

U.S.C.G. Merchant Marine Exam  
Assistant Engineer-MODU  
Q717 General Subjects  
(Sample Examination)

**Choose the best answer to the following Multiple Choice Questions**

**1.** From the information given in the illustration, which of the following statements is correct? Illustration EL-0106

- (A) It is normally the case where the main-emergency bus-tie circuit breaker and any on-line ship's service generator circuit breakers be simultaneously closed.
- (B) It is possible for the main-emergency bus-tie circuit breaker and the emergency generator circuit breaker to be simultaneously closed.
- (C) The emergency generator is capable of being connected directly to the main 480 VAC bus.
- (D) Shore power, in port, is only capable of feeding emergency loads.

*If choice A is selected set score to 1.*

**2.** Which pair of safety disconnect switches shown in the illustration represents the exterior and interior views of a double-throw switch? Illustrations EL-0176

- (A) A and B
- (B) B and D
- (C) C and D
- (D) A and C

*If choice B is selected set score to 1.*

**3.** What is the correct color-coding of refrigerant recovery cylinders regardless of the refrigerant contained within?

- (A) light blue top and yellow lower body
- (B) yellow top and gray body
- (C) gray top and light blue lower body
- (D) gray top and yellow lower body

*If choice B is selected set score to 1.*

**4.** Why can CFC or HCFC refrigerants leaking into a confined space or in limited surroundings cause suffocation?

- (A) Refrigerants are heavier than air and displace oxygen.
- (B) Refrigerants lighter than air will rise.
- (C) Refrigerants obnoxious odor prevents breathing.
- (D) Refrigerants contain an acidic substance.

*If choice A is selected set score to 1.*

5. The gas that exists in the stratosphere forming a protective shield that helps to protect the environment from the harmful effects of ultraviolet radiation is called what?

- (A) radon
- (B) ozone
- (C) oxygen
- (D) nitrogen

*If choice B is selected set score to 1.*

6. 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

*If choice C is selected set score to 1.*

7. Which term represents the change in speed required before a speed control governor will initiate corrective action as the load changes?

- (A) Promptness
- (B) Power
- (C) Sensitivity
- (D) Dead band

*If choice D is selected set score to 1.*

8. The pressure of an operating hydraulic system, as indicated by a pressure gauge, is a result of the fluid flow overcoming \_\_\_\_\_.

- (A) the load applied to the system
- (B) resistance of the internal components
- (C) internal resistance to flow
- (D) all of the above

*If choice D is selected set score to 1.*

9. 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

*If choice B is selected set score to 1.*

10. At a minimum threshold, how many milliamps of current through the body produces a condition where most people would experience respiratory paralysis and be unable to breathe while still in contact with the energized conductor?
- (A) 3 to 7 mA
  - (B) 10 to 16 mA
  - (C) 30 mA
  - (D) 75 mA for 5 sec.

*If choice C is selected set score to 1.*

11. Charring or glazing of the inner circumference of the packing rings in a centrifugal pump is caused by \_\_\_\_\_.
- (A) failure to seat the packing rings
  - (B) packing ring rotation
  - (C) under-tightening the packing
  - (D) insufficient lubrication of the packing

*If choice D is selected set score to 1.*

12. Which of the substances listed can be used to shield sensitive equipment from static magnetic fields?
- (A) Permeable iron
  - (B) Bakelite
  - (C) Mica
  - (D) Glass

*If choice A is selected set score to 1.*

**13.** The low-pressure cut-out switch settings vary with the refrigerant used and the temperature application. If the low-pressure cut-out switch for a particular application is set with a cut-in pressure of 5 psig, what would be the cut-out pressure if the differential is 7.5 psig?

- (A) 5" Hg
- (B) 0 psig
- (C) 2.5 psig
- (D) 12.5 psig

*If choice A is selected set score to 1.*

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

- (A) Accumulator
- (B) Modulator
- (C) Pressure compensator valve
- (D) Sump actuator

*If choice A is selected set score to 1.*

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

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

*If choice D is selected set score to 1.*

**16.** Before charging a refrigeration unit, unless quick disconnect fittings are used, the refrigerant charging hoses should be prepared in what way?

- (A) they should be cleaned with carbon tetrachloride
- (B) they should be purged with refrigerant
- (C) they should be flushed with clean refrigerant oil
- (D) they should be warmed in an oven

*If choice B is selected set score to 1.*

**17.** Referring to illustrated diagram, what type of HVAC system is shown? Illustration GS-RA-42

- (A) A single zone system
- (B) A terminal reheat system
- (C) A dual duct system
- (D) A variable air volume system

*If choice B is selected set score to 1.*

**18.** 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

*If choice B is selected set score to 1.*

**19.** What is the purpose of an electromagnetic relay?

- (A) provide over current protection during starting
- (B) relay voltages at increased power
- (C) remotely open and close contacts by action of a coil
- (D) open a circuit only in the event of overload

*If choice C is selected set score to 1.*

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

- (A) Raising the blow down adjusting ring further decreases the area of exposure to pressure after the valve pops and as a result, the valve blow down will decrease.
- (B) Raising the blow down adjusting ring further increases the area of exposure to pressure after the valve pops and as a result, the valve blow down will decrease.
- (C) Raising the blow down adjusting ring further decreases the area of exposure to pressure after the valve pops and as a result, the valve blow down will increase.
- (D) Raising the blow down adjusting ring further increases the area of exposure to pressure after the valve pops and as a result, the valve blow down will increase.

*If choice D is selected set score to 1.*

**21.** In examining a baseline vibration signature and the historical record of periodic vibration analyses, what must be considered for the evaluation of rotating machinery?

- (A) Minimum vibration limits and the change in vibration levels over time.
- (B) Maximum vibration limits and the change in vibration levels over time.
- (C) Change in vibration levels over time, with no regard to maximum vibration limits.
- (D) Maximum vibration limits only, with no regard for the change in vibration levels over time.

*If choice B is selected set score to 1.*

**22.** A radiation pyrometer is sensitive to what form of radiation?

- (A) Infraviolet radiation
- (B) Ultrared radiation
- (C) Ultraviolet radiation
- (D) Infrared radiation

*If choice D is selected set score to 1.*

**23.** What is the pressure and condition of the refrigerant entering the receiver of a refrigeration system?

- (A) superheated low-pressure vapor
- (B) superheated high-pressure vapor
- (C) sub cooled low-pressure liquid
- (D) sub cooled high-pressure liquid

*If choice D is selected set score to 1.*

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

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

*If choice D is selected set score to 1.*

**25.** 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) pump shaft and central valve
- (B) floating ring and cylinder body
- (C) floating ring and pump shaft
- (D) pump shaft and horizontal ports

*If choice B is selected set score to 1.*

**26.** What statement is true with regard to the basic operating principle of gravity associated with an oily-water separator?

- (A) The density of oil is less than that of water and as a result the oil droplets in an oily-water mixture will tend to rise.
- (B) The density of oil is greater than that of water and as a result the oil droplets in an oily-water mixture will tend to sink.
- (C) The density of oil is greater than that of water and as a result the oil droplets in an oily-water mixture will tend to rise.
- (D) The density of oil is less than that of water and as a result the oil droplets in an oily-water mixture will tend to sink.

*If choice A is selected set score to 1.*

**27.** Suppose the illustrated pneumatically operated diaphragm actuated control valve is used to control the fuel oil outlet temperature of a steam-heated fuel oil heater by controlling the steam flow. What would be the result if the stem packing was over-tightened and the stem was unable to vertically move in either direction? Illustration GS-0051

- (A) The valve would fail in the fully closed position, most likely resulting in a low fuel oil temperature alarm condition.
- (B) The valve will lose control of the fuel oil temperature with the result that the fuel temperature will fluctuate with changes in fuel demand.
- (C) The valve would fail in the fully open position, most likely resulting in a high fuel oil temperature alarm condition.
- (D) It is not possible to predict how the valve would respond to over-tightened valve stem packing.

*If choice B is selected set score to 1.*

**28.** The output volume of a positive fixed displacement pump can be changed only by \_\_\_\_\_.

- (A) moving the slide block and rotor
- (B) changing the angle of the tilting plate
- (C) moving the shaft trunnion block
- (D) changing the speed of the pump

*If choice D is selected set score to 1.*

**29.** According to the illustration, which of the following conditions would most likely cause pump "A" to short cycle? Illustration GS-0173

- (A) The hydro-pneumatic expansion tank is operating with an insufficient air charge.
- (B) The hydro-pneumatic tank is operating with a low water level.
- (C) A low water level exists in the potable water storage tank.
- (D) Pump "A" wearing rings have excessive clearance.

*If choice A is selected set score to 1.*

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

- (A) Gauge calibrator
- (B) Wire gauge
- (C) Inside micrometer
- (D) Circular mil

*If choice B is selected set score to 1.*

**31.** As shown in figure "B" of the illustrated block diagram for a central operating system configured for supervisory control, what is becoming the industry standard for transmission of analog signals for a measured variable? Illustration EL-0094

- (A) 1 volt to 5 volts
- (B) -10 volts to +10 volts
- (C) 4 milliamps to 20 milliamps
- (D) 10 milliamps to 50 milliamps

*If choice C is selected set score to 1.*

**32.** (2.2.30.2-2) Referring to the illustrated motor ship fresh water 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 MP-CW-06

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

*If choice D is selected set score to 1.*

**33.** (2.1.13.2-1) What is the name of the semiconductor that decreases in resistance with an increase in temperature?

- (A) thermopile
- (B) thermistor
- (C) diode
- (D) resistor

*If choice B is selected set score to 1.*

**34.** Which of the following motors has a frame configuration for solid base mounting only? Illustration EL-0184

- (A) A
- (B) B
- (C) C
- (D) D

*If choice A is selected set score to 1.*

**35.** The individual 12 volt lead-acid batteries, when connected as shown in the illustration, as a battery bank would produce how many volts? Illustration EL-0070

- (A) 12 volts
- (B) 24 volts
- (C) 36 volts
- (D) 48 volts

*If choice A is selected set score to 1.*

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

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

*If choice A is selected set score to 1.*

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

- (A) Rotary
- (B) Ring-plate
- (C) Strip-type
- (D) Sliding

*If choice C is selected set score to 1.*

**38.** The general purpose of a heat exchanger is to \_\_\_\_\_.

- (A) reduce the engine room temperature in tropical climates
- (B) heat, or cool one fluid by means of another fluid
- (C) maintain steady pressure in a system
- (D) eliminate hot air from the condenser

*If choice B is selected set score to 1.*

**39.** When opening or closing compressor service and line isolation valves on a typical refrigeration system that is fitted with packed valves, what must you do?

- (A) you must first remove the stem seal cap
- (B) you should replace the gasket each time the valve position is changed
- (C) you should never loosen or tighten the packing gland
- (D) you should turn valves slowly to avoid thermal stresses due to low temperatures

*If choice A is selected set score to 1.*

**40.** 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 on the bilge through either 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 suction directly on the bilge independent of any 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 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.

*If choice B is selected set score to 1.*

**41.** A device used to hold open the refrigeration compressor suction valve during starting to reduce the compression load is called what?

- (A) cylinder unloader
- (B) relief valve
- (C) suction line bypass
- (D) discharge line bypass

*If choice A is selected set score to 1.*

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

- (A) A
- (B) B
- (C) C
- (D) D

*If choice A is selected set score to 1.*

**43.** What is the functional purpose of the resistor " $R_L$ " placed in parallel to the output of a DC power supply as shown in section "D" of the regulated DC power supply? Illustration EL-0085

- (A) aids in output voltage regulation
- (B) corrects power factor
- (C) is a temperature compensator
- (D) prevents excessive currents

*If choice A is selected set score to 1.*

**44.** How many hidden lines are shown in the right side (end) view of the drawing illustrated? Illustration GS-0021

- (A) None
- (B) Two
- (C) Four
- (D) Six

*If choice A is selected set score to 1.*

**45.** What shipboard system uses the synchronous transmission system?

- (A) Turbocharger RPM indicator system
- (B) Shaft revolution indicator system
- (C) Rudder angle indicator system
- (D) Centrifuge RPM indicator system

*If choice C is selected set score to 1.*

**46.** What is the normal direction of flow through the device shown in the illustration while operating in the processing mode? Illustration GS-0153

- (A) The oily-water mixture enters through the pressure control valve "2" and exits with the processed liquid through valve "14".
- (B) The oily-water mixture enters through valve "4" and exits as processed liquid through valve "14".
- (C) The oily-water mixture enters through valve "5" and exits the separator through valve "14" as processed liquid.
- (D) The oily-water mixture enters through valve "14" and exits with the processed liquid through valve "4".

*If choice C is selected set score to 1.*

**47.** 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"

*If choice C is selected set score to 1.*

**48.** Which of the statements listed is applicable to the thermostatic expansion valve shown in the illustration? Illustration GS-RA-07

- (A) The control bulb is located on the evaporator coil outlet.
- (B) The external equalizing pipe is connected to the liquid receiver.
- (C) It regulates the temperature of the refrigerated space.
- (D) It regulates the amount of superheat at the solenoid valve.

*If choice A is selected set score to 1.*

**49.** 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

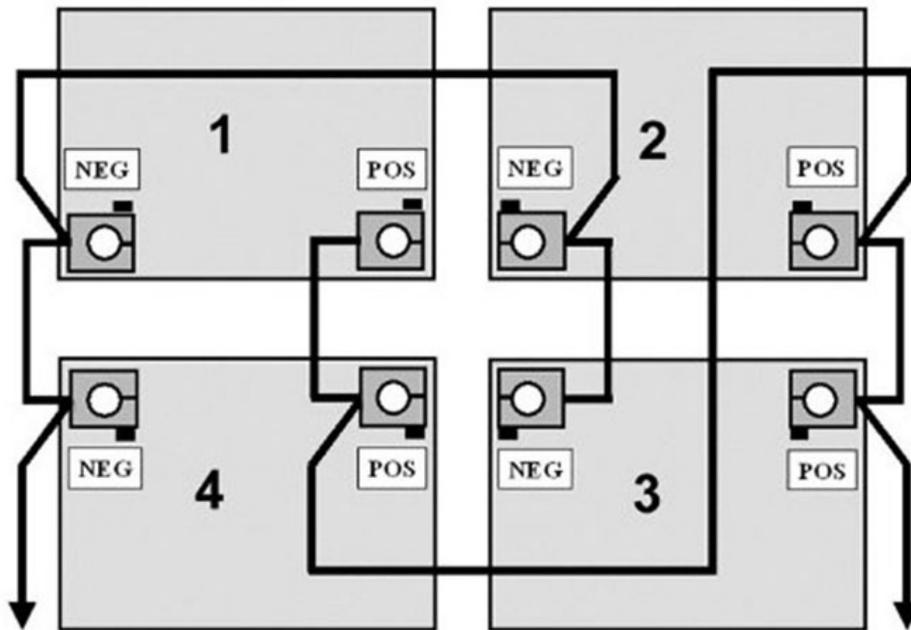
*If choice A is selected set score to 1.*

**50.** The shaft sleeve for the pump shown in the illustration is identified by which item number? Illustration GS-0143

- (A) 14
- (B) 17
- (C) 27
- (D) 68

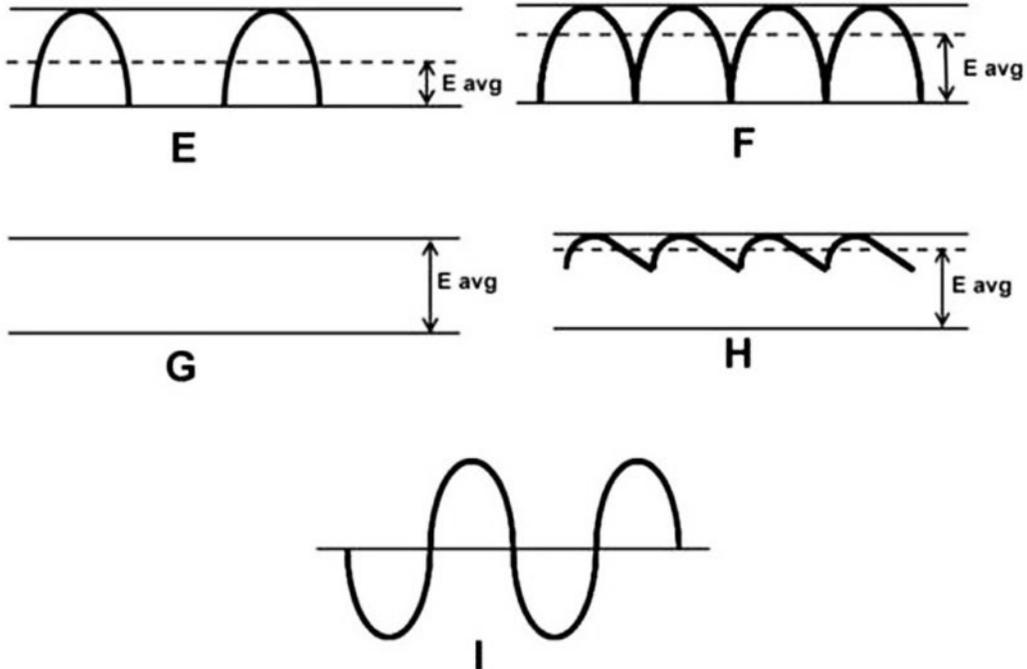
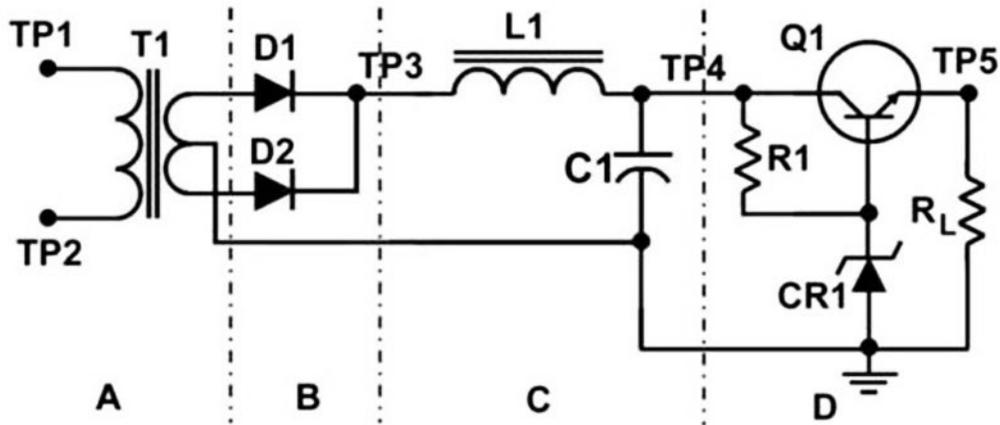
*If choice A is selected set score to 1.*

## EL-0070



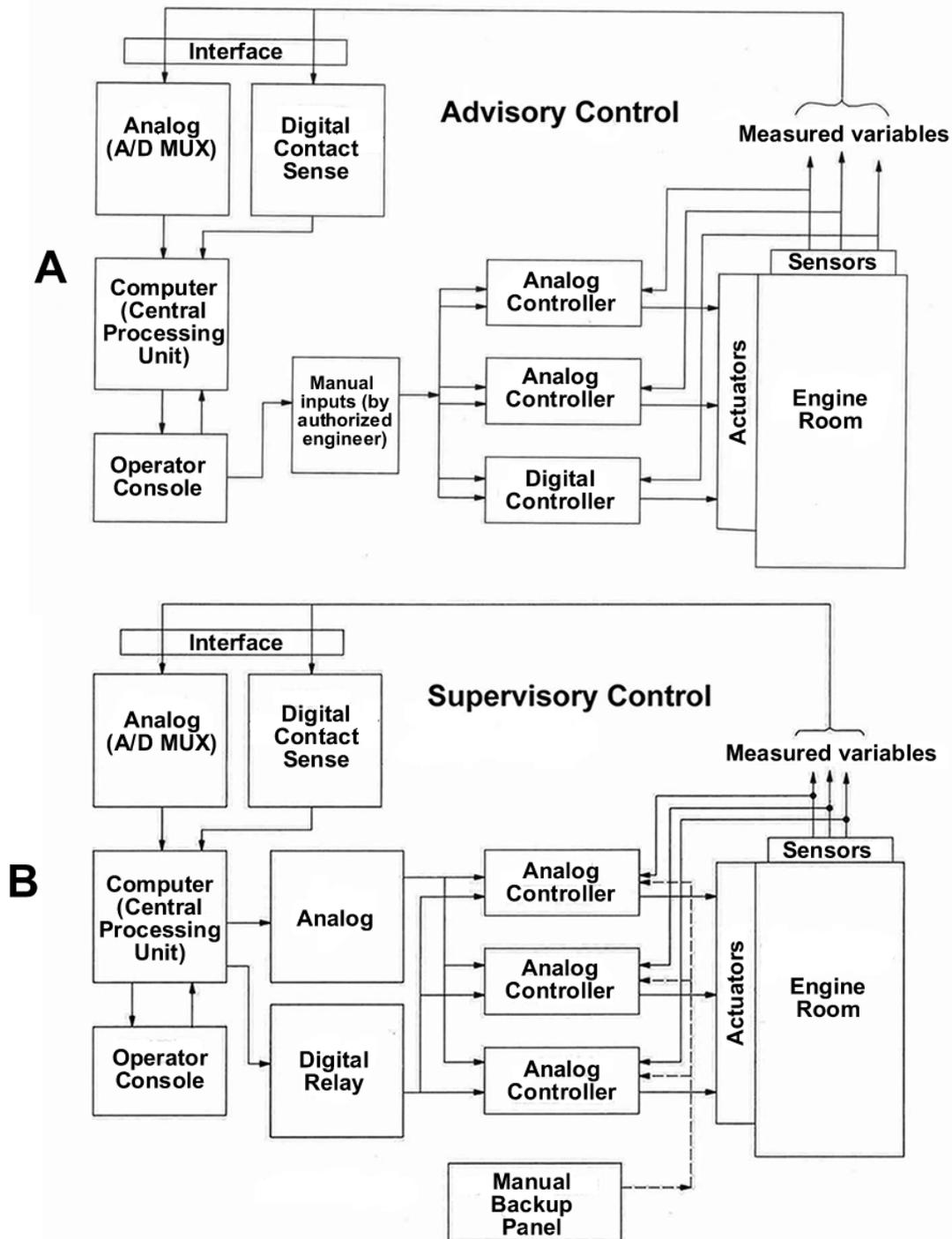
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## EL-0085



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## EL-0094

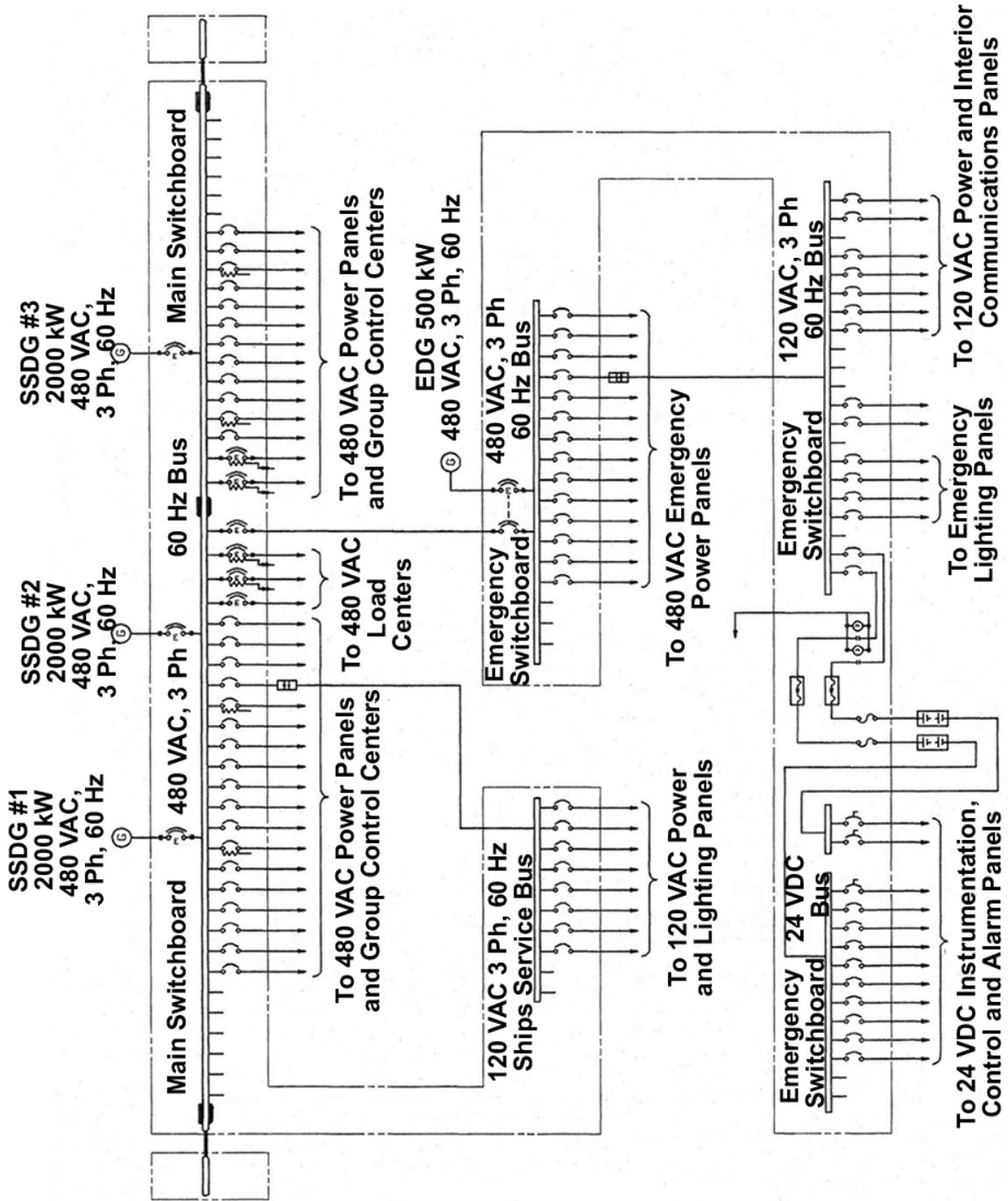


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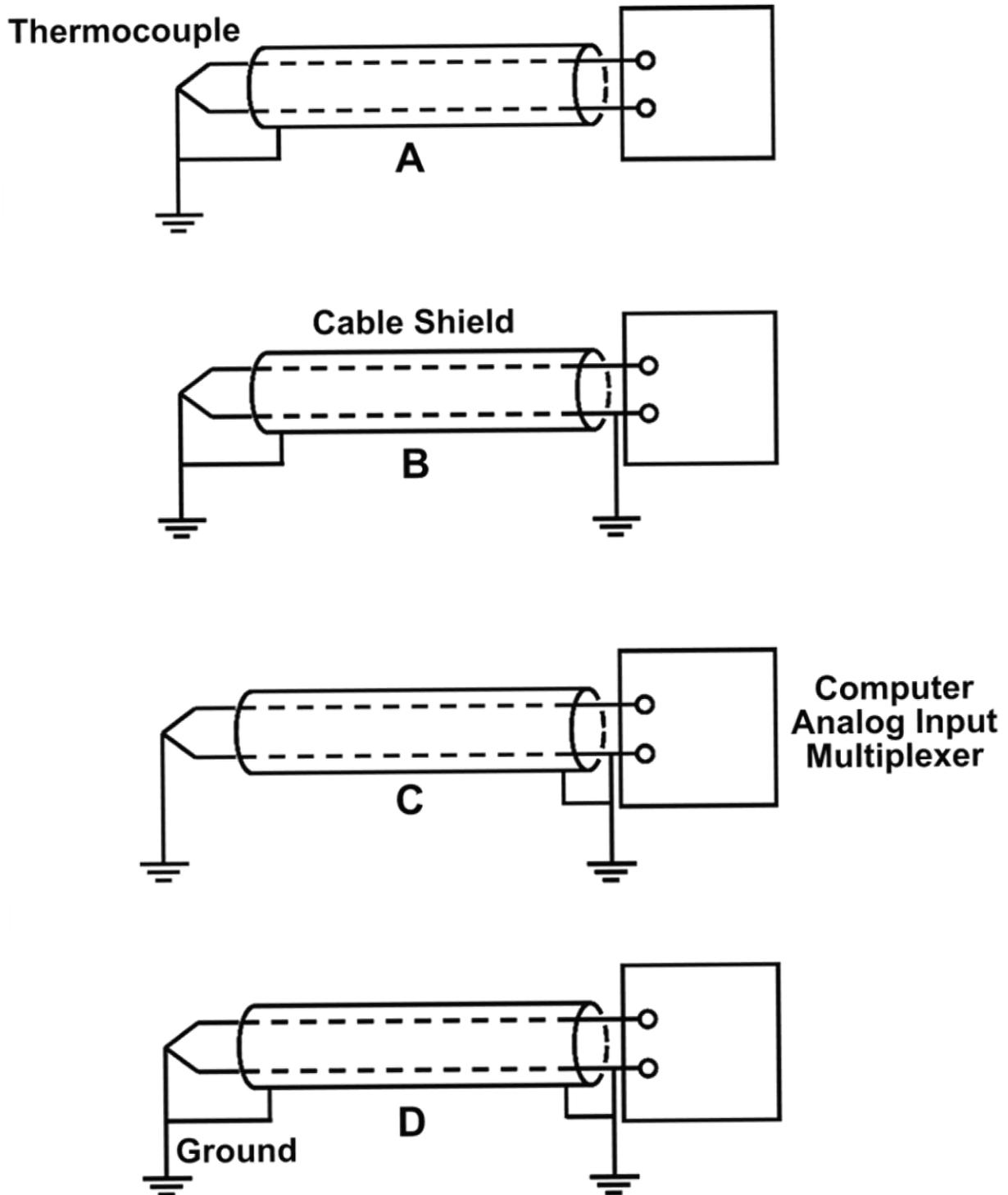
## EL-0106

### One Line Distribution Diagram



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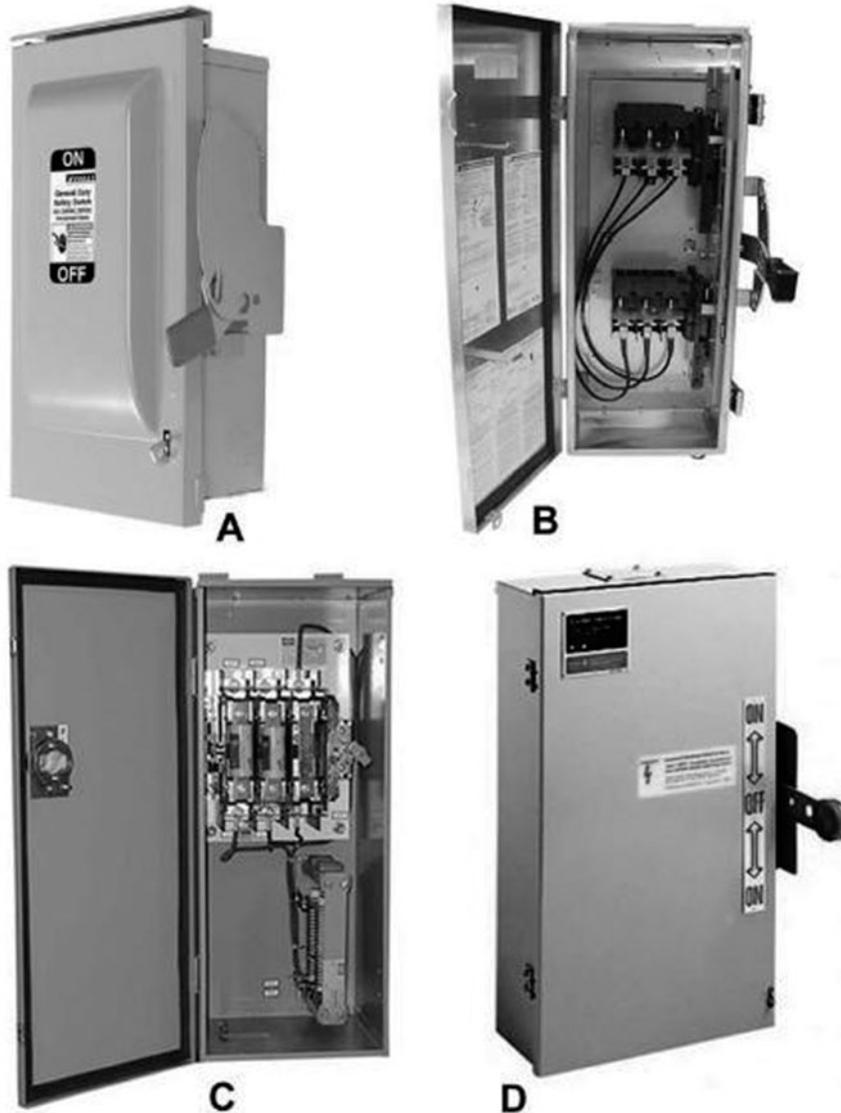
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## EL-0176



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## EL-0184



**A**



**B**



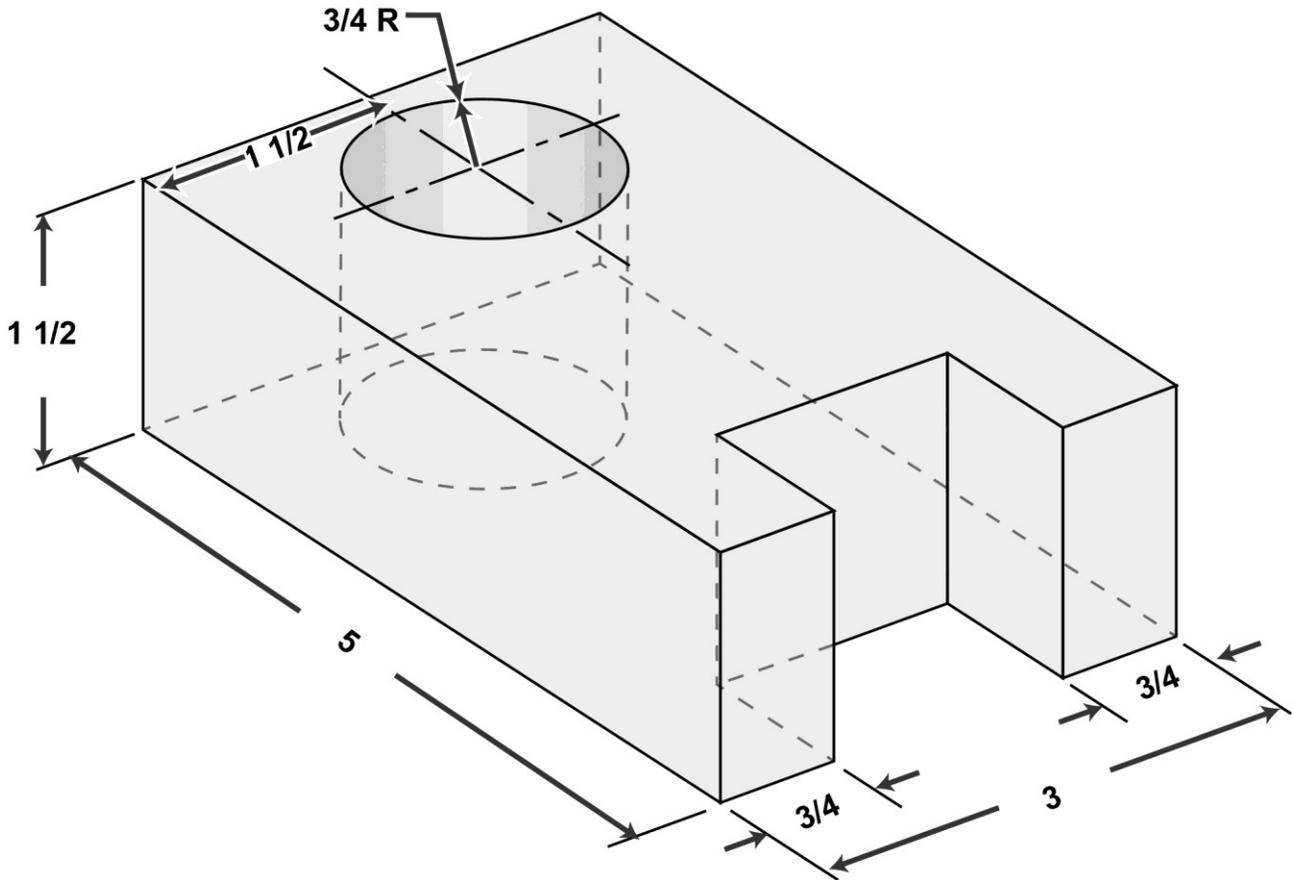
**C**



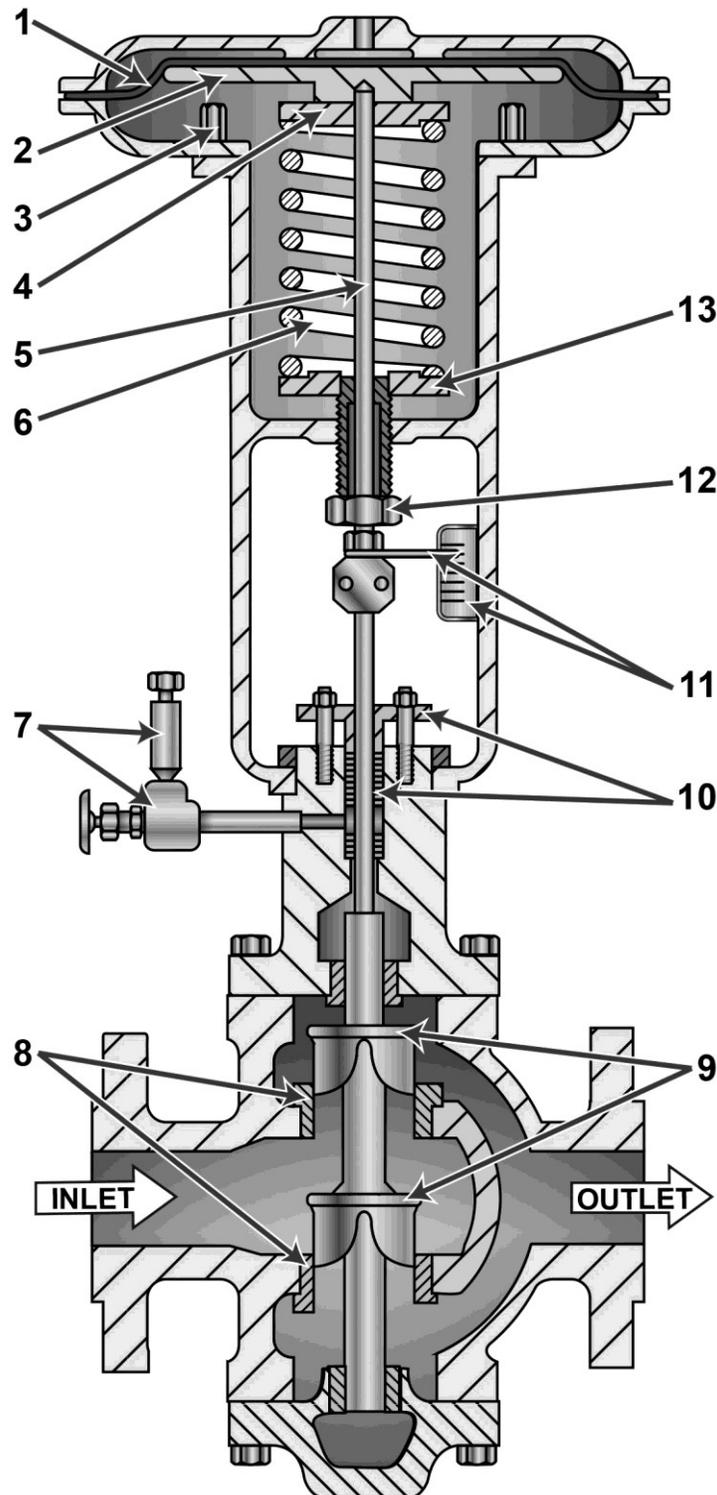
**D**

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## GS-0021



## GS-0051



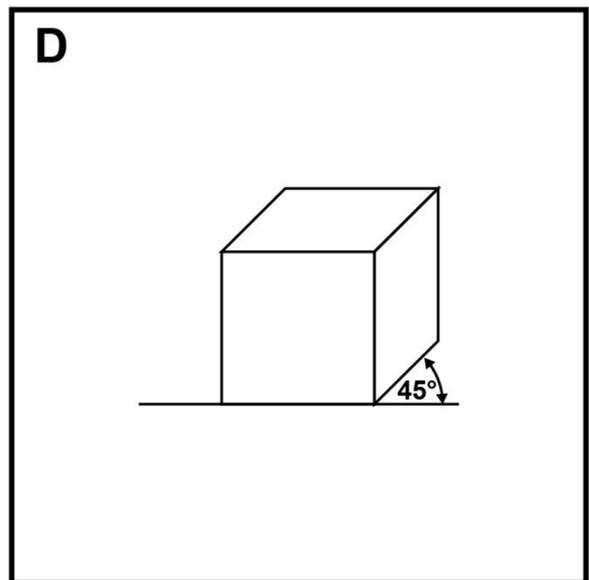
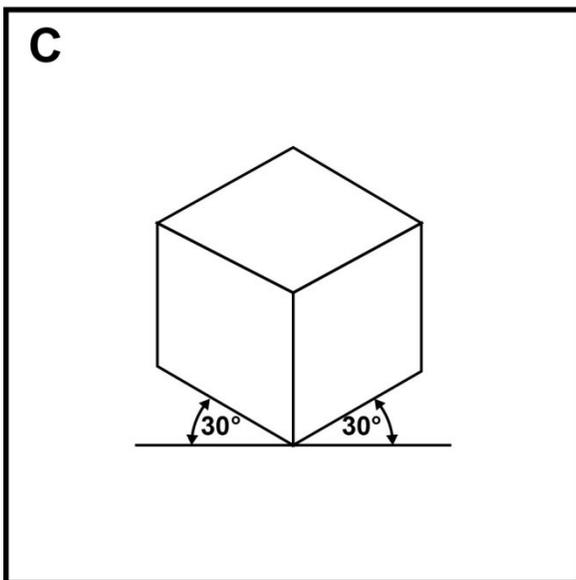
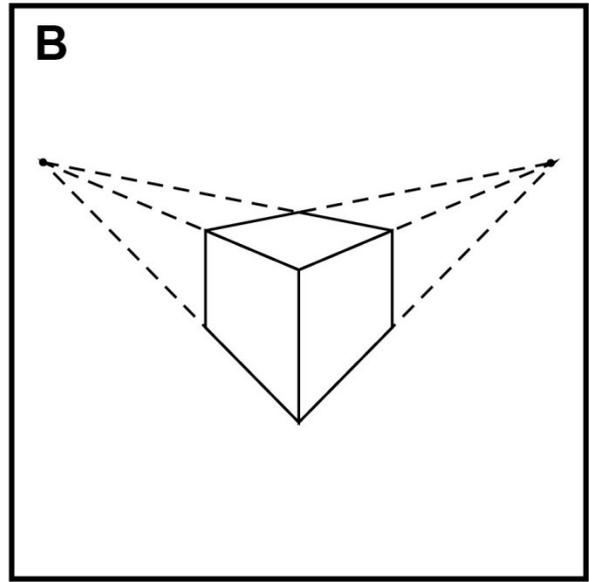
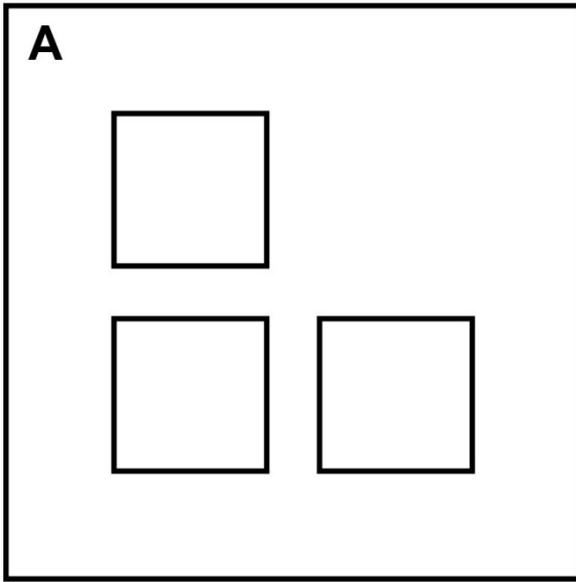
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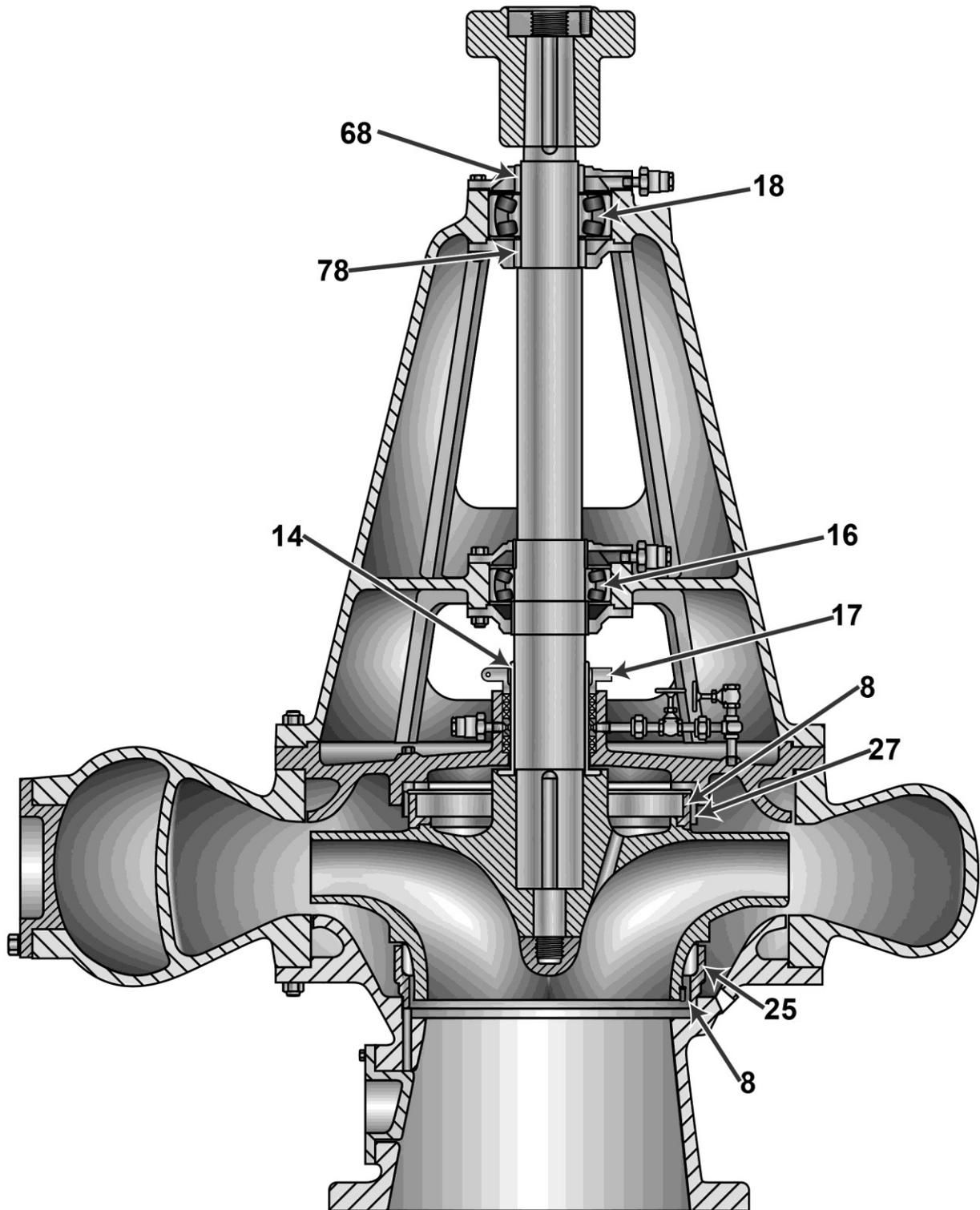
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## GS-0142



## GS-0143



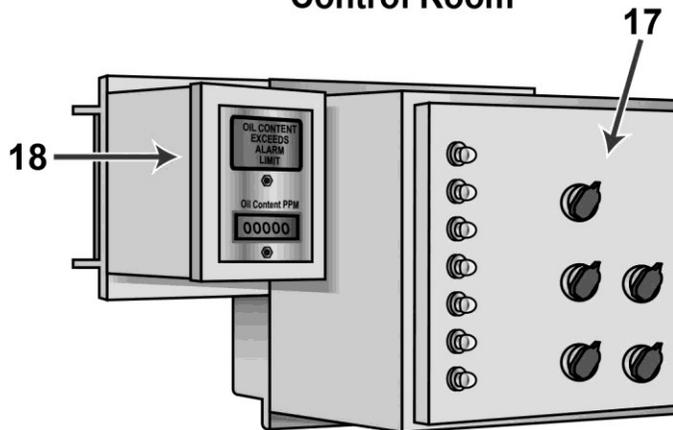
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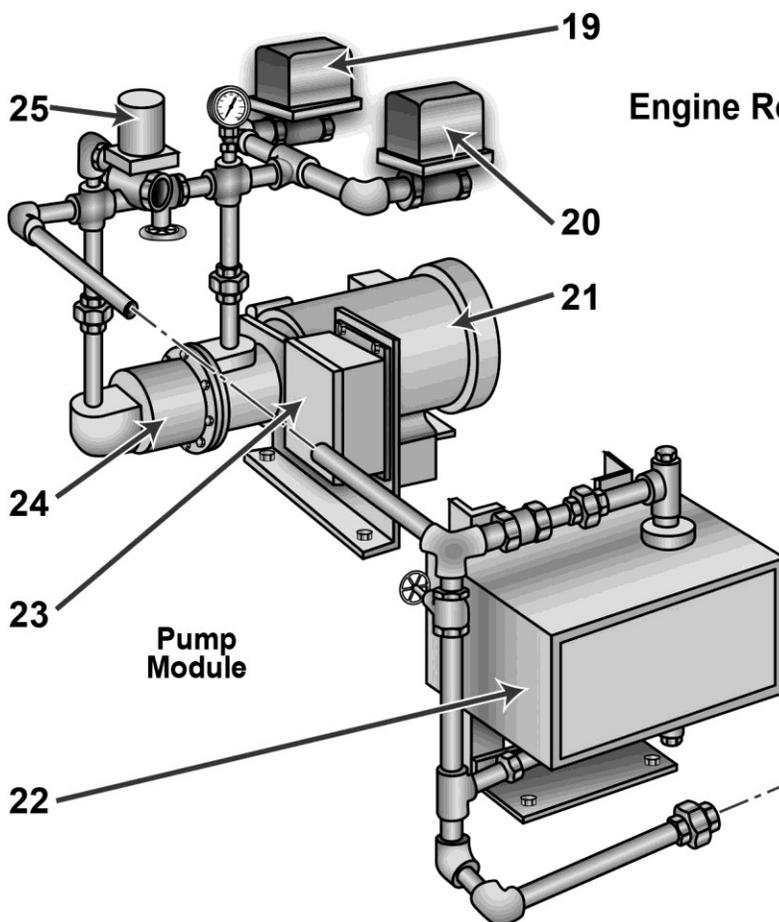
## GS-0153

### Control Room

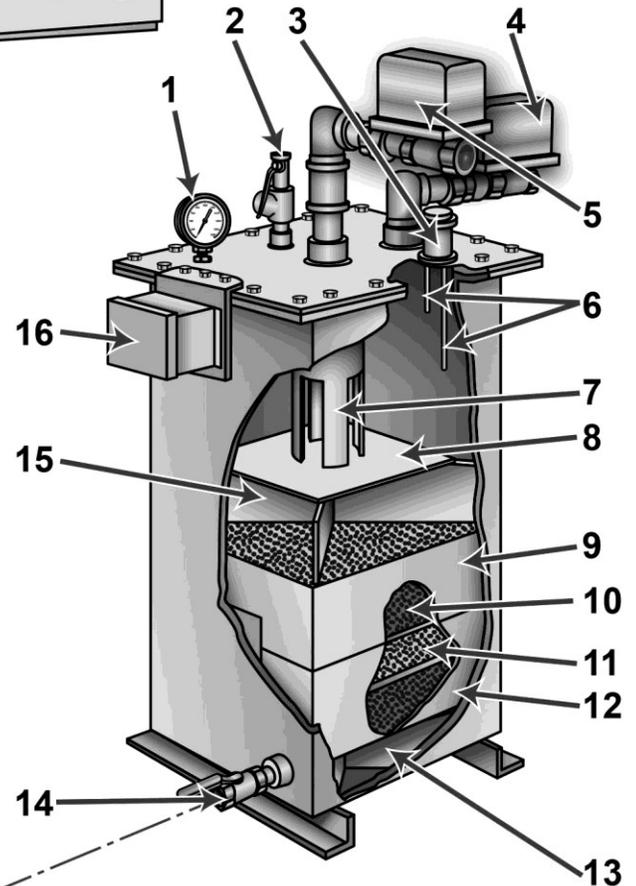


Control Panel  
Assembly

### Engine Room



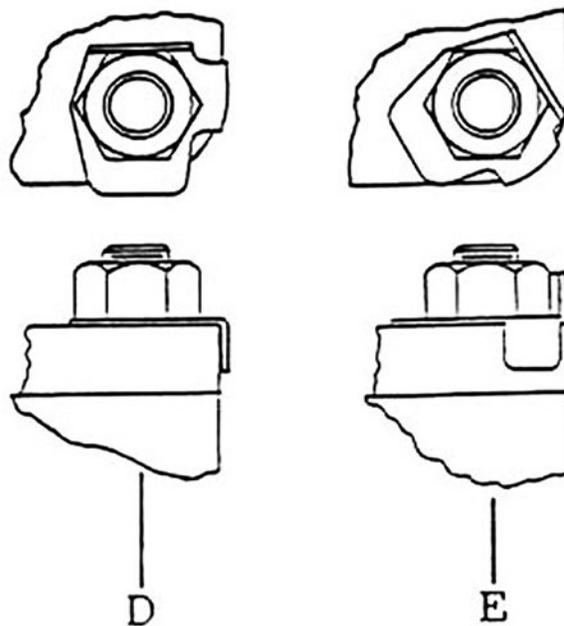
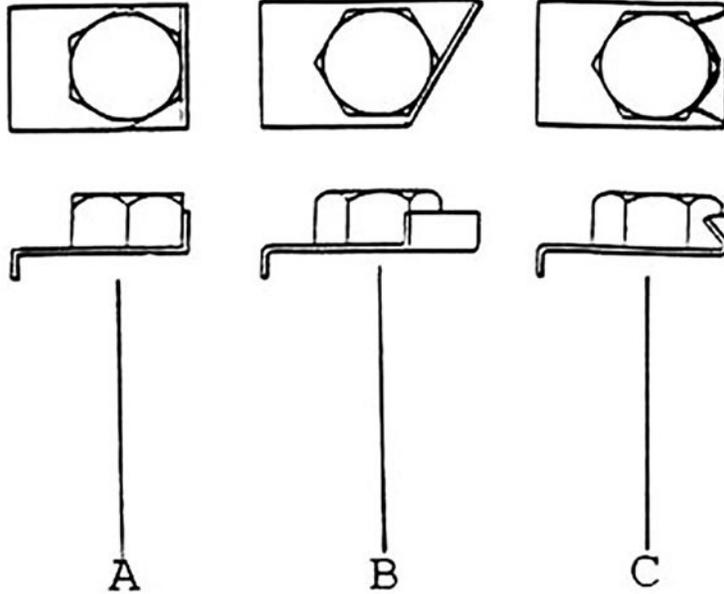
Pump  
Module



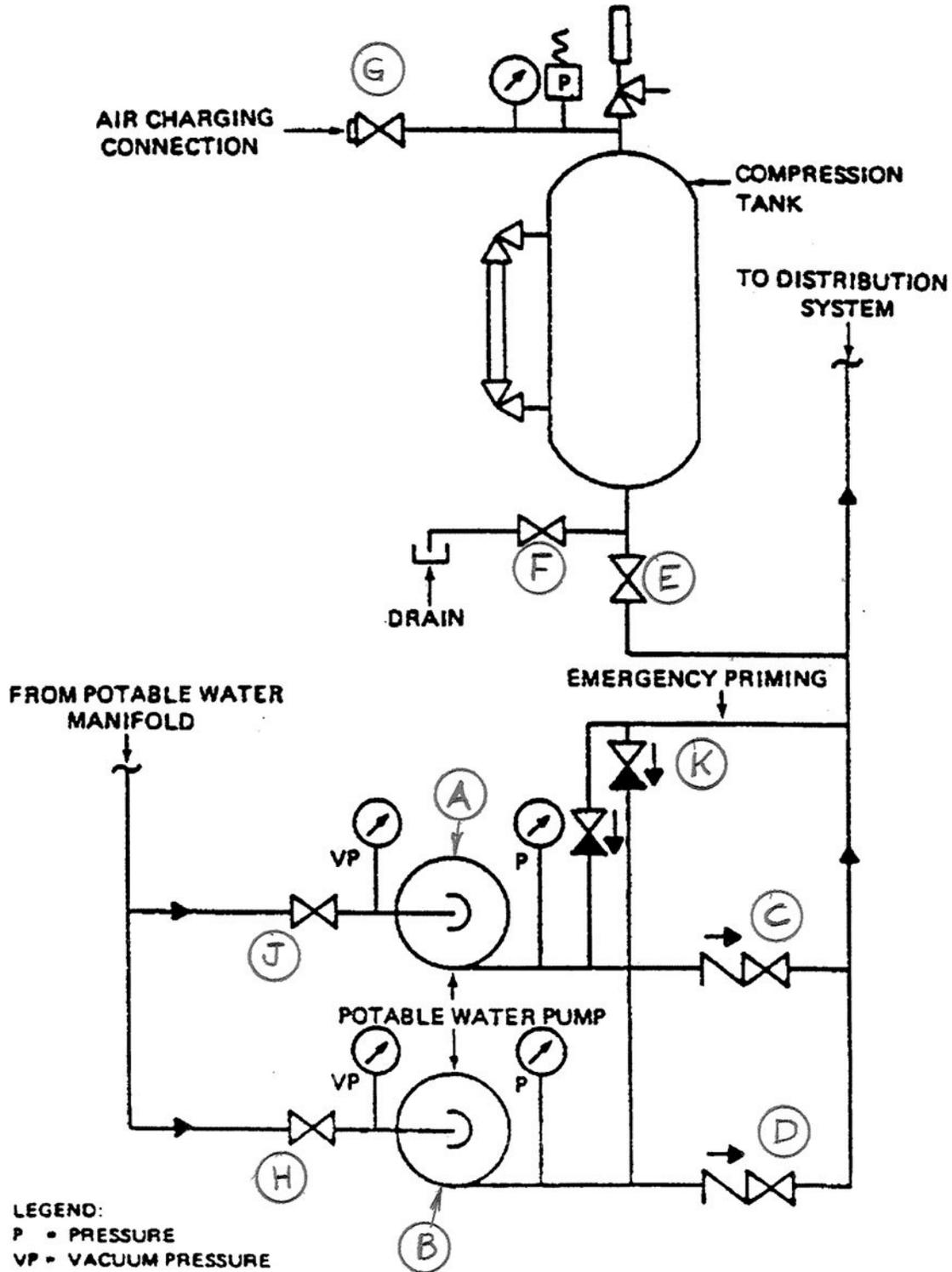
Separator Tank  
Module

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Including Repair Parts and Special Tools List for Oil Water Separator  
TM 55-1925-285-13 & P

## GS-0156

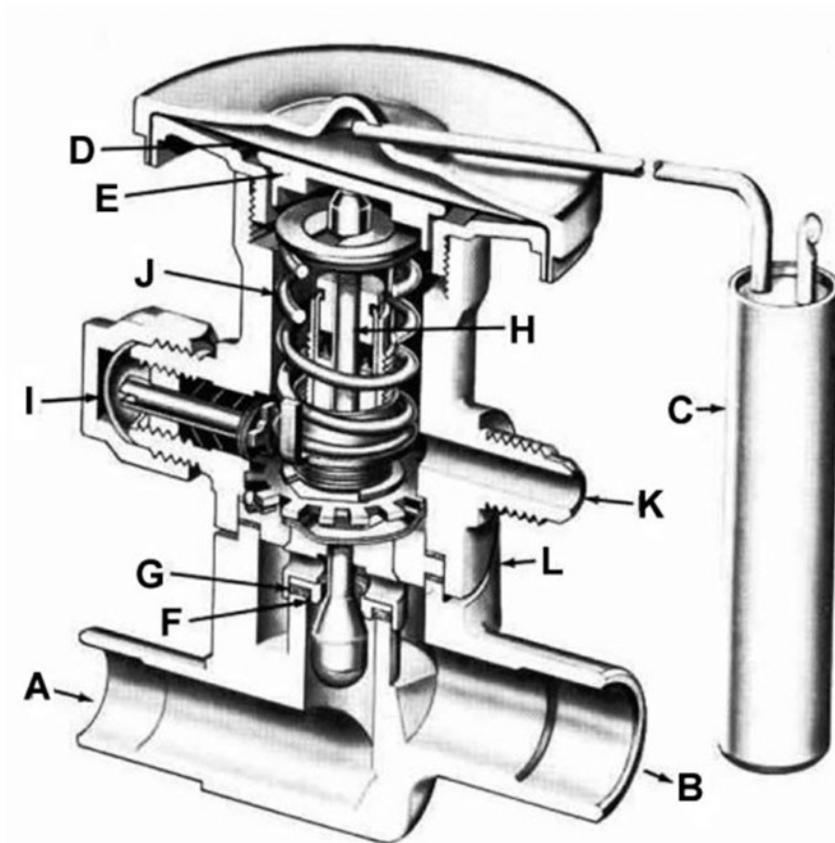


## GS-0173



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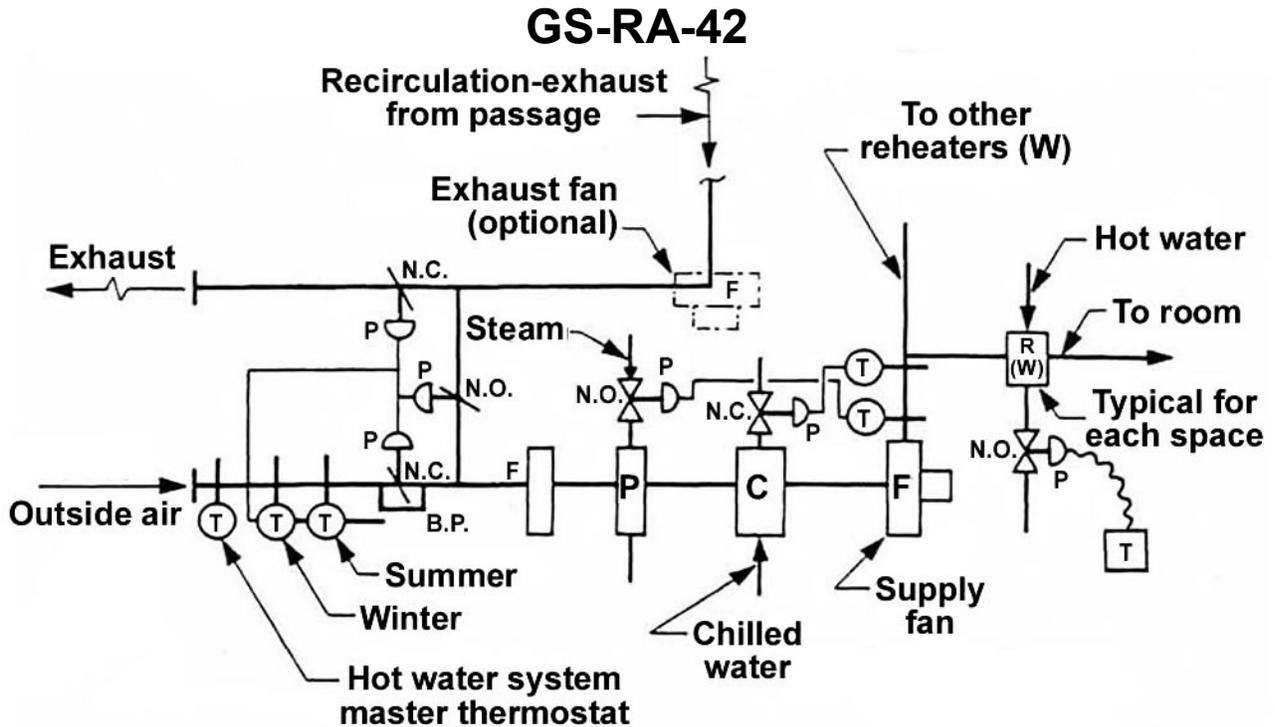
## GS-RA-07



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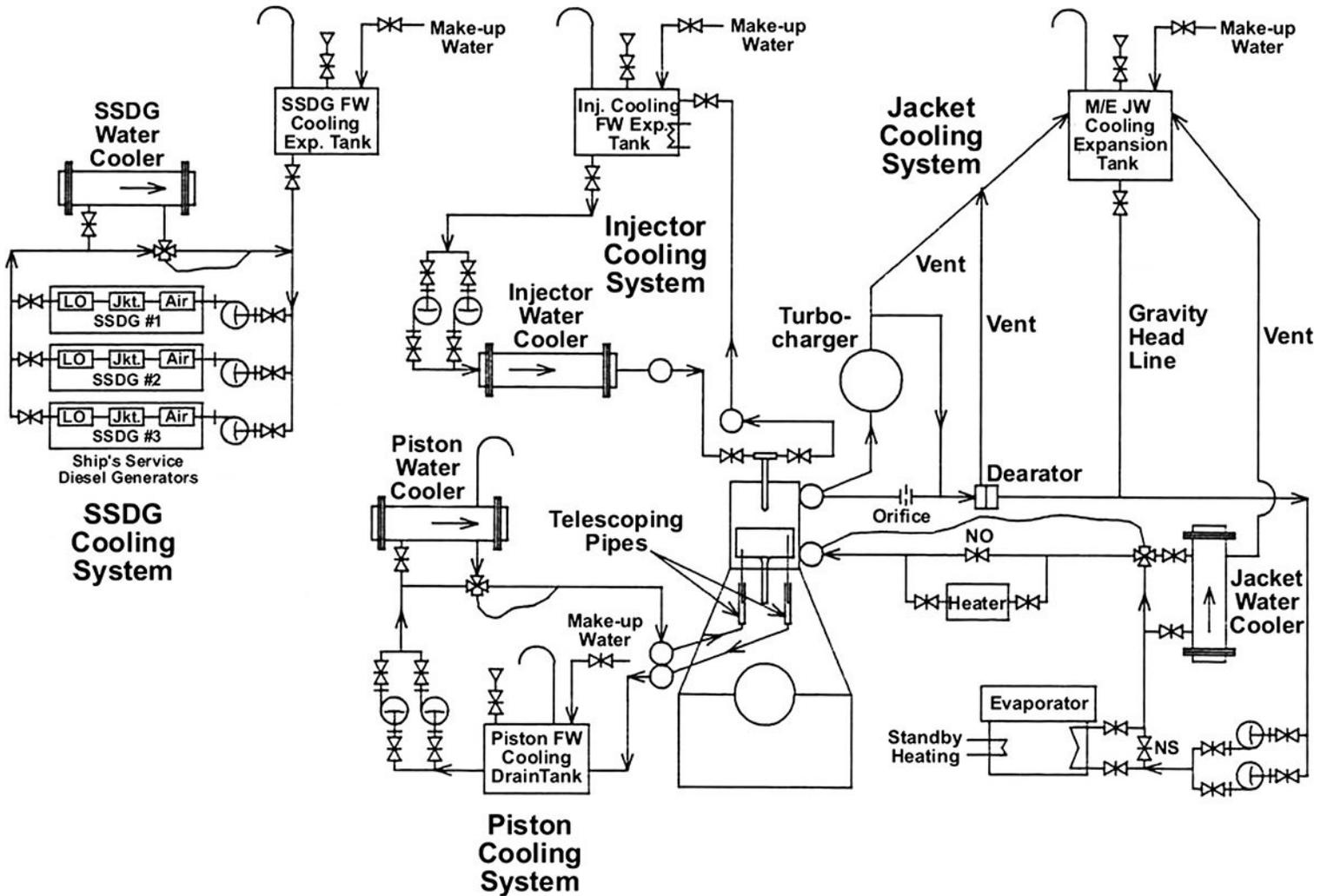
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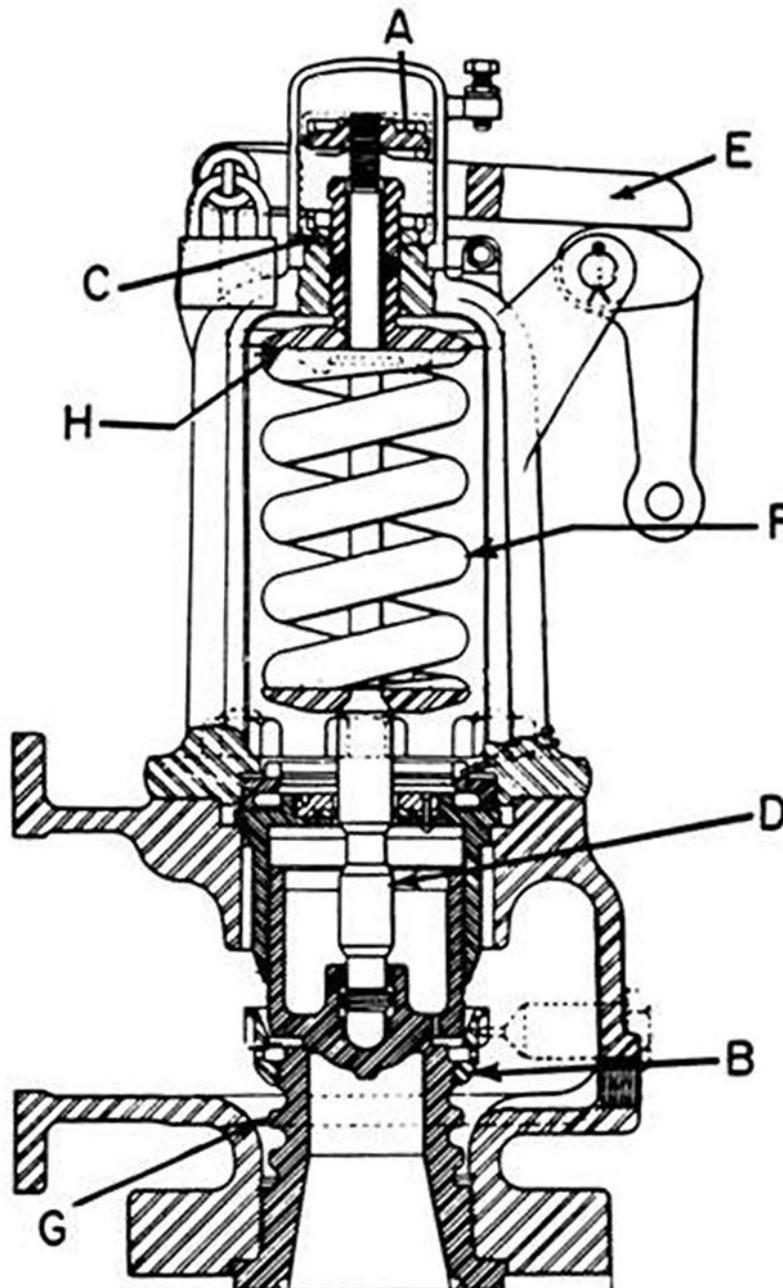
## MP-CW-06

# Fresh Water Cooling Systems



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## SG-0018



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