U.S.C.G. Merchant Marine Exam

DDE - Unlimited HP

Q620 Motor Plants

(Sample Examination)

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Illustrations: 33

Choose the best answer to the following Multiple Choice Questions:

1. You are assigned to a river push boat fitted with main propulsion diesel engines operating on the cycle represented in the polar timing diagram shown in the illustration. What combustion cycle event has a duration of 103º? Illustration MO-0206

- (A) Exhaust
- (B) Compression
- (C) Intake
- (D) Power

If choice D is selected set score to 1.

2. Prior to starting a main propulsion diesel engine fitted on your salvage tug, it has been determined that the transfer of make-up oil is required. At what checked level should you stop adding make-up oil?

- (A) When the oil level rises to the between the ADD and FULL marks on the side of the dipstick marked ENGINE STOPPED and OIL COLD.
- (B) When the oil level rises to the FULL mark on the side of the dipstick marked ENGINE STOPPED and OIL COLD.
- (C) When the oil level rises to a level well above the FULL mark on the side of the dipstick marked ENGINE STOPPED and OIL COLD.
- (D) When the oil level rises to the ADD mark on the side of the dipstick marked ENGINE STOPPED and OIL COLD.

If choice B is selected set score to 1.

3. Before shutting down the main propulsion engines on a tractor tug, ideally what should be accomplished FIRST?

- (A) The engine should be operated with the load removed from the engine for several minutes, then shut down.
- (B) The engine should be operated at rated load for several minutes, then shut down.
- (C) The engine should be operated at a steady, but substantial load for several minutes, then shut down.
- (D) The engine should be shut down immediately with no delay period, regardless of the engine load.

If choice A is selected set score to 1.

4. You are on a ship-docking tug using main propulsion engines of the type shown in the illustration. Assuming that the piston is properly positioned, what statement represents the procedure for inspection of the compression rings while in place inside the engine? Illustration MO-0192

- (A) The inspection takes place by removing the appropriate crankcase access door and viewing through the resulting opening.
- (B) It is not possible to inspect the compression rings while in place inside the engine.
- (C) The inspection takes place by removing the appropriate side cover and viewing through the resulting opening.
- (D) The inspection takes place by removing the appropriate cylinder head valve cover and viewing through the resulting opening.

If choice B is selected set score to 1.

5. You are analyzing the data used for trend analysis for a two-stroke main propulsion diesel engine on your river push boat. Although the engine has yet to experience a safety shutdown on high crankcase pressure, over time the crankcase pressure (which normally runs in a vacuum) has gradually become less negative. Which of the following failures would most likely be responsible for this condition?

- (A) Leaking crankcase handhole cover.
- (B) Worn piston compression rings.
- (C) Burned cylinder exhaust valve.
- (D) Dribbling injector needle valve.

If choice B is selected set score to 1.

6. Prior to starting a diesel generator set engine fitted on your salvage tug, it has been determined that the transfer of make-up oil is required. At what checked level should you stop adding make-up oil?

- (A) When the oil level rises to the between the ADD and FULL marks on the dipstick.
- (B) When the oil level rises to the FULL mark on the dipstick.
- (C) When the oil level rises to a level well above the FULL mark on the dipstick.
- (D) When the oil level rises to the ADD mark on the dipstick.

If choice B is selected set score to 1.

7. You are about to check the valve lash adjustment on #1 cylinder's intake and exhaust valves of an auxiliary diesel engine fitted on the ship-docking tug to which you are assigned. You want to adjust the valve lash on both valves without having to reposition the crankshaft between adjustments. What should be the position of #1 piston to insure both the intake and exhaust valves are both in a position to facilitate valve adjustment?

- (A) The crankshaft should be barred in the direction of rotation with #1 piston at BDC having just completed an intake stroke.
- (B) The crankshaft should be barred in the direction of rotation with #1 piston at BDC having just completed a power stroke.
- (C) The crankshaft should be barred in the direction of rotation with #1 piston at TDC having just completed an exhaust stroke.
- (D) The crankshaft should be barred in the direction of rotation with #1 piston at TDC having just completed a compression stroke.

If choice D is selected set score to 1.

8. An engine that emits black smoke through the stack may indicate a misfiring cylinder. Assume that the auxiliary diesel engines on your articulated tug-barge unit have a fuel injection system that permits the injectors to be disabled for troubleshooting purposes by loosening the high pressure fuel injection line fitting at the injector nozzle while the engine is running and noting the response of the engine in terms emission of black smoke. Which of the following statements is true?

- (A) After disabling the injector of a given cylinder, if the engine previously producing a clear exhaust now produces black smoke, this indicates that the cylinder associated with the disabled injector is misfiring.
- (B) After disabling the injector of a given cylinder, if the engine previously producing black smoke now produces even denser black smoke, this indicates that the cylinder associated with the disabled injector is misfiring.
- (C) After disabling the injector of a given cylinder, if the engine previously producing black smoke now produces a clear stack, this indicates that the cylinder associated with the disabled injector is misfiring.
- (D) After disabling the injector of a given cylinder, if the engine previously producing black smoke continues to produce equally dense black smoke, this indicates that the cylinder associated with the disabled injector is misfiring.

If choice C is selected set score to 1.

9. An auxiliary diesel engine on your towboat is equipped with an electric starting motor such as is shown in the illustration. For what reason is there a significant gap in distance between the start solenoid plunger (C) and the rod that is used to close the starter motor contacts. Illustration MO-0051

- (A) Upon starter solenoid coil energization, this gap prevents chattering and associated arcing of the starter motor contacts.
- (B) Upon starter solenoid coil energization, this gap delays the engagement of the pinion to the flywheel ring gear until after the starter motor contacts close.
- (C) Upon starter solenoid coil energization, this gap delays the closure of the starter motor contacts until after engagement of the pinion to the flywheel ring gear.
- (D) Upon starter solenoid coil energization, this gap compensates for starter motor armature reaction to minimize arcing at the brushes.

If choice C is selected set score to 1.

10. Various diesel engines onboard your salvage tug are started by means of either vane-type or air-turbine air-starting motors. At a minimum, in the absence of automatic drain valves, how often should moisture separators be drained of moisture while the vessel is underway?

- (A) Hourly
- (B) Daily
- (C) Weekly
- (D) Monthly

If choice B is selected set score to 1.

11. The main engines on your harbor tug utilize a starting system with two air-start motors similar to that shown in the illustration. Upon pushing the start button, the solenoid air valve energizes open, but the air start relay valve fails to receive pilot air, and thus the starter motors and engine fail to rotate. Which of the listed conditions would most likely be the cause of the failure to start? Illustration MO-0200

- (A) The upper pinion fails to engage, which in turn does not allow the lower pinion to engage. Because engagement of both pinions is required to supply air to the air-start motors, the engine does not start.
- (B) The upper pinion fails to retract, which in turn does not allow the lower pinion to retract. Because retraction of both pinions is required to supply air to the air-start motors, the engine does not start.
- (C) The lower pinion fails to retract, which in turn does not allow the upper pinion to retract. Because retraction of both pinions is required to supply air to the air-start motors, the engine does not start.
- (D) The lower pinion fails to engage, which in turn does not allow the upper pinion to engage. Because engagement of both pinions is required to supply air to the air-start motors, the engine does not start.

If choice D is selected set score to 1.

12. A diesel generator set on your ship-docking tug has a simplex lube oil strainer of the type shown in the illustration, situated on the discharge side of the lube oil pump. At a specified engine rpm and lube oil temperature, you notice that the inlet pressure is increasing and the outlet pressure is decreasing, resulting in an unacceptable pressure drop. What should be done? Illustration MO-0057

- (A) The drain plug (B) is removed to drain the sludge from the strainer sump, but the engine must be stopped to perform this operation.
- (B) While the engine is running, the drain plug (B) should be carefully loosened to drain the sludge from the strainer sump.
- (C) While the engine is running, the cleaning handle (A) should be rotated one or more full turns to remove the accumulated dirt from the disk stack (C).
- (D) While the engine is running, the cleaning handle (A) should be rotated one-half turn to remove the accumulated dirt from the disk stack (C).

If choice C is selected set score to 1.

13. The tank-type full-flow lubricating oil filter is situated on the discharge side of the engine-driven lube oil pump on the main engines on your sea-going tug. Assuming oil pressure readings are observed at constant engine rpm and lube oil temperature, what is the indication of gradually clogging filter elements as long as the bypass relief valve remains closed?

- (A) The filter inlet pressure gradually drops, while the filter outlet pressure gradually rises.
- (B) The filter inlet AND outlet pressures BOTH gradually drop.
- (C) The filter inlet pressure gradually rises, while the filter outlet pressure gradually drops.
- (D) The filter inlet AND outlet pressures BOTH gradually rise.

If choice C is selected set score to 1.

14. The diesel fuels burned in auxiliary and main diesel engines of tugboats operating in harbor areas are required to meet certain specifications. Among these are limits of certain contaminants to limit atmospheric emissions to acceptable levels. Which of the following soluble contaminants is applicable?

- (A) Sulfur
- (B) Water
- (C) Total sediment
- (D) Asphaltenes

If choice A is selected set score to 1.

15. The main engines on the harbor tug to which you are assigned are fitted with duplex secondary spin-on fuel filters. Concerning the selector handle, what statement is true?

- (A) The selector handle is placed in the "BOTH" position when the engine is running at high load or rpm to accommodate higher fuel delivery requirements. When the engine is running at low load or rpm, the selector handle is placed in either the "1" or "2" position.
- (B) The selector handle is normally placed in the "BOTH" position regardless of the load or rpm on the engine in order to be able to double the fuel handling throughput at any load or rpm and allow the engine speed to be changed without worrying about the selector handle position.
- (C) The selector handle is placed in the "BOTH" position when the engine is running at low load or rpm. When the engine is running at high load or rpm, the selector handle is placed in either the "1" or "2" position depending upon which filter element is clean.
- (D) The selector handle is placed in either position the "1" or "2" position regardless of the load or rpm on the engine. The selector handle is temporarily placed in the "BOTH" position only when transitioning from a restricted filter element over to a clean filter element.

If choice D is selected set score to 1.

16. The manufacturer of the diesel generator set drive engines used aboard your ship-docking tug recommends that no more than a 2 psig pressure drop across a fuel primary metal-edge suction strainer be allowed before recommended servicing. Assuming that the strainer inlet pressure is 4 psig, what would be the minimum allowable outlet pressure before recommended servicing?

- (A) 2 psig
- (B) 2" Hg
- (C) 6 psig
- (D) 6" Hg

If choice A is selected set score to 1.

17. The river push boat to which you are assigned has diesel generators fitted with fuel injectors with the operating principle as shown in the illustration. In figure "B" which plunger rotation position corresponds to the engine running under no load at idle RPM? Illustration MO-0144

- (A) 1
- (B) 2
- (C) 3
- (D) 4

If choice B is selected set score to 1.

18. The harbor tug to which you are assigned has diesel generators fitted with injectors with the operating principle as shown in the illustration. What statement is true concerning the metering principle used in this system? Illustration MO-0146

- (A) The amount of fuel injected is dependent upon the pressure of the inlet fuel to the injector and the length of time the orifice is open during metering.
- (B) The amount of fuel injected depends upon the injector pre-load torque setting.
- (C) The amount of fuel injected is dependent upon the distance of plunger travel.
- (D) The amount of fuel injected is dependent upon the cylinder compression pressure and the cylinder compression temperature.

If choice A is selected set score to 1.

19. The main propulsion diesel engines on your ship-docking tug are fitted with conventional hydraulically operated injector nozzles of the orifice type. When testing an injector by performing a pop-test on an injector test stand, you observe no leakage prior to reaching the popping pressure, the pressure holds at just below the popping pressure, the actual popping pressure is within specification, but the spray pattern is distorted. What maintenance is required?

- (A) The injector spring compression must be readjusted or a broken spring replaced.
- (B) The injector needle valve and seat must be reconditioned or replaced.
- (C) The injector nozzle tip orifices must be reconditioned by cleaning or the tip replaced.
- (D) The injector spindle and nozzle holder bore must be reconditioned or replaced.

If choice C is selected set score to 1.

20. You suspect that a diesel generator set on your river push boat has a misfiring cylinder because the engine, although warm, is running roughly. The six-cylinder engine is fitted with a multi-plunger in-line high pressure fuel injection pump with hydraulically operated injector nozzles. When you slacken the high pressure fuel line fitting at No. 5 fuel injector nozzle, the engine continues to run roughly as before with no real change. Upon re-tightening the high pressure fuel line fitting, the engine begins and continues to run smoothly. What does this indicate?

- (A) No. 5 cylinder was and continues to be firing properly. No. 6 cylinder is misfiring. No. 1, No. 2, No. 3, and No. 4 cylinders are all firing properly.
- (B) No. 5 cylinder was and continues to be misfiring. You have successfully located the misfiring cylinder.
- (C) No. 5 cylinder was and continues to be firing properly. No. 1, No. 2, No. 3, or No. 4 cylinder is misfiring. No. 6 cylinder is firing properly.
- (D) No. 5 cylinder had been misfiring. You have successfully purged the air from the No. 5 cylinder high pressure fuel line, and the engine is no longer misfiring.

If choice D is selected set score to 1.

21. The towboat to which you are assigned has main diesel engines fitted with intake and exhaust systems as shown in the simplified illustration. What is the primary purpose of the intercooler? Illustration MO-0180

- (A) Provide cooling to the turbocharger turbine.
- (B) Increase the charge air density to increase the engine power output.
- (C) Provide cooling to the turbocharger blower.
- (D) Eliminate the need for water jacketing of the exhaust receiver.

If choice B is selected set score to 1.

22. The diesel generator set drive engines on your river push boat 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 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.
- (B) 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.
- (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.

If choice D is selected set score to 1.

23. The diesel engines on your tug are all protected with dry-type air filters. When changing filter elements what visual indication would cause you to suspect that the engine has been contaminated with dust as the result of improperly sealing of the filter element gasket?

- (A) The "dirty" side of the air filter housing is coated with dust.
- (B) The "clean" side of the air filter element is streaked with dust.
- (C) The "clean" side of the air filter element is clean and free of dust.
- (D) The "dirty" side of the air filter element is coated with dust.

If choice B is selected set score to 1.

24. What statement is true concerning the primary purpose of an exhaust muffler/silencer fitted on the exhaust system for any diesel engine so equipped?

- (A) Maximize sound attenuation while maximizing exhaust system back pressure.
- (B) Maximize sound attenuation while minimizing exhaust system back pressure.
- (C) Minimize sound attenuation while maximizing exhaust system back pressure.
- (D) Minimize sound attenuation while minimizing exhaust system back pressure.

If choice B is selected set score to 1.

25. Assuming the use of ultra-low sulfur content diesel fuel, what combination of conditions associated with harbor tug engine room operations would require the most frequent draining of exhaust systems of condensation?

- (A) Winter operations with lengthy ship escort transit times.
- (B) Summer operations with prolonged idling on station.
- (C) Winter operations with prolonged idling on station.
- (D) Summer operations with lengthy ship escort transit times.

If choice C is selected set score to 1.

26. A main propulsion diesel engine on your towing vessel produces gray to black smoke under virtually all load conditions as observed at the stack. The heavier the load on the engine, the darker the smoke becomes. What condition would most likely account for this?

- (A) Excessively worn exhaust valve guides.
- (B) Leaking exhaust piping expansion joints.
- (C) Excessively restricted exhaust silencer/muffler.
- (D) Leaking exhaust manifold cooling water jackets.

If choice C is selected set score to 1.

27. Your salvage tug is fitted with cooling water systems serving the main propulsion diesel engines as shown in the illustration. Which heat exchanger/cooler application and aspect would most likely require periodic mechanical cleaning with a specially designed brush? Illustration MO-0137

- (A) The outside of the tubes of the lube oil cooler.
- (B) The inside of the tubes of the RW/FW heat exchanger.
- (C) The inside of the tubes of the lube oil cooler.
- (D) The outside of the tubes of the RW/FW heat exchanger.

If choice B is selected set score to 1.

28. The fresh water cooling systems serving the main engines on your ship-docking tug are arranged as shown in the illustration. If coolant drain valves are inadvertently opened during engine operation, what combination set of symptoms would most likely result? Illustration MO-0138

- (A) Low level in the jacket water expansion tank.
  High fresh water outlet temperature from the engine.
  High freshwater pump(s) discharge pressure.
- (B) High level in the jacket water expansion tank.
  High fresh water outlet temperature from the engine.
  High fresh water pump(s) discharge pressure.
- (C) Low level in the jacket water expansion tank.
  High fresh water outlet temperature from the engine.
  Low freshwater pump(s) discharge pressure.
- (D) Low level in the jacket water expansion tank.
  Low fresh water outlet temperature from the engine.
  Low fresh water pump(s) discharge pressure.

If choice C is selected set score to 1.

29. In comparison to a naturally aspirated 4-stroke cycle engine, what characteristics are associated with turbocharging?

- (A) The exhaust gas pressure on the engine exhaust manifold is decreased, and the intake air temperature to the cylinders is decreased.
- (B) The exhaust gas pressure on the engine exhaust manifold is decreased, and the intake air temperature to the cylinders is increased.
- (C) The exhaust gas pressure on the engine exhaust manifold is increased, and the intake air temperature to the cylinders is increased.
- (D) The exhaust gas pressure on the engine exhaust manifold is increased, and the intake air temperature to the cylinders is decreased.

If choice C is selected set score to 1.

30. The two-stroke cycle main propulsion engines on the river pushboat to which you are assigned are fitted with Roots-type blowers for scavenging purposes. Upon inspection of the air boxes, what condition would indicate a need to replace the Roots-type blower immediately?

- (A) Water accumulations
- (B) Oil accumulations
- (C) Iron dust residue
- (D) Aluminum dust residue

If choice D is selected set score to 1.

31. A Roots-blown, two-stroke cycle main propulsion engine on the ship-docking tug to which you are assigned is emitting excessive bluish-tinged smoke from the stack. Further investigation reveals excessive lube oil consumption. What condition would most likely account for this?

- (A) Worn blower rotor shaft seals.
- (B) Restricted blower air intake filter.
- (C) Leaking fuel injector needle valve.
- (D) Restricted scavenging air intake ports.

If choice A is selected set score to 1.

32. The lubricating oil system supporting the main propulsion reduction gear on the ship-docking tug to which you are assigned is fitted with a lube oil strainer as shown in the illustration. What strainer attribute will dictate the degree of filtration in terms of the particle size capable of being filtered? Illustration MO-0057

- (A) The dimensions of the triangular oil passages in each disc conveying the strained oil upward.
- (B) The length of the oil sump enclosing the straining element.
- (C) The number of discs in the disc-stack making up the straining element.
- (D) Vertical spacing between the metal discs as determined by the thickness of the cleaner blades.

If choice D is selected set score to 1.

33. The escort tug to which you are assigned is fitted with hydraulic clutches similar to that shown in the illustration. If the time required for the clutch to disengage is unacceptably long, which of the following conditions would most likely be responsible for this? Illustration MO-0089

- (A) Clutch operating fluid is maintained at too high a temperature.
- (B) Clutch operating fluid is maintained at too low a temperature.
- (C) Solid contaminants are present in the hydraulic fluid.
- (D) Fluid clutch sump level maintained at too high a level.

If choice C is selected set score to 1.

34. The main engines on your harbor tug are equipped with over speed trip devices as shown in the illustration. By what method is the engine shutdown on an over speed condition? Illustration MO-0171

- (A) A trip shaft cam positions all the unit injectors plungers to the bottom of their respective strokes, preventing plunger reciprocation, which results in engine shutdown.
- (B) The fuel control linkage controlling the unit injector racks goes to the no fuel position, which results in engine shutdown.
- (C) A trip shaft cam positions all the unit injectors plungers to the top of their respective strokes, preventing plunger reciprocation, which results in engine shutdown.
- (D) A solenoid valve in the common fuel supply line to the unit injectors is closed, which results in engine shutdown.

If choice A is selected set score to 1.

35. The main engines on your harbor tug are protected with a low crankcase oil level detector protective device designed to provide an alarm when the main sump oil level drops below a certain level. It is malfunctioning, and upon investigation you determine from the technical manual that the oil level detector is a sealed unit. What statement best represents the best strategy to remedy this situation?

- (A) The oil level detector is adjusted just as if it was an unsealed unit, without regard to any seals associated with the unit.
- (B) The oil level detector is adjusted just as if it was an unsealed unit, but the seals must be re-established before placing the unit back into operation.
- (C) The oil level detector must be replaced with a new detector if it is found to be defective, since field adjustments are not possible on this type of unit.
- (D) The oil level detector seals must be broken before adjustments can be made, as long as new seals are established before placing the unit back into operation.

If choice C is selected set score to 1.

36. The rated speed of the main propulsion diesel engines on your towing vessel is 900 rpm. The installed centrifugal over speed trip device similar to the one shown in the illustration is designed to shut down the engine at 110% of rated speed. Upon testing the over speed trip device, you determine that the actual shutdown occurs at 945 rpm. Which of the following would account for this? Illustration MO-0101

- (A) The compression spring (item 12) was excessively compressed when the over speed trip was last set.
- (B) The jam nut was not properly tightened against the adjusting nut (items 13) when the over speed trip was last set.
- (C) The throw-out weight (item 10) link bolt (item 15 and 16) is binding within the spring guide (item 14) drilling.
- (D) The throw-out weight (item 10) pivot bolt (not labelled) is binding within the counterweight (item 1 through 9) drilling.

If choice B is selected set score to 1.

37. The auxiliary oil-fired water-tube steam boiler on your ship-docking tug is equipped with a water column similar to that shown in the illustration. Assuming that the water level is at the normal operating water level (NOWL) of the boiler, what would be the result of alternately opening and reclosing each of the water column tri-cocks? Illustration MO-0093

- (A) Steam should issue from the uppermost tri-cock, and water should issue from lowermost tri-cock. Either steam or water could issue from the middle tri-cock.
- (B) Steam should issue from both the uppermost and middle tri-cocks, and water should issue from the lowermost tri-cock.
- (C) Steam should issue from the uppermost tri-cock, and water should issue from both the middle and lowermost tri-cocks.
- (D) Water should issue from each of the uppermost, middle, and lowermost tri-cocks.

If choice A is selected set score to 1.

38. What would be the most practical and efficient way of removing soot deposits from the fire-sides of the tubes of an auxiliary water-tube natural-circulation boiler as fitted on your sea-going tug?

- (A) Use of an air lance.
- (B) Use of a suitable acid.
- (C) Use of a high-pressure water jet.
- (D) Use of a power driven wire brush.

If choice A is selected set score to 1.

39. You are observing the flame condition on an oil-fired auxiliary boiler installed on your coast-wise tug through an observation window peephole. The flame is a reddish color accompanied by a noticeably panting/pulsating furnace. What would be the correlating color of the gases exhausting from the stack under these conditions?

- (A) Clear stack.
- (B) Light brown haze.
- (C) White smoke.
- (D) Dense black smoke.

If choice D is selected set score to 1.

40. Due to environmental and safety concerns, the towing winch drive diesel engine cooling water system is treated with propylene glycol for protection against freezing. According to the illustration, what would be the limit of protection if 40 pints of propylene glycol are used in treating a cooling water system with a volumetric capacity of 10 gallons? Illustration MO-0209

- (A) 10°F
- (B) -6°F
- (C) -30°F
- (D) -53°F

If choice C is selected set score to 1.

41. In a closed, re-circulating fresh water cooling system used for the towing winch drive engine on your coastwise towing vessel, what function would chemical treatment with pure ethylene glycol mixed with fresh water primarily perform?

- (A) Freezing point and boiling point elevation.
- (B) Freezing point and boiling point depression.
- (C) Freezing point depression and boiling point elevation.
- (D) Freezing point elevation and boiling point depression.

If choice C is selected set score to 1.

42. After a main diesel engine on your river push boat has experienced a safety shutdown due to excessive crankcase pressure, why is it important to wait 2 hours before opening the crankcase to investigate the cause of the trip?

- (A) Opening the crankcase before 2 hours has elapsed may result in a crankcase explosion.
- (B) Opening the crankcase before 2 hours has elapsed may result in crankshaft rotation.
- (C) Opening the crankcase before 2 hours has elapsed may result in excessively rapid cooling.
- (D) Opening the crankcase before 2 hours has elapsed may result in the engine spontaneously restarting.

If choice A is selected set score to 1.

43. A main propulsion diesel engine on your ship docking tug has experienced a safety shutdown due to high lubricating oil temperature. What is the appropriate response?

- (A) Immediately restart the engine, and monitor the oil temperature to verify the cause of the shutdown.
- (B) Allow 2 hours for the engine to cool down before attempting to inspect the engine and correct the cause of the trip before attempting to restart the engine.
- (C) Immediately perform the engine inspections to determine the cause of the high oil temperature safety shutdown.
- (D) Allow the engine to cool off for two minutes, then restart and monitor the lubricating oil temperature to verify the cause of the shutdown.

If choice B is selected set score to 1.

44. When rolling over a main engine on your river push boat prior to starting with the cylinder test valves open to expel any fluids accumulated within the cylinders, a rather large amount of water is discharged. What is the appropriate response?

- (A) Start the engine, but run the engine with the cylinder test valves cracked slightly open.
- (B) Start the engine, but maintain the jacket water expansion tank level higher than normal.
- (C) Do not allow the engine to be started until the cause of the water discharge has been determined and corrected.
- (D) Start the engine, but monitor all fluid levels very closely, especially that of the jacket water.

If choice C is selected set score to 1.

45. Suppose the diesel generator set drive engines are of the type shown in the illustration on your ship docking tug. What description best represents the operating cycle and aspiration method? Illustration MO-0165

- (A) Roots-blown, four-stroke cycle engine.
- (B) Crankcase scavenged, two-stroke cycle engine.
- (C) Roots-blown, two-stroke cycle engine.
- (D) Naturally aspirated, two-stroke cycle engine

If choice C is selected set score to 1.

46. Suppose the diesel generator set drive engines are of the type shown in the illustration on your ship docking tug. What description best represents the operating cycle and aspiration method? Illustration MO-0163

- (A) Crankcase scavenged, four-stroke cycle engine.
- (B) Naturally aspirated, four-stroke cycle engine.
- (C) Crankcase scavenged, two-stroke cycle engine.
- (D) Naturally aspirated, two-stroke cycle engine

If choice B is selected set score to 1.

47. The ship-docking tug to which you are assigned has main engines fitted with injectors similar to those shown in the illustration. What statement is true concerning the operating principle of this type of injector? Illustration MO-0151

- (A) The fuel pressure within the annulus and the compression load on the spring are both needle valve opening forces.
- (B) The fuel pressure within the annulus is a needle valve closing force, the compression load on the spring is a needle valve opening force.
- (C) The fuel pressure within the annulus and the compression load on the spring are both needle valve closing forces.
- (D) The fuel pressure within the annulus is a needle valve opening force, the compression load on the spring is a needle valve closing force.

If choice D is selected set score to 1.

48. The harbor tug to which you are assigned has a main engine fuel system as shown in the illustration. Besides preventing the attached fuel oil pump and the hand priming fuel oil pump from discharging through the other, what other purpose do the anti-flood check valves serve? Illustration MO-0152

- (A) They prevent backflow of fuel from the engine to the day tank when the engine is shut down and when the day tank is located below the engine.
- (B) They prevent backflow of fuel from the engine to the day tank when the engine is shut down and when the day tank is located above the engine.
- (C) They prevent backflow of fuel from the engine to the day tank when the engine is running and when the day tank is located below the engine.
- (D) They prevent backflow of fuel from the engine to the day tank when the engine is running and when the day tank is located above the engine.

If choice A is selected set score to 1.

49. The main propulsion engines onboard your tractor tug use a lubricating oil system as shown in the illustration. What item number represents the lubricating oil filter? Illustration MO-0183

- (A) 2
- (B) 5
- (C) 10
- (D) 12

If choice B is selected set score to 1.

50. The deck winch drive engine onboard your salvage tug uses a lubricating oil filtration scheme as shown in the illustration. What type of filtration system is illustrated? Illustration MO-0182

- (A) Sump filtration
- (B) Full-flow filtration
- (C) Bypass filtration
- (D) Shunt filtration

If choice C is selected set score to 1.

51. The main propulsion diesel engines fitted on your salvage tug are started with compressed air using the system illustrated. What is the starting method used with this system? Illustration MO-0199

- (A) Hydraulic cranking motor(s) with air over hydraulics
- (B) Direct air admission with air start distributor
- (C) Air cranking motor(s)
- (D) Direct air admission with cam actuated air start valves.

If choice C is selected set score to 1.

52. The harbor tug to which you are assigned is fitted with 4-stroke cycle, 6-cylinder in-line diesel generator sets. Using the chart shown in the illustration, what is the firing order of the engines? Illustration MO-0164

- (A) 1-2-3-4-5-6
- (B) 1-5-3-6-2-4
- (C) 1-4-2-6-3-5
- (D) Not enough information is provided to determine the firing order.

If choice B is selected set score to 1.

53. The ocean-going tug to which you are assigned is fitted with auxiliary engines as partly shown in the illustration. What statement is true concerning the valve guide and valve seat arrangements? Illustration MO-0163

- (A) The valve guides are replaceable inserts, and the valve seats are integral (non-replaceable).
- (B) The valve guides and the valve seats are both replaceable inserts.
- (C) The valve guides are integral (non-replaceable), and the valve seats are replaceable inserts.
- (D) The valve guides and the valve seats are both integral (non-replaceable).

If choice B is selected set score to 1.

54. The ship-docking tug to which you are assigned is fitted with auxiliary diesel engines of the type shown in the illustration. In terms of valve operating gear and cylinder liner type, what statement is true? Illustration MO-0006

- (A) This is a pushrod operated overhead valve engine with jacketed cylinder liners.
- (B) This is an overhead cam engine with wet cylinder liners.
- (C) This is an overhead cam engine with jacketed cylinder liners.
- (D) This is a pushrod operated overhead valve engine with wet cylinder liners.

If choice D is selected set score to 1.

55. The ship-docking tug to which you are assigned is fitted with main propulsion diesel engines of the type shown in the illustration. In terms of valve operating gear, cylinder liner type, and connecting rod type, what statement is true? Illustration MO-0192

- (A) This is a pushrod operated overhead valve engine, with wet cylinder liners and conventional connecting rods.
- (B) This is a pushrod operated overhead valve engine, with jacketed cylinder liners and articulated connecting rods.
- (C) This is an overhead cam engine, with wet cylinder liners and conventional connecting rods.
- (D) This is an overhead cam engine, with jacketed cylinder liners and marine-type connecting rods.

If choice A is selected set score to 1.

56. The river push boat to which you are assigned has diesel generators fitted with intake and exhaust systems as shown in the illustration. What does the component labeled "3" represent? Illustration MO-0176

- (A) Wet muffler
- (B) Charge air cooler
- (C) Charge air manifold
- (D) Exhaust manifold

If choice B is selected set score to 1.

57. The harbor tug to which you are assigned has main engines fitted with intake and exhaust systems as shown in the illustration. What type of turbo-charging configuration is used? Illustration MO-0076

- (A) 2-stage turbo-charging.
- (B) Pulse turbo-charging.
- (C) Constant pressure turbo-charging.
- (D) Boost-controlled turbo-charging.

If choice B is selected set score to 1.

58. The fresh water cooling systems serving the main engines of the towing vessel to which you are assigned are arranged as shown in the illustration. What statement best describes the arrangement of the fresh water keel cooler shown in the system diagram? Illustration MO-0138

- (A) The keel cooler is mounted on the outside of the hull below the water line.
- (B) The keel cooler is mounted on the outside of the hull above the water line.
- (C) The keel cooler is mounted on the inside of the hull above the water line.
- (D) The keel cooler is mounted on the inside of the hull below the water line.

If choice A is selected set score to 1.

59. The winch drive engine on the harbor tug to which you are assigned is fitted with a Roots-type blower as shown in the illustration. What statement is true concerning this blower? Illustration MO-0082

- (A) Rotor "1" turns counter-clockwise, and rotor "2" turns clockwise. Area "3" is the discharge passage, and area "4" is the suction passage.
- (B) Rotor "1" turns clockwise, and rotor "2" turns counter-clockwise. Area "3" is the discharge passage, and area "4" is the suction passage.
- (C) Rotor "1" turns clockwise, and rotor "2" turns counter-clockwise. Area "3" is the suction passage, and area "4" is the discharge passage.
- (D) Rotor "1" turns counter-clockwise, and rotor "2" turns clockwise. Area "3" is the suction passage, and area "4" is the discharge passage.

If choice A is selected set score to 1.

60. The ship-docking tug to which you are assigned is fitted with main propulsion engines driving through pneumatic airflex clutches as shown in the illustration. What statement is true concerning this type of clutch? Illustration MO-0141

- (A) The clutch is an expanding type clutch and expands to engage against the clutch gland when inflated.
- (B) The clutch is a constricting type clutch and constricts to engage against the clutch gland when inflated.
- (C) The clutch is an expanding type clutch and expands to engage against the clutch drum when inflated.
- (D) The clutch is a constricting type clutch and constricts to engage against the clutch drum when inflated.

If choice D is selected set score to 1.

61. Suppose one of the overhead camshafts on the V-type main propulsion diesel engines on your tug are fitted on the forward end with the device shown in the illustration. In addition to serving as a counterweight, what other function does the device serve? Illustration MO-0101

- (A) Overload sensor
- (B) Harmonic balancer
- (C) Torsional vibration damper
- (D) Overspeed trip

If choice D is selected set score to 1.

62. The steam generating plant on your articulated tug-barge unit is of the forced-circulation type. Which figure of the illustration represents a steam generator or boiler of this type? Illustration MO-0197

- (A) 1
- (B) 2
- (C) 3
- (D) 4

If choice C is selected set score to 1.

63. Diesel engine closed, re-circulating cooling water systems are particularly prone to cavitation corrosion/erosion. Which of the listed cooling system/engine components has surfaces in contact with the coolant that are most susceptible to this type of corrosion and erosion?

- (A) Cylinder cooling water jackets.
- (B) Wet-type cylinder liners.
- (C) Engine exhaust cooling water jackets.
- (D) Cylinder head cooling water passages.

If choice B is selected set score to 1.

64. What statement is true concerning diesel engines, such as those used for main propulsion and auxiliary power on tugboats?

- (A) Diesel engines are reciprocating, internal combustion engines using the heat of compression to achieve ignition.
- (B) Diesel engines are reciprocating, external combustion engines using the heat of compression to achieve ignition.
- (C) Diesel engines are reciprocating, internal combustion engines using an electric spark to achieve ignition.
- (D) Diesel engines are rotary, internal combustion engines using the heat of compression to achieve ignition.

If choice A is selected set score to 1.

65. Suppose the main propulsion diesel engines on your river pushboat are fitted with pressure-compensated governors as shown in the illustration. What function does the engine lube oil pressure connection provide? Illustration MO-0156

- (A) It is used as a governor lubricant and as a hydraulic power medium for the power cylinder.
- (B) It is used solely for the purpose of achieving engine shutdown on low engine lube oil pressure.
- (C) It is used solely for the purpose of activating an alarm on low engine lube oil pressure.
- (D) It is used for both activating an alarm and achieving engine shutdown on low engine lube oil pressure.

If choice D is selected set score to 1.

66. The oil of a speed control governor on one of your tug's main diesel engines is foaming excessively, and internally governor parts are sticking due to corrosion. What is the most likely cause?

- (A) The type of oil used is incompatible with governor seals.
- (B) The oil is excessively contaminated with water.
- (C) The viscosity grade of the oil is improper for existing temperature conditions.
- (D) The oil is excessively contaminated with solids.

If choice B is selected set score to 1.

67. The main engines on your ocean-going tug are fitted with speed control governors of the type shown in the illustration. What is the purpose of the compensation system, consisting of the buffer cylinder, buffer piston, buffer springs, and compensation needle valve? Illustration MO-0158

- (A) It limits engine speed to a maximum value to prevent over speeding.
- (B) It prevents engine hunting when responding to load changes.
- (C) It senses the engine speed setting delivered from the bridge.
- (D) It senses the actual engine speed of rotation.

If choice B is selected set score to 1.

68. Suppose the generator set drive engines on your ship docking tug are fitted with hydraulic isochronous governors such as shown in the illustration. How is the speed set point conveyed from the generator control panel on the main switchboard conveyed to the governor fitted on the diesel engine? Illustration MO-0160

- (A) Electrically via wire connections
- (B) Pneumatically via tubing connections
- (C) Mechanically via cable connections
- (D) Hydraulically via tubing connections

If choice A is selected set score to 1.

69. The towing vessel to which you are assigned is fitted with a totally pneumatic propulsion control system as shown in the illustration. If propulsion control functions perfectly from the engine room control station, but will not function at all from any of the remote stations, which of the following system faults best accounts for these symptoms? Illustration MO-0168

- (A) The pilot house/remote transfer valve at the pilot house has a blocked remote port.
- (B) The attendance valve at the pneumatic remote control station has a blocked outlet port.
- (C) The local/remote transfer valve at the engine room control station has a blocked remote port.
- (D) The local/remote transfer valve at the engine room control station has a blocked local port.

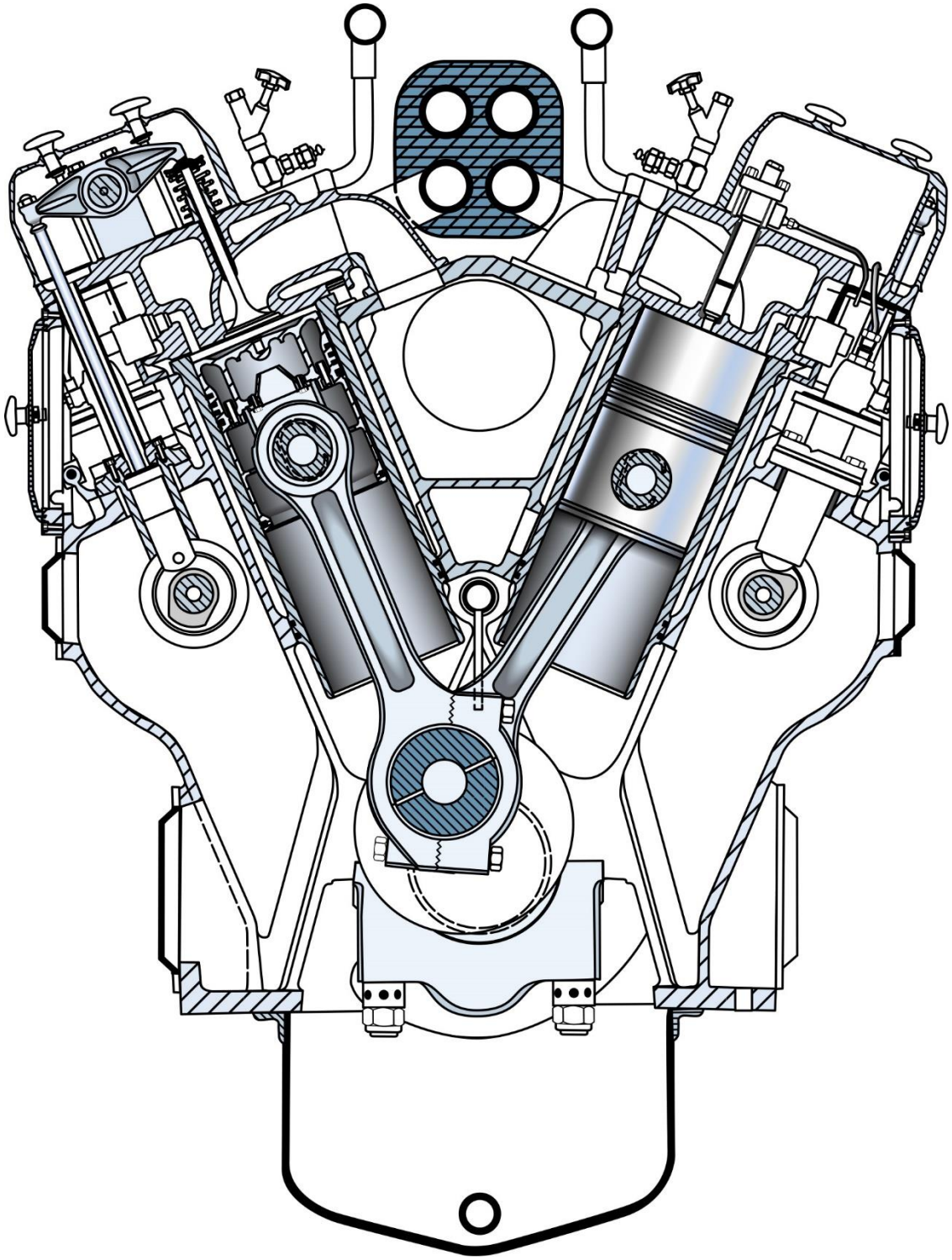
If choice C is selected set score to 1.

70. The pneumatic propulsion control system used on your towing vessel is configured as shown in the illustration. In terms of clutch air system maintenance, what statement best represents operational requirements? Illustration MO-0168

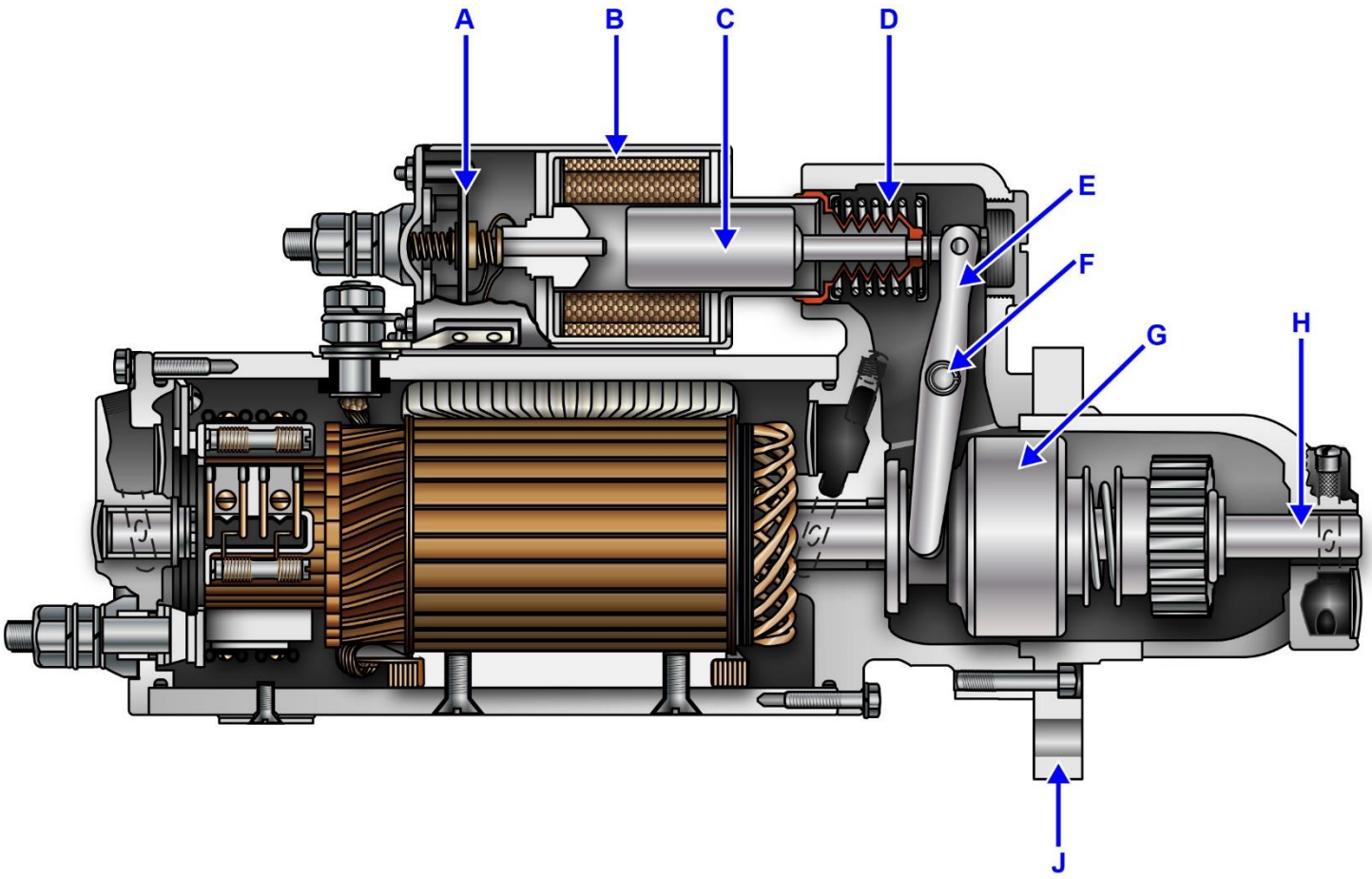
- (A) Whereas the clutch air pressure is critical, the dryness and cleanliness of the clutch air are of secondary concern.
- (B) Whereas the dryness of clutch air is critical, the pressure and cleanliness of the clutch air are of secondary concern.
- (C) Whereas the cleanliness of clutch air is critical, the dryness and pressure are clutch air are of secondary concern.
- (D) The pressure, dryness, and cleanliness of clutch air are all critical to successful pneumatic propulsion control operations.

If choice D is selected set score to 1.

MO-0006



MO-0051



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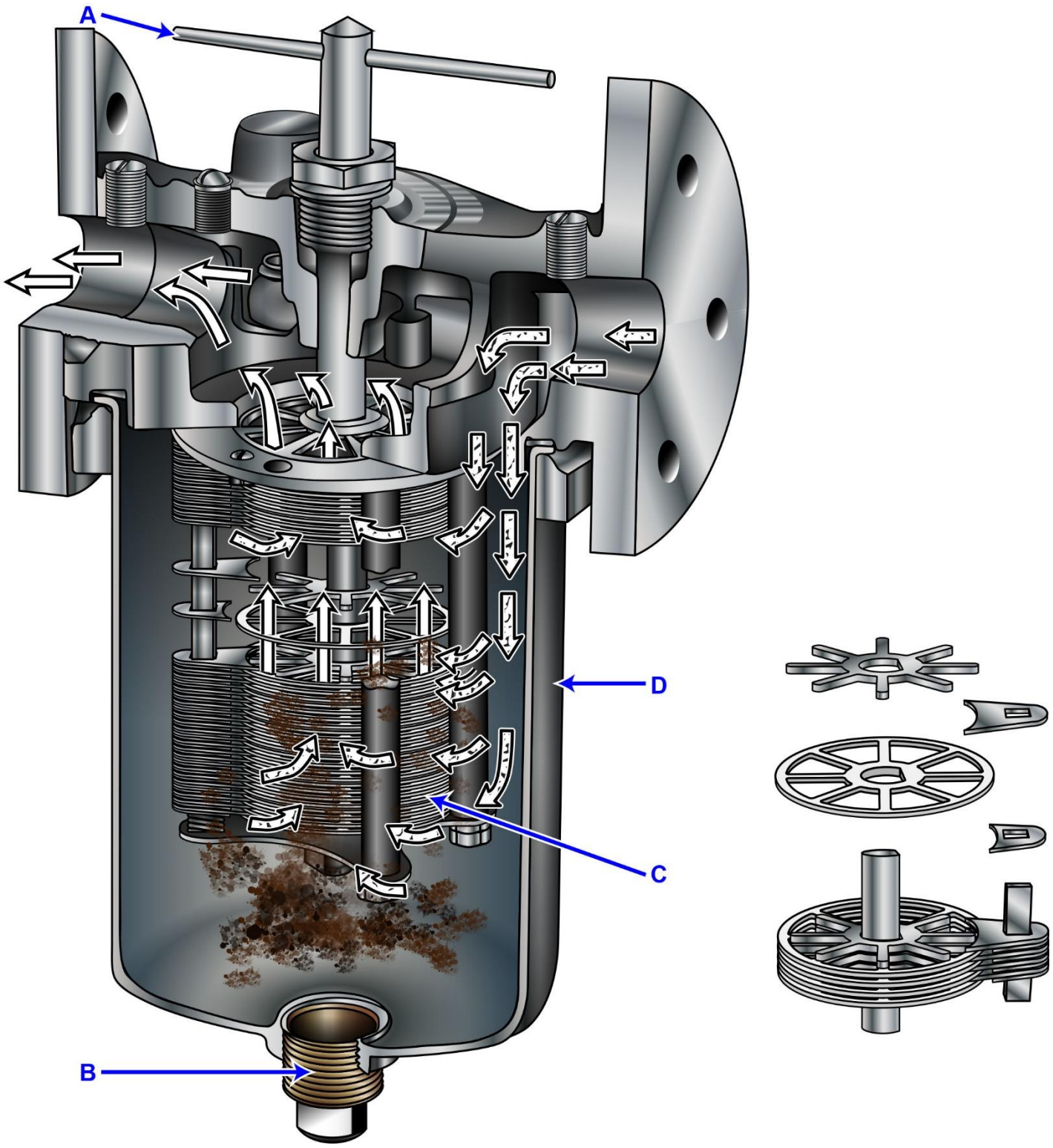
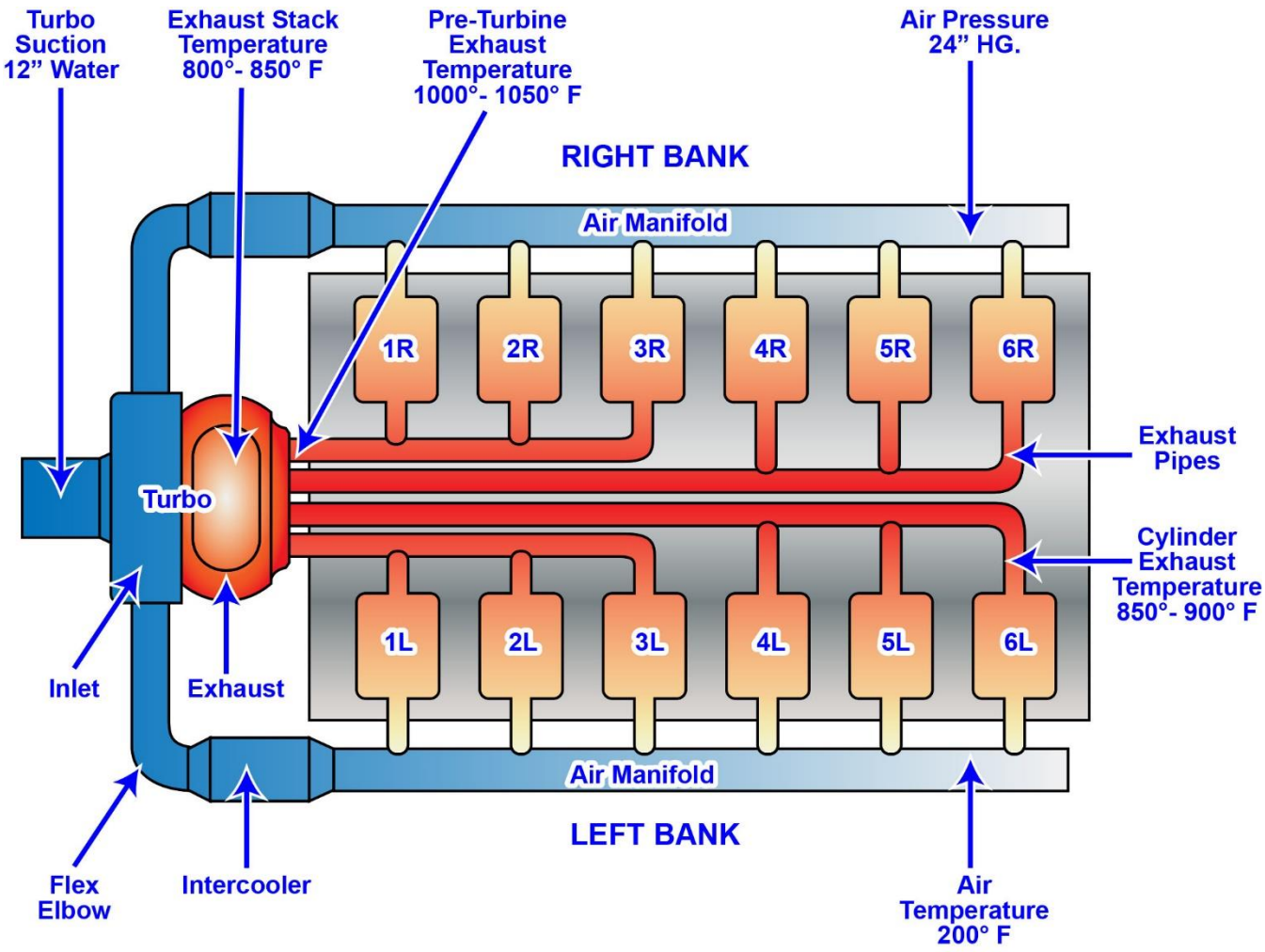
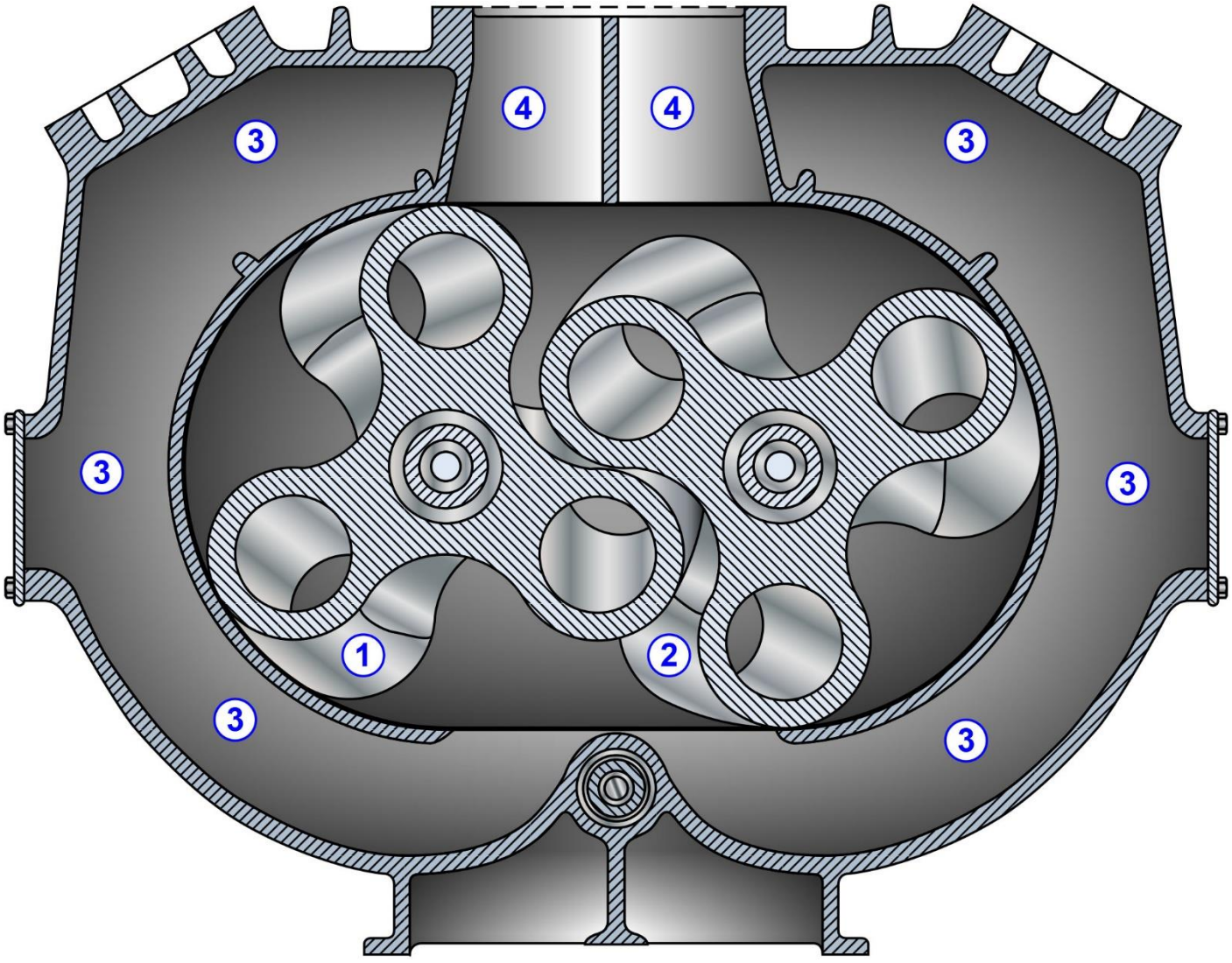


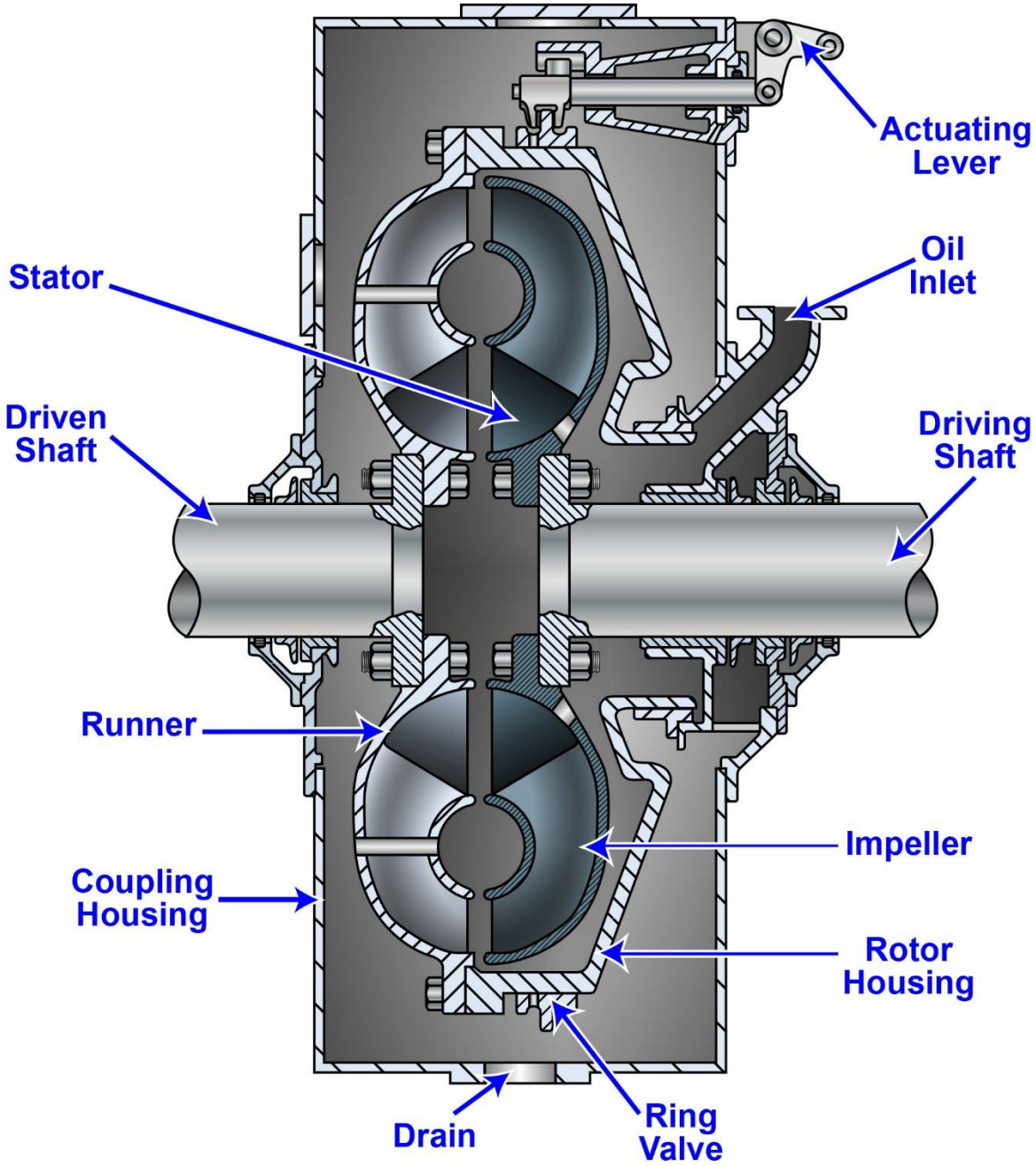
MO-0076



MO-0082



MO-0089



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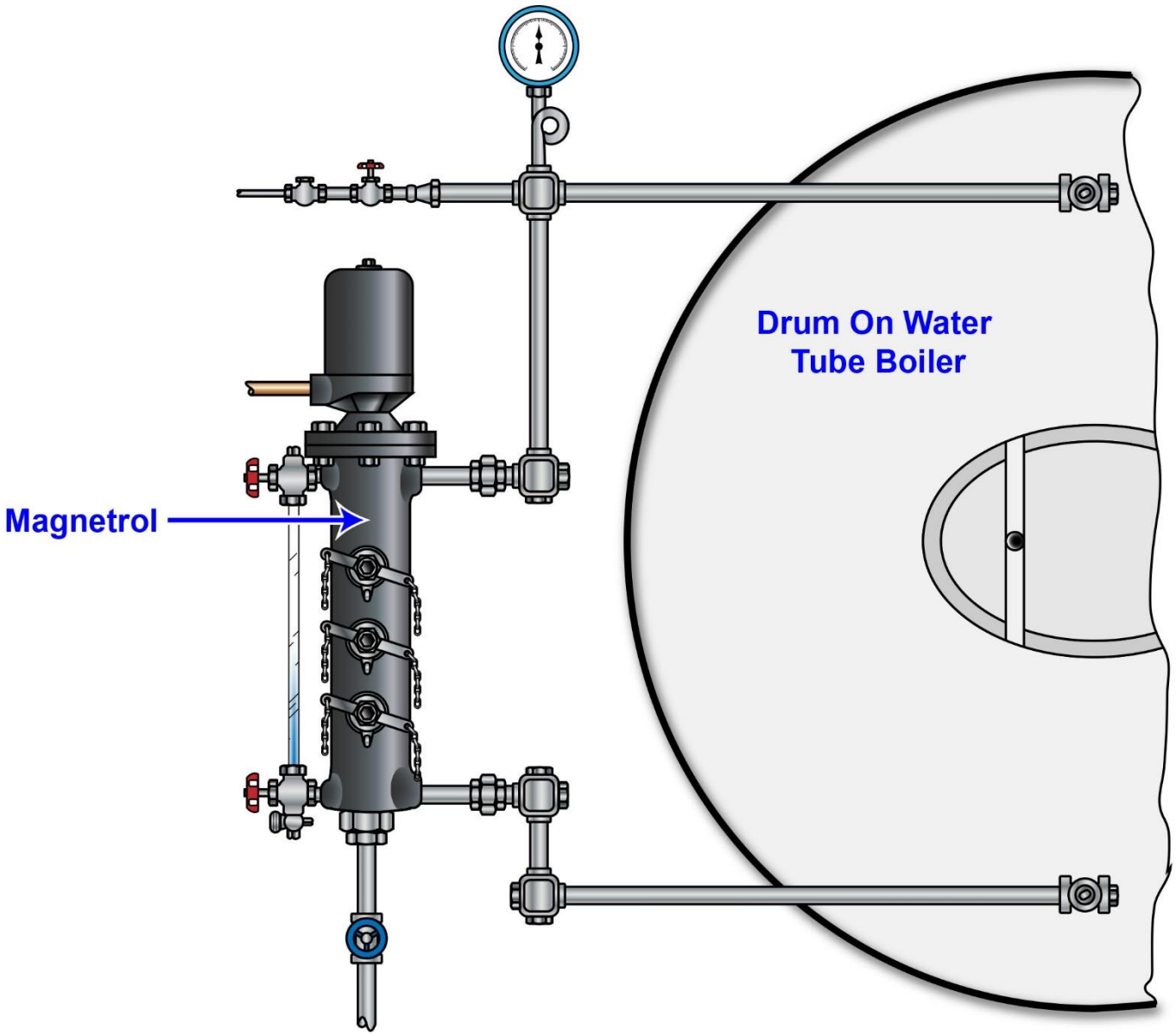
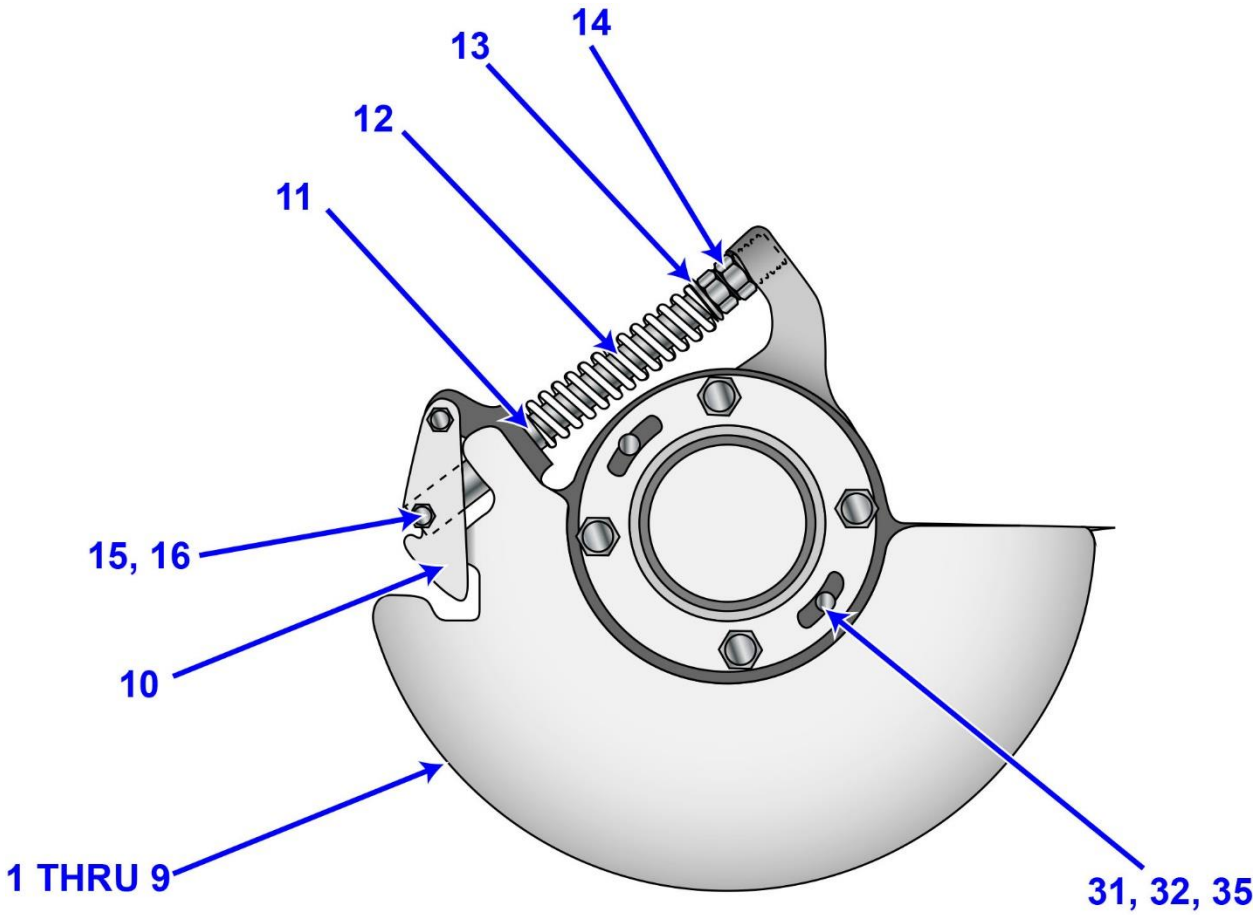
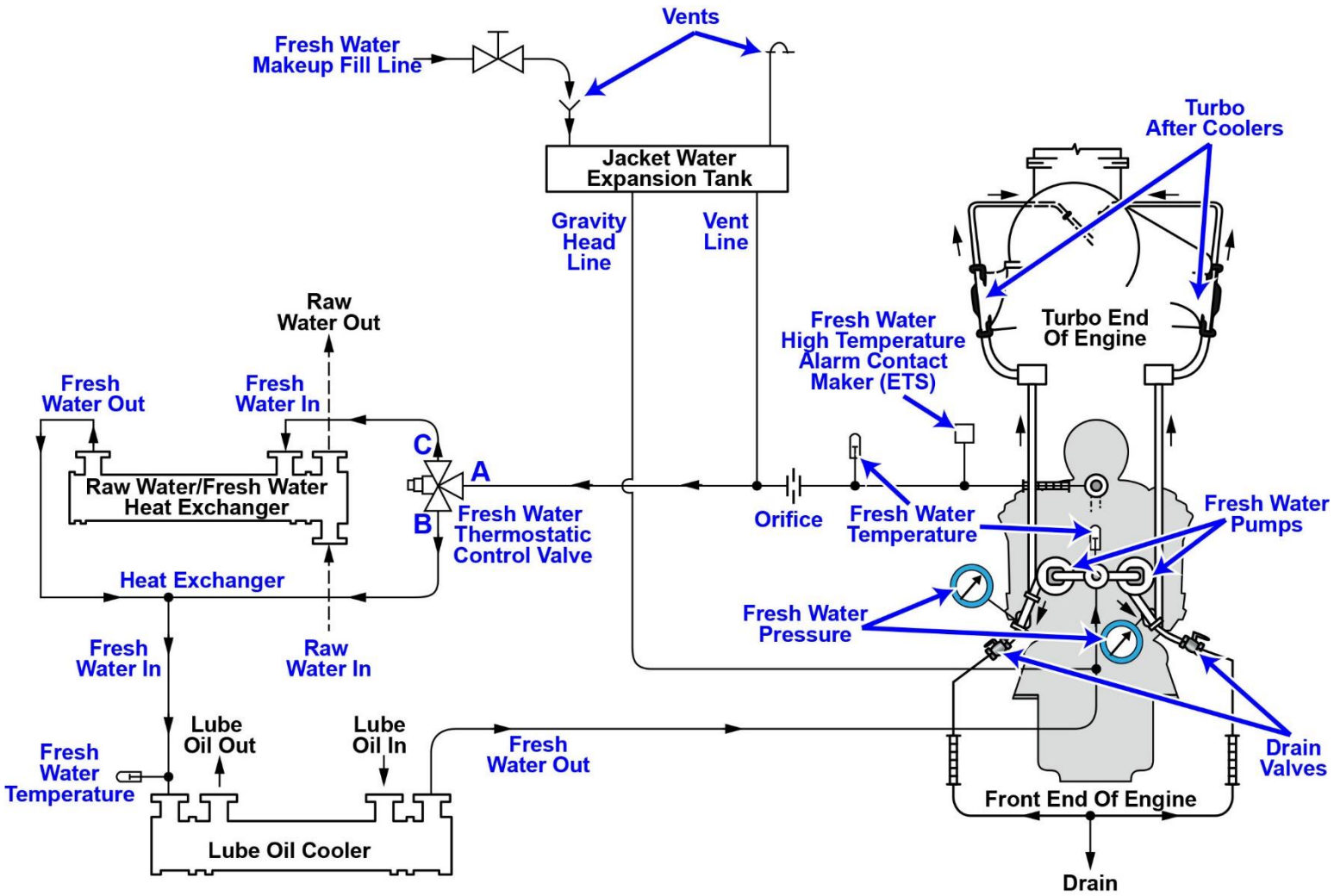


Adapted for testing purposes only from MAGNETROL, Installation, Maintenance, Operating Instructions for Models W126, W127, W251, W252, W291

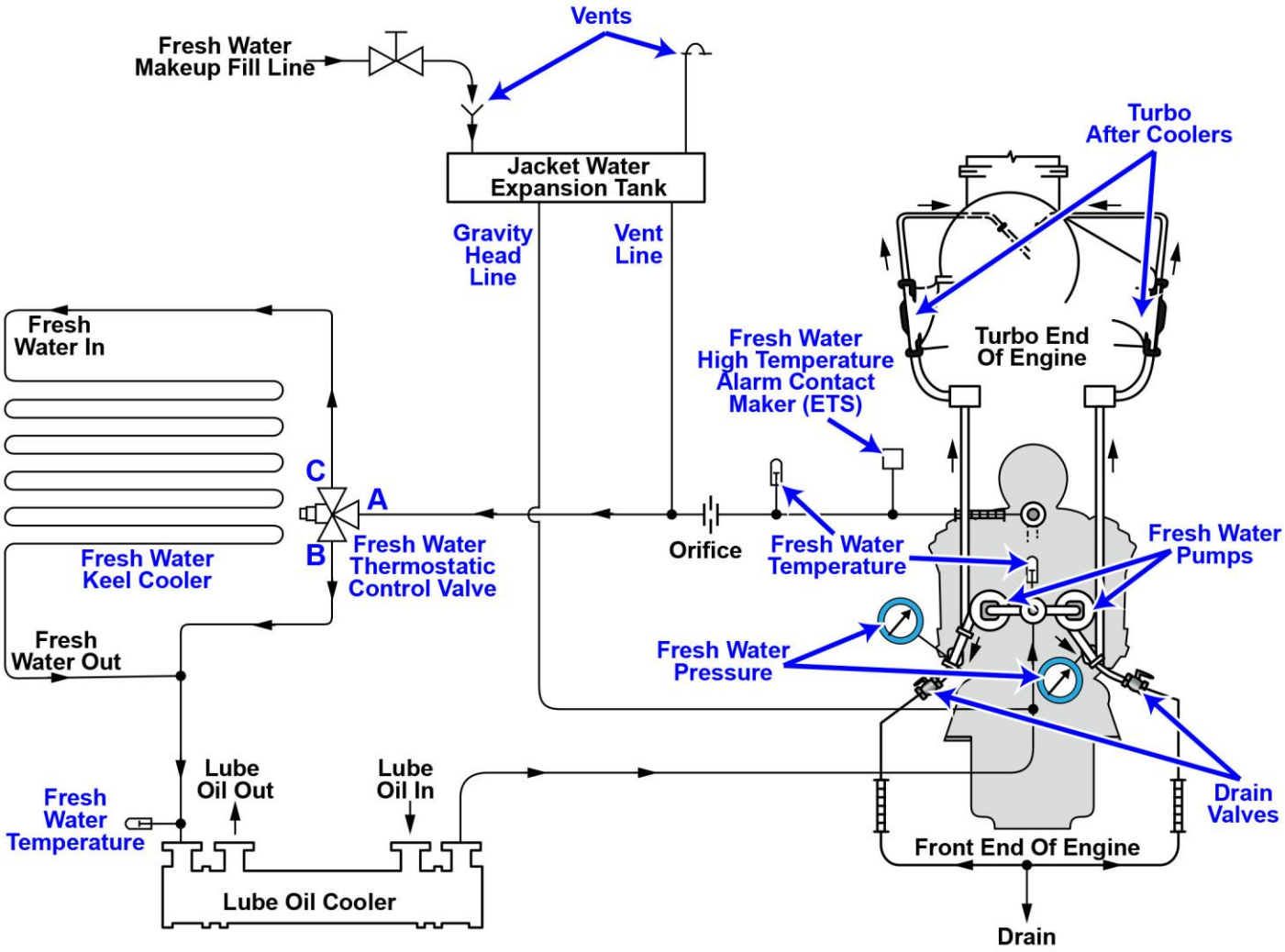
MO-0101



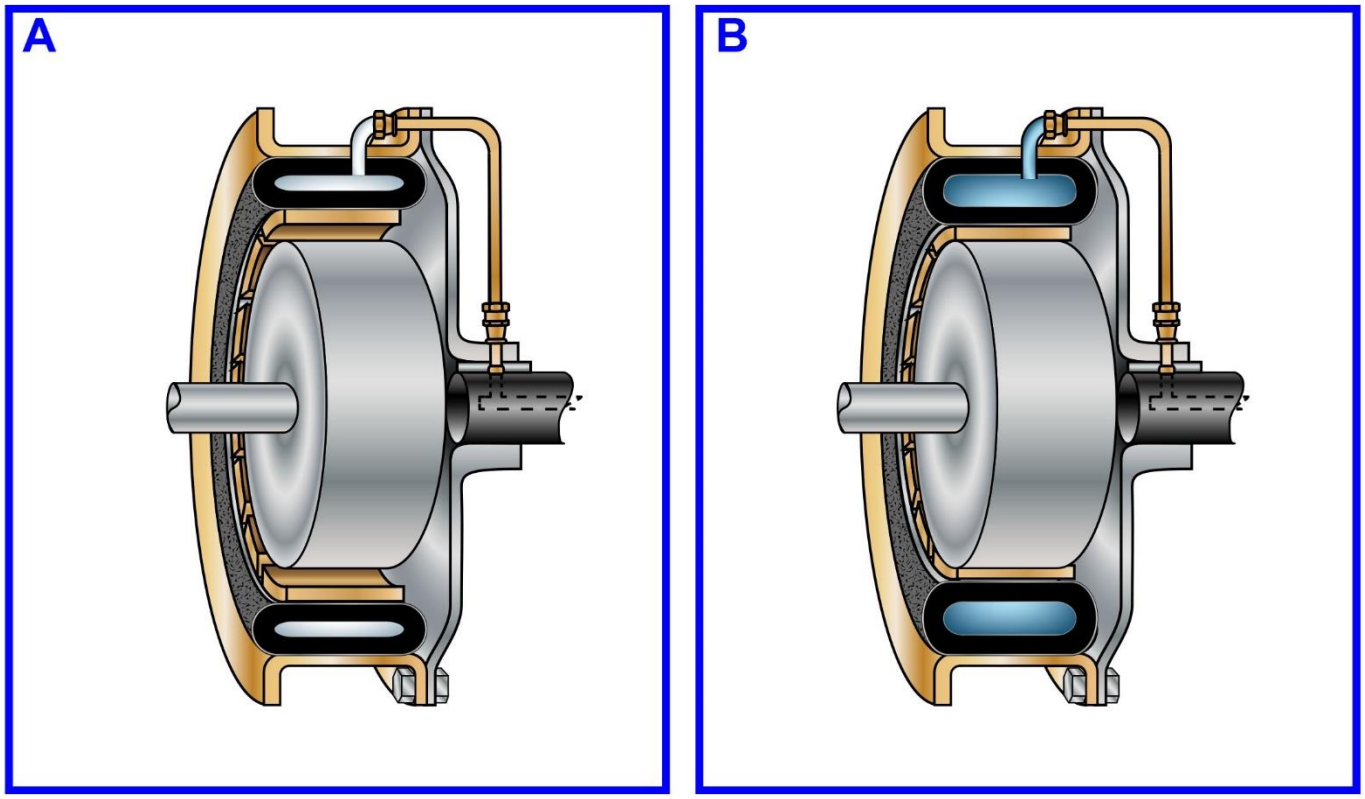
MO-0137
EMD Engine Fresh Water Cooling System with Heat Exchanger



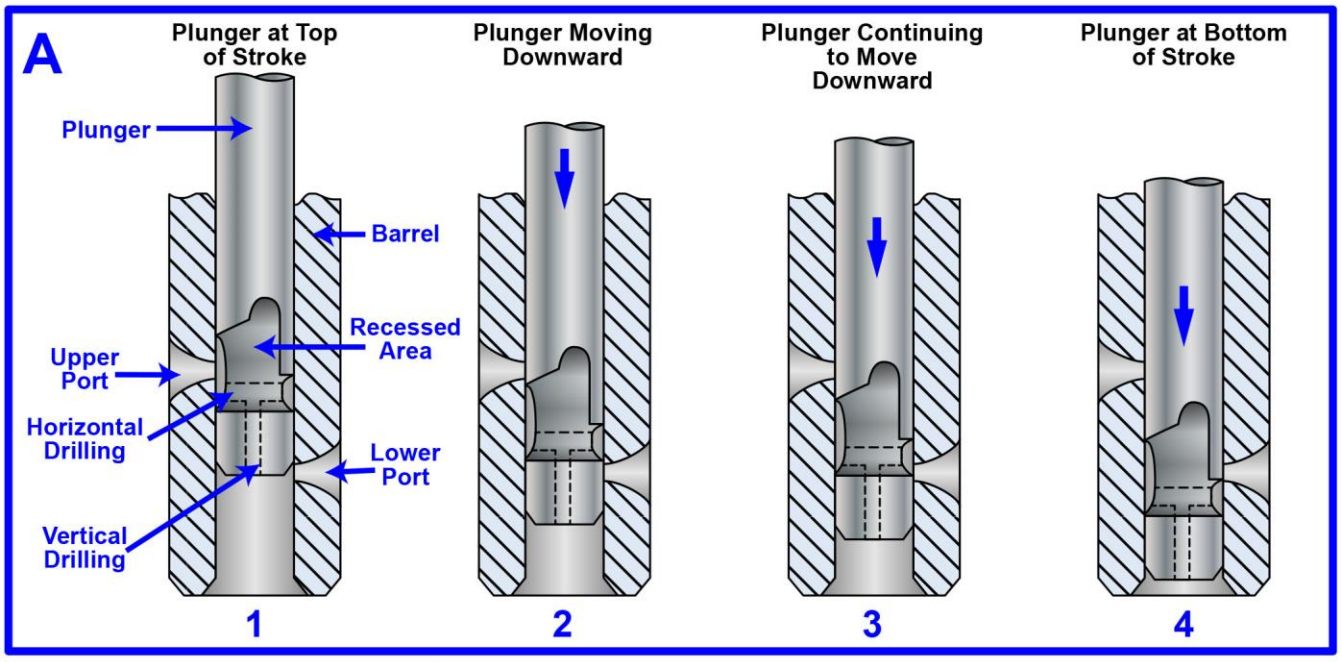
MO-0138
EMD Engine Fresh Water Cooling System with Keel Cooler



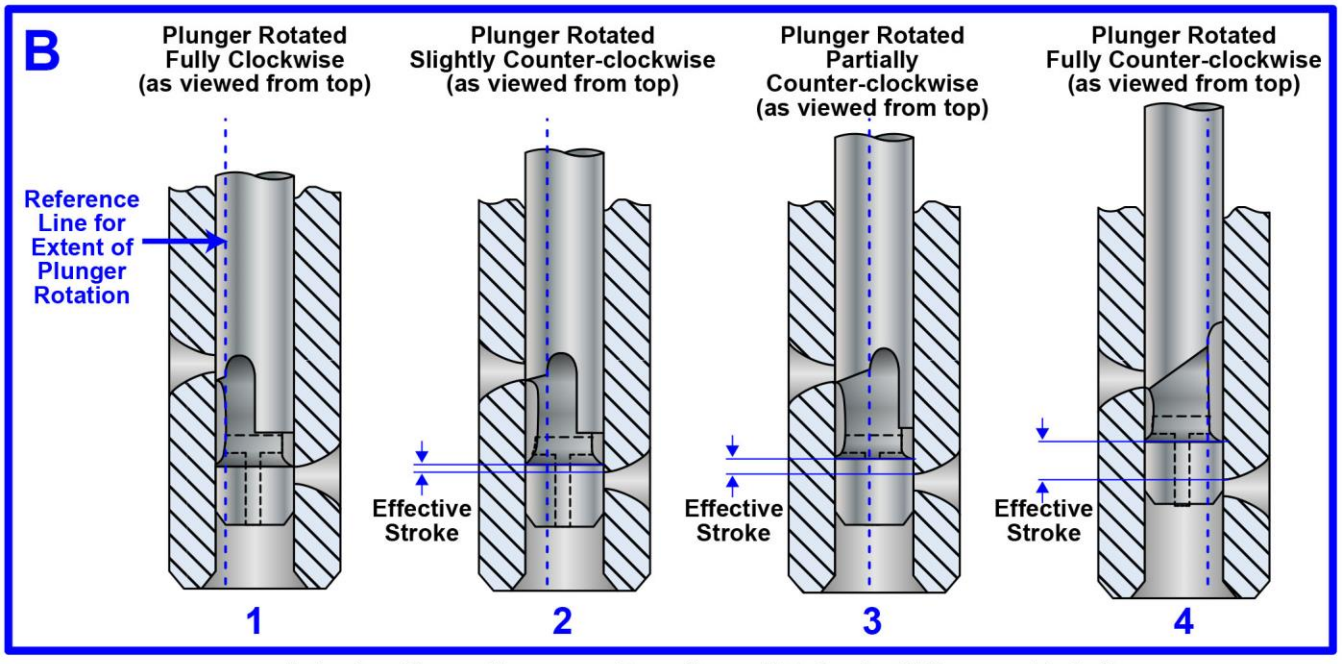
MO-0141
Pneumatic Airflex Clutch Operation



MO-0144
Detroit Diesel 71 Series Engine Unit Injector

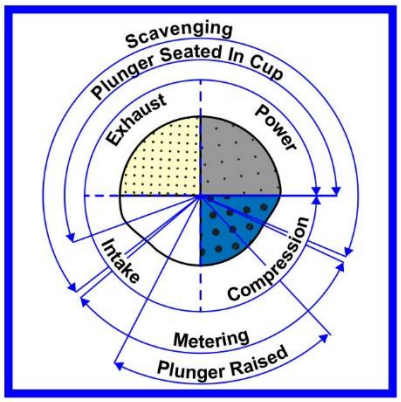


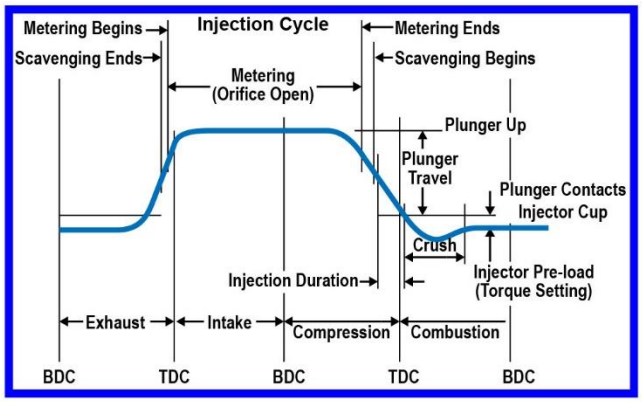
Injector Operation as a Function of Vertical Plunger Travel

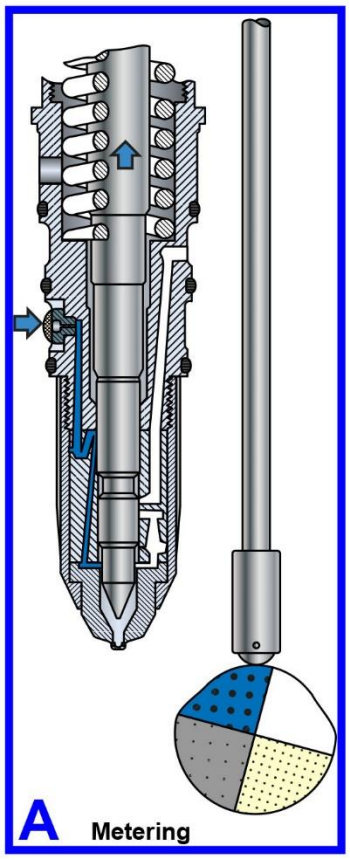


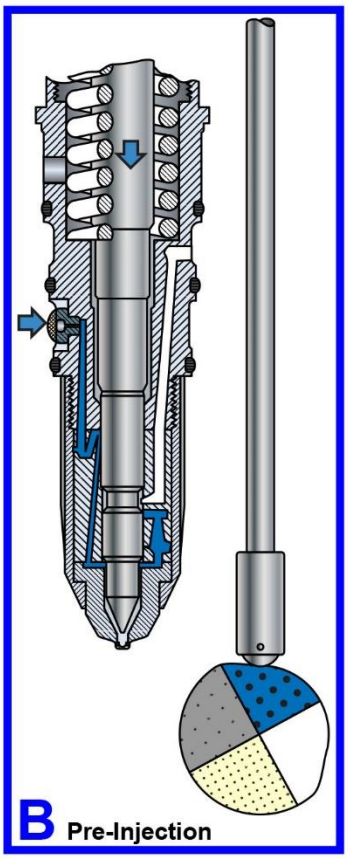
Injector Operation as a Function of Extent of Plunger Rotation

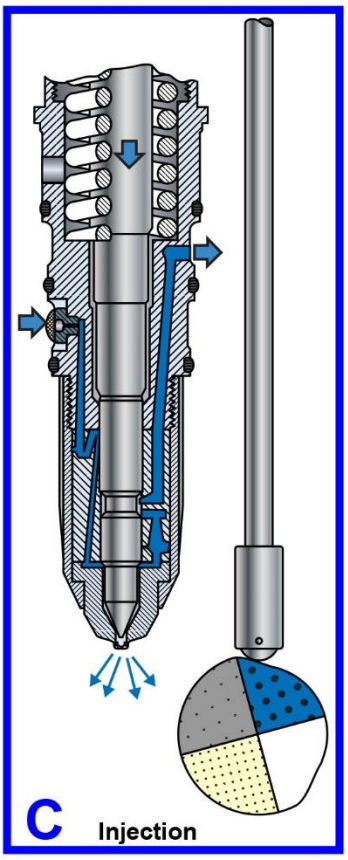
MO-0146
Cummins PT Injection System Injector

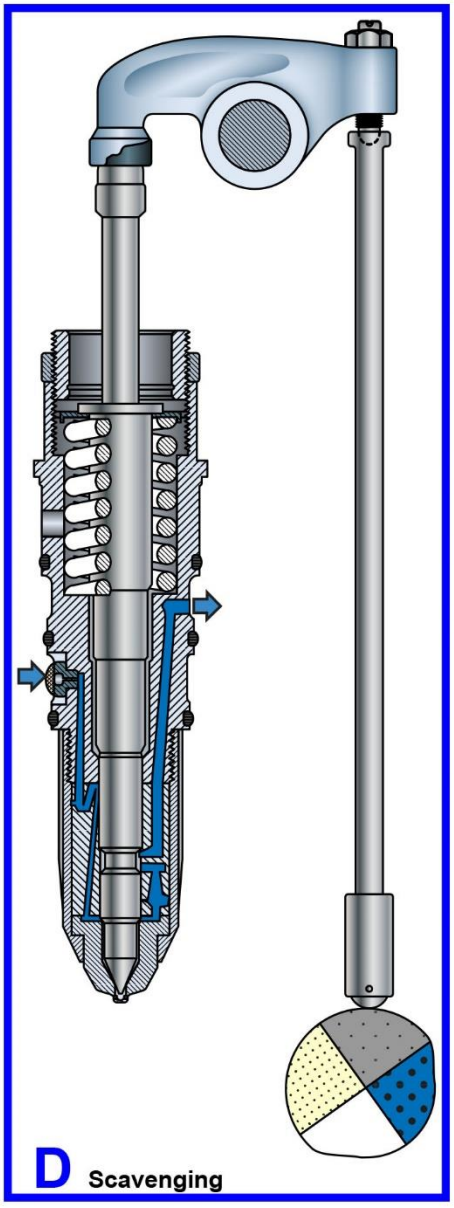




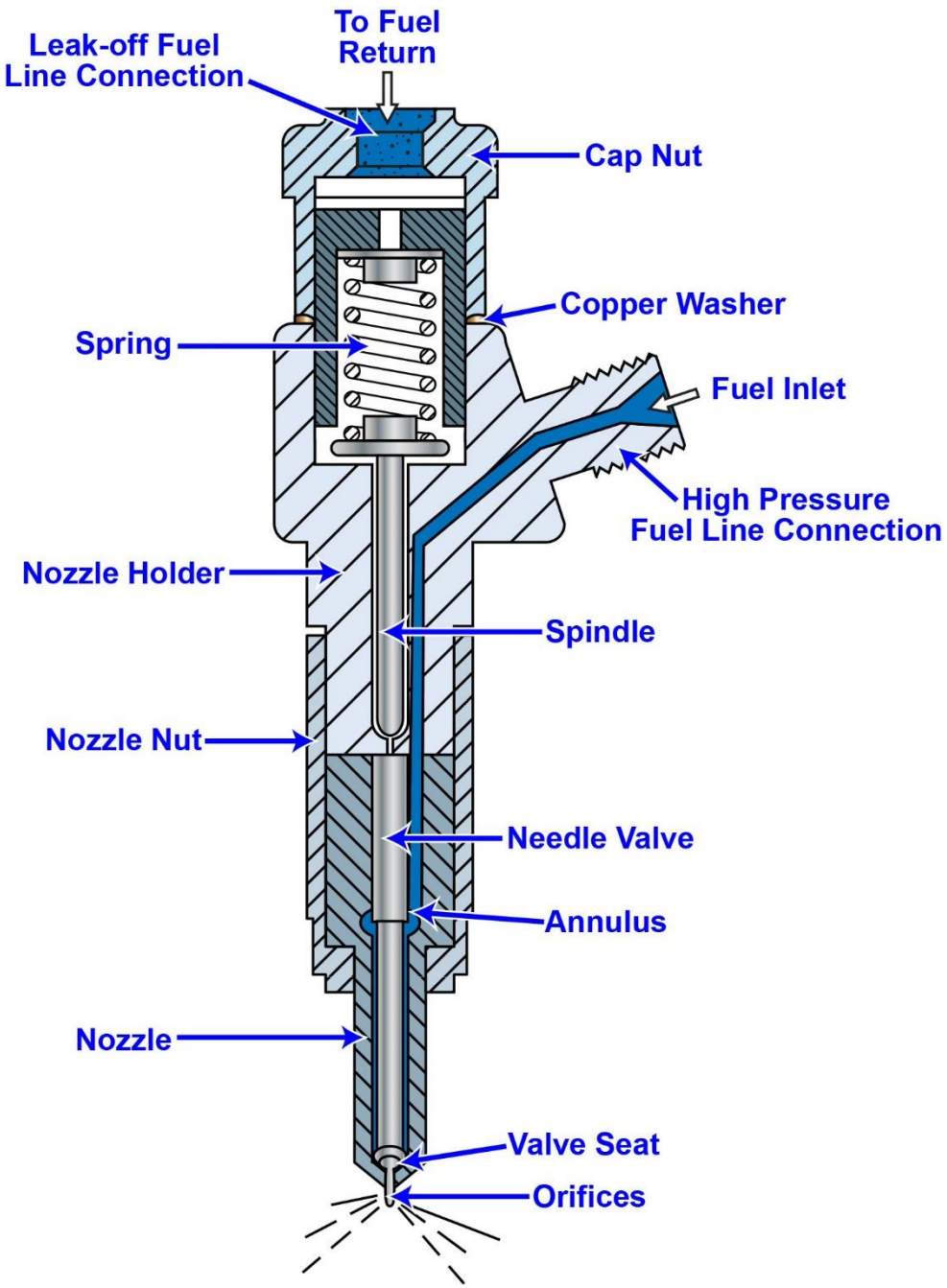








MO-0151



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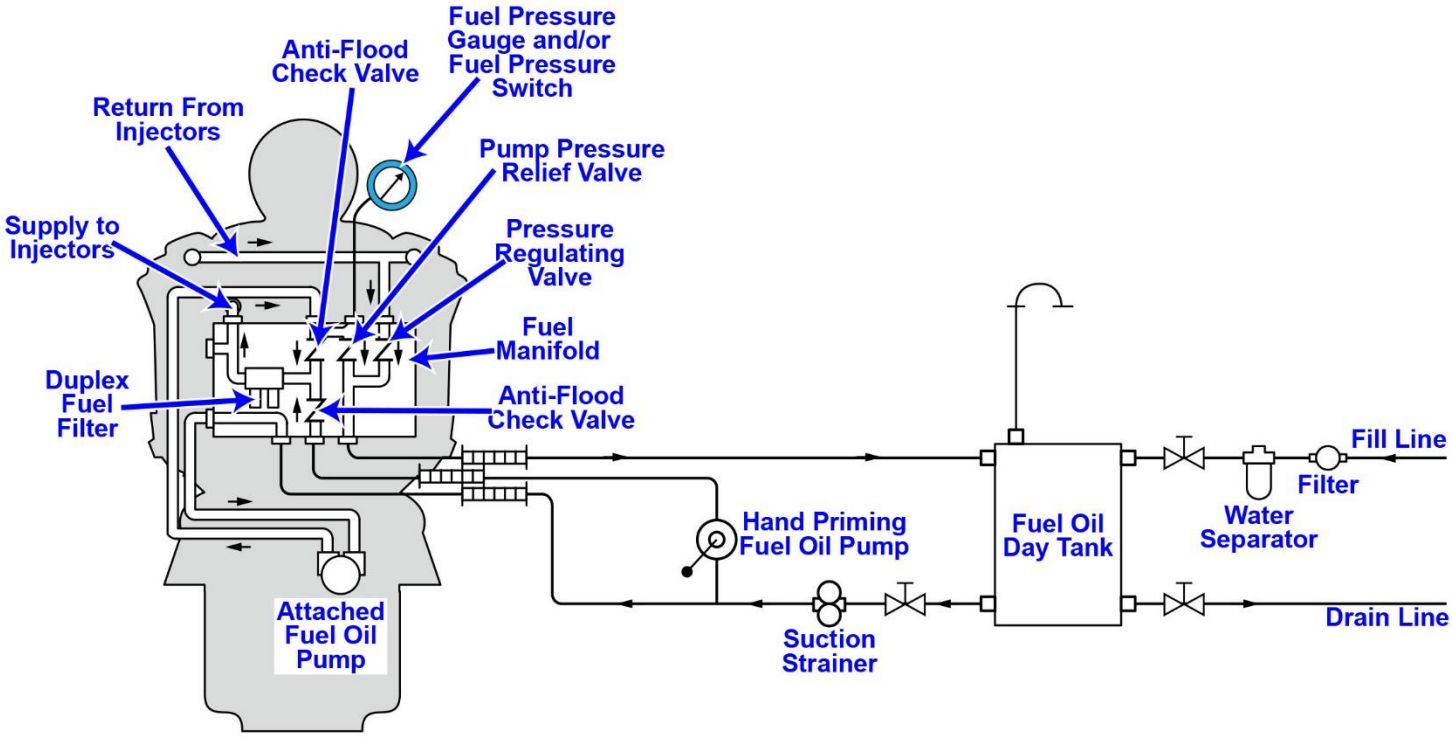
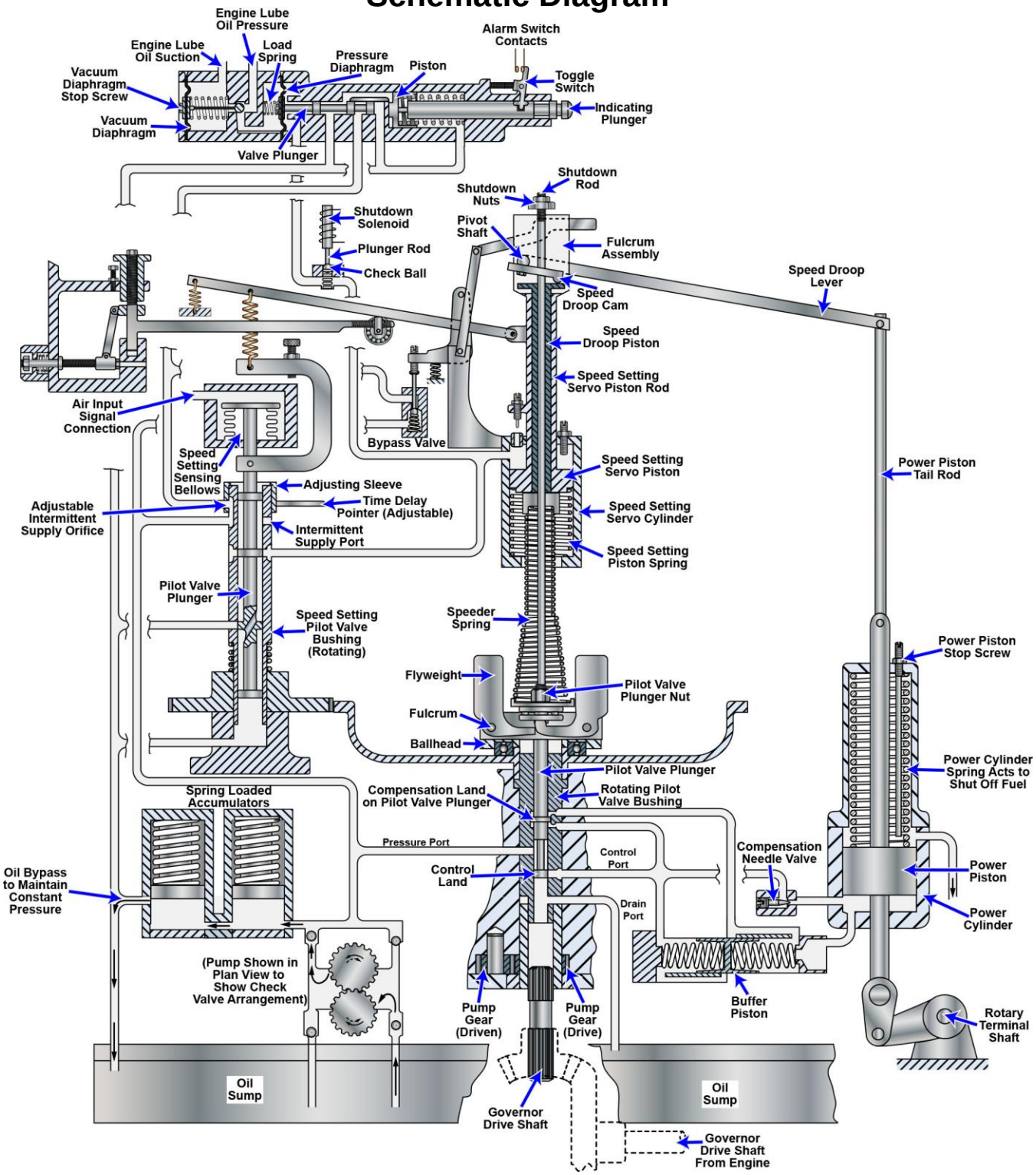
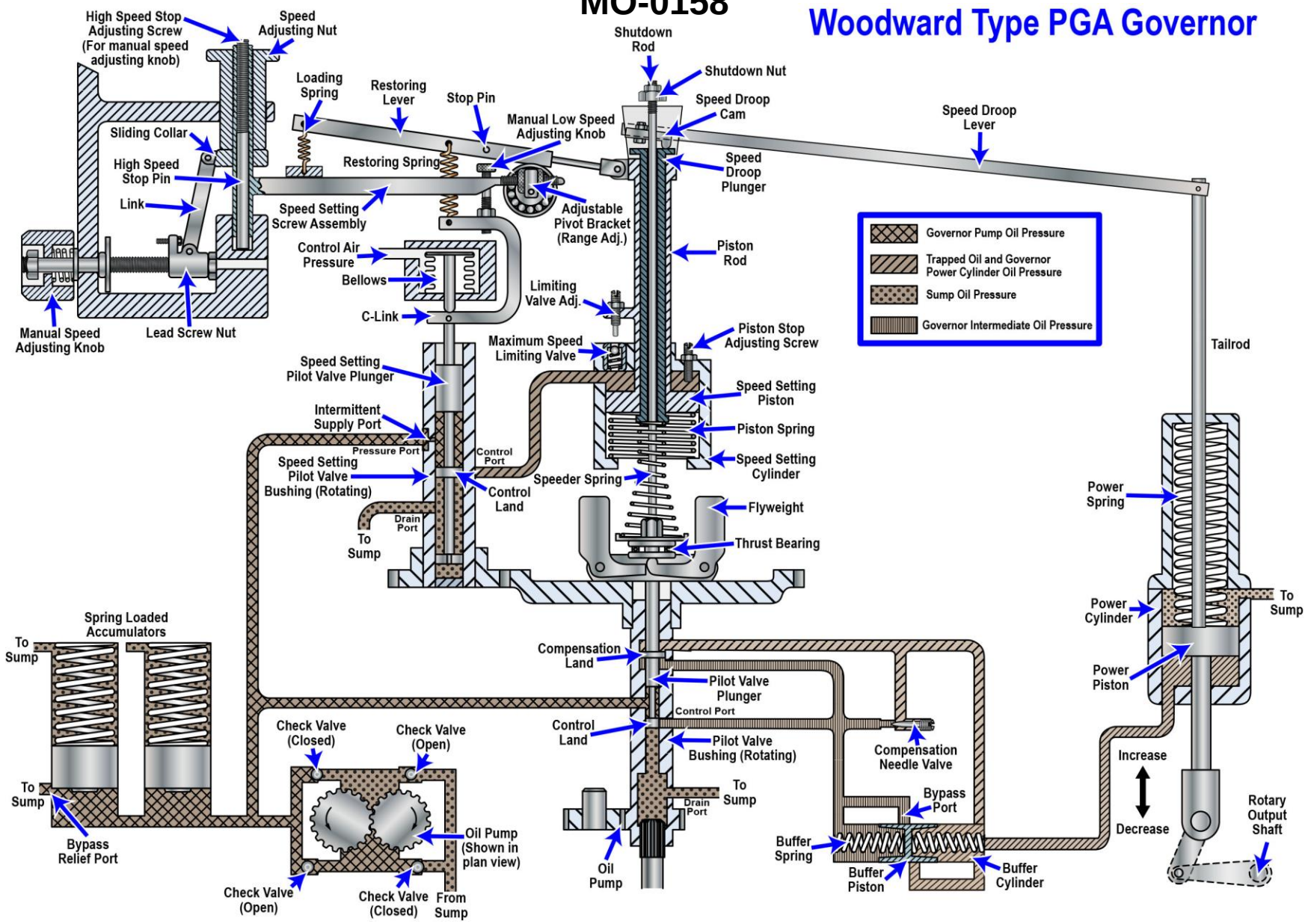


MO-0156
Woodward Type PGA Governor
Schematic Diagram

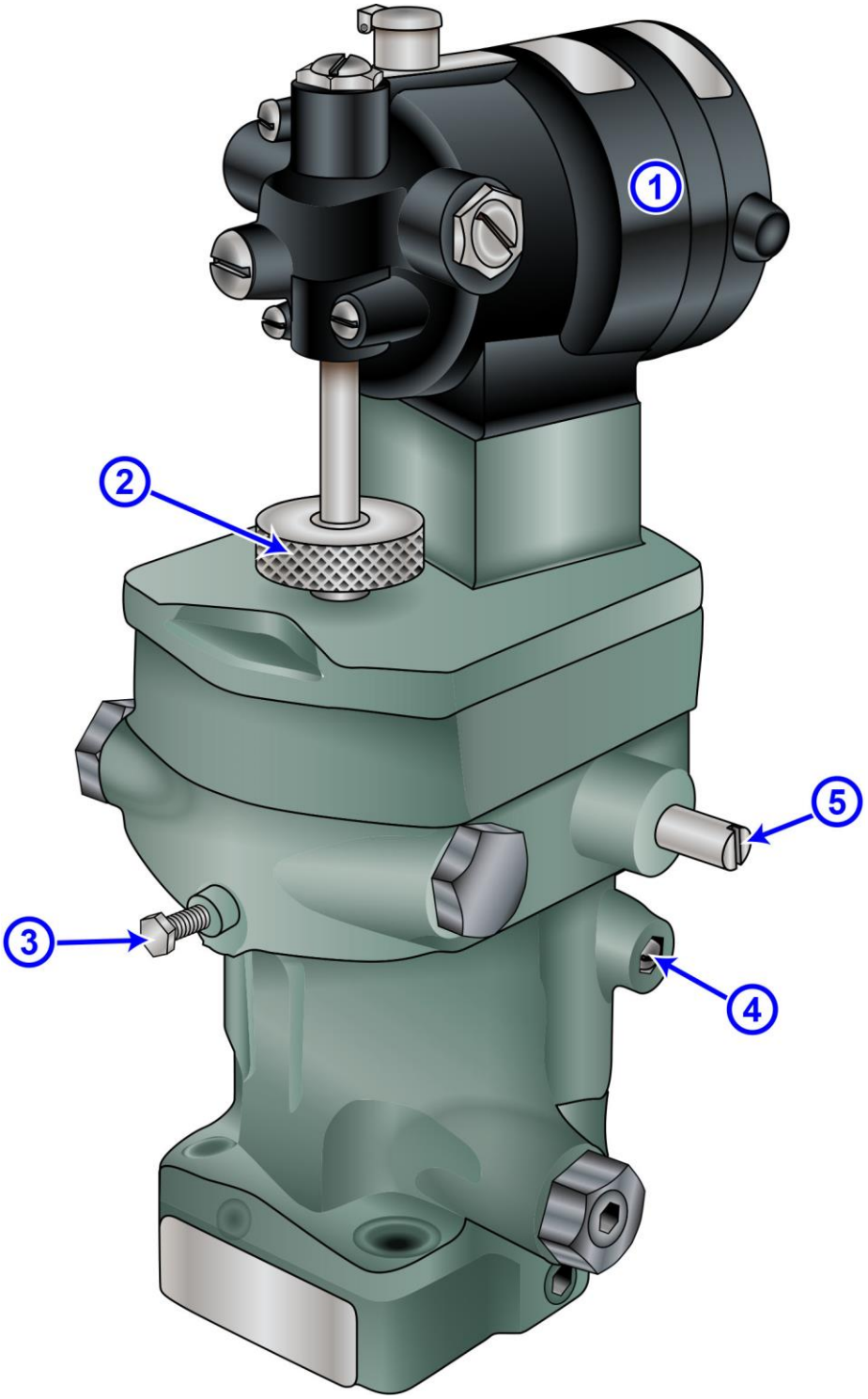


MO-0158

Woodward Type PGA Governor

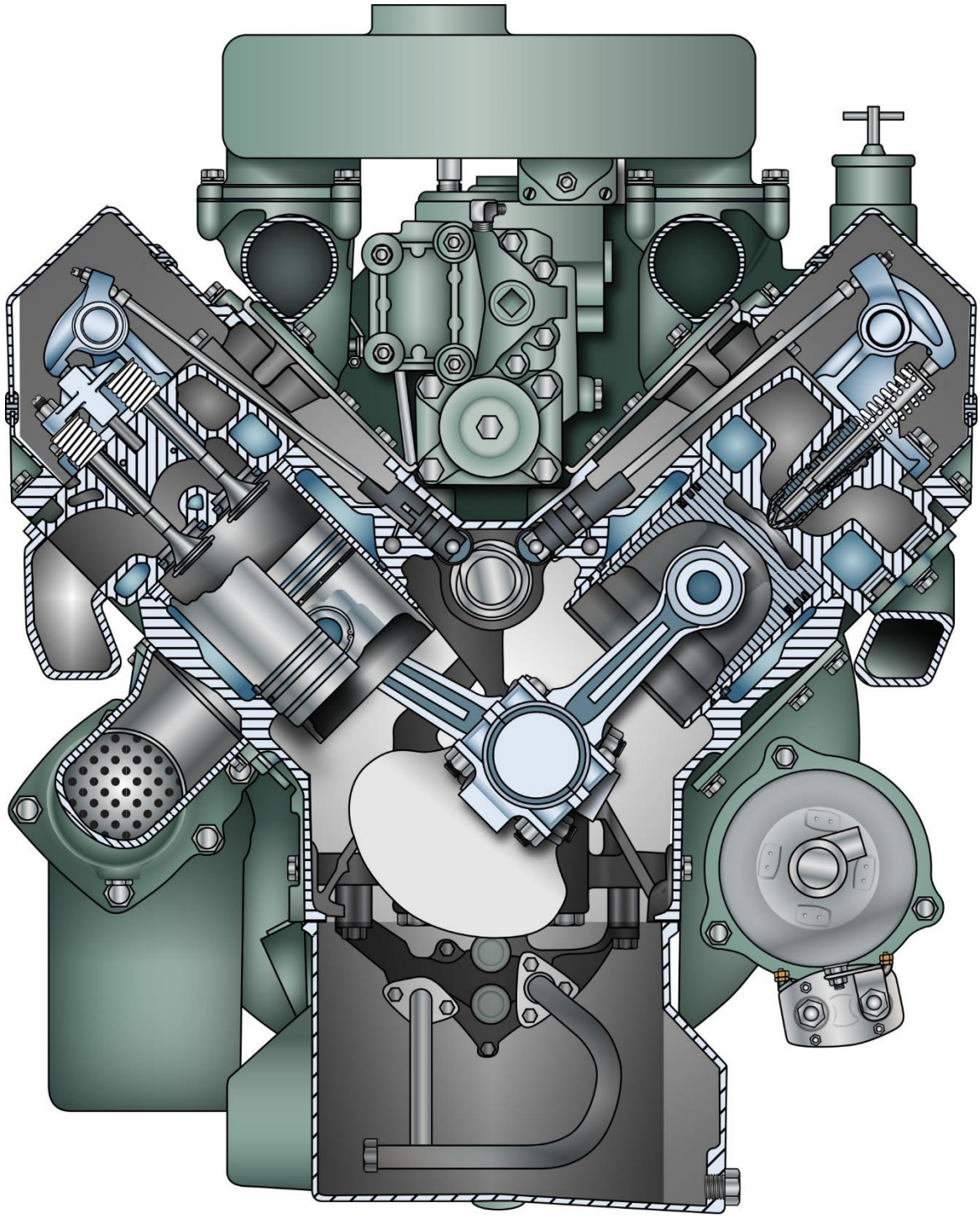


MO-0160
Woodward Type PSG Governor



Adapted for testing purposes only from PSG Governor with Aluminum Case
Installation and Operation Manual 37013 (Revision M)

MO-0163



MO-0164

Number of Cylinders	Four-Stroke Engines		Two-Stroke Engines	
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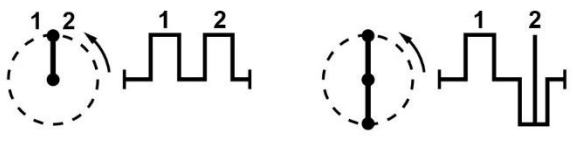
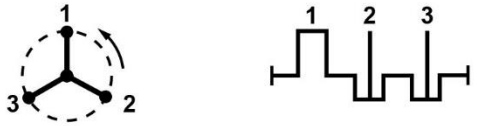
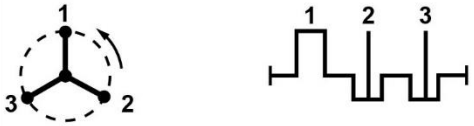
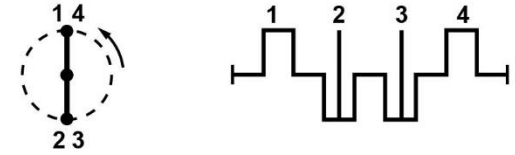
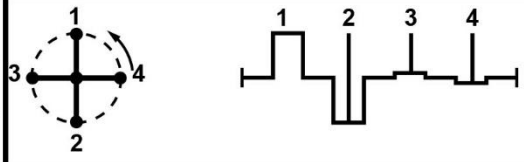
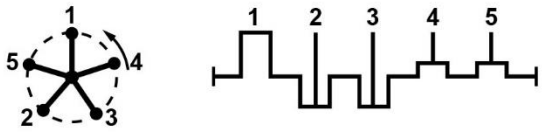
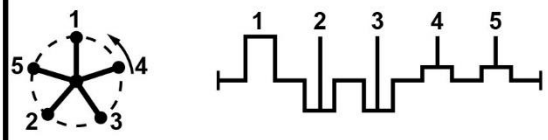
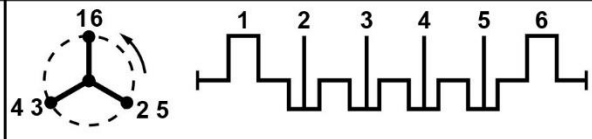
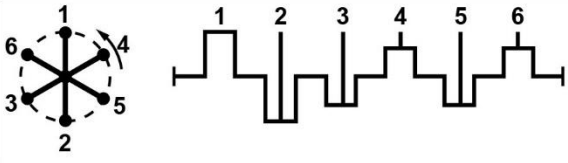
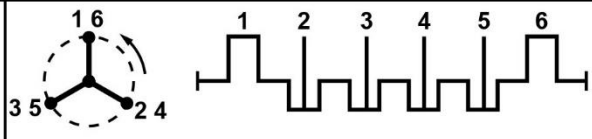
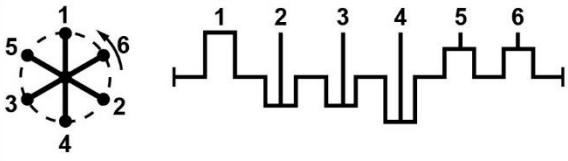
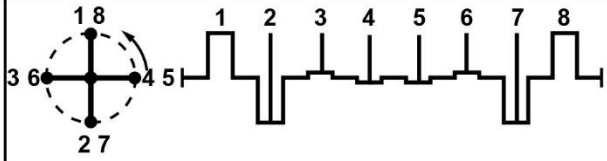
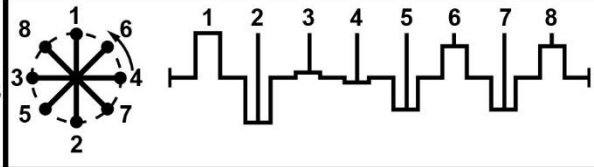
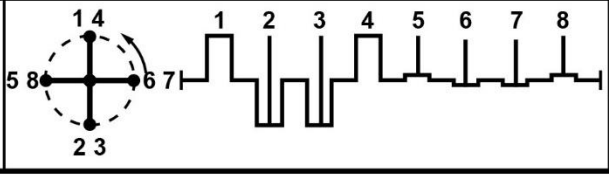
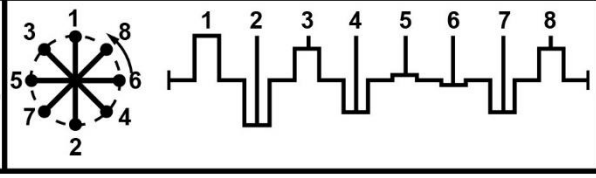
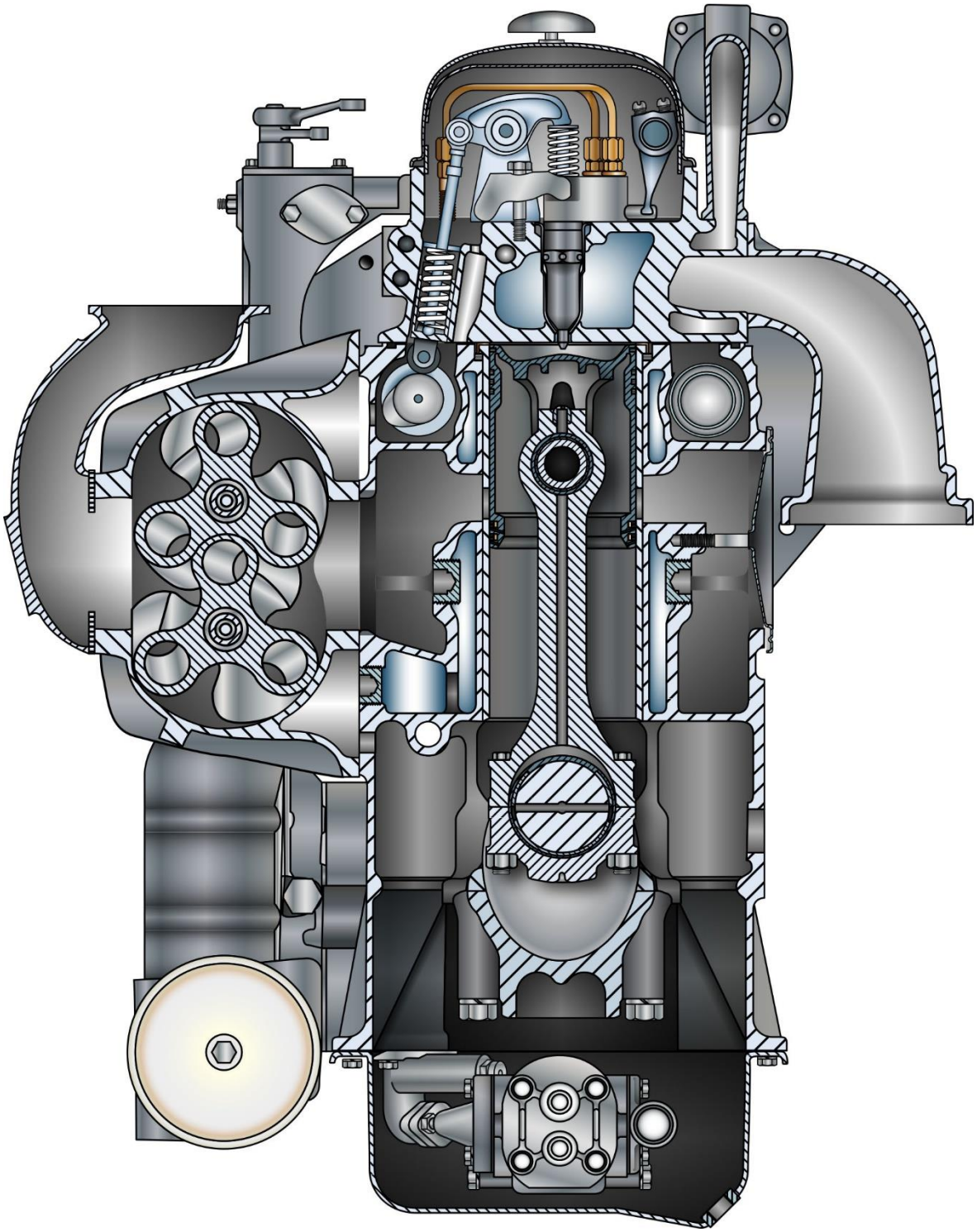
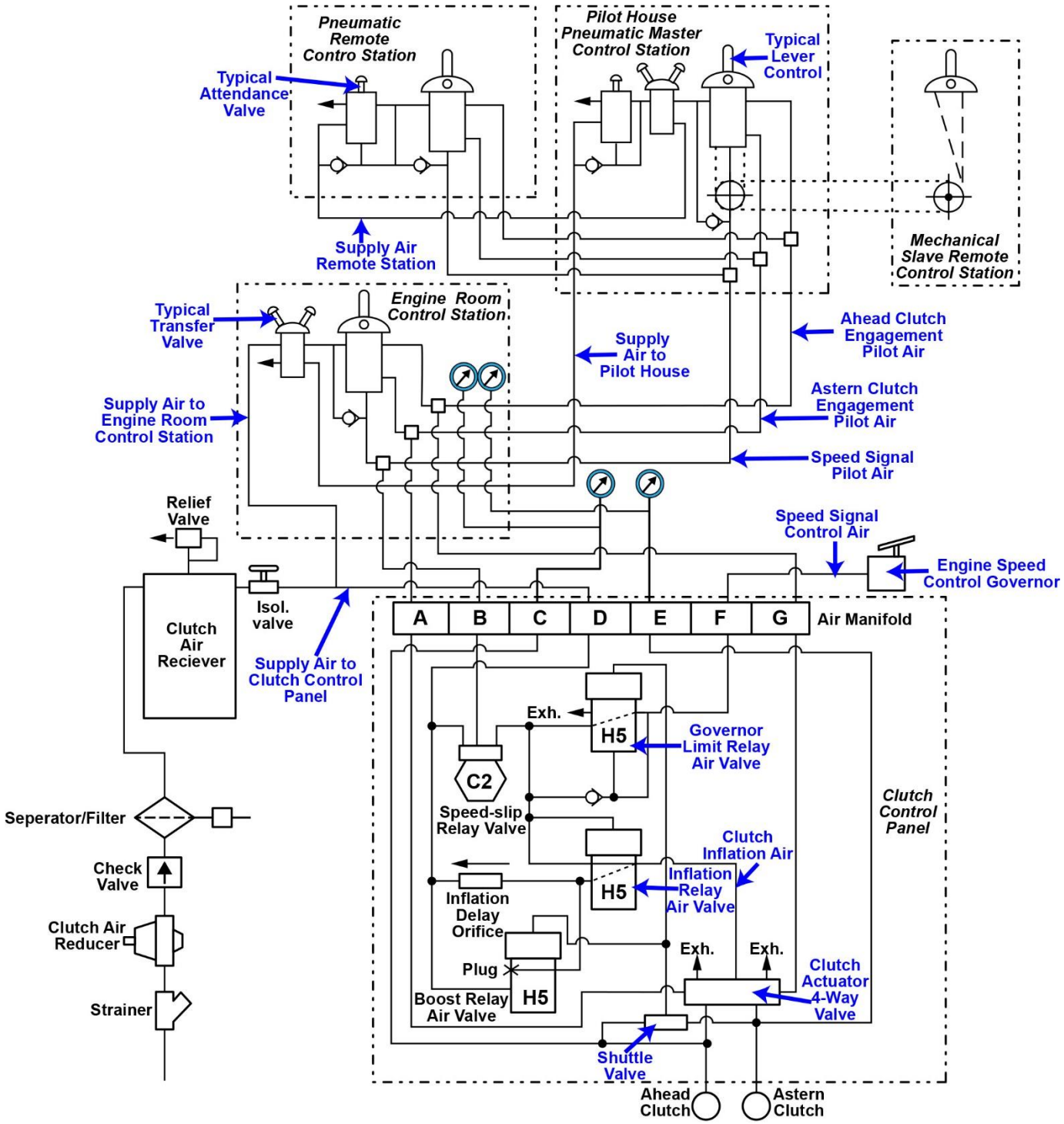
2		1-2 1-2		1-2
3		1-3-2		1-2-3
4		1-2-4-3 or 1-3-4-2		1-4-2-3
5		1-3-5- 4-2		1-4-3- 2-5
6		1-5-3- 6-2-4		1-4-5- 2-3-6
6		1-4-3- 6-2-5		1-6-2- 4-3-5
8		1-5-2-6 -8-4-7-3		1-6-4-7 -2-5-3-8
8		1-6-2-8 -4-7-3-5		1-8-6-4 -2-7-5-3

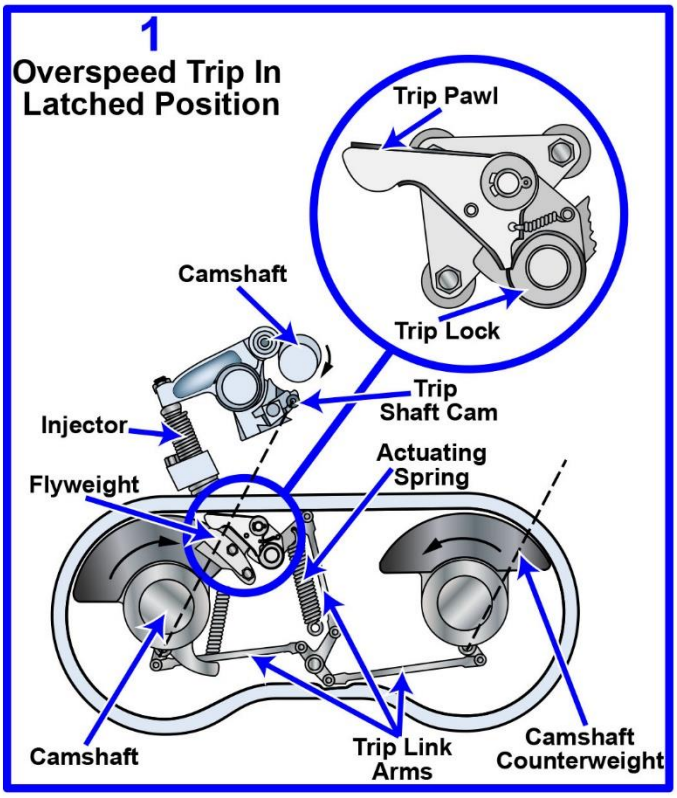
MO-0165

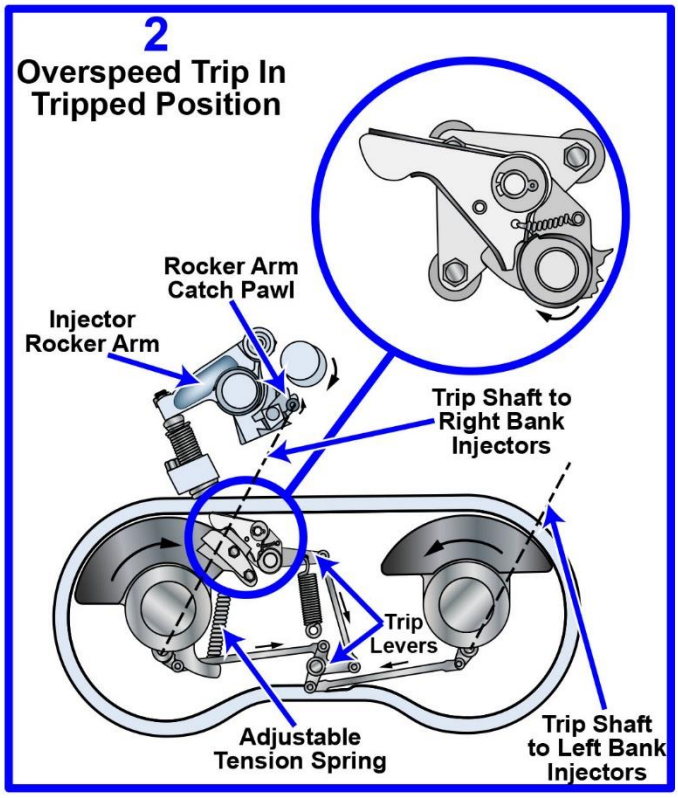


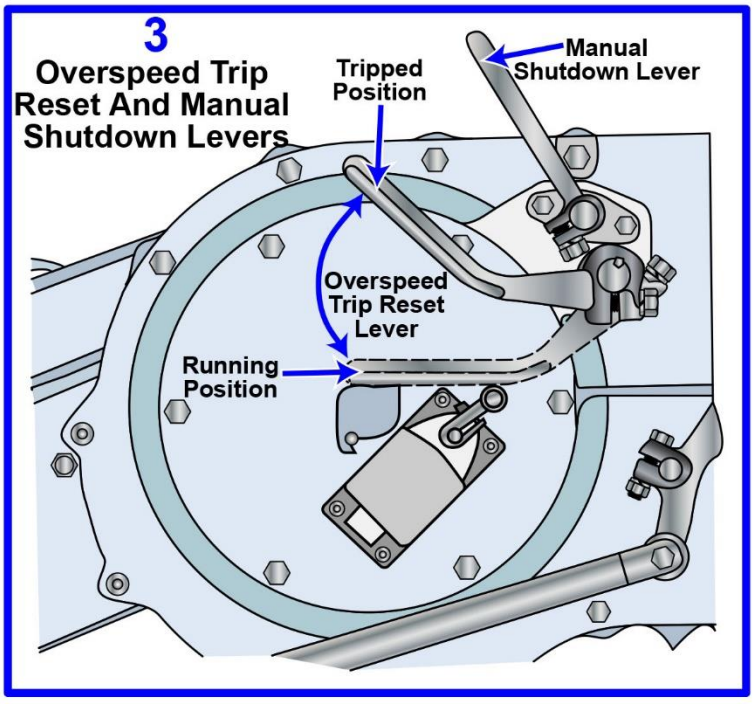
MO-0168
Pneumatic Propulsion Control System



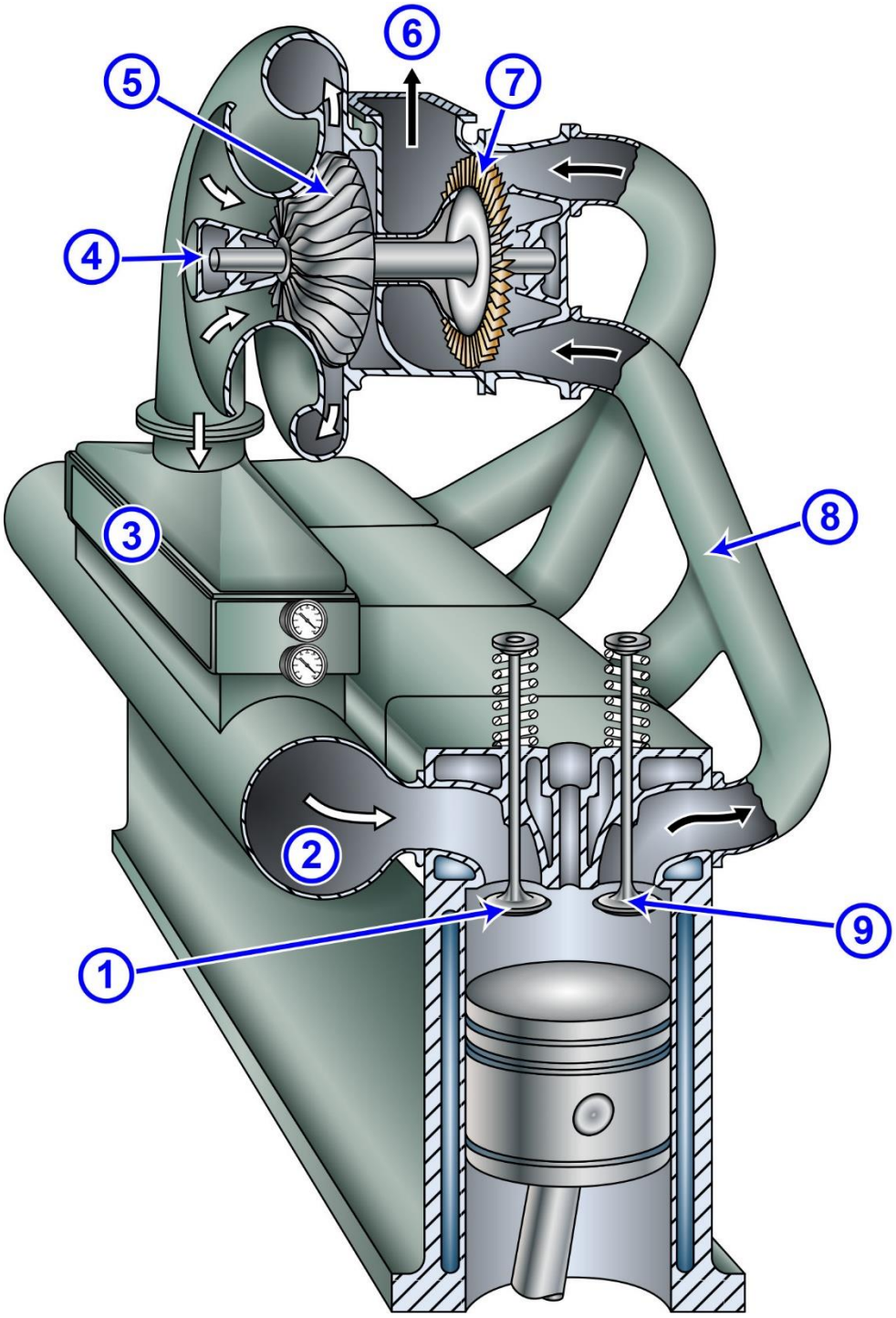
MO-0171
EMD 645 Overspeed and Manual Trips



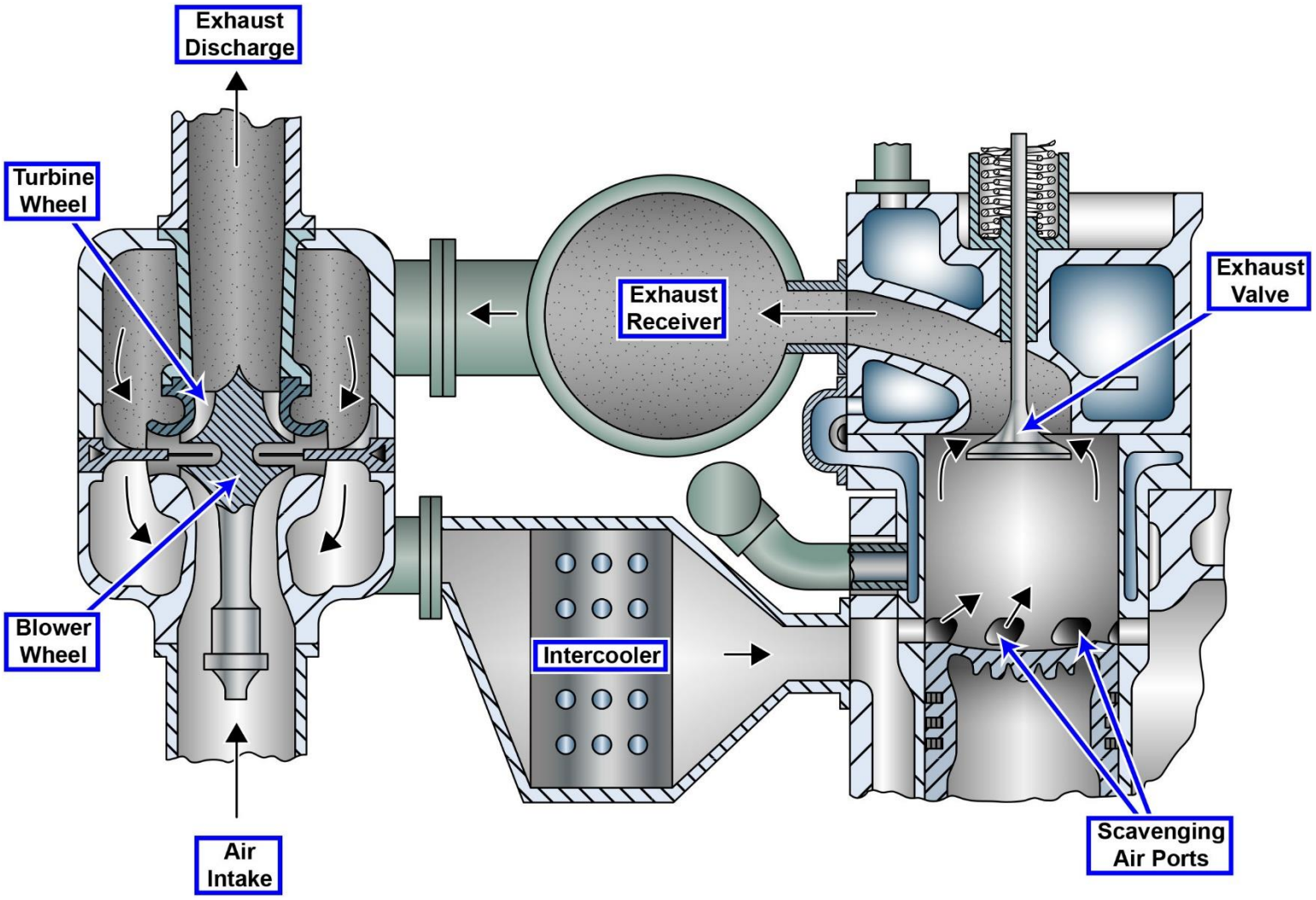




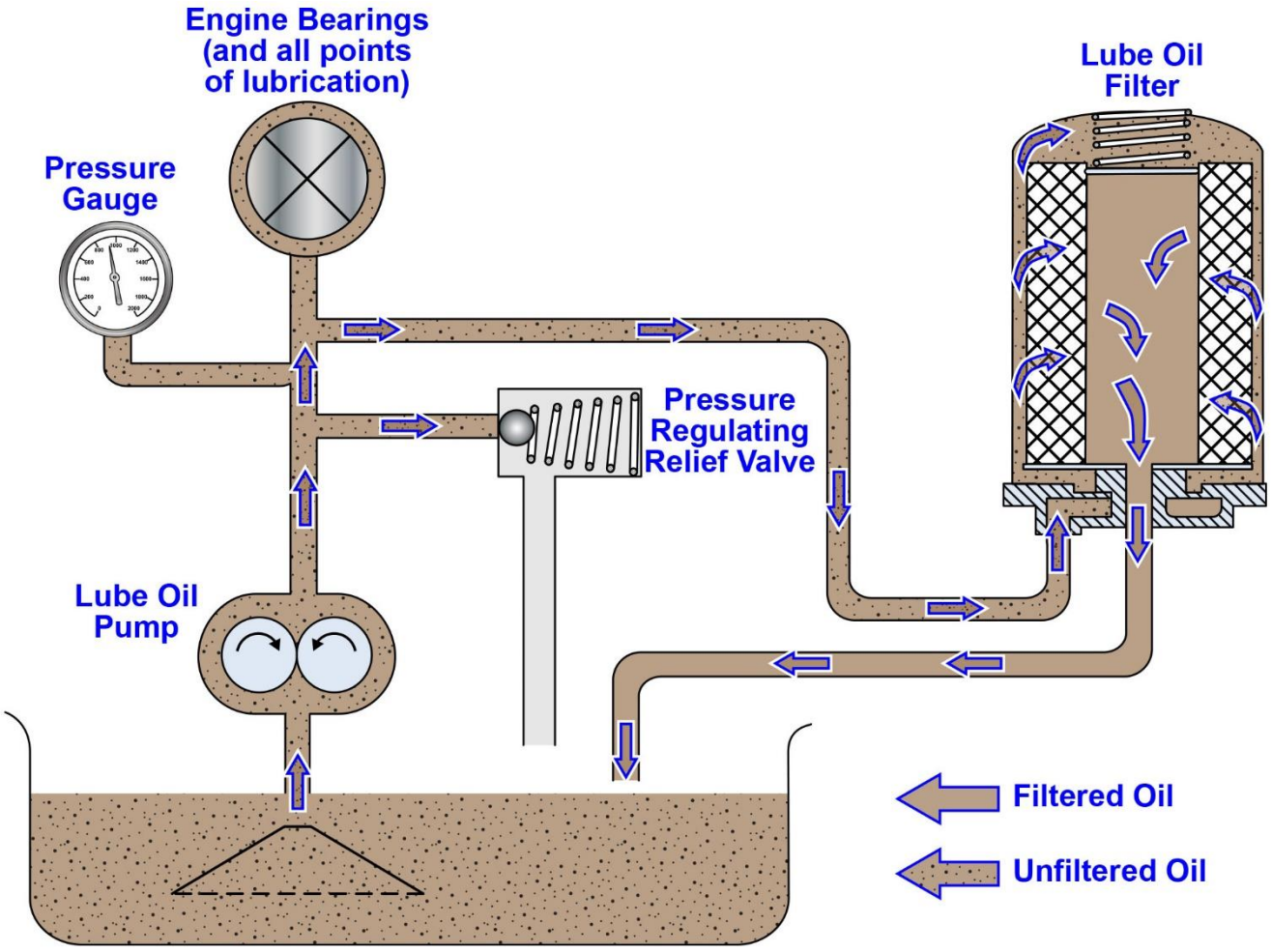
MO-0176



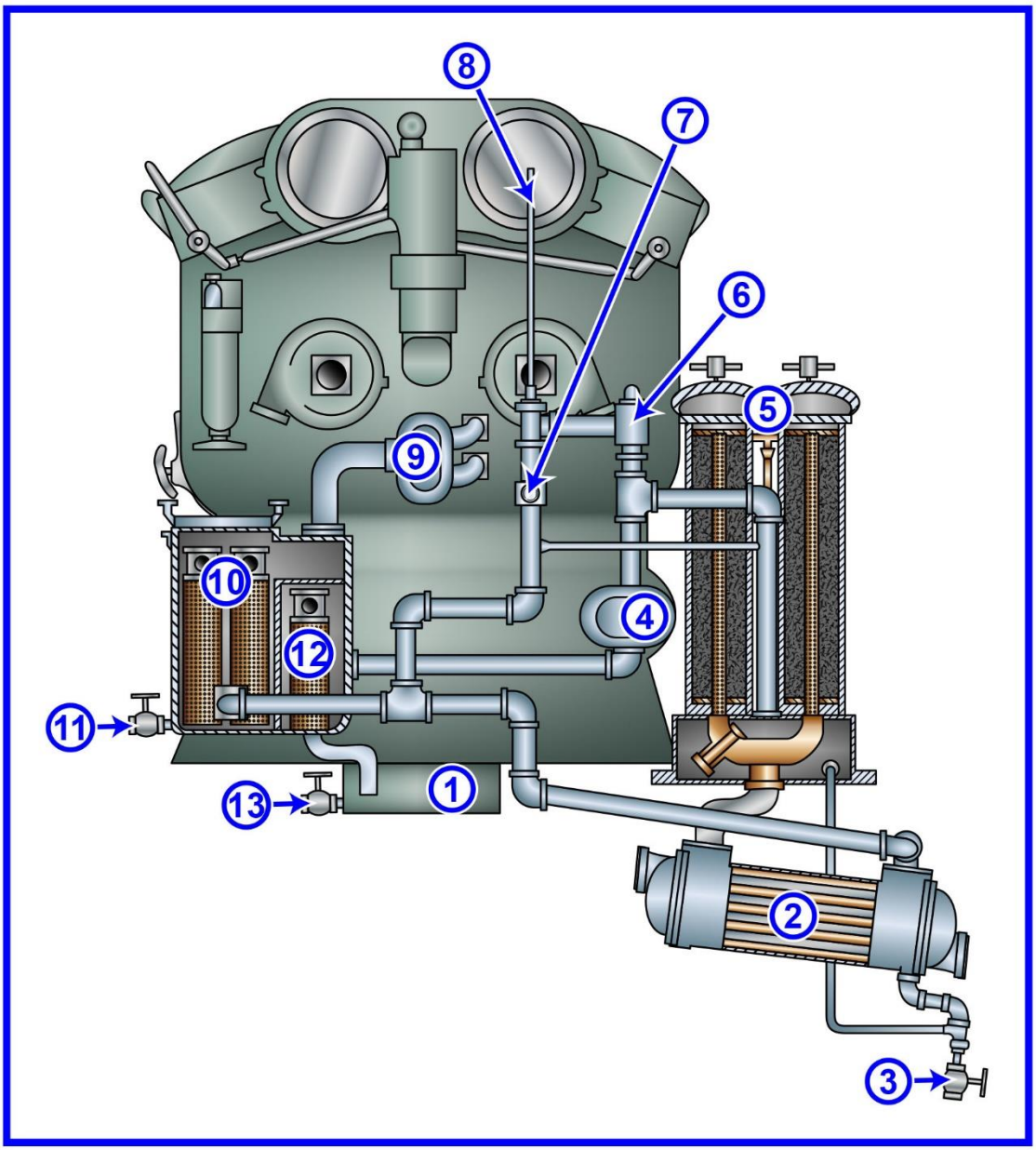
MO-0180



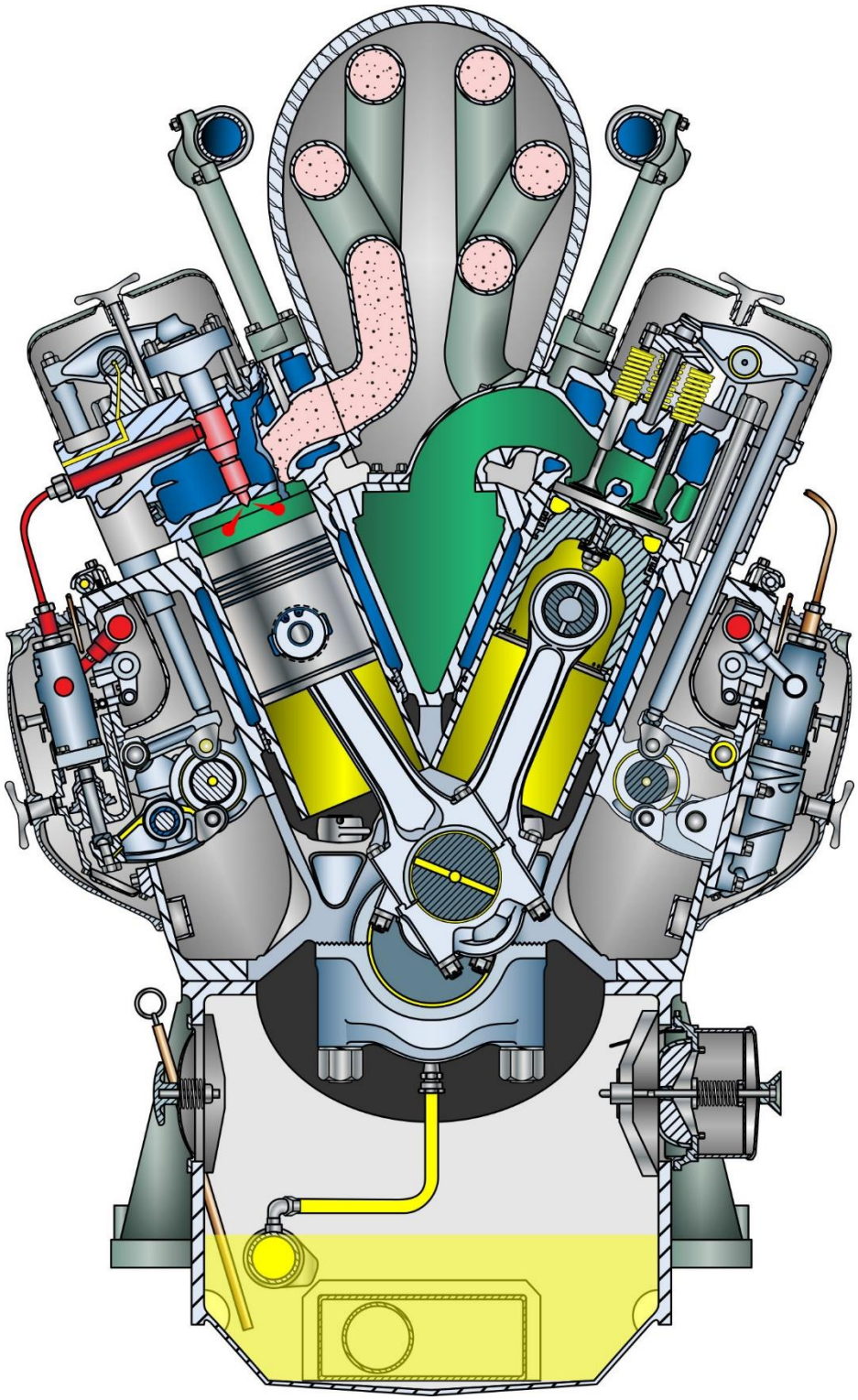
MO-0182
Simplified Lube Oil Filtration System



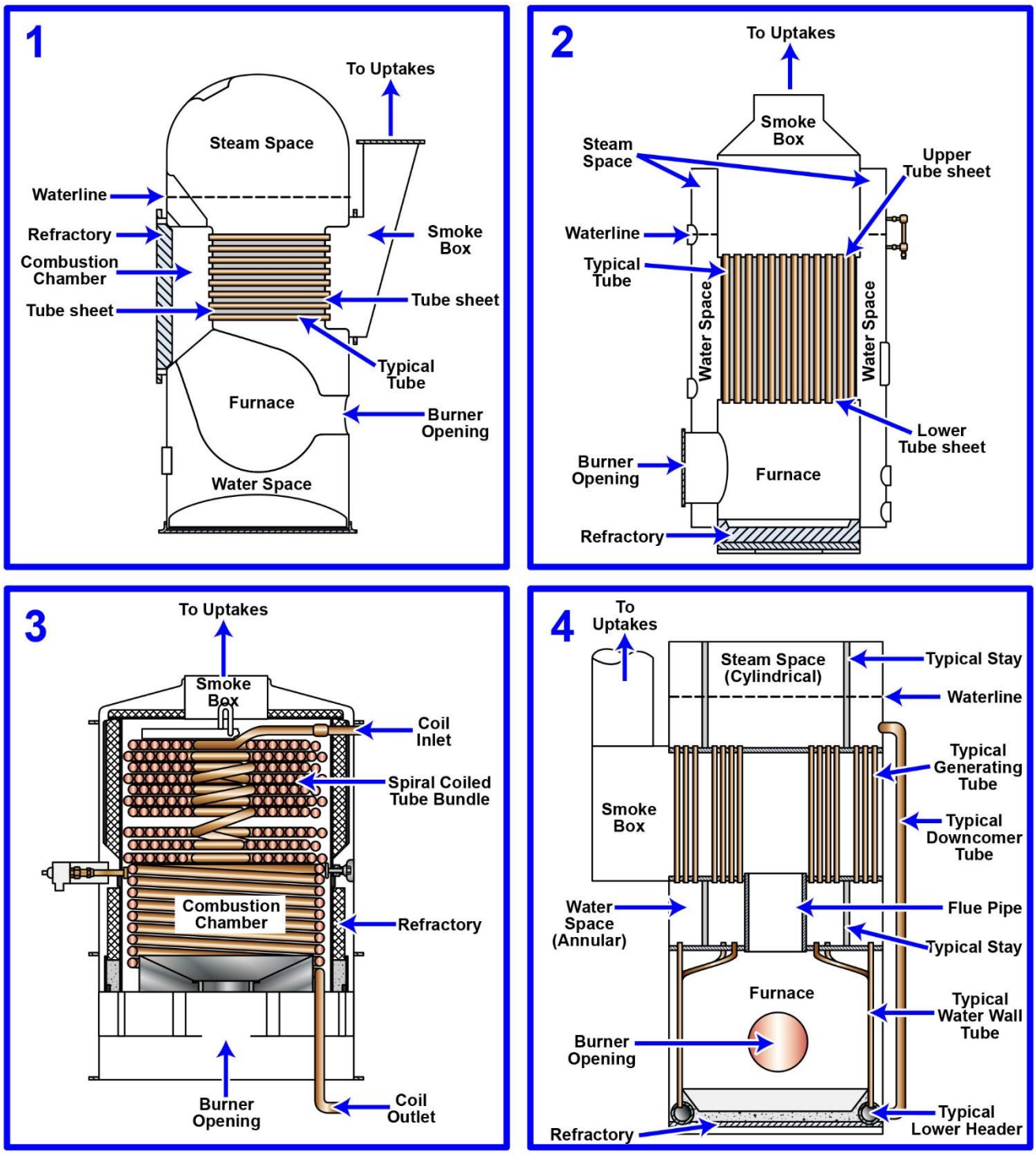
MO-0183



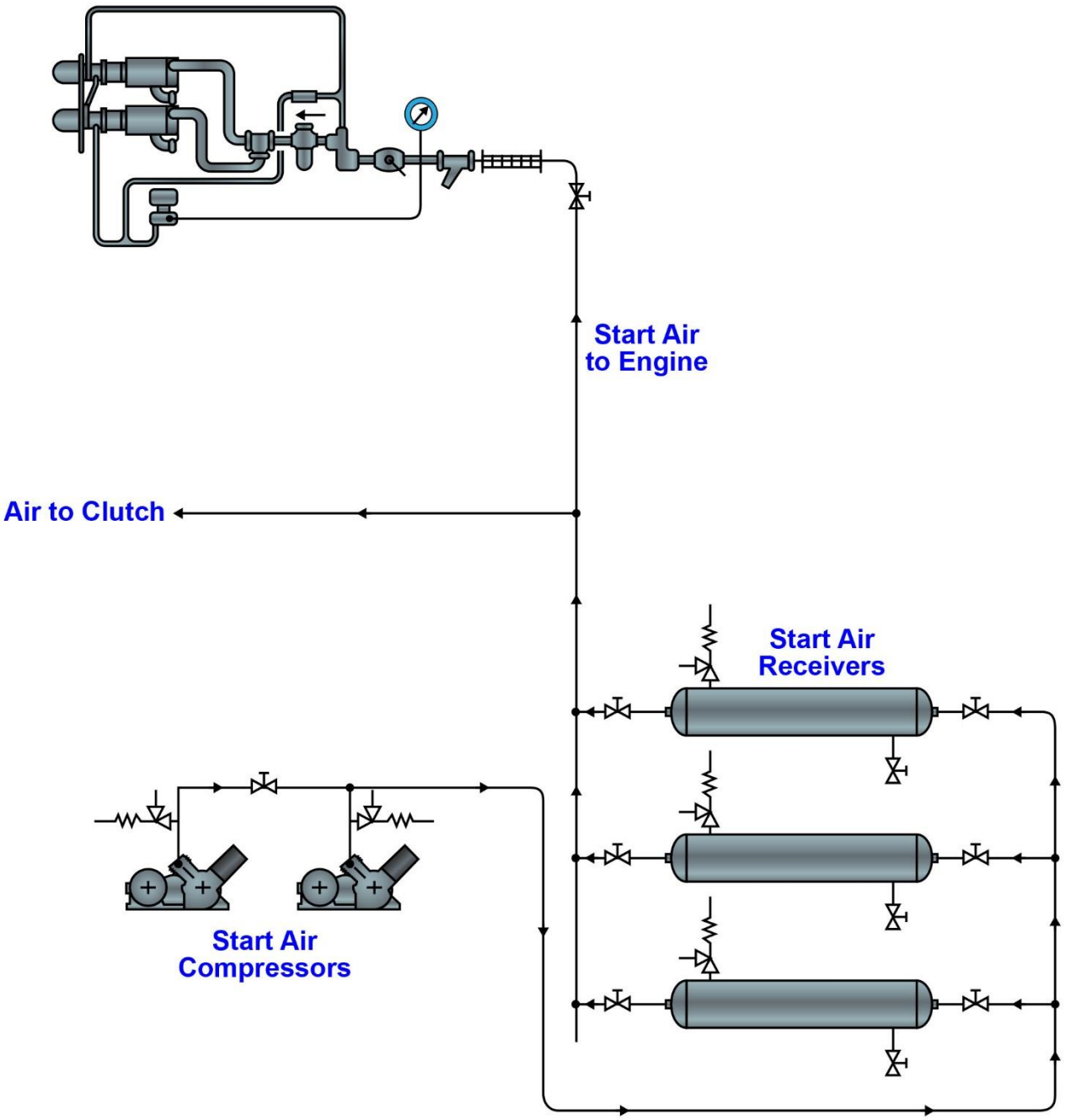
MO-0192
ALCO 251 Series Engine



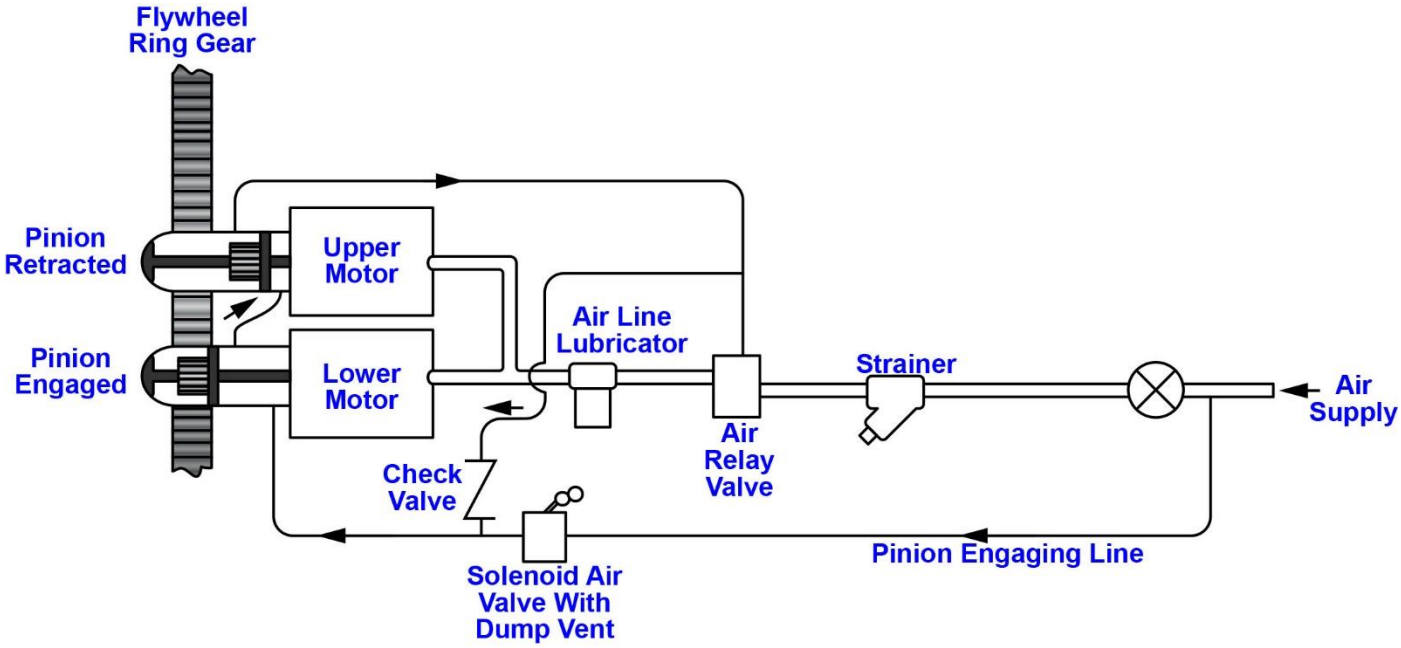
MO-0197



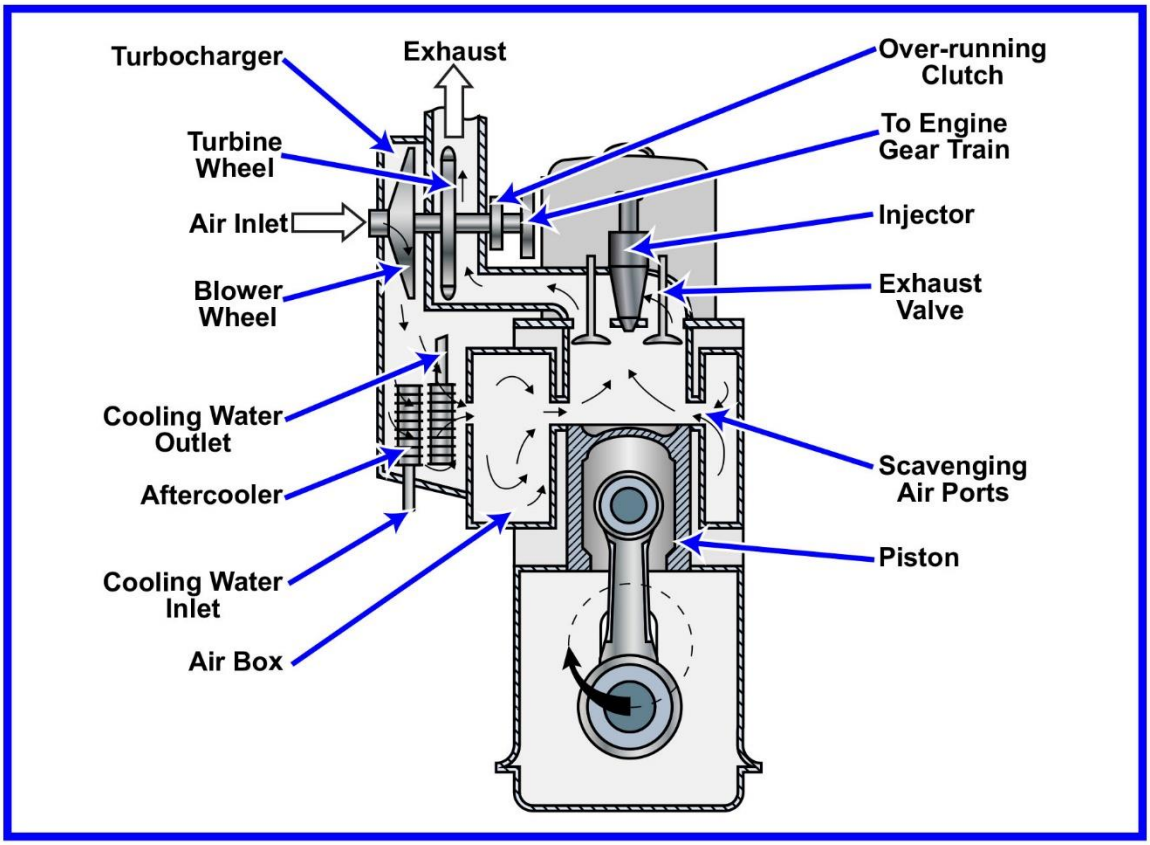
MO-0199
EMD Air Start System

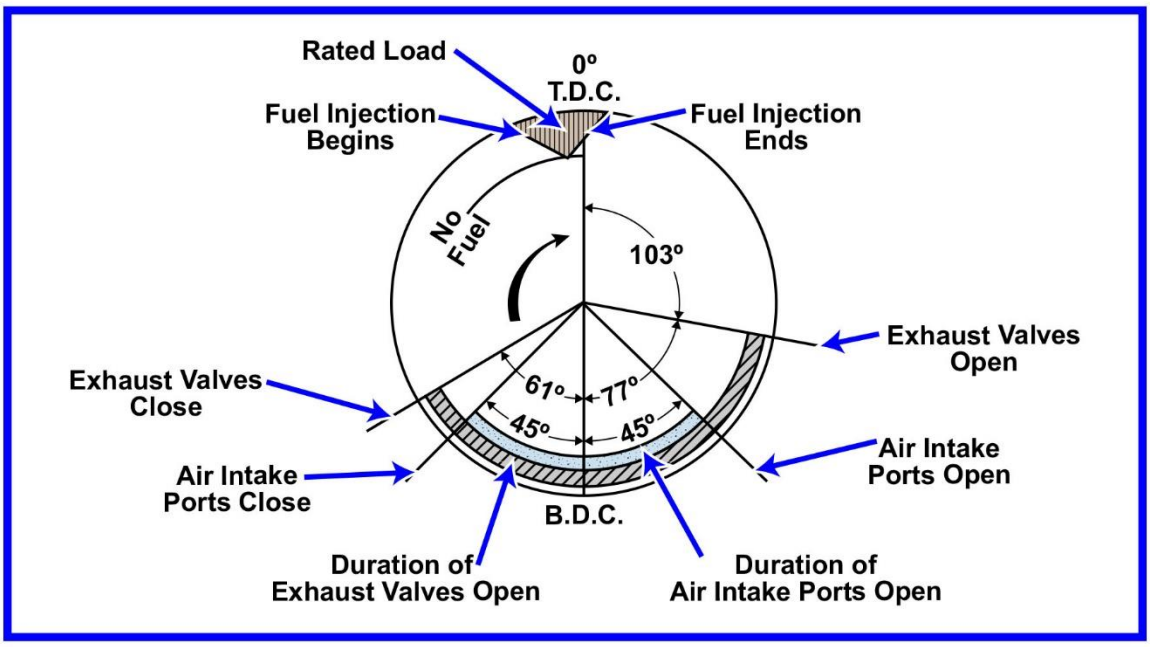


MO-0200
EMD Air Start System Piping at Engine



MO-0206
EMD 645 Engine Operating Cycle





MO-0209
Freezing Point of Coolant as a Function of Glycol Concentration