Serial No. _____

OPERATING

INSTRUCTION MANUAL

for

52' RESCUE BOATS

PROTOTYPES #1 & #2

PROTOTYPE #1 (DIRECT DRIVE)

REGISTRY NO. C-7161

BUREAU OF SHIPS
PLAN NO. S8203(5)52H-1170409

PROTOTYPE #2 (VEE DRIVE)

REGISTRY NO. C-7162

BUREAU OF SHIPS
PLAN NO. S8203(5)52H-1298636

NAVY DEPARTMENT
BUREAU OF SHIPS

CONTRACT NObs - 2796

Chris-Craft

ALGONAC, MICHIGAN

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STARTING ENGINES

Assuming that engines have been secured and that Coolant Heating System is functioning so that coolant and lubricating oil are at stand-by temperature of 100^{o} minimum.

(For starting, warm-up and idling instructions for engines which are not in stand-by condition, i. e. with cold oil and cold coolant -- see Packard Operating Manual Model 4M2500 - Page 304, disregarding references to salt water scoops).

See page 12 in this Operating Manual for specific instructions applying only to Prototype No. 2.

AT MAIN DISTRIBUTION PANEL - IN RADIO ROOM:- (See Fig. I)

1. Place BATTERY #1 and BATTERY #2 switches in "ON" position. These switches are at lower right hand corner of Main Distribution Panel.

2. MAIN ENGINE GEN. AND BAT. BUSS switch - "ON" - located at center of panel, with interlock.

3. ENGINE GENERATOR Switches - Port and Starboard - "ON" - located at lower left hand corner of Main Distribution Panel.

Also place in "ON" position the following Main Distribution Panel switches located at center of Panel.

Air Compressor and Fuel Transfer Pump.

Bridge Control Panel.

Engine Room and Galley Blowers.

Starting and Ignition Panel - Two Switches.

AT BRIDGE CONTROL STATION:- (See Fig. II)

1. EMERGENCY STOP SWITCH must be ON. Clutch and throttle control levers must be at NEUTRAL POSITION.

ENGINE ROOM: - (See Fig. III)

1. Place IGNITION AND BLOWER SWITCH on BLOWER. The blowers should operate at least five minutes before engines are started. Blowers may also be operated by BLOWER switch located in Engine Room Companionway.

2. Remove fabric cover from air cleaner of carburetor.

3. Close manifold condensation drain cocks at low end of engine manifolds (two on each engine).

4. Rotate engines at least two complete revolutions by starter to be sure engines rotate freely. If starter rotates but does not engage - push in and release large push button located in side of main engine clutch housing after starter has stopped rotating.

5. Turn IGNITION SWITCH to IGNITION AND BLOWER position.

6. Place carburetor MIXTURE CONTROL in RICH position for start.

7. Place SPARK CONTROL in RETARD position.

NOTE: Operations 8 through 11 to be performed for one engine at a time.

8. Regulate FUEL VALVES as indicated in Figure IV, and operate electric FUEL PUMP by means of push button switch to a fuel pressure of 5 to 7 PSI as indicated on FUEL PRESSURE Gauge.

9. Turn IGNITION SWITCH to BOTH.

10. Operate STARTER push buttons as follows:

(a) Press center push button (this closes solenoid switch paralleling the #1 and #2 service batteries).

(b) Hold center push button firmly in place and then press starter button for engine to be started.

Continue to operate Fuel Pump while cranking engine. (Pump push button and battery paralleling push button may be operated by one hand while starter push button is operated by the other hand).

NOTE: Under extreme cold conditions IGNITION SWITCH (See Step 9) may be turned to START while engine is being cranked. This brings booster coil into operation. If engine fails to start, turn booster coil off before discontinuing cranking. Operation of booster coil should not be continued for more than one-half minute. Prime with two to six strokes of hand primer if necessary. Be sure to close primer pumps.

To avoid overheating starter motor, do not crank continuously for more than one-half minute. Allow two to three minutes between cranking periods.

11. As soon as engine starts, return IGNITION SWITCH to BOTH (if it has been on START). Do not move Mixture Control to LEAN until oil "IN" is 110^{O}F.

Leave SPARK CONTROL in RETARD position for all speeds up to 1200. Use full ADVANCE position for operation at and above 1200 R.P.M.

Immediately after engine starts, check oil pressure (Fig. III). Gauge should show pressure within five seconds. If pressure does not register after ten seconds, shut the engine down and determine cause of lack of oil pressure.

Check that sea water pump for cooling the main engine manifold and exhaust pipes is operating by observing water flow in sea water intake strainers in Engine Room and note that water is

coming from exhaust outlets on hull sides.

Sea water for cooling the main engine manifolds and exhaust pipes is drawn through thru-hull fittings and sea-cocks into the strainers located in the aisle between engines, Port and Starboard. These are dual type strainers, one section only being in use at a given time, so that the other section may be disassembled and cleaned while engines are in operation. The control handles on the strainers are arranged so that the handle lays toward the side in use. The seacock must not be closed while engine is in operation, and should be checked for open position before engines are started.

Check fuel pressure -(See Fig. III.) 5 to 7 PSI should be registered with engine running. Lower Pressure indicates restriction in fuel system (dirty filters, misadjusted valves, etc.).

Check all lube oil and cooling water connections for leaks.

NOTE:-

An electric SIGNAL horn is provided, with push buttons at Engine Room Control (marked BRIDGE SIGNAL - Fig. III) and at Bridge Switch Panel (marked ENGINE ROOM SIGNAL - Fig. II) for communication between Engine Room and Bridge - code to be arranged by Operating Personel.

UNDER WAY

CLUTCH & THROTTLE CONTROL

Clutch and throttle are controlled by a single lever for each engine - located in front of the helmsman, at his right hand. (See AIR SYSTEM - Page 9). Moving the lever forward first engages the clutch in FORWARD and further forward movement advances the throttle. Movement of the lever aft from the neutral position first engages the clutch in REVERSE and then advances the throttle. Throttle action in reverse is limited to 800 - 900 engine R.P.M. Note that engine R.P.M. cannot be increased above idling until clutch is engaged.

OIL PRESSURE

Oil pressure should never be permitted to fall below 90 PSI except when idling at less than 1000 R.P.M., when 60 PSI minimum is permissible. Oil pressure relief valve is adjusted for pressure of 95 - 100 PSI at 2200 R.P.M., with oil at average operating temperature. See Packard Operating Manual 4M2500. Turn handles on lube oil "OUT" filters two or three complete turns every 8 to 12 hours of operation.

OIL TEMPERATURE

Normally, the oil thermostat will hold the oil "IN" temperature within the desired range of 130°F. to 150°F. Oil "OUT" temperature will normally increase as the engine speed is increased. Oil "OUT" temperatures of 200°F. should not be experienced except when operating at 2400 to 2500 R.P.M. An abnormal temperature rise in oil through the engine is an indication of internal trouble and should be investigated.

WATER TEMPERATURES

Water temperatures are controlled by thermostat and should keep within the

specified limits of 150°F. to 170°F.

IGNITION ADVANCE

The spark control should be fully retarded for starting and operation below 1200 R.P.M. - with all grades of fuel. Full advance for operation at and above 1200 R.P.M. with 100 octane and 91 octane fuels.

CARBURETOR MIXTURE CONTROL

The carburetor MIXTURE CONTROL provides a means of increasing fuel economy at low engine power for cruising and long range patrol when the conservation of fuel is important. It is intended for constant speed operation and not for maneuvering accelerating or operating at variable engine speeds. The mixture control is brought into operation by moving the Mixture Control Lever to the "LEAN" position.

It is not necessary to move the Mixture Control Lever from the "LEAN" position for operation in the high power range for accelerating or at idle.

As the engine speed is brought into the higher power range, the internal mechanism of the mixture control automatically restores the normal mixture ratio when manifold pressure reaches approximately 26 in. Hg. Abs. (-2PSI gauge). When the throttles are opened for acceleration at low engine speed, the manifold pressure increases to 26 in. Hg. Abs. (-2PSI gauge) almost instantly and the mixture control restores the normal mixture. Normal mixture is restored for idle by the idle override which locks out the mixture control when the throttles are closed.

R.P.M. AND MANIFOLD PRESSURE

IMPORTANT: See Packard Operating Manual - 4M2500, Paragraph g, Pages 307 - 308.

NOTE:

Maximum sustained speed 2000 R.P.M. Maximum emergency speed 2400 - 1 hr. Maximum emergency speed 2500 - 15 min. If running continously below 1200 R.P.M. drain manifold condensation drains at 30 minute intervals.

THROTTLE HANDLING

Open and close the throttles gradually at all times when changing speed or stopping. Sudden acceleration or deceleration imposes high inertia loads on the supercharger drive gears, engine bearings, pistons, and all moving engine parts and may contribute to engine failure.

STOPPING ENGINES

Close throttles gradually to idling position and then to NEUTRAL.

Place SPARK CONTROL in RETARD below 1200 R.P.M.

Place MIXTURE CONTROLS in PUMP LOCK position whenever engines are to be stopped, to prevent flooding of the engines by movement of the carburetor throttles.

Close Fuel Supply Valves (Valves F-11 and F-12, Figure IV) and allow engines to idle until fuel in carburetor is nearly exhausted. When engine begins to run roughly due to lack of fuel, shut OFF the IGNITION AND BLOWER switch. This procedure will drain fuel

from carburetor, prevent flooding of supercharger, and reduce possibility of backfire.

An EMERGENCY STOP SWITCH is provided on the Bridge Switch Panel for EMERGENCY STOPPING ONLY of the Main Engines. This switch grounds the ignition (Magneto) of both engines. WARNING - use of the **Emergency Stop Switch** at high speed may result in serious damage to the main engines.

SECURING

Open condensation drains at low end of exhaust manifolds. Make certain that drains are not clogged, by inserting a short stiff length of wire entirely through valve opening. It is important that the drains be left open to permit water formed by condensation to drain out, also to prevent water entering cylinder through exhaust valves should a leak develop in the water jacketed exhaust manifold.

Check Lube Oil Supply (while engine oil sumps are dry).

Wipe engines clean while still warm.

Execute needed minor repairs or adjustments.

Attach the water-proofed fabric covers to the combination air cleaners and flame arresters of carburetors. The covers prevent entrance of moisture or water into the engines and should be installed each time the boat is secured for several hours or longer.

EMERGENCY OPERATION

THROTTLES:

Throttle Control can be transferred from bridge to Engine Room Control Board. (See Fig. III). Engines will immediately return to idle and can be controlled by Engine Room Throttle levers by first desconnecting throttle actuator rods by means of "Quick Disconnects" provided just below carburetors.

CLUTCHES:

Hand levers are provided for emergency operation of main engine clutches and are stowed adjacent to clutches. Hand levers should not be left in place on clutches when not being used.

STEERING:

An auxiliary emergency hand tiller is provided for direct operation of either or both rudders in case of failure of the steering system. The hand tiller is stowed under a hatch in the aft cockpit floor and instructions for its use under various conditions are posted on the forward side of the dispensary aft bulkhead, at companionway step to aft cockpit.

ELECTRICAL

Electrical power, 24 Volt Direct Current is supplied from two banks of 24 Volt batteries located under hatch in the floor below forward companionway ladder. The negative potential of both banks of batteries is common and grounded.

POWER DISTRIBUTION BOX: The distribution of the power of these banks of batteries is through a Power Distribution Box located on bulkhead back of the forward companionway ladder. Distribution from this box is to the main engine starter motors and to the Main Distribution Panel through two circuit breaker type switches in lower right hand corner of panel.

MAIN DISTRIBUTION PANEL (in Radio Room - See Fig. I):- Distribution of power for all requirements aboard the boat other than for starter motors is made through main power busses in this panel, through circuit breaker type switches located in the face of the panel. The voltage of these busses is shown on the voltmeter in upper right hand corner of panel. The total amperage being supplied to the electrical system is indicated on the 300 AMP ammeter at upper left corner of panel. The two 100 AMP ammeters at upper center of panel indicate the charge rate of the engine driven generators.

POWER to the distribution busses in this panel may be supplied from three different sources.

SOURCE #1

DOCK POWER - 24 VDC, controlled through circuit breaker switch at left center of Main Distribution Panel, useable only when shore cable is connected to a source of 24 VDC. Power being available from this source will be shown by indicator light above switch.

SOURCE #2

AUXILIARY GENERATOR - 5.5 KW capacity-controlled through circuit breaker switch on right side, middle of Panel. Control and starting of this plant is accomplished at control panel adjacent to unit, in the engine room. EMERGENCY stopping of this unit may be accomplished by throwing the BATTERY # 1 and BATTERY # 2 switches on main distribution panel to "OFF" position. The ignition switch on generator control panel in engine room must be switched "OFF" before throwing these battery switches on again.

The 5.5 KW auxiliary generator is connected to the ships batteries through the Main Distribution Panel for its ignition and starting requirements, but cannot be used for charging the service batteries.

The 5.5 KW auxiliary generator should be started and kept in service while boat is in use, unless the boat is docked and a sufficient source of 24 VDC shore power is connected to the main power buss in the main distribution panel.

SOURCE #3

The SERVICE BATTERIES and the connected engine generators are controlled through circuit breaker at left side middle of panel. An interlock bar is arranged so that engine generators and batteries cannot be connected to main power buss at the same time the auxiliary light plant is connected. These batteries are charged by the two engine driven generators and can be controlled by the two circuit breaker switches located at left bottom corner of main distribution panel.

The ship's batteries should only be connected to the main power buss in Main Distribution Panel for emergency use of accessories and lights. The

engine generators and service batteries cannot supply the loads required by the accessory and electronic equipment for long periods.

When operating electrical accessories and electronic equipment the main power buss in main distribution panel should be powered by the 5.5 KW auxiliary generator which will supply up to 200 AMPs at 24 VDC maximum power.

CHARGING SERVICE BATTERIES:-

Charging the service batteries may be accomplished by either, or both, engine generators when boat is under way only. The generator accessory drives turn only when engine clutch is engaged. Their charging is controlled on the Main Distribution Panel by the two circuit breaker switches at lower left corner of panel. Either, or both, banks of service batteries can be charged depending on their connection through the two circuit breaker switches at lower right corner of the Main Distribution Panel.

Either or both of these service batteries may be charged from the main power buss while dock power is connected if component switches are arranged as follows:

1. The two engine generator circuit breaker switches at lower left hand corner of main distribution panel to be "OFF".

2. The main engine generator and battery buss circuit breaker switch at left middle of main distribution panel to be "ON".

3. Either or both Battery #1 and/or Battery #2 circuit breaker switches at lower right corner of main distribution panel to be "ON".

To accomplish full charge of service batteries the line voltage of the dock power should be 28 VDC which will be shown on voltmeter at upper right corner of Main Distribution Panel.

POWER DISTRIBUTION

All power requirements, except engine starter motors, are supplied through circuit breaker switches on the face of the Main Distribution Panel plus secondary controls at the individual equipment. This applies to the engine ignition and starter solenoids, coolant heater and other accessories.

If the main power buss is powered by some source of 24 VDC it will be indicated by the voltmeter in upper right corner of Main Distribution Panel and the turning on of any circuit breaker switch on face of panel will activate a circuit.

Any power drain of connected components will be shown on total-load ammeter in upper left corner of Main Distribution Panel.

The six circuit breaker switches located at lower center of Main Distribution Panel are the main switches for the electronic equipment and must be placed "ON" before actuating the radio equipment affected by its separate "OFF" - "ON" switch.

The circuit breaker switch at right middle of Main Distribution Panel labelled "RADAR" must be on be-

fore the power to that unit can be controlled by the various radar equipment switches.

The RADAR equipment circuit (Prototype #1 only) is activated by the power switch in upper left corner of Indicator on the bridge -- if the following component switches are ON:

1. Circuit breaker switch on Main Distribution Panel.

2. Main line switch - in Radar Motor Generator locker, located starboard side of aft cockpit.

3. Antenna heater switch and blower motor switch located under cover of Radar transmitter which is in the Port locker of aft cockpit. (Normally left ON)

The antenna on mast over dispensary will rotate if all switches are on and screen on indicator will show picture after warm-up period of from three to five minutes.

Failure to operate may indicate a blown fuse at main switch or that the switch has tripped. Both are located in starboard locker in aft cockpit.

The Electric Range in galley has a selector switch on forward side for selection of various combinations of heat. This power is supplied thru the circuit breaker switch located at right center of Main Distribution Panel.

Between the Shore Power circuit breaker switch and Electric Range circuit breaker switch are located ten additional circuit breaker switches that control circuits as indicated on their name plates. These main distribution panel circuit breaker switches must be "ON" to activate those circuits.

Searchlights and Navigation Lights are controlled by switches located on Bridge Control Panel. Power supply is through circuit breaker switches located at upper right corner of Engine Room Control Panel, which in turn is supplied through circuit breaker switch on face of Main Distribution Panel in Radio Room (labeled Bridge Control Panel EL-50).

A switch is provided at the lower right corner of Bridge Control Panel which may be used for possible future installation of instrument and compass lights.

FUEL SYSTEM

Fuel is supplied from two 600 gal. (each) tanks located port and starboard, outboard, in aft dispensary. They are filled through filler connections located on deck, port and starboard, at forward corners of dispensary.

Fuel Level is indicated by gauges located in Engine Room. Sounding rods are also provided for checking fuel levels. They are stowed in dispensary, port and starboard, above fuel tanks.

The Fuel System and Valve arrangement is delineated in Figure IV. As indicated, either tank or engine can be isolated.

FUEL STRAINERS should be disassem-

bled and the elements cleaned periodically. In EMERGENCY they can be cleaned by "backwashing" - See Figure IV for instruction.

AIR SYSTEM

Clutch and throttle action are accomplished by compressed air operating units as indicated in Fig. V. Available air pressure is shown by gauge at control station, to left of steering wheel. Full air pressure is 150 PSI. Clutch will not operate at less than 90 PSI.

Air pressure is maintained by a compressor, belt driven from the starboard main engine, located at forward end of engine, inboard. Air pressure is also supplied by an electrically drivcompressor located in engine room. Operation of both compressors is automatic and controlled by regulating valves located outboard in engine room, aft starboard corner.

NOTE: The air steering booster indicated by dotted lines in Figure V has been removed and steering is entirely manual. The red and green warning lights adjacent to the air pressure gauge indicate pressure available to steering booster and will be operative if the steering booster is reinstalled. The green light indicates sufficient pressure is available for all air operated units. The red light indicates that air to the steering booster is less than 80 PSI and will automatically shut off (steering reverting to manual) when air pressure is reduced to 75 PSI. The purpose of this control is to conserve available air for clutch and throttle control.

COOLANT HEATING SYSTEM

This boat is equipped with a heating system designed to keep the main engine coolant and lubricating oil at "STAND-BY" temperature so that engines can be started and brought to maximum R.P.M. with the least possible delay required for "warm-up". This system also provides heat for the cabin space heaters and for the service hot water. The system is delineated by diagram in Fig. VI. (Prototype 1) and Fig. VI A (Prototype 2)

Heat is provided by the Anchor Post unit located on the bridge deck. This is a gasoline fired unit. Fuel is supplied from the main engine fuel tanks, controlled by fuel valve F-14 (See Fig. IV). To put the unit into operation, the COOLANT HEATER and FRESH WATER PUMP switch on Main Distribution Panel, Fig. I, and switch located on Anchor Post unit control panel, attached to the unit, must be "ON" - in addition to the main power buss, on Main Distribution Panel as described under "Electrical", Page 5.

If heater fails to ignite or stops after a short period of operation, check reset switches located on unit - particularly SAFETY SWITCH. These are heat operated switches and cannot be reset until they have cooled.

A combined pressure and temperature gauge is mounted directly on the Anchor Post unit. Pressure should be approximately 5 PSI when unit is operating. Temperature is automatically controlled between 140° - 170°F.

The engine coolant expansion tanks

(two outboard tanks of the group of three tanks located above the Anchor Post unit) should be from 3/4 to full and the heater expansion tank (center) should be 1/3 to 3/4 full.

FIRE EXTINGUISHING SYSTEM

Two fixed CO_2 fire extinguishing systems are installed. One (100#) protects the engine room. One (15#) protects the fuel tank space. Controls (pullbox type) for releasing both systems are located at two stations. One set of release controls is located on bridge deck, port side. The other set is located in the aft cockpit, port side. Location of CO_2 cylinders, nozzles, release controls, piping, etc., for this system is shown by diagram in Fig. VII.

NOTE: Engine room BLOWERS should be immediately turned OFF if engine room fire extinguishing system is released.

In addition to the two fixed CO_2 systems described above, there are two 15# portable CO_2 fire extinguishers aboard, one located on bridge deck, starboard side, and one located in aft dispensary, starboard side forward.

FRESH WATER SYSTEM-HOT & COLD

Fresh water is supplied from two 40 gal. (each) tanks located outboard of berths, port and starboard, in forward cabin. They are filled through filler connections located on deck. Pressure for the fresh water system is provided by an electric powered pressure pump located under the port berth in forward cabin.

This pump is automatically controlled by a pressure switch mounted on the unit and set to maintain a pressure of approximately 20 PSI in the fresh water system. An automatic safety switch is also provided which will trip if the supply of fresh water from the tanks is cut off or is exhausted. This switch is located on the unit and must be reset manually when fresh water is again available to the pump.

Fresh water heating is accomplished by a heating coil installed in the hot water tank, located under the port berth in dispensary. Heat is supplied by the coolant heating system, see Fig. VI and Fig. VI A.

BILGE DRAINAGE

A centrifugal type bilge pump is provided. This pump is belt driven by the port main engine and is in operation continously while engine is running. Pump and suction lines are primed by bleeder lines from the sea water cooling for the main engine manifold and exhaust. A four valve manifold, is provided in engine room to allow selection of compartment to be pumped. Valves are labeled:

Forward Compartment (all bilge forward of engine room).

Engine Room.

Dispensary.

Aft Compartment (all bilge aft of

dispensary).

On Prototype No. 2 a flexible suction line is also provided, to allow pumping of either "Package Unit" well.

TO PUMP BILGE:

Open valve for compartment to be pumped and close the other valves. Engine R.P.M. must be 800 or higher. More than one compartment can be pumped at the same time if there is sufficient water in each to prevent air entering the pump.

Foot valves in suction strainers must be tight to accomplish priming. Inspect frequently for foreign matter which may hold valves open. If foot valves are not watertight they will allow priming water to flow into bilge.

VENTILATION

The main engines must have an adequate air supply for maximum efficiency. The principal entry for this air is provided by the specially designed hatch cover over the engine room companionway. In addition, there are two hooded vents located at the aft end of the engine room and two louvered openings, port and starboard, located on the inboard sides of the cabin side extensions. Two mechanical blowers are provided to exhaust fumes from the engine room bilge.

Ventilation to the forward cabin is provided by two swivel cowl ventilators on the forward deck. These can be turned as required by wind and sea conditions and the cowls can be completely removed and the openings closed by means of cover plates.

Ventilation to the Forepeak Locker, Radio Room, Galley, Aft Dispensary and to Radar equipment lockers, port and starboard, at aft cockpit, is provided by mushroom type ventilators. These should be kept open at all times, except when wind and sea conditions are such that water would enter. They are normally rain proof.

PROTOTYPE HULL NO. 2

SUPPLEMENTARY INSTRUCTIONS

Prototype Hull No. 2 is provided with the same controls and equipment (with the exception of Radar) as Prototype No. 1.

Propulsion is through VEE DRIVE GEARS and Engines and Gears are mounted in a "Package" unit which also carries the propeller shaft strut, shaft and propeller and allows removal of the entire propulsion group as a unit by means of the lifting rings and hoisting sling provided.

A REVERSING GEAR is provided which may be installed between the Main Engine and the Vee Drive on the Port "Package" unit, allowing use of a left hand propeller on that side if desired. A separate lube oil storage tank and piping system is provided for this installation as shown on Fig. VI A.

Foregoing instructions, pages 1 - 11 apply to Prototype No. 2 as well as to Prototype No. 1 with the following comments:

MAIN ENGINE OIL TEMPERATURES will run higher than in Prototype No. 1, due to difference in coolant system, as shown in Fig. VI A. Operating oil temperatures should not be allowed to exceed the maximum recommended temperatures stated in Packard Operating Manual 4M2500.

SAE #50 Viscosity lube oil should be used in Vee Drive Gears and Rotation Reversing Gear when ambient atmospheric temperature is 32°F. or higher. SAE #30 viscosity for temperatures below 32°F.

OIL PRESSURE FOR VEE DRIVE GEARS (and for ROTATION REVERSING GEAR on Port Engine, if installed) should be 10 to 12 PSI at operating temperatures and at speeds above 1200 R.P.M. Maximum relief valve setting is 15 PSI. At low R.P.M. (800-900) the minimum pressure should not be less than 3 PSI.

OIL TEMPERATURE FOR VEE DRIVE GEARS (and for ROTATION REVERSING GEAR on Port Engine, if installed) should not exceed 150°F.

Turn handles on lube oil "out" filters on vee drive gears (and Rotation Reversing Gear, if installed) two or three complete turns every 8 to 12 hours of operation.

Lube oil tank levels should be observed while boat is underway. Otherwise oil may be drained from tanks into units and sight gauge readings will be inaccurate.

No Radar equipment is installed on Prototype No. 2.

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REFERENCES

Engine Operating Manual - Packard Model 4M 2500
Packard Motor Car Company
1580 E. Grand Boulevard, Detroit 32, Michigan

Fuel Pump - Romec #RD-7650
Romec Pump Co., Elyria, Ohio

Water Strainer - Groco types HD 2000 and S750
Gross Mechanical Laboratories
1530 Russell Street, Baltimore 30, Maryland

Auxiliary Generator Unit Manual - Capitol Engine Model 5-1/2 KW-28.5 volts D.C.
(Navy Dept. BuShips - Contract NObs 16326)
Capitol Engine Company
280 Undercliff Ave., Edgewater, New Jersey

Coolant Heater Manual - Model B77-30A-N (Contract NObs 2796(151)-N151S 93530)
Anchor Post Products, Inc.
Baltimore 24, Maryland

Westinghouse Air Controls Manual - Outline Drawings for Specifications I-350-1
Chris-Craft 52 ft. Rescue Boats.
Westinghouse Air Brake Co.
Wilmerding, Penn.

Gemmer Steering Gear Manual - Model 400
Gemmer Manufacturing Company
Detroit 11, Michigan

Evans Space Heater - Models ES-18 and ES-20
Evans Products Company
Plymouth, Michigan

Kidde CO_2 Fire Extinguishing System Manual
Walter Kidde & Company, Inc.
Belleville 9, N. J.

Bilge Pump Belt Drive - Marine Products Model 200
Marine Products Company
515 Lycaste Ave., Detroit 14, Michigan

Bilge Pump Hand Operated - Wilcox Crittenden - Fig. 5392-B-W/C Plan No. M-3266
Wilcox Crittenden & Co., Inc.
Middletown, Conn.

MAIN DISTRIBUTION PANEL

(RADIO ROOM)

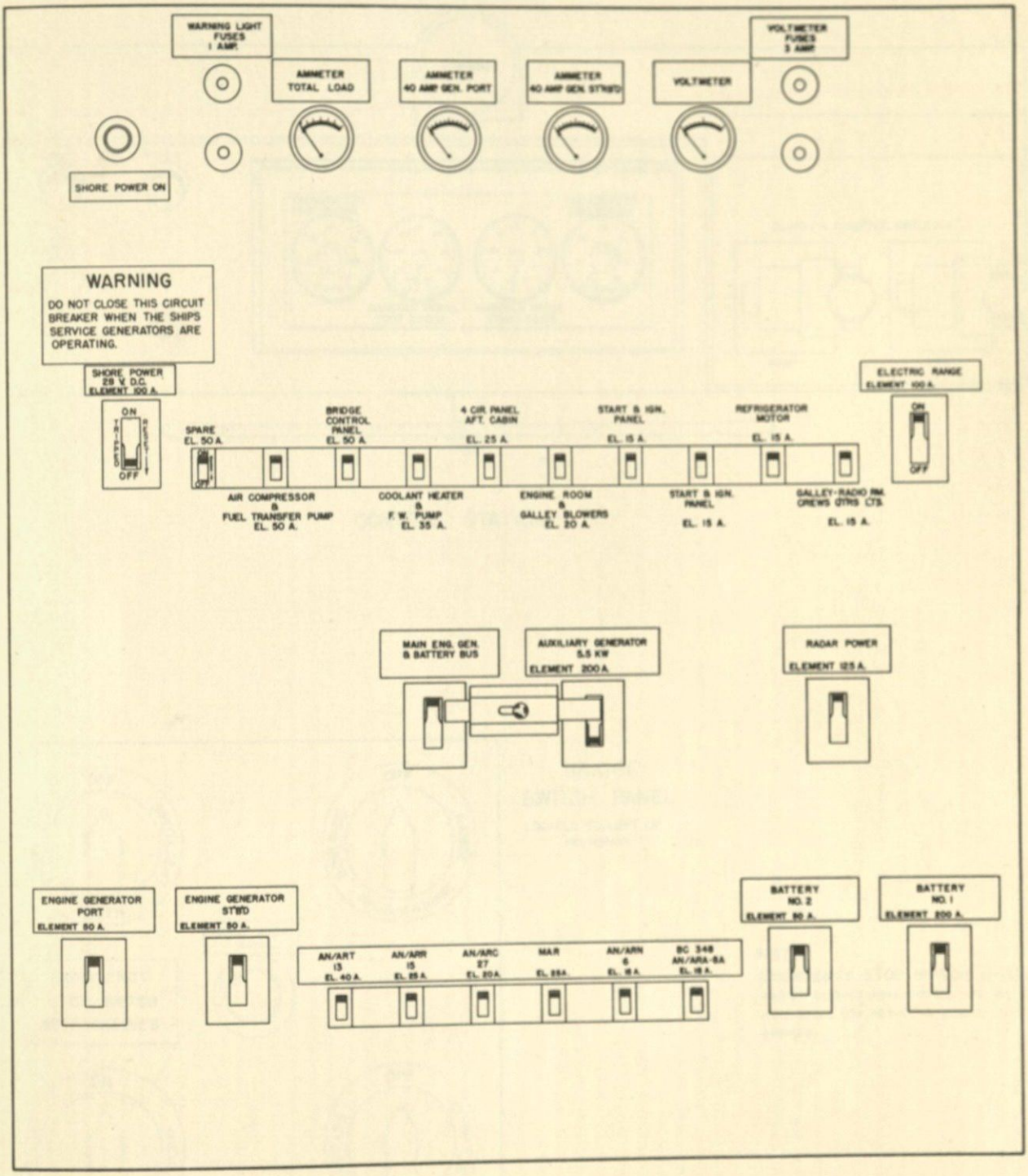
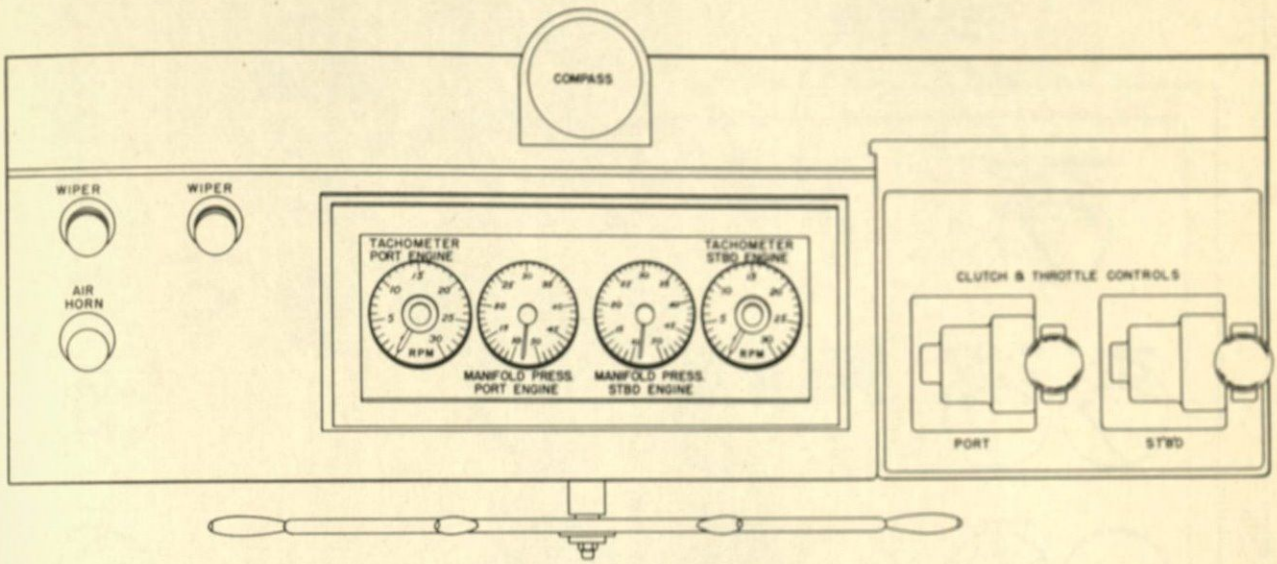
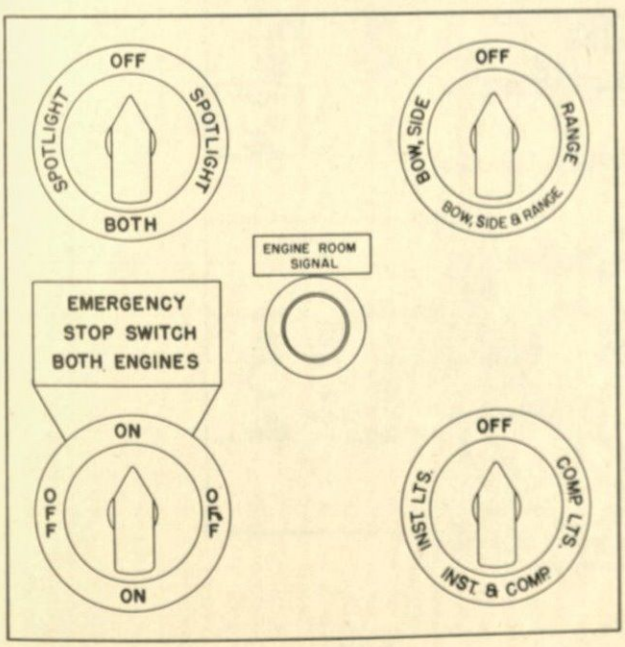


FIG. I

BRIDGE PANELS



CONTROL STATION



BRIDGE
SWITCH PANEL

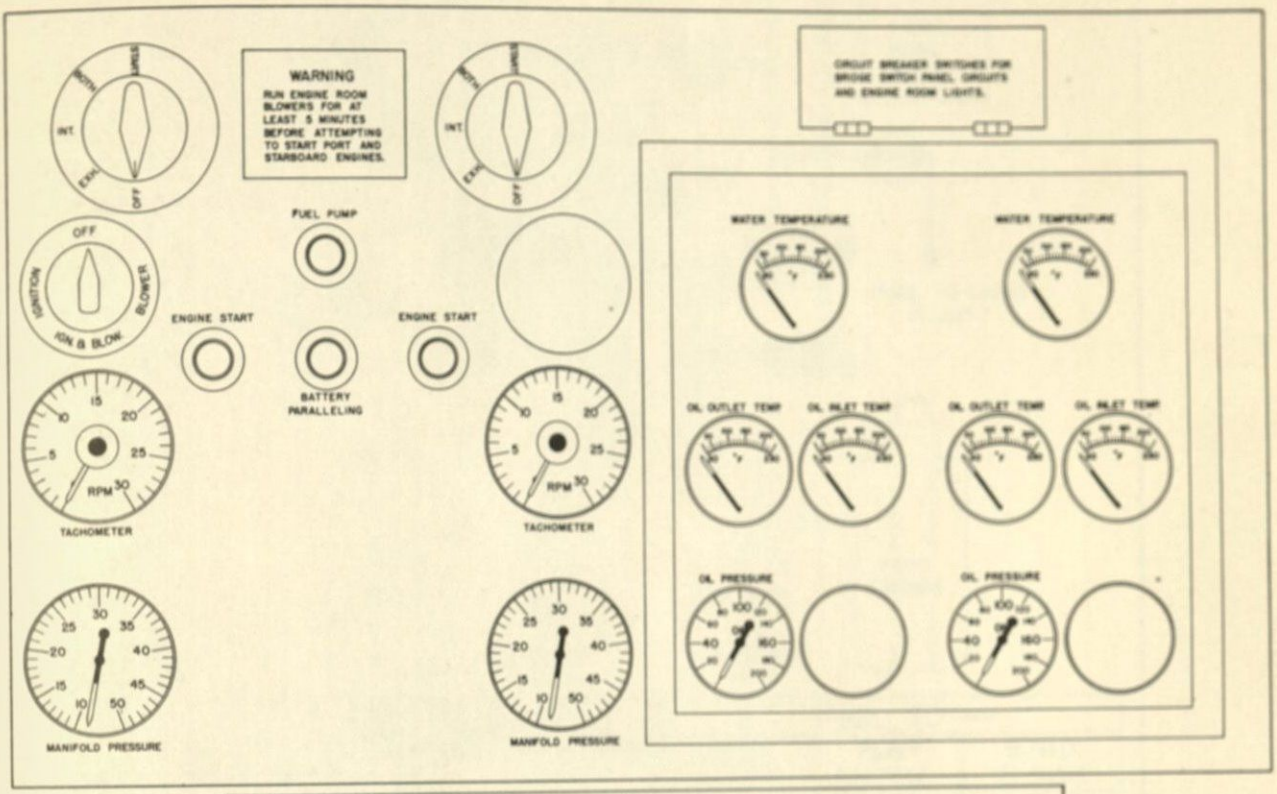
LOCATED TO LEFT OF HELMSMAN

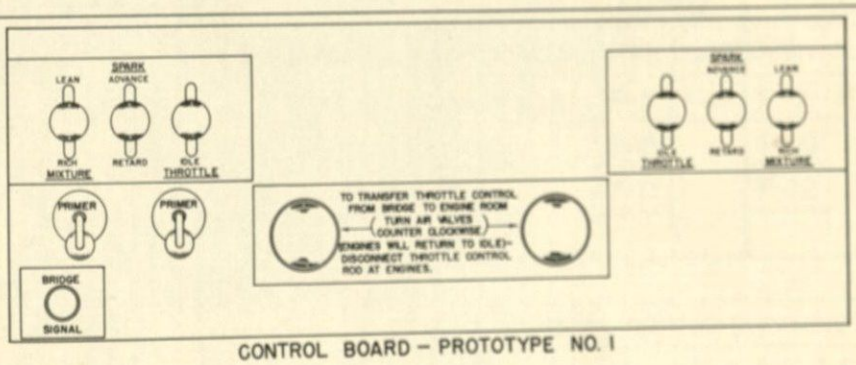
NOTE:
EMERGENCY STOP SWITCH GROUNDS IGNITION ON BOTH MAIN ENGINES. ITS USE AT HIGH SPEED MAY RESULT IN DAMAGE TO ENGINES.

FIG. II

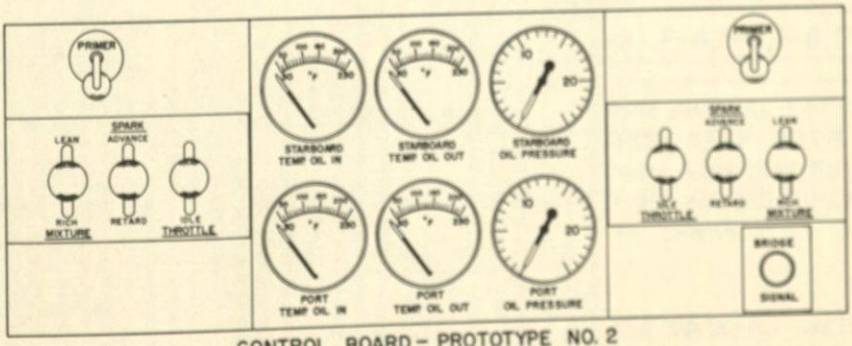
ENGINE CONTROL PANEL

(ENGINE ROOM)





CONTROL BOARD – PROTOTYPE NO. 1



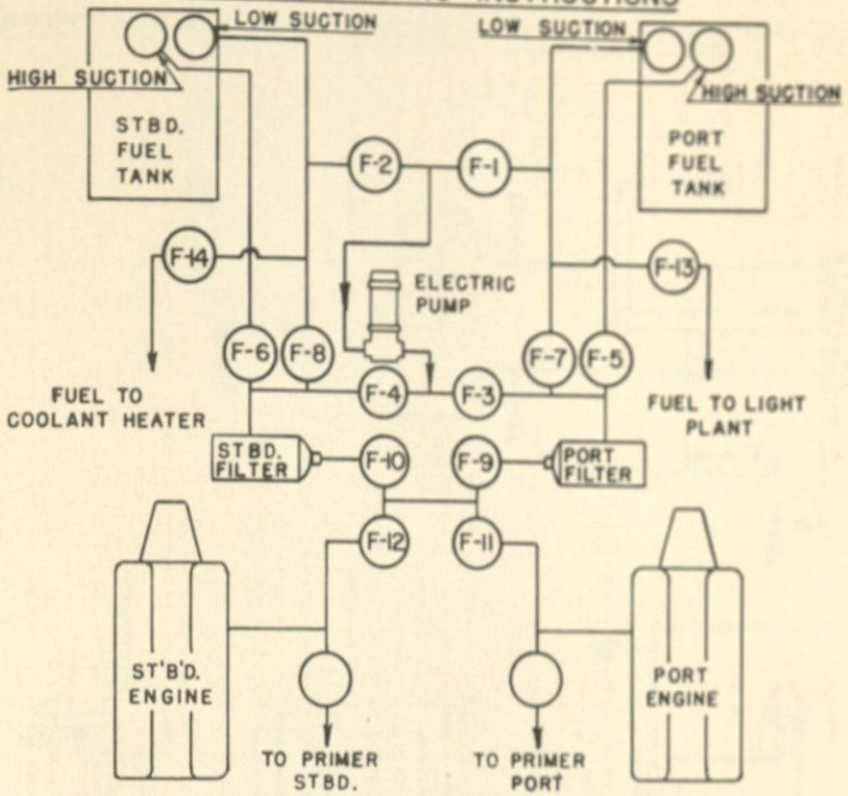
CONTROL BOARD – PROTOTYPE NO. 2

(VEE DRIVE INSTRUMENTS)

FIG. III

FUEL SYSTEM

VALVE OPERATING INSTRUCTIONS



FUEL FROM —					
BOTH TANKS		PORT TANK ONLY		STBD. TANK ONLY	
OPEN	CLOSE	OPEN	CLOSE	OPEN	CLOSE
F-1	NONE	F-1	F-2	F-2	F-1
F-2		F-3	F-6	F-3	F-5
F-3		F-4	F-8	F-4	F-7
F-4		F-5 PORT HI-SUC.		F-6 STBD. HI-SUC.	
F-5 PORT HI-SUC.		F-7 PORT LO-SUC.		F-8 STBD. LO-SUC.	
F-7 PORT LO-SUC.					
F-6 STBD. HI-SUC.					
F-8 STBD. LO-SUC.					

FUEL TO —					
BOTH ENGINES		PORT ENGINE		STBD. ENGINE	
OPEN	CLOSE	OPEN	CLOSE	OPEN	CLOSE
F-9	NONE	F-9	F-12	F-9	F-11
F-10		F-10		F-10	
F-11		F-11		F-12	
F-12					

TO CLOSE FILTER (FOR CLEANING)	
PORT FILTER	CLOSE- F-3, F-5, F-7, F-9
STBD. FILTER	CLOSE- F-4, F-6, F-8, F-10

TO BACKWASH FILTERS			
PORT		ST'B'D.	
OPEN	CLOSE	OPEN	CLOSE
F-1	F-3	F-1	F-4
F-2	F-6	F-2	F-5
F-4	F-8	F-3	F-7
F-5	F-11	F-6	F-11
F-7	F-12	F-8	F-12
F-9		F-9	
F-10		F-10	

TO PRIME ENGINES			
PORT		ST'B'D.	
OPEN	CLOSE	OPEN	CLOSE
F-1	F-6	F-1	F-5
F-2	F-5	F-2	F-6
F-3	F-7	F-3	F-7
F-4	F-8	F-4	F-8
F-9	F-12	F-9	F-11
F-10		F-10	
F-11		F-12	

FOR NORMAL OPERATION KEEP BOTH HIGH AND LOW SUCTION VALVES OPEN AT TANKS.

SEE PACKARD OPERATING MANUAL FOR ENGINE PRIMING AND FILTER BACKWASHING INSTRUCTIONS.

FIG. IV

AIR CONTROLS SYSTEM

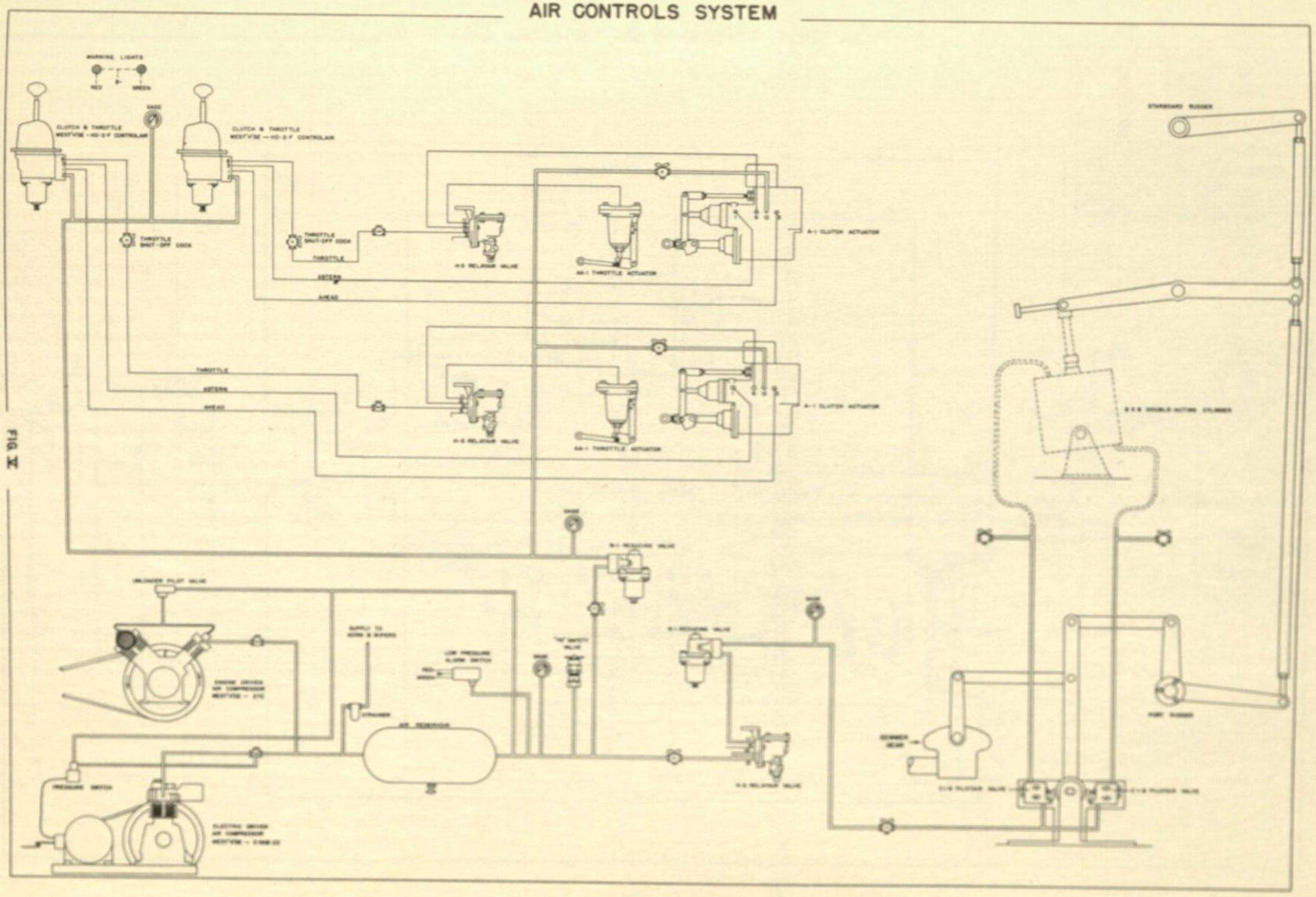
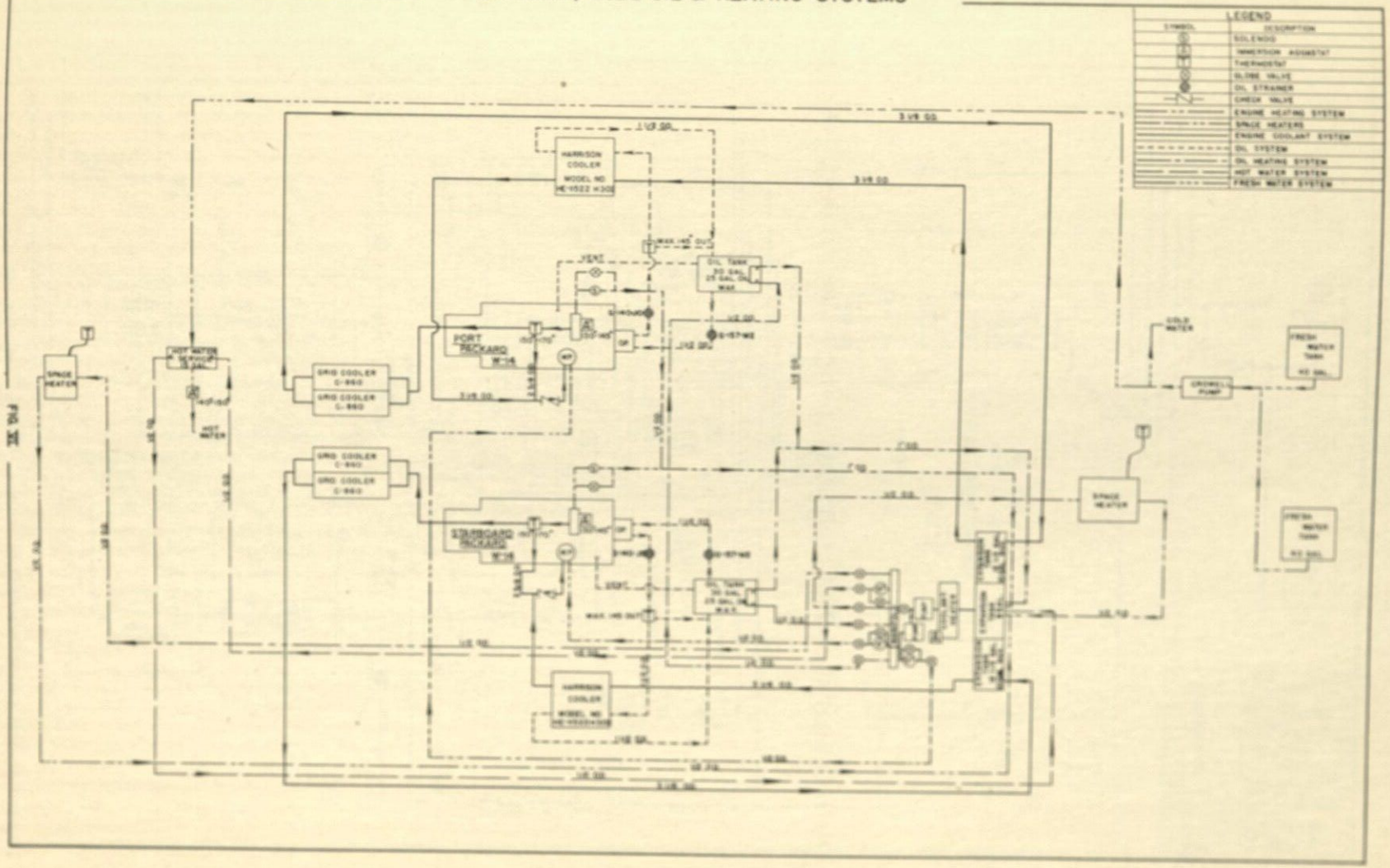
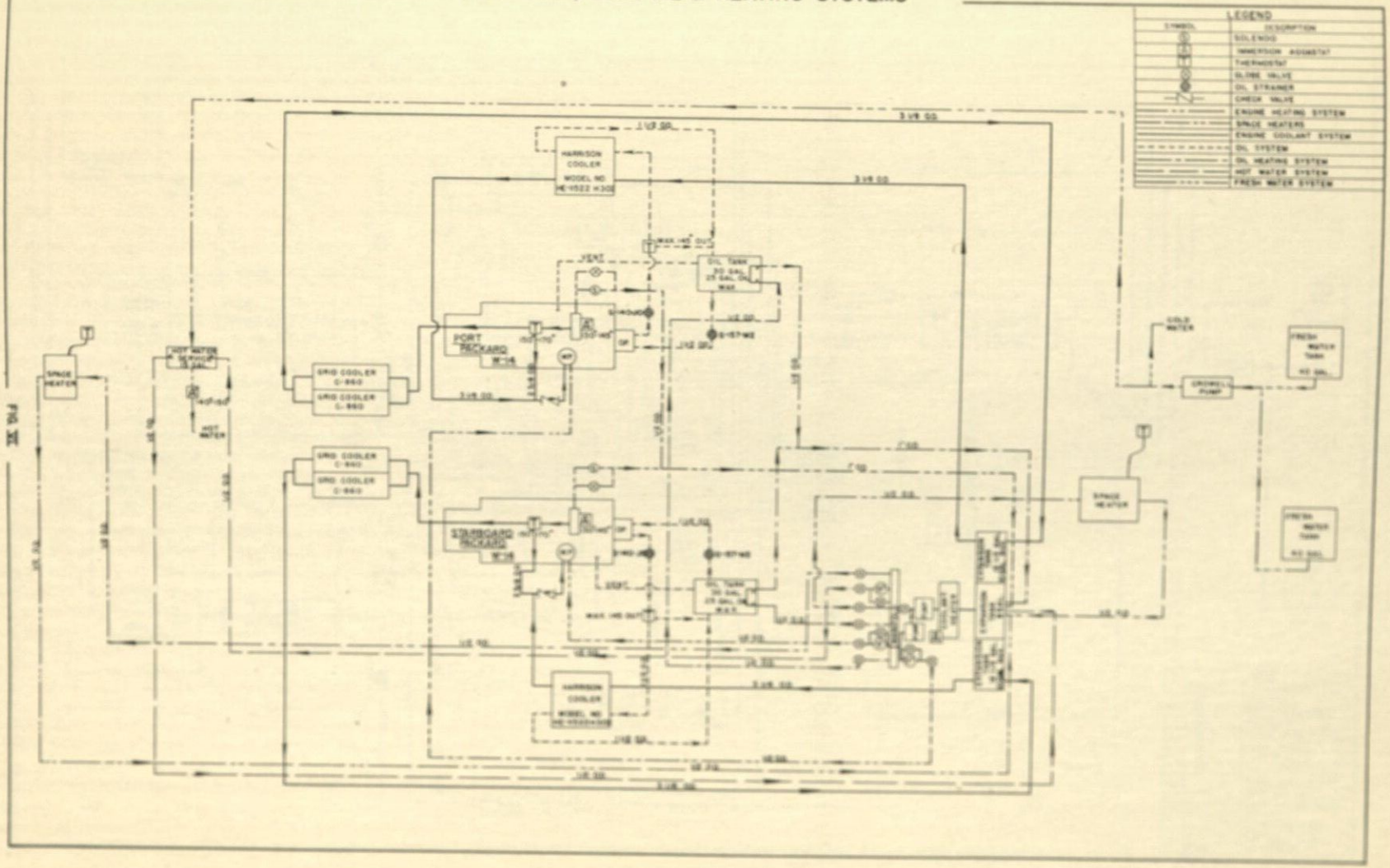


FIG X

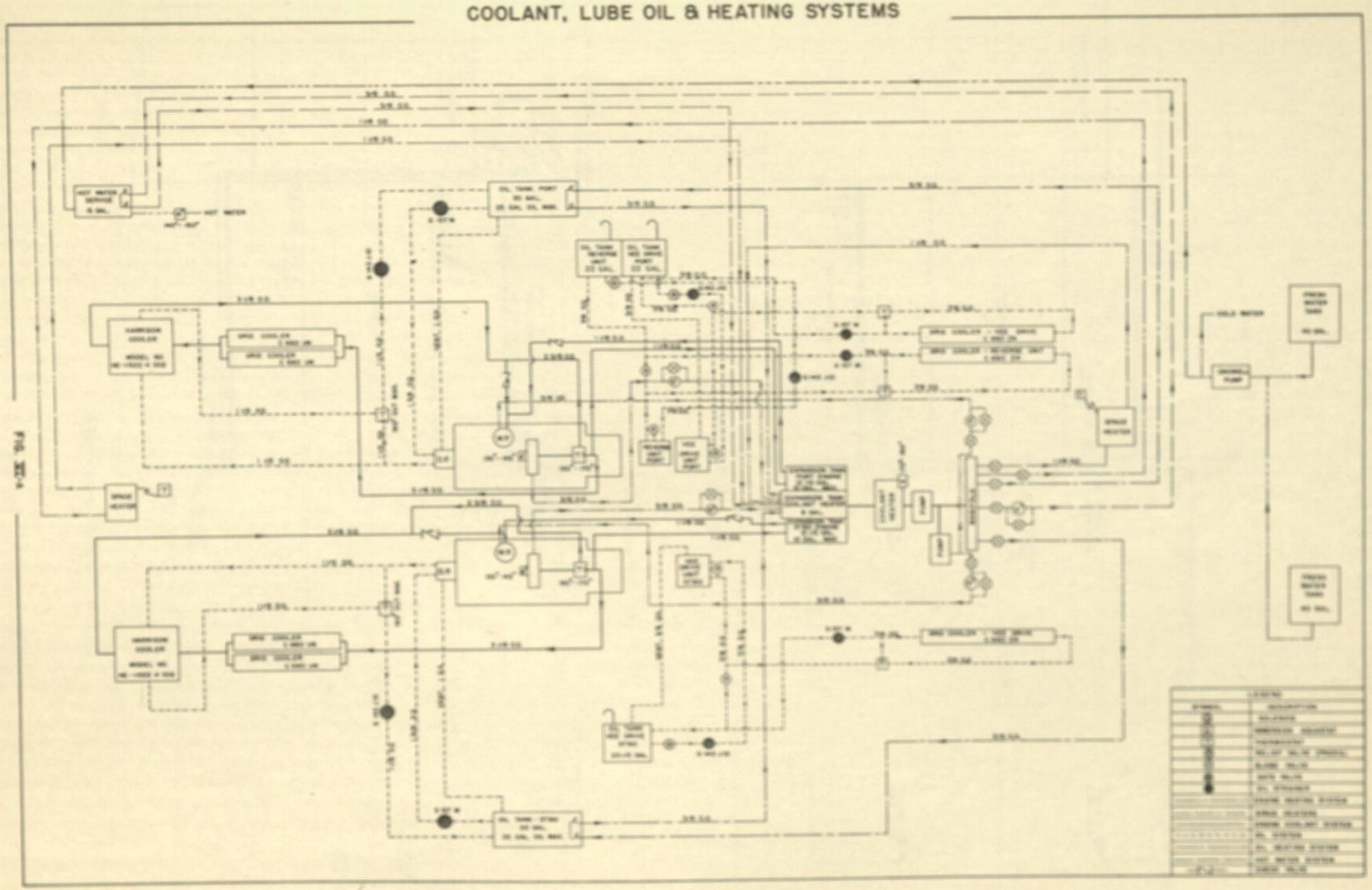
COOLANT, LUBE OIL & HEATING SYSTEMS



COOLANT, LUBE OIL & HEATING SYSTEMS



COOLANT, LUBE OIL & HEATING SYSTEMS



COOLANT, LUBE OIL & HEATING SYSTEMS

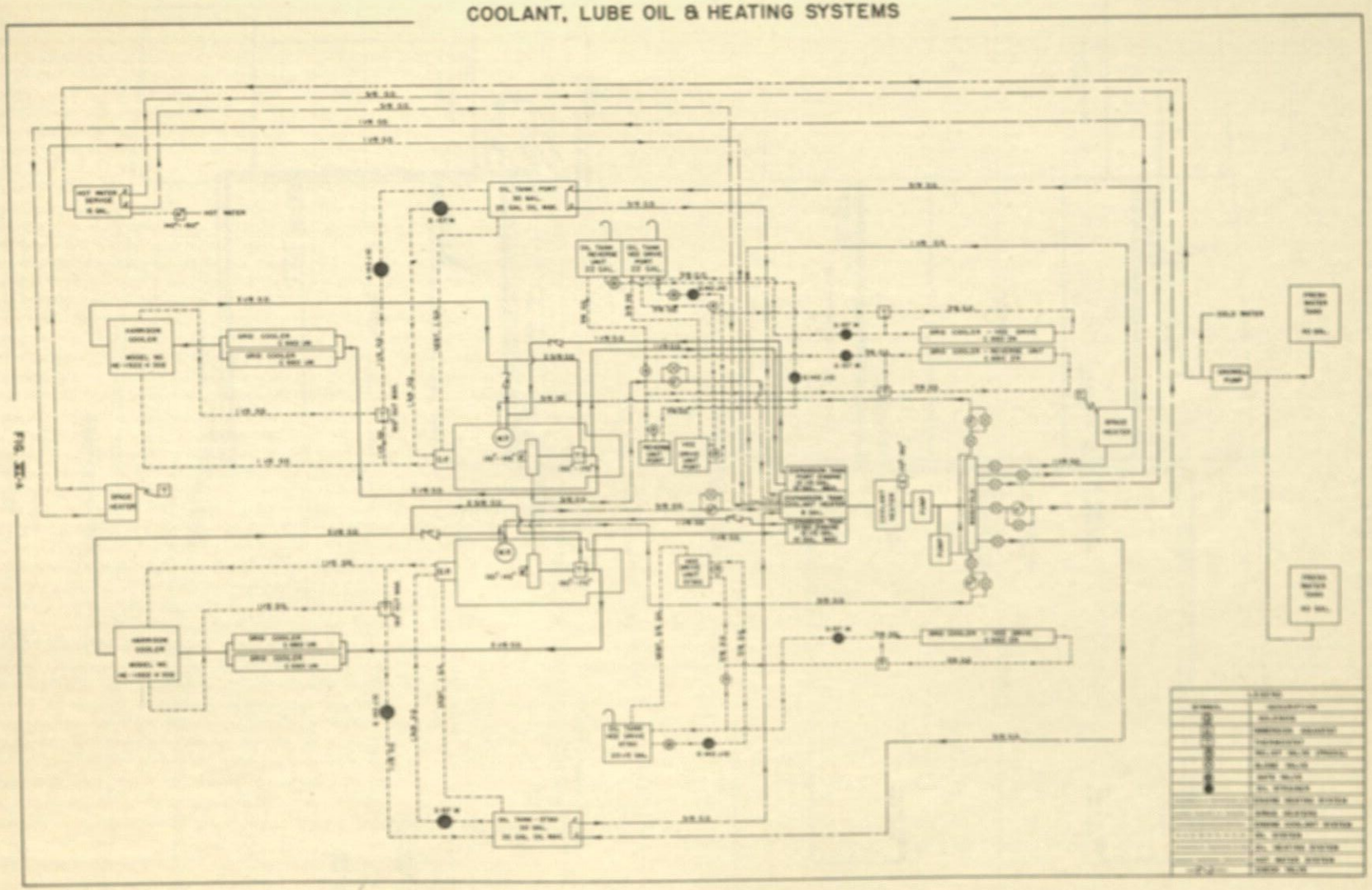
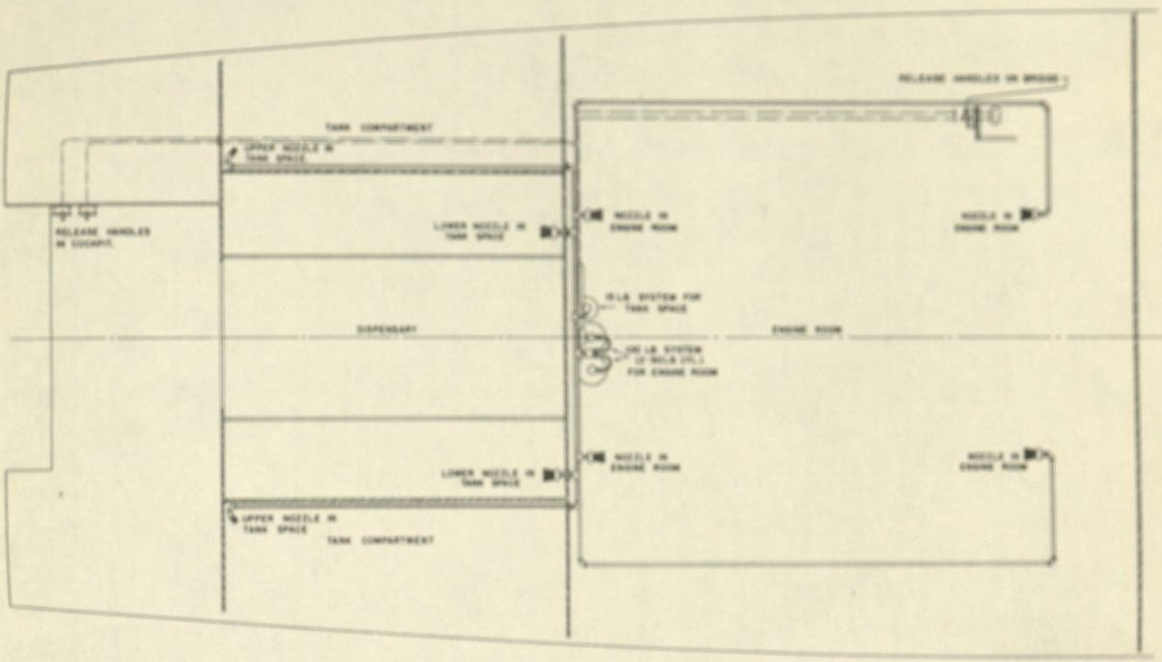
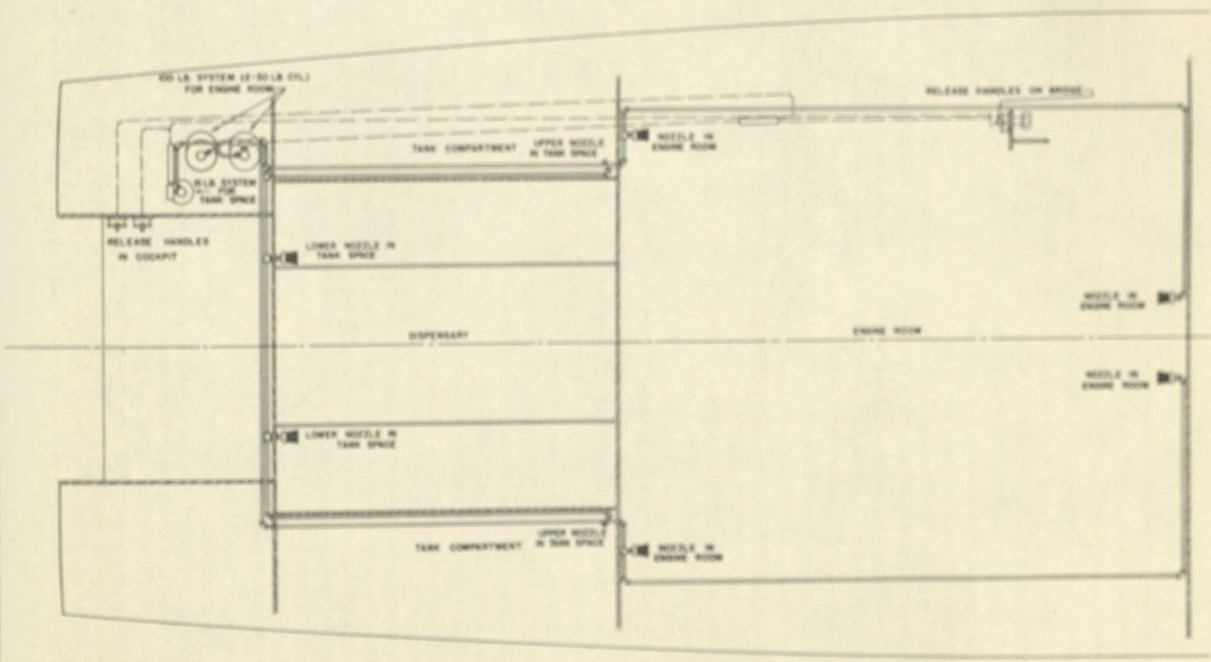


FIG. 32-1

FIXED CO_2 SYSTEMS



PROTOTYPE NO. 1



PROTOTYPE NO. 2

FIG. XII