

U.S.C.G. Merchant Marine Exam

QMED

Q800 Junior Engineer, Part I

(Sample Examination)

Choose the best answer to the following Multiple Choice Questions.

1. The adjustable spherically seated self-aligning bearing housings used in main turbines are provided with oil deflector rings. The function of these rings is to _____.
- (A) prevent the external leakage of oil out of the bearing housing
 - (B) ensure efficient lubrication of the bearing
 - (C) direct the flow of oil through the bearing
 - (D) prevent the leakage of main steam into the oil

If choice A is selected set score to 1.

2. Salt water ballast is to be discharged into the #6 port and starboard wing tanks. Which combination of valves, illustrated, must be opened, and which valves should be closed? Illustration GS-0139
- (A) 1, 2, 5 and 6 open; 4, 7, 8 and 9 closed.
 - (B) 1, 2, 7 and 9 open; 3, 4, 5, 6, 8 and 10 closed.
 - (C) 1, 3, 5, 6, 8 and 10 open; 2, 4, 7 and 9 closed.
 - (D) 3, 4, 7 and 9 open; 1, 2, 5, 6 and 10 closed.

If choice C is selected set score to 1.

3. As shown in the illustrated D type single furnace boiler, what does item "G" represent? Illustration SG-0008
- (A) Superheater tubes
 - (B) Generating tubes
 - (C) Screening tubes
 - (D) Desuperheater tubes

If choice A is selected set score to 1.

4. The primary function of line "J" shown in the illustration is to _____. Illustration MO-0110
- (A) remove air and non-condensable gases from the unit
 - (B) remove condensable gases from the unit
 - (C) allow for removal of produced distillate
 - (D) prevent backflow of eductor discharge

If choice A is selected set score to 1.

5. What is the function of the intake system for a diesel engine?

- (A) The intake system's function is to ensure an adequate supply of clean lubricating oil to support engine lubrication.
- (B) The intake system's function is to ensure an adequate supply of clean sea water to support engine cooling.
- (C) The intake system's function is to ensure an adequate supply of clean air to support engine combustion and scavenging.
- (D) The intake system's function is to ensure an adequate supply of clean air to support engine crankcase ventilation.

If choice C is selected set score to 1.

6. If an air compressor is used to supply air primarily to the combustion control system and other pneumatic controllers, the entire system is known as the _____.

- (A) control air system
- (B) ships service air system
- (C) forced draft air system
- (D) supply air system

If choice A is selected set score to 1.

7. The pressure in the feed water system must exceed boiler steam drum pressure in order to _____.

- (A) prevent air leakage into the feed water system
- (B) prevent water hammer in the lines
- (C) remove the steam from the steam drum
- (D) force the feed water into the boiler

If choice D is selected set score to 1.

8. Before starting a diesel engine, you should always _____.

- (A) clean the air filter
- (B) check the crankcase oil level
- (C) change the fuel oil strainers
- (D) check the pyrometer readings

If choice B is selected set score to 1.

9. Which of the tanks, shown in the illustration, supplies fuel to the emergency generator? Illustration MO-0058

- (A) Light fuel oil service tank
- (B) Light fuel oil settling tank
- (C) Light fuel oil boiler tank
- (D) Light fuel oil booster tank

If choice A is selected set score to 1.

10. Which of the following modes of heat transfer does NOT require any physical contact between a warmer and a cooler substance?

- (A) Lamination
- (B) Radiation
- (C) Conduction
- (D) All of the above

If choice B is selected set score to 1.

11. Babbitt is a metal alloy commonly used for lining _____.

- (A) precision bearings
- (B) shim stock
- (C) valve seats
- (D) salt water piping

If choice A is selected set score to 1.

12. A main condenser utilizing a scoop for the circulation of sea water must be constructed as a _____.

- (A) parallel flow heat exchanger
- (B) counter flow heat exchanger
- (C) single-pass heat exchanger
- (D) two-pass heat exchanger

If choice C is selected set score to 1.

13. Which statement is true concerning two-stage air ejector assemblies?

- (A) The steam/air mixture from the main condenser is discharged by the first stage air ejector to the inter condenser.
- (B) Steam to the after condenser is condensed and returned to the main condenser via the loop seal.
- (C) Air is removed from the condensate as it passes through the tubes.
- (D) The first stage air ejector takes suction on the second stage to increase vacuum.

If choice A is selected set score to 1.

14. Exhaust pipes for separate main propulsion diesel engines can be combined only when _____.

- (A) space limitations prevent separately run pipes
- (B) the engines are small auxiliary units
- (C) they are arranged to prevent gas backflow to each engine
- (D) a waste heat boiler is installed

If choice C is selected set score to 1.

15. Which of the statements represents a characteristic of the thrust collar in a Kingsbury thrust bearing?

- (A) It turns with the shaft and the pivot shoes do not rotate.
- (B) It is stationary and the shoes turn with the shaft.
- (C) It is turned by the base ring of the bearing.
- (D) It is held in position by the bearing base ring.

If choice A is selected set score to 1.

16. Fuel injection pumps using the port and helix metering principle requires the use of a _____.

- (A) crosshatched design
- (B) lapped plunger and barrel
- (C) variable stroke
- (D) variable cam lift

If choice B is selected set score to 1.

17. Which of the following conditions is indicated by oil flowing through a lube oil gravity tank overflow sight glass?

- (A) Excessive oil is stored in the gravity tank.
- (B) Insufficient oil is being pumped to the gravity tank.
- (C) Turbine bearing failure has occurred.
- (D) Sufficient oil flow is being supplied to the gravity tank.

If choice D is selected set score to 1.

18. In which lubrication application is lubricating oil with demulsibility properties most likely to be used?

- (A) Crosshead diesel engine cylinder oil.
- (B) Gas turbine lubricating oil.
- (C) Steam turbine lubricating oil.
- (D) Trunk type diesel engine lubricating oil.

If choice C is selected set score to 1.

19. (1.6.10.4-3) The device shown in the illustration is lubricated by _____. Illustration GS-0119

- (A) air pressure forcing lube oil to areas of friction
- (B) splash-type lubrication provided in the compressor
- (C) a small spur gear pump
- (D) gravity feed provided by component "A"

If choice A is selected set score to 1.

20. (1.4.11.1-2) Gland sealing steam is used during steam turbine operation to prevent the loss of _____.

- (A) air
- (B) vacuum
- (C) temperature
- (D) oil

If choice B is selected set score to 1.

21. For a diesel engine, approximately how long can an electric starter motor be operated continuously before damage may begin to occur due to overheating?

- (A) Not more than 30 seconds
- (B) Not more than 60 seconds
- (C) Not more than 90 seconds
- (D) Overheating the motor cannot occur.

If choice A is selected set score to 1.

22. The jacking gear must be engaged as quickly as possible when securing the main turbines in order to _____.

- (A) prevent uneven cooling of the turbine rotors
- (B) maintain a constant supply of lube oil to the main unit
- (C) prevent the stern tube bearing from overheating
- (D) permit rapid cooling of the reduction gears

If choice A is selected set score to 1.

23. In a cross-compounded turbine propulsion plant, steam enters the _____.

- (A) high-pressure unit and then cross-flows to the condenser
- (B) high and low-pressure units simultaneously
- (C) high-pressure unit and then flows through a crossover to the low-pressure unit
- (D) high-pressure, intermediate and low-pressure units simultaneously

If choice C is selected set score to 1.

24. What type of gland seal packing arrangement is shown in the illustrated turbine shaft gland?
Illustration SE-0006

- (A) Straight-through carbon packing.
- (B) Stepped labyrinth packing.
- (C) Straight-through labyrinth packing.
- (D) Stepped carbon packing.

If choice B is selected set score to 1.

25. Clean low-pressure steam drains are collected in the _____.

- (A) deaerating feed water heater
- (B) contaminated drain inspection tank
- (C) atmospheric drain tank
- (D) main condenser hot well

If choice C is selected set score to 1.

26. During high-speed operation of the main turbine propulsion unit, the heat absorbed by the lubricating oil is removed by the _____.

- (A) distillate cooler
- (B) lube oil purifier
- (C) sump vents
- (D) lube oil cooler

If choice D is selected set score to 1.

27. The process of supplying a diesel engine cylinder with air at a pressure greater than atmospheric is called _____.

- (A) engine displacement
- (B) super-aspirating
- (C) air injection
- (D) supercharging

If choice D is selected set score to 1.

28. The main feed check valve functions to _____.

- (A) reduce feed pump discharge pressure loading
- (B) prevent backflow of water from the boiler in the event of a feed pump failure
- (C) check pressure pulsations in the feed line
- (D) provide feed pump positive discharge head

If choice B is selected set score to 1.

29. Concerning the classification of steam turbines, a cross compound designed unit _____.

- (A) consists of reaction stages and a dummy piston
- (B) consists of a high-pressure turbine, crossover pipe, and low-pressure turbine
- (C) is made up of a varied assortment of impulse and reaction staging
- (D) consists of one Curtis stage and reaction blading

If choice B is selected set score to 1.

30. The DC heater automatic level dump valve is used to _____.

- (A) drain excess feed water to the distilled water tank
- (B) divert the flow of condensate from the first stage heater to the vent condenser
- (C) recirculate condensate to the atmospheric drain tank
- (D) maintain a proper condensate level in the condenser hot well

If choice A is selected set score to 1.

31. Which of the following desalination plants will always require a sterilizer when providing water to a potable water system?

- (A) Submerged tube type unit
- (B) Titanium plate type unit
- (C) Reverse osmosis type unit
- (D) Multi-stage flash type unit

If choice C is selected set score to 1.

32. What is the function of the after coolers installed in the diesel engine air intake system?

- (A) Decrease the air density
- (B) Increase the exhaust temperature
- (C) Decrease the lube oil temperature
- (D) Increase the air density

If choice D is selected set score to 1.

33. The bearing shown in the illustration is designed to carry thrust when applied _____.
Illustration MO-0001

- (A) left to right only
- (B) right to left only
- (C) in either direction
- (D) the bearing pictured is not designed to carry thrust

If choice B is selected set score to 1.

34. What is the primary purpose of self-aligning spherically-seated line shaft bearings?

- (A) To compensate for torsional twisting of the shaft in response to torque variations.
- (B) To compensate for variations in propeller thrust loading in response to load changes.
- (C) To compensate for flexing of the hull in response to different loading conditions.
- (D) To compensate for propeller induced vibrations as a result of propeller irregularities.

If choice C is selected set score to 1.

35. On a diesel engine working on the four-stroke operating cycle, what engine feature ensures proper scavenging?

- (A) Both the intake and exhaust valves are closed during the transition from the exhaust stroke to the intake stroke at top dead center.
- (B) Both the intake and exhaust valves are open during the transition from the exhaust stroke to the intake stroke at top dead center.
- (C) Both the intake and exhaust valves are closed during the transition from the exhaust stroke to the intake stroke at bottom dead center.
- (D) Both the intake and exhaust valves are open during the transition from the exhaust stroke to the intake stroke at bottom dead center.

If choice B is selected set score to 1.

36. Which of the bearings listed below is most widely used for the main and connecting rod bearings of a modern high-speed diesel engine?

- (A) Poured Babbitt, self-aligning
- (B) Precision insert
- (C) Steel-lined
- (D) Split roller

If choice B is selected set score to 1.

37. One of the factors limiting the amount of load which can be put on a modern marine diesel engine is the _____.

- (A) governor sensitivity
- (B) exhaust temperature
- (C) fuel injection pressure
- (D) speed of the camshaft

If choice B is selected set score to 1.

38. The diaphragm orifice labeled "H", as shown in the illustration is used as a/an _____.
Illustration GS-0155

- (A) check valve
- (B) pressure reducer
- (C) time delay
- (D) injector

If choice C is selected set score to 1.

39. (1.3.7.1-1) The lube oil strainer shown in the illustration is used on the reduction gear of a mid-size diesel engine. The strainer elements consist of _____. Illustration MO-0057

- (A) fibrous braid
- (B) wire mesh
- (C) pleated paper
- (D) metal disks

If choice D is selected set score to 1.

40. (1.4.14.4-3) To stop the rotor of a main turbine while underway at sea you should _____.

- (A) tighten the stern tube packing gland
- (B) secure all steam to the turbine
- (C) apply the pronny brake
- (D) admit astern steam to the turbine after securing the ahead steam

If choice D is selected set score to 1.

41. (1.4.4.3-6) While raising steam on a cold boiler, the air cock is to be closed after _____.

- (A) the economizer drain is closed
- (B) steam has formed and all air is vented
- (C) all burners have been lit and firing normally
- (D) the boiler is cut in on the line

If choice B is selected set score to 1.

42. (1.3.1.2-1) Which of the following devices will increase the power output of a diesel engine without increasing its frictional load?

- (A) Positive displacement blower
- (B) Roots-type rotary blower
- (C) Gear-driven centrifugal blower
- (D) Turbine-driven centrifugal blower

If choice D is selected set score to 1.

43. Starting air check valves are held firmly on their seats by _____.

- (A) cam rollers on the camshaft
- (B) spring force
- (C) air pressure on top of the valve differential piston
- (D) air pressure on the bottom of the valve differential piston

If choice B is selected set score to 1.

44. In the event of a failure of the pneumatic control system, a multi-element feed water regulator is designed to operate as a _____.

- (A) constant-volume feed water regulator
- (B) manually controlled feed water regulator
- (C) constant-pressure regulator
- (D) thermo-hydraulic feed water regulator

If choice B is selected set score to 1.

45. Under normal conditions, the rate of heat transfer in a feed water heater is most greatly affected by the _____.

- (A) speed of the main feed pump
- (B) density of the feed water
- (C) temperature differential between the steam and feed water
- (D) pH of the feed water

If choice C is selected set score to 1.

46. Hydraulically, servo-operated, automatic, change over valves, utilized in a two ram hydraulic steering gear, serve to _____.

- (A) prevent either main pump from being hydraulically motored when idle by cross pressure flow
- (B) prevent both units from operating simultaneously which could result in doubling the flow of oil and pressure leading to over pressurization of the system
- (C) allow an alternate main pump to start in the fully loaded condition thus developing immediate full torque
- (D) all of the above

If choice A is selected set score to 1.

47. The proper location for journal bearing oil grooves is _____.

- (A) halfway between bottom and where shells meet
- (B) at the bottom of the bearing
- (C) as a side relief where the two shells meet
- (D) in the region of the load bearing surface

If choice C is selected set score to 1.

48. Which of the following statements is correct relative to distillation plant operation?

- (A) Distillation is the process of boiling sea water to produce vapor which is condensed into fresh water.
- (B) Evaporation is the second part of the distillation process where brine is removed.
- (C) Distillate is the product resulting from the evaporation of fresh water vapor.
- (D) Brine is the result of condensed sea water vapor.

If choice A is selected set score to 1.

49. What would be the primary indication that a heavy fuel oil purifier supply pump suction strainer needed cleaning?

- (A) An increase in fuel oil supply temperature to the bowl.
- (B) An increased pressure drop across the strainer (more differential).
- (C) A decreased pressure drop across the strainer (less differential).
- (D) A drop in purifier bowl speed.

If choice B is selected set score to 1.

50. Which of the following statements concerning fire-tube boilers is correct?

- (A) Combustion gases flow through the tubes.
- (B) Flames impinge on the tubes.
- (C) Combustion occurs in the tubes.
- (D) Water flows through the tubes.

If choice A is selected set score to 1.

51. In addition to achieving a speed reduction for efficient propeller operation, what statement represents other possible functional purposes for reduction gears?

- (A) Reduction gears can be used for engine rotation reversal and reduction gears can be used for multiple propeller shaft outputs.
- (B) Reduction gears can be used for propeller thrust reversal and reduction gears can be used for multiple prime mover inputs.
- (C) Reduction gears can be used for propeller thrust reversal and reduction gears can be used for multiple propeller shaft outputs.
- (D) Reduction gears can be used for engine rotation reversal and reduction gears can be used for multiple prime mover inputs.

If choice B is selected set score to 1.

52. The purpose of try-cocks used on an auxiliary boiler is to _____.

- (A) provide an alternate means of determining the water level, if the gage glass fails
- (B) provide a means of adding chemical feed to the boiler water
- (C) provide a means for blowing down the gage glass
- (D) act as a steam sentinel valve, if any of the fusible plugs should melt

If choice A is selected set score to 1.

53. Auxiliary diesel engine electric starting motors use _____.

- (A) low amperage, high voltage AC power
- (B) alternating current transformers
- (C) 400 cycle per second motor-generator power
- (D) battery power direct current

If choice D is selected set score to 1.

54. Water is best removed from lubricating oil by _____.

- (A) centrifuging
- (B) pressure filters
- (C) silica gel cartridges
- (D) paper edge filters

If choice A is selected set score to 1.

55. A naturally aspirated diesel engine at full throttle will have an intake manifold pressure _____.

- (A) slightly less than atmospheric pressure
- (B) approximately equal to exhaust manifold pressure at all times
- (C) that is widely fluctuating
- (D) constantly decreasing as engine load increases

If choice A is selected set score to 1.

56. When an air started, four-stroke cycle diesel engine is being cranked over; the starting air is admitted to each cylinder during the beginning of its _____.

- (A) intake stroke
- (B) compression stroke
- (C) power stroke
- (D) exhaust stroke

If choice C is selected set score to 1.

57. Fuel injection systems are designed to primarily meter fuel, atomize fuel, and _____.

- (A) create turbulence in the combustion chamber
- (B) aid in completing cylinder scavenging
- (C) inject fuel at the proper time
- (D) minimize fuel penetration into the cylinder

If choice C is selected set score to 1.

58. In a two-stage flash evaporator, the sea water feed temperature is increased as it passes through the _____.

- (A) second-stage distilling condenser
- (B) salt water feed heater
- (C) first-stage distilling condenser
- (D) all of the above

If choice D is selected set score to 1.

59. According to the illustrated diagram, what is the correct sequential order of heat exchangers that the main condensate pump pumps condensate through? Illustration SG-0010

- (A) Main air ejector condenser, deaerating feed tank, first stage feed heater, gland exhaust condenser.
- (B) Main air ejector condenser, gland exhaust condenser, first stage feed heater, deaerating feed tank.
- (C) Main air ejector condenser, first stage feed heater, gland exhaust condenser, and deaerating feed tank.
- (D) Main air ejector condenser, deaerating feed tank, gland exhaust condenser, first stage feed heater.

If choice B is selected set score to 1.

60. Lubrication for the main reduction gears used with diesel engines is usually supplied by _____.

- (A) oil from the main engine sump
- (B) the stern bearing head tank
- (C) the stern bearing sump tank
- (D) an independent lube oil system

If choice D is selected set score to 1.

- 61.** A two-stroke cycle diesel engine requires less starting air than a four-stroke cycle diesel engine, of equal displacement, because the two-stroke cycle diesel engine _____.
- (A) has little or no internal friction
 - (B) has a lower effective compression ratio
 - (C) operates with scavenge air under a positive pressure
 - (D) operates without energy absorbing intake and exhaust strokes

If choice D is selected set score to 1.

- 62.** Which of the devices listed is commonly used to compensate for the expansion and minor misalignments occurring between the main turbine rotor and the reduction gear?
- (A) Quill shaft
 - (B) Expansion gear
 - (C) Sliding sleeve
 - (D) Gear-type flexible coupling

If choice D is selected set score to 1.

- 63.** What type of clutch is used in the illustrated medium-speed diesel engine reduction gear? Illustration MO-0085
- (A) Pneumatic
 - (B) Mechanical
 - (C) Electromagnetic
 - (D) Hydraulic

If choice A is selected set score to 1.

- 64.** (1.6.5-3) The device shown in the illustration is a/an _____. Illustration GS-0116
- (A) mechanical shaft seal
 - (B) vane type steering gear
 - (C) diesel engine motor mount
 - (D) oil scraper ring stuffing box for a crosshead engine

If choice B is selected set score to 1.

- 65.** (1.4.4.3-3) After a boiler has been taken off the line and is cooling, the air cock is opened to _____.
- (A) purge all air from the steam drum
 - (B) prevent the formation of a vacuum within the boiler
 - (C) guard against entrapped gas pockets in the superheater
 - (D) allow even cooling of the steam drum

If choice B is selected set score to 1.

66. What is the normal destination of steam exiting a main feed pump drive turbine?

- (A) SSTG condensers via the auxiliary exhaust steam line.
- (B) Main condenser via the auxiliary exhaust steam line.
- (C) Deaerating feed tank via the main feed pump discharge line.
- (D) Deaerating feed tank via the auxiliary exhaust steam line.

If choice D is selected set score to 1.

67. (1.3.10.2-4) As shown in the illustration, the function of component "1" is to _____. Illustration MO-0128

- (A) condense excess steam produced in the boiler
- (B) evaporate circulating boiler water into saturated steam
- (C) maintain a water level in the steam drum
- (D) generate superheated steam to operate the turbo-generator

If choice B is selected set score to 1.

68. (1.3.3.1-7) The load is always placed on the lower half of the main bearings in a _____.

- (A) two-stroke cycle engine
- (B) four-stroke cycle engine
- (C) reverse cycle engine
- (D) double acting engine

If choice A is selected set score to 1.

69. (1.3.7.3-1) The purpose of an oil mist detector in a main propulsion diesel engine is to warn of _____.

- (A) a possible overheated bearing
- (B) excessive carbon buildup in the lube oil
- (C) low cylinder oil pressure
- (D) excessively high crankcase vacuum

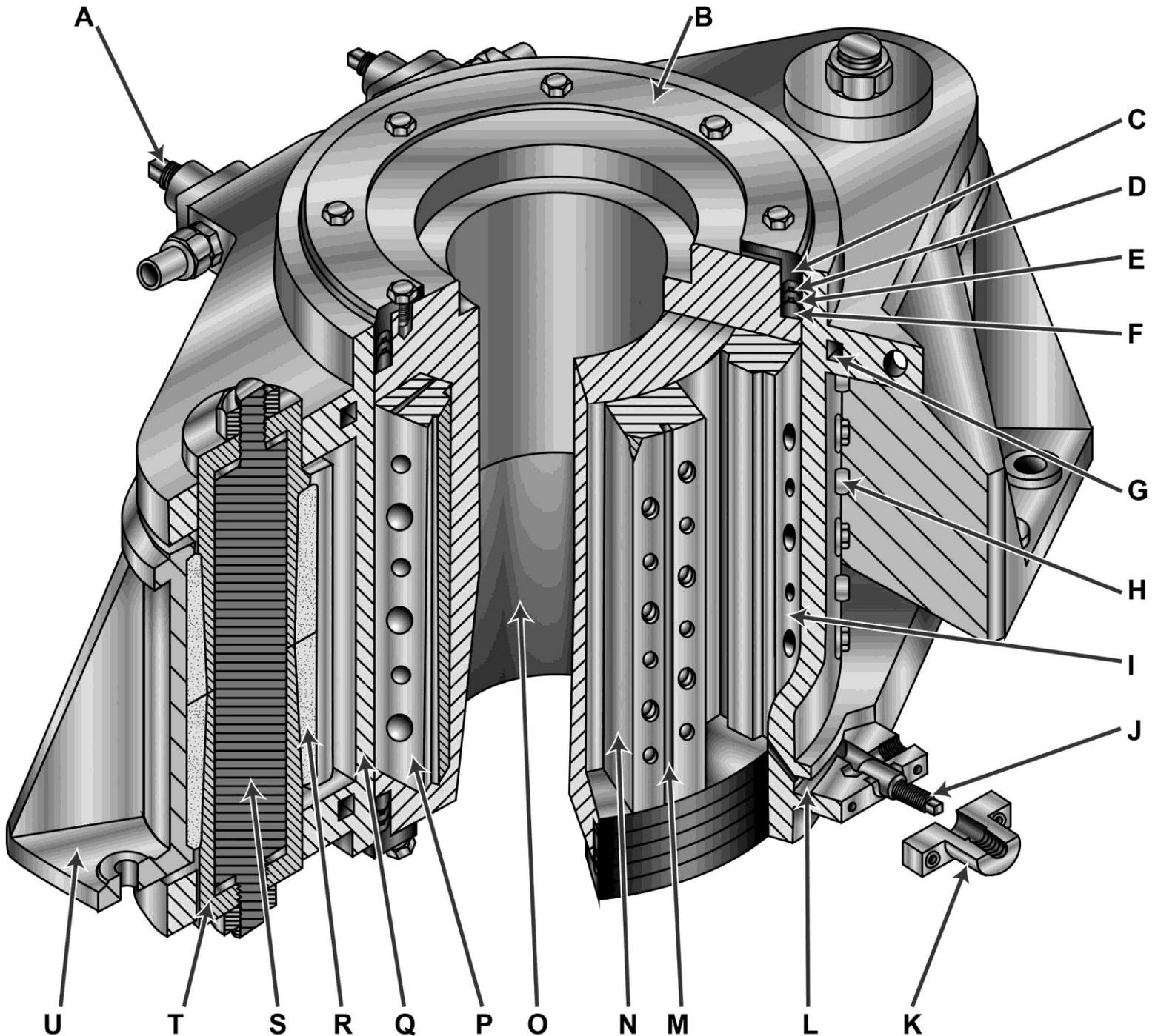
If choice A is selected set score to 1.

70. (1.3.3.1-6) The highest pressure in a diesel engine cylinder normally occurs _____.

- (A) at TDC
- (B) before TDC
- (C) after TDC
- (D) during air starting

If choice C is selected set score to 1.

GS-0116

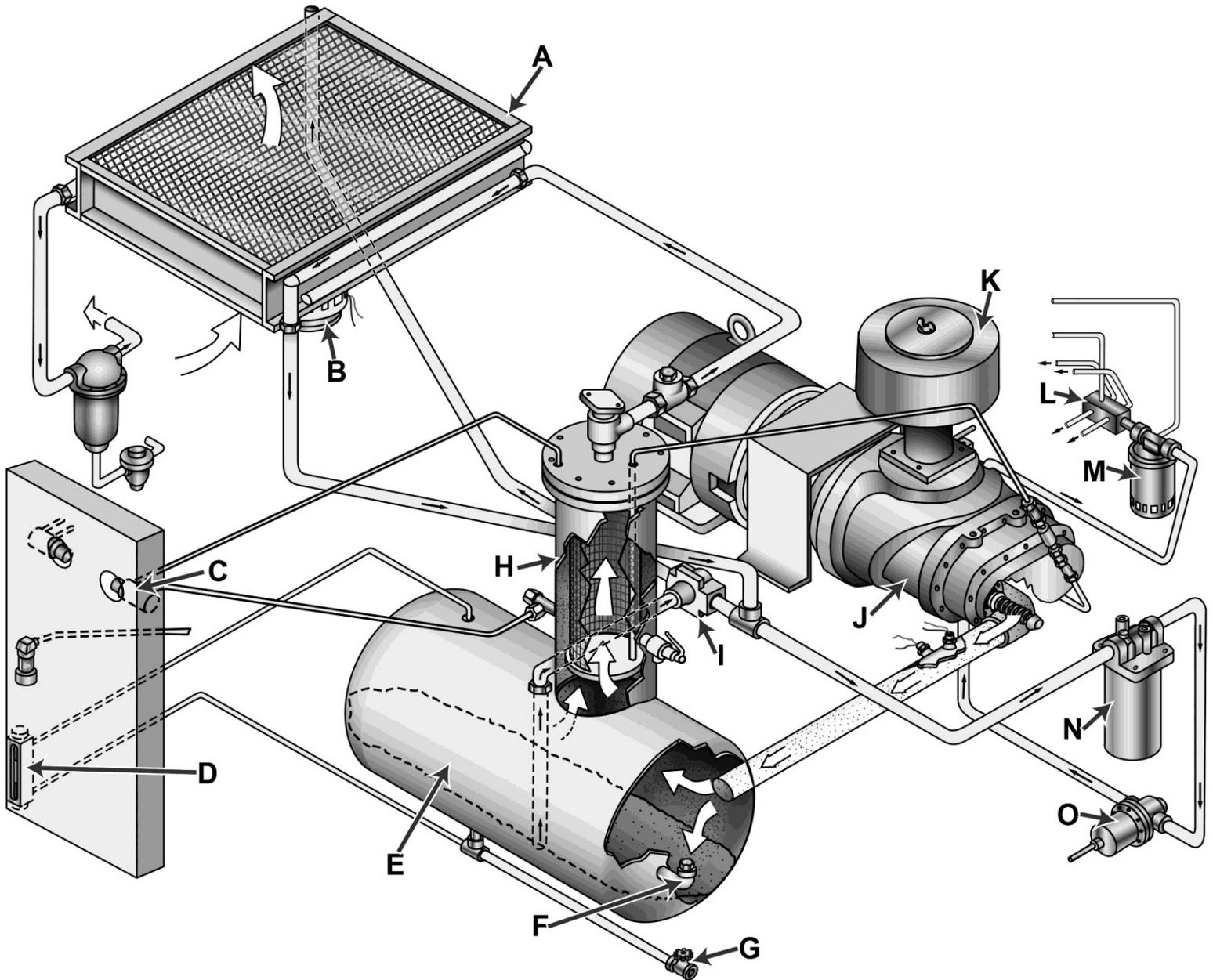


Adapted for testing purposes only from HUNT, Modern Marine Engineer's Manual, Volume II

Copyright © 2002 by Cornell Maritime Press, Inc.

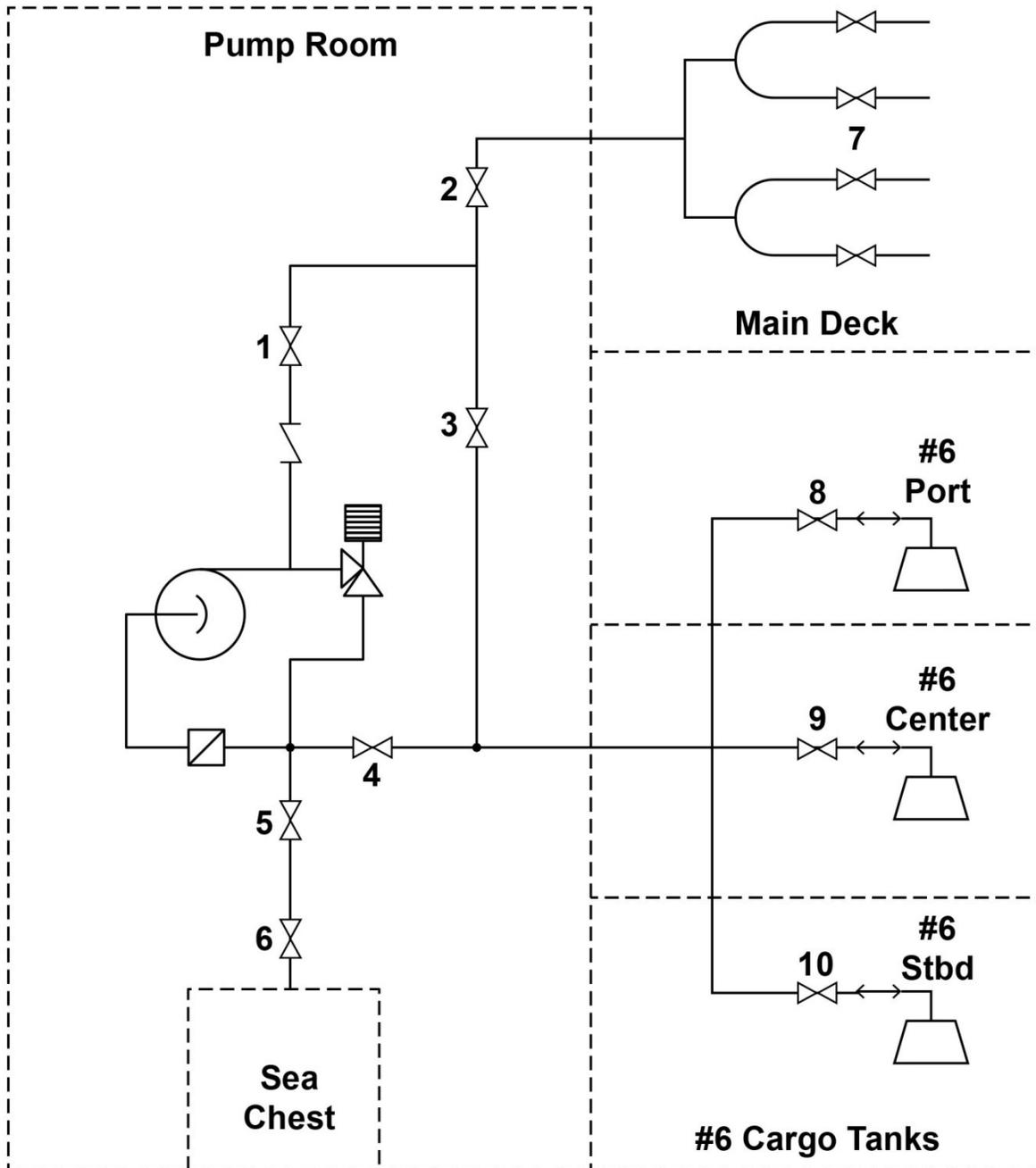
Further reproduction prohibited without permission

GS-0119



Adapted for testing purposes only Sullair® Compressor Series 16 60 & 75
Standard & 24KT Industrial Rotary Screw Air Compressors, Operators Manual and Parts List
Copyright © by Sullair Corporation

GS-0139

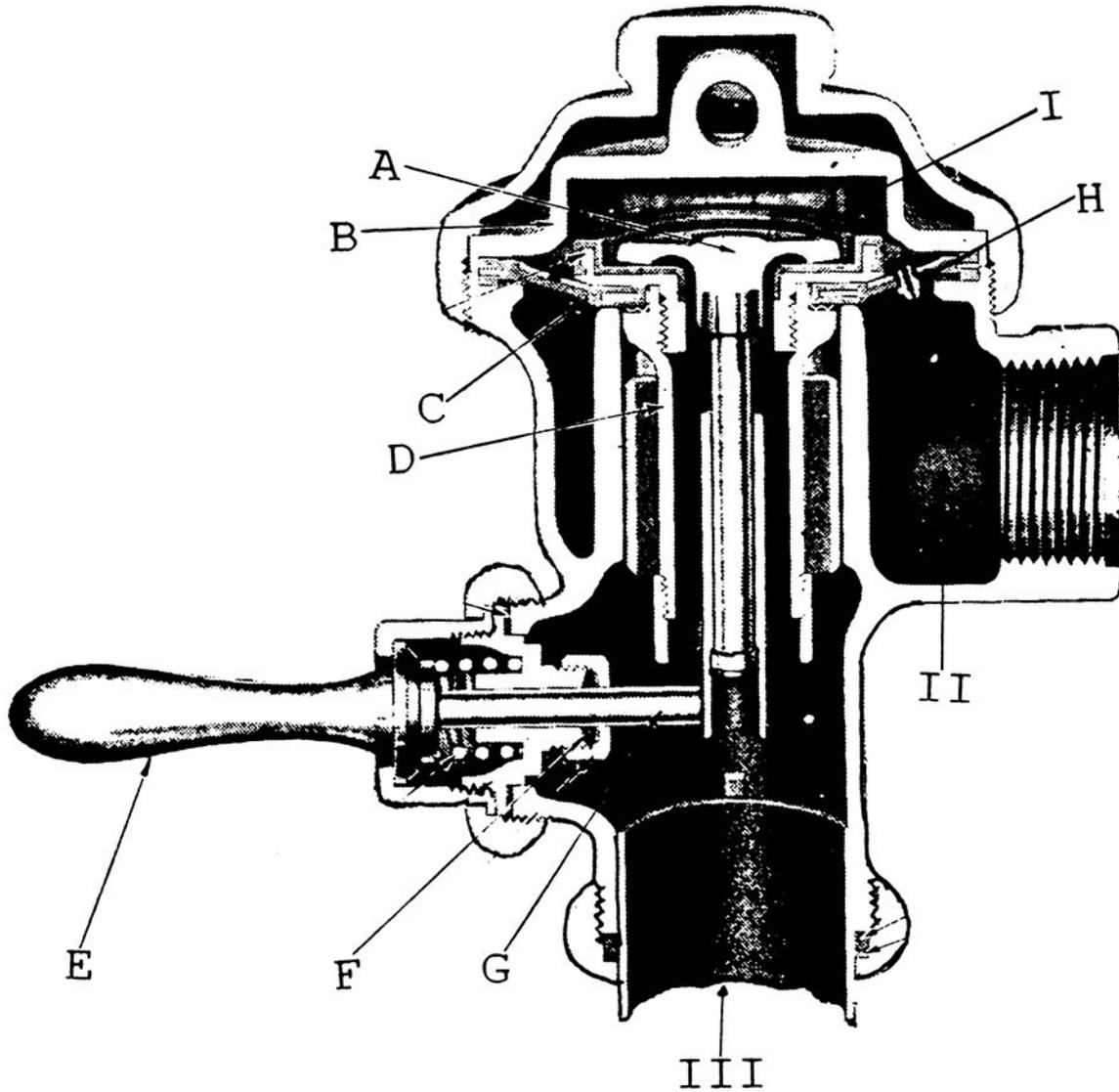


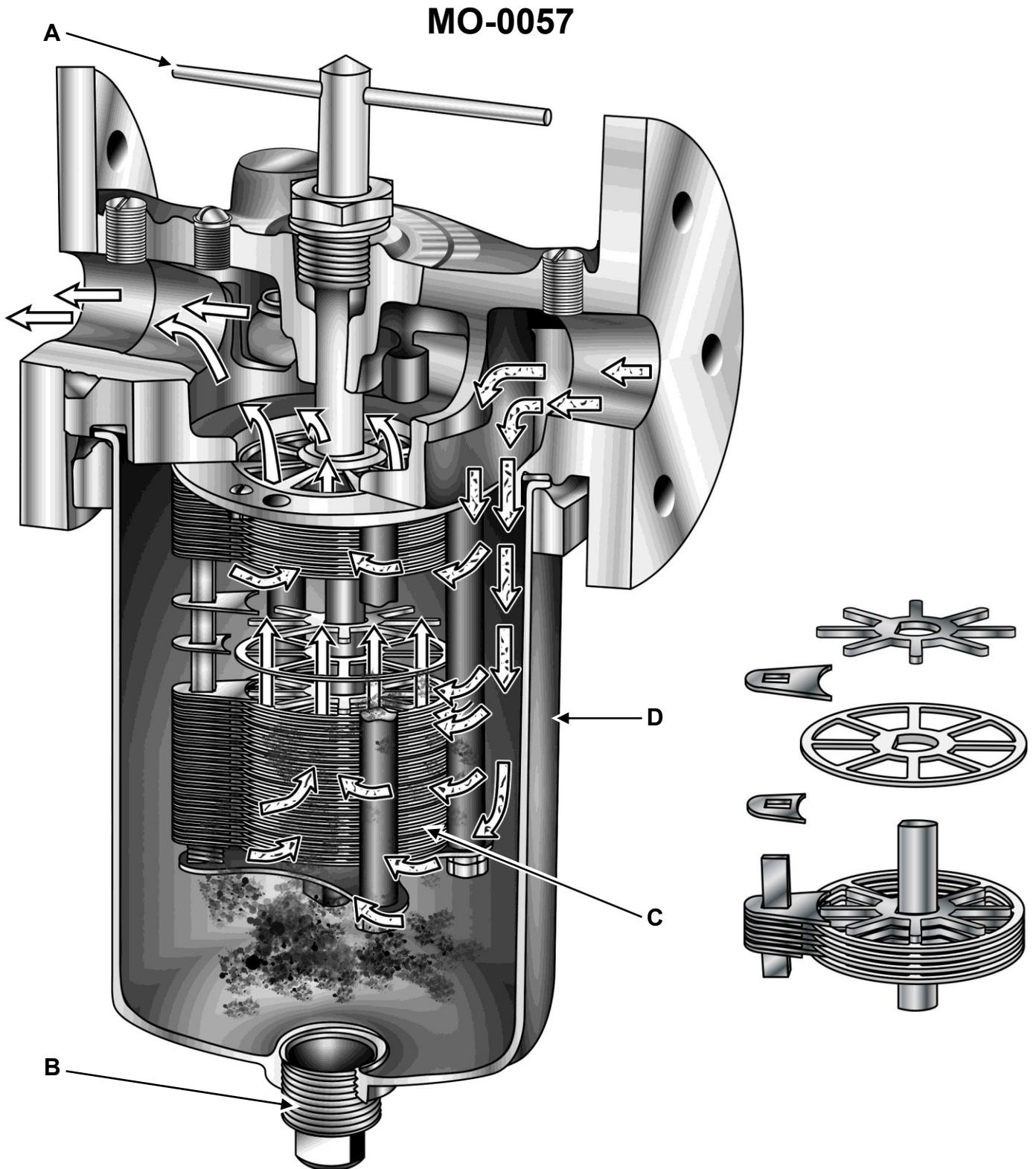
Adapted for testing purposes only from HUBER, Tanker Operations, Fourth Edition

Copyright © 2001 by Cornell Maritime Press

Further reproduction prohibited without permission

GS-0155



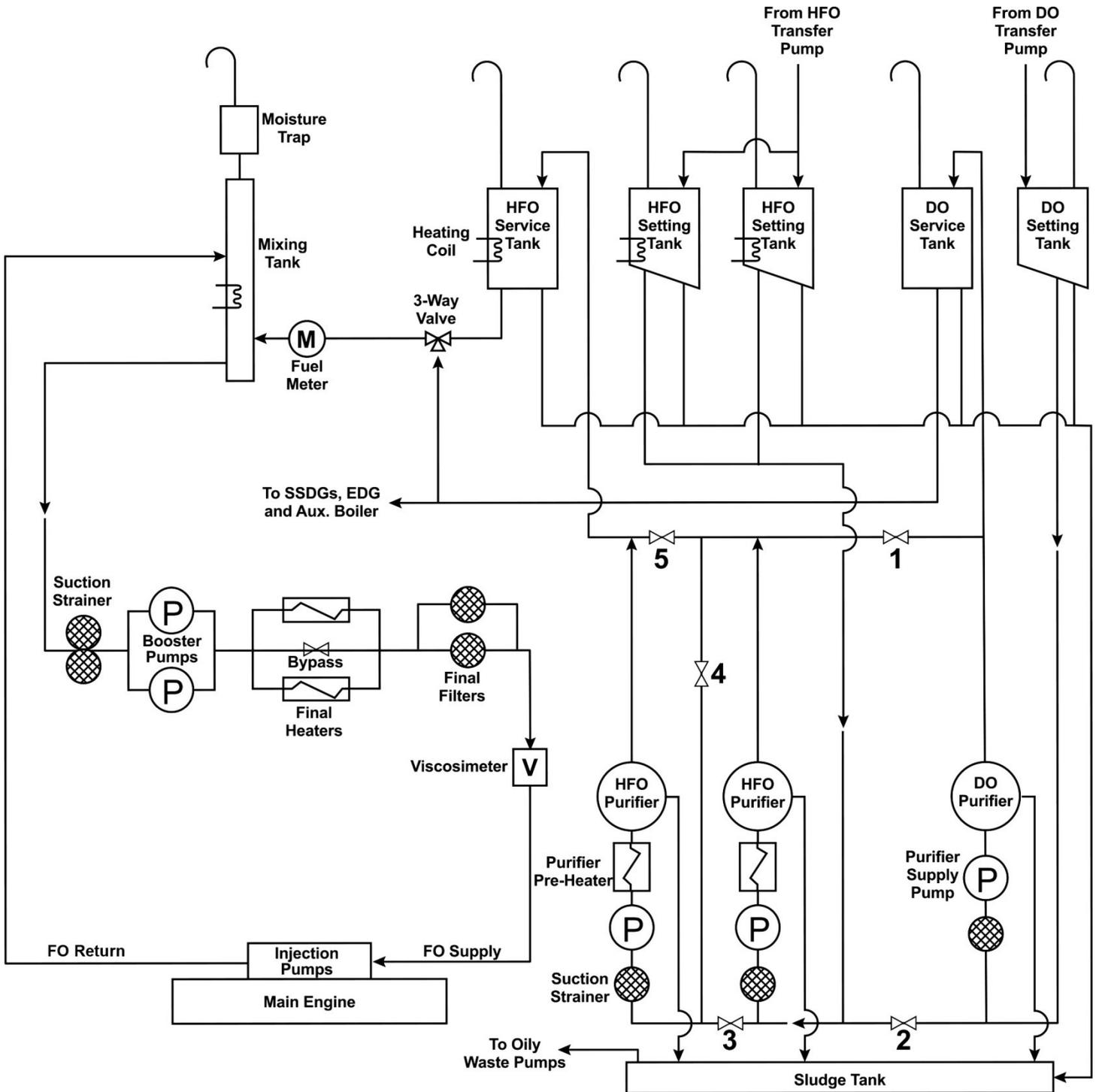


Adapted for testing purposes only from GUNTHER, Lubrication.

Copyright © 1971 by Raymond C. Gunther.

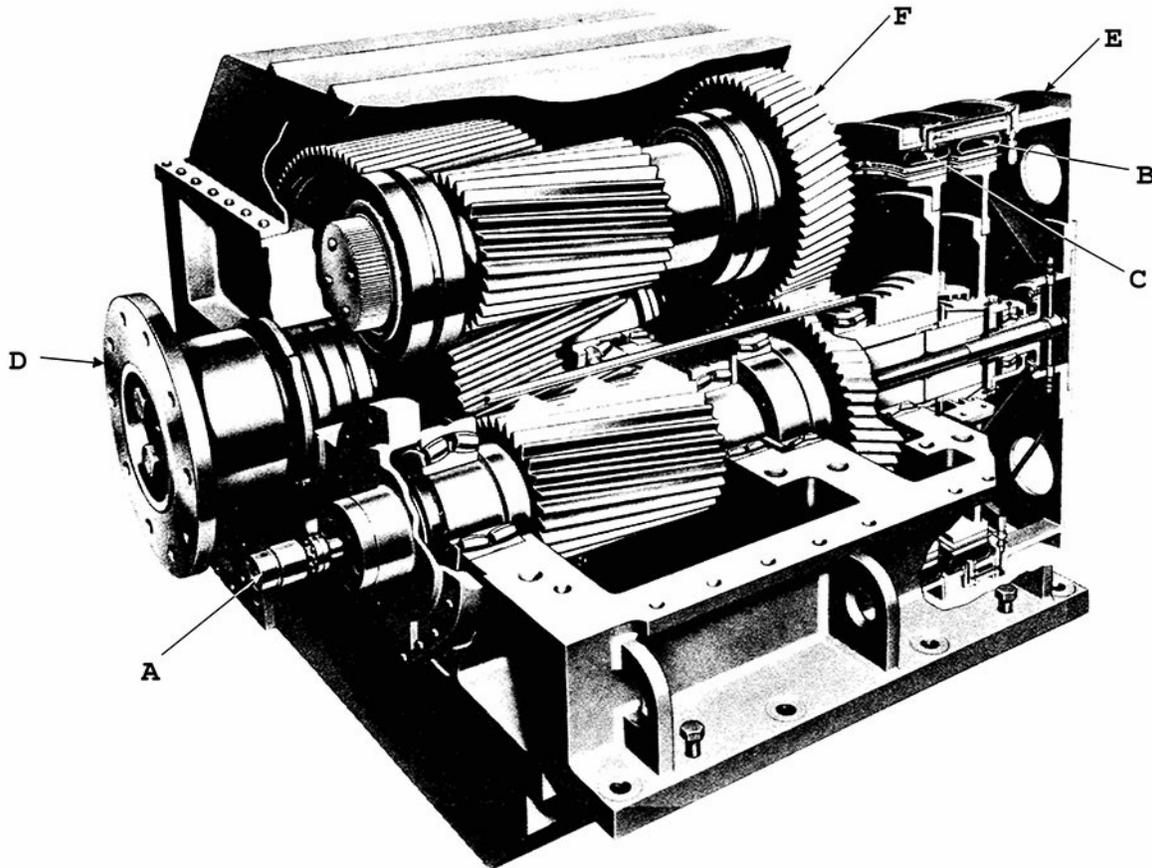
Further reproduction prohibited without permission.

MO-0058



Adapted for testing purposes only from HARRINGTON, Marine Engineering. Copyright © 1992 by The Society of Naval Architects and Marine Engineers. Further reproduction prohibited without permission.

MO-0085

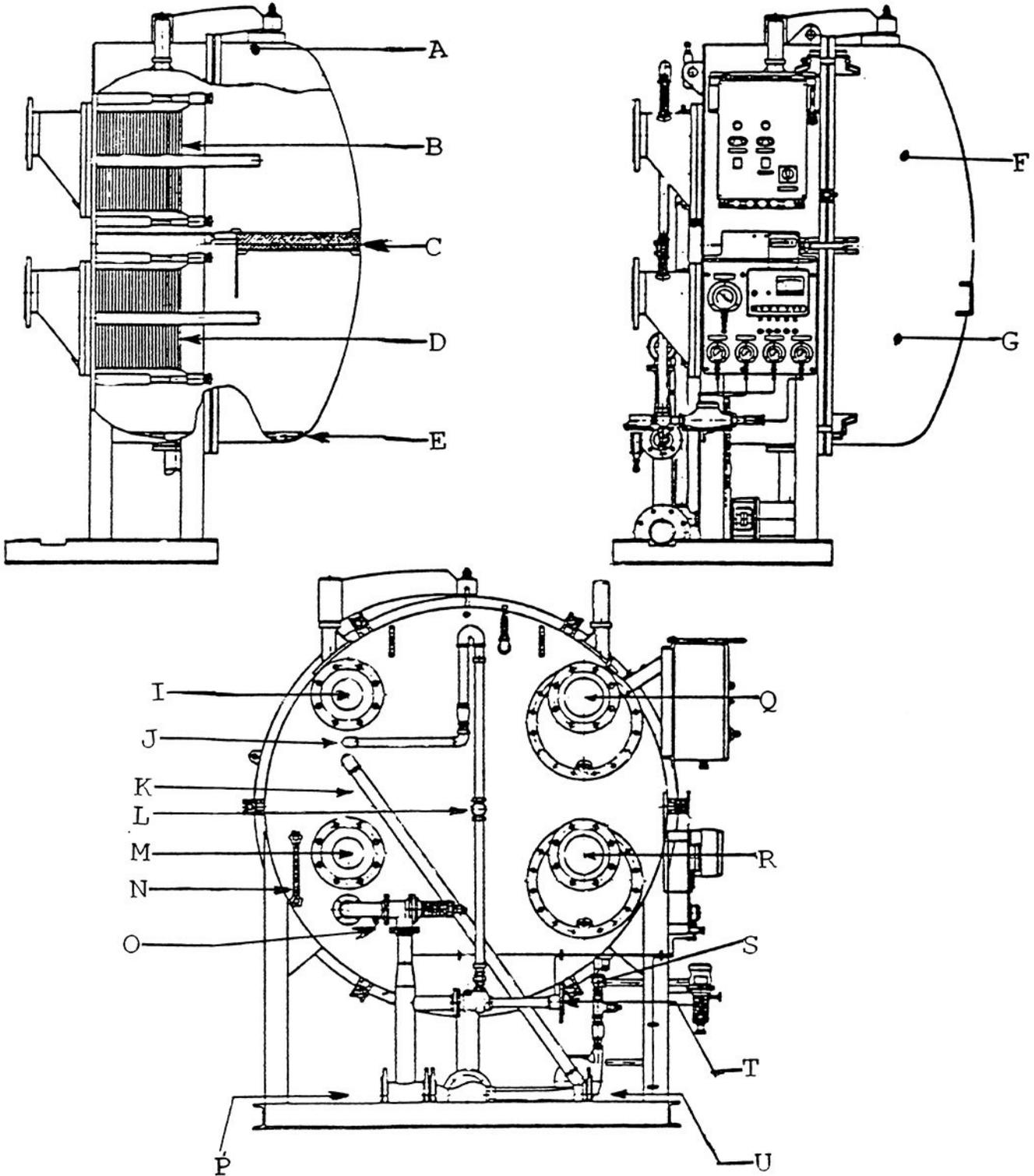


Adapted for testing purposes only from Falk Marine Reduction Drives,
Installation, Operation and Maintenance Manual

Copyright © Falk

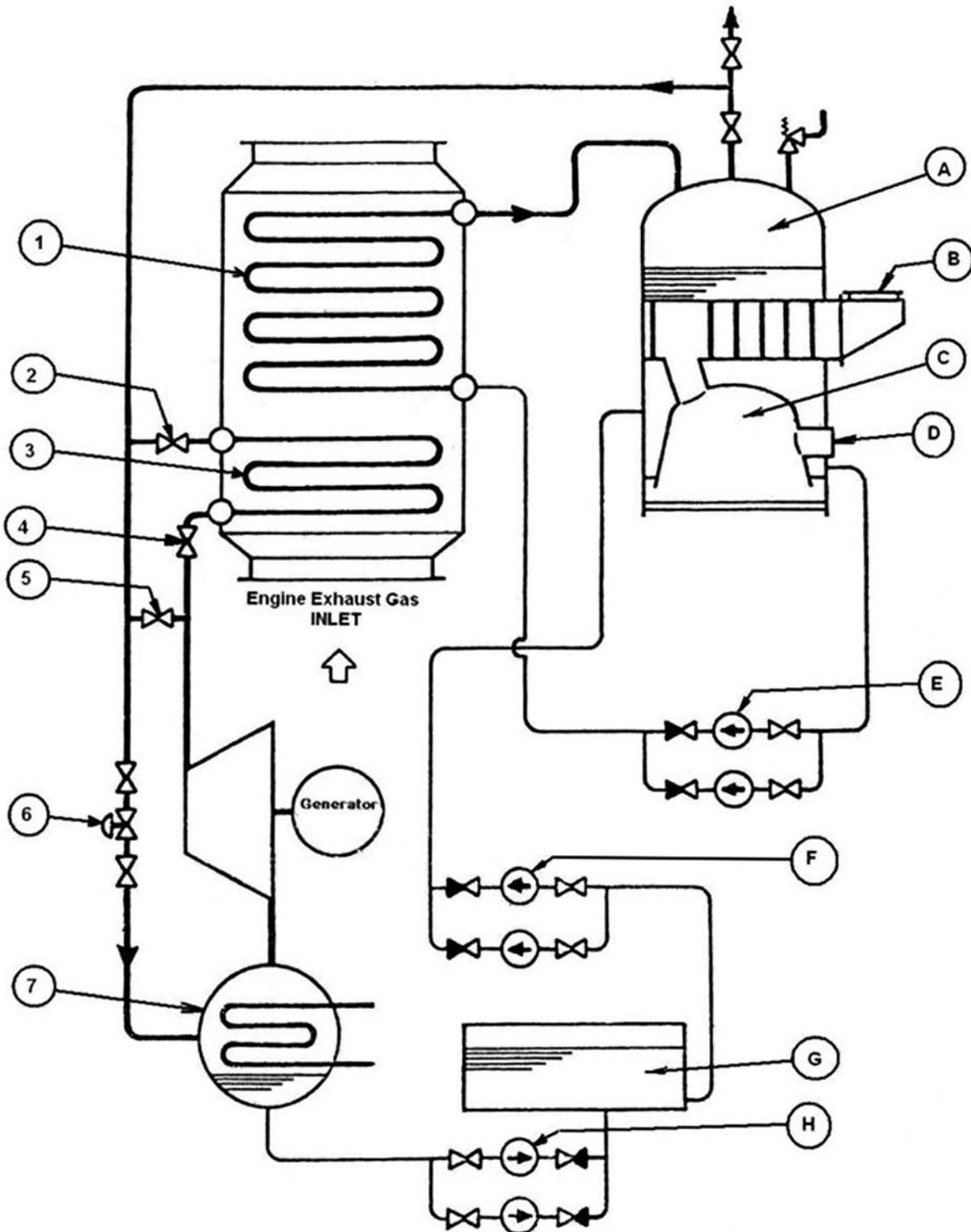
Further reproduction prohibited without permission.

MO-0110



Adapted for testing purposes only
Further reproduction prohibited without permission.

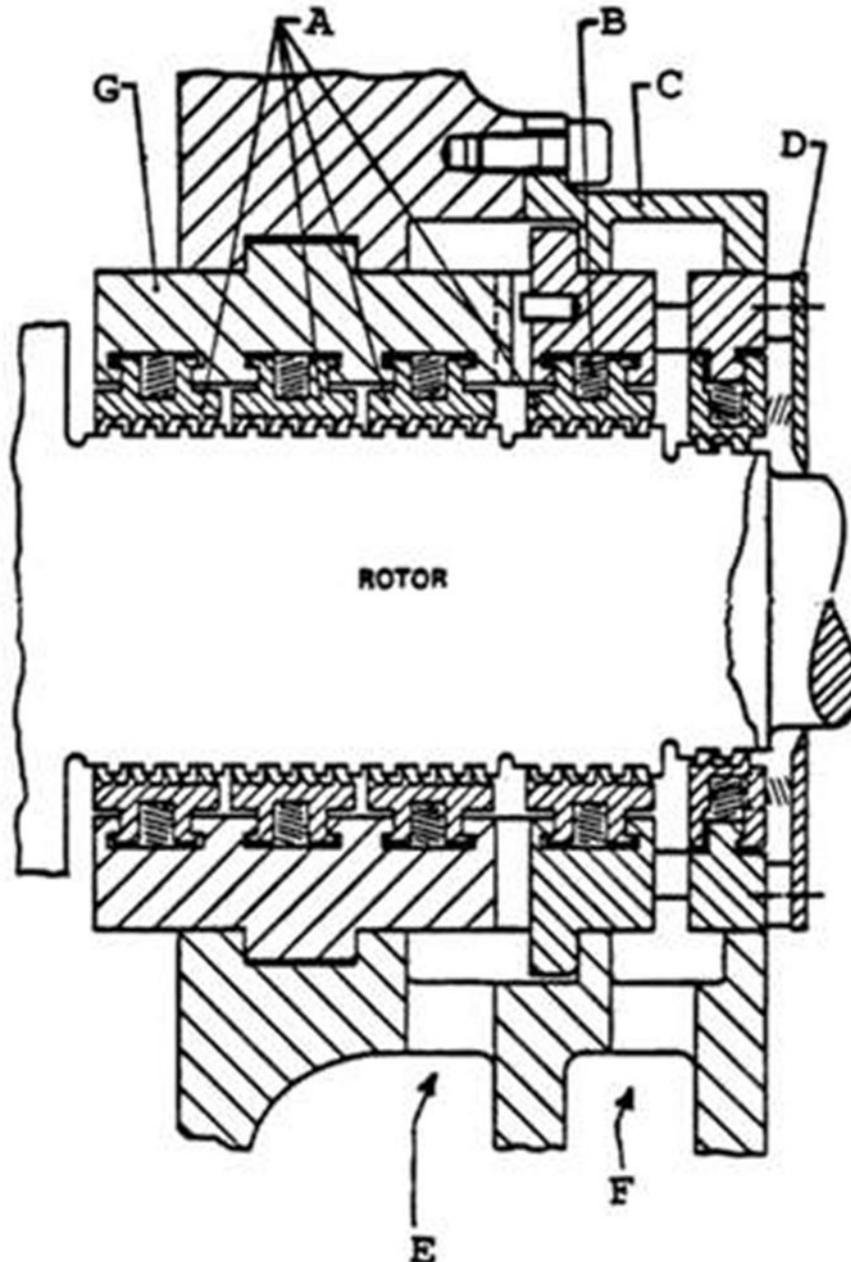
MO-0128



Adapted for testing purposes only

Further reproduction prohibited without permission.

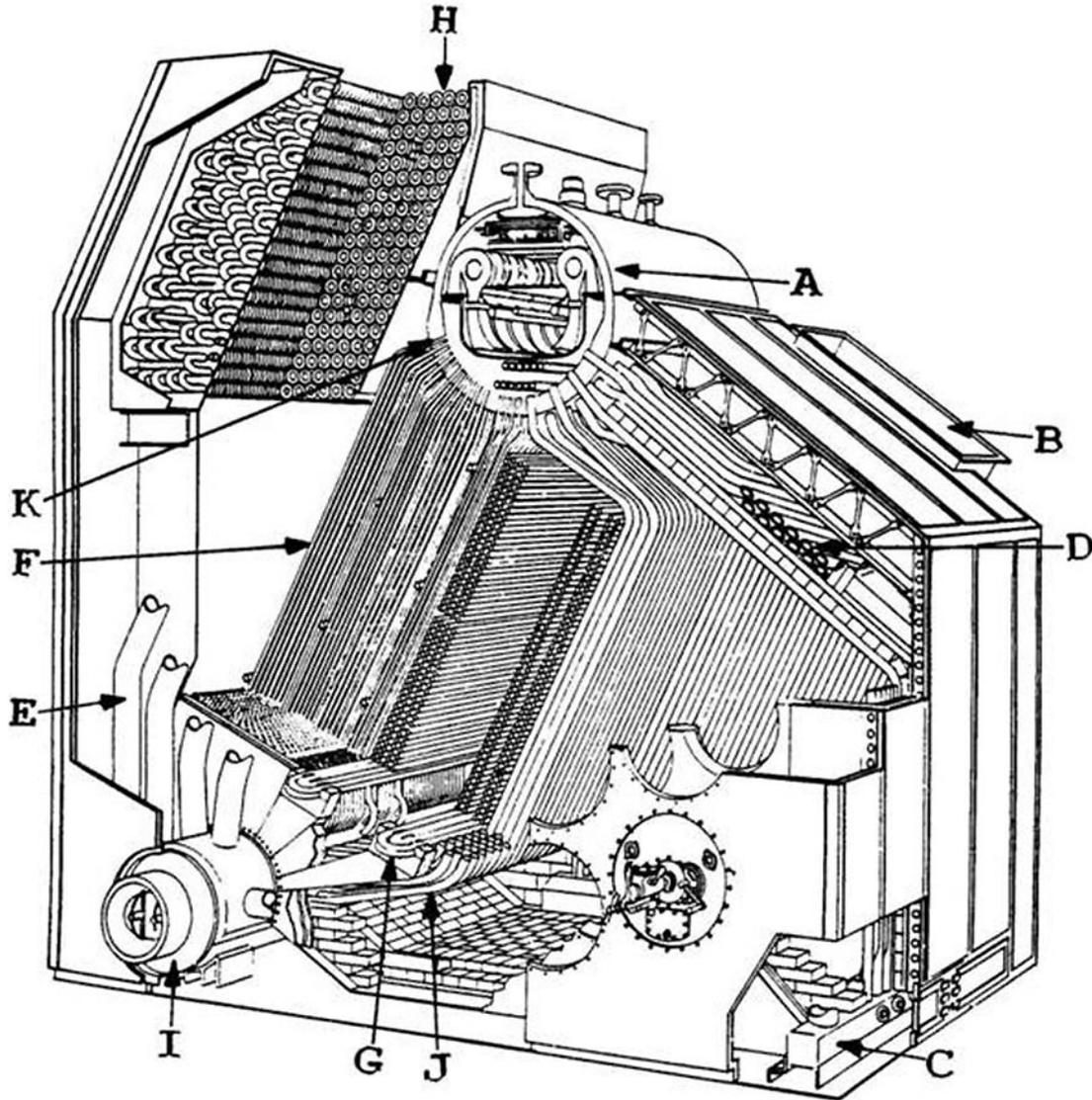
SE-0006



Adapted for testing purposes only from HARRINGTON, Marine Engineering
Copyright © 1992 by the Society of Naval Architects and Marine Engineers

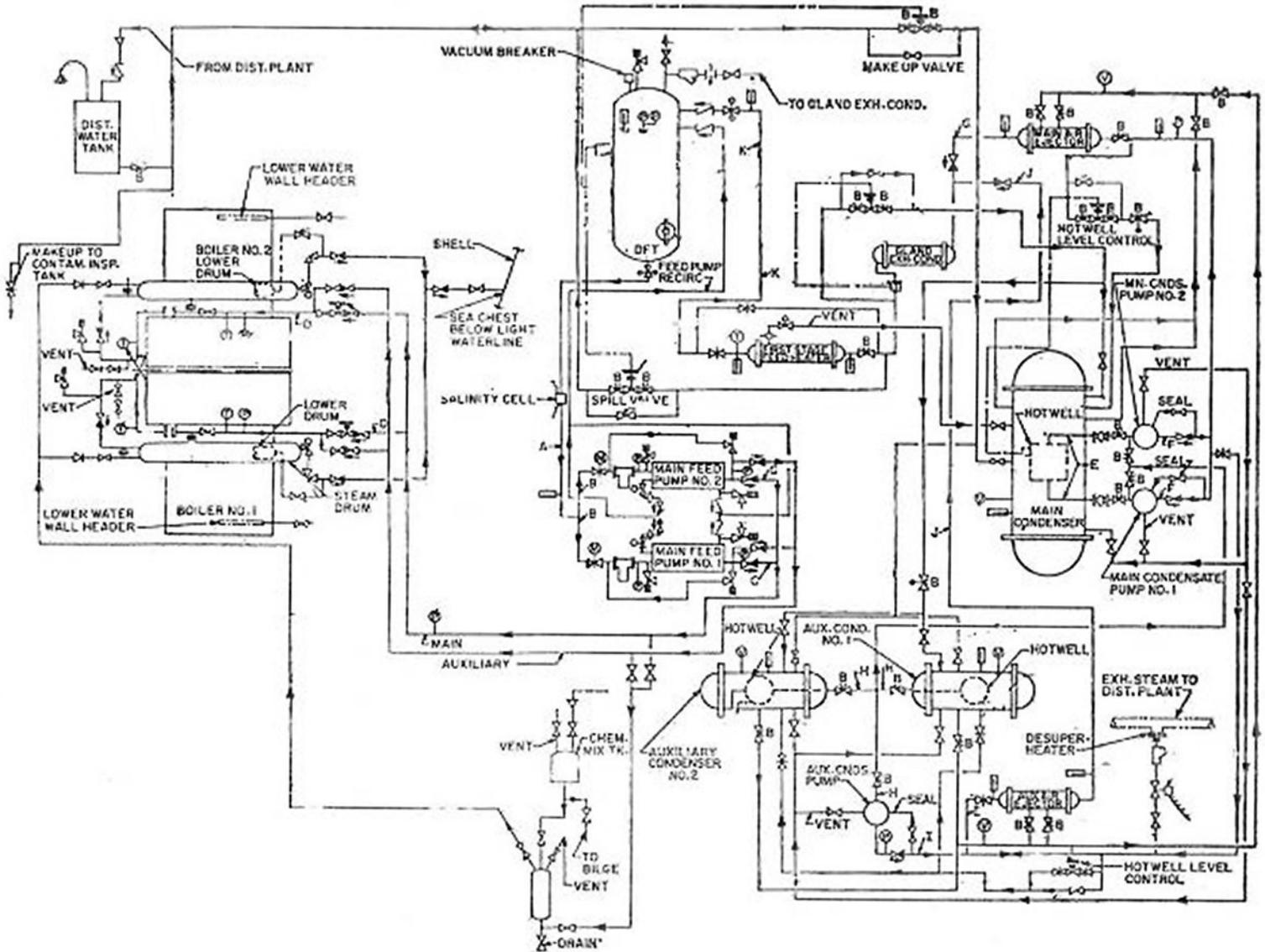
Further reproduction prohibited without permission

SG-0008



Adapted for testing purposes only from Principles of Naval Engineering
NAVPERS 10788-B

SG-0010



Adapted for testing purposes only from HARRINGTON, Marine Engineering
Copyright © 1992 by the Society of Naval Architects and Marine Engineers