U.S.C.G. Merchant Marine Exam

MODU – Assistant Engineer

Q717 General Subjects

(Sample Examination)

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

1. Which of the fluids listed is suitable and commonly used as a secondary refrigerant?

   A. Cuprous chloride
   B. Brine
   C. Carbon dioxide
   D. Methyl alcohol

   Correct answer: B

2. What is the physical state and pressure condition of refrigerant as it enters the condenser of a typical refrigeration system?

   A. high-pressure liquid
   B. low-pressure vapor
   C. low-pressure liquid
   D. high-pressure vapor

   Correct answer: D

3. The carbon seal ring of a refrigeration compressor crankshaft mechanical seal is held in position against the stationary ring face by using what device?

   A. thrust washer
   B. woodruff key
   C. snap ring
   D. spring

   Correct answer: D

4. In a refrigeration system featuring low-side pumpdown prior to the automatic shutdown of the compressor, the temperature of the refrigerated space is controlled by the action of a thermostat wired to what device?

   A. suction line solenoid
   B. liquid line box solenoid
   C. thermostatic expansion valve
   D. low-pressure cut-out switch

   Correct answer: B

5. In a refrigeration system, the bulb for the thermal expansion valve is always located where?

   A. at the beginning of the bottom row of the evaporator coils
   B. in the middle of the evaporator coils
   C. at the evaporator coil outlet
   D. at the evaporator coil inlet

   Correct answer: C

6. In a refrigeration system, the push-pull technique can be used for the recovery of the refrigerant in what state?

   A. liquid only
   B. vapor only
   C. both liquid and vapor
   D. should never be used with low-pressure systems

   Correct answer: A

7. The amount of HCFC-123 in a storage cylinder is measured by what means?

   A. saturation temperature
   B. weight
   C. saturation pressure
   D. volume

   Correct answer: B

8. In general, the thermal bulb for a thermal expansion valve used in a reciprocating air conditioning system is usually charged with what substance?

   A. bees wax
   B. the same refrigerant as the system
   C. mercuric sulfate
   D. distilled water

   Correct answer: B

9. When starting a reciprocating refrigeration compressor that has been shut down for a period of time, you should manually throttle which valve?

   A. suction valve
   B. sea water valve
   C. expansion valve
   D. king valve

   Correct answer: A

10. For safe storage, the maximum allowable temperature to which refrigerant bottles should be exposed is what temperature?

    A. 100°F
    B. 125°F
    C. 150°F
    D. 175°F

    Correct answer: B

11. 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

12. Which of the illustrated motors has an open motor enclosure? Illustration EL-0001

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

    Correct answer: B

13. What is the functional name of an electrical device which prevents simultaneous energization of loads thereby preventing damage or injury?

    A. modulating device
    B. mechanical limit device
    C. monitoring device
    D. electrical interlock device

    Correct answer: D

14. How will the value of the output frequency change if the load is removed from a turbogenerator having a governor speed droop setting of 3%?

    A. It will become variable
    B. It will increase
    C. It will remain unchanged
    D. It will decrease by approximately 3%

    Correct answer: B

15. A common type of molded case circuit breaker has both thermal and magnetic trip elements. If a branch circuit breaker has only thermal or magnetic trip elements (but not both), it is common to use multiple series-connected protective devices to provide both short-circuit and overload protection. If a motor branch circuit is protected with both a thermal trip-type circuit breaker and fuses, what is the protective purpose of the fuses used in this arrangement?

    A. sustained overload protection
    B. short duration surge protection
    C. short-circuit protection
    D. time-delay protection

    Correct answer: C

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

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

    Correct answer: D

17. A silicon-controlled rectifier (SCR) is a solid-state device used for what functional purpose?

    A. automatic impedance matching function
    B. triggering the operation of a switching function
    C. amplifying voltage, current, and/or power
    D. attenuating of voltage, current, and/or power

    Correct answer: B

18. Of the following, what shipboard system is MOST likely to use the synchronous transmission system featuring a transmitter and receiver?

    A. Shaft revolution indicator system
    B. Rudder angle indicator system
    C. Turbocharger RPM indicator system
    D. Centrifuge RPM indicator system

    Correct answer: B

19. A common-emitter circuit has an input voltage of 0.1 volt, an output voltage of 2.0 volts, an input current of 0.5 milliamps, and an output current of 10 milliamps. What is the power gain?

    A. 20
    B. 40
    C. 400
    D. 4000

    Correct answer: C

20. Referring to the illustrated diagram, what type of HVAC system is shown? Illustration RA-0043

    A. A single zone system
    B. A dual duct system
    C. A variable air volume system
    D. A terminal reheat system

    Correct answer: B

21. What is meant by the term emergency bilge suction?

    A. The means by which the machinery space bilge is pumped out by a pump not normally used as a bilge pump and drawing a suction directly on the bilge independent of any bilge manifolds or automatic bilge suction valves.
    B. The means by which the machinery space bilge is pumped out by a pump not normally used as a bilge pump and drawing a suction on the bilge through either bilge manifolds or automatic bilge suction valves.
    C. The means by which the machinery space bilge is pumped out by a pump normally used as a bilge pump and drawing a suction directly on the bilge independent of any bilge manifolds or automatic bilge suction valves.
    D. The means by which the machinery space bilge is pumped out by a pump normally used as a bilge pump and drawing a suction on the bilge through either bilge manifolds or automatic bilge suction valves.

    Correct answer: A

22. Which of the listed valve types is typically used for the low-pressure stage of a reciprocating air compressor?

    A. Ring-plate
    B. Strip-type
    C. Rotary
    D. Sliding

    Correct answer: B

23. 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 analog outputs from the CPU and converts these to digital signals for transmission to the digital actuators.
    C. It receives digital outputs from the CPU and conditions 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: C

24. What type of temperature transmitter would be most suitable for measuring running gear bearing temperatures in a diesel engine in that it requires no contact with the bearing?

    A. Radiation pyrometer
    B. Resistance temperature detector
    C. Thermocouple pyrometer
    D. Thermistor probe

    Correct answer: A

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

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

    Correct answer: C

26. With regard to the number of passes through the tubes of shell-and-tube heat exchangers, what statement is true?

    A. In two-pass and four-pass heat exchangers, the inlet and outlet tube-side fluid connections are at the same end.
    B. In two-pass and four-pass heat exchangers, the inlet and outlet tube-side fluid connections are at opposite ends.
    C. In single-pass and two-pass heat exchangers, the inlet and outlet tube-side fluid connections are at opposite ends.
    D. In single-pass and two-pass heat exchangers, the inlet and outlet tube-side fluid connections are at the same end.

    Correct answer: A

27. With an increase in temperature, the volume of hydraulic fluid _____.

    A. remains the same
    B. contracts
    C. increases
    D. remains constant if pressure decreases

    Correct answer: C

28. For the various sizes of tubing and wall thickness used in a hydraulic system, the inside diameter can be determined if it is remembered that the inside diameter equals the outside diameter less _____.

    A. the wall thickness
    B. 1.5 times the wall thickness
    C. 2 times the wall thickness
    D. 2.5 times the wall thickness

    Correct answer: C

29. 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

30. Which of the listed components of a hydraulic system would enable the pump to be temporarily shut down, and yet still provide an instantaneous source of hydraulic force?

    A. Accumulator
    B. Modulator
    C. Pressure compensator valve
    D. Sump actuator

    Correct answer: A

31. What is the operating principle of detergent type lubricating oil that provides the oil with its unique properties?

    A. Detergent and dispersant additives chemically dissolve the solids.
    B. Detergent and dispersant additives are able to hold solids in suspension.
    C. Detergent and dispersant additives convert the solids into a soap-like substance.
    D. Detergent and dispersant additives cause the solids to settle out.

    Correct answer: B

32. What type of fuel oil as part of an oily-water mixture is most likely to have a density approaching that of water?

    A. Marine diesel oil
    B. Distillate/residual fuel oil blends
    C. Heavy residual fuel oil
    D. Light distillate oil

    Correct answer: C

33. The components indicated as "7" and "8" as shown in the illustration, are known as the _____. Illustration GS-0153

    A. Outlet weir and outlet baffle
    B. First stage oil separator and drip pan
    C. Second stage oil separator and drip pan
    D. Inlet weir and inlet baffle

    Correct answer: D

34. Which of the following statements is true regarding mechanical seals?

    A. They are not suitable for use on fuel oil transfer pumps.
    B. They may be used in lieu of conventional packing glands for any service other than salt water.
    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

35. Pitting in the suction areas of a centrifugal pump bronze impeller is usually caused by _____.

    A. cavitation
    B. electrolysis
    C. corrosion
    D. abrasion

    Correct answer: A

36. The function of the section labeled "C" in the device illustrated is to provide a/an _____. Illustration GS-0075

    A. area for pump packing
    B. passage for sealing liquid to enter the pump
    C. passage for gas to be discharged
    D. bearing surface for the rotor shaft

    Correct answer: C

37. In accordance with 33 CFR Subchapter O (Pollution), which type of Marine Sanitation Device (MSD) is used solely for the storage of sewage and flush water at ambient air pressure and temperature?

    A. Type I
    B. Type II
    C. Type III
    D. Type IV

    Correct answer: C

38. Which of the instruments listed is used to measure the gauge of a piece of sheet metal?

    A. Wire gauge
    B. Circular mil
    C. Inside micrometer
    D. Gauge calibrator

    Correct answer: A

39. The locking plates shown in the illustration are used in many marine applications. Which figure indicates the improper method for using these devices? Illustration GS-0156

    A. "A"
    B. "B"
    C. "C"
    D. "D"

    Correct answer: C

40. Which of the listed temperature sensors consists of finely coiled wire, such as platinum, where the resistance varies directly with temperature?

    A. Bimetallic device
    B. Thermistor
    C. Thermocouple
    D. Resistance temperature detector

    Correct answer: D

41. What is meant by the term "deadband" as it applies to prime mover speed control governors?

    A. Deadband is the result of transient speed changes of a prime mover as the governor responds to load changes.
    B. Deadband is the change in speed required before the governor will initiate a corrective action as the result of a load change.
    C. Deadband is the repeated and sometimes rhythmic variation of speed due to over-control by the governor.
    D. Deadband is the repeated variation of speed due to under-control by the governor and a lack of governor power.

    Correct answer: B

42. What operating condition (or conditions) would necessitate shifting from a high sea suction to a low sea suction for a machinery space sea water cooling system?

    A. Entering port or shallow water
    B. Underway operations or encountering rough seas
    C. Increasing the number of sea water-cooled heat exchangers on service
    D. Reducing the total number of sea water-cooled heat exchangers on service

    Correct answer: B

43. Which of the following voltage testers would be associated with high quality, be safe to use, and minimize the electric shock hazard?

    A. a voltage tester with a low input impedance and a higher voltage rating than any expected measured voltages
    B. a voltage tester with a high input impedance and a lower voltage rating than any expected measured voltages
    C. a voltage tester with a low input impedance and a lower voltage rating than any expected measured voltages
    D. a voltage tester with a high input impedance and a voltage rating higher than any expected measured voltages

    Correct answer: D

44. When reading a pressure that fluctuates severely on a direct-reading pressure gauge, what should be done?

    A. The maximum and minimum pressures should be noted and added together and divided by two to obtain the average pressure.
    B. The pulsation dampening needle valve should be throttled down (without closing) until the fluctuation ceases.
    C. Attempt to determine the midpoint between the maximum and minimum pressures and use this an estimate of the average pressure.
    D. The pulsation dampening needle valve should be opened wider until the fluctuation ceases.

    Correct answer: B

45. Referring to the illustrated motorship freshwater cooling system drawing, what statement is true concerning the main engine jacket water cooling system heat recovery capability as associated with generating fresh water? Illustration MO-0212

    A. The evaporator itself is used as a main engine heat recovery device for use in generating fresh water at the evaporator.
    B. The main engine jacket water cooler is used as a main engine heat recovery device for use in generating fresh water at the evaporator.
    C. The main engine jacket water heater is used as a main engine heat recovery device for use in generating fresh water at the evaporator.
    D. The evaporator standby heater is used as a main engine heat recovery device for use in generating fresh water at the evaporator.

    Correct answer: A

46. Which of the figures shown in the illustration depicts an orthographic projection? Illustration GS-0142

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

    Correct answer: A

47. In the illustration, line "C" is a _____. Illustration GS-0006

    A. dimension line
    B. leader line
    C. cutting plane line
    D. phantom line

    Correct answer: A

48. Suppose the illustrated pneumatically operated diaphragm actuated control valve is used to control the fuel oil outlet temperature of a steam-heated heavy fuel oil heater by controlling the steam flow. What would be the result if there was a complete loss of pilot air being delivered to the valve actuator? Illustration GS-0051

    A. It is not possible to predict how the valve would respond to a loss of pilot air.
    B. The valve would fail in the fully open position, most likely resulting in a high fuel oil temperature alarm condition.
    C. The valve would fail in the fully closed position, most likely resulting in a low fuel oil temperature alarm condition.
    D. The valve would fail in the exact position just before the loss of pilot air. The fuel temperature will fluctuate with changes in fuel demand.

    Correct answer: B

49. Referring to the illustrated huddling-chamber safety valve, what statement concerning the blowdown adjusting ring (B) is true? Illustration SG-0018

    A. Lowering the blowdown adjusting ring further decreases the area of exposure to pressure after the valve pops and as a result, the valve blowdown will increase.
    B. Lowering the blowdown adjusting ring further increases the area of exposure to pressure after the valve pops and as a result, the valve blowdown will decrease.
    C. Lowering the blowdown adjusting ring further increases the area of exposure to pressure after the valve pops and as a result, the valve blowdown will increase.
    D. Lowering the blowdown adjusting ring further decreases the area of exposure to pressure after the valve pops and as a result, the valve blowdown will decrease.

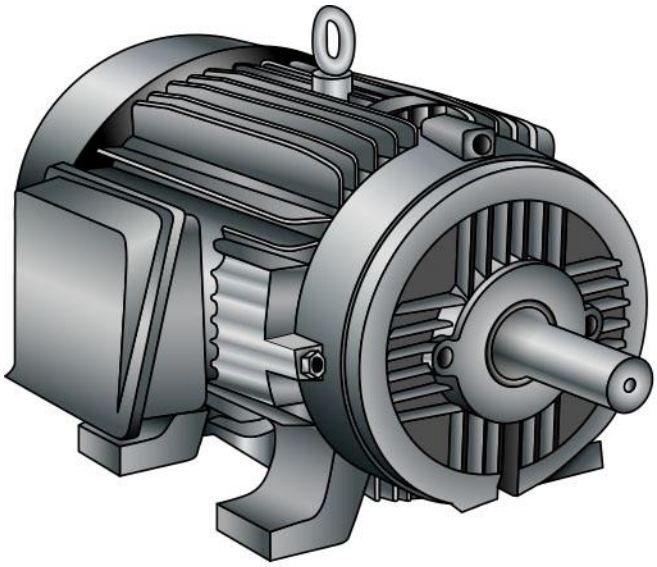
    Correct answer: D

50. Probably the most useful troubleshooting tools used in a predictive maintenance management program for shipboard machinery are vibration meters, analyzers, and monitors. What is the term that represents the number of vibration cycles per unit time as a result of a part vibrating during its periodic or oscillatory motion?

    A. Vibration acceleration
    B. Vibration frequency
    C. Vibration velocity
    D. Vibration displacement

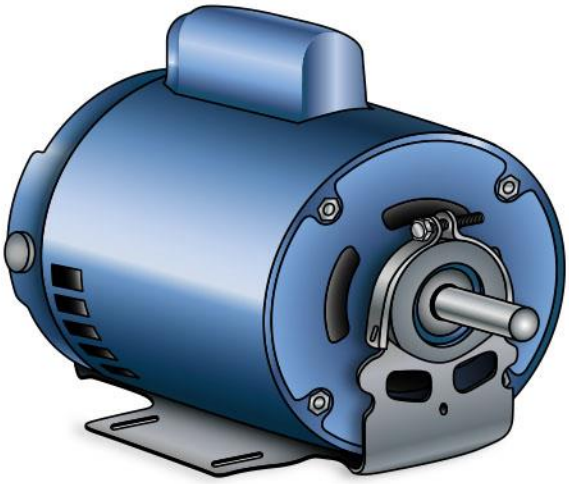
    Correct answer: B

EL-0001



A

B



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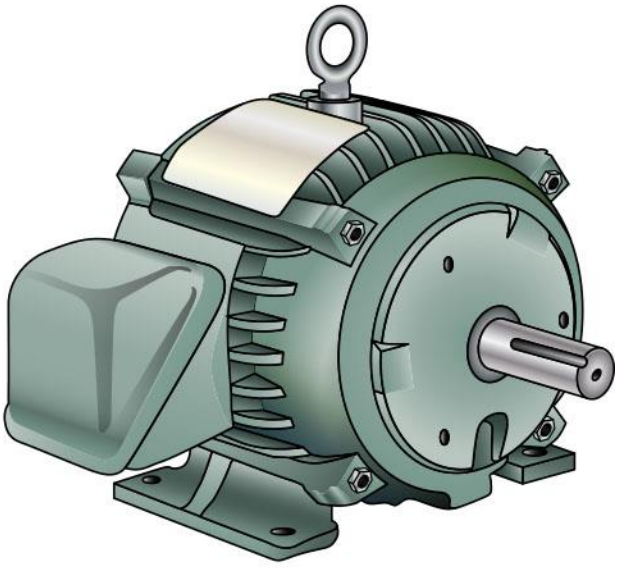

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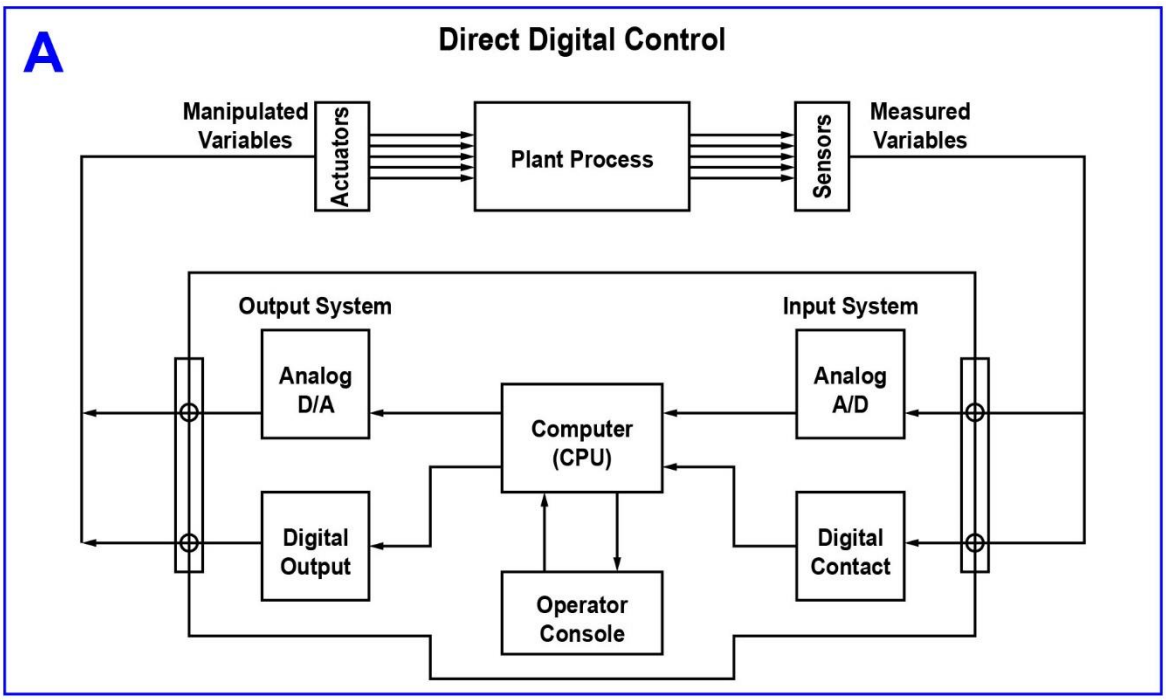
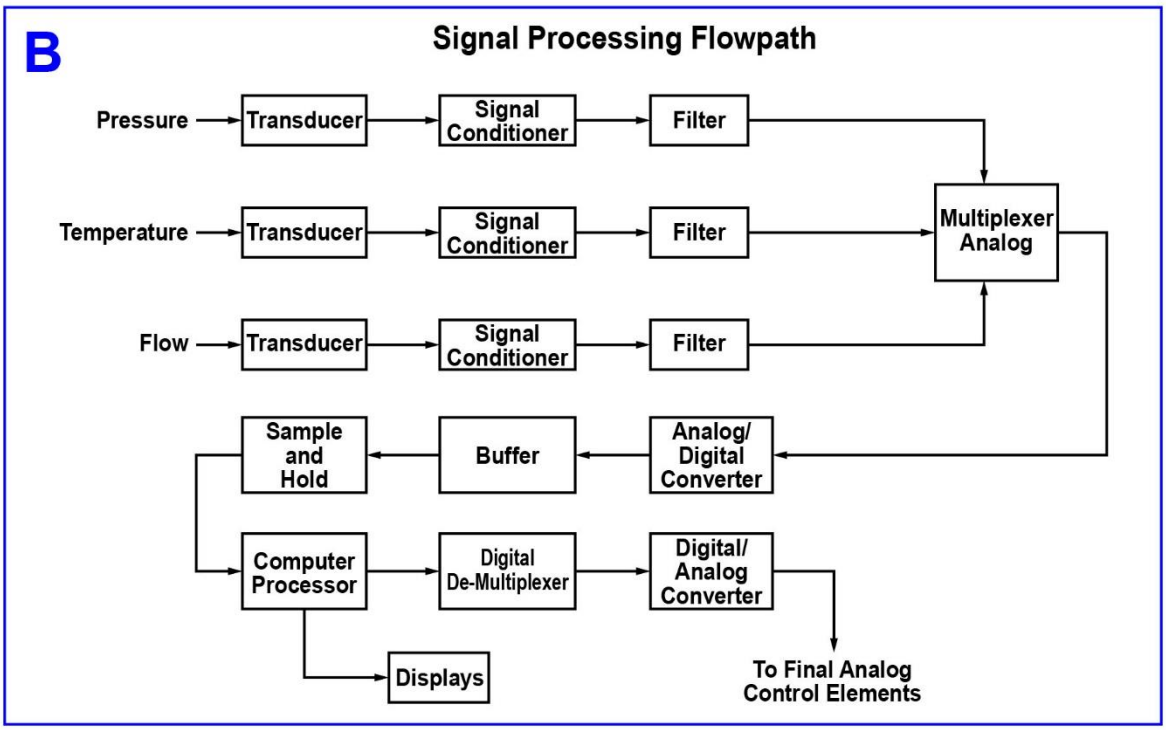
EL-0095





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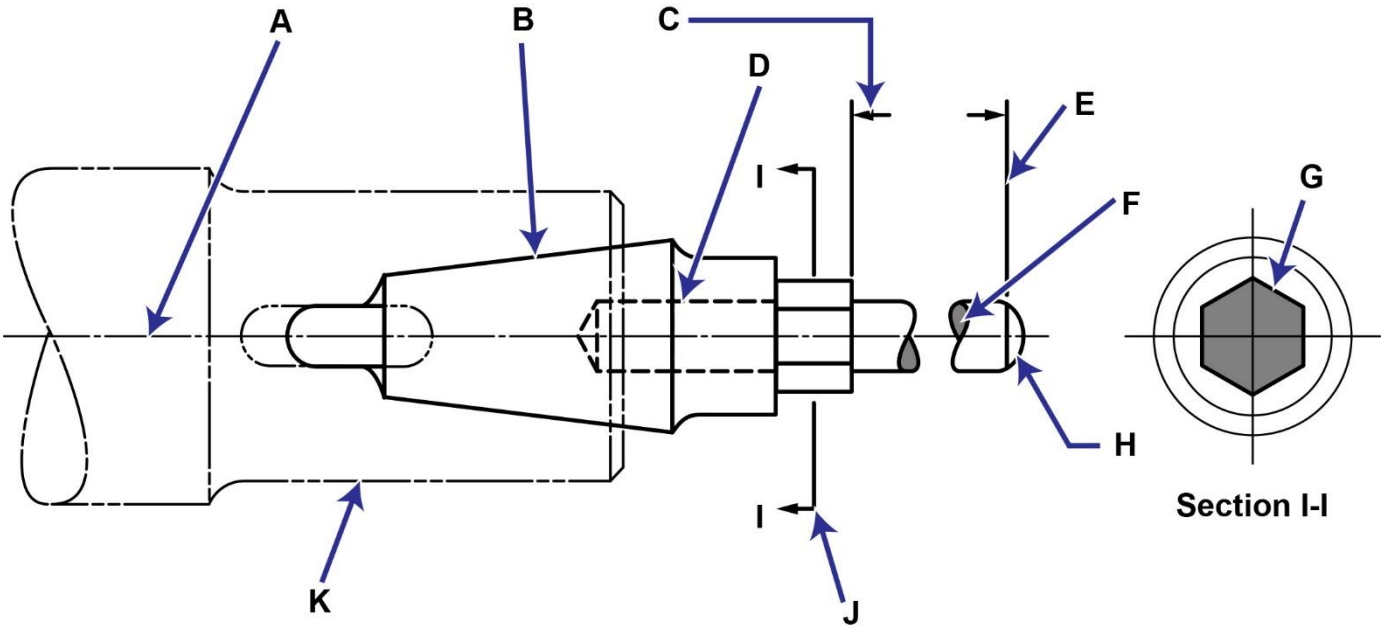

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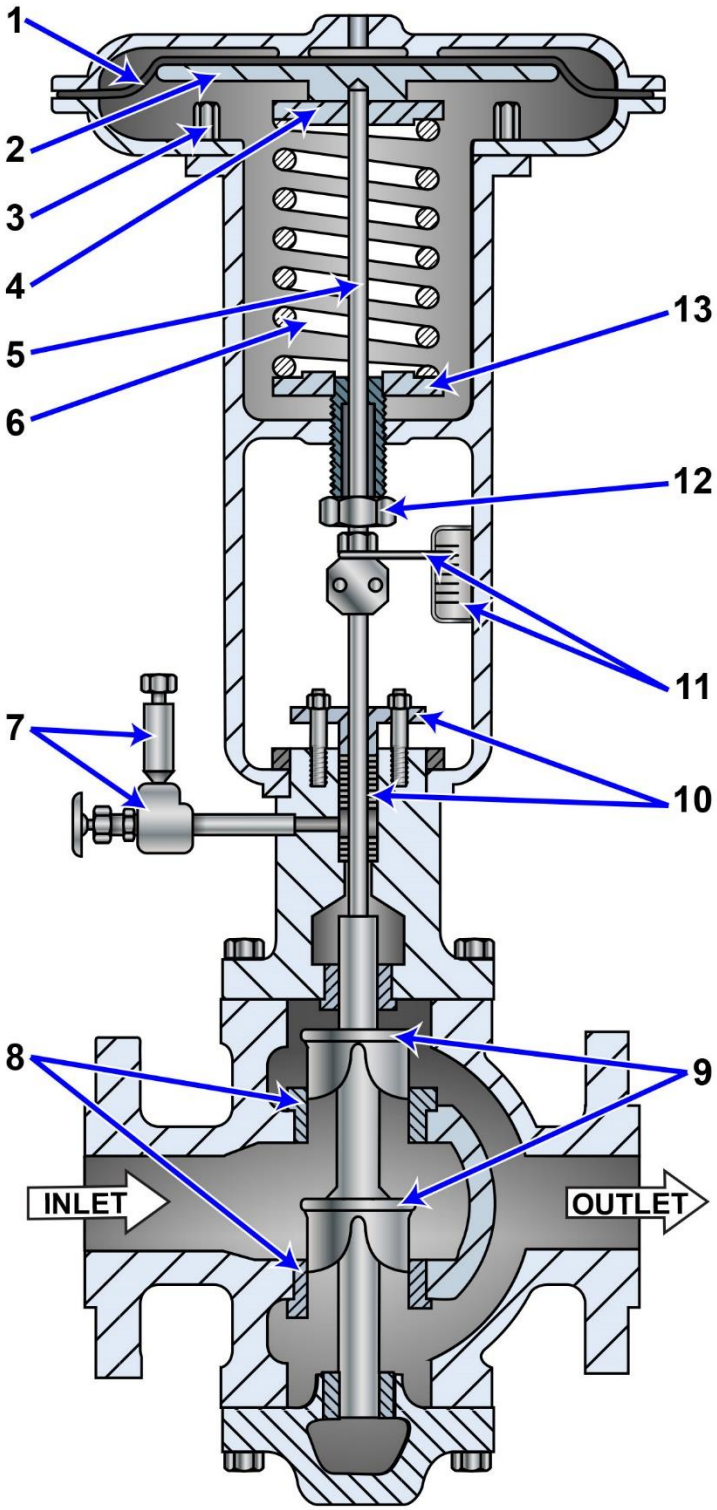
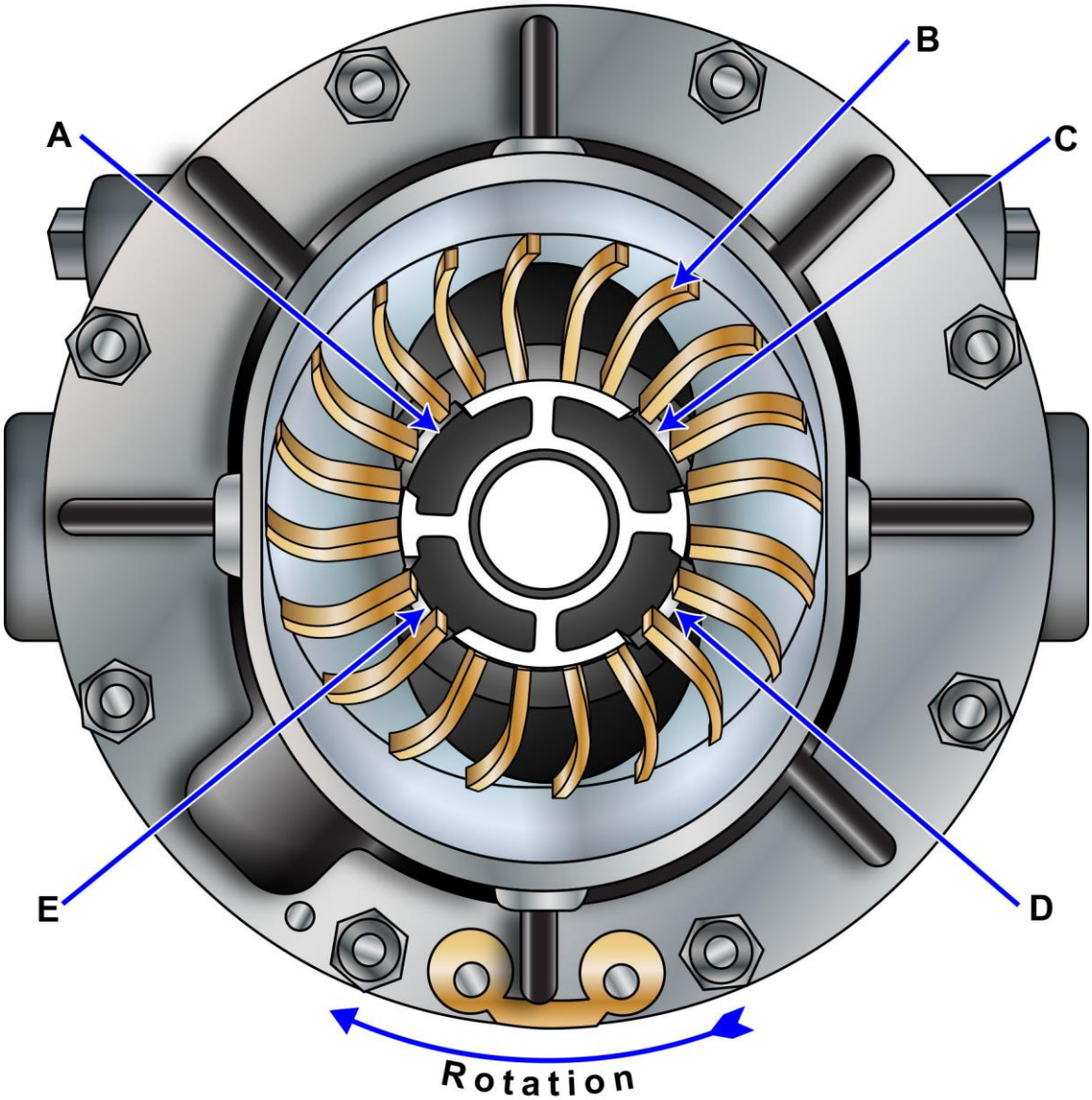
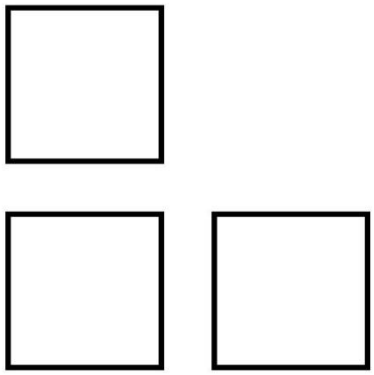


GS-0075

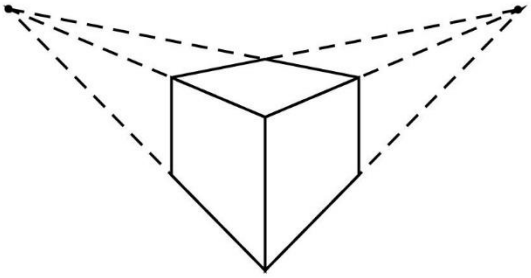


GS-0142

A



B



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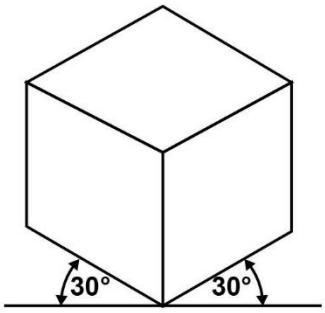
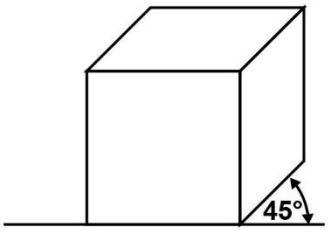


D



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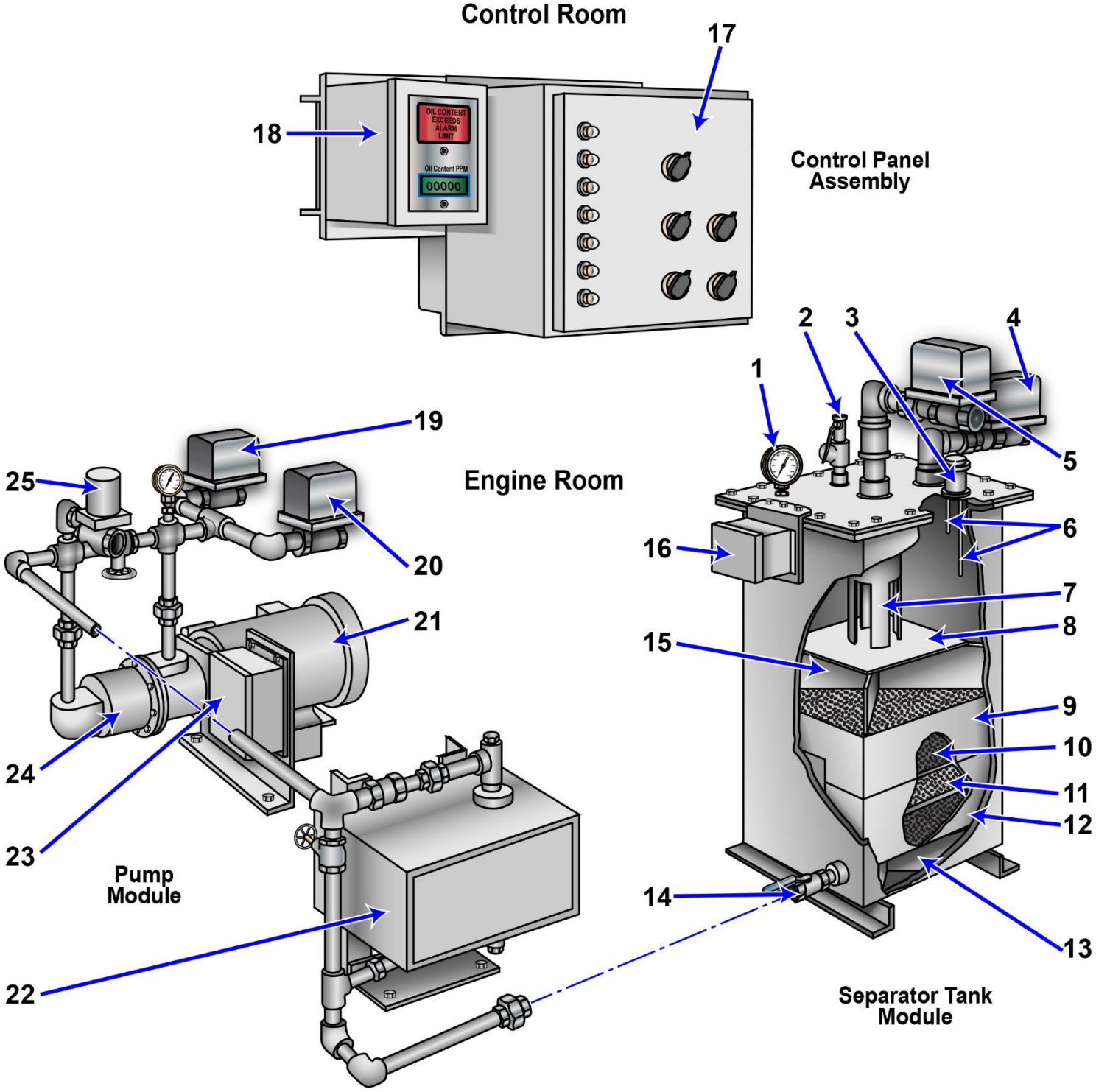

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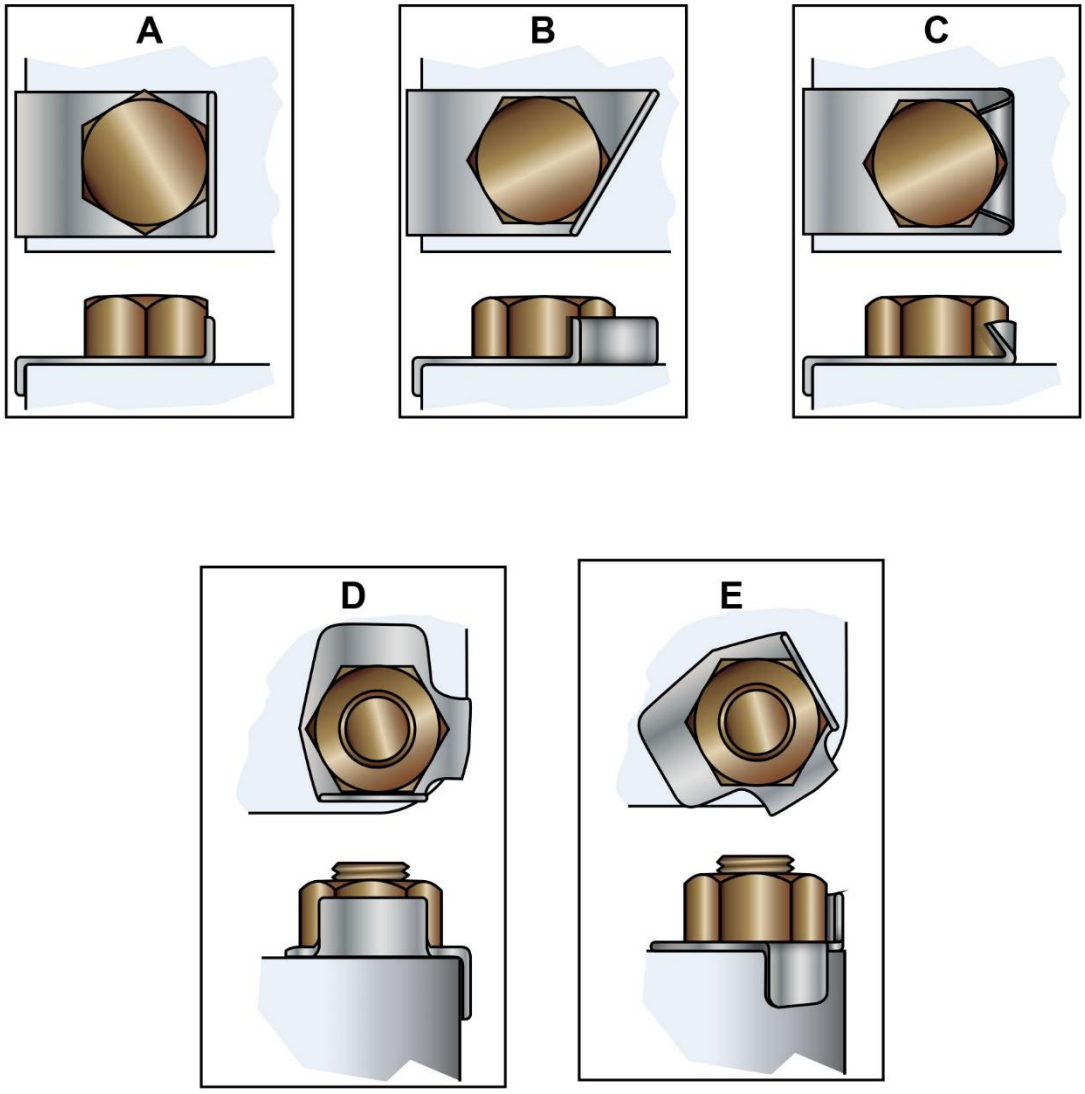
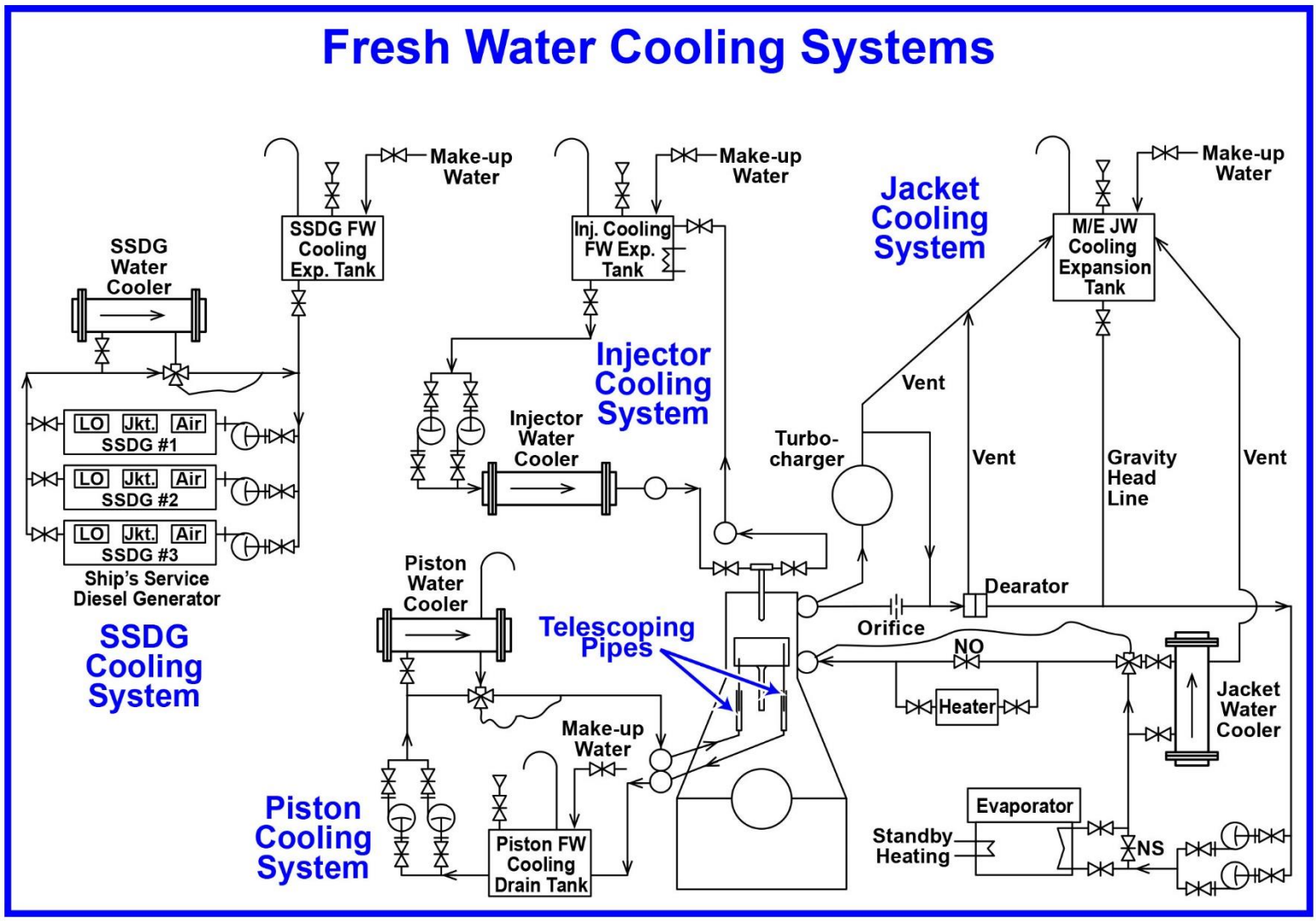
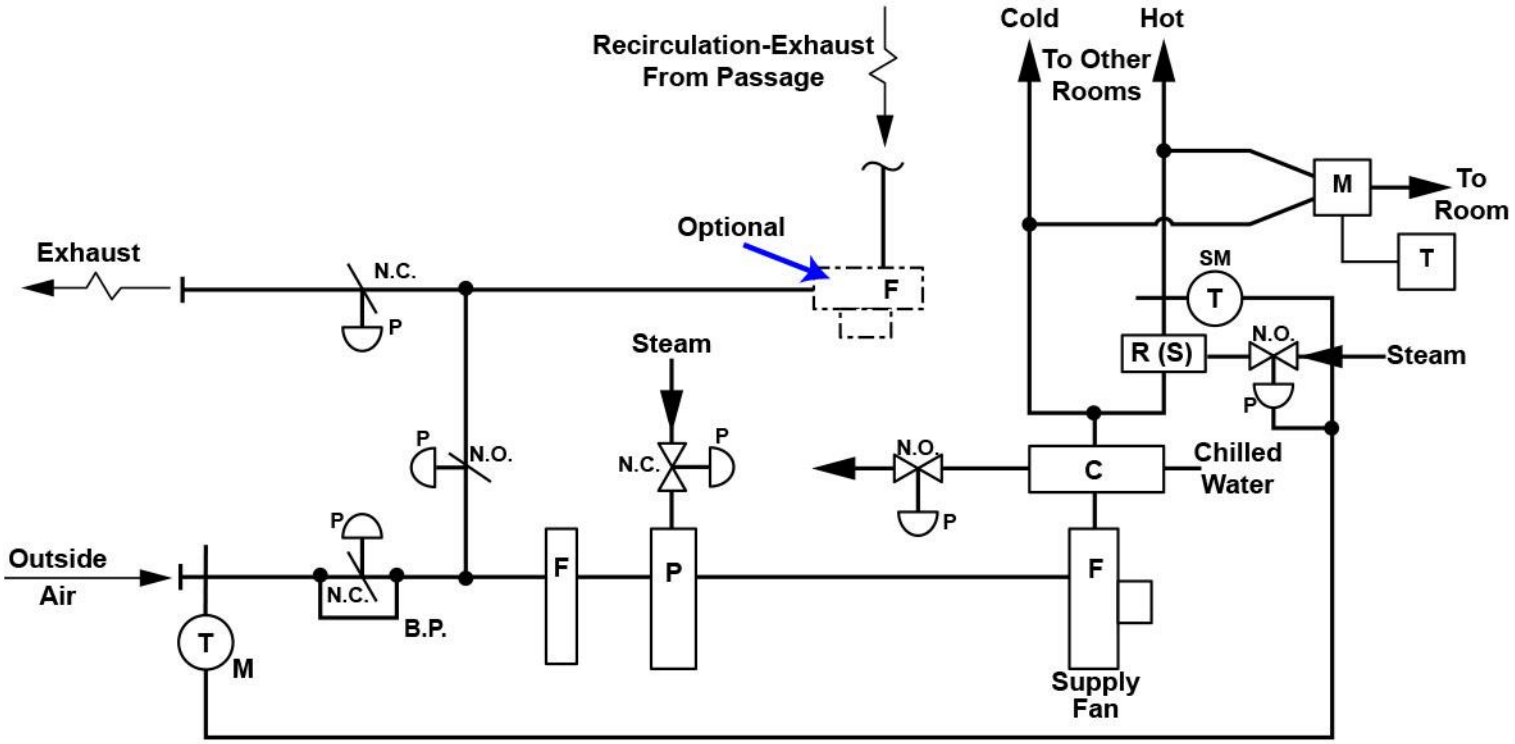


MO-0212



RA-0043



LEGEND

F — Fan	T — Room Thermostat
F — Filter	T — Duct Thermostat
C — Cooling Coil	Pneumatic Damper and Motor
P — Preheater (Steam)	Pneumatic Relay
R (S) — Reheater (Steam)	N.C. — Normally Closed (Valve or Damper)
M — Dual Duct Air Mixing Unit	N.O. — Normally Open (Valve or Damper)
	B.P. — Minimum Outside Air Bypass
	P — Positive Positioning Relay
	M — Sub-Master
	SM — Master

SG-0018