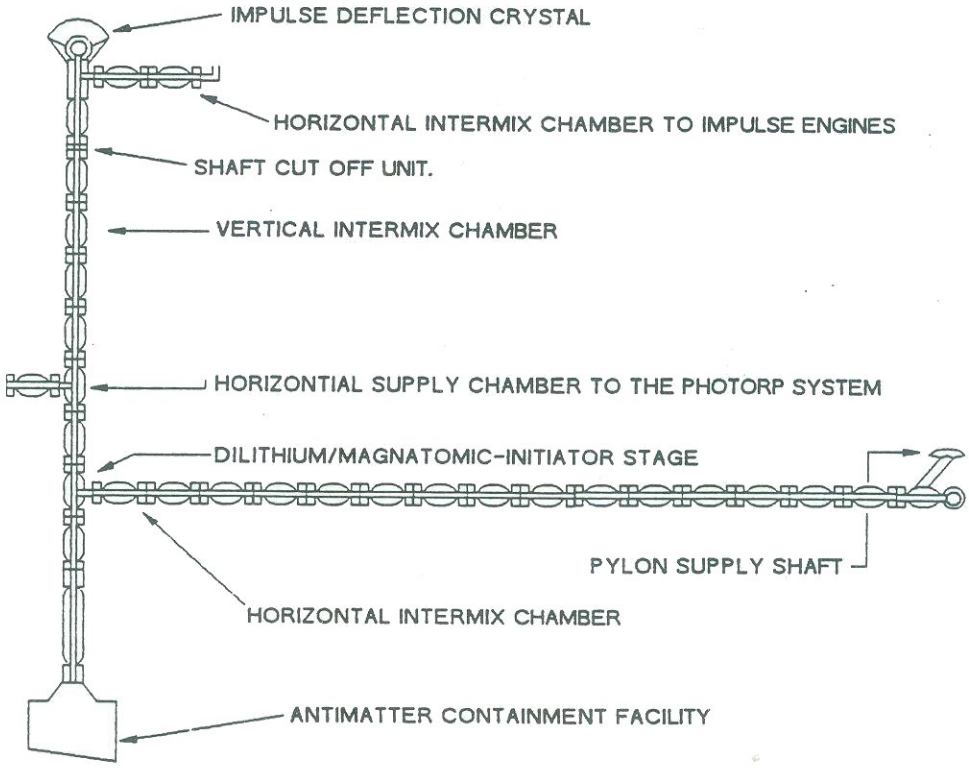
Emergency Flush System: Space Energy Wave Dilithium Gas Evacuators.

Impulse Deflection Crystal: Leor-3 Yield Dilithium Crystal Firing Assembly.

Final Stage Intercoolers: Multiple Gravitonic Injector Housing.

Inlet Flow Sensors: Level 12 Sensitivity Space Normal Matter Sensors.

LN-64 INTERMIX CHAMBER



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Linear Intermix Chamber Design

The linear intermix chamber was incorporated in both the new Enterprise and Belknap cruisers. The vertical chamber stretched from level 7, patched into the impulse deflection crystal, and continued to level 19 where it entered the matter/antimatter containment bottles containing the fuel.

This chamber supplied power past the dilithium/magnatomic-initiator stage to the impulse engines. Spare power was used for certain ship's systems; e.g. the phasers and torpedo systems.

At the dilithium/magnatomic-initiator stage on level 15 the horizontal intermix chamber extended aftwards supplying power to the warp engines. Spare power was also diverted to the ships systems.

Intermix Chamber Specifications

Horizontal Chamber Type	-	.06 M Dilithium Gas Piping Prometheus 300 Magnetic Flux Antimatter Conduit
Vertical Chamber Type	-	Z Charge Phaser Transmission Tube .06 M Dilithium Gas Piping
Support Pylon Supply Shafts	-	.06 M Dilithium Gas Piping Prometheus 508 Magnetic Flux Antimatter Conduit
Horizontal Supply Chamber	-	.06 M Dilithium Gas Piping Prometheus 350 Magnetic Flux Antimatter Conduit
Shaft Coupling and Cut Off Units	-	.7 M Counterflux Antimatter Venturi Valves
Systems Contractor	-	Cochrane Warp Dynamics

Energy Converters and Emergency Batteries

On level 16 twin energy converter units took the raw matter antimatter power from the intermix chambers and converted it into a form of power suitable for the ship's systems. It was then sent into the main energizer which supplied the power around the ship, and could divert extra power to any system if the energizer was damaged. The internal bypass circuits of the energizer could be manually altered, causing the engineer a headache, but worth it to have the main unit back on line.

The main battery room had twelve nuclear generator cells which provided power if the intermix system failed. The batteries could not generate enough power to operate the warp systems, but could keep life support going as well as the deflector shields of the secondary hull. A secondary battery room was found on level 6 to supply the primary hull in the same manner as the main room; the power from the batteries was of a type suitable to be fed straight into the power network.

Matter/Antimatter Fuel Mixture.

Matter/antimatter annihilation can be best described as a controlled nuclear explosion. The principles are the same as in atomic physics, where anti-particles (which have a negative charge) and electrons, protons and neutrons that compose matter collide, releasing their stored energy.

When small amounts of matter and antimatter are mixed in the intermixing chambers, they release a type of raw energy. While matter/antimatter is breaking down it is fed through the dilithium crystals which help control the breakdown process. This energy in its present state can be used to power the

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impulse and warp engines, and the waste anti-matter can be used for the photon torpedos. The raw energy needs to go through the converters before it is used for the ship's systems.

The start up of cold engines takes an initial fine mixing either by computer control or manual mixing. Only the most qualified chief engineers take the risk of manual start up. The whole process takes time to reach operational stage, and while there is a formula which cuts the time down to a few minutes, this has been tried only once with success. Failure leads to a matter/antimatter imbalance and subsequent explosion. When the engines are warm, intermixing can be taken over by any engineering personnel without any danger.

The Worm-Hole Effect

The cause of the worm hole is by a Grade 2 warp imbalance. When the warp field distorts it creates a warp corridor. The engines are designed to close down, and helm control and other certain systems will cease operating due to the effects of the field. The ship is then left with reaction control thrusters to brake to sublight speed. Depending on the speed when it entered the worm hole, it can take up to eight minutes to regain full ship operation. Normally it leaves shaken nerves and furious engineers, though no external damage, but it is possible that external objects outside the worm hole can be dragged in, blocking the path of the ship, Hopefully it can be dealt with, or the ship stopped before impact. Unless the engine imbalance is fixed, it is likely that upon entering warp speed again the ship will enter the worm hole a second time.

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The Use of Certain Thruster Control Units

The first list shows the three different thruster control packages, their uses, and an example of their speeds for the Enterprise class of vessel.

1. Trentis pulsed laser reaction control system. 14 units placed around the hull.
   These units control the direction control of the vessel, and can be used when docking or leaving drydock areas, at low sublight speed these units can provide in conjunction with the QASR maneuvering thrusters a tight sublight turn, at warp speed the units can incorporate gradual turn or a tight turn with extreme stress output on the ship.

The max speed on the units on there own is about 30 meters per second with the indock speed setting of 18 meters per second. When used for turning the vessel the amount of thrust needed can be adjustable for the type of turn, when at station keeping it is possible to rotate the vessel with just reaction control.

2. QSAR particle beam maneuvering thrusters, 8 placed on hull.
   This system is used for speeds in between 200 KPS up to 1/4 impulse, used for in-system travel and if needed course control.

3. RSM subatomic unified energy impulse units, Two units.
   These are used when in deep space when warp speed is impractical or in system when fast departure is needed. Speed is in between 49,000 KPS to 149,000 KPS.

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The Constitution class in the terms of sublight speed travelled at the same speed as the Enterprise class, the SC44B chemical combustion precise control package, took care of docking and course control.

The Constitution never had fine course control of the Trentis system, and relied on the SC44B for its low speed maneuvering. All thruster control systems are used as braking thrusters, when called upon to do so.

Continued in the next LOGBOOK
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