

U.S.C.G. Merchant Marine Exam

Third Assistant Engineer

Q531 Motor Plants I

(Sample Examination)

Choose the best answer to the following Multiple-Choice Questions:

1. The average pressure exerted on a piston during each power stroke is termed _____.
- A. indicated horsepower
 - B. mean effective pressure
 - C. exhaust back pressure
 - D. compression pressure

Correct answer: B

2. Modern marine diesel engines equipped with mechanical fuel injection operate on a combustion cycle which is _____.
- A. entirely constant volume
 - B. entirely constant pressure
 - C. a combination of constant volume and constant pressure
 - D. a combination of constant temperature and constant pressure

Correct answer: C

3. The intake ports of a two-stroke cycle diesel engine are opened and closed by the action of the _____.
- A. camshaft
 - B. piston movement
 - C. exhaust valves
 - D. vertical drive

Correct answer: B

4. A four-stroke eight cylinder in-line medium-speed diesel engine has a firing order of 1-5-2-6-8-4-7-3. If No.4 piston is at TDC and firing, how many degrees of crankshaft rotation will occur when No.5 piston reaches TDC and fires?
- A. 120 degrees
 - B. 180 degrees
 - C. 240 degrees
 - D. 360 degrees

Correct answer: D

5. If the piston stroke in a four-stroke cycle diesel engine is 10 1/2 inches and the speed of rotation of the crankshaft is 720 RPM, what is the average piston speed?
- A. 1200 feet/minute
 - B. 1260 feet/minute
 - C. 1320 feet/minute
 - D. 1380 feet/minute

Correct answer: B

6. Which of the following conditions would NOT be considered a valid reason for the diesel engine to operate in the area indicated by letter "B" shown in the illustration? Illustration MO-0126
- A. Operating the vessel against high winds and current
 - B. Operating the vessel in shallow water
 - C. Operating with a fouled or damaged propeller
 - D. Operating with minimal hull drag and under light draft

Correct answer: D

7. An indicator card or pressure-volume diagram shows graphically the _____.
- A. compression ratio of the engine
 - B. volume of the engine
 - C. relationships between pressure and temperature during one stroke of the engine
 - D. relationships between pressure and volume during one cycle of the engine

Correct answer: D

8. Which of the indicator diagrams illustrated depicts the condition that should be corrected by retarding only the timing? Illustration MO-0029
- A. A
 - B. B
 - C. C
 - D. D

Correct answer: A

9. Heat for igniting the fuel oil in the cylinder of a diesel engine is generated by the _____.
- A. electronic ignition system
 - B. compression of air by the piston
 - C. friction in the fuel injector
 - D. fuel oil heating system

Correct answer: B

10. Air/Fuel ratio is defined as _____.
- A. the ratio of the volume of air present to the volume of fuel injected during each compression stroke of an internal combustion engine
 - B. the ratio of the volume of air present to the volume of fuel injected during each power stroke of an internal combustion engine
 - C. the ratio of the weight of air present to the weight of fuel injected during each compression stroke of an internal combustion engine
 - D. the ratio of the weight of air present to the weight of fuel injected during each power stroke of an internal combustion engine

Correct answer: D

11. On the cylinder indicator diagram illustrated, the maximum rise in pressure occurs during the period labeled as _____. Illustration MO-0033
- A. G
 - B. H
 - C. J
 - D. K

Correct answer: B

12. A characteristic of a bearing material which permits small dirt particles to become embedded in the bearing surface is _____.
- A. desirable, as it will minimize damage to the journal surface
 - B. desirable, as it will assist in keeping the lube oil filters clean
 - C. undesirable, since the embedded particles will score the journal
 - D. undesirable, since the particles will interfere with lube oil flow

Correct answer: A

13. Connecting rods in a diesel engine are used to connect the _____.
- A. crankshaft to the gear train
 - B. piston to the crankshaft
 - C. engine to the bed
 - D. rocker arm to the camshaft

Correct answer: B

14. In the diesel engine shown in the illustration, the space below the cylinder liner lower seals is subjected to _____. Illustration MO-0005
- A. lube oil pressure
 - B. crankcase pressure
 - C. scavenge air pressure
 - D. cooling water pressure

Correct answer: B

15. Barrel face, taper face, grooved, and chrome plated are all types of diesel engine _____.
- A. pistons
 - B. piston rings
 - C. piston skirts
 - D. cylinder liners

Correct answer: B

16. The use of push rods becomes necessary in a diesel engine when _____.
- A. the camshaft is located some distance below the valve gear
 - B. the rocker arms are pivoted near their centers
 - C. two or more valves must be opened and closed at the same time
 - D. hydraulic valve lash adjusters are used

Correct answer: A

17. What is the function of a diesel engine's stationary parts?
- A. To add power to the engine
 - B. To keep the engine firmly attached to its auxiliary pumps
 - C. To maintain the engine's moving parts in their proper relative positions
 - D. To rotate the crankshaft

Correct answer: C

18. Multiple concentric valve springs are often used with diesel engine valves to _____.
- A. enable research and development of cam contour to be simplified
 - B. operate the valve gear where a larger force is normally required, but space limitations restrict the use of a single large spring
 - C. allow for easier valve replacement
 - D. enable a total smaller valve spring force to keep the valve tight on its seat

Correct answer: B

19. The diesel engine shown in the illustration, the exhaust manifold is indicated by the letter _____ . Illustration MO-0003
- A. A
 - B. B
 - C. P
 - D. U

Correct answer: D

20. In the large slow-speed main propulsion diesel engine shown in the illustration, the part labeled "G" is the _____. Illustration MO-0003
- A. crankcase exhaust fan
 - B. lube oil pump
 - C. jacket water pump
 - D. fuel oil pump

Correct answer: D

21. In the diesel engine illustration provided, which of the given choices indicate rocker arm assemblies? Illustration MO-0122
- A. "B" and "Z"
 - B. "C" and "Z"
 - C. "C" and "Y"
 - D. "D" and "ZZ"

Correct answer: C

22. Which letter represents the top deck (valve) cover of the engine shown in the illustration? Illustration MO-0122
- A. "A"
 - B. "H"
 - C. "8"
 - D. None of the above are correct

Correct answer: A

23. Which of the following procedures should be carried out when a large, low-speed, diesel engine is operated with one cylinder secured?
- A. Lubrication to the defective cylinder should be increased.
 - B. Cooling water temperature to the engine should be increased.
 - C. Only the turbocharger speed should be reduced.
 - D. Engine speed should be reduced.

Correct answer: D

24. After a long period of operation, a wear ridge, caused by piston ring action, will develop near the top of the cylinder liner. This ridge must be removed during maintenance in order to prevent _____.
- A. Excessive ring wear during the seating period
 - B. Excessive lubrication of the top ring
 - C. Improper coating of lubrication on the cylinder wall
 - D. Breaking of the rings, ring lands, or both during piston removal

Correct answer: D

25. Which of the following statements would apply when checking the valve clearance of the unit shown in the illustration? Illustration MO-0074
- A. Tappet clearance is measured between points "A" and "B".
 - B. Cold valve clearance is measured between components "C" and "D".
 - C. The valve is mechanically adjusted at point "D".
 - D. The valve is mechanically adjusted at point "E".

Correct answer: B

26. Excessive side clearance between a piston ring and its groove will cause the ring to _____.
- A. Expand excessively under operating temperatures
 - B. Scuff the cylinder liner excessively
 - C. Hammer the piston land above the ring
 - D. Hammer the piston land below the ring

Correct answer: D

27. The vessel to which you are assigned is fitted with generator drive engines of the type shown in the illustration. In terms of operating cycle and cylinder configuration, what statement is true? Illustration MO-0163
- A. This is a two-stroke cycle, 90o V-type engine.
 - B. This is a four-stroke cycle, 60o V-type engine.
 - C. This is a four-stroke cycle, 90o V-type engine.
 - D. This is a two-stroke cycle, 60o V-type engine.

Correct answer: C

28. The vessel to which you are assigned is fitted with auxiliary engines as shown in the illustration. What statement is true concerning the valve guide and valve seat arrangements? Illustration MO-0163
- A. The valve guides and the valve seats are both replaceable inserts.
 - B. The valve guides are replaceable inserts, and the valve seats are integral (non-replaceable).
 - C. The valve guides and the valve seats are both integral (non-replaceable).
 - D. The valve guides are integral (non-replaceable), and the valve seats are replaceable inserts.

Correct answer: A

29. Prior to starting an auxiliary diesel engine on your vessel, the crankcase oil level must be checked. At what checked level would you be required to add make-up oil?
- A. When the oil level drops below the ADD mark on the dipstick.
 - B. When the oil level drops to between the ADD and FULL marks on the dipstick.
 - C. When the oil level drops below the FULL mark on the dipstick.
 - D. When the oil level drops to where it is no longer visible on the dipstick.

Correct answer: A

30. The diesel generator set drive engines on your vessel are protected with heavy-duty oil bath air cleaners. The oil within these air cleaners should be periodically replaced in accordance with manufacturer recommendations. What statement best describes when it would be appropriate to deviate from the recommended frequency?
- A. Replace the oil more frequently when the engine is exposed to dusty conditions (such as arc welding in the engine room) and replace the oil less frequently when the oil is unusually dirty or when it thickens.
 - B. Replace the oil less frequently when the engine is exposed to dusty conditions (such as arc welding in the engine room) and replace the oil more frequently when the oil is unusually dirty or when it thickens.
 - C. Replace the oil less frequently when the engine is exposed to dusty conditions (such as arc welding in the engine room) and replace the oil less frequently when the oil is unusually dirty or when it thickens.
 - D. Replace the oil more frequently when the engine is exposed to dusty conditions (such as arc welding in the engine room) and replace the oil more frequently when the oil is unusually dirty or when it thickens.

Correct answer: D

31. When servicing dry-type air filters as used on the vessel to which you are assigned, which of the following criteria would be the most accurate for determining the need for servicing?
- A. Determination of operating hours since last servicing
 - B. Determination of engine room fresh air exchange rate
 - C. Determination of restriction with suitable gauge
 - D. Estimation of severity of dust conditions at the air intake

Correct answer: C

32. One cylinder on an auxiliary diesel engine indicates a low firing pressure and high exhaust temperature. Which of the following operating conditions would most likely have caused this?
- A. Late injection timing
 - B. Air intake clogged
 - C. Early injection timing
 - D. Low back pressure

Correct answer: A

33. The turbocharged, four-stroke, diesel generator set drive engines on your vessel are protected with dry-type air intake filters. The filter element condition can be evaluated by attaching a water manometer to measure the vacuum in the air duct between the air intake filter and the turbocharger blower inlet. Assume that the manometer reads 10" of water column (negative) at rated engine rpm under full load with a clean, properly sealing filter element. What would a reading of 20" of water column (negative) indicate at rated engine rpm under full load?
- A. The filter element is being severely bypassed due to an improper seal and should be immediately re-seated.
 - B. The filter element is being slightly bypassed due to an improper seal and can be ignored until time is available for re-seating.
 - C. The filter element is severely restricted with dust and requires immediate replacement.
 - D. The filter element is slightly restricted with dust but does not yet require replacement.

Correct answer: C

34. An accumulator used in a hydraulic starting system is generally located between the _____.

- A. pump and the compressor
- B. storage tank and the pump
- C. starting motor and the reserve tank
- D. pump and the starting motor

Correct answer: D

35. 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

Correct answer: B

36. In a medium-speed marine propulsion engine equipped with direct admission air starting valves, the cylinders without air starting valves fire first because the _____.

- A. operation is under higher compression
- B. fuel is admitted only to these cylinders during cranking
- C. compression is released during starting by opening the exhaust valve
- D. cylinders are not chilled by the expansion of the starting air

Correct answer: D

37. Which internal combustion engine starting system uses a vane type fluid motor?

- A. Centrifugal
- B. Jet flow
- C. Compressed air
- D. Electric

Correct answer: C

38. Clogged or partially obstructed exhaust ports on a diesel engine can cause _____.

- A. Overspeeding of the engine
- B. Failure of the engine to shut down
- C. No effect of engine performance
- D. High exhaust temperatures

Correct answer: D

39. If an auxiliary diesel engine equipped with an electric starting system cranks very slowly after repeated attempts to start, the cause could be a/an _____.

- A. Low lube oil viscosity
- B. Low compression pressure
- C. Ring gear with broken teeth
- D. Overheated motor windings

Correct answer: D

40. Which lubricating oil additive is used in diesel engines to reduce the tendency for sludge and varnish to form on the engine parts?

- A. Flash point improvers
- B. Pour point improvers
- C. Oxidation inhibitors
- D. Foam suppressors

Correct answer: C

41. The TBN value of diesel engine lube oil refers to its ability to _____.

- A. resist changes in viscosity with changes in temperature
- B. resist emulsification
- C. neutralize acids
- D. resist oxidation at high temperatures

Correct answer: C

42. In a normally operating diesel engine, the main source of lubricating oil contamination in the crankcase is a result of which of the following?

- A. Metal particles loosened by wear
- B. Air when no air cleaners are used
- C. Condensation of water vapors
- D. Lubricating oil itself

Correct answer: D

43. Which of the following statements is true concerning a main diesel engine oil cooler?

- A. The oil temperature is less than the cooling water temperature.
- B. The oil pressure is less than the cooling water pressure.
- C. The oil pressure is greater than the cooling water pressure.
- D. The oil flow control valve is always installed in the oil input line.

Correct answer: C

44. Mechanical lubricators for diesel engine cylinders are usually small reciprocating pumps which are _____.

- A. operated manually once each hour
- B. operated until the engine has started
- C. placed into operation only at maximum load
- D. adjustable to meet lubrication requirements

Correct answer: D

45. The device shown in the illustration is classified as a/an _____. Illustration MO-0008

- A. comparator type mist detector
- B. exhaust gas vapor condenser
- C. Ringelmann exhaust gas analyzer
- D. reflective type explosion meter

Correct answer: A

46. A decrease in the flash point of diesel engine lube oil indicates the lube oil has become _____.
- A. contaminated with sludge
 - B. contaminated with carbon
 - C. diluted with fuel oil
 - D. diluted with water

Correct answer: C

47. Which of the following effects will excessively cold lube oil have on the operation of a diesel engine?
- A. The engine will crank slowly and may fail to start.
 - B. The engine will overspeed when started.
 - C. The fuel oil supply will become diluted resulting in rough running.
 - D. The cooling system will overheat causing the engine to stall.

Correct answer: A

48. Crankcase explosions in propulsion diesel engines can result from which of the following?
- A. The splashing of lubrication oil by the crankshaft
 - B. The dilution of crankcase oil with particles of combustion
 - C. Broken fuel lines spraying oil on the crankcase
 - D. The ignition of vaporized lube oil in the crankcase

Correct answer: D

49. What type of marine engine has a fuel nozzle and combustion chamber located between two pistons in a common cylinder liner?
- A. Horizontal reciprocating
 - B. Vertical opposed-piston
 - C. Single acting in-line cylinder
 - D. Double acting in-line cylinder

Correct answer: B

50. The combustion of fuel for the illustrated engine is initiated by _____. Illustration MO-0020
- A. a spray of fuel into a turbulence combustion chamber
 - B. fuel sprayed into an energy cell
 - C. individual Bosch fuel pumps
 - D. fuel injection provided by a unit injector

Correct answer: A

51. In terms of the diesel fuels burned in auxiliary and main propulsion diesel engines onboard vessels, which of the listed fuel properties would be most critical to consider when transferring and forwarding fuel in extremely low ambient temperature conditions?
- A. Ash content
 - B. Heating value
 - C. Flash point
 - D. Pour point

Correct answer: D

52. Which of the following statements is true concerning the cetane number of diesel fuel?

- A. The cetane number affects the amount of injection lag.
- B. The cetane number is an indication of the fuel's viscosity.
- C. Ignition lag is reduced with fuels having a high cetane number.
- D. The cetane number is of little significance in the combustion process.

Correct answer: C

53. Whether using a centrifuge or a simple filter, oil cleaning and filtration will be the most effective when the oil is at a _____.

- A. high temperature and a high viscosity
- B. high temperature and a low viscosity
- C. low temperature and a high viscosity
- D. low temperature and a low viscosity

Correct answer: B

54. What is the purpose of water transducers used with the separator shown in the illustration? Illustration MO-0127

- A. A transducer is located in the dirty oil inlet to measure the amount of water coming into the separator with the process fluid.
- B. A transducer is located in the clean oil outlet to sense water content in the oil.
- C. A transducer is located inside the separator to assist in adjustment of the water and oil interface.
- D. All of the above are correct.

Correct answer: B

55. After removing the bowl hood of the device shown in the illustration, excessive quantities of sludge are visible. Which of the following statements represents the approach to rectify the situation? Illustration MO-0112

- A. Disassemble the entire unit, clean all components, replace all defective discs and use the proper lubricant where required.
- B. Steam clean the components in place, check for proper alignment, using the match marks provided, reassemble and restart the unit.
- C. Remove only the disc stack, separate all the discs, clean with steel wool and solvent, replace the disc stack ensuring it is located by use of the dowel pin shown.
- D. Disassemble the entire unit, clean all components, replace any defective gaskets and use the proper lubricants where required.

Correct answer: D

56. From the graph shown in the illustration, determine the size of the regulating ring required for the proper operation of the fuel oil centrifuge if the fuel oil specific gravity is 0.9 kg/dm³ at 68°F, and the separating temperature is 158°F. Illustration MO-0113

- A. 86 mm
- B. 104 mm
- C. 110 mm
- D. 117 mm

Correct answer: C

57. When running a large, dual fuel, main propulsion diesel engine on heavy fuel, which of the following precautions should be observed when switching from heavy fuel oil to diesel oil?
- A. The diesel oil must never be allowed to mix with the heavy fuel.
 - B. The temperature of the fuel from the preheater should be gradually reduced after switching over the three-way valve.
 - C. The heating steam to the preheater should be increased as soon as the diesel fuel passes through the three-way valve.
 - D. The heating steam must be secured before the diesel oil passes through the three-way valve.

Correct answer: B

58. Which of the following fuel systems is characterized by a complete absence of high-pressure fuel lines?
- A. Rotary plunger type system
 - B. Common rail type system
 - C. In-line multi-plunger type system
 - D. Unit injector type system

Correct answer: D

59. When running a large, dual fuel, main propulsion diesel engine on heavy fuel, which of the following precautions should be observed when switching from heavy fuel oil to diesel oil?
- A. The diesel oil must never be allowed to mix with the heavy fuel.
 - B. The heating steam must be secured before the diesel oil passes through the three-way valve.
 - C. The heating steam to the preheater should be increased as soon as the diesel fuel passes through the three-way valve.
 - D. The temperature of the fuel from the preheater should be gradually reduced after switching over the three-way valve.

Correct answer: D

60. As shown in the illustration, which of the following conditions would be responsible for a "low-pressure in oil outlet" alarm to be indicated? Illustration MO-0127
- A. Throughput too low
 - B. Separating temperature too low
 - C. Controller setpoint changed
 - D. Emergency stop button not reset

Correct answer: A

61. 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

Correct answer: C

62. Fuel injector nozzles are usually of the multi-orifice type with the number and placement of the holes arranged according to the _____.
- A. type of piston rings
 - B. pressure of the fuel system
 - C. size of the pump plunger spring
 - D. design of the combustion chamber

Correct answer: D

63. The amount of fuel delivered by a unit injector is controlled by the _____.
- A. camshaft
 - B. main spring
 - C. rack position
 - D. engine speed

Correct answer: C

64. As shown in the illustration of the fuel injection pump, the section designated as "M" is referred to as the _____. Illustration MO-0061
- A. plunger relief shoulder
 - B. plunger sleeve
 - C. plunger control tab
 - D. plunger helix

Correct answer: D

65. The component shown in the illustration would be identified as a/an _____. Illustration MO-0097
- A. slow-speed engine cylinder liner lubricator
 - B. slow-speed engine fuel pump
 - C. centrifugal flyweight governor
 - D. injector cooling system pump

Correct answer: B

66. When a nozzle tester is being used to test a "closed" type fuel injection nozzle, a clogged nozzle orifice will be indicated by a _____.
- A. Distorted spray pattern
 - B. Chattering sound when the nozzle closes
 - C. Squealing sound mid-way in the pump stroke
 - D. Popping sound when the nozzle opens

Correct answer: A

67. An immediate repair is required if a leak occurs in the high-pressure fuel piping between the injection pump and fuel nozzle because of the _____.
- A. High cost of fuel
 - B. Pollution hazard
 - C. Serious fire hazard
 - D. Poor combustion which will occur in that cylinder

Correct answer: C

68. High cylinder firing pressure, accompanied by low exhaust temperature, can result from _____.

- A. Improper fuel rack positioning
- B. Lengthy exhaust valve duration
- C. Extended operation at light load
- D. Excessively early injection timing

Correct answer: D

69. According to regulations, what is the minimum nominal pipe size for a fuel oil service tank vent line?

- A. 1.5 inches
- B. 2 inches
- C. 2.5 inches
- D. 3 inches

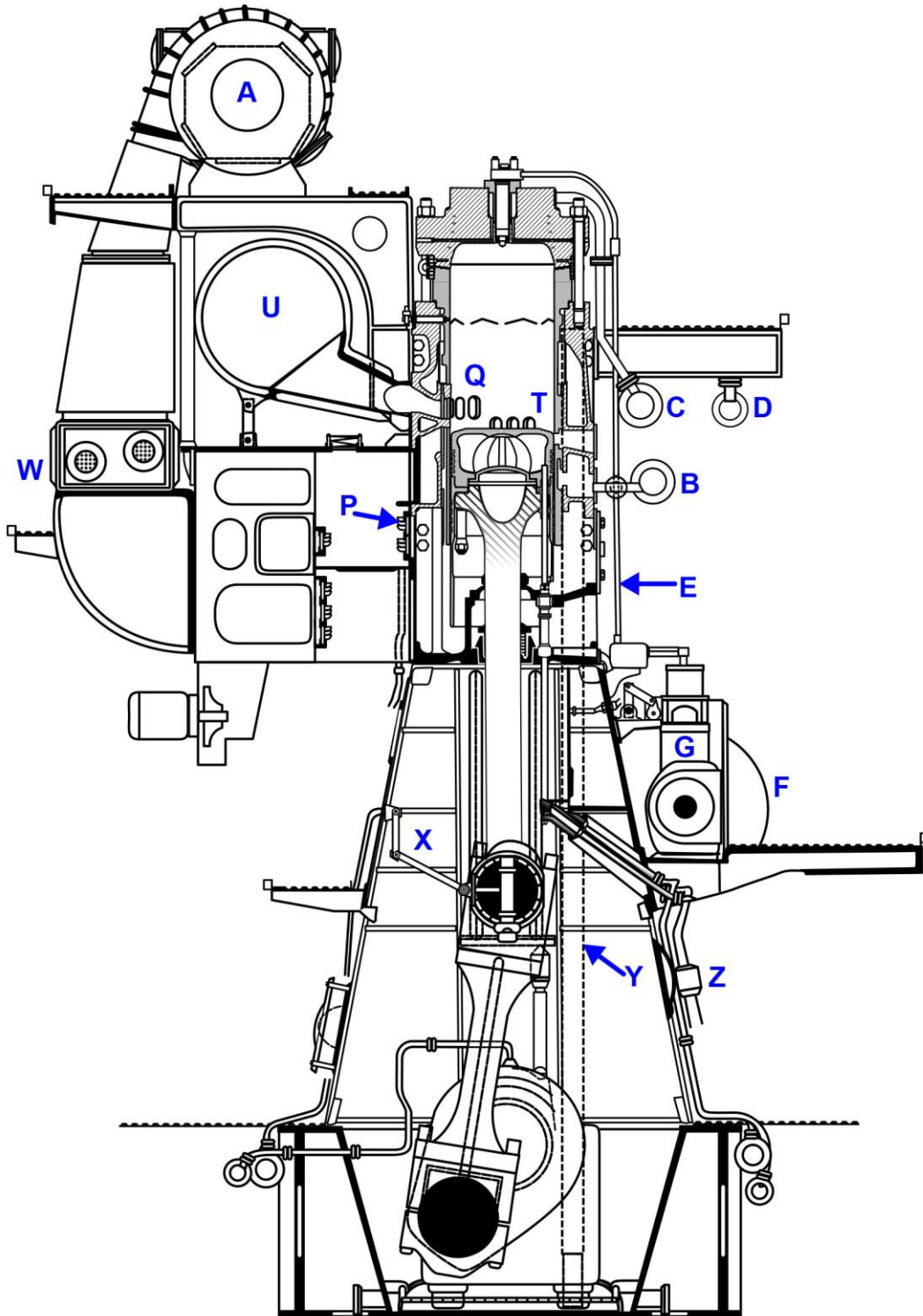
Correct answer: C

70. Under what condition would valves "4" and "5", as shown in the illustration, be closed? Illustration MO-0077

- A. Operating the main engine on DO.
- B. Loading the HFO bunkers.
- C. Operating in normal mode.
- D. Operating DO purifier on HFO.

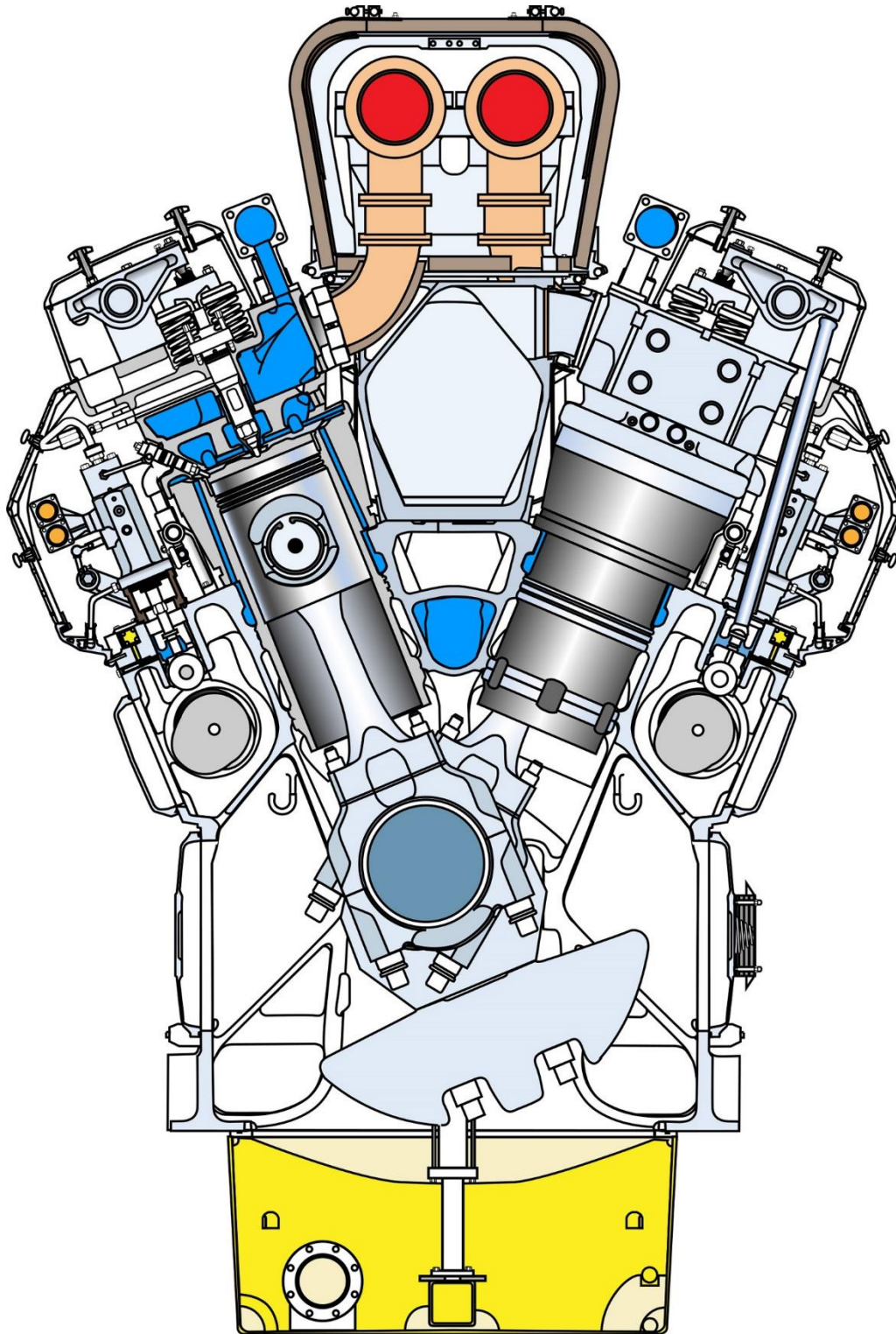
Correct answer: C

MO-0003



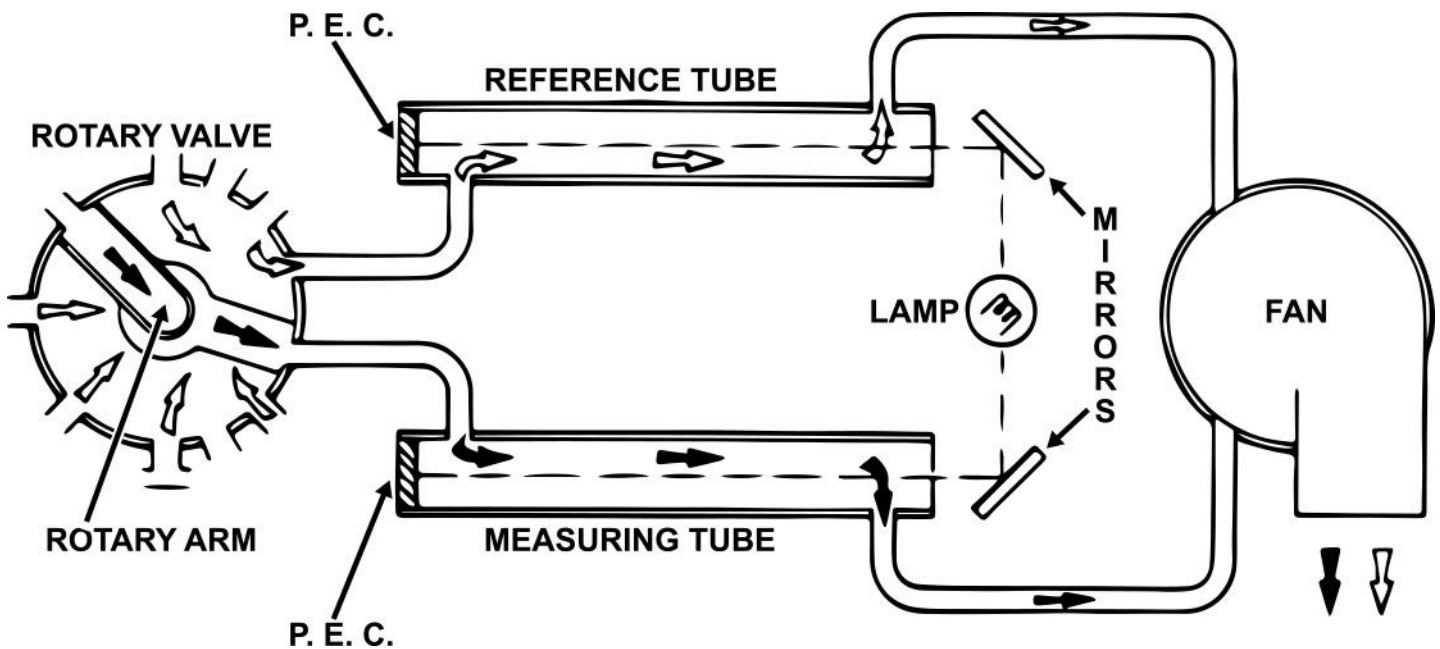
Adapted for testing purposes only from ROWEN, Introduction to Practical Marine Engineering, Vol. 2: Figures
Copyright © 2005 The Society of Naval Architects and Marine Engineers
Further reproduction prohibited without permission

MO-0005



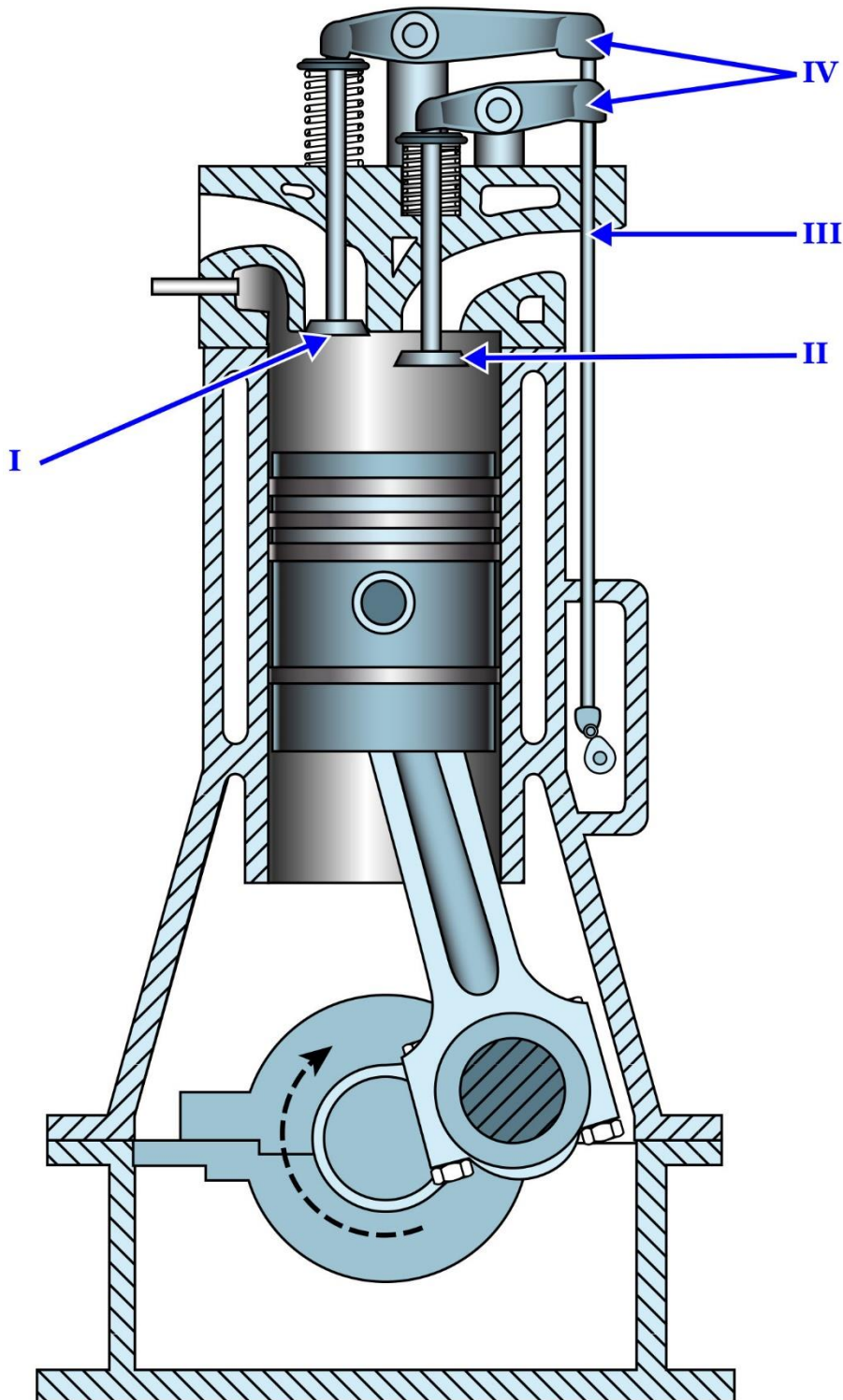
Adapted for testing purposes only from Wärtsilä 46 Instruction Manual
Copyright © Wärtsilä NSD Corporation.
Further reproduction prohibited without permission.

MO-0008



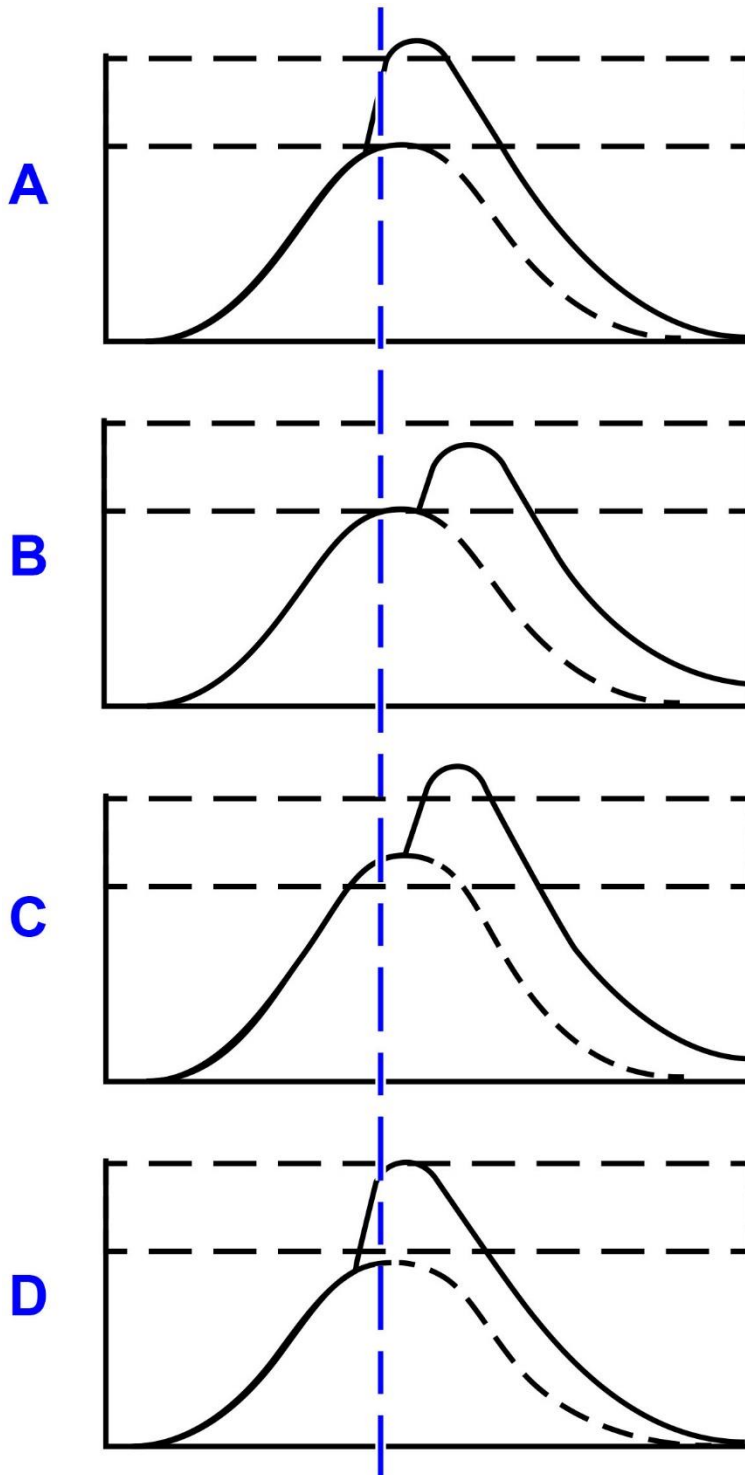
Adapted for testing purposes only from LILY, Diesel Engine Reference Book
Copyright © 1984 by Butterworth and Co. (Publishers) Ltd.
Further reproduction prohibited without permission

MO-0020



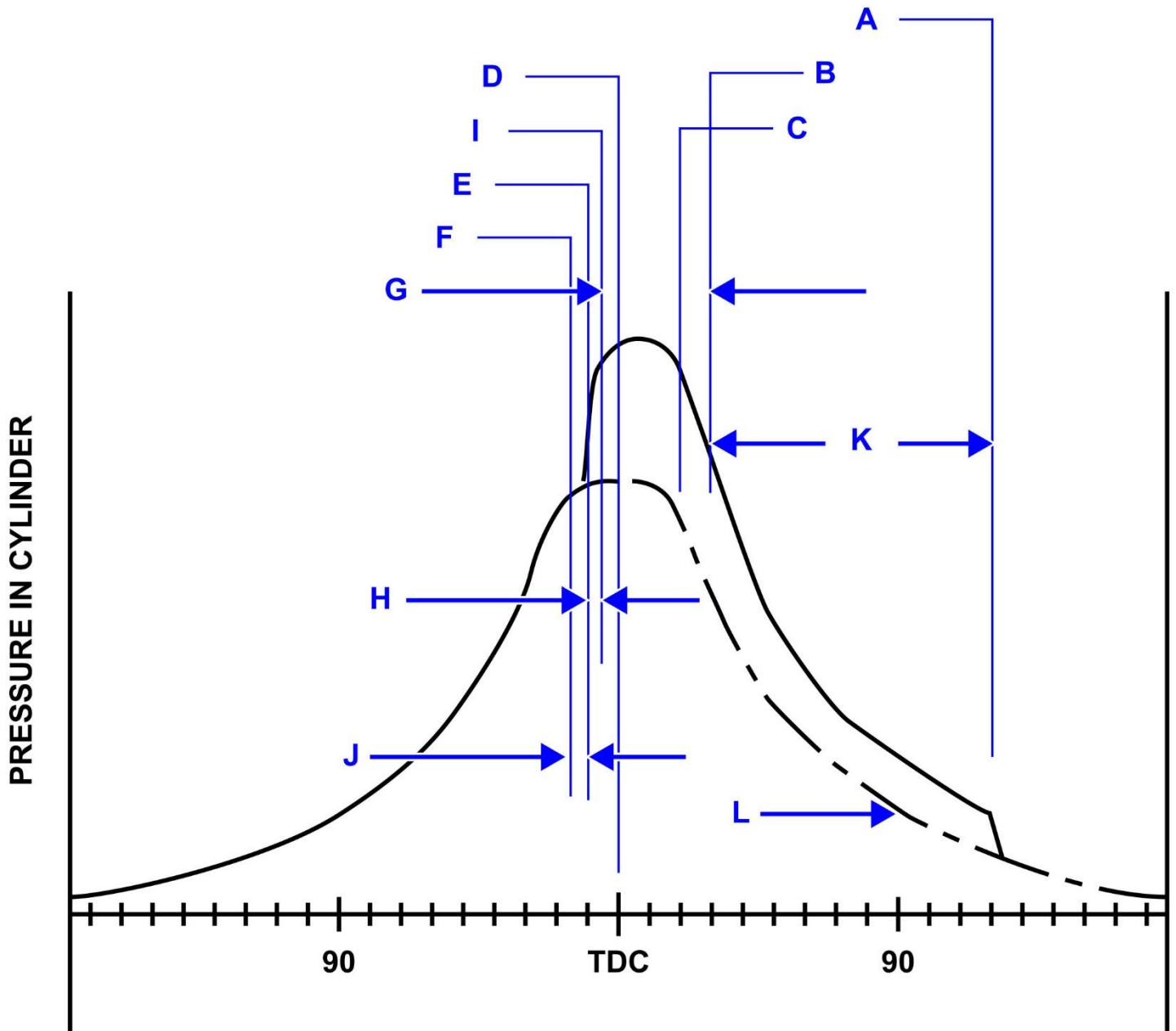
Adapted for testing purposes only from MALEEV, Diesel Engine Operation and Maintenance
Copyright © 1954 by McGraw-Hill.
Further reproduction prohibited without permission

MO-0029



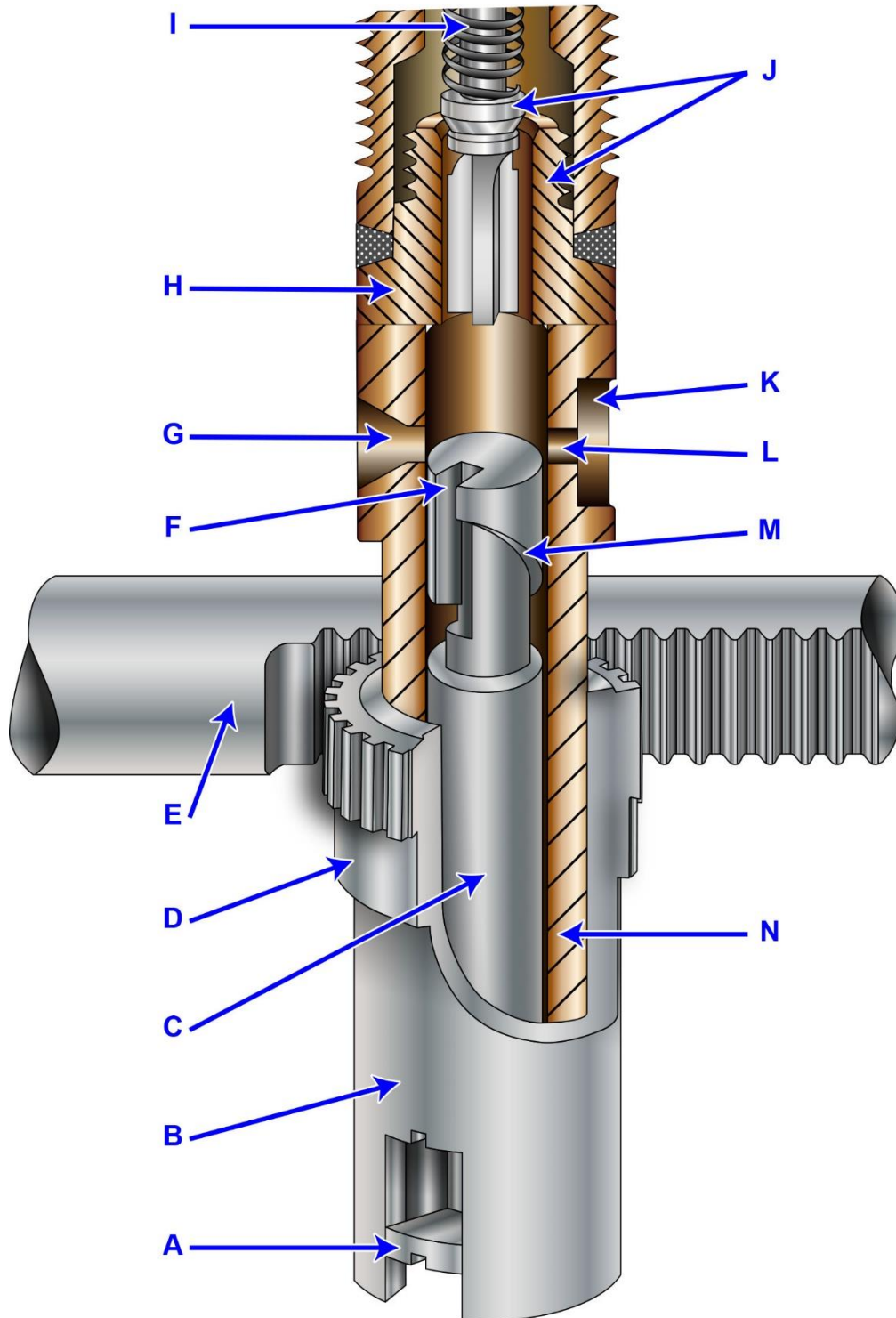
Adapted for testing purposes only from SULZER, Description of and Operating Instructions for Sulzer Diesel Engines RND-M
Copyright © Sulzer Brothers Limited
Further reproduction prohibited without permission

MO-0033



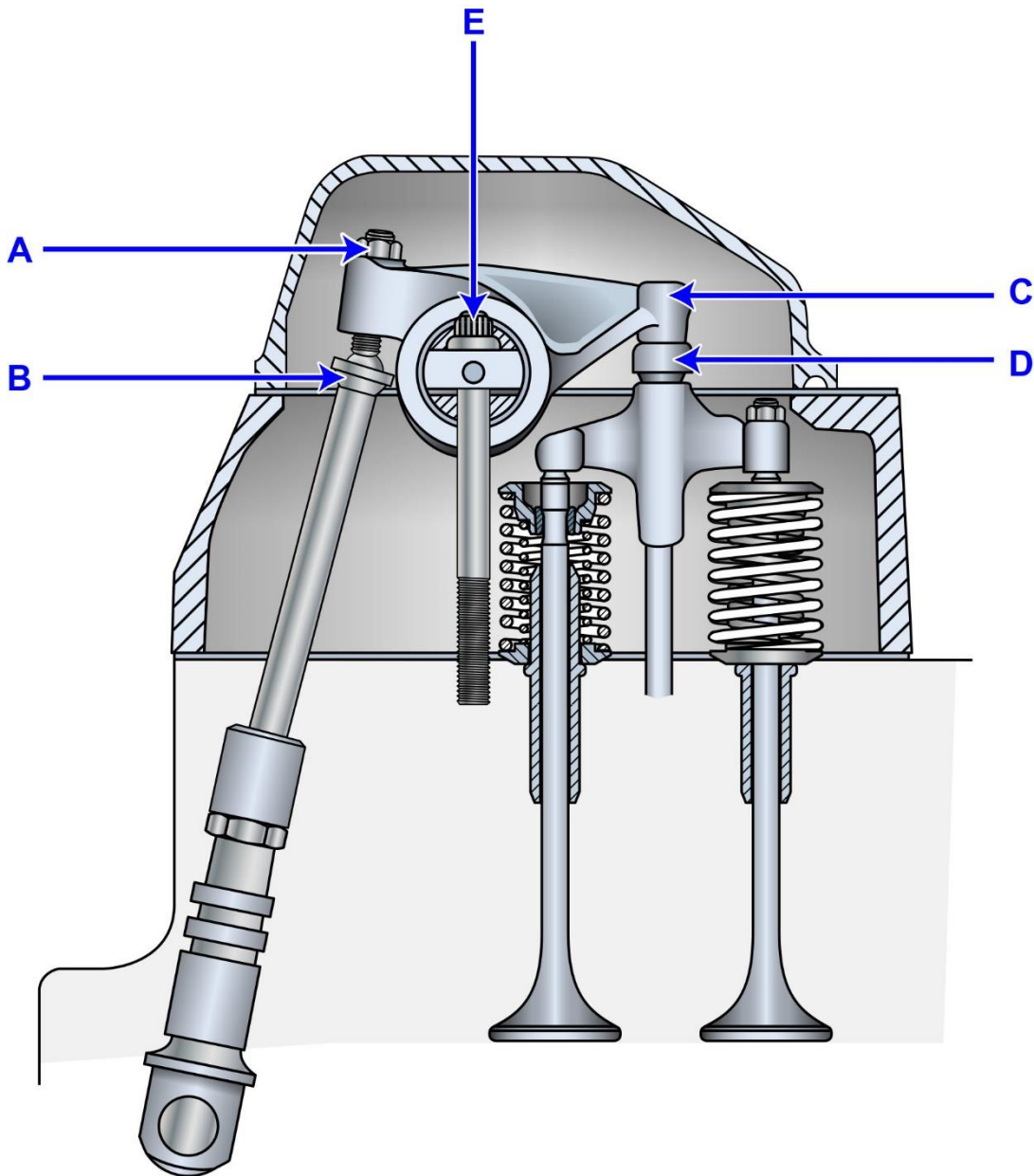
Adapted for testing purposes only from HUNT, Modern Marine Engineer's Manual, Vol. II, 3rd Ed.
Copyright © 2002 by Cornell Maritime Press, Inc.
Further reproduction prohibited without permission

MO-0061



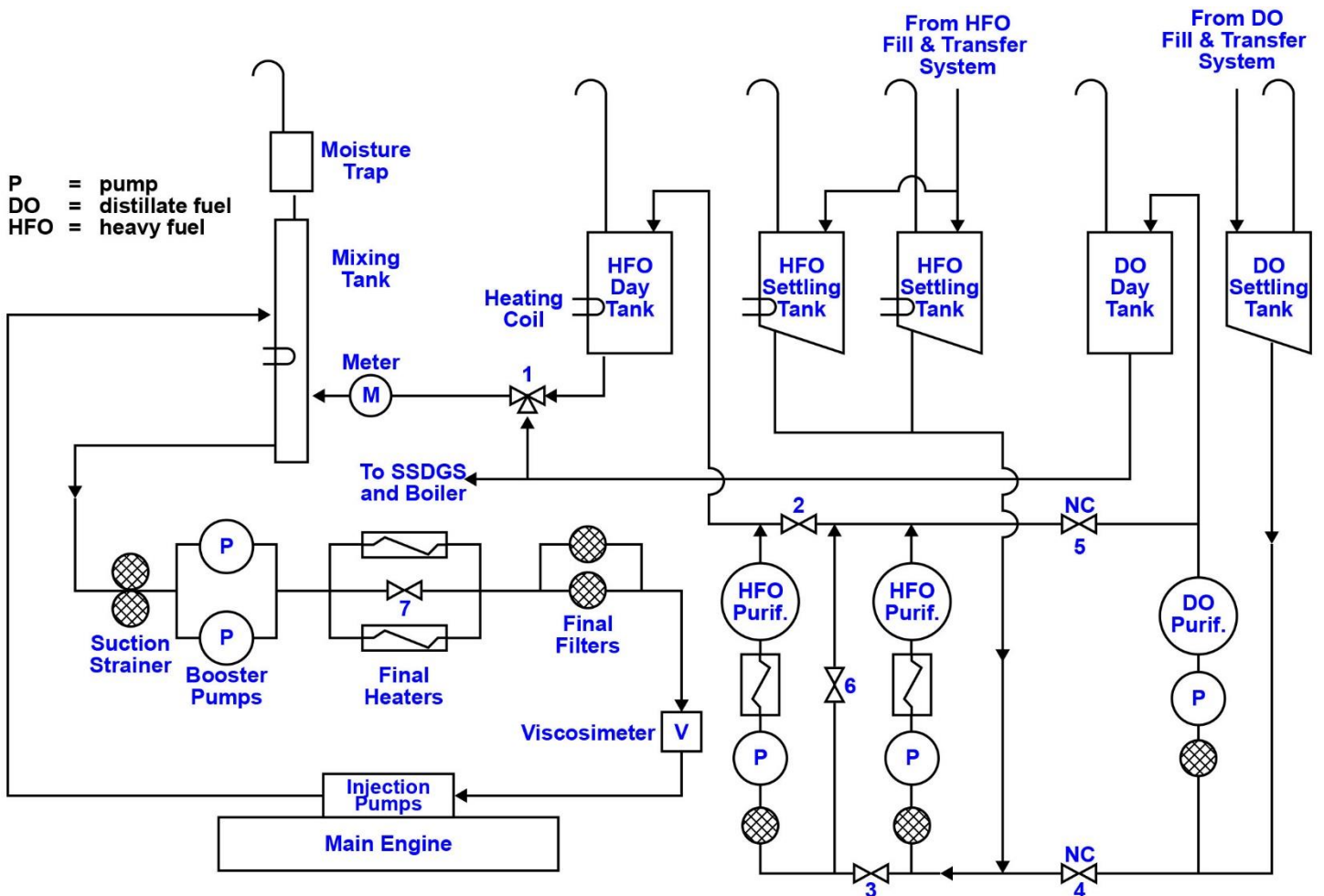
Adapted for testing purposes only from KATES/LUCK, Diesel and High Compression Gas Engines, 3rd Ed.
Copyright © 1974 by American Technical Society
Further reproduction prohibited without permission

MO-0074



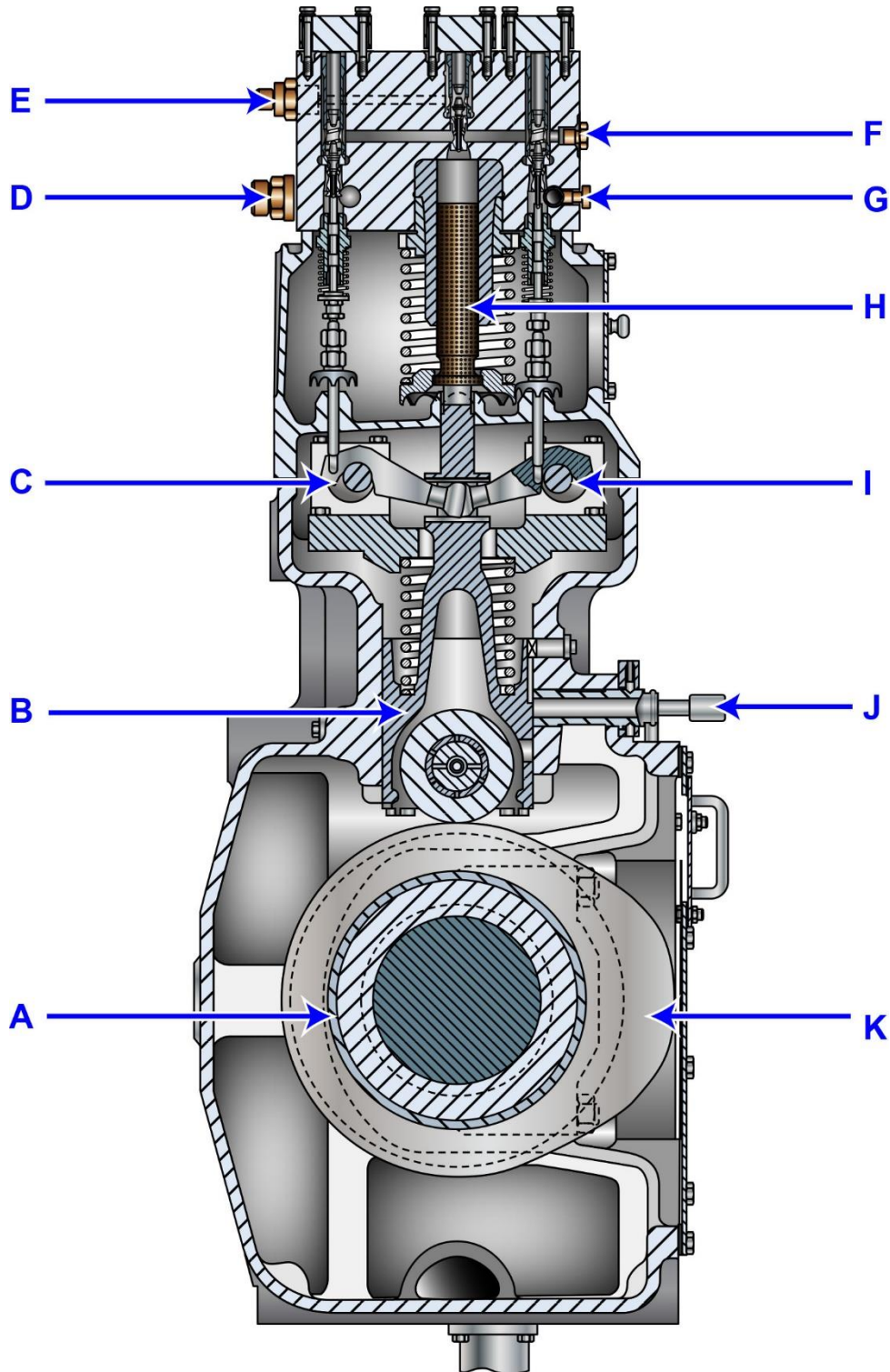
Adapted for testing purposes only from CAT 3500 Series Marine Engine Service Manual, Vol. 1
Copyright © 1997 by Caterpillar
Further reproduction prohibited without permission

MO-0077



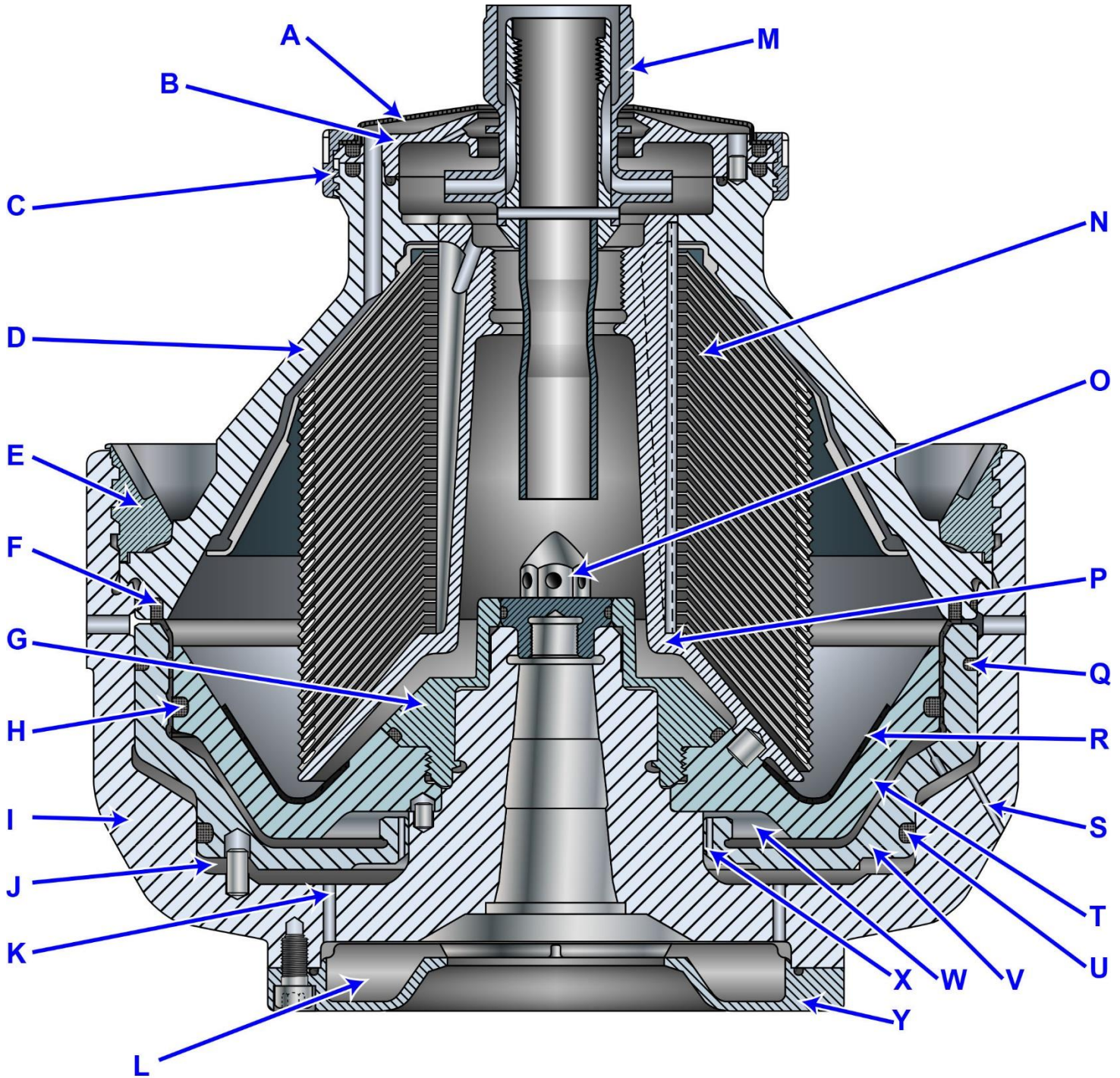
Adapted for testing purposes only from HARRINGTON, Marine Engineering
 Copyright © 1992 by The Society of Naval Architects and Marine Engineers
 Further reproduction prohibited without permission

MO-0097



Adapted for testing purposes only from HUNT, Modern Marine Engineer's Manual, Vol. II, 3rd Ed.
Copyright © 2002 by Cornell Maritime Press, Inc.
Further reproduction prohibited without permission

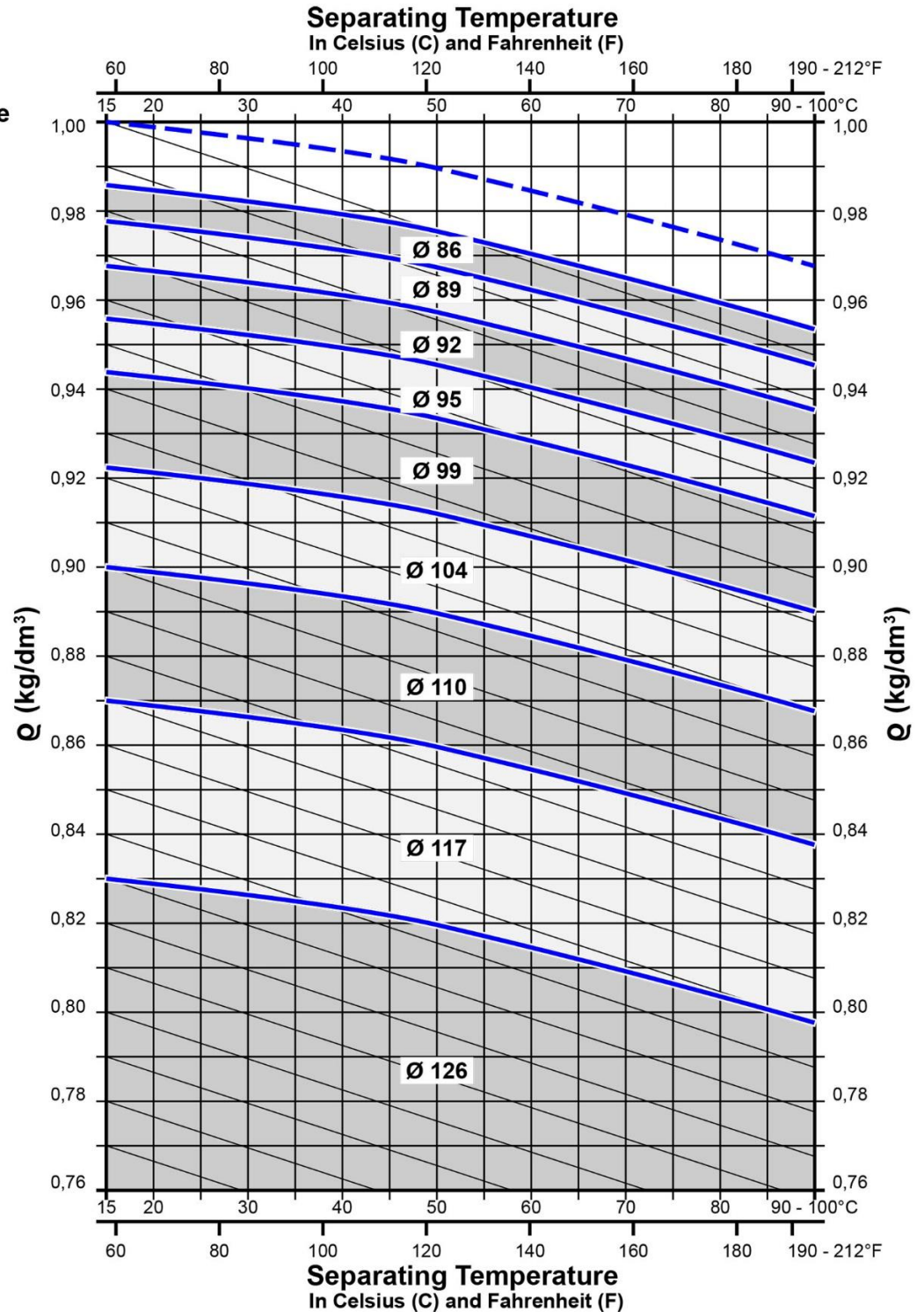
MO-0112



Adapted for testing purposes only from Instruction Manual and Parts List, Mineral Oil Separator with
Self-Cleaning Bowl, Model OSA 20-02-066
Copyright © Westfalia Separator
Further reproduction prohibited without permission

MO-0113

- - - Q - Water
 — Q - Oil
 \emptyset - Regulating Ring Size

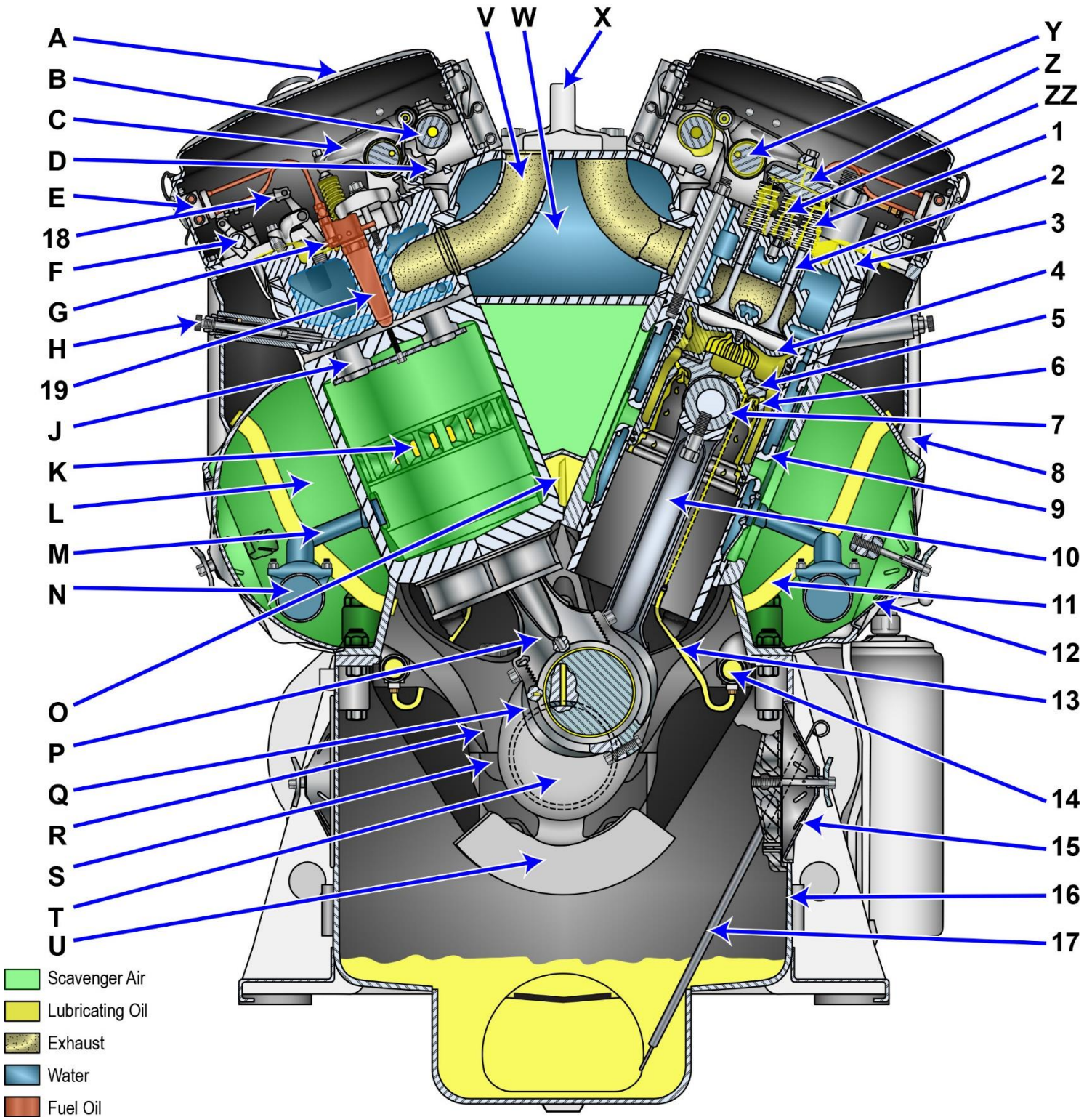


Adapted for testing purposes only from Instruction Manual and Parts List, Mineral Oil Separator with Self-Cleaning Bowl, Model OSA 20-02-066

Copyright © Westfalia Separator

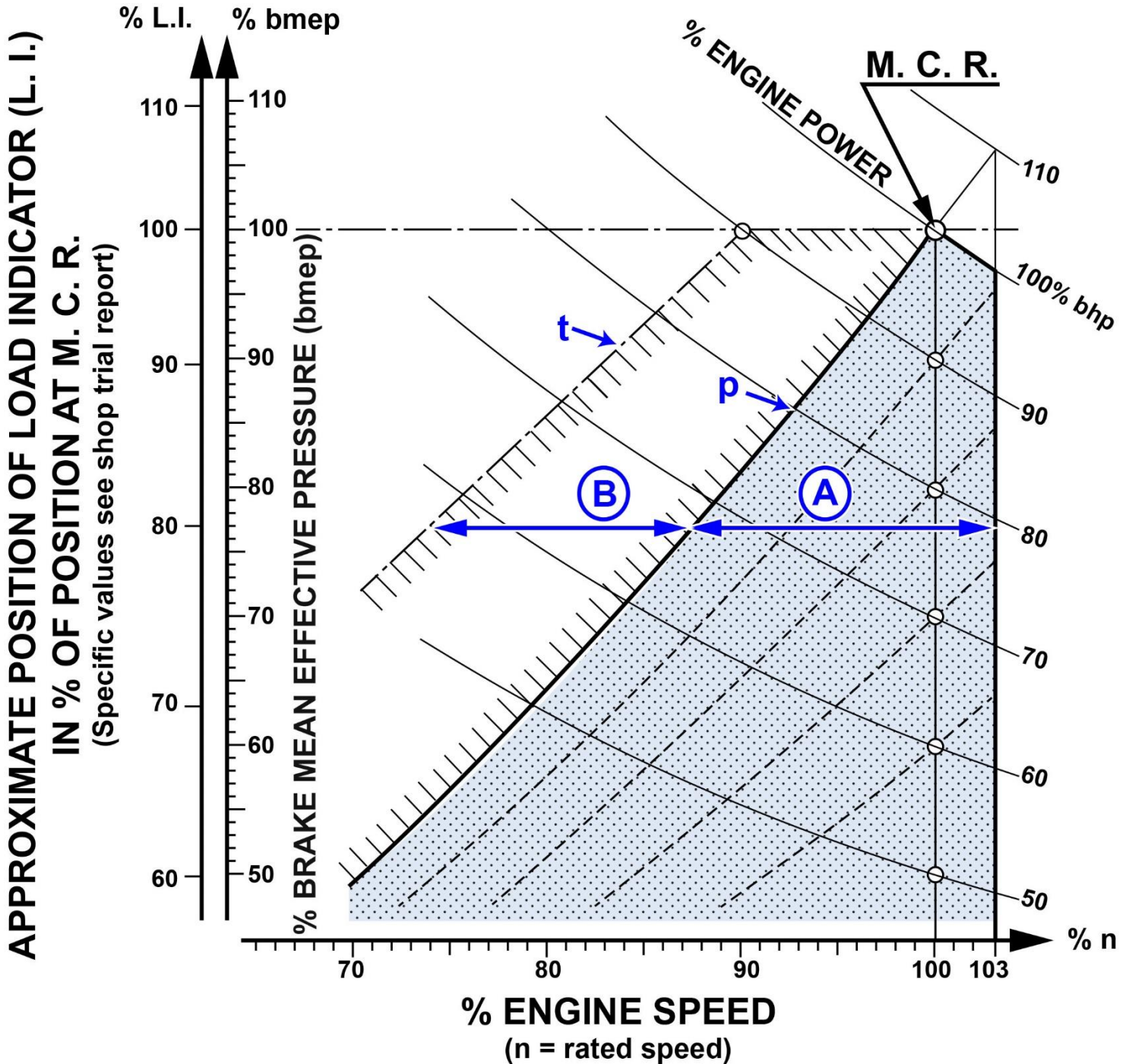
Further reproduction prohibited without permission

MO-0122



Adapted for testing purposes only from EMD 645E9 Turbocharged Engine Maintenance Manual
 Copyright © 1973 Electro-Motive Division, General Motors
 Further reproduction prohibited without permission

MO-0126

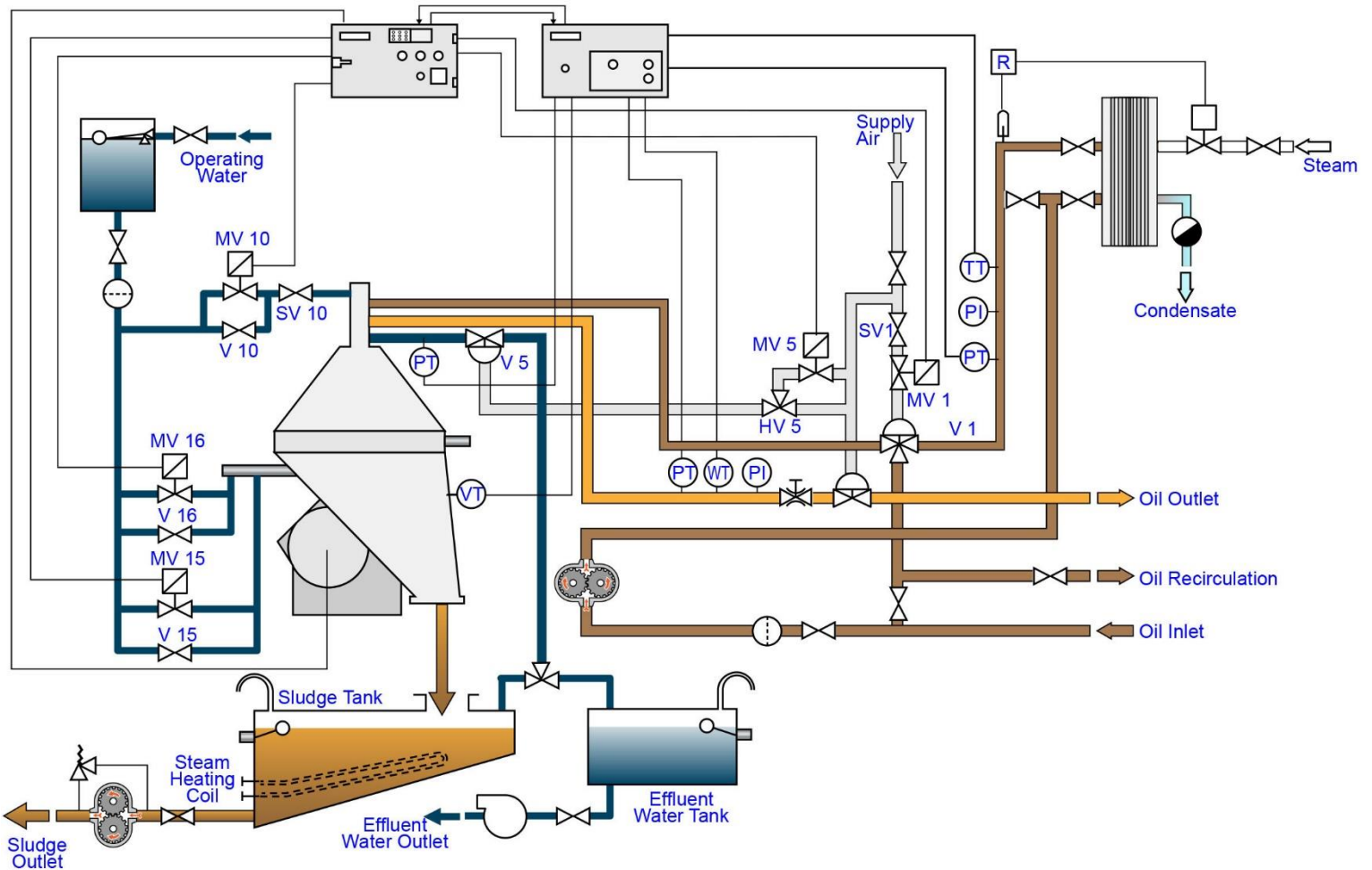


Adapted for testing purposes only from SULZER, Description of and Operating Instructions for Sulzer Diesel Engines RND-M
Copyright © Sulzer Brothers Limited
Further reproduction prohibited without permission

MO-0127

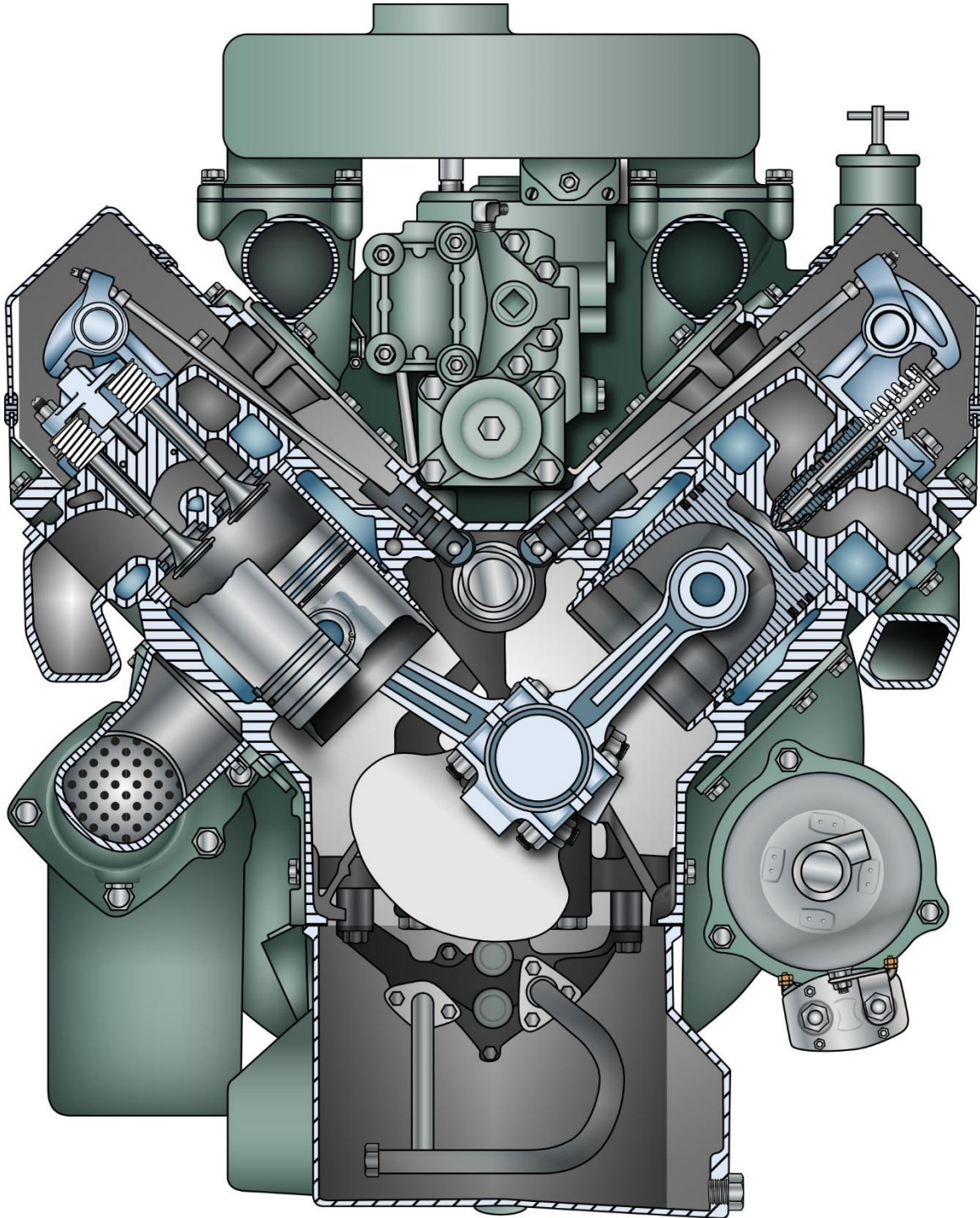
EPC Alarm Indications Program Unit			
Alarm from MARST1	Low pressure in oil outlet	High oil temperature after preheater	Low oil temperature after preheater
Emergency stopping or vibrations	No discharge	Logically wrong signal from 1st separator	Remote alarm signal only

MARST1 Alarm Indications Program Unit			
A01	A02	A03	A04
Abnormal water content	Transducer signal minimum value	No discharge feedback signal	Drain valve insufficient
A05	A06	A07	
Micro-processor error	Liquid indication	Transducer fault	



Adapted for testing purposes only from KNAK, Diesel Motor Ships Engines and Machinery, Drawings
 Copyright © 1979 by Christen Knak
 Further reproduction prohibited without permission

MO-0163



Adapted for testing purposes only from TOBOLDT, Diesel Fundamentals, Service, Repair
Copyright © 1973 by the Goodheart-Willcox Co., Inc.
Further reproduction prohibited without permission.