

U.S.C.G. Merchant Marine Exam

DDE – 1000/4000 HP

Q634 General Subjects

(Sample Examination)

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

1. As shown in figure "A" of the illustrated block diagram of a central operating system configured for direct digital control, what does the output system block "DIGITAL OUTPUT" represent? Illustration EL-0095
- A. It receives digital outputs from the CPU and converts these to analog signals for transmission to the analog actuators.
 - B. It receives digital outputs from the CPU and conditions these to digital signals for transmission to the digital actuators.
 - C. It receives analog outputs from the CPU and converts these to digital signals for transmission to the digital actuators.
 - D. It receives analog outputs from the CPU and conditions these to analog signals for transmission to the analog actuators.

Correct answer: B

2. Which of the listed valve types is typically used for the low-pressure stage of a reciprocating air compressor?
- A. Sliding
 - B. Strip-type
 - C. Ring-plate
 - D. Rotary

Correct answer: B

3. Which of the following statements represents the proper procedural sequence for adjusting the metering rate of an in-line lubricator as used in a ship's service air system hose station? Assume that the pressure regulator has been properly set.
- A. Establish normal air flow. Determine drip rate. Further open needle valve to increase drip rate or further close needle valve to decrease drip rate, as appropriate.
 - B. Establish normal air flow. Determine drip rate. Further open needle valve to decrease drip rate or further close needle valve to increase drip rate, as appropriate.
 - C. Temporarily shut-off air flow. Determine drip rate. Further open needle valve to increase drip rate or further close needle valve to decrease drip rate, as appropriate. Re-establish normal air flow.
 - D. Temporarily shut-off air flow. Determine drip rate. Further open needle valve to decrease drip rate or further close needle valve to increase drip rate, as appropriate. Re-establish normal air flow.

Correct answer: A

4. Which of the following illustrations represents the proper method of circuit grounding for a low level analog signal cable? Illustration EL-0124
- A. A
 - B. B
 - C. C
 - D. D

Correct answer: A

5. Hot water heaters used in potable water systems may have multiple heat sources, such as an electric heating element and a jacket water heated tube bundle. What is the primary purpose of such an arrangement?
- A. Allow electricity to be used in port and jacket water to be used while underway.
 - B. Allow jacket water to be used in port and electricity to be used while underway.
 - C. Allow both the heat sources to be used when the demand for hot water is high, whether in port or underway.
 - D. Allow the designated backup heat source to be used in the event of failure of the designated primary heat source, whether in port or underway.

Correct answer: A

6. What statement is true concerning the term "isochronous" as it applies to prime mover speed control governors?
- A. Isochronous governors are able to maintain constant prime mover speed regardless of load by employing permanent speed droop.
 - B. Isochronous governors are able to maintain constant prime mover load regardless of speed by employing permanent speed droop.
 - C. Isochronous governors are able to maintain constant prime mover load regardless of speed by employing temporary speed droop.
 - D. Isochronous governors are able to maintain constant prime mover speed regardless of load by employing temporary speed droop.

Correct answer: D

7. In a forced-feed lubrication system, what statement is true concerning lube oil reservoir/sump residence time?
- A. The lower the oil level, the shorter the residence time, and the hotter the oil will be as delivered by the pump.
 - B. The lower the oil level, the longer the residence time, and the cooler the oil will be as delivered by the pump.
 - C. The lower the oil level, the shorter the residence time, and the cooler the oil will be as delivered by the pump.
 - D. The lower the oil level, the longer the residence time, and the hotter the oil will be as delivered by the pump.

Correct answer: A

8. Which of the following statements is true regarding mechanical seals?
- A. They may be used in lieu of conventional packing glands for any service other than salt water.
 - B. They are not suitable for use on fuel oil transfer pumps.
 - C. They are normally lubricated and cooled by the fluid being pumped.
 - D. Once placed into service, leakage between the dynamic seal surfaces may be reduced by monthly adjustment of the spring compression.

Correct answer: C

9. Referring to the illustration, note that the solenoid in line "C" is closed. The check valve in line "E" is open. The separator service pump is running. The check valve in line "G" is closed. Valve "B" is closed. Valve "D" is open. What is the operational status of the oily-water separator unit? Illustration GS-0175
- A. The oily-water separator is in the bilge water separation processing mode with water discharging back to the bilge water holding tank with an oil content greater than 15 ppm.
 - B. The oily-water separator is in the bilge water separation processing mode with water discharging overboard with an oil content less than 15 ppm.
 - C. The oily-water separator is in the bilge water separation processing mode with water discharging back to the bilge water holding tank with an oil content less than 15 ppm.
 - D. The oily-water separator is in the bilge water separation processing mode with water discharging overboard with an oil content greater than 15 ppm.

Correct answer: A

10. Referring to the illustrated motorship freshwater cooling system drawing, what statement is true concerning the evaporator? Illustration MO-0212
- A. The evaporator uses heat recovered from the main engine cooling water as a heat source to generate fresh water and is piped in series with and prior to the jacket water cooler.
 - B. The evaporator uses heat recovered from the main engine cooling water as a heat source to generate fresh water and is piped in parallel with the jacket water cooler.
 - C. The evaporator uses heat recovered from the main engine cooling water as a heat source to generate fresh water and is piped in series with and after the jacket water cooler.
 - D. The evaporator uses heat recovered from the jacket water cooler sea water as a heat source to generate fresh water and is piped in series with and prior to the jacket water cooler.

Correct answer: A

11. What is the pressure and condition of the refrigerant entering the receiver of a refrigeration system?
- A. subcooled high-pressure liquid
 - B. subcooled low-pressure liquid
 - C. superheated low-pressure vapor
 - D. superheated high-pressure vapor

Correct answer: A

12. In the presence of an open flame or hot surfaces, chlorinated fluorocarbon refrigerants decompose and form what chemical substance?
- A. petroleum crystals
 - B. carbon monoxide
 - C. water vapor
 - D. phosgene gas

Correct answer: D

- 13.** For a typical transverse-framed deep-draft commercial vessel, what is the normal arrangement for the support of decks?
- A. Deck beams are transversely arranged and deck girders are longitudinally arranged and the deck beams are continuous with the exception of hatches and other openings. The deck girders are intercostal.
 - B. Deck beams are transversely arranged and deck girders are longitudinally arranged and both are continuous with the exception of hatches and other openings.
 - C. Deck beams are longitudinally arranged and deck girders are transversely arranged and both are continuous with the exception of hatches and other openings.
 - D. Deck beams are transversely arranged and deck girders are longitudinally arranged and the deck girders are continuous with the exception of hatches and other openings. The deck beams are intercostal.

Correct answer: B

- 14.** In general, the thermal bulb for a thermal expansion valve used in a reciprocating air conditioning system is usually charged with what substance?
- A. mercuric sulfate
 - B. the same refrigerant as the system
 - C. bees wax
 - D. distilled water

Correct answer: B

- 15.** To prevent the unnecessary loading of an air conditioning system while maintaining the designed dry bulb temperature and relative humidity in an air conditioning system, what should be done?
- A. admit only enough fresh outside air to provide proper ventilation
 - B. operate the purge recovery unit continuously
 - C. reduce the air reheating system load
 - D. lower the compressor head pressure

Correct answer: A

- 16.** In the illustrated refrigeration system, what is the proper name for the component labeled "A"? Illustration RA-0012
- A. accumulator
 - B. filter drier
 - C. compressor
 - D. condenser

Correct answer: C

- 17.** Which of the following refrigerants is normally classified as a low-pressure refrigerant based on a relatively high boiling point?
- A. HCFC-22
 - B. HCFC-123
 - C. HFC-23
 - D. HFC-134A

Correct answer: C

- 18.** To prevent motor overload during start-up of a centrifugal refrigeration system, what is true concerning the compressor suction gas variable inlet guide vanes?
- A. opened until the motor is connected across the line at full voltage and current drawn is up to full load current
 - B. closed until the motor is connected across the line at full voltage and current drawn is below full load current
 - C. closed until the motor is connected across the line at full voltage and current drawn is up to full load current
 - D. opened until the motor is connected across the line at full voltage and current drawn is below full load current

Correct answer: B

- 19.** In a refrigeration system, the bulb for the thermal expansion valve is always located where?
- A. in the middle of the evaporator coils
 - B. at the evaporator coil outlet
 - C. at the evaporator coil inlet
 - D. at the beginning of the bottom row of the evaporator coils

Correct answer: B

- 20.** What must be done, at a minimum, before a system can legally be opened up for repairs while adhering to the prohibition against the venting of halogenated fluorocarbon refrigerants to the atmosphere?
- A. reclamation of the refrigerant
 - B. recycling of the refrigerant
 - C. destruction of the refrigerant
 - D. recovery of the refrigerant

Correct answer: D

- 21.** Which of the valves listed is normally closed when charging the refrigeration system through the high side?
- A. Liquid line king valve
 - B. Suction line valve
 - C. Thermal expansion valve
 - D. Dehydrator inlet valve

Correct answer: A

- 22.** Which of the devices listed is used to maintain a snug interface between the rotating and stationary seal members shown in the illustration? Illustration GS-0071
- A. spring
 - B. notch and keyway
 - C. bellows
 - D. seal retaining ring

Correct answer: A

23. Which characteristic or condition will have the greatest effect on increasing a hydraulic oil's viscosity?

- A. Vacuum
- B. Cloud point
- C. Pour point
- D. Pressure

Correct answer: D

24. Both the direction of flow and fluid flow rate of a variable displacement radial piston pump are determined by the relative positions of the _____.

- A. floating ring and pump shaft
- B. pump shaft and central valve
- C. pump shaft and horizontal ports
- D. floating ring and cylinder body

Correct answer: D

25. The component used in a hydraulic system to store potential energy in the form of hydraulic fluid under pressure, is the _____.

- A. ram
- B. pump
- C. accumulator
- D. piping

Correct answer: C

26. In a series circuit, what is the applied voltage (or sum of the applied voltages) equal to?

- A. the total resistance divided by the total current
- B. the sum of the individual voltage drops
- C. the total current divided by the total resistance
- D. the sum of the individual currents multiplied by the number of resistors

Correct answer: B

27. What statement is true concerning the total resistance of a parallel circuit?

- A. The total resistance is larger than that of the branch with the greatest resistance.
- B. The total resistance is equal to the sum of the individual branch resistances.
- C. The total resistance is less than that of the branch with the lowest resistance.
- D. The total resistance is equal to the sum of the individual branch resistances divided by the number of branches.

Correct answer: C

- 28.** When configuring a digital multimeter as an ohmmeter, what will MOST likely be displayed on the screen when the test leads are shorted together?
- A. A reading of "OL" ohms will be displayed.
 - B. A reading of residual test lead and internal resistance will be displayed (typically .2 to .5 ohms).
 - C. A reading of 0 ohms will be displayed.
 - D. B or C could be correct depending upon the digital multimeter.

Correct answer: D

- 29.** When a battery-operated megohmmeter (insulation tester) is used to perform a dielectric absorption test, the resistance is measured and recorded from each conductor to ground each minute for 10 consecutive minutes. What condition accounts for a gradual rise in resistance each successive minute?
- A. The insulation is cracked and otherwise deteriorated.
 - B. The insulation is contaminated with moisture.
 - C. The insulation has direct continuity with ground.
 - D. The insulation is in good condition.

Correct answer: D

- 30.** As the electrolyte level in the cells of a lead-acid battery evaporates over time, what will tend to happen to the specific gravity of the electrolyte in the cells as the level drops due to evaporation?
- A. The specific gravity of the electrolyte will remain unchanged as both the water and sulfuric acid will evaporate from the electrolyte solution.
 - B. Although the specific gravity will change due to evaporation, there is no predictable tendency either way.
 - C. The specific gravity of the electrolyte will decrease as only the sulfuric acid will evaporate from the electrolyte solution.
 - D. The specific gravity of the electrolyte will increase as only the water will evaporate from the electrolyte solution.

Correct answer: D

- 31.** A split-phase induction squirrel-cage motor will not start and come up to speed, even though the rated voltage and frequency are applied. Assuming that the motor hums without rotating, which of the following troubles would MOST likely be suspected?
- A. a shorted thermal protector
 - B. a shorted centrifugal switch
 - C. a shorted rotor bar
 - D. an open run or start winding

Correct answer: D

- 32.** What can be the cause of excessive heat or burning contacts in an operating motor controller?
- A. low motor starting torque
 - B. high ambient temperature
 - C. dirty or pitted contacts
 - D. burned out operating coil

Correct answer: C

33. Which of the procedures or conditions listed could result in damaging a transistor beyond repair?

- A. Applying silicone grease between the heat sink and the transistor mounting.
- B. Installing a transistor whose current rating exceeds the design circuit current.
- C. Providing insufficient voltage to the input circuit.
- D. Providing incorrect polarity to the collector circuit.

Correct answer: D

34. Three 12-volt, lead-acid, batteries connected in series will develop how many volts?

- A. 12 volts
- B. 24 volts
- C. 36 volts
- D. 48 volts

Correct answer: C

35. Which of the illustrated motors has an open, drip-proof (ODP) motor enclosure? Illustration EL-0001

- A. A
- B. B
- C. C
- D. D

Correct answer: C

36. What is the functional purpose of a generic electromagnetic relay?

- A. Remotely open and/or close contacts by the presence or absence of a permanent magnetic field
- B. Remotely open and/or close contacts by the presence or absence of voltage across a capacitor
- C. Remotely open and/or close contacts by the presence or absence of a permanent electrostatic field
- D. Remotely open and/or close contacts by the action or absence of current flowing through a coil

Correct answer: D

37. Which of the substances listed can be used to shield sensitive equipment from static magnetic fields?

- A. Bakelite
- B. Glass
- C. Mica
- D. Iron

Correct answer: D

38. Ships requiring extremely rapid maneuvering response using propeller shaft speed and direction as the sole means of controlling propeller thrust are most likely to use what type of drive system?

- A. Gas turbine geared drive
- B. Direct or geared diesel drive
- C. Diesel-electric drive
- D. Steam turbine geared drive

Correct answer: C

- 39.** In which of the following branch circuits types would time lag fuses (or dual-element fuses) be MOST likely used?
- A. main lighting circuits
 - B. emergency lighting circuits
 - C. general alarm circuits
 - D. motor starting circuits

Correct answer: D

- 40.** The arc resulting from the tripping of a circuit breaker is prevented from damaging the contacts. How is this done?
- A. an inverse timed thermal trip for short circuit currents
 - B. instantaneous magnetic trip for overload currents
 - C. extinguishing the arc by means of an arc chute
 - D. designing the contacts to open slowly

Correct answer: C

- 41.** Assuming the vessel has an engine control room, where is an engineers' assistance-needed alarm required to produce an audible signal?
- A. The wheelhouse/navigational bridge
 - B. The engineers' accommodation spaces
 - C. The engine room/machinery space
 - D. The crew's and officers' mess

Correct answer: B

- 42.** Which of the valves listed is NOT considered to be a hydraulic system directional control valve?
- A. Three-position valve
 - B. Two-position valve
 - C. Detented-position valve
 - D. Counterbalance valve

Correct answer: D

- 43.** A vessel is in compliance with federal regulations regarding the discharge of sewage by _____.
- A. pumping the sewage ashore to an approved container
 - B. treating sewage in an approved system
 - C. holding all sewage onboard
 - D. all of the above

Correct answer: D

44. The rudder torque capacity of the four-ram steering gear illustrated, is rated at 44,210,000 inch-pounds with one power unit in operation. If the four-ram system was able to be operated as a two-ram system with both power units online, what would be the available torque? Illustration GS-0067

- A. 11,052,500 inch-pounds
- B. 22,105,000 inch-pounds
- C. 44,210,000 inch-pounds
- D. 88,420,000 inch-pounds

Correct answer: B

45. For a pneumatic transmission system for instrumentation purposes, if a pneumatic pressure indicator has a calibrated scale of 0 to 1000 psig, what would be the actual measured pressure if the transmitted pneumatic signal pressure to the indicator is 9 psig, assuming the industry standard of 3 to 15 psig is used for instrument air?

- A. 300 psig
- B. 500 psig
- C. 600 psig
- D. 750 psig

Correct answer: B

46. Which of the following components listed is shown in the illustration? Illustration GS-0041

- A. Variable displacement pump
- B. Heat exchanger
- C. Filter
- D. All of the above

Correct answer: C

47. Which of the following statements is true concerning the gauge labeled "A" of the illustrated gauge manifold set? Illustration RA-0001

- A. The gauge labeled "A" is a compound gauge and is usually color-coded red.
- B. The gauge labeled "A" is a standard pressure gauge and is usually color-coded blue.
- C. The gauge labeled "A" is a standard pressure gauge and is usually color-coded red.
- D. The gauge labeled "A" is a compound gauge and is usually color-coded blue.

Correct answer: D

48. Which of the listed numeric values represents the smallest size drill?

- A. 0
- B. 1
- C. 60
- D. 80

Correct answer: D

- 49.** In accordance with 33 CFR Subchapter O (Pollution), besides retention of ballast water onboard or use of approved onboard ballast water treatment equipment, what is another acceptable means for a vessel to be in compliance with the ballast water management regulations?
- A. Perform a complete ballast water exchange in an area no less than 3 nautical miles from any shore prior to discharging ballast in U.S. waters.
 - B. Perform a complete ballast water exchange in an area no less than 12 nautical miles from any shore prior to discharging ballast in U.S. waters.
 - C. Perform a complete ballast water exchange in an area no less than 25 nautical miles from any shore prior to discharging ballast in U.S. waters.
 - D. Perform a complete ballast water exchange in an area no less than 200 nautical miles from any shore prior to discharging ballast in U.S. waters.

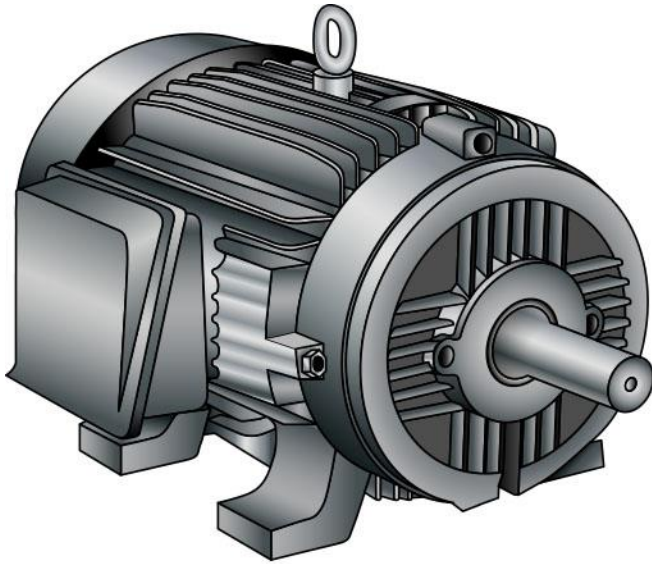
Correct answer: D

- 50.** From the information given in the illustration, what would be the maximum output amperage available from the emergency generator if it operated with a power factor of 0.9? Illustration EL-0106
- A. 541 amps
 - B. 669 amps
 - C. 937 amps
 - D. 1156 amps

Correct answer: B



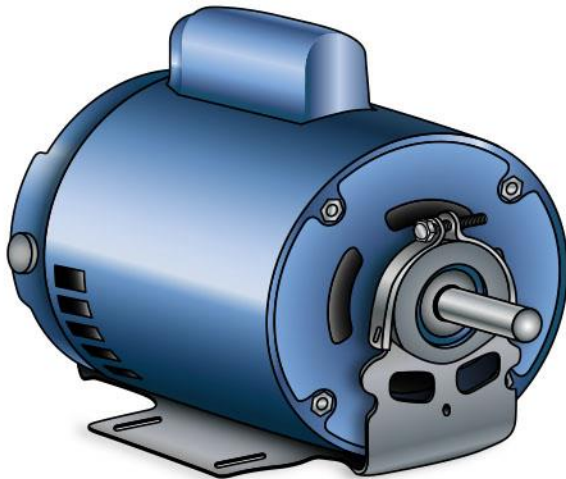
EL-0001



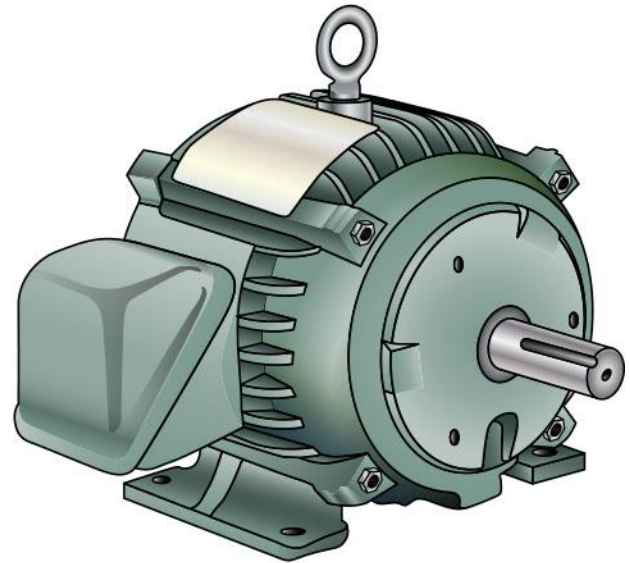
A



B



C

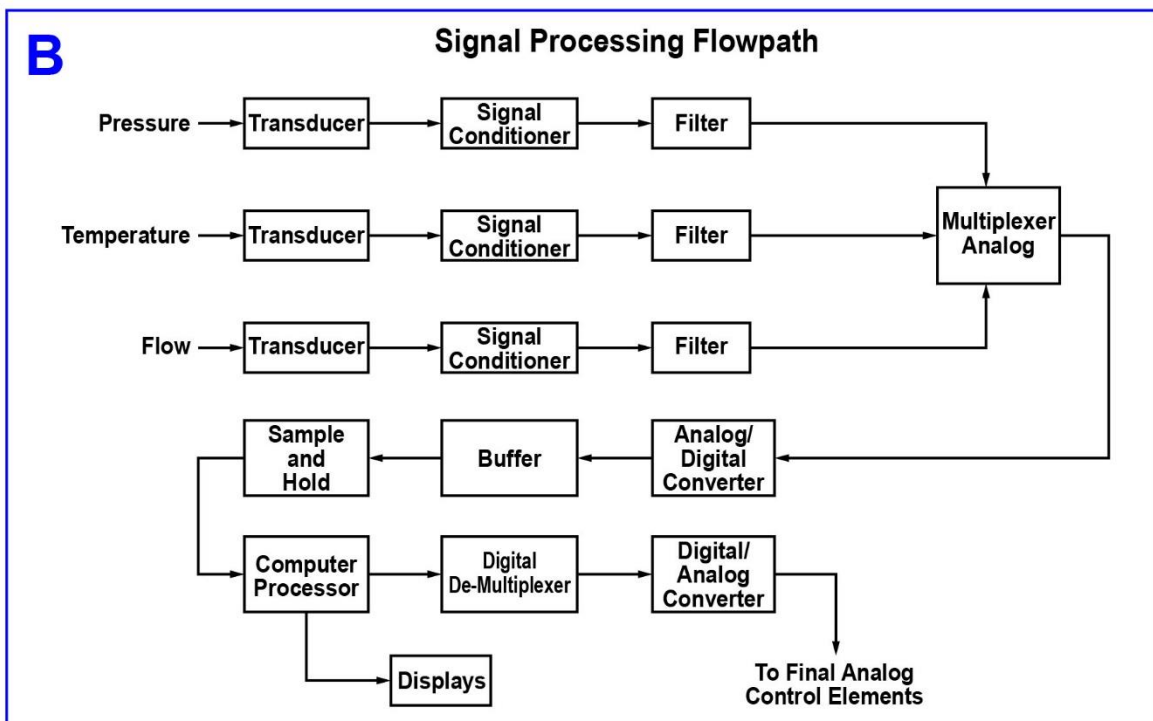
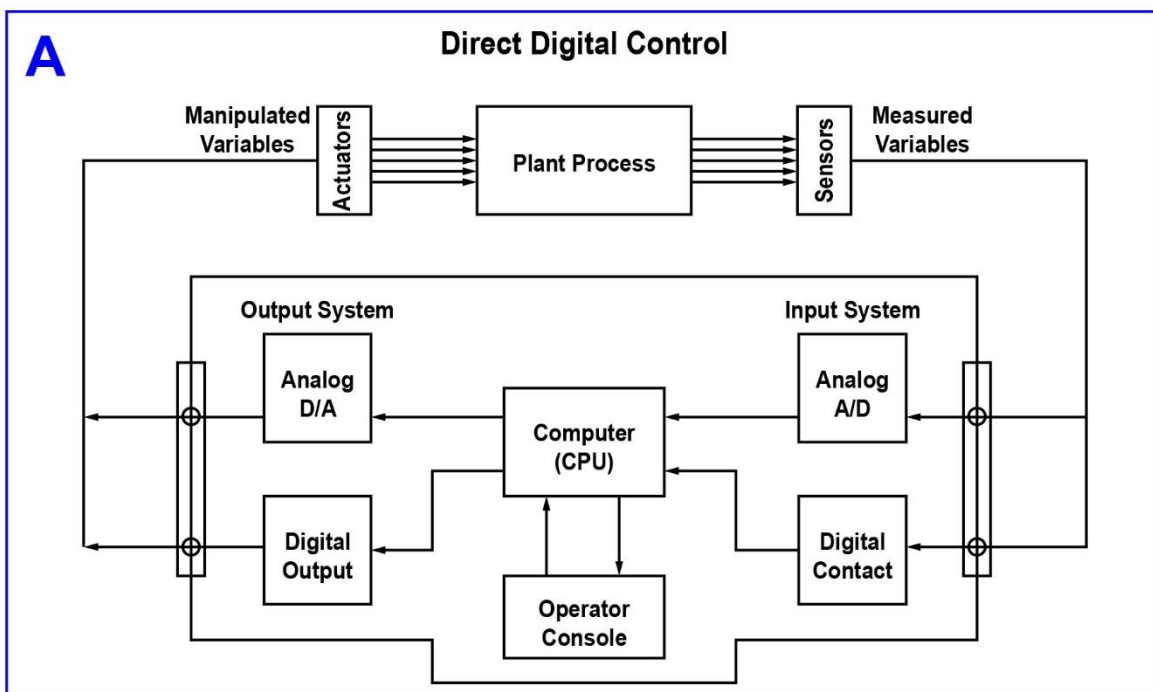


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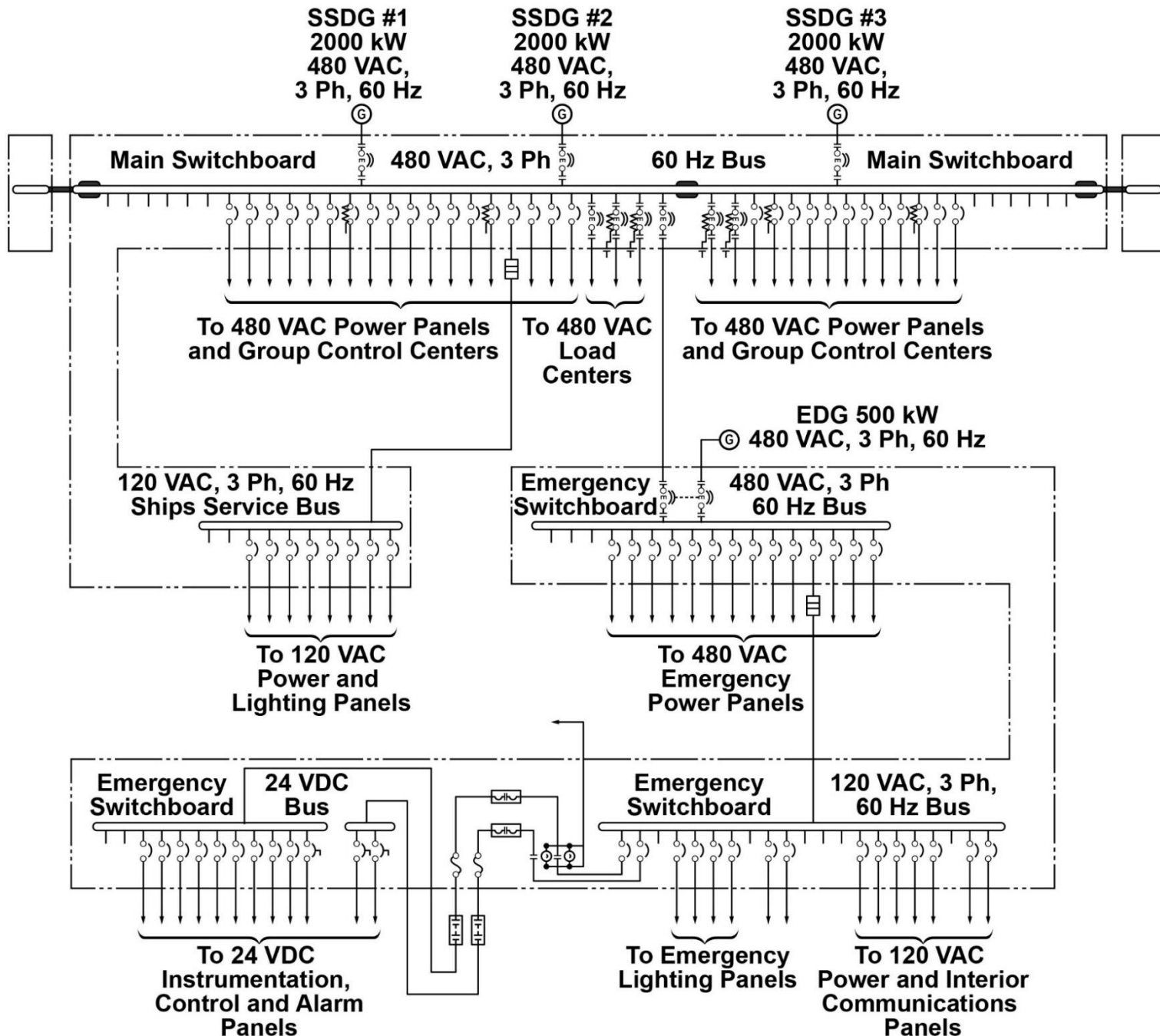
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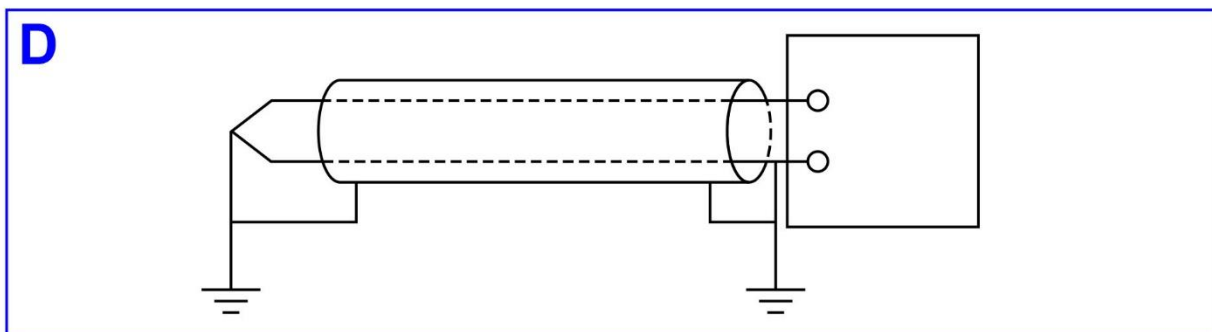
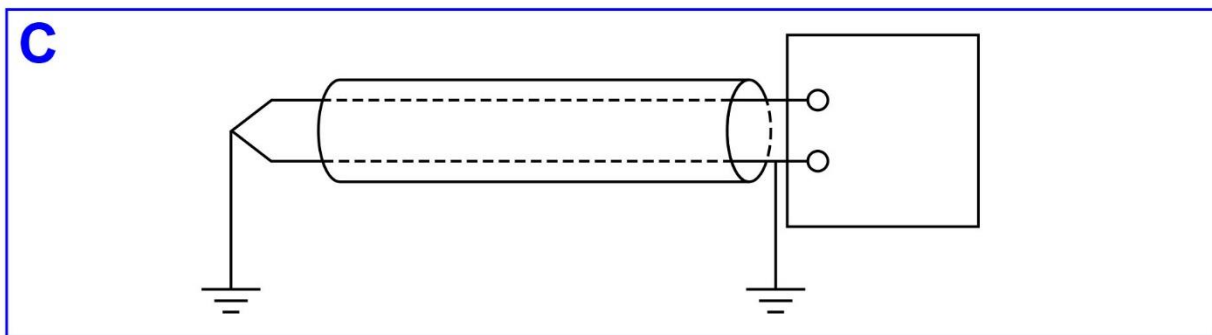
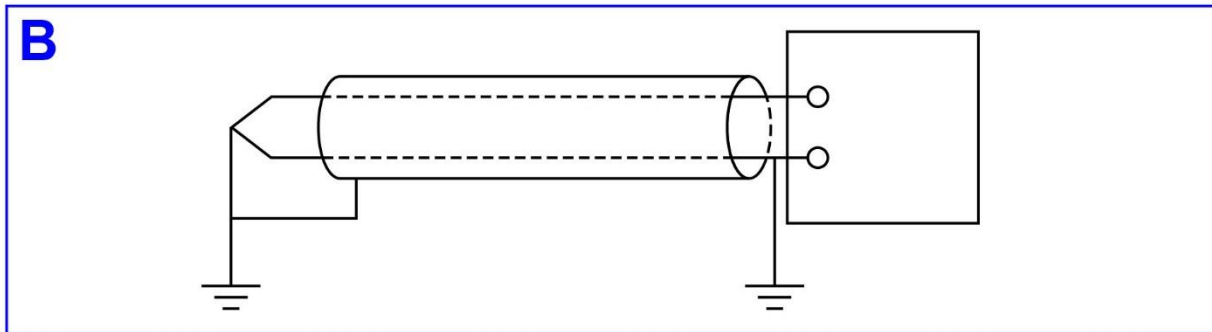
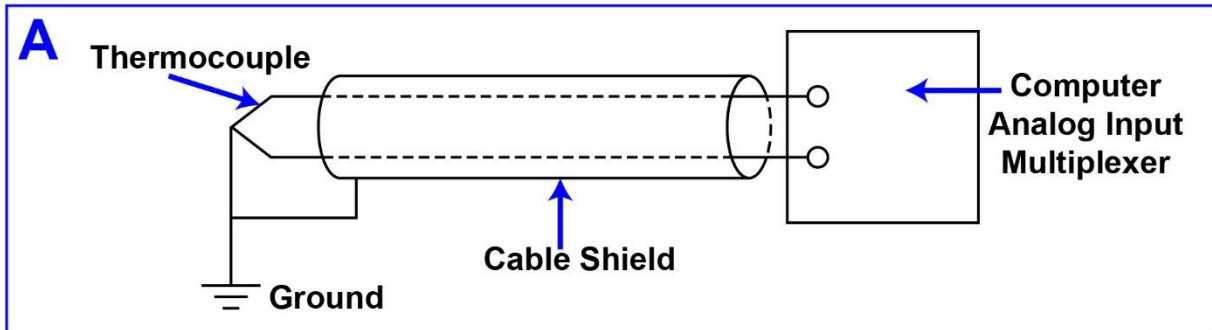
EL-0106 One Line Distribution Diagram



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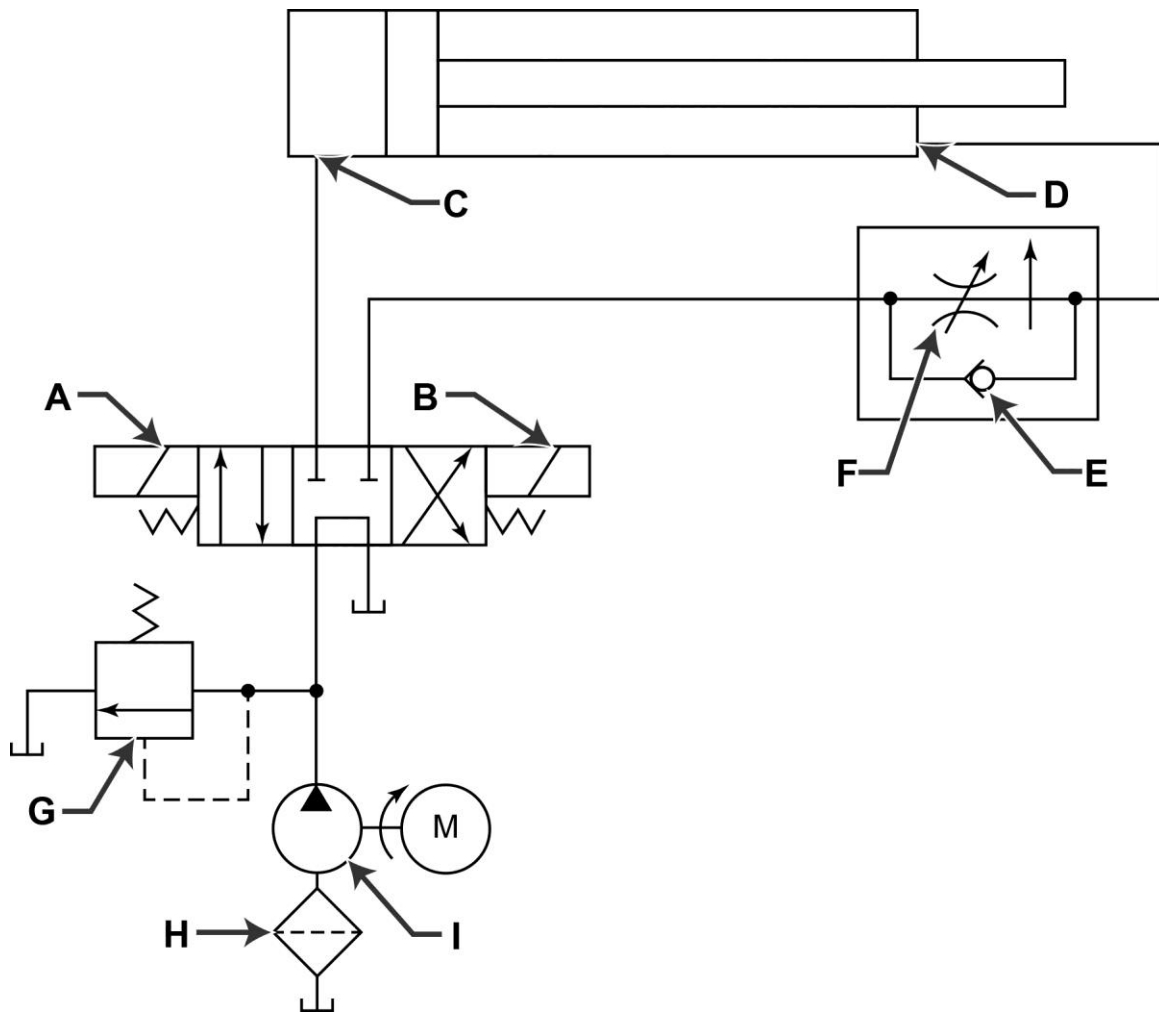
EL-0124 Signal Cabling Circuit



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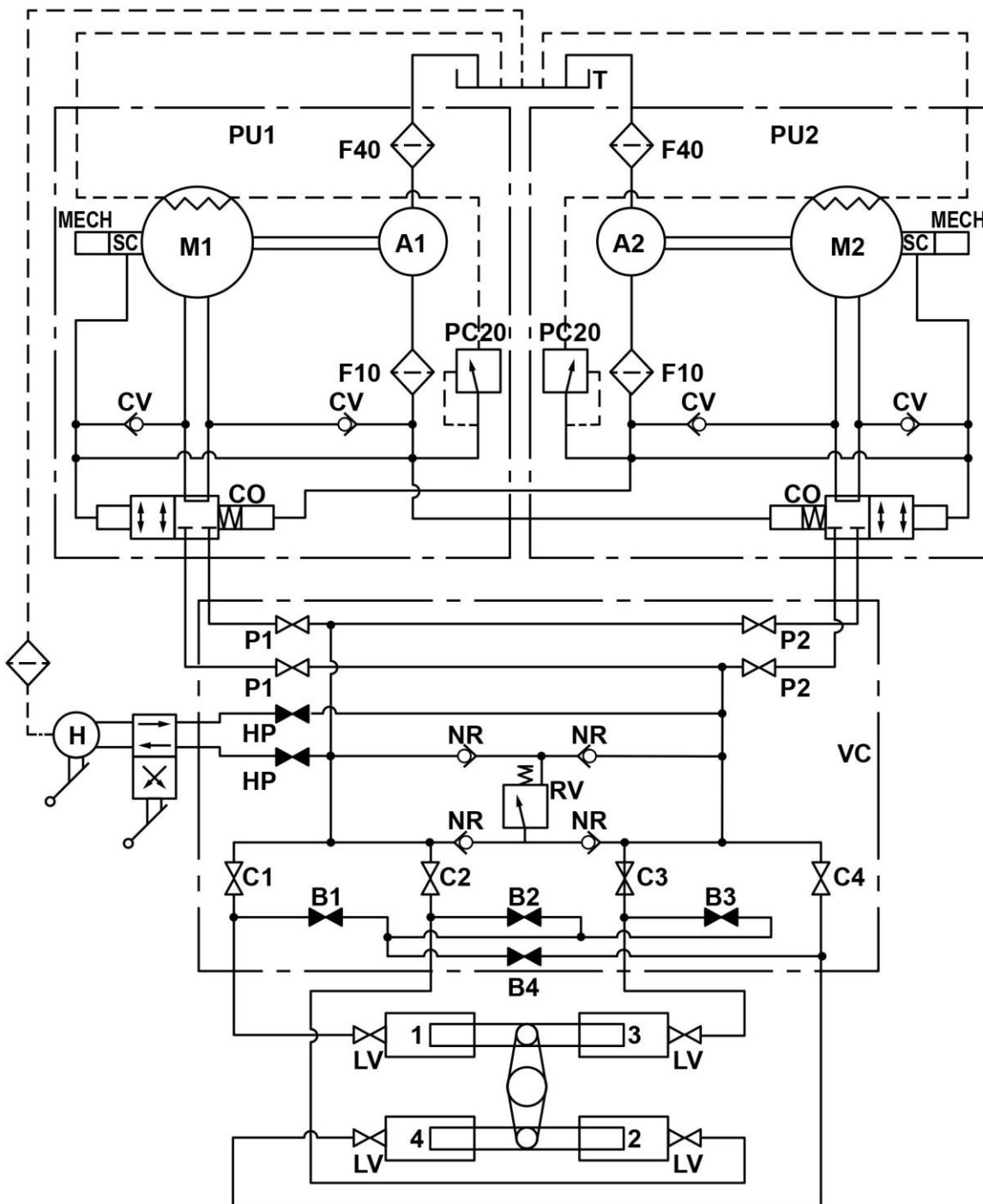
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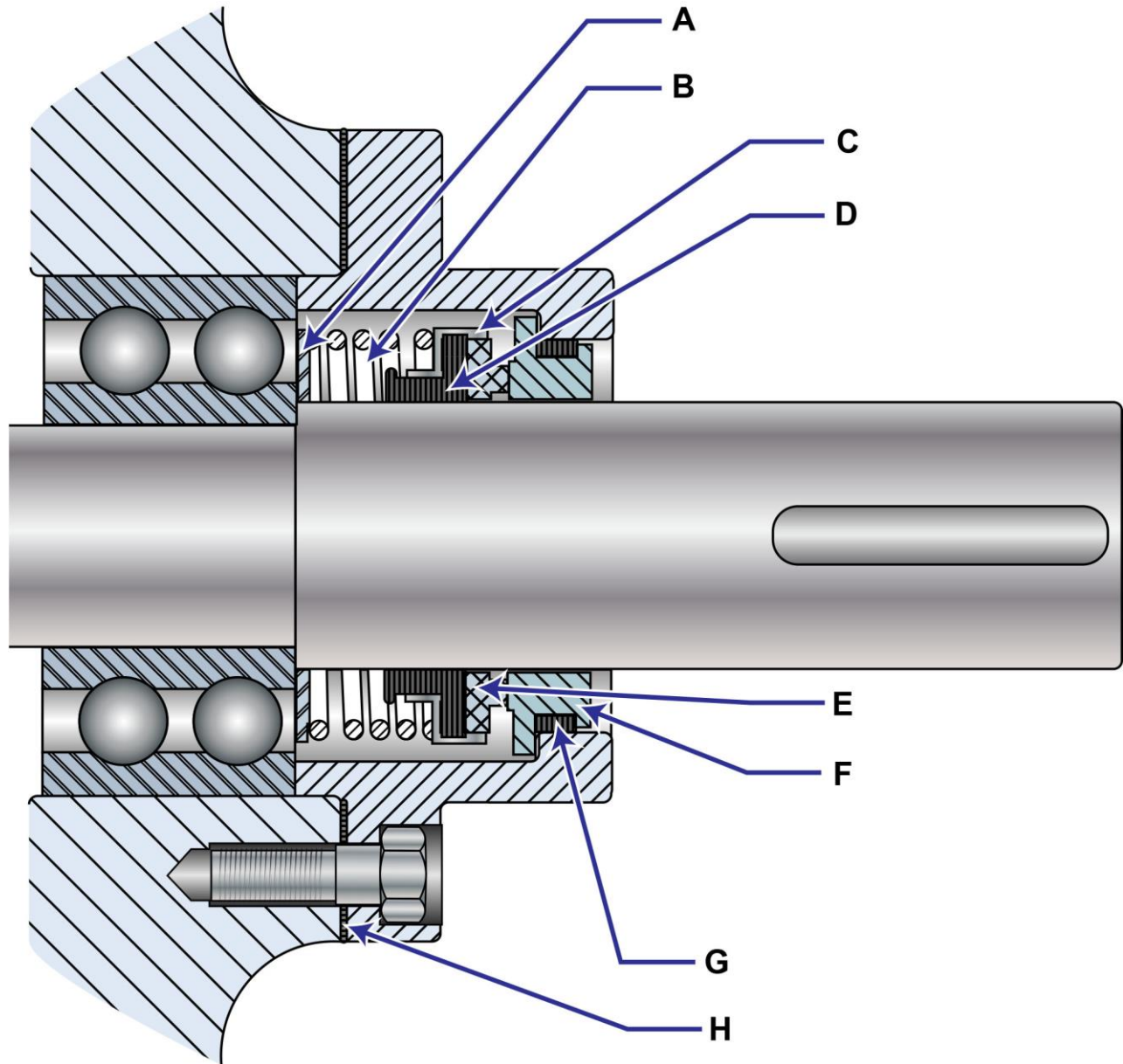
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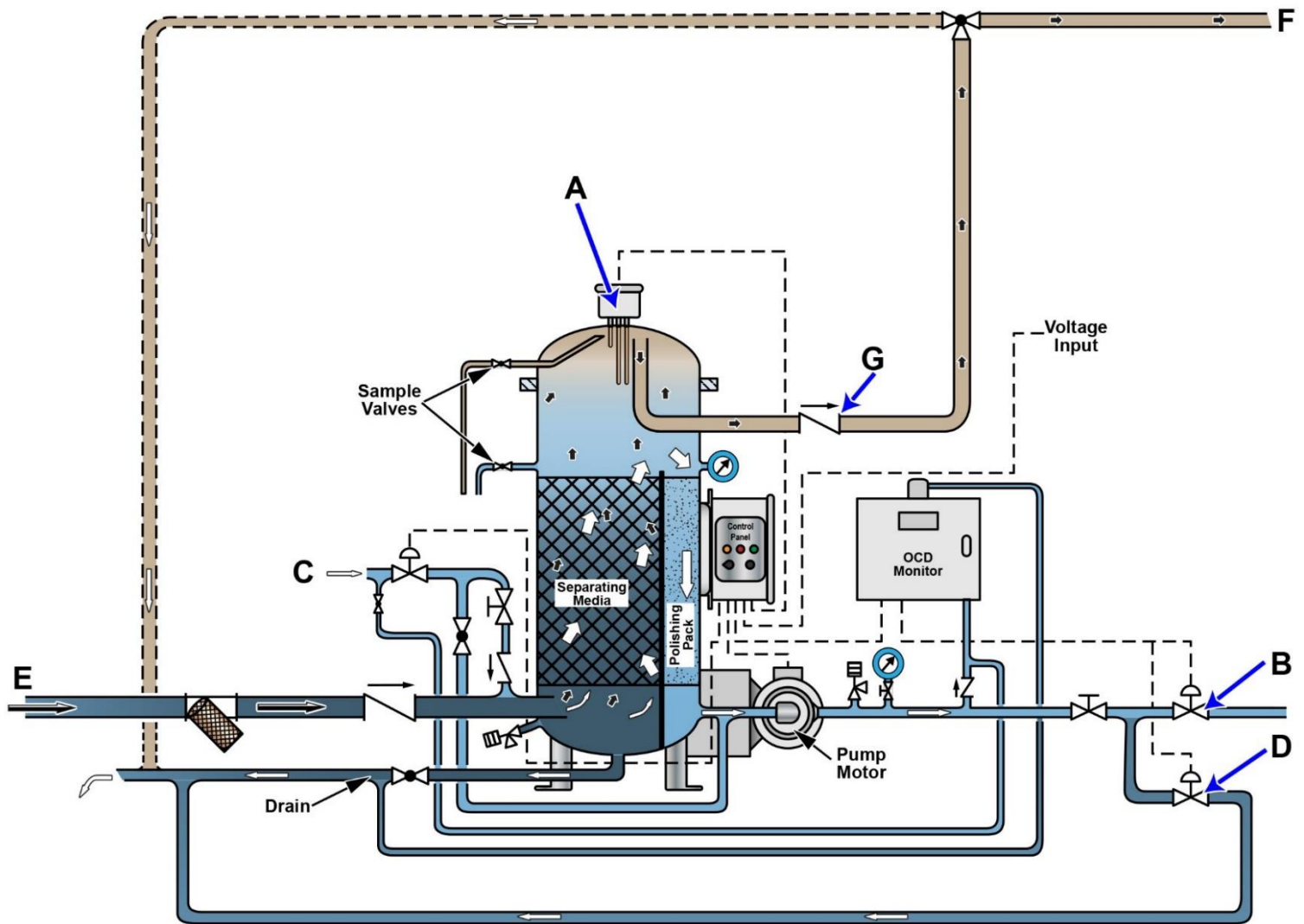
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GS-0175

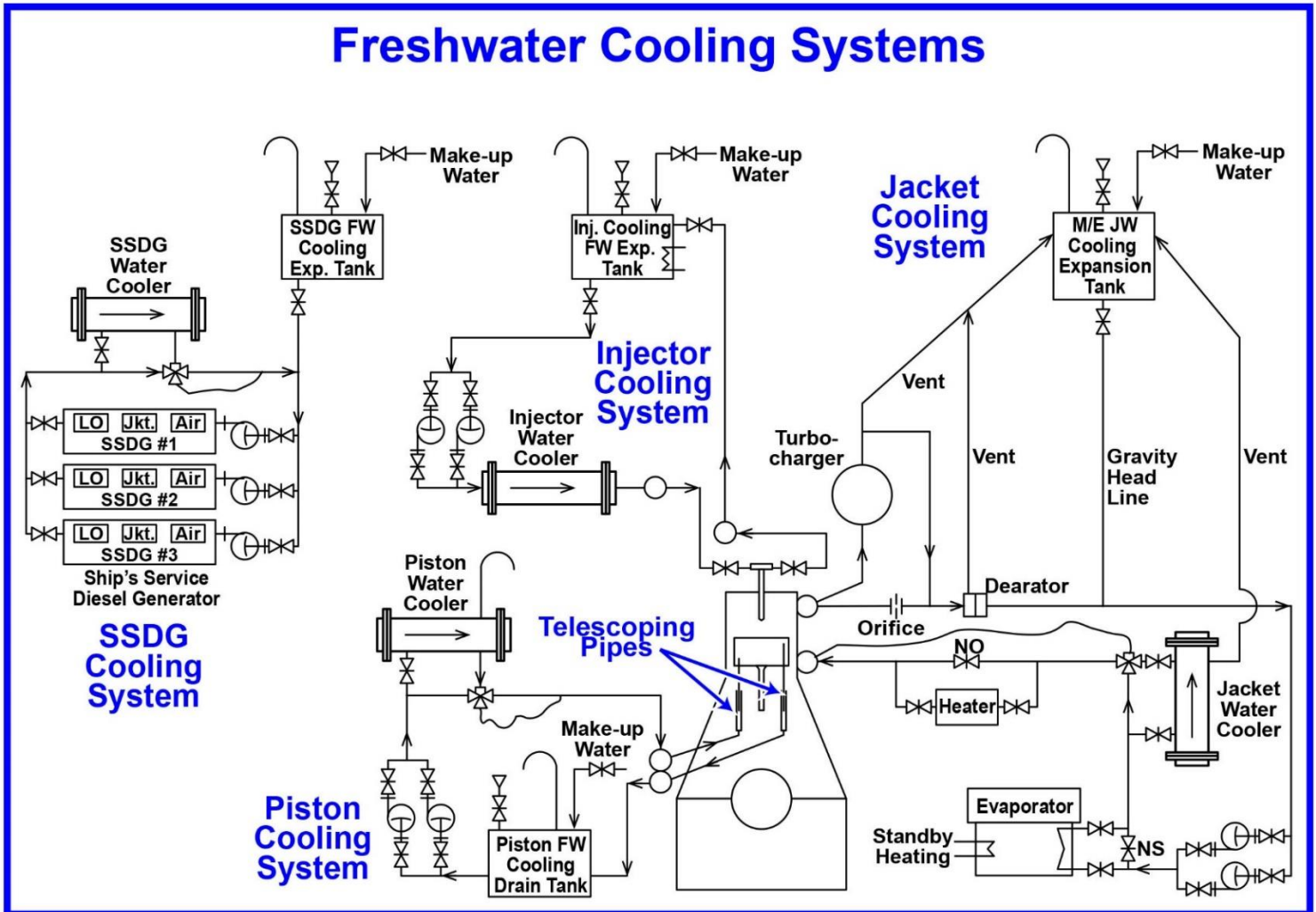


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MO-0212

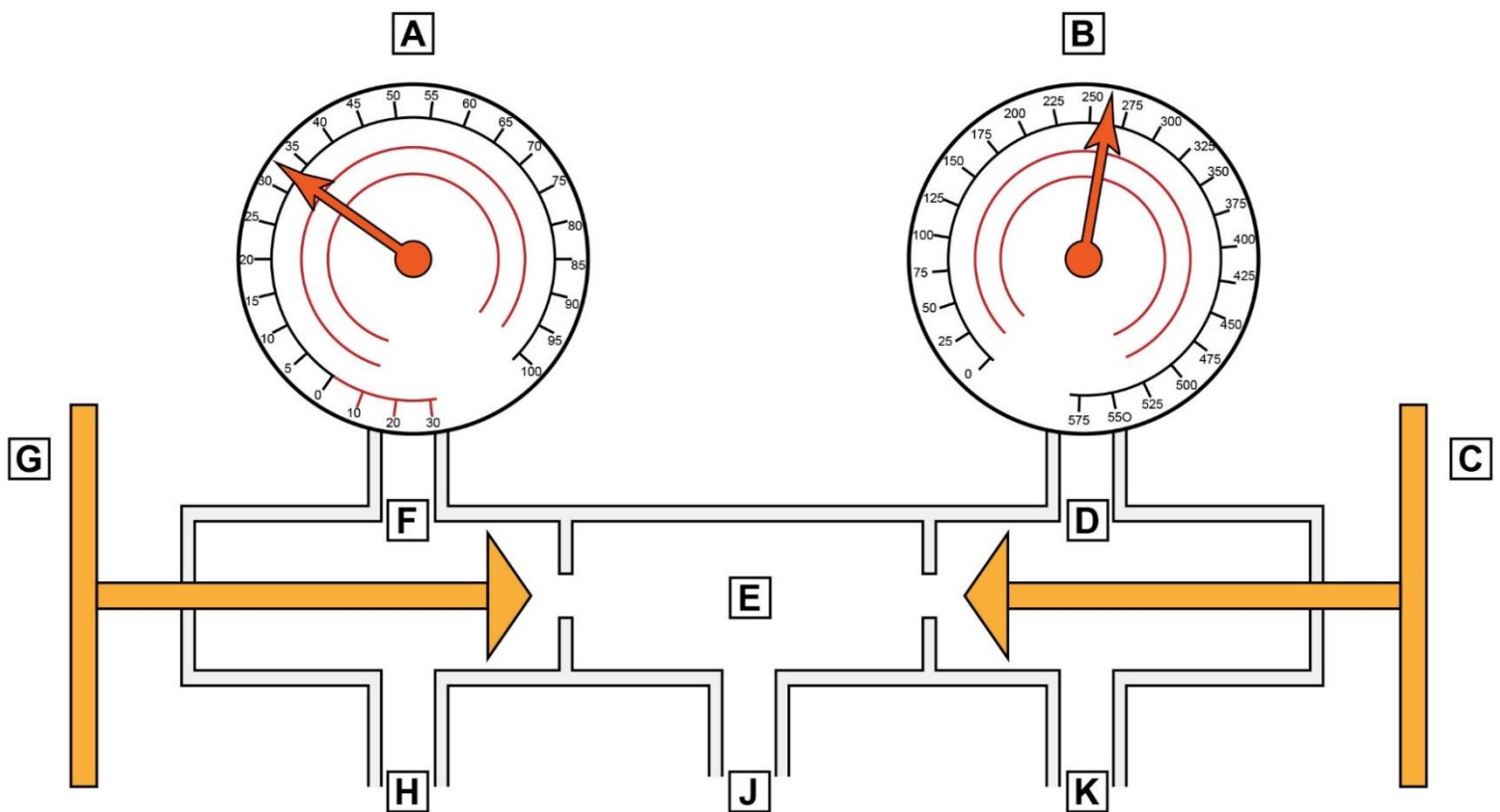
Freshwater Cooling Systems



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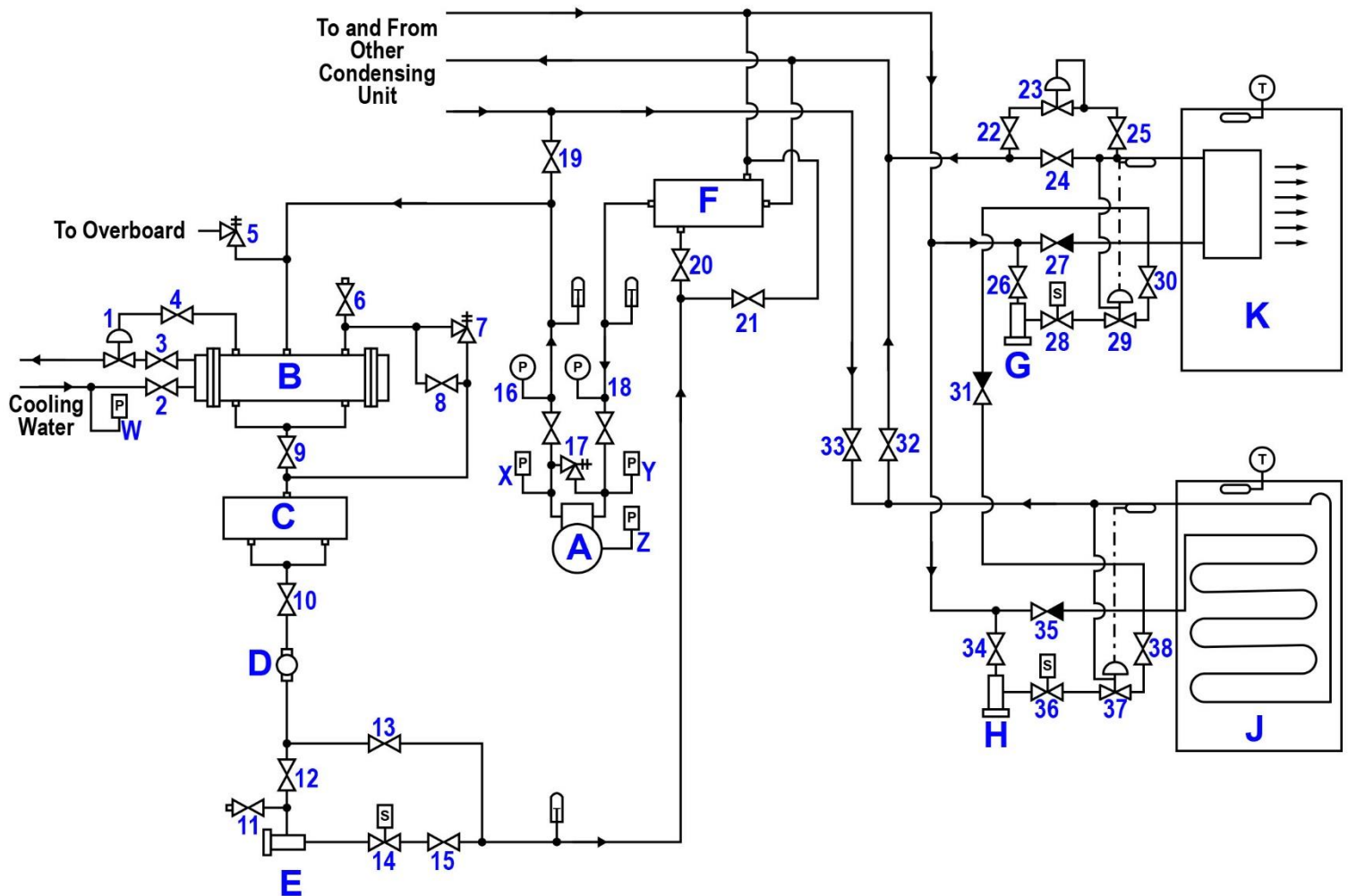
RA-0001



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RA-0012



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