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FIRST COAST GUARD

HIGH ENDURANCE CUTTER

IN TWENTY YEARS

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Author's Biography

LCDR Hubert E. Russell is a 1950 graduate of the Coast Guard Academy. He served at sea until 1953 on buoy tender and cruising cutter duty. He then entered graduate school at the Massachusetts Institute of Technology graduating in 1956 with a Degree of Naval Engineering. After a year at the Coast Guard Yard in Baltimore, he served on the icebreaker CGC NORTHWIND in the Antarctic and was a district assistant naval engineer before his assignment to Coast Guard Headquarters as Chief, Cruising Cutter Section in 1960. He was project officer for the High Endurance Cutter design and in 1964 was assigned to the building Shipyard as Commanding Officer of the Office of Resident Inspector, U.S. Coast Guard.

First Coast Guard High Endurance Cutter in twenty years.

The Coast Guard Cutter "HAMILTON" powered by CODAG plant.

Existing Coast Guard High Endurance Cutters will average 24 years of age when the new 2800 ton High Endurance Cutter, WPG 715, is completed in September 1966. Now under construction by Avondale Shipyards, Incorporated of New Orleans, Louisiana, she is the first of a class of 38 ships. She will be named for Alexander Hamilton, the first Secretary of the Treasury, under which department the Coast Guard operates. Avondale Shipyards, Incorporated, was also the low bidder in March 1965 on a later contract for three sister ships, the WPG 716, WPG 717 and WPG 718. These are scheduled for completion in June, August and October 1967 respectively.

Figure 1 is an artist's conception of the HAMILTON. Figures 2, 3 and 4 are pictures of the existing High Endurance Cutters; the Treasury WPG class, built in 1934-36; the seaplane tender WAVP class, built in 1940-42; and the Lake WPG class, built in 1944-46, respectively. The similarities to existing ships are many - the differences are striking. A bow tractor propulsion unit, an anti-roll tank, a waste heat evaporator, 1500 Kilowatt ship's service generating capacity, sewage tanks, two high crew's berthing, staterooms for Chief Petty Officers, extensive air conditioning, more extensive aerological, oceanographic, communications and plotting equipment and the combined diesel gas turbine main propulsion plant (CODAG) are the main differences.

The twin screw HAMILTON will use 7000 diesel shaft horsepower to make 20 knots, 36,000 gas turbine shaft horsepower to make 29 knots. The older ships, half of which are diesel and the rest of which are steam, use 4600 to 6200 horsepower to make 18 to 20 knots. Table 1 compares Coast Guard High Endurance Cutters.

MAIN MACHINERY

The main propulsion plant consists of two 3500 horsepower diesels by Fairbanks Morse, two 18,000 horsepower gas turbines by Pratt & Whitney, two reduction gears by Philadelphia Gear Corporation and two controllable pitch propellers by Propulsion Systems, Incorporated. The main diesels, gas turbines and reduction gears are in a single engineroom along with most of the auxiliary machinery. Figure 5 illustrates the machinery layout. A 260 square foot air conditioned control booth on the after upper level of the engineroom looking forward will contain all types of gauges including shaft horsepower readouts, remote starting, securing and maneuvering controls, plus switchboards for the ship's service diesel generators. Engine controls will also be installed in the pilothouse and on both bridge wings.

PROPELLERS

Since gas turbines do not reverse direction like a steam turbine or a diesel, controllable pitch propellers will be used for backing down. Time to go from full power ahead to full power astern could be as low as 10 seconds, but the possibility of "turbine effect" overspeeding of the propellers will probably require incorporation of a time delay.

Controllable pitch propellers are also used on the Coast Guard's RELIANCE class 210' WPC. On the CGC RELIANCE, commissioned in 1964, the 1,000 shaft horsepower gas turbine and the 1,500 shaft horsepower diesel engine (per shaft) are operated together to meet the maximum power requirement of 2,500 SHP. The RELIANCE cruises at 300 shaft revolutions per minute with the diesel at 1,000 RPM producing 1,500 SHP. For maximum power of 2,500 SHP, pitch is increased on the propeller to absorb the turbine power keeping the shaft at 300 RPM and the diesel at 1,000 RPM. Propeller efficiency remains near optimum since it does not take a large change of pitch to absorb the added 1,000 SHP. In this case, the controllable pitch propeller performs two functions: (1) Mates the turbine and diesel, and (2) Reverses blade pitch for backing down. Mating could have been accomplished with speed changing gears as per automotive practice. Backing down could have been accomplished with a reversing clutch and gear on each prime mover. The added maneuverability available with the controllable pitch propeller at both high and low speed was the deciding factor in requiring the controllable pitch propeller.

On the new High Endurance Cutter, the power available from the turbines is so much greater than that available from the diesels that propeller pitch increase alone cannot absorb the turbine power at shaft RPM equivalent to top diesel RPM. This is true even if propeller efficiency is assumed constant as pitch is increased. In fact, propeller efficiency decreases if pitch is changed from the optimum design setting. Therefore, the gas turbine will operate alone with no full power requirement to mate with the diesel. Another factor is the ability of the gas turbines to easily turn out 7,000 additional SHP in an emergency if one accepts higher operating temperatures and a shorter time between overhaul for the gas turbine. Optimum design propeller pitch of about 1.3 P/D is kept constant while shaft speed is increased from about 147 RPM with diesels at 20 knots to 235 RPM with turbines at 29 knots. This keeps propeller efficiency high. The controllable pitch propellers' diameter is 13 feet, making it the largest controllable pitch propeller in the United States. This, plus a hull-tip clearance of 39" will require extension of the propeller sweep below the keel line for the first time on a major Coast Guard Cutter. In this case, a 5'4" extension will be required. Propeller pitch will be controlled by hydraulic oil at 700 psi, piped to the propeller hub servo through a 9 inch tube inside the hollow propeller shafting. There are both main shaft driven hydraulic pumps for servo oil and electric motor driven pumps.

REDUCTION GEAR

The pitch control sending servo will be mounted on a shaft extension forward of the bull gear. The thrust bearing will also be incorporated in the reduction gear on the forward end. The reduction gear will use roller bearings instead of the traditional sleeve bearings except for the gas turbine pinion where high contact speed at 4,000 RPM requires the use of sleeve bearings.

DIESELS

The diesels are 3,600 BHP Fairbanks Morse 12 cylinder supercharged two stroke opposed piston engines weighing approximately 50,000 pounds each. They will use Fawick friction clutches and will drive the ship up to 20 knots.

GAS TURBINES

The Pratt & Whitney gas turbines are the FT4A model which is a three shaft machine, two on the gas generator section and one on the free turbine section. One shaft in the gas generator section runs inside the other. The forward group of compressor blades are driven by the after turbine blades through this internal shaft. The external shaft connects another set of compressor blades with its driving turbine. The two shafts are used in order to reduce the starting power, which in this case is provided by a 4,500 psi hydraulic motor of about 80 horsepower. Except for the exhaust elbow, the hot portion of the gas turbine will not be insulated. Instead of this, a thermal and acoustic hood will be installed around it. Engineroom air for cooling will be ducted through the annular space between the hood and the gas generator section.

The gas generator section alone is known as the JT4 (for jet turbine 4). It powers some Boeing 707's, the B-52's and the F-105. The FT4A (for free turbine 4A) is being extensively tested for powers up to 30,000 SHP. On the HAMILTON, each turbine will produce about 20,000 horsepower which after ducting losses will give 18,000 SHP aft of the reduction gear. The total of 36,000 SHP will provide a top speed of 29 knots. The power turbines are clutched in and out of engagement with the reduction gear by a Force Control Inc., clutch. This is a multi-disc all metallic synchronizing clutch in parallel with a fine pitch tooth clutch for positive lock up. Simultaneous use of both diesels and turbines is provided for only during the short time of shift over from one to the other.

At 18,000 shaft horsepower, each gas turbine consumes 200 pounds of air per second. Each air inlet duct will have a 54 square foot cross section as will each exhaust duct. The specific fuel consumption of this 13,000 pound gas turbine is good, about .55 pounds of fuel per shaft horsepower hour at the full 18,000 SHP and about 1.0 at the cruising 3,500 SHP. This compares favorably to comparable steam plants which might have a theoretical specific fuel consumption of .6 #/SHP-HR at full power and .65 #/SHP at cruising. In small warship practice, the steam plant's actual fuel consumption is nearly double the theoretical due to inability to match laboratory conditions and due to the tendency to keep a presently unneeded second boiler on the line or "warmed up" for emergency use. In addition, a great deal of fuel is burned on a steamship in order to remain operational when anchored or drifting. It may take fifteen minutes to several hours to get up a head of steam depending on how much damage to boiler brickwork is acceptable. In contrast, the gas turbine used here, can go from cold to full power in a few minutes.

The specific fuel consumption of the diesel engine is about 0.45 #/SHP-HR at almost any power output. The roughly 50,000 pound weight of each diesel is accepted so as to give the HAMILTON a long cruising range of 9,600 miles at 20 knots. In comparison with a steam plant then, this CODAG plant will have a lower fuel consumption at low speeds, at cruising speed, and at full power.

SIMILAR SHIPS

There are no combined diesel gas turbine ships in the world with 18,000 shaft horsepower gas turbines installed. The Danish Navy has several ships, being built in Sweden, which are in this range and are to be completed in 1966. They also use the Pratt & Whitney JT4 gas generator but are developing their own free power turbine. The Danes plan to run the turbine at about 22,000 SHP. General Motors' diesels of about 3,000 SHP will give the Danish ships a long cruising range. Controllable pitch propellers are used. Like the "HAMILTON", these ships use either the diesels or the gas turbines, not both at the same time.

The German Navy has four CODAG ships of the KOLN class, first commissioned in 1961. Controllable pitch propellers and reverse reduction gears as backup, are installed for maneuvering. Each ship has two 3,000 HP diesel engines plus a 13,000 HP gas turbine on each shaft for a total of 38,000 HP at full power.

The British Royal Navy has two classes, those similar to the frigate HMS ASHANTI and those similar to the destroyer leader HMS DEVONSHIRE. HMS ASHANTI has a single fixed pitch propeller with a steam turbine of 15,000 horsepower and gas turbine of 7,700 horsepower. HMS DEVONSHIRE has two gas turbines plus the steam turbine on each of two shafts. The Royal Navy uses clutches and reverse gears for maneuvering, thus utilizing a rather complex reduction gear.

No U.S. Navy gas turbine ships of this size are being built. The displacement and length of the new High Endurance Cutter is close to the DE-1037 class of destroyer escorts (DE 1037-1038) and the DD 692 class of World War II destroyers. The latter class of ships is still the backbone of the Navy destroyer fleet. The High Endurance Cutter is bigger than the DE 1006 class and smaller than the DE 1040 class now being constructed by the U.S. Navy. All of the above DE's are post-war built, single screw, steam turbine powered, burning Navy special fuel oil and/or diesel oil. Table 2 compares these ships and the new High Endurance Cutter.

AUXILIARY MACHINERY:

Two diesel generators of 500 kilowatts each are sized to carry the ship's electrical load independently. The emergency generator in the steering room is a 500 KW gas turbine driven generator. There are two sewage systems installed, one forward and one aft. Each sewage system is designed for an aerobic digestion process of sewage elimination. The WPG 716 will be the first one to get the complete system. It incorporates a series of tanks through which the sewage flows and in one of which air is bubbled through the collected sewage. Bacteria reduces the sewage to a clean effluent. This is chlorinated in the discharge tank and pumped overboard. The Coast Guard is installing such sewage treatment plants on numerous existing vessels in an attempt to lead the way toward cleaner rivers and harbors. In addition, sewage discharge hull connections are designed for connection of dockside hoses for possible discharge into a municipal sewage system, when dockside. An oily water separator is installed in the engine room to be used for separating out the oil from bilge discharge. When pumping bilges in port, this separator will retain the oil and discharge only clean water into the harbor. It may also be used in stripping fuel tanks. A trash burner room located between the exhaust ducts should relieve the in-harbor fantail mess of trash awaiting disposal. A multi-stage (probably 4 to 8 stages) evaporator uses diesel ship service generator jacket water as waste heat to produce fresh water. A steam heat exchanger provides an auxiliary source of heat in the event of difficulty with jacket water use.

The ship can receive fuel at a rate of 180,000 gallons per hour. To handle full power fuel consumption of over 60,000 gallons per day, coalescent fuel filters are installed in lieu of the conventional centrifugal action fuel oil purifiers. Coalescent filters are also used for the filtration of the 15,000 gallon supply of JP-5 helicopter fuel. The ship can handle the HH-52A heli-copter, having a flight deck that is 88 feet long by over 40 feet wide.

Three fire pumps of 500 GPM each are installed, two in the engine room and one well forward. The emergency supply of power from the after steering room runs outside the engine room.

A bow propulsion plant is located at frame 76. This is not shown on figure 5. A 350 HP motor mounted on a retractable vertical shaft drives the four foot diameter propeller. An auxiliary motor trains the propeller at 2 RPM. When retracted, a fairing plate closes the hull opening.

The ventilation system is designed such that replenishment air for air conditioning is supplied at low speed on the two speed fans. In event of temperate weather not requiring air conditioning, the fans can be used at high speed to provide 30 cubic feet per man per minute replenishment air. The air conditioning units are commercial fan units modified for marine use. They are located in the compartments being served. All living and working spaces are air conditioned except for the machinery spaces.

HULL DESIGN

The hull lines stress seaworthiness with high speed a secondary consideration. Electronic engineers wanted a longer ship so as to provide longer antenna runs and better communications. Naval engineers wanted a longer ship for both seakeeping and speed considerations. The jump to 29 knots was required by Operations. They sadly noted a lack of progress in this respect since the 1898 dash of the Revenue Cutter McCULLOCH from Manila to Hong Kong with news of Dewey's victory. She made 18 knots. Today's CGC McCULLOCH does the same.

The bow sections were shaped to present a gradually increasing horizontal section to lifting seas. Two sets of lines, one with "U" sections and one with "V" sections forward, were drawn. Twenty foot models of each, and the 327' Treasury Class Cutter, chosen for its seaworthiness capability, were built and tested at the David Taylor Model Basin. It is understood that the U.S. Navy uses "U" vertical sections forward for improved speed and seaworthiness, and that the British Navy uses "V" vertical sections forward for the same reasons. Perhaps our sets of lines were not different enough from each other. In any case, little difference was found in speed and seakeeping, but the better damage stability of the "V"lines which increase in breadth at the waterline as the ship sinks, led to its selection. The seakeeping model runs demonstrated that the new hull should be superior to the 327' WPG. To further improve seakeeping, an anti-rolling tank of the Frahm passive-type is being installed. It uses the full beam of the ship between frames 256 and 272 from the third deck to the second deck. The flow of 60 tons of water or fuel from side to side will be slowed by dams to place the liquid out of phase with the motion of the ship. The flow of liquid to starboard while the ship is starting to roll to port will reduce rolling amplitude 40 to 60%. Fin stabilizers were rejected due to their dependence on ship speed for stabilization. Gyro stabilizers were considered unsatisfactory due to weight.

The ship is longitudinally framed. Frame numbers have nothing to do with frame locations but are based simply on the number of feet one is aft of the forward perpendicular. Web frames are spaced every eight feet except in the engine room where they are closer to six feet apart. Watertight bulkheads from the keel to the main deck subdivide the ship into 14 watertight compartments. The third deck forward and the second deck aft are watertight. This is a great reduction in watertight compartmentation from that found on other Naval ships. See figures 6 and 7. The guiding philosophy here was that if a major subdivision is damaged, the ship will be more stable with flooded compartments below the new waterline than empty ones. The watertight decks are close to or above the waterline so that damage above them could not totally flood the compartment above.

The ship is of all welded construction with special emphasis given to structural details and fitup. No clips, attachments or brackets are allowed on the sheer strake or the deck stringer plate. In the engine room, joints in the web frames have an overlap of twelve inches from the flange joint to the web joint. All longitudinals are continuous through bulkheads and while master plating butts in one transverse plane are allowed, the master butt for longitudinals must be displaced by at least 12 inches. The shell plating varies from 5/16" to 1/2" thick. The 01 deck is 3/16" forward, 1/4" amidships and 5/16" for the flight deck. The main deck is 1/4" plate except in the midships region where it is 5/16". To compensate for the loss of strength in the hull structure due to the large area required for the intake and exhaust ducts (9' x 6') for each gas turbine, the 01 deck was designed as a strength deck using the deckhouse sides to transmit stresses. High yield 80,000 psi (HY-80) tensile strength steel will be in the 01 (helicopter) deck from frame 175 aft and in the main deck, frames 183-273. This high strength steel will be used instead of mild steel due to HY-80's notch toughness and greater resistance to brittle fracture. It also reduces the design weight of the helicopter deck which is strong enough to handle twin turbine helicopters and the single turbine HH-52A..

Careful consideration was given to areas inaccessible and difficult to maintain. There are no cofferdams. A special anti-corrosion feature is the "boxed in" construction of structural members exposed to the weather. This type of construction will use closed channels for topside structure in place of all angles and tees less than five inches in depth. Foundations for deck equipment will also be boxed in completely to eliminate hard to maintain reentrant corners. Epoxy coatings are used throughout in lieu of standard paints in an attempt to reduce long term maintenance. The superstructure above the 01 deck is aluminum. The aluminum to steel joint will use stainless steel huck bolts for strength and epoxy coal tar and rubber compounds for dissimilar metal isolation.

ARRANGEMENTS

The general arrangements of the ship and profile and plan view are shown by figures 7 through 9. The most conspicuous feature of the original design is the kingpost twin mast aft. This has been eliminated due to the deletion of TACAN, an aircraft homing system no longer required, and tests which showed a single mast configuration gave better propagation patterns for transmitting antennas. The bridge features pilothouse and bridge wing controls of the main machinery and the bow propulsion plant. A closed circuit TV system allows bridge personnel to assimilate data from a TV presentation instead of using status boards which require laborious transcription of data by hand after receipt by phone. All equipment is mounted in consoles for ease of operation. The Combat Information Center is one deck below and aft of the bridge. It contains radar presentations for air search radar, surface search, balloon tracking and fire control radar. A tactical navigation system is also installed in CIC. This uses projectors similar to 35 mm slide projectors with a marking stylus to record and keep track of ship and aircraft movements. The marked up slides are projected onto screens for a full view of the action. One screen is for true motion, the second for relative motion. The balloon shelter is mounted just aft of the mainmast and is large enough to double as a nose hanger for the helicopter. It has a clear opening 19 feet high by 16 feet wide. The gas turbine intakes face inboard between the 02 and 03 deck levels. A cargo hold forward is provided with booms port and starboard, and with a one ton hydraulic hoist.

Interior arrangements stress habitability. Marinite paneling is used extensively to improve the decor and to reduce maintenance. Chief Petty Officers are berthed in double staterooms amidships just below the CPO mess on the main deck. The crew's mess is also on the main deck aft. An elevator delivers stores from the third deck commissary stores area to the galley. Crew's berthing is divided into three areas, one for each section of the ship's complement. Each area consists of two main compartments. The after compartment berths 30 men. The forward compartment provides berthing for 20 men plus a study and recreation area. Heads and showers are provided in every compartment. The Captain's cabin is just under the bridge. There are four double officer's staterooms and four singles on the main deck with a head and shower between adjacent staterooms. Single staterooms are provided on the 01 deck for the engineer and executive officer.

ELECTRONICS FACILITIES

In order to improve communications, air-sea rescue, navigational, weather and oceanographic capabilities, the electronics installation is much more extensive than on existing cutters. The antenna configuration includes a broadband high frequency "cone" receiving antenna, 10-30 MC fan and 4-12 MC fan broadband transmitting antennas, HF whip antennas and the conventional MF radiobeacon antenna. Both MF and UHF radiobeacons are used. There are five HF transmitters with simultaneous keying of four transmitters, single sideband tone shift and frequency shift keying.

The CIC/Bridge communications system is separate from radio room communications with two trunk lines connecting the two systems. The voice communications include 18 channel VHF/FM, two HF transceivers with single sideband, four single channel UHF transmitters and receivers and one 19 channel UHF transceiver, three VHF transmitters and receivers, three 6 channel microphone multicouplers, thirteen remote phone units, and a UHF transmitter antenna multicoupler for simultaneous transmission/reception on four units with one antenna. The tape recorder will record simultaneously on 9 channels. The CIC has an evaluators console, inputs from surface search, air search, balloon tracking and fire control radars, an assistant evaluators console and the tactical navigation system.

Both Loran C and Loran A are installed along with facsimile for weather receiving. MF, HF and UHF direction finder capability is installed. There are two depthsounders, a shallow one for the pilothouse and a deep one for the chart room. A graphic recorder will provide accurate data keeping. In addition to the closed circuit TV mentioned earlier, there is an electrical manning and area status reporting system.

Oceanographic features include a deep sea oceanographic winch, an electronic bathythermograph winch, a standard bathythermograph winch, a bow mounted wave height sensor, and oceanographic wet and dry laboratories. Besides taking upper air observations with radio transmitters carried aloft by balloons, there will be facilities for continuously measuring and recording radiation, temperature, humidity and atmospheric pressure. Teletype machines will be used for rapid transmission of such data.

The ship should be a very effective communications platform with adequate space available for future electronics expansion.

CRITICAL PATH NETWORK

The detailed scheduling of the ships construction is being handled by Avondale Shipyards on a critical path network presentation with about 5000 inputs. This is believed to be the first ship in this country to be completely scheduled by this computer method of programming. There have been some difficulties in the use of this system including those associated with only one ship in the shipyard being built according to this method. However, the program has pinpointed some areas of engineering and production difficulty, and has tentatively proven its worth. Final evaluation is not yet possible

CONCLUSION

The true test of this new cutter will be its performance on station performing oceanographic, aerological and aircraft directing functions while remaining ready to go in heavy seas at high speed to the rescue of any ship or aircraft in distress. She should compete favorably with any ship in the world in her size range insofar as electronics capability, maneuverability, seaworthiness, range and speed performance are concerned.

TABLE 1 -- Comparison of Coast Guard High Endurance Cutters

TABLE 2 - Comparison of WPG-715 and other Naval ships

Table 1

Class	378' WPG	327' WPG	255' WPG	WAVP
Displacement (Tons)	2750	2827	1913	2800
Length (Waterline)	350'	308'	250'	—
Length (Overall)	378'	327'	255'	311'
Beam	42'	41'	43'	41'
Draft	13'-6"	15'	17'	14'
Superstructure	Aluminum	Steel	Steel	Steel
Hull	Steel	Steel	Steel	Steel
Shaft Horsepower	36,000	6,200	4,600	6,200
Speed (Max)	29	20	18	18
Speed (Cruising)	20	15	15	15
Endurance (Miles at max. speed)	2000	3500	5720	8,000
Endurance (Miles at cruis. speed)	9600	7350	9700	14,000
Fuel Capacity (Tons)	732	516	440	533
Fuel Capacity-Aviation (Tons)	18	—	—	—
Fresh Water (Gals)	16,000	48,370	22,760	19,690
Number of Generators	3	2	2	4
Installed Generating Capacity	1500kw	680kw	430kw	600kw

TABLE 2

Nationality..............	Germany	United Kingdom	United Kingdom	United States	United States	United States	United States	United States	United States
Name.....................	KOLN	ASHANTI	DEVONSHIRE	DE 1040	WPG	DE 1006	DE 1033	DE 1037	DD 692
Class....................	Frigate	Frigate	Missile Destroyer	Destroyer Escort	Coast Guard	Destroyer Escort	Destroyer Escort	Destroyer Escort	Destroyer
Displacement (F.L. Tons)..	2800	2700	6200	3400	2750	1900	1950	2600	3300
Length (Waterline)........	345'	350'	505'	----	350'	----	----	350'	----
Length (overall)..........	358'	360'	520'	414'	378'	314'	312'	371.5'	376.5'
Beam.....................	34'	42.5'	54'	44'	42'	36.7'	39'	40.5'	40.7'
Draft....................	12'	13.2'	16'	18' (max)	13.5'	9.2' (mean)	10' (mean)	18' (max)	19' (max)
Diesel/Shaft.............	2-3,000	None	None	None	1-3,500	None	4-3,000	None	None
Steam Turbine/Shaft.......	None	15,000	15,000	35,000	None	20,000	None	Yes	30,000
Gas Turbine/Shaft.........	1-13,000	1-7,500	2-7,500	----	1-18,000	None	None	None	None
No. of Shafts............	2	1	2	1		1	1	1	2
Total SHP................	38,000	22,500	60,000	35,000	36,000*	20,000	12,000	?	60,000
Speed Max (Knots).........	32	28	32.5	----	29	25	----	----	33
Propellers...............	V.P.	F.P.	F.P.	F.P.	V.P.	F.P.	F.P.	F.P.	F.P.
Completed................	1960	1961	1962	1965	1966	1954	1959	1963	1944

* Diesel engines not used at maximum speed.
Data on the above ships, except for the planned Coast Guard WPG, was taken from Jane's Fighting Ships, 1962-1963 Edition.