

U.S.C.G. Merchant Marine Exam

UFIV - Chief Engineer

Q694 Motor Plants

(Sample Examination)

Choose the best answer to the following Multiple Choice Questions:

1. You are serving as an engineer onboard a mollusc dredger equipped with main propulsion diesel engines of the type shown in the illustration. What scavenging flow pattern is used in this engine type? Illustration MO-0122
- (A) Cross-flow
 - (B) Loop
 - (C) Uniflow
 - (D) Return-flow

If choice C is selected set score to 1.

2. You are assigned to a fishing factory ship fitted with main propulsion diesel engines of the type shown in the illustration. If the engine's crankshaft is turning at 720 rpm, what will be the rotational speed of the two camshafts? Illustration MO-0005
- (A) 360 rpm
 - (B) 720 rpm
 - (C) 1440 rpm
 - (D) Not enough information is given to determine camshaft rpm.

If choice A is selected set score to 1.

3. You are assigned as an engineer on an uninspected fishing industry vessel 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-0005
- (A) The inspection takes place by removing the appropriate crankcase access door and viewing through the resulting opening.
 - (B) The inspection takes place by removing the appropriate cylinder head valve cover and viewing through the resulting opening.
 - (C) It is not possible to inspect the compression rings while in place inside the engine.
 - (D) The inspection takes place by removing the appropriate side cover and viewing through the resulting opening.

If choice C is selected set score to 1.

4. You are assigned as an engineer on a fishing industry factory ship 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-0122

- (A) It is not possible to inspect the compression rings while in place inside the engine.
- (B) The inspection takes place by removing the appropriate air box handhole cover and viewing through the resulting opening.
- (C) The inspection takes place by removing the appropriate cylinder head valve cover and viewing through the resulting opening.
- (D) The inspection takes place by removing the appropriate oil pan 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 one of the main propulsion diesel engines on the fishery research vessel to which you are assigned. The cylinder exhaust temperature of one of the cylinders is significantly lower than the others. When analyzing compression and firing pressure data, however, the numbers are within the normal range for this particular cylinder. What condition would produce these results?

- (A) Excessive carbon build-up on exhaust pyrometer probe of affected cylinder.
- (B) Leaking fuel injector needle valve for affected cylinder.
- (C) Excessive carbon build-up on air inlet ports or valves of affected cylinder.
- (D) Leaking exhaust valve on affected cylinder.

If choice A is selected set score to 1.

6. You are in the process of setting up a system for collecting engine data for trend analysis for the main propulsion engines on your uninspected fishing industry vessel. In terms of the conditions under which readings are to be taken and recorded, what statement is true?

- (A) Data should be collected under random conditions of load and speed.
- (B) Data should be collected under conditions of load and speed as variable as possible.
- (C) Data should be collected with no particular concern for conditions of load and speed.
- (D) Data should be collected under conditions of load and speed that are similar, if not constant.

If choice D is selected set score to 1.

- 7.** When checking the cylinder jacket water cooling expansion tank level on a main propulsion diesel engine on your fishing factory ship while underway, what should be the expansion tank level?
- (A) The actual level is unimportant as long as it is visible in the sight glass when the engine is at operating temperature.
 - (B) The level should be out of sight high in the sight glass when the engine is at operating temperature.
 - (C) The level should be in the lower part of the sight glass when the engine is at operating temperature.
 - (D) The level should be in the upper part of the sight glass when the engine is at operating temperature.

If choice D is selected set score to 1.

- 8.** When starting a main propulsion diesel engine fitted with attached pumps in preparation for getting underway on your fishery research vessel, what parameter must be checked FIRST upon start-up to avoid immediate engine damage?
- (A) Lubricating oil supply header pressure.
 - (B) Cylinder jacket water pump discharge pressure.
 - (C) Fuel oil supply header pressure.
 - (D) Sea water pump discharge pressure.

If choice A is selected set score to 1.

- 9.** When checking the crankcase oil level on an off-line diesel generator set engine on your uninspected fishing trawler, what should be the oil level as indicated on the dipstick?
- (A) The level should be between the FULL and ADD marks on the dipstick.
 - (B) The level should be well above the FULL mark on the dipstick.
 - (C) The level should be below the ADD mark on the dipstick.
 - (D) The actual level is unimportant as long as it is visible on the dipstick.

If choice A is selected set score to 1.

- 10.** When starting a deck winch drive engine in preparation for seine net handling operations, what parameter must be checked FIRST upon start-up to avoid immediate engine damage?
- (A) Engine lubricating oil supply header pressure.
 - (B) Fuel oil supply header pressure.
 - (C) Winch gear oil pump discharge pressure.
 - (D) Cylinder jacket water pump discharge pressure.

If choice A is selected set score to 1.

11. The fishing industry line vessel 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-0122

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

If choice B is selected set score to 1.

12. The fishing industry factory ship to which you are assigned has a main propulsion engine of the type shown in the illustration. In terms of piston action, operating cycle, and piston type, what statement is true concerning this engine type? Illustration MO-0069

- (A) This is a double-acting, four-stroke cycle, opposed piston type engine.
- (B) This is a single-acting, two-stroke cycle, opposed piston type engine.
- (C) This is a double-acting, two-stroke cycle, crosshead piston type engine.
- (D) This is a single-acting, two-stroke cycle, crosshead piston type engine.

If choice B is selected set score to 1.

13. The mollusc dredger to which you are assigned is fitted with generator set drive engines as shown in the illustration. What statement is true in terms of the combustion chamber design? Illustration MO-0006

- (A) The engine uses an open type combustion chamber with a hemispherical fire-deck.
- (B) The engine uses turbulence chambers with a hemispherical fire-deck.
- (C) The engine uses an open type combustion chamber with a flat fire-deck.
- (D) The engine uses pre-combustion chambers with a flat fire-deck.

If choice C is selected set score to 1.

14. The uninspected fishing trawler 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-0013

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

If choice D is selected set score to 1.

15. The main propulsion diesel engines fitted on your fishing industry factory ship are started with compressed air using the system illustrated. What would be the FIRST consequence of having the start solenoid valve energized open by depressing the start button? Illustration MO-0200

- (A) The lower cranking air motor drive pinion is engaged to the engine flywheel.
- (B) The upper cranking air motor drive pinion is disengaged from the engine flywheel.
- (C) The lower cranking air motor drive pinion is disengaged from the engine flywheel.
- (D) The upper cranking air motor drive pinion is engaged to the engine flywheel.

If choice A is selected set score to 1.

16. The various auxiliary diesel engines fitted on your uninspected fishing trawler may employ a variety of different cranking methods for engine starting. What type of cranking method is shown in the illustration? Illustration MO-0044

- (A) Electric cranking motor.
- (B) Air cranking motor.
- (C) Hydraulic cranking motor.
- (D) Gasoline engine cranking motor.

If choice B is selected set score to 1.

17. The diesel generator engines onboard your mollusc dredger use a lubricating oil filtration scheme as shown in the illustration. What type of filtration system is illustrated? Illustration MO-0181

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

If choice D is selected set score to 1.

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

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

If choice A is selected set score to 1.

19. Which of the following fuel systems is characterized by a complete absence of high pressure fuel lines?

- (A) Common rail type system.
- (B) Rotary plunger type system.
- (C) In-line multi-plunger type system.
- (D) Unit injector type system.

If choice D is selected set score to 1.

20. The fishing industry seiner to which you are assigned has an engine as shown in the illustration. What statement concerning air box and exhaust manifold pressure is true, if the engine is running at rated speed? Illustration MO-0224

- (A) There is no predictable, consistent relationship between the exhaust manifold and air box pressures.
- (B) The exhaust manifold pressure will be lower than the air box pressure.
- (C) The exhaust manifold pressure will be higher than the air box pressure.
- (D) The exhaust manifold pressure will be equal to the air box pressure.

If choice B is selected set score to 1.

21. The fresh water cooling systems of the main engines on your fishing vessel are configured as shown in the illustration. During normal engine operation which of the listed fresh water temperature locations would indicate the highest temperature? Illustration MO-0137

- (A) Fresh water inlet to the RW/FW heat exchanger
- (B) Fresh water outlet from the RW/FW heat exchanger
- (C) Fresh water outlet from the lube oil cooler
- (D) Fresh water inlet to the lube oil cooler

If choice A is selected set score to 1.

22. The auxiliary engines on the uninspected fishing trawler to which you are assigned are fitted with Roots-blowers as shown in the illustration. What statement is true concerning the timing gears as shown in figure "A"? Illustration MO-0135

- (A) The timing gears are helically cut and insure that the blower rotor lobes are properly spaced apart with a close tolerance.
- (B) The timing gears are straight cut and insure that the blower rotor lobes are properly spaced apart with a close tolerance.
- (C) The timing gears are straight cut and insure that the blower is properly timed to the engine's crankshaft.
- (D) The timing gears are helically cut and insure that the blower is properly timed to the engine's crankshaft.

If choice A is selected set score to 1.

23. The mollusc dredger to which you are assigned is fitted with reduction gears as shown in the illustration. What statement is true concerning this type of reduction gear? Illustration MO-0085

- (A) The reduction gear is a single-input, single-reduction type of gear.
- (B) The reduction gear is a double-input, single-reduction type of gear.
- (C) The reduction gear is a single-input, double-reduction type of gear.
- (D) The reduction gear is a double-input, double-reduction type of gear.

If choice A is selected set score to 1.

24. The fishing industry factory ship to which you are assigned has a pneumatic propulsion control system as shown in the illustration. Which control valve is responsible for bypassing the inflation delay orifice to insure rapid and positive reversals and to protect the clutches from excessive slip? Illustration MO-0167

- (A) H5 inflation air relay valve
- (B) H5 boost relay air valve
- (C) H5 governor limit relay air valve
- (D) C2 speed-slip relay valve

If choice B is selected set score to 1.

25. The fishing seiner to which you are assigned has a pneumatic propulsion control system as shown in the illustration. When the mechanical slave remote control station is being used to control propulsion, what is the direct result of positioning the control lever in the ahead direction? Illustration MO-0168

- (A) Movement of the mechanical slave remote control station lever directly shifts the pilot house pneumatic master control station lever control valve spool by the action of a chain or cable which results in pneumatic shifting of the clutch actuator 4-way control valve to the ahead direction.
- (B) Movement of the mechanical slave remote control station lever directly shifts the pneumatic remote control station lever control valve spool by the action of a chain or cable which results in pneumatic shifting of the clutch actuator 4-way control valve to the ahead direction.
- (C) Movement of the mechanical slave remote control station lever directly shifts the engine room control station lever control valve spool by the action of a chain or cable which results in pneumatic shifting of the clutch actuator 4-way control valve to the ahead direction.
- (D) Movement of the mechanical slave remote control station lever directly shifts the clutch actuator 4-way control valve to the ahead direction by the action of a chain or cable.

If choice A is selected set score to 1.

26. The main engines on your fishing industry factory ship are fitted with speed control governors of the type shown in the illustration. If the shutdown solenoid is de-energized during normal operation, which of the following scenarios depicts the response on a safety shutdown where the shutdown plunger rod moves downward unseating the ball check valve when the shutdown solenoid energizes? Illustration MO-0170

- (A) The servo piston rod moves downward.
The power cylinder tail rod moves upward.
- (B) The servo piston rod moves upward.
The power cylinder tail rod moves downward.
- (C) The servo piston rod moves upward.
The power cylinder tail rod moves upward.
- (D) The servo piston rod moves downward.
The power cylinder tail rod moves downward.

If choice B is selected set score to 1.

27. The main engines on your fishing industry line vessel are equipped with manual shutdown levers as shown in the illustration. What statement concerning manual shutdown is true? Illustration MO-0171

- (A) The manual shutdown lever is operated by means of a remote pull cable and uses the governor fuel control linkage to accomplish engine shutdown.
- (B) The manual shutdown lever is operated by means of a remote pull cable and uses the over speed trip mechanism to accomplish engine shutdown.
- (C) The manual shutdown lever is operated by means of the over speed trip reset lever and uses the over speed trip mechanism to accomplish engine shutdown.
- (D) The manual shutdown lever is operated by means of the emergency trip reset lever and uses the governor fuel control linkage.

If choice B is selected set score to 1.

28. The diesel generators on your uninspected fishing trawler are fitted with speed control governors of the type shown in the illustration. If an adjustment is made to item #2, what will change? Illustration MO-0160

- (A) The governed speed setting.
- (B) The maximum high speed setting.
- (C) The speed droop setting.
- (D) The minimum low speed setting.

If choice A is selected set score to 1.

29. The deck winch on your fishing industry seiner is fitted with a speed control governor of the type shown in the illustration. In addition to variable governed speed setting, what other group of settings is built into this particular governor? Illustration MO-0157

- (A) Engine load limit (maximum fuel delivery)
Engine speed limit (maximum governed speed)
- (B) Engine idle speed (minimum governed speed)
Engine speed limit (maximum governed speed)
Engine load limit (maximum fuel delivery)
- (C) Engine idle speed (minimum governed speed)
Engine speed limit (maximum governed speed)
- (D) Engine idle speed (minimum governed speed)
Engine load limit (maximum fuel delivery)

If choice C is selected set score to 1.

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

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

If choice A is selected set score to 1.

31. Fusible plugs are installed in fire-tube boilers to _____.

- (A) provide a means of draining the boiler
- (B) warn the engineer of low water level
- (C) cool the crown sheet at high firing rates
- (D) open the burners' electrical firing circuits

If choice B is selected set score to 1.

32. The primary function of a flame safeguard system, as used on an automatically fired auxiliary boiler, is to prevent _____.

- (A) accidental dry firing and overpressure
- (B) uncontrolled fires in the furnace
- (C) explosions in the boiler furnace
- (D) overheating of the pressure parts

If choice C is selected set score to 1.

33. You are replacing a damaged high pressure fuel injection line for #1 cylinder on an auxiliary diesel engine onboard your fishery research vessel. Which of the following statements represents the best replacement practice or strategy?

- (A) Custom fabricate the fuel injection line minimizing length and bends to create the shortest possible replacement fuel injection line.
- (B) Replace the damaged fuel injection line with a custom fabricated line without regard to the length and configuration of the bends of the original.
- (C) Replace the damaged fuel injection line with a factory-formed fuel injection line specifically fabricated for #1 cylinder line replacement.
- (D) Custom fabricate the fuel injection line as close as possible to the fuel injection line being replaced in terms of bends and overall length.

If choice C is selected set score to 1.

34. An engine that runs rough or expels large amounts of black smoke may indicate a misfiring cylinder. Assume that the auxiliary diesel engines on your fishing vessel 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 engine response. If before the injector is disabled the engine is running rough and expelling large amounts of black smoke, and after the injector is disabled, the engine runs even rougher, but continues to produce equally dense black smoke, what is indicated?

- (A) This indicates that the cylinder associated with the disabled injector is firing properly, and all other injectors are firing properly.
- (B) This indicates that the cylinder associated with the disabled injector is firing properly, but at least one other injector is misfiring.
- (C) This indicates that the cylinder associated with the disabled injector is misfiring, and at least one other injector is misfiring.
- (D) This indicates that the cylinder associated with the disabled injector is misfiring, but all other injectors are firing properly.

If choice B is selected set score to 1.

35. The main propulsion diesel engines used to power the fishing vessel to which you are assigned are started with vane-type air-starting motors designed to operate at 250 psig. The in-line lubricator should provide 3 drops of oil per cranking minute, as long as the in-line lubricator oil viscosity is as specified. If the start air pressure is within the normal range and the oil viscosity is correct, but the oil injection rate is only 1 drop per minute, what should be done?

- (A) The starting air pressure supplied to the air-starting motors should be increased.
- (B) The oil in the in-line lubricator should be replaced with oil of lower viscosity than specified.
- (C) The in-line lubricator oil injection metering needle valve should be further opened.
- (D) The in-line lubricator oil injection metering needle valve should be further closed.

If choice C is selected set score to 1.

36. The diesel generator sets on your mollusc dredger use a starting system similar to the one shown in the illustration. While the engine is running, the starting battery bank terminal voltage and specific gravity gradually fall off and the ammeter indicates a discharging battery bank, eventually resulting in a dead battery bank. Which of the following failures would most likely result in this condition?
Illustration MO-0202

- (A) An open circuited starter solenoid coil.
- (B) An open circuited start switch.
- (C) An open voltage regulator/alternator field circuit.
- (D) A closed oil pressure switch.

If choice C is selected set score to 1.

37. The main engines on your fishery research vessel utilize a starting system similar to that shown in the illustration. The air supply pressure and engine room ambient temperatures are both within the normal range. Upon attempted start-up, the engine turns very slowly, and the flow rate of air from the air starting motor exhaust is very low. Which of the listed conditions would most likely be the cause of the failure to start? Illustration MO-0203

- (A) The air-starting motor vanes are stuck in their slots.
- (B) The in-line strainer basket element is severely restricted.
- (C) The fuel injection system piping is air-bound.
- (D) The in-line lubricator siphon tube is severely restricted.

If choice B is selected set score to 1.

38. A diesel generator set on your fishing trawler 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 pressure drop becomes unacceptably high. When you rotate the cleaning handle you notice that it is extremely difficult to rotate. What should be done? Illustration MO-0057

- (A) After stopping the engine, the drain plug (B) should be removed to drain the accumulated sludge from the strainer sump.
- (B) No special consideration need be taken as long as the cleaning handle (A) rotates, even if it rotates with great difficulty.
- (C) After stopping the engine, the strainer element should be withdrawn and soaked in solvent to break up the heavy deposits on the disk stack (C).
- (D) The cleaning handle (A) should be forced to rotate, even if it requires an extender handle to produce greater rotating torque.

If choice C is selected set score to 1.

39. The main diesel engines on the uninspected fishing industry vessel to which you are assigned are fitted with a basket type lube oil strainer, which must be periodically cleaned. The engine manufacturer recommends using a petroleum based solvent for cleaning. Which of the following would typically be acceptable?

- (A) A high flash point solvent such as kerosene or diesel fuel.
- (B) An aromatic solvent such as benzene or toluene.
- (C) A low flash point solvent such as gasoline.
- (D) A chlorinated solvent such as perchlorethylene or trichlorethylene.

If choice A is selected set score to 1.

40. When interpreting the engine lube oil supply header pressures for the main engines on your fishing trawler, what statement is true assuming that the lube oil pump is engine-driven?

- (A) As the lube oil temperature increases, the supply header pressure tends to increase, and as the engine rpm increases, the supply header pressure tends to decrease.
- (B) As the lube oil temperature increases, the supply header pressure tends to decrease, and as the engine rpm increases, the supply header pressure tends to increase.
- (C) As the lube oil temperature increases, the supply header pressure tends to increase, and as the engine rpm increases, the supply header pressure tends to increase.
- (D) As the lube oil temperature increases, the supply header pressure tends to decrease, and as the engine rpm increases, the supply header pressure tends to decrease.

If choice B is selected set score to 1.

41. The lube oil quality management system used on your mollusc dredger requires on board testing of lubricating oil to include testing for viscosity at the same temperature consistently. In terms of viscosity test results, what statement is true?

- (A) An unusual drop in viscosity indicates excessive oxidation of the lubricating oil OR excessive dilution of the lubricating oil with diesel fuel oil OR BOTH.
- (B) An unusual drop in viscosity indicates excessive dilution of the lubricating oil with diesel fuel oil and an unusual rise in viscosity indicates excessive oxidation of the lubricating oil.
- (C) An unusual rise in viscosity indicates excessive oxidation of the lubricating oil OR excessive dilution of the lubricating oil with diesel fuel oil OR BOTH.
- (D) An unusual drop in viscosity indicates excessive oxidation of the lubricating oil and an unusual rise in viscosity indicates excessive dilution of the lubricating oil with diesel fuel oil.

If choice B is selected set score to 1.

42. The main diesel engines on the uninspected fishing industry vessel to which you are assigned are fitted with a metal-edge duplex suction fuel strainer, where the elements must be periodically cleaned. The engine manufacturer recommends using a petroleum based solvent for cleaning. Which of the following would typically be acceptable?

- (A) White mineral spirits.
- (B) Kerosene or diesel fuel.
- (C) Benzene or toluene.
- (D) Perchloroethylene or trichloroethylene.

If choice B is selected set score to 1.

43. Which fishing vessel diesel fuel oil day tank condition would be most likely to result in water contaminated fuel?

- (A) Maintaining relatively low day tank levels when the relative humidity of the atmosphere is low.
- (B) Maintaining relatively high day tank levels when the relative humidity of the atmosphere is high.
- (C) Maintaining relatively high day tank levels when the relative humidity of the atmosphere is low.
- (D) Maintaining relatively low day tank levels when the relative humidity of the atmosphere is high.

If choice D is selected set score to 1.

44. A deck winch drive engine fuel system on board your uninspected fishing industry vessel is prone to becoming air bound, and you suspect a fuel system piping leak. Assuming that the diesel fuel tank is beneath the engine, that the fuel booster pump is engine driven, and that the fuel injection pump is a high pressure multi-plunger pump, where in the system would the leak most likely exist?

- (A) In the booster pump discharge line between the booster pump outlet and the fuel injection pump inlet.
- (B) In the fuel injection pump return line between the fuel injection pump return outlet and the fuel oil day tank (or booster pump suction as appropriate).
- (C) In the booster pump suction line between the day tank suction line and the booster pump inlet.
- (D) In the fuel injection pump high pressure fuel lines between the fuel injection pump high pressure outlets to the fuel injector nozzle inlets.

If choice C is selected set score to 1.

45. On diesel engines used on a fishing industry factory ship, which type of injection system is most likely to use sophisticated electronic controls for timing and metering?

- (A) Distributor type pump
- (B) Rotary plunger type pump
- (C) Unit injector type pump
- (D) In-line multi-plunger pump

If choice C is selected set score to 1.

46. The mollusc dredger to which you are assigned has a deck winch drive engine fitted with fuel injectors with the operating principle as shown in the illustration. In figure "A" which plunger travel position corresponds to when fuel injection begins? Illustration MO-0144

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

If choice B is selected set score to 1.

47. The mollusc dredger to which you are assigned has diesel generators fitted with unit injectors of the type shown in the illustration. What statement is true concerning the operation of unit injectors of this type? Illustration MO-0143

- (A) Pressurization and metering of the fuel is accomplished by the mechanically operated rocker arm, and the timing of the fuel is accomplished by the electronically controlled solenoid.
- (B) Pressurization of the fuel is accomplished by the mechanically operated rocker arm, and the timing and metering of the fuel is accomplished by the electronically controlled solenoid.
- (C) Pressurization and timing of the fuel is accomplished by the mechanically operated rocker arm, and the metering of the fuel is accomplished by the electronically controlled solenoid.
- (D) Pressurization of the fuel is accomplished by the electronically controlled solenoid, and the timing and metering of the fuel is accomplished by the mechanically operated rocker arm.

If choice B is selected set score to 1.

48. The generator drive diesel engines on your fishing trawler are fitted with a multi-plunger injection pump with high pressure fuel lines leading to each hydraulically operated injector. If the engine is allowed to run out of fuel, it may become necessary to purge the high pressure fuel lines of air. How is this accomplished?

- (A) Slackening each high pressure fuel line fitting at the fuel injector while cranking over the engine with the starter and allowing air to escape, then retightening when air bubbly fuel is observed.
- (B) Slackening each high pressure fuel line fitting at the fuel injector while stroking the manually operated priming pump and allowing air to escape, then retightening when bubbly fuel is observed.
- (C) Slackening each high pressure fuel line fitting at the fuel injector while cranking over the engine with the starter and allowing air to escape, then retightening when a solid stream of fuel is observed.
- (D) Slackening each high pressure fuel line fitting at the fuel injector while stroking the manually operated priming pump and allowing air to escape, then retightening when a solid stream of fuel is observed.

If choice C is selected set score to 1.

49. In order to minimize the abrasive action of dust particles entering the combustion spaces of the diesel engines used on the fishery research vessel to which you are assigned, each engine is protected with a heavy-duty air intake filter. Which one of the listed air intake filter elements is periodically cleaned as opposed to being periodically replaced with a new element?

- (A) Wire-mesh filter element.
- (B) Spiral-rotor filter element.
- (C) Multi-tube filter element.
- (D) Panel-type filter element.

If choice A is selected set score to 1.

50. In order to determine the restriction across a dry-type air filter on one of the diesel engines on your fishing trawler, the engine should be operating at rated speed and load. What instrument would give the most accurate measurement of air filter element restriction?

- (A) A mercury manometer.
- (B) A water manometer.
- (C) A bourdon tube compound gauge.
- (D) A bourdon tube vacuum gauge.

If choice B is selected set score to 1.

51. The turbocharged, four-stroke, main propulsion diesel engines on your fishery research vessel are protected with dry-type air intake filters. The engines are fitted with dial-type restriction indicators measuring the pressure in the air duct between the air intake filter and the turbocharger blower inlet. Under what conditions should the air intake filters be evaluated using the restriction indicators?

- (A) The engine should be running at rated RPM with no load (propulsion clutch disengaged).
- (B) The engine should be running at idle RPM with no load (propulsion clutch disengaged).
- (C) The engine should be running at rated RPM with full load (propulsion clutch engaged).
- (D) The engine should be running at idle RPM with minimal load (propulsion clutch engaged).

If choice C is selected set score to 1.

52. Assuming the use of ultra-low sulfur content diesel fuel, what combination of conditions associated with uninspected fishing industry vessel 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.

53. Assuming the use of low sulfur content diesel fuel, what combination of conditions associated with uninspected fishing industry vessel engine room operations would most contribute to internal corrosion of exhaust systems?

- (A) Low ambient temperature and high engine load.
- (B) Low ambient temperature and low engine load.
- (C) High ambient temperature and high engine load.
- (D) High ambient temperature and low engine load.

If choice B is selected set score to 1.

54. The raw water boxes of the fresh water coolers serving the main propulsion diesel engines on your uninspected fishing industry vessel are fitted with sacrificial zinc anodes. Upon inspection, at what percentage of deterioration should the zinc anodes be replaced?

- (A) 25%
- (B) 50%
- (C) 75%
- (D) 100%

If choice B is selected set score to 1.

55. The fresh water cooling systems serving the main engines on your fishing factory ship 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 fresh water pump(s) discharge pressure.
- (B) Low level in the jacket water expansion tank.
High fresh water outlet temperature from the engine.
Low fresh water pump(s) discharge pressure.
- (C) Low level in the jacket water expansion tank.
Low fresh water outlet temperature from the engine.
Low fresh water pump(s) discharge pressure.
- (D) High level in the jacket water expansion tank.
High fresh water outlet temperature from the engine.
High fresh water pump(s) discharge pressure.

If choice B is selected set score to 1.

56. The fresh water cooling systems serving the main engines on your uninspected fishing industry vessel are arranged as shown in the illustration. If there is excessive scale build up inside the tubes of an engine's shell and tube RW/FW heat exchanger, while the engine is in operation, what would be the resulting symptoms? Illustration MO-0137

- (A) An increased temperature rise on the raw water side, and an increased temperature drop on the fresh water side.
- (B) A decreased temperature rise on the raw water side, and a decreased temperature drop on the fresh water side.
- (C) A decreased temperature rise on the raw water side, and an increased temperature drop on the fresh water side.
- (D) An increased temperature rise on the raw water side, and a decreased temperature drop on the fresh water side.

If choice B is selected set score to 1.

57. The four-stroke cycle, turbocharged main propulsion engines on your fishing vessel are fitted with after coolers for the purposes of increasing the air charge density and total power output. The after cooler air ducts must be periodically drained to remove accumulated condensation. What combination of conditions dictate more frequent draining?

- (A) Low ambient temperature and high engine load.
- (B) High ambient temperature and high engine load.
- (C) High ambient temperature and low engine load.
- (D) Low ambient temperature and low engine load.

If choice D is selected set score to 1.

58. You are inspecting the blower of a Roots-blown, two-stroke cycle main propulsion engine on the fishing vessel to which you are assigned and discover the presence of aluminum dust on the rotors and on the air duct surfaces. What would most likely be the direct cause of this?

- (A) Worn blower rotor shaft seals.
- (B) Restricted blower air intake filter.
- (C) Restricted scavenging air intake ports.
- (D) Worn blower rotor shaft bearings.

If choice D is selected set score to 1.

59. A turbocharged, two-stroke cycle main propulsion diesel engine on your fishery research vessel is emitting gray to black smoke excessively from the stack. Upon comparing the measured air box pressure against a reference engine which is producing a clear stack, the measured air box pressure is determined to be too low. Which of the following conditions would most likely be the cause for the relatively low air box pressure?

- (A) Airside aluminum fins on after coolers are excessively restricted.
- (B) Exhaust silencer/muffler is excessively restricted with carbon deposits.
- (C) Scavenging air intake ports are excessively restricted with carbon deposits.
- (D) Turbocharger exhaust turbine inlet screen is excessively restricted.

If choice A is selected set score to 1.

- 60.** The lubricating oil system supporting the main propulsion reduction gear on the fishing trawler to which you are assigned is fitted with a sea water cooled 4-pass shell and tube lube oil cooler. The water box sacrificial zinc anodes must be inspected periodically. Which of the following listed actions correctly states maintenance criteria pertaining to scale build-up on the zincs?
- (A) Any sacrificial zinc anodes with accumulated scale build-up should be replaced regardless of the degree of deterioration.
 - (B) Any accumulated scale build-up on sacrificial zinc anodes should be scraped off until the zinc anodes are shiny.
 - (C) Any accumulated scale build-up on sacrificial zinc anodes should be left intact to ensure proper protection from galvanic corrosion.
 - (D) There is no need to check for scale build-up on the sacrificial zinc anodes as this phenomenon is not physically possible.

If choice B is selected set score to 1.

- 61.** The uninspected fishing industry vessel to which you are assigned is fitted with reversing reduction gears equipped with airflex pneumatic tire-type friction clutches. With the bridge in control of the main engines, you hear unusual screeching noises coming from the clutches, but only when transitioning from one direction to the other. Given the situation of changing direction from ahead to astern as an example, what is the most likely cause?
- (A) The EOT handle is being left in ahead idle and then in neutral for too long a period of time.
 - (B) The EOT handle is being left in neutral and then in astern idle for too short a period of time.
 - (C) The EOT handle is being left in ahead idle and then in neutral for too short a period of time.
 - (D) The EOT handle is being left in neutral and then in astern idle for too long a period of time.

If choice B is selected set score to 1.

- 62.** The pneumatic propulsion control system used on the fishing vessel to which you are assigned uses a diaphragm-operated relay valve as shown in the illustration. Periodically, the valve is to be disassembled for cleaning and inspection. What statement best describes the proper method for lubrication upon reassembly? Illustration MO-0052
- (A) O-rings should be lubricated with desiccant powder.
 - (B) O-rings should be lubricated with a silicone-based grease.
 - (C) O-rings should be lubricated with penetrating oil.
 - (D) O-rings should not be lubricated by any means.

If choice B is selected set score to 1.

63. The fishing vessel to which you are assigned is fitted with a totally pneumatic propulsion control system as shown in the illustration. If the astern clutch fails to engage from all control locations, but the ahead clutch properly engages from all control locations, which of the following system faults best accounts for these symptoms? Illustration MO-0168

- (A) The astern clutch engagement pilot air tubing has separated from the clutch actuator 4-way control valve at the clutch control panel.
- (B) The control lever at the engine room control station has a blocked astern clutch engagement pilot port.
- (C) The control lever at the pneumatic remote control station has a blocked astern clutch engagement pilot port.
- (D) The ahead clutch engagement pilot air tubing has separated from the clutch actuator 4-way control valve at the clutch control panel.

If choice A is selected set score to 1.

64. The main diesel propulsion engines on your uninspected fishing industry vessel are protected with a mechanical over speed trip mechanism similar to that shown in the illustration. Upon testing the trip setting, you discover that it is necessary to make an adjustment. Assuming that several adjustments may be necessary before the final setting is accurately achieved, what statement concerning adjustment is true? Illustration MO-0101

- (A) To adjust the over speed trip, the engine must be stopped AND the locknut must be retightened after each adjustment.
- (B) To adjust the over speed trip, the engine must be running AND the locknut must be retightened only after the final adjustment.
- (C) To adjust the over speed trip, the engine must be stopped AND the locknut must be retightened only after the final adjustment.
- (D) To adjust the over speed trip, the engine must be running AND the locknut must be retightened after each adjustment.

If choice A is selected set score to 1.

65. A main engine on your fishing trawler has experienced a low coolant water level alarm even though the water level in the expansion tank is normal. Assuming that the float activated switch is designed to open at low coolant level to activate the alarm, which of the following would account for this?

- (A) The float switch wire connections are loose at the terminals, not permitting continuity through the switch.
- (B) The float is binding in the float chamber, not permitting the float to drop.
- (C) The float level switch contacts are welded closed, not permitting the contacts to open.
- (D) It is not possible for a low coolant level alarm to occur when the water level is normal.

If choice A is selected set score to 1.

66. The rated speed of the main propulsion diesel engines on your uninspected fishing industry vessel is 900 rpm. The installed centrifugal over speed trip device similar to the one shown in the illustration is designed to shutdown 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 throw-out weight (item #10) link bolt (item #15 & #16) is binding within the spring guide (item #14) drilling.
- (B) The jam nut was not properly tightened against the adjusting nut (items #13) when the over speed trip was last set.
- (C) The compression spring (item #12) was excessively compressed when the over speed trip was last set.
- (D) The throw-out weight (item #10) pivot bolt (not labeled) is binding within the counterweight (item 1 through 9) drilling.

If choice B is selected set score to 1.

67. Using the oil chart provided in the illustration for guidance, which of the oils listed below would provide the best protection against high governor oil operating temperatures for speed control applications for fishing industry main propulsion diesel engines? Illustration MO-0161

- (A) All Proof 10W50 (Polyolester)
- (B) DN600 (Hydrocarbon)
- (C) Mobil 1 (Synthesized Hydrocarbon)
- (D) Delvac I (Synthesized Hydrocarbon)

If choice A is selected set score to 1.

68. A main engine speed control governor for one of your uninspected fishing industry vessel's main propulsion engines hunts, surges, or is sluggish to respond to load changes. Which of the following governor oil conditions would be the greatest single source of governor troubles?

- (A) Foamy oil (air entrainment).
- (B) Wrong grade of oil (viscosity).
- (C) Wrong type of oil (composition).
- (D) Dirty oil (solid contaminants).

If choice D is selected set score to 1.

69. You are attempting to start a deck winch drive engine fitted with an electric cranking motor where the battery electrolyte is frozen. What should be done to facilitate starting?

- (A) The engine should be started by means of jumper cables connected to another battery without any particular concern regarding the electrolyte being frozen.
- (B) The battery electrolyte should be allowed to thaw, and then the battery should be recharged as necessary before attempting to start the engine.
- (C) The battery electrolyte should be thawed by means of a battery charger, and then the battery should be recharged as necessary before attempting to start the engine.
- (D) The battery electrolyte should be allowed to thaw, and then the battery electrolyte should be diluted with distilled water as necessary before attempting to start the engine.

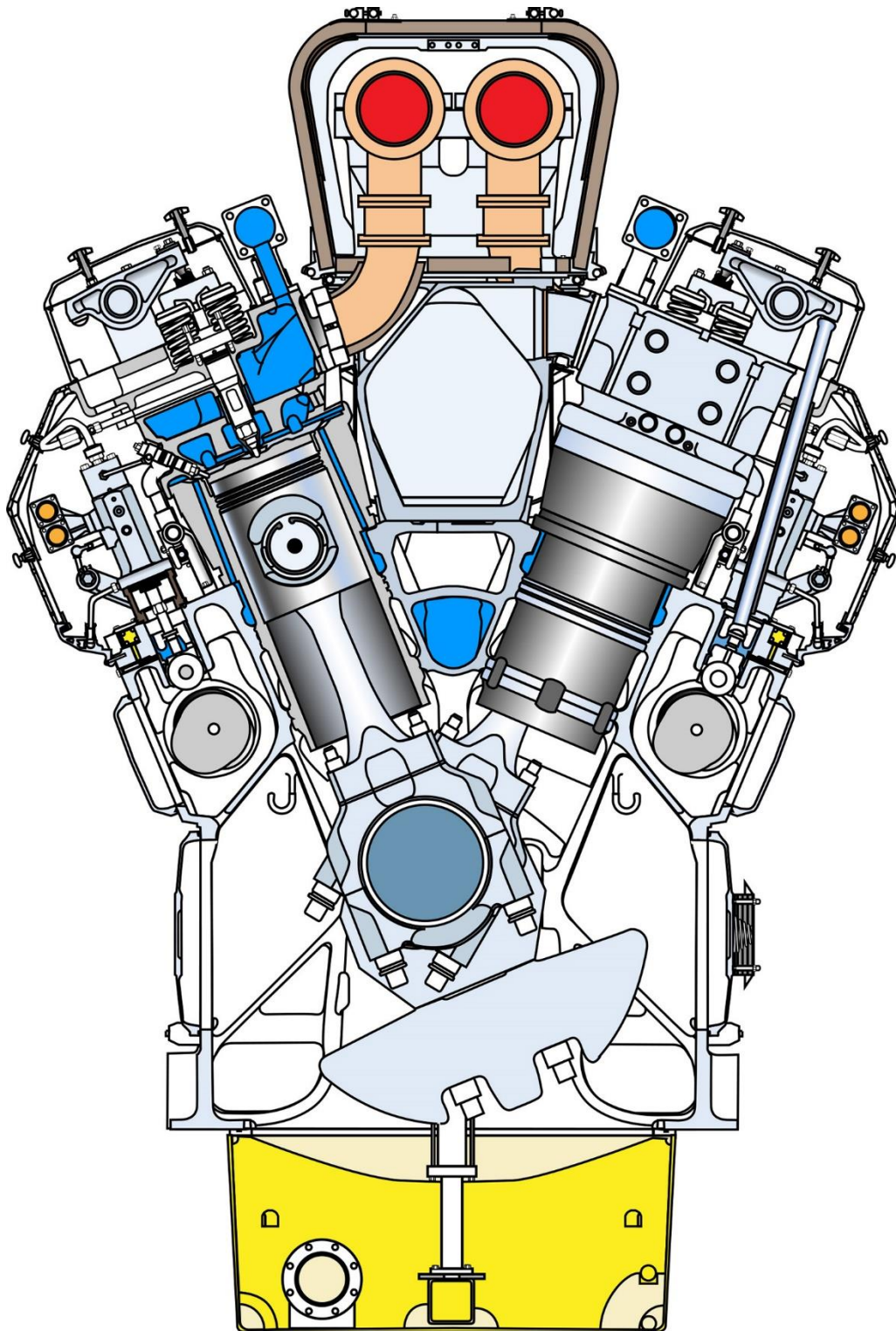
If choice B is selected set score to 1.

70. While underway in open waters on your commercial crabbing vessel, the low clutch air pressure alarm sounds and the faint odor of burning rubber is detected. What is the appropriate response?

- (A) Investigate the cause of low clutch air pressure, then bring the throttle and clutch control to the stop position if necessary.
- (B) Bring the throttle and clutch control to the stop position, then investigate the cause of low clutch air pressure.
- (C) Reduce the load and speed on the engine, then investigate the cause of low clutch air pressure.
- (D) Investigate the cause of low clutch air pressure, then reduce the engine load and speed if necessary.

If choice B is selected set score to 1.

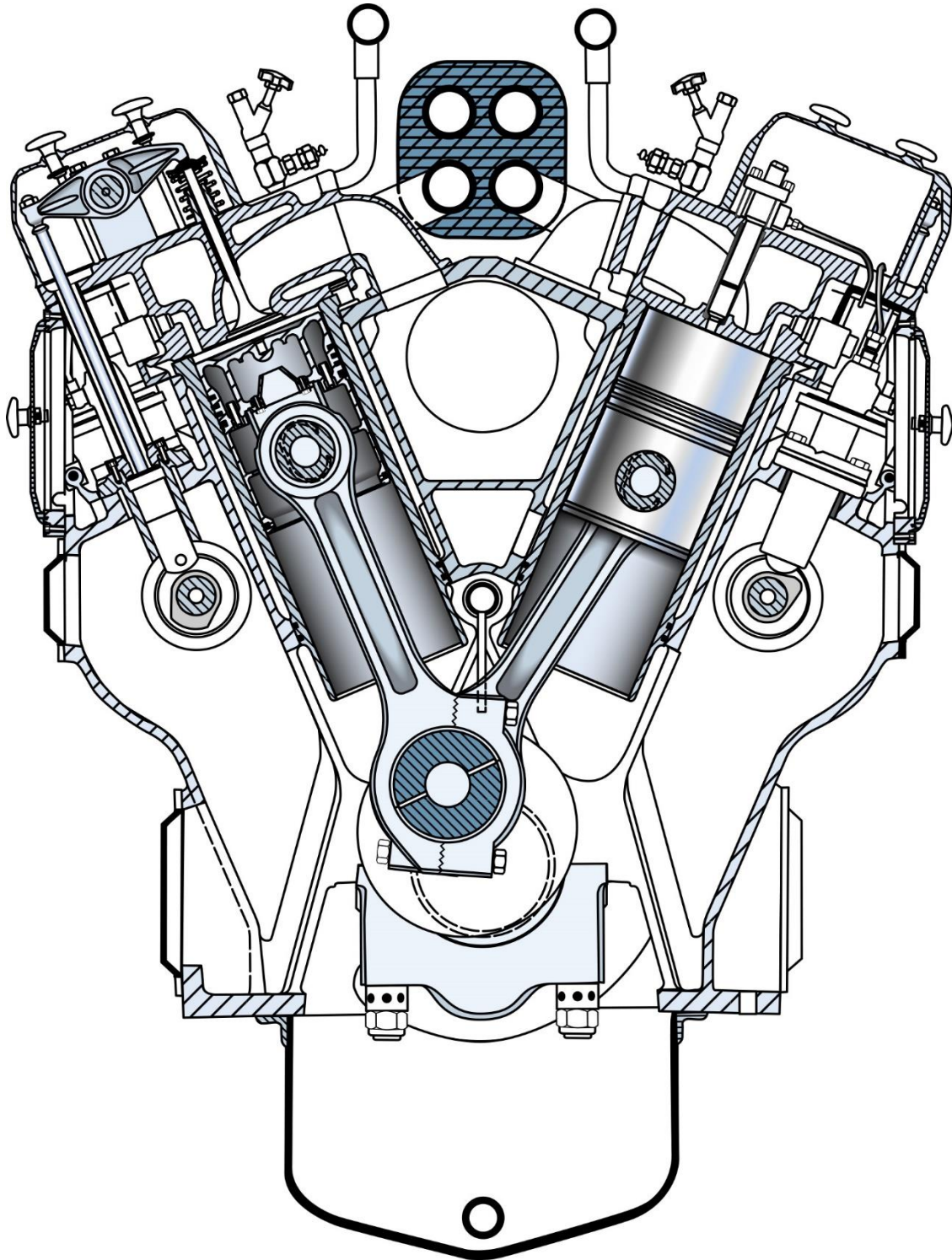
MO-0005



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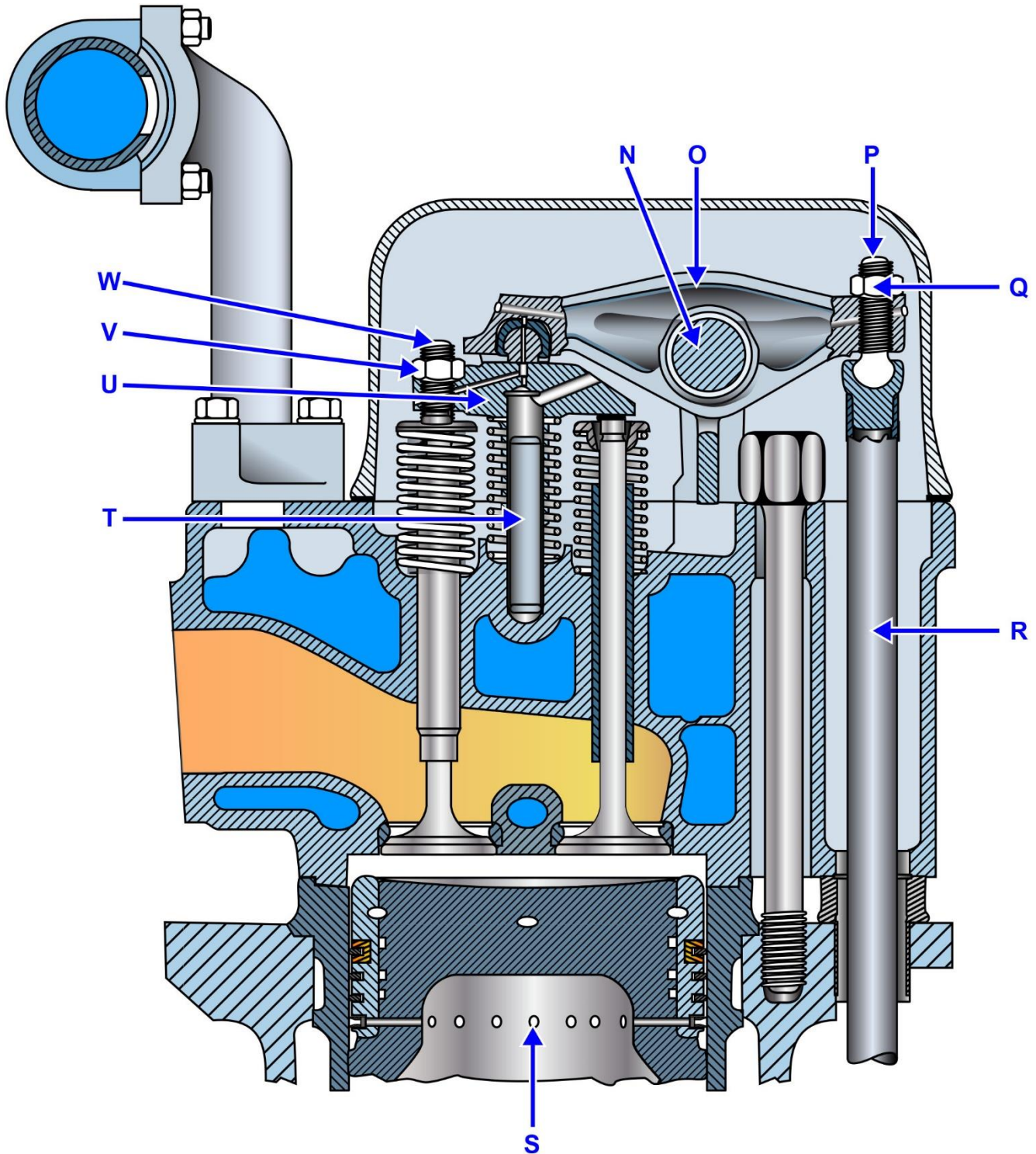
MO-0006



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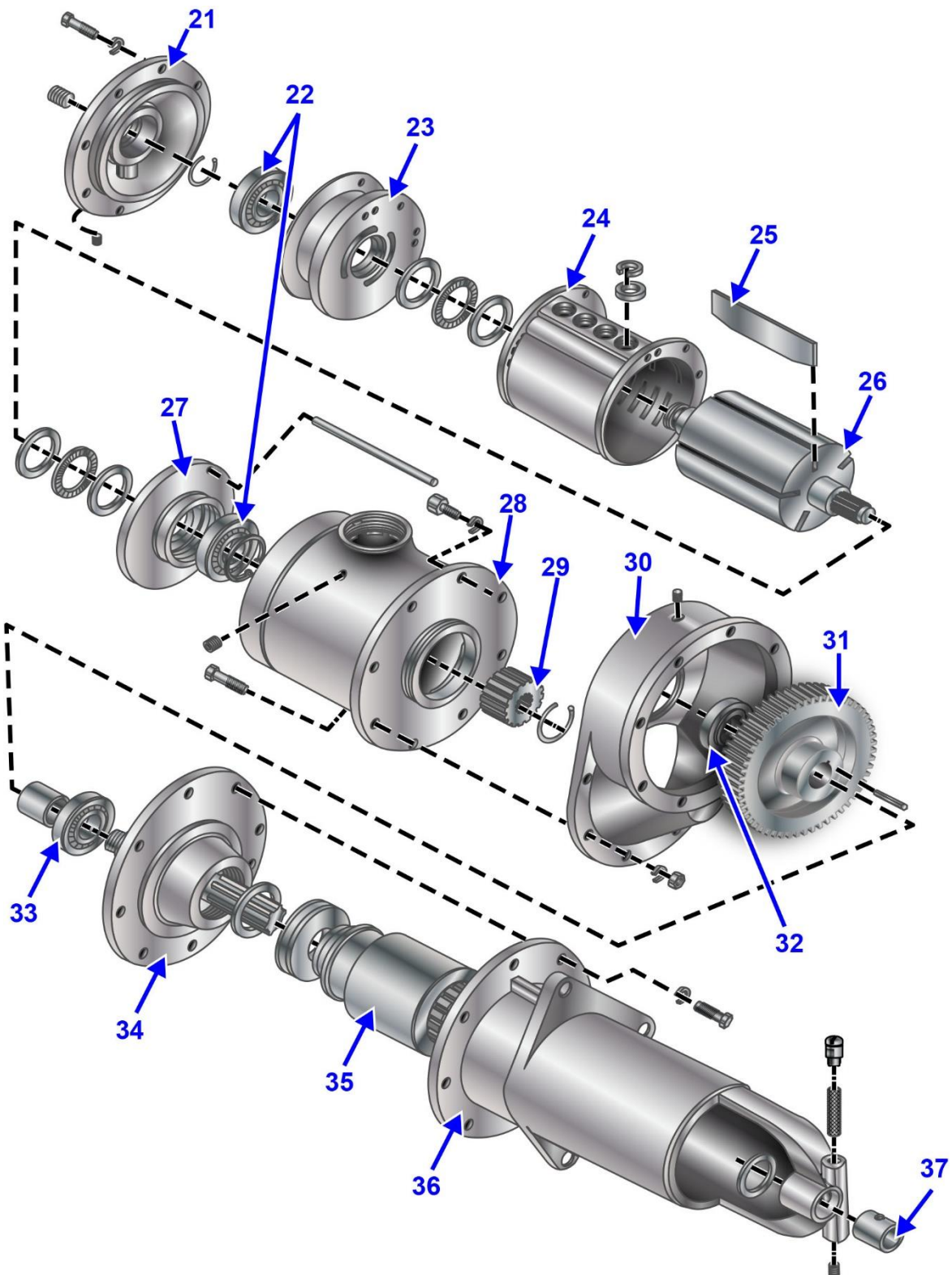
MO-0013



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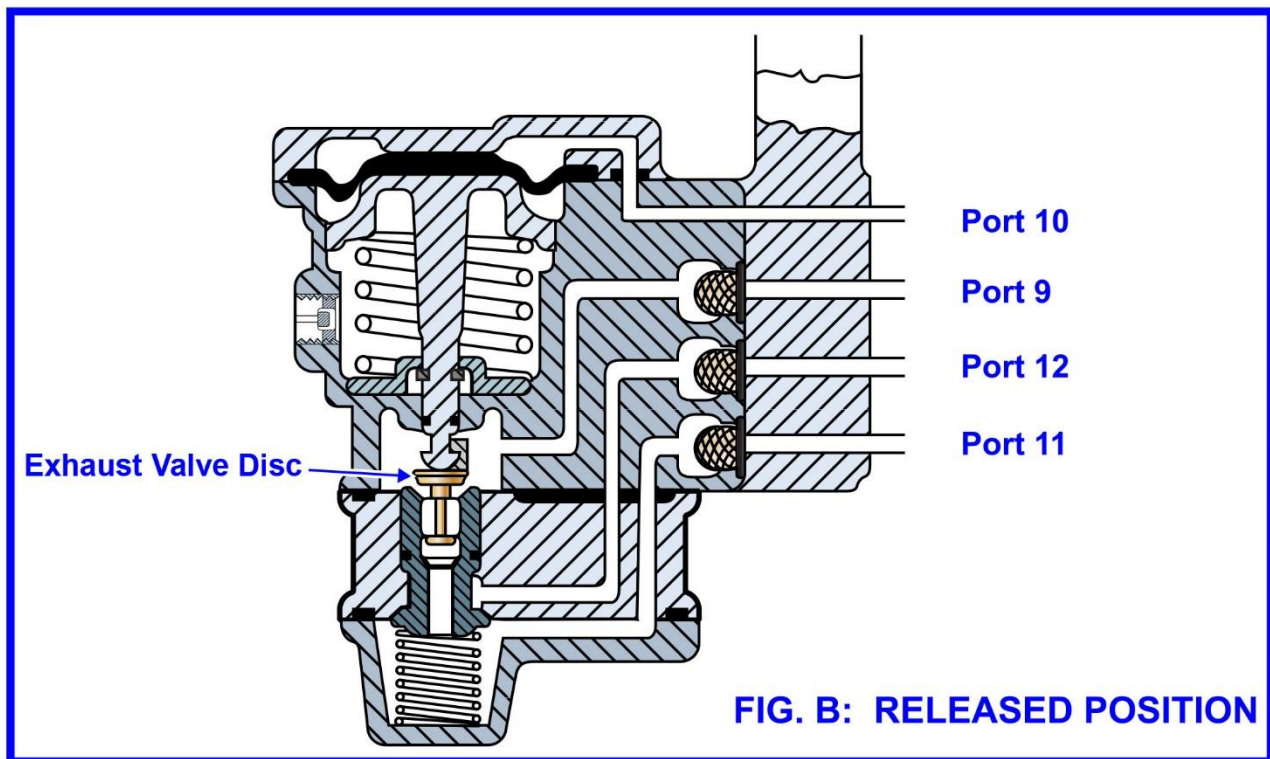
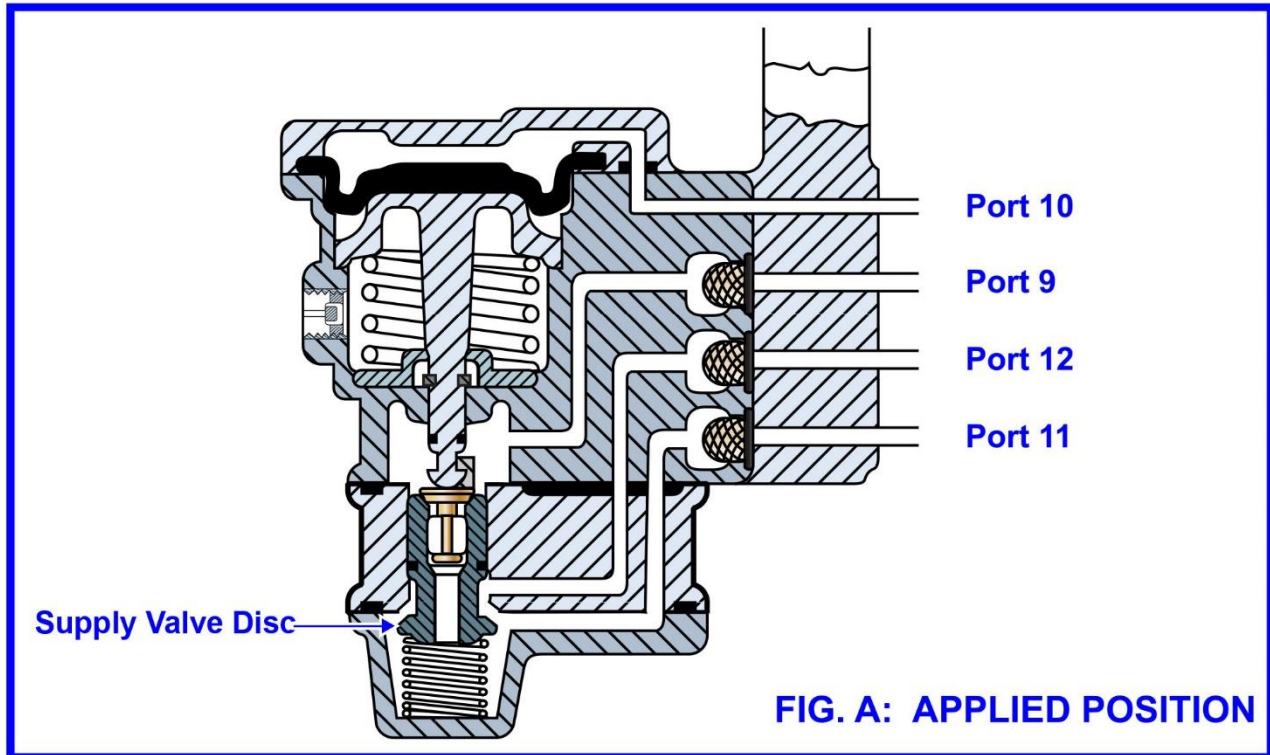
MO-0044



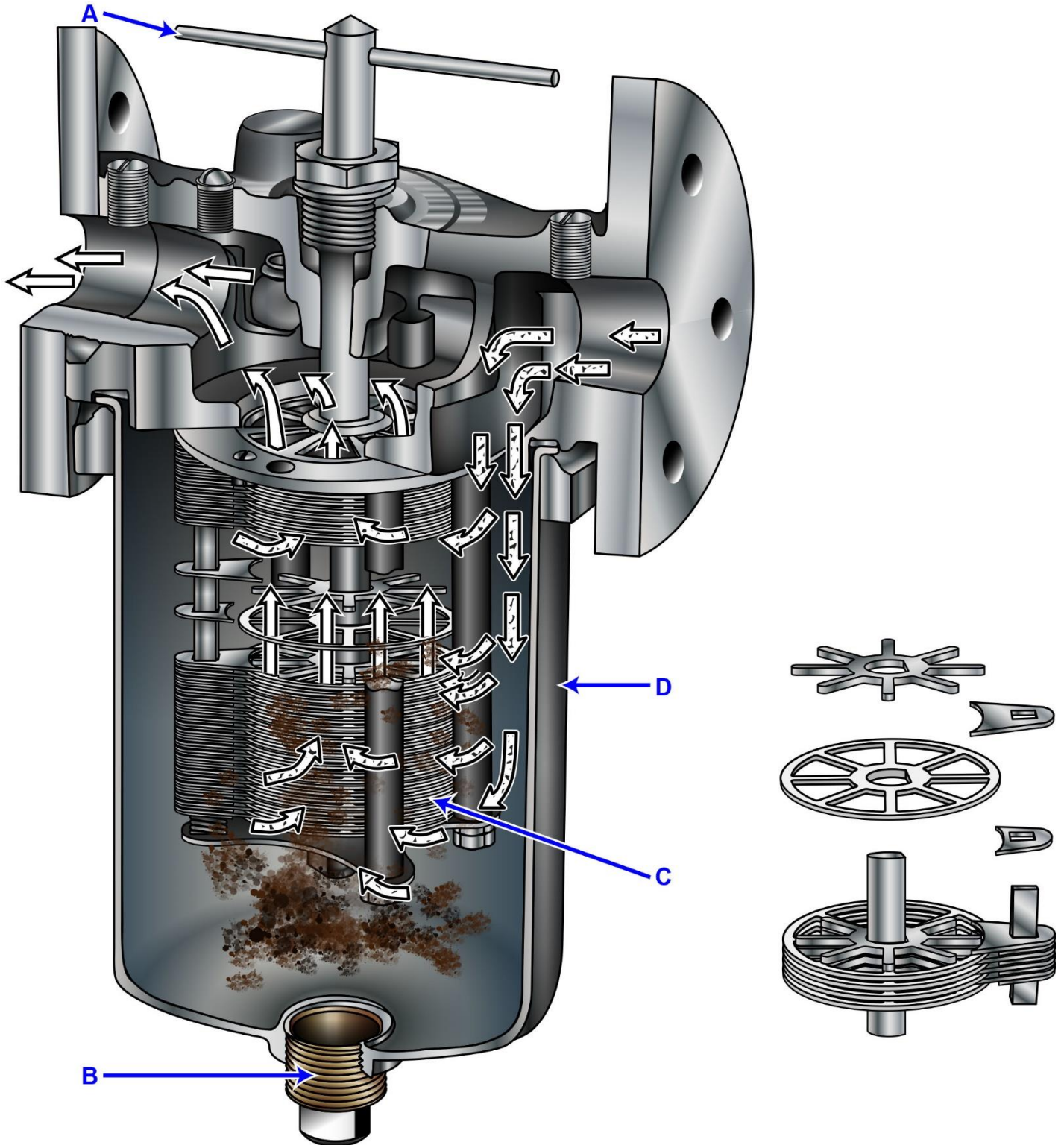
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MO-0052



MO-0057

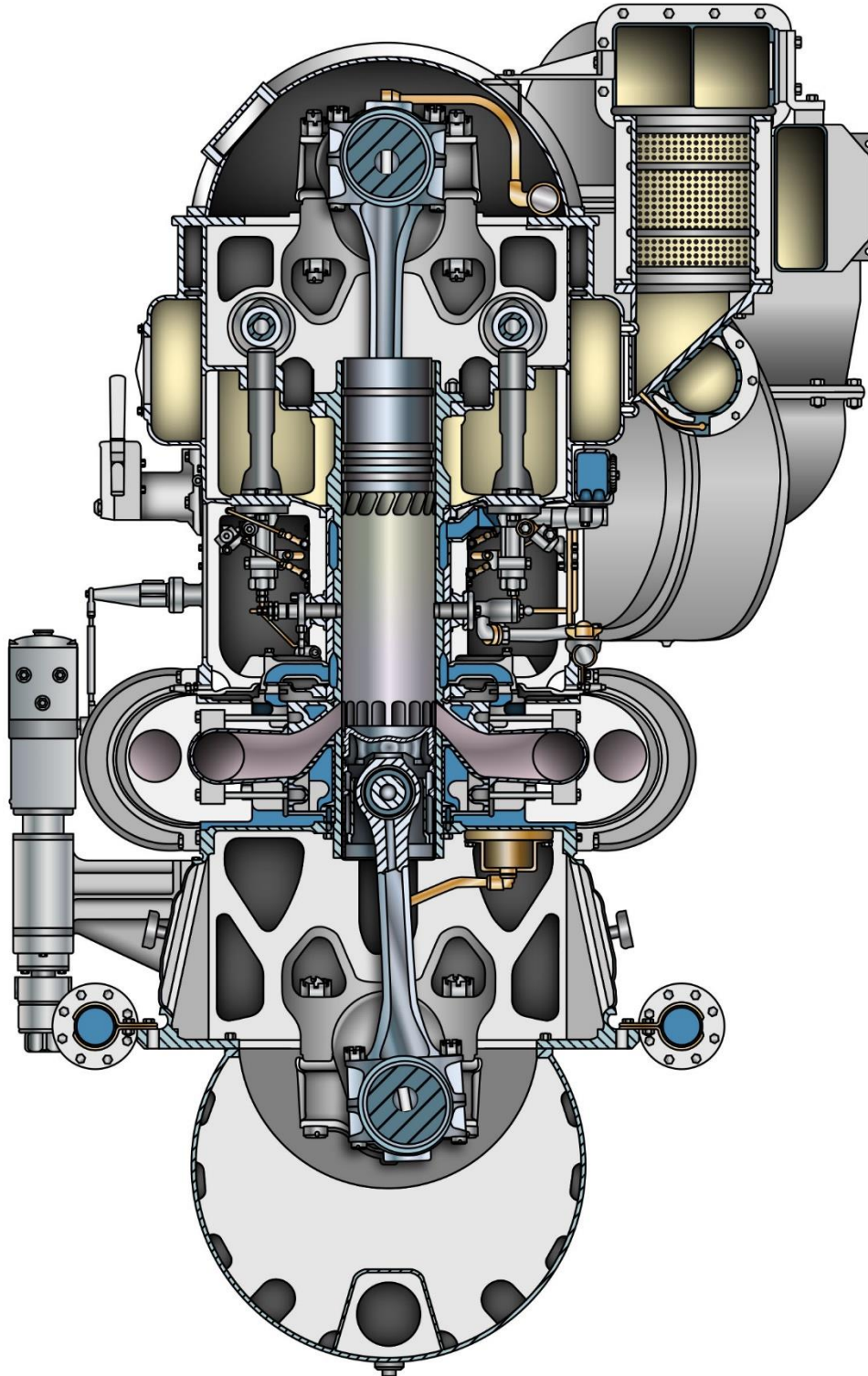


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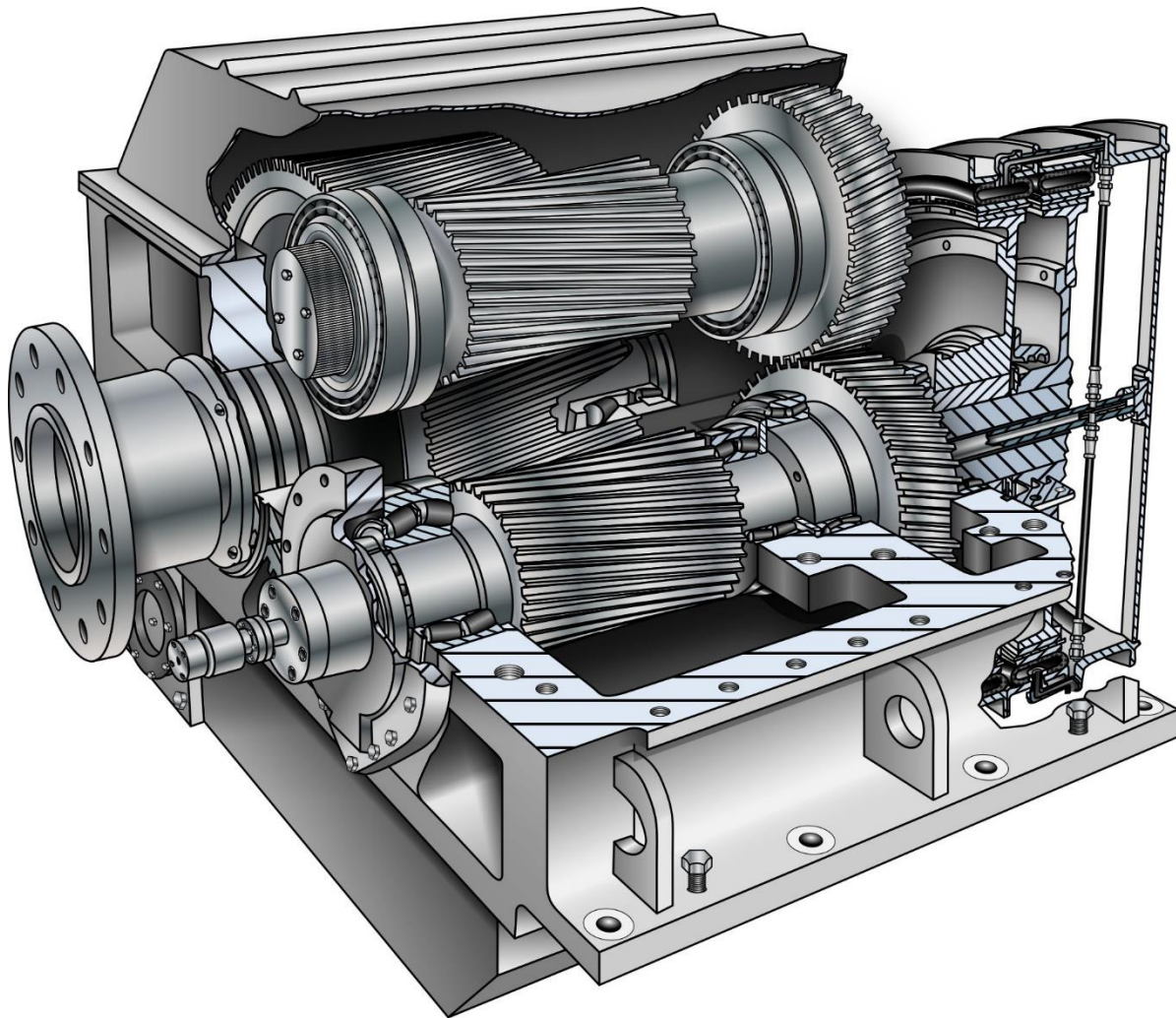
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MO-0085

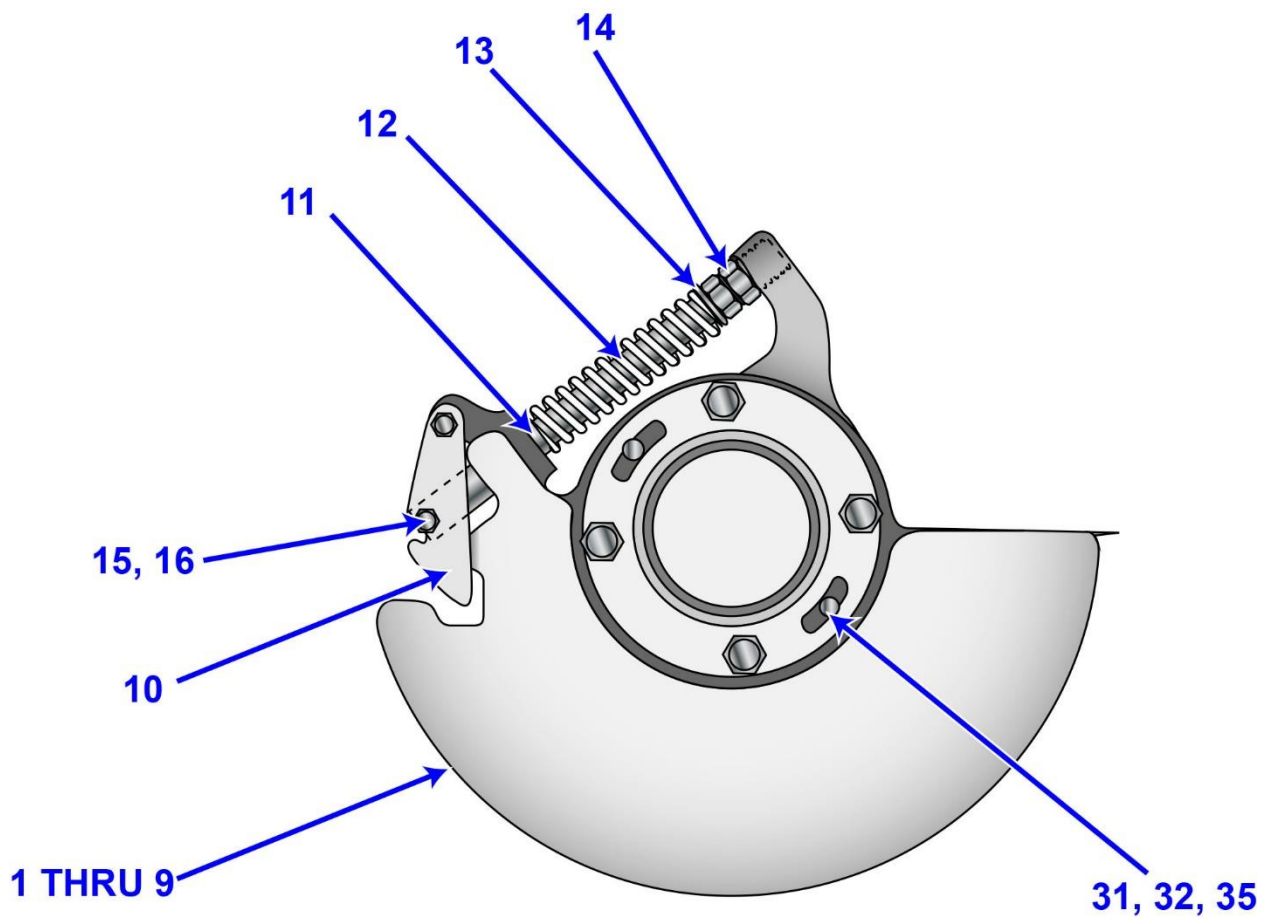


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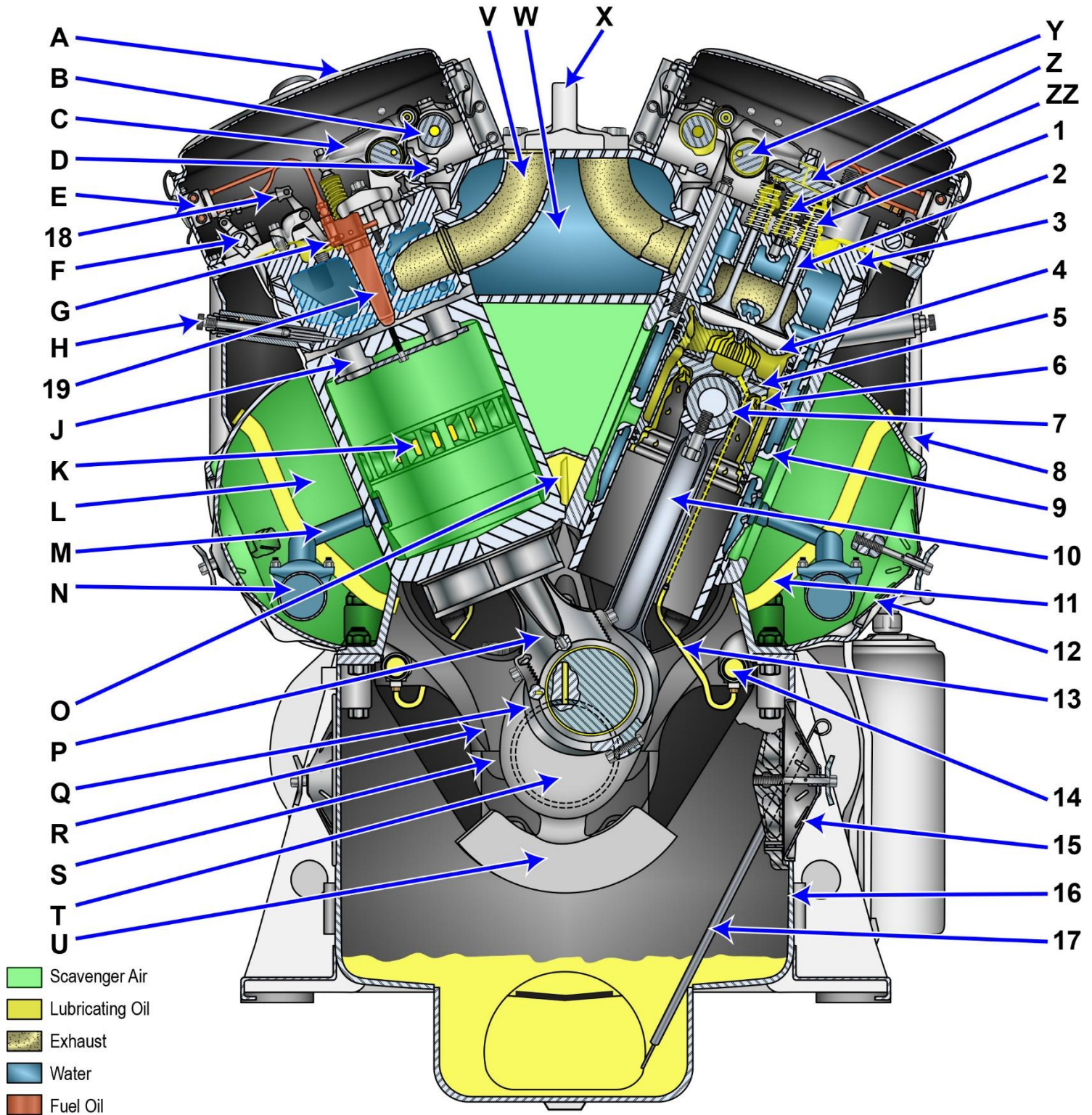
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MO-0101



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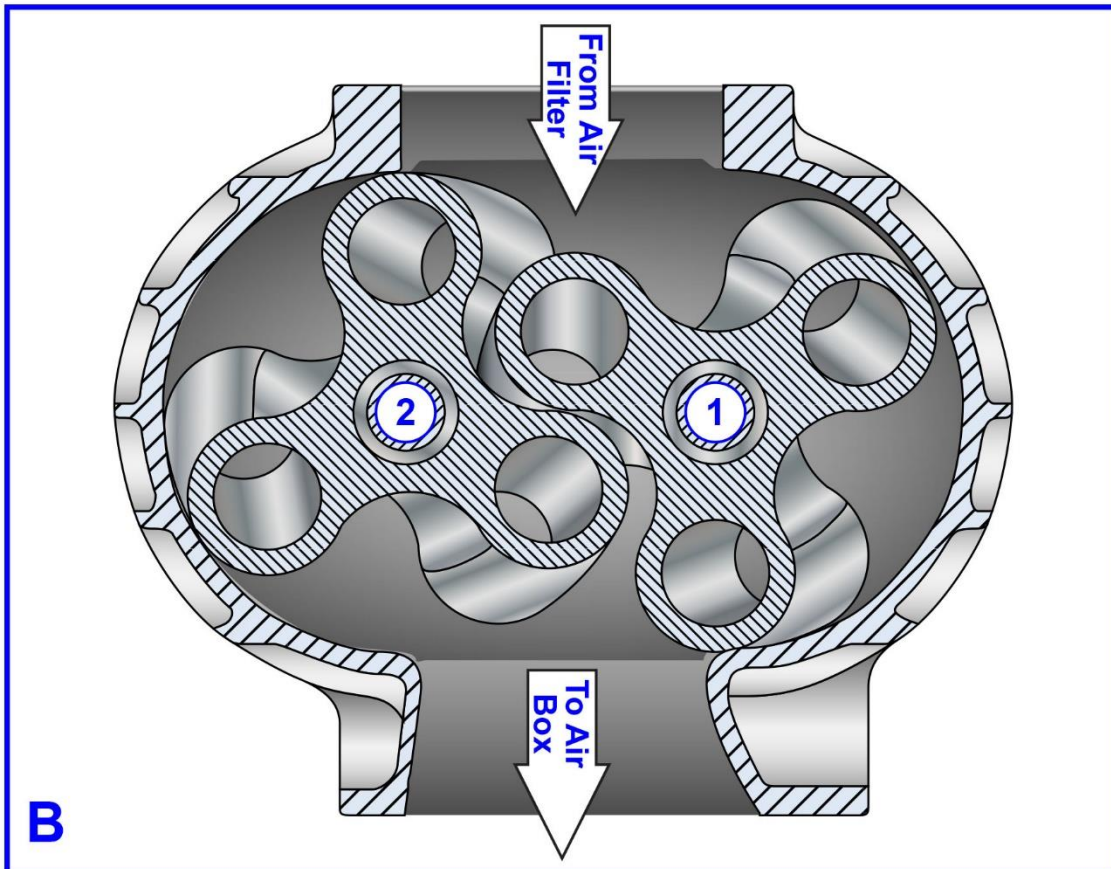
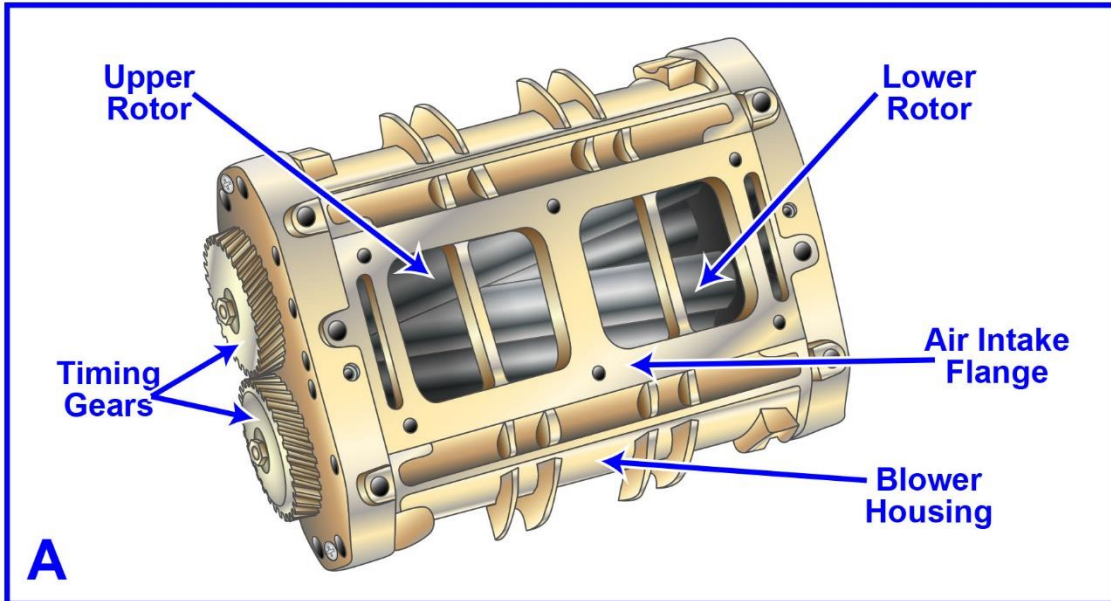
MO-0122



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MO-0135

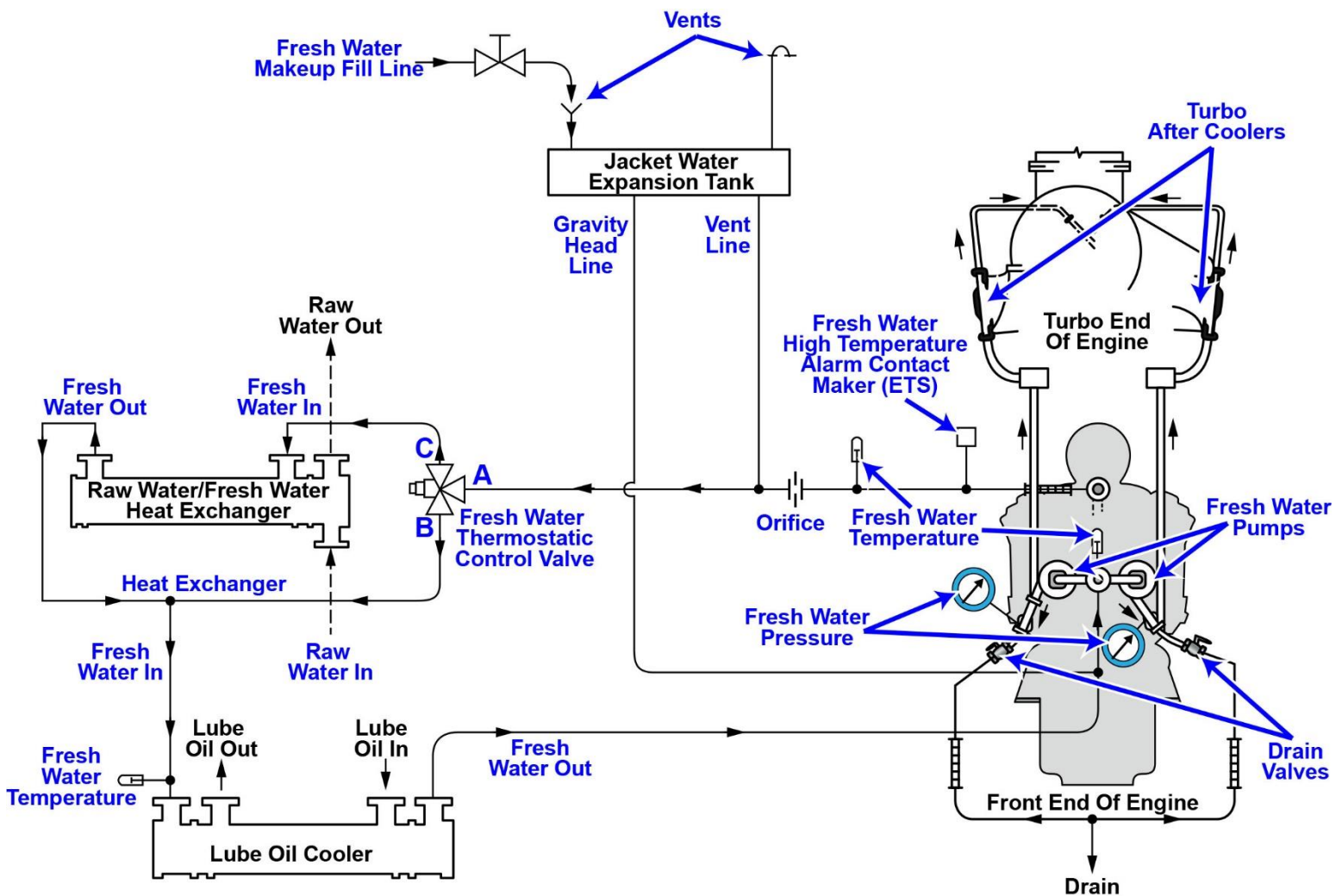


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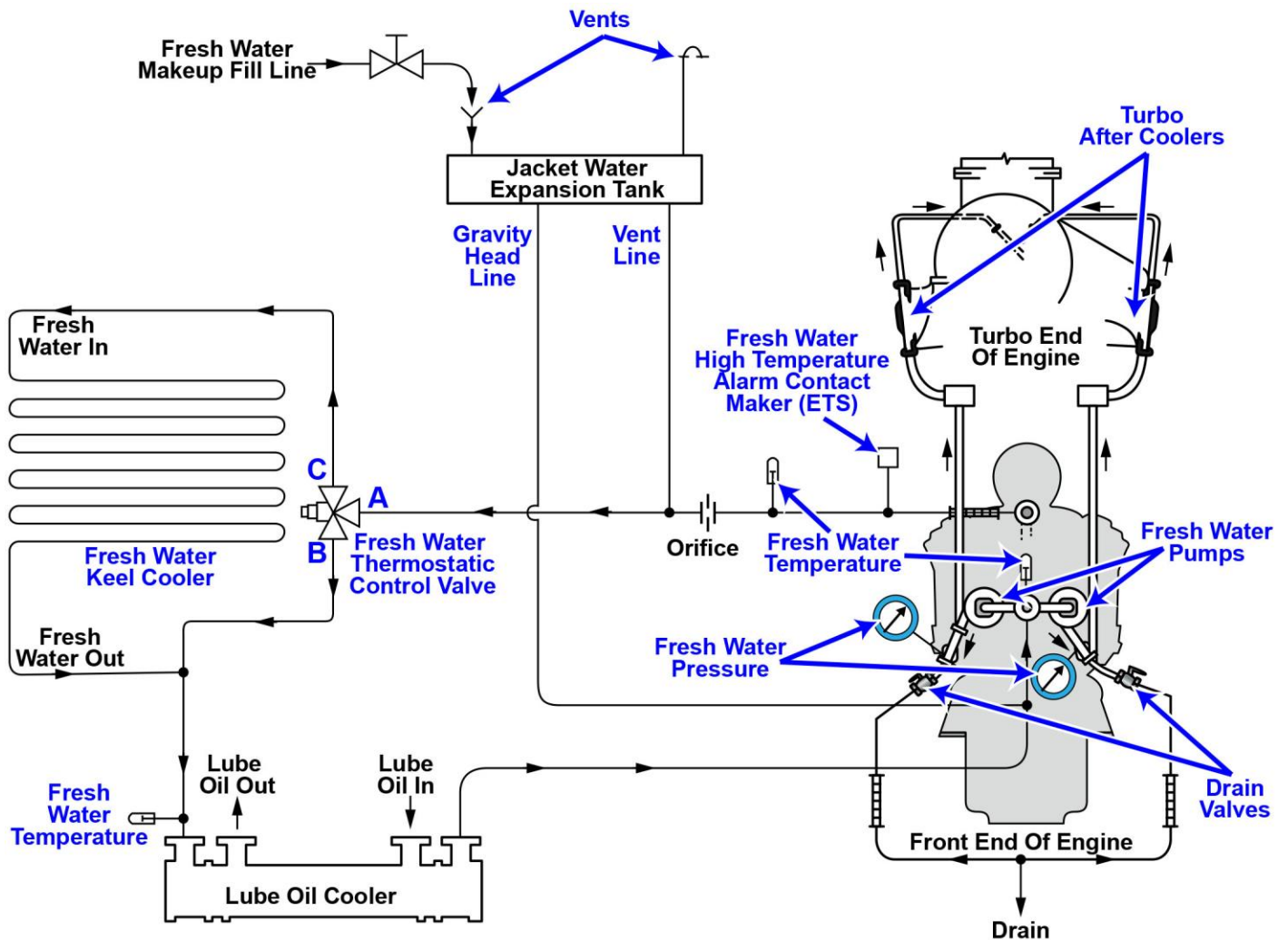
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MO-0137 EMD Engine Fresh Water Cooling System with Heat Exchanger

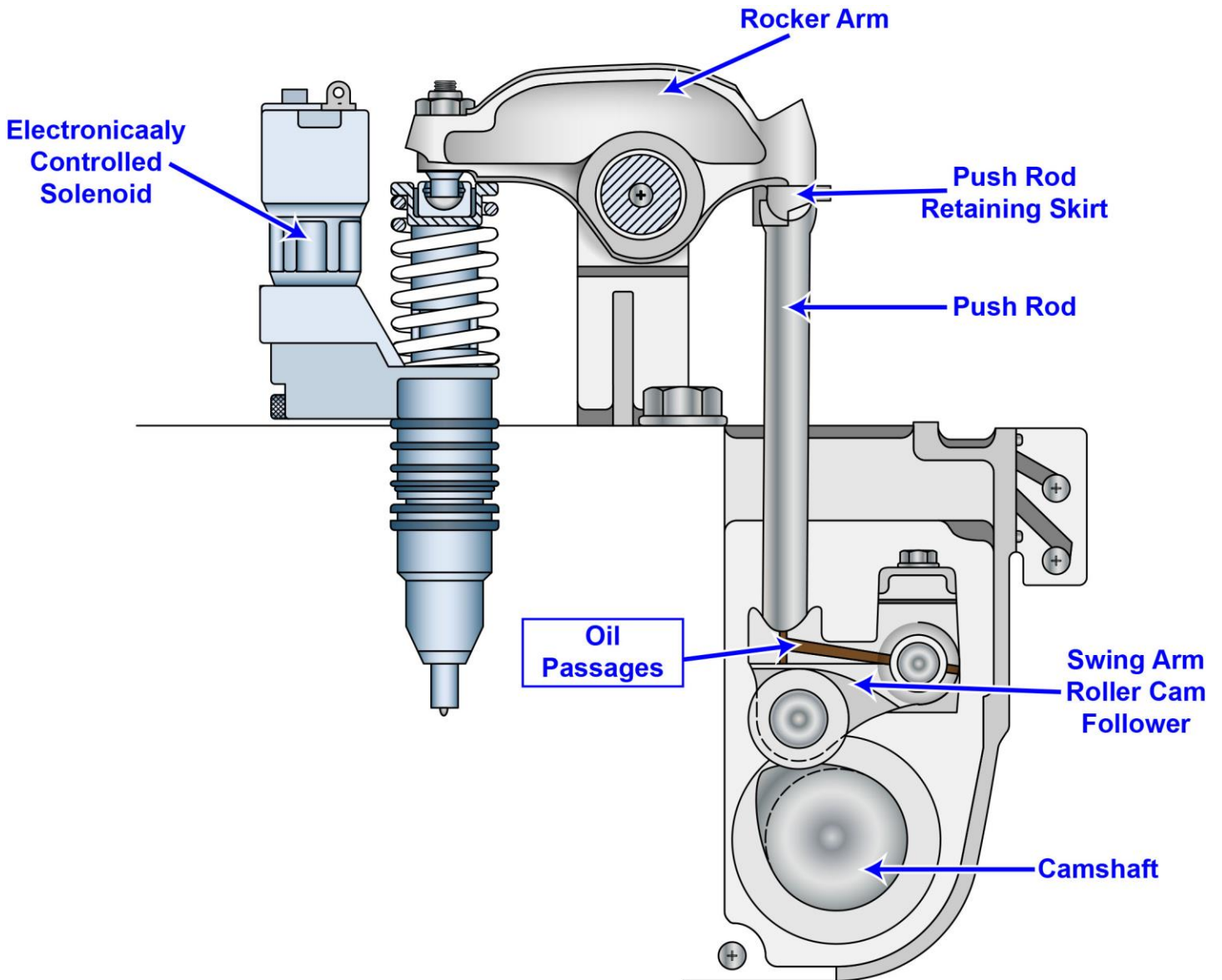


MO-0138 EMD Engine Fresh Water Cooling System with Keel Cooler



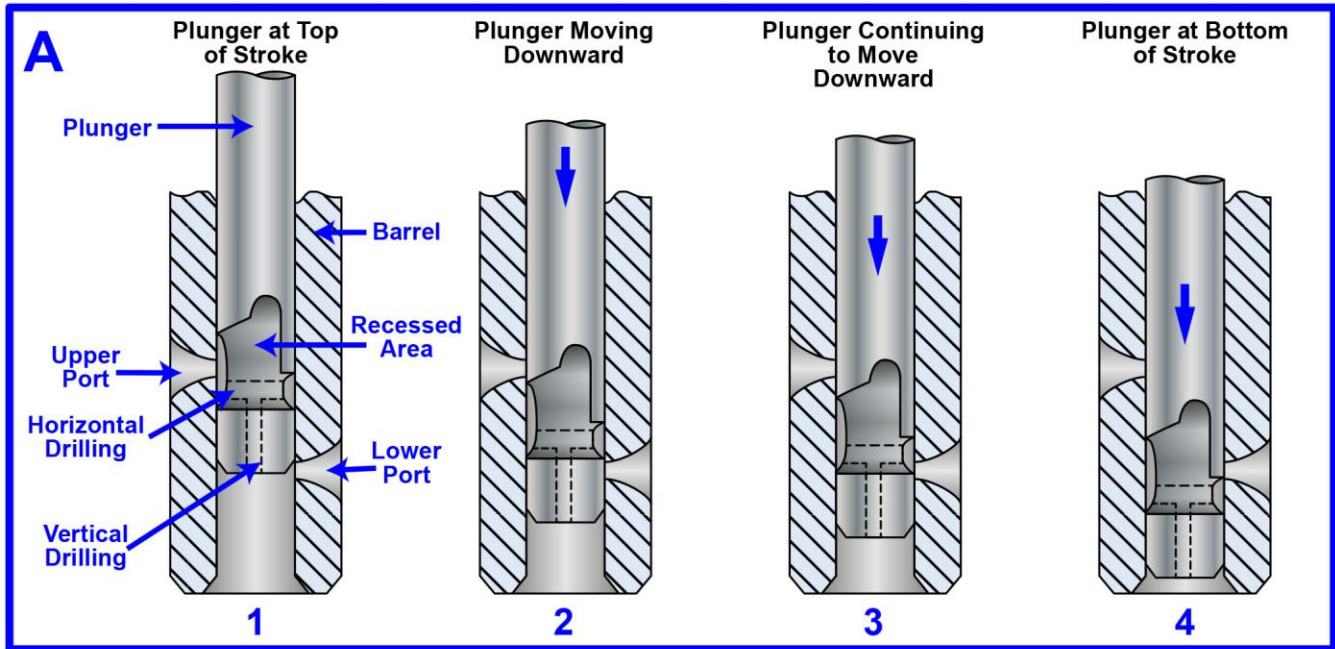
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MO-0143 Detroit Diesel 60 Series Engine Unit Injector Arrangements

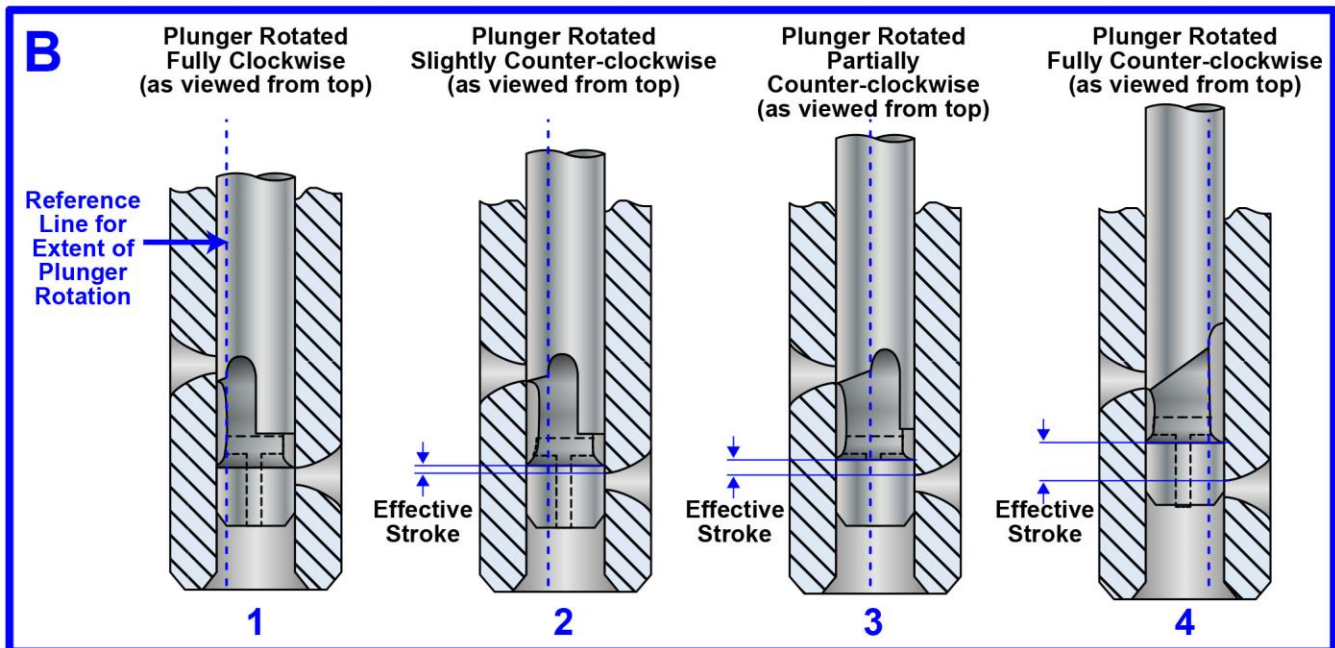


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MO-0144 Detroit Diesel 71 Series Engine Unit Injector

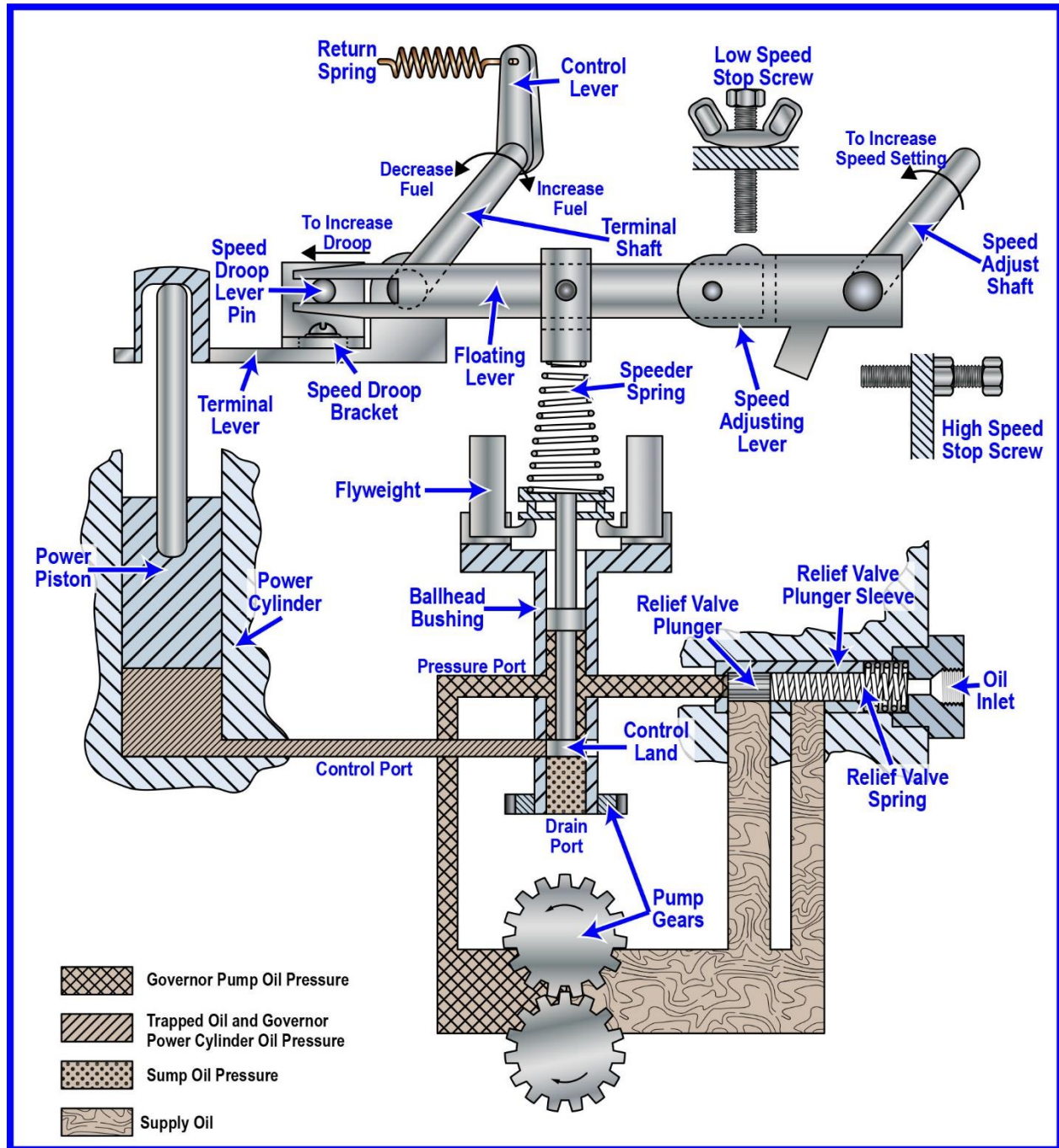


Injector Operation as a Function of Vertical Plunger Travel



Injector Operation as a Function of Extent of Plunger Rotation

MO-0157 Woodward Type SG Governor

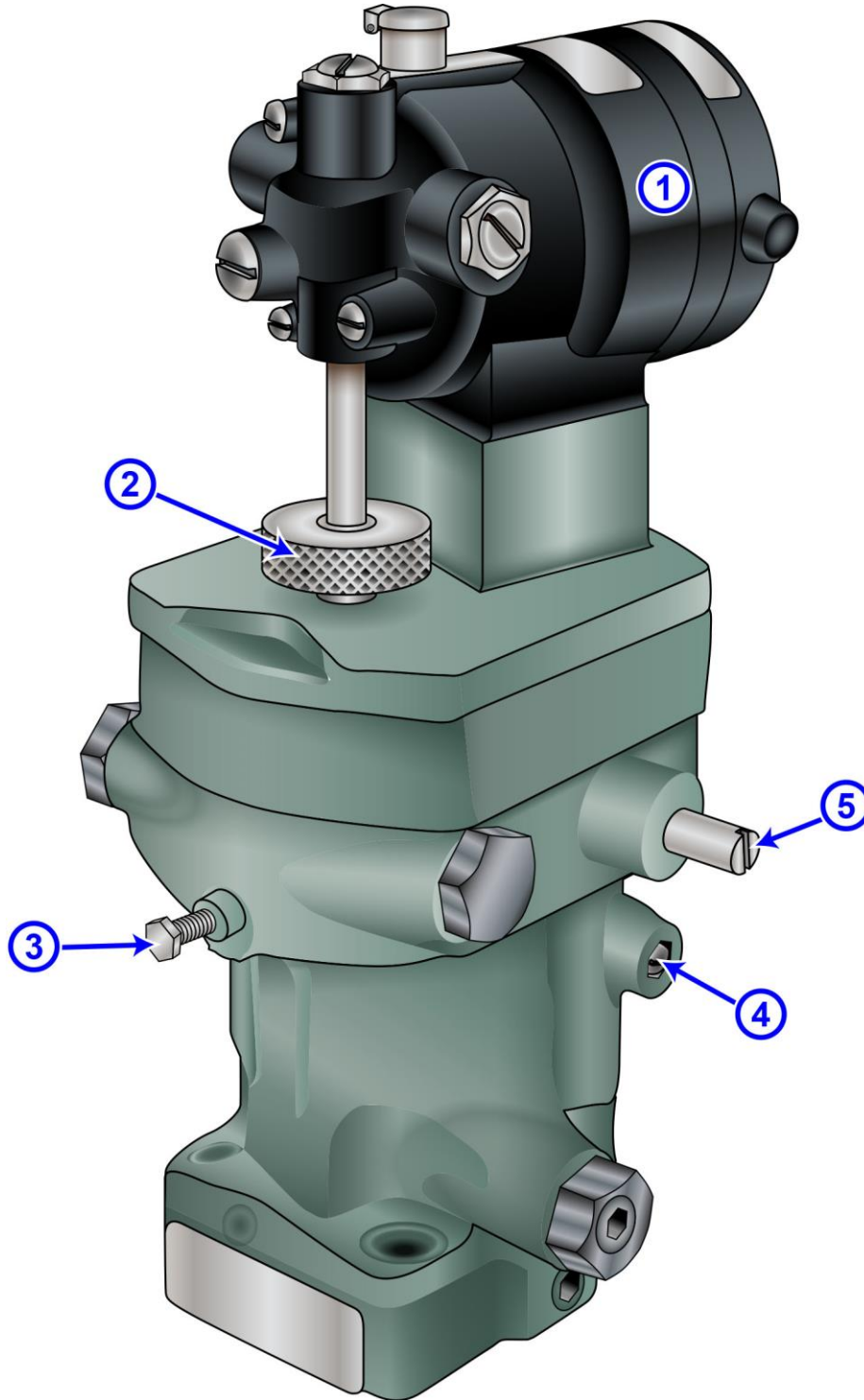


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MO-0160 Woodward Type PSG Governor



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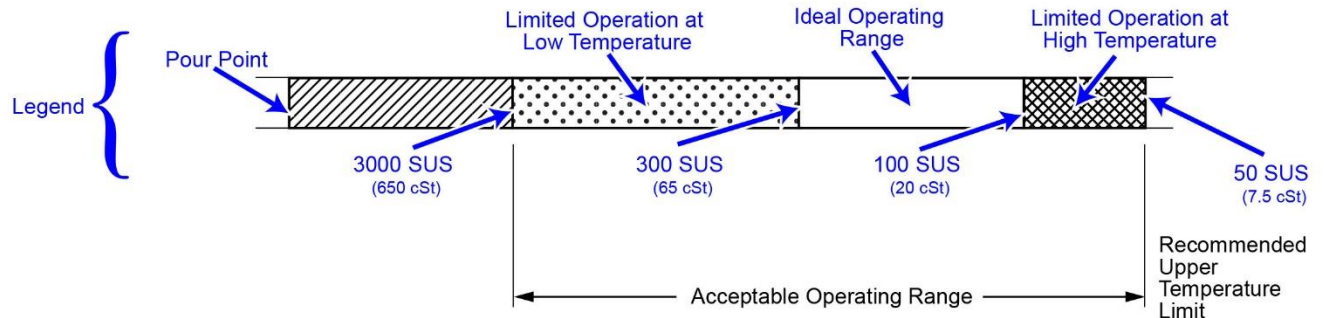
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MO-0161 Oil Chart

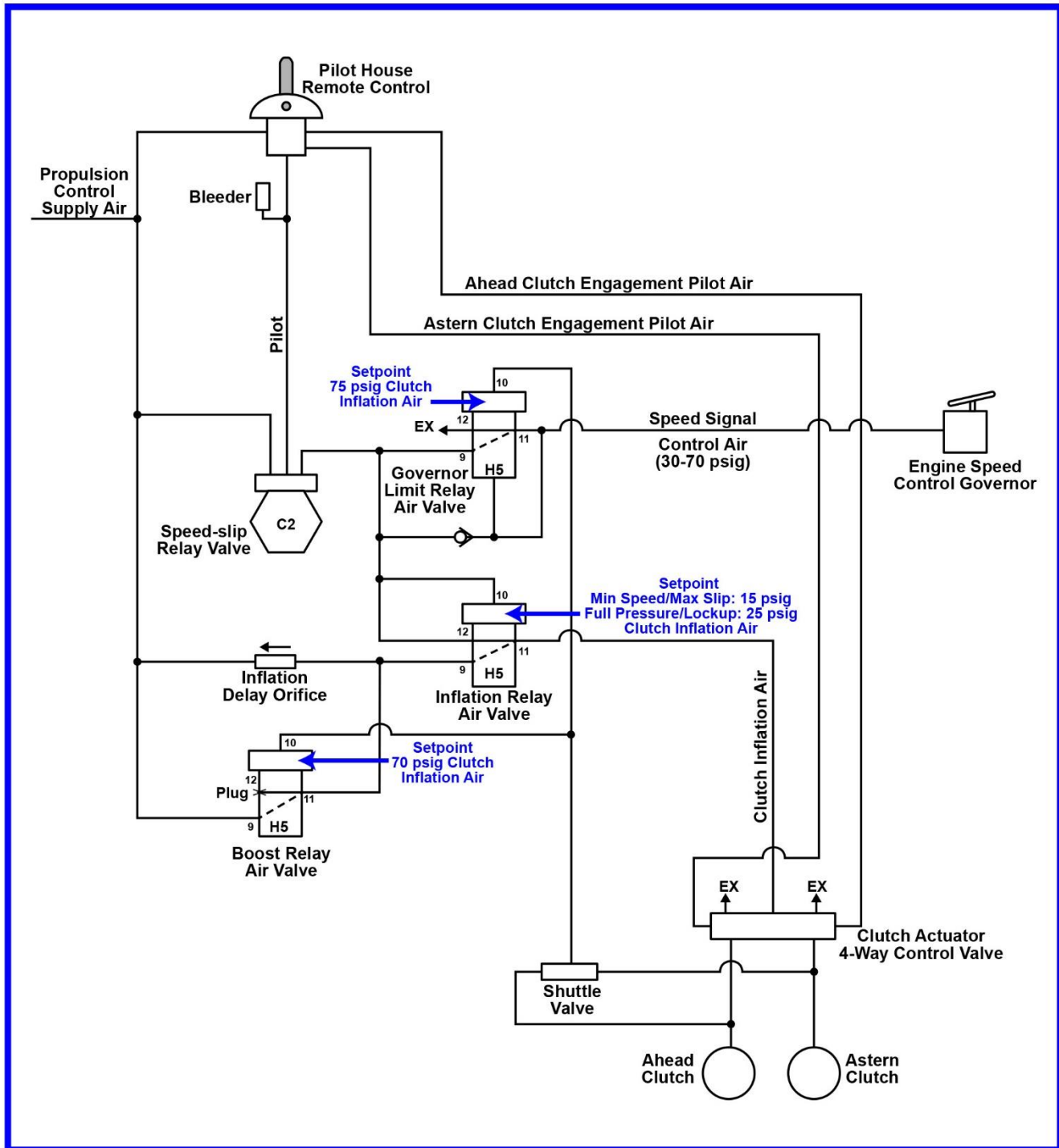
Recommended Upper Limit of Petroleum Oil is 200°F

Recommended Upper Limit of Synthetic Oil is 250°F

Gov. Oil Operating Temperature	-40°F -40°C	0°F -18°C	40°F 4°C	80°F 27°C	120°F 49°C	160°F 71°C	200°F 93°C	240°F 118°C	
Petroleum Oils	SAE 40			SAE 30		SAE 20		SAE 10	
	SAE 10W30			SAE 10W40		SAE 20W40		SAE 15W40	
	Auto. Trans. Fluid			Type A-F Dexron II		All Proof 10W50 (Polyester)		Amsoil 10W40 (Diester)	
	Synthetic Oils			DN 600 (Hydrocarbon)		Mobil I (Synthesized Hydrocarbon)		Delvac I (Synthesized Hydrocarbon)	



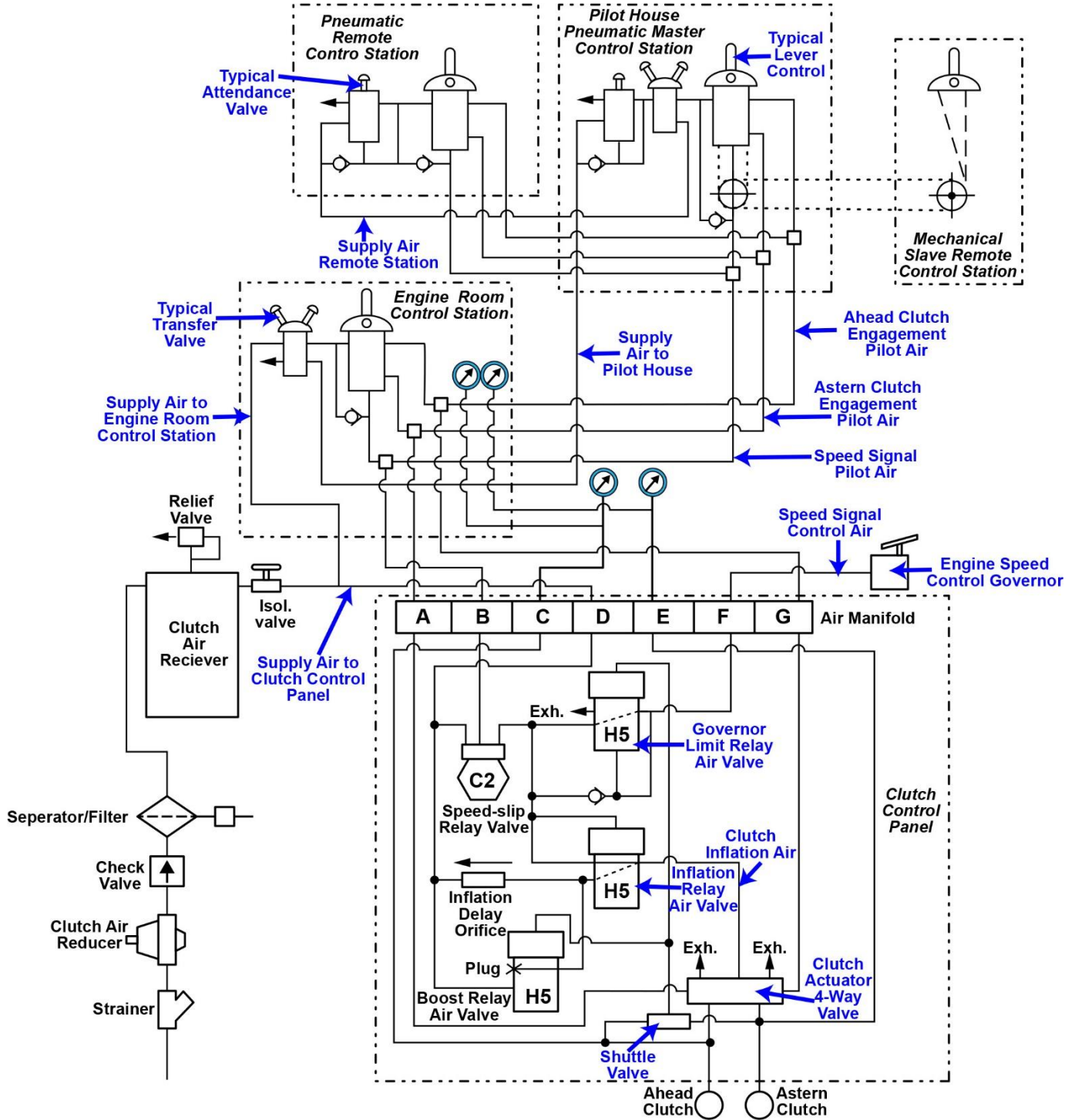
MO-0167 Pneumatic Propulsion Control System with Single Lever Pilot House Control



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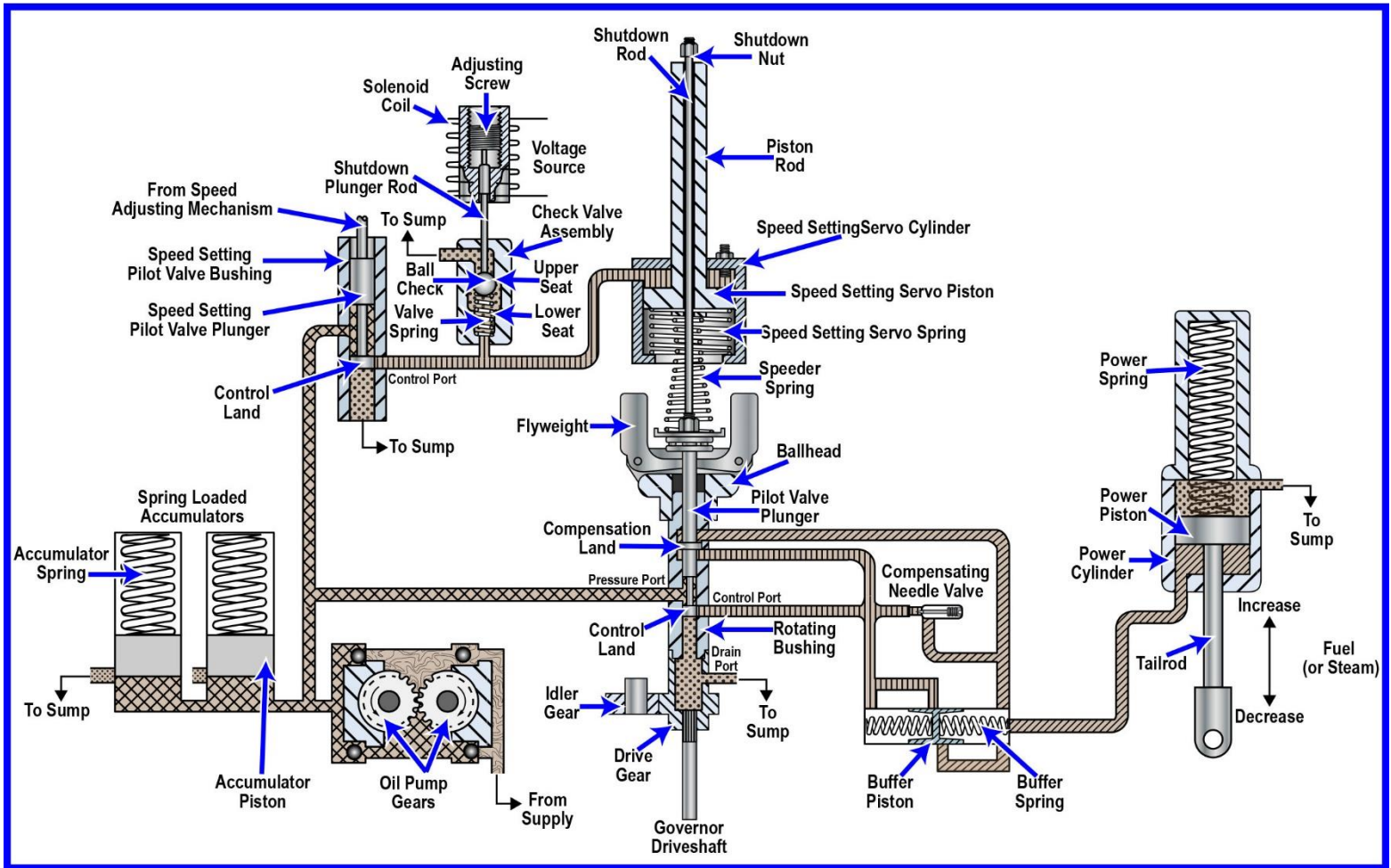
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MO-0168 Pneumatic Propulsion Control System



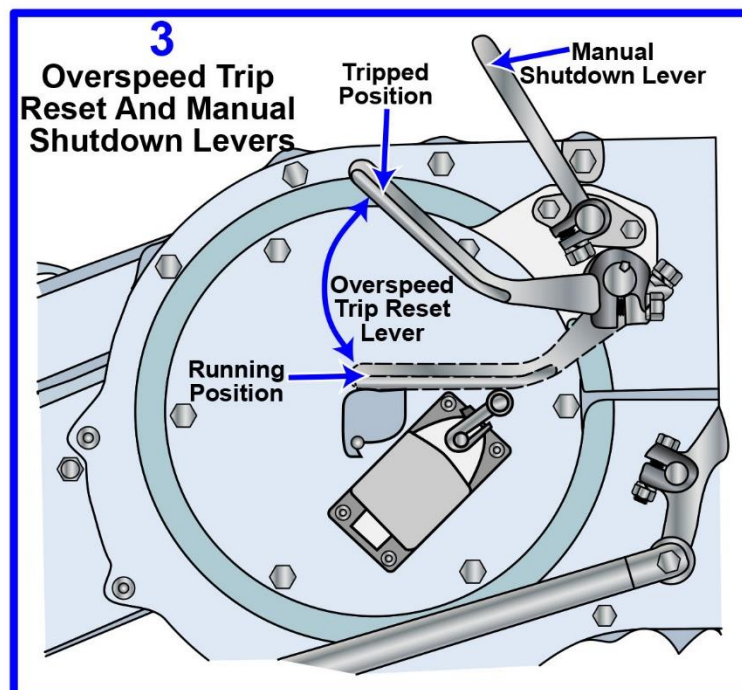
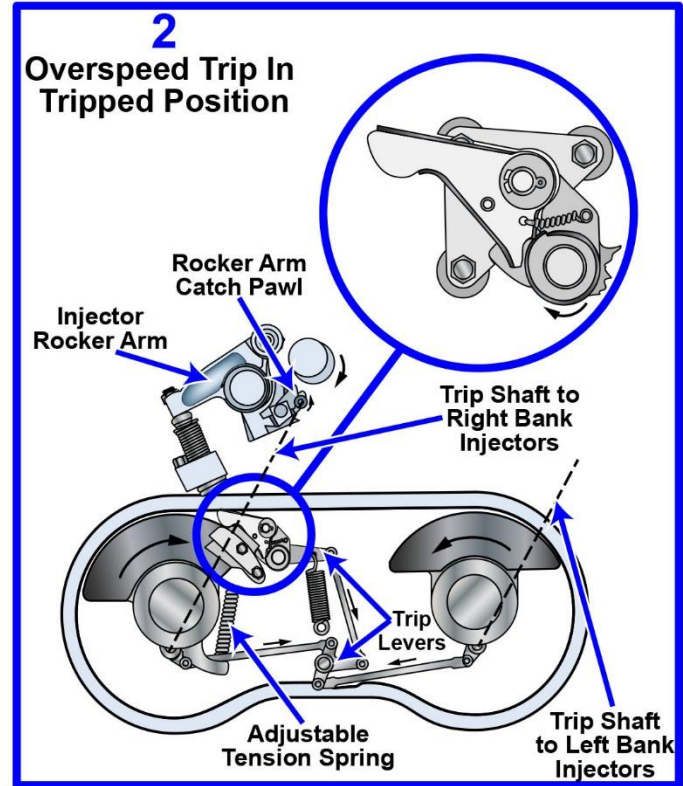
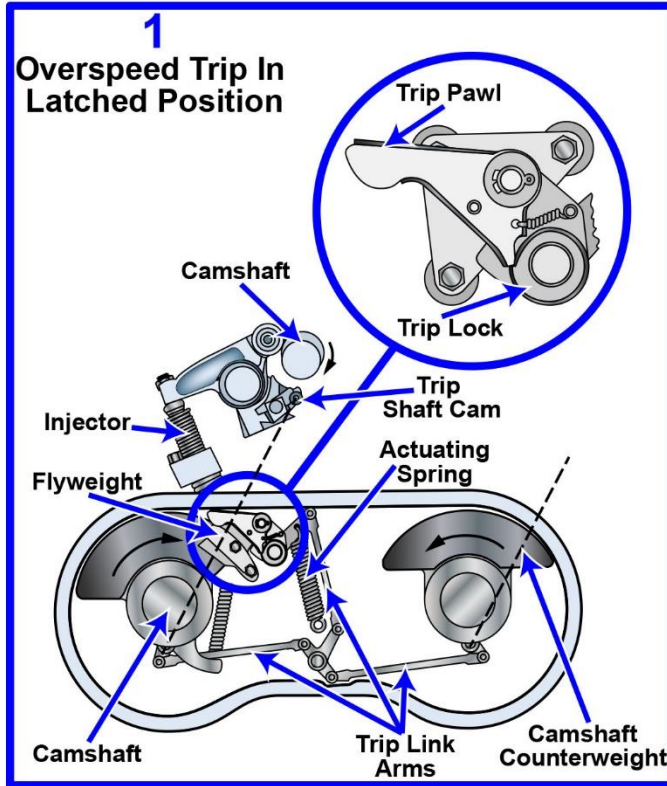
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MO-0170 Woodward PG Governor with Shutdown Solenoid Assembly

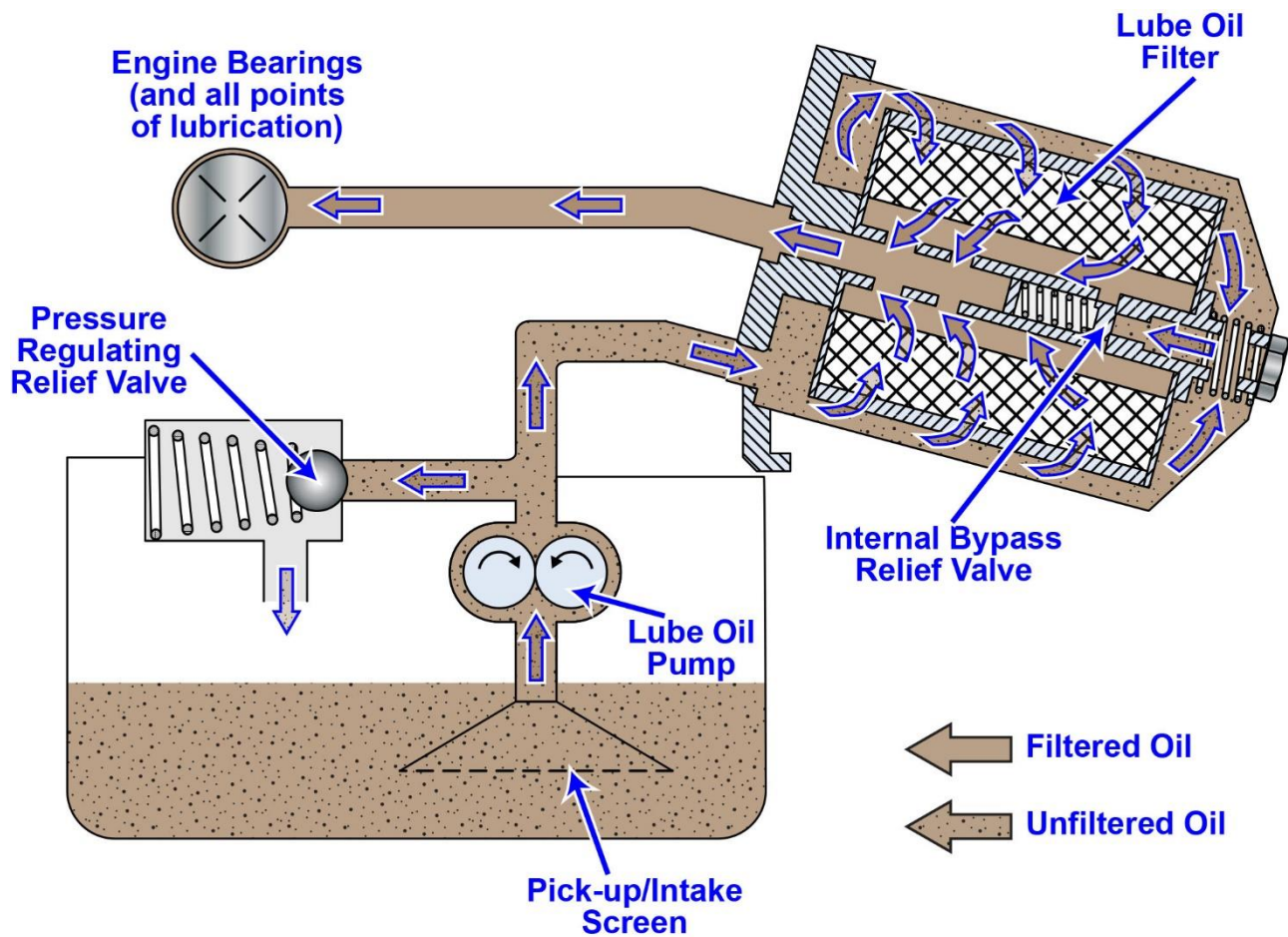


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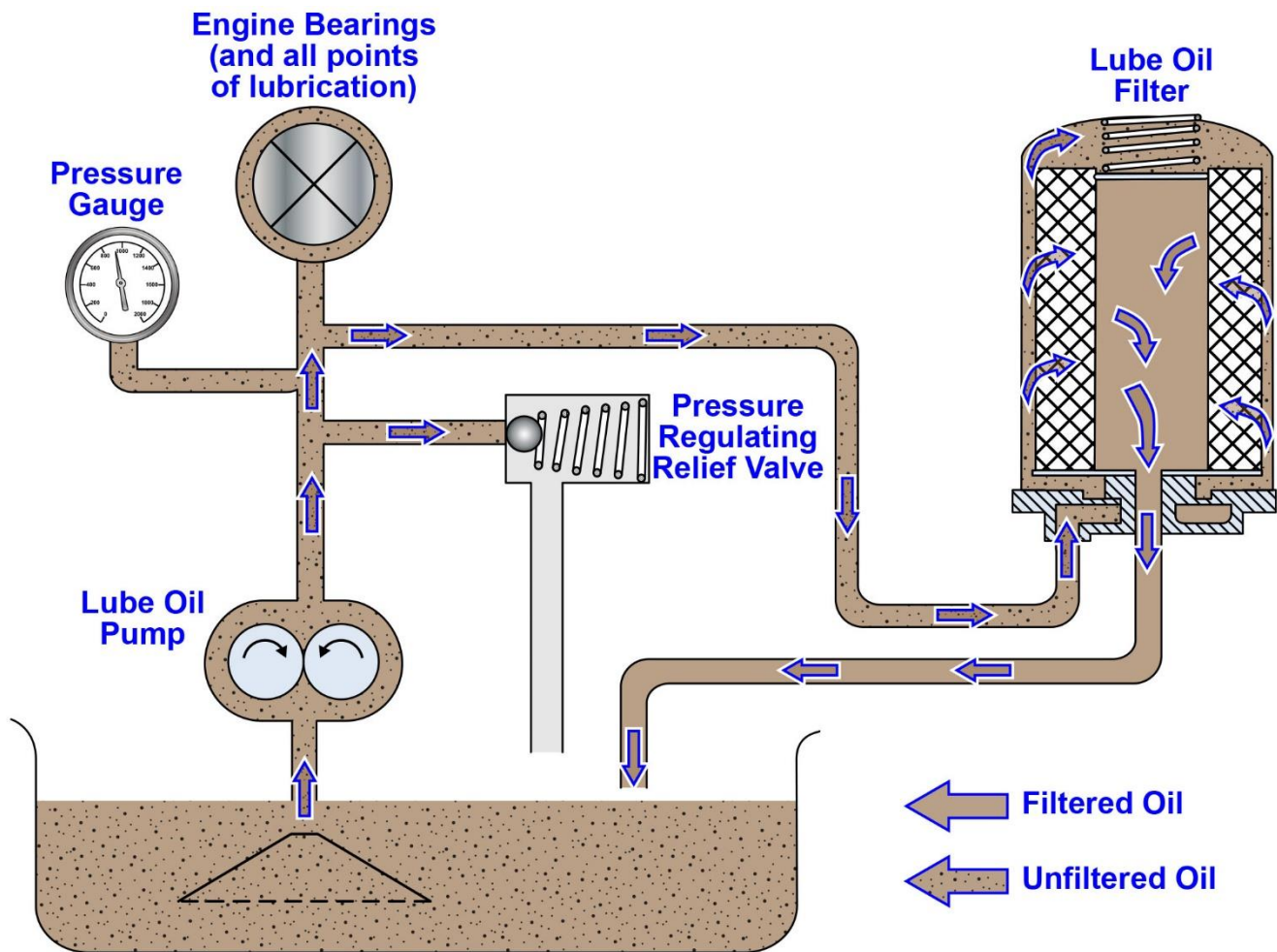
MO-0171 EMD 645 Overspeed and Manual Trips



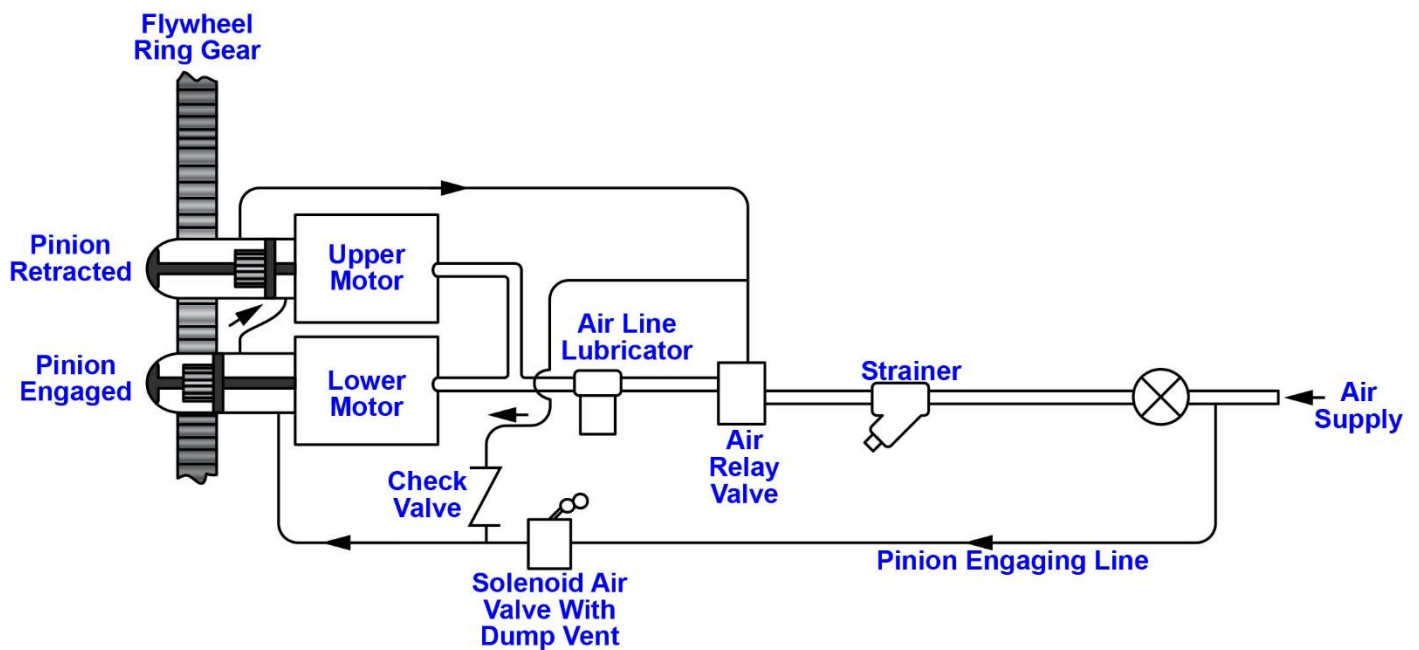
MO-0181 Simplified Lube Oil Filtration System



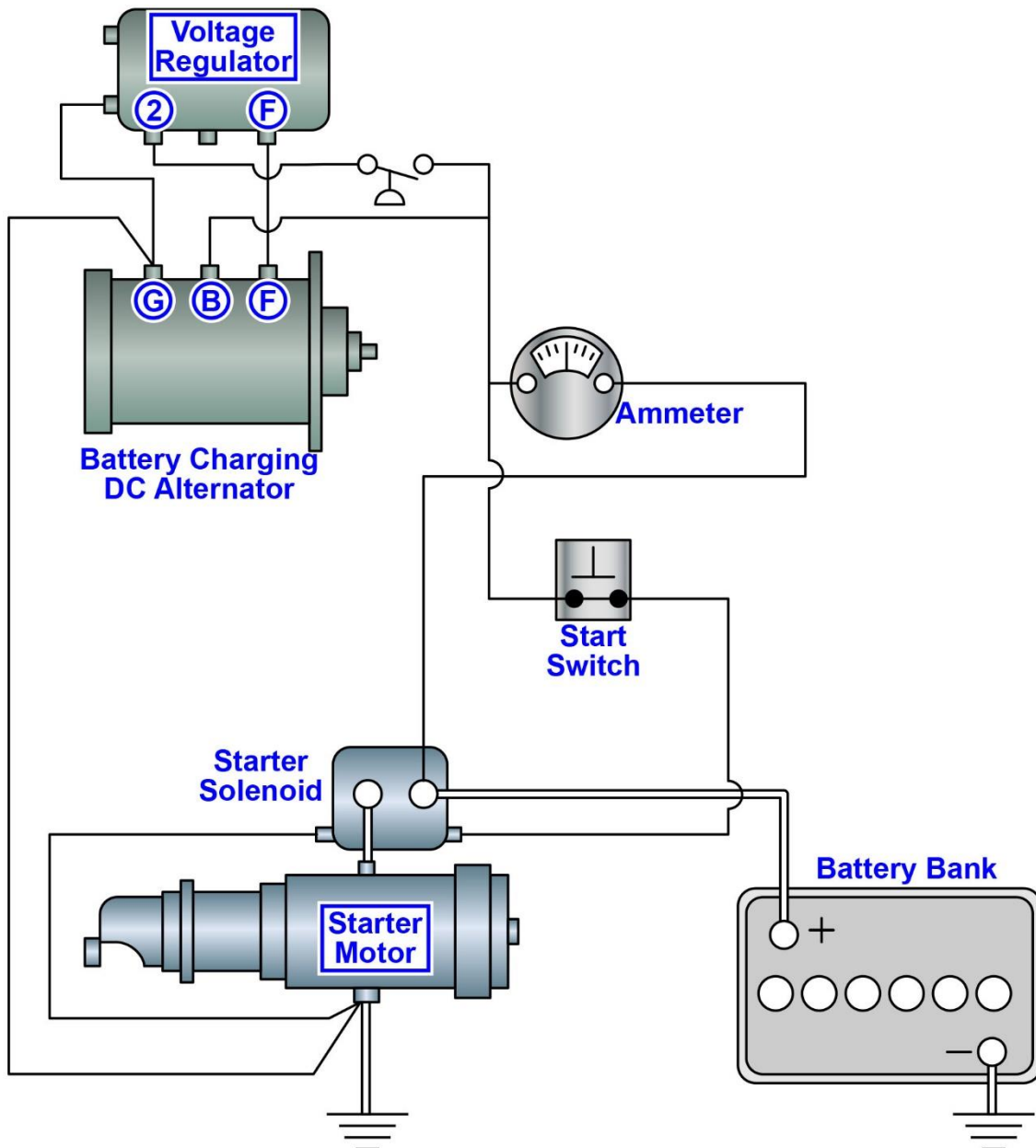
MO-0182 Simplified Lube Oil Filtration System



MO-0200 EMD Air Start System Piping at Engine



MO-0202 Simplified Electric Starting System

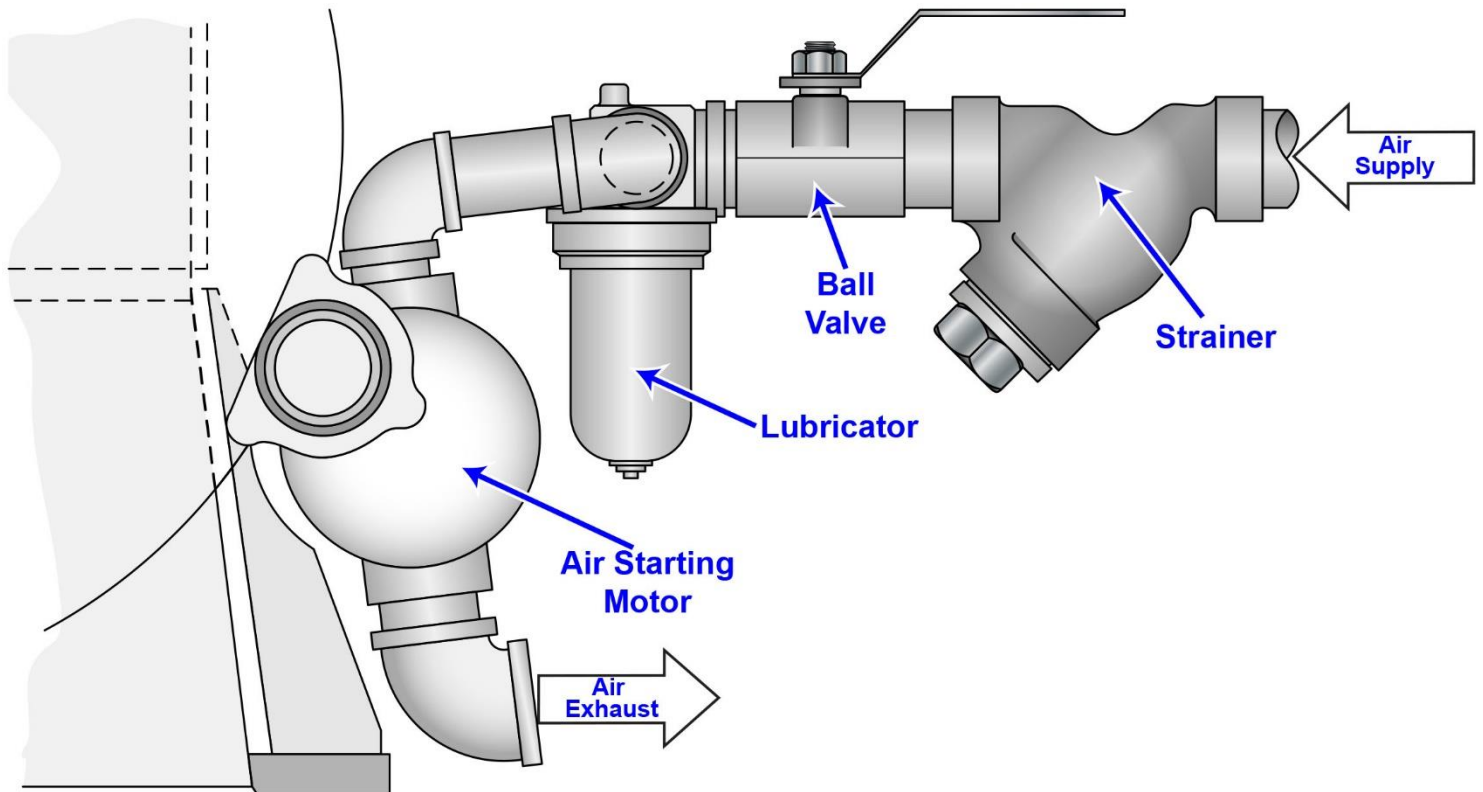


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MO-0203 Simplified Air Starting System



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MO-0224

