U.S.C.G. Merchant Marine Exam

UFIV – Assistant Engineer

Q693 General Subjects

(Sample Examination)

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

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

A. 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.
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 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.
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: C

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

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

Correct answer: A

3. What is another name for the control mode used in a process control system that uses two-point control?

A. Derivative control
B. Proportional control
C. Integral control
D. On-off control

Correct answer: D

4. In a closed-loop process control system, what statement concerning feedback is true as it relates to stability and the direction of error displacement?

A. Negative feedback is used to minimize instability by pushing the system in the same direction as the error displacement.
B. Positive feedback is used to minimize instability by pushing the system in the opposite direction as the error displacement.
C. Positive feedback is used to minimize instability by pushing the system in the same direction as the error displacement.
D. Negative feedback is used to minimize instability by pushing the system in the opposite direction as the error displacement.

Correct answer: D

5. With respect to shaft bearing load absorption capability in terms of direction, what is meant by an axial load?

A. An axial load is a load applied tangent to the circumference of the shaft.
B. An axial load is a load applied parallel to the axis of the shaft.
C. An axial load is a load applied perpendicular and parallel to the axis of the shaft.
D. An axial load is a load applied perpendicular to the axis of the shaft.

Correct answer: B

6. What is the primary purpose of the lead-lag arrangement of the two potable water pumps supporting a typical potable water system?

A. Enabling the lead pump to pump against a shut-off head during periods of relatively low demand and the lag pump to recirculate when the demand is high.
B. Enabling both potable water pumps to cycle on and off together in response to system demand changes.
C. Enabling the lead pump to cycle on and off during periods of relatively low demand and the lag pump to assist the lead pump only when the demand is high.
D. Enabling the lag pump to cycle on and off during periods of relatively low demand and the lead pump to assist the lag pump only when the demand is high.

Correct answer: C

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

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

Correct answer: A

8. If both the shell-and-tube lube oil cooler and shell-and-tube jacket water cooler of a diesel engine are sea water-cooled, what statement is true?

A. Sea water flows through the shells of both the lube oil and jacket water coolers.
B. Sea water flows through the tubes of the lube oil cooler and through the shell of the jacket water cooler.
C. Sea water flows through the tubes of both the lube oil and jacket water coolers.
D. Sea water flows through the tubes of the jacket water cooler and through the shell of the lube oil cooler.

Correct answer: C

9. Energy losses occurring in a hydraulic system are ultimately absorbed by the _____.

A. fluid as friction
B. hydraulic piping flexibility
C. reservoir expansion chamber
D. atmosphere as heat

Correct answer: D

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

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

Correct answer: B

11. A precharged bladder-type accumulator used in a hydraulic system, can be potentially dangerous if _____.

A. it is precharged with dry nitrogen
B. compressed air is used rather than an inert gas
C. the bladder contacts the top of the poppet
D. the inert gas is exposed to hydraulic oil

Correct answer: B

12. 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

13. What type of oil as part of an oily-water mixture is most likely to require heating to facilitate separation in an oily-water separator?

A. Heavy residual fuel oil.
B. Diesel engine lubricating oil.
C. Steam turbine lubricating oil.
D. Marine diesel oil.

Correct answer: A

14. Permanent centrifugal pump shaft damage due to erosion, corrosion, and wear at the stuffing box is usually prevented by _____.

A. internally flooded lantern rings
B. renewable sleeves
C. a hardened sprayed metal coating
D. wearing rings

Correct answer: B

15. Which of the following propulsor types represents the proper terminology for a Kort nozzle?

A. Cycloidal propellers
B. Ducted propellers
C. Tandem propellers
D. Vane wheels

Correct answer: B

16. What provision is made for sea chests for removal of solid debris restricting the entry grating into the sea chest of a machinery space sea water cooling system?

A. The debris is continuously removed by draining the sea chest clear by cracking open a drain valve located at the bottom of the sea chest.
B. The debris may be removed by blowing the sea chest clear with either compressed air or steam, as appropriate.
C. The debris may be removed by draining the sea chest clear by opening a drain valve located at the bottom of the sea chest.
D. The debris is continuously removed by blowing the sea chest clear with either compressed air or steam by cracking open the blow valve, as appropriate.

Correct answer: B

17. The "tare weight" of a refrigerant storage cylinder refers to what weight?

A. the maximum weight of the refrigerant allowed
B. the weight of an empty cylinder
C. the weight of a cylinder AND its current contents
D. the total weight of a fully charged cylinder

Correct answer: B

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

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

Correct answer: C

19. The safety heads of most large reciprocating compressors used in refrigeration systems are held in place by what means?

A. tack welding on the sides
B. large Teflon gaskets
C. heavy coil springs
D. discharge pressure in the relief valve return line

Correct answer: C

20. The fluid used as a source of actuating power against the underside of the unloader power element piston of the refrigeration compressor capacity control mechanism illustrated is obtained from where? Illustration RA-0013

A. discharge of the compressor lube oil pump
B. discharge of a secondary hydraulic pump specifically installed for this operation
C. high side liquid receiver
D. gas discharge from the compressor

Correct answer: A

21. Concerning the proper installation of the sensing bulb of a thermal expansion valve that is attached to the evaporator tail coil on a horizontal run, what statement is true?

A. the bulb should be attached so that the pinched off tubing should be oriented to one side and the capillary tube running to the valve diaphragm should be oriented to the opposite side
B. the bulb should be attached with no regard to the orientation of the pinched off tubing or the capillary tube running to the valve diaphragm
C. the bulb should be attached so that the pinched off tubing should be oriented down and the capillary tube running to the valve diaphragm should be oriented up
D. the bulb should be attached so that the pinched off tubing should be oriented up and the capillary tube running to the valve diaphragm should be oriented down

Correct answer: C

22. As shown in figure "B" of the illustrated self-contained recovery unit connection diagrams, what is the recovery method supported by the connection scheme? Illustration RA-0033

A. liquid recovery/push-pull
B. direct vapor recovery
C. direct liquid recovery
D. vapor recovery/push-pull

Correct answer: B

23. Which of the illustrated devices would be the LEAST accurate for the purposes of weighing-in a refrigerant charge? Illustration RA-0045

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

Correct answer: C

24. Spring reinforced oil seals are generally installed with the tail or lip of the seal facing _____. Illustration GS-0152

A. toward the bearing preload washer
B. away from the bearing housing recess
C. toward the oil pressure being sealed
D. away from the oil pressure being sealed

Correct answer: C

25. 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

Correct answer: D

26. An electric propulsion drive system in which the propulsion generator supplies power to both the propulsion motor and ship service loads is referred to as what type of system?

A. a multi-purpose system
B. an integrated system
C. a dedicated system
D. a composite system

Correct answer: B

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

Correct answer: D

28. 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

29. 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 on line, 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

30. Which of the following statements is true concerning the operation of the device shown in the illustration? Illustration GS-0116

A. Item "I" moves as the rudder stock rotates.
B. Item "N" moves as the rudder stock rotates.
C. Both item "I" and item "N" move as the rudder stock rotates.
D. Neither item "I" nor item "N" move as the rudder stock rotates.

Correct answer: B

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

Correct answer: D

32. Which of the drill sizes listed represents the largest size drill?

A. A
B. X
C. Z
D. XX

Correct answer: C

33. What is the primary function of the devices shown in the illustration? Illustration GS-0156

A. The transit washers transmit the rotary motion of the cap screw to the actuating assembly.
B. The grounding straps help prevent electrolysis by improving the conductivity between the components.
C. The locking plates are used to prevent the fastening devices from vibrating loose.
D. These abrasion resistors prevent damage to the surface around the bolt holes when tightening the bolts.

Correct answer: C

34. Suppose the pilot pressure is from 3 to 15 psig for the illustrated pneumatically operated, diaphragm actuated control valve. Assuming the control valve is trimmed for a linear response and the travel position indicator is calibrated in percentage, what would be the approximate pilot pressure if the position indicator showed the valve to be 75% open? Illustration GS-0051

A. 4.5 psig
B. 6.0 psig
C. 7.5 psig
D. 9.0 psig

Correct answer: B

35. Which of the projections represents the left side view of the object "X" in the illustration? Illustration GS-0022

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

Correct answer: A

36. The working depth of the gear illustrated is represented by _____. Illustration GS-0111

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

Correct answer: A

37. How would the pressure setting of the illustrated self-contained, internal-pilot, piston-operated steam pressure-reducer be reduced to a lower setpoint? Illustration GS-0044

A. The adjusting spring would need to have its compression load reduced by rotating the adjusting screw clockwise further into the adjusting spring chamber.
B. The adjusting spring would need to have its compression load increased by rotating the adjusting screw counterclockwise further out of the adjusting spring chamber.
C. The adjusting spring would need to have its compression load reduced by rotating the adjusting screw counterclockwise further out of the adjusting spring chamber.
D. The adjusting spring would need to have its compression load increased by rotating the adjusting screw clockwise further into the adjusting spring chamber.

Correct answer: C

38. The purpose of the instrument illustrated is to _____. Illustration GS-0079

A. measure insulation thickness
B. gage resistors
C. measure wire diameter
D. strip insulation from wire

Correct answer: C

39. The best tool to use to measure the number of threads per inch on a bolt is a _____.

A. Tap
B. Screw pitch gauge
C. Pair of outside calipers
D. Micrometer

Correct answer: B

40. Four incandescent lamps are connected in parallel in a single circuit. If one of the lamp filaments burns out, what will happen to the other lamps?

A. all go out
B. become dimmer
C. no change in brightness
D. become brighter

Correct answer: C

41. Periodic testing using a special sensing device may be performed to detect potentially dangerous loose or corroded bus bar and controller connections. What is the name of this testing technology?

A. electric vibro-analysis
B. visual pyrotronics
C. infra-red thermography
D. corrosion electrolysis

Correct answer: C

42. Which line in figure "B" shown in the illustration represents the trailing edge of the wave? Illustration EL-0088

A. 3
B. 4
C. 5
D. 6

Correct answer: B

43. What does the symbol in figure "1" shown in the illustration represent? Illustration EL-0065

A. PNP bipolar junction transistor
B. junction field effect transistor
C. silicon controller rectifier
D. NPN bipolar junction transistor

Correct answer: A

44. What is the nominal output voltage of a 6-cell lead-acid battery?

A. 6 volts
B. 7.5 volts
C. 12 volts
D. 18 volts

Correct answer: C

45. What is the most reliable and preferred method for determining the state of charge of a wet cell NiCad battery while it is being charged?

A. Measuring the battery voltage with a solenoid type voltage tester.
B. Measuring the specific gravity of each cell with a hydrometer.
C. Measuring the temperature corrected specific gravity of each cell with a hydrometer and thermometer.
D. Measuring the battery voltage with a digital voltmeter.

Correct answer: D

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

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

Correct answer: B

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

Correct answer: D

48. What is the basic similarity between a circuit breaker and a fuse?

A. after a short or overload condition, both must be reset to re-energize the circuit
B. after a short or overload condition, both have to be replaced before the circuit can be re-energized
C. after a short or overload condition, both should open to de-energize the circuit
D. a circuit breaker and a fuse have no similarities

Correct answer: C

49. A grinding wheel is trued with a _____.

A. lathe tool
B. garnet stone
C. round file
D. dressing tool

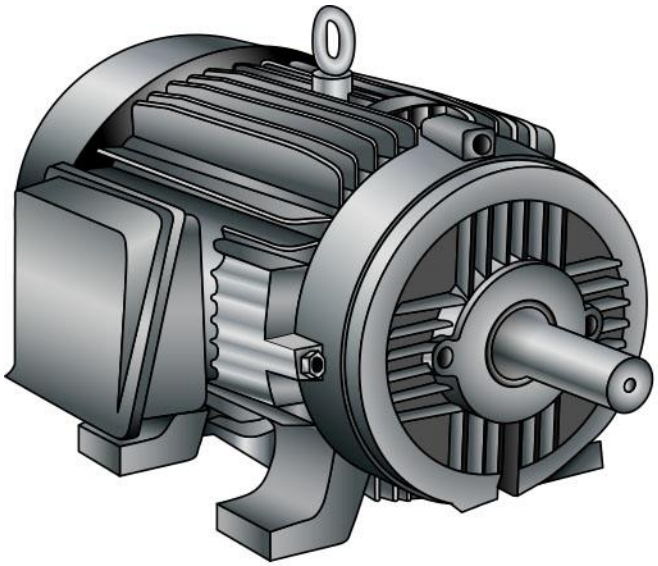
Correct answer: D

50. Which of the listed temperature sensors is made of heat-treated metallic oxides and generally has a negative coefficient of resistance?

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

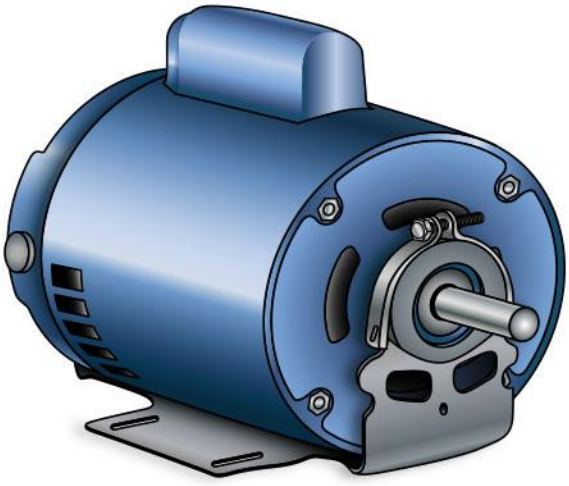
Correct answer: B

EL-0001

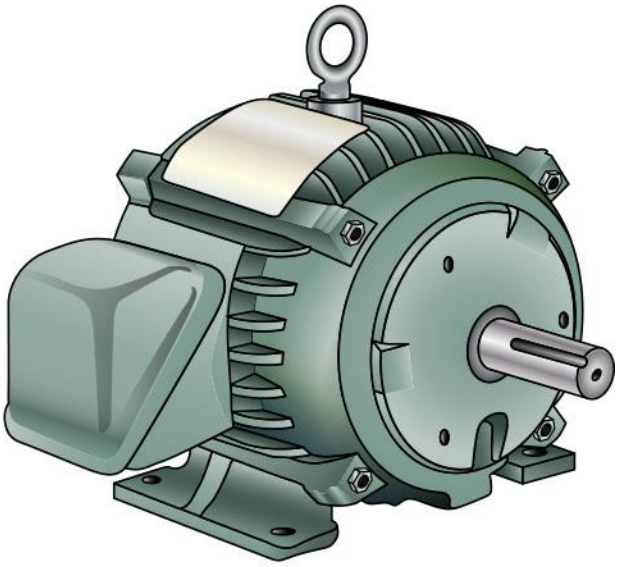


A

B



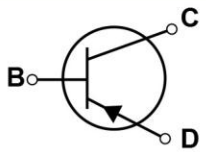
C



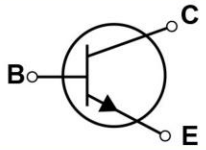
D

EL-0065

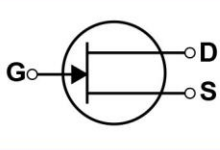
1



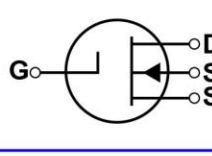
2



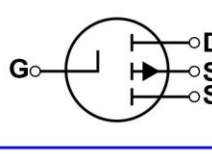
3



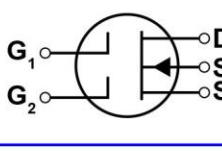
4



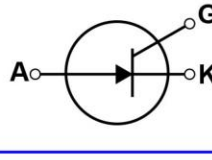
5



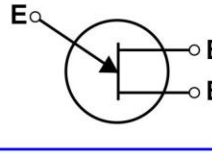
6



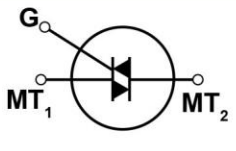
7



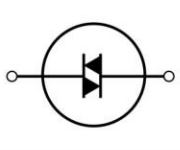
8



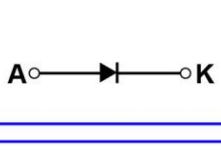
9



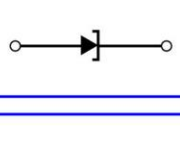
10



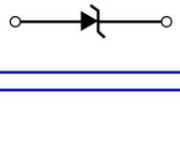
11



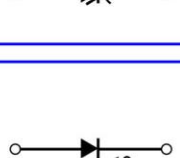
12



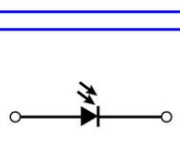
13



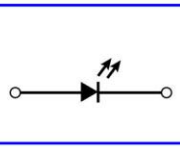
14



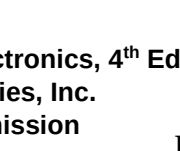
15



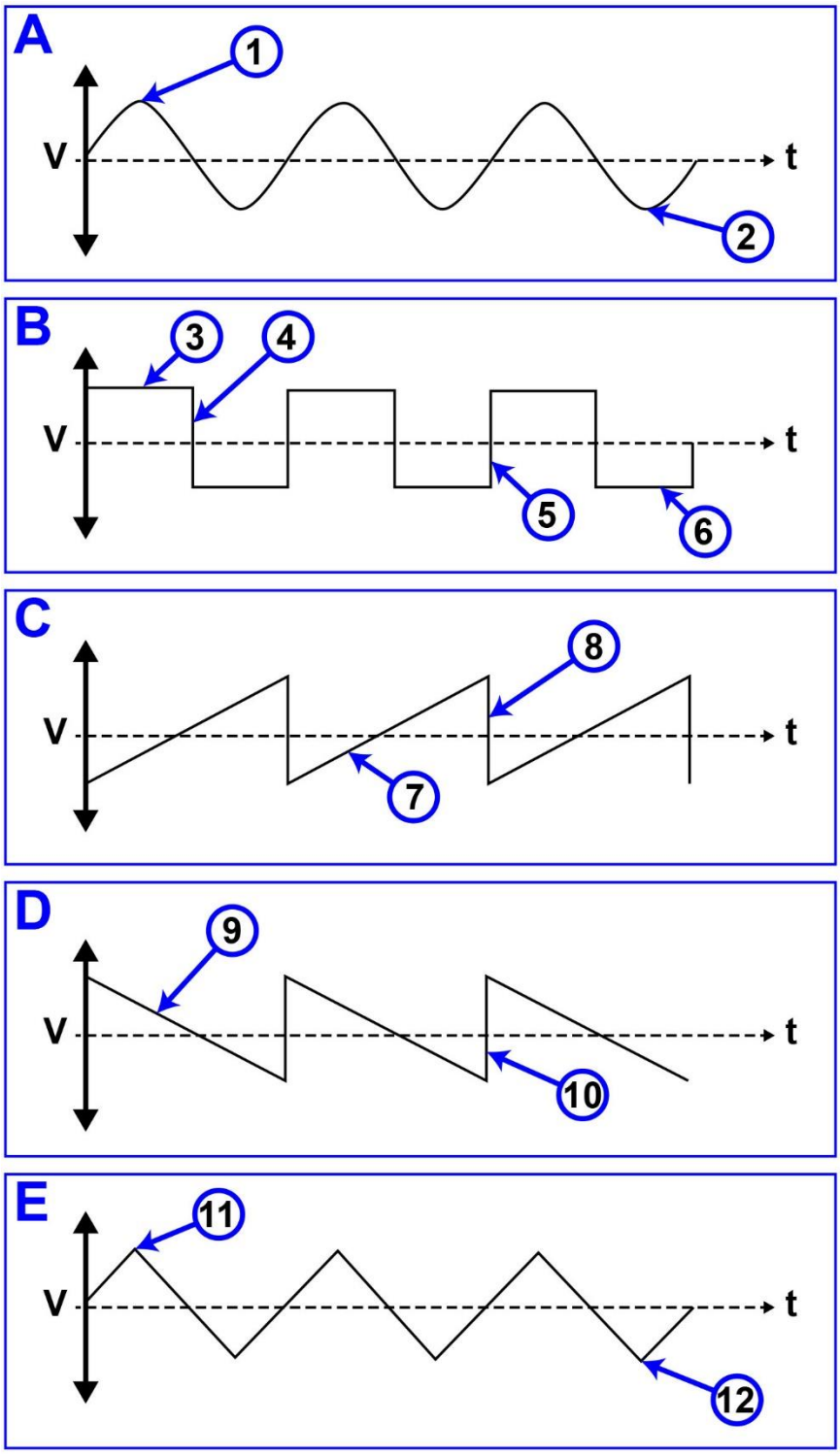
16



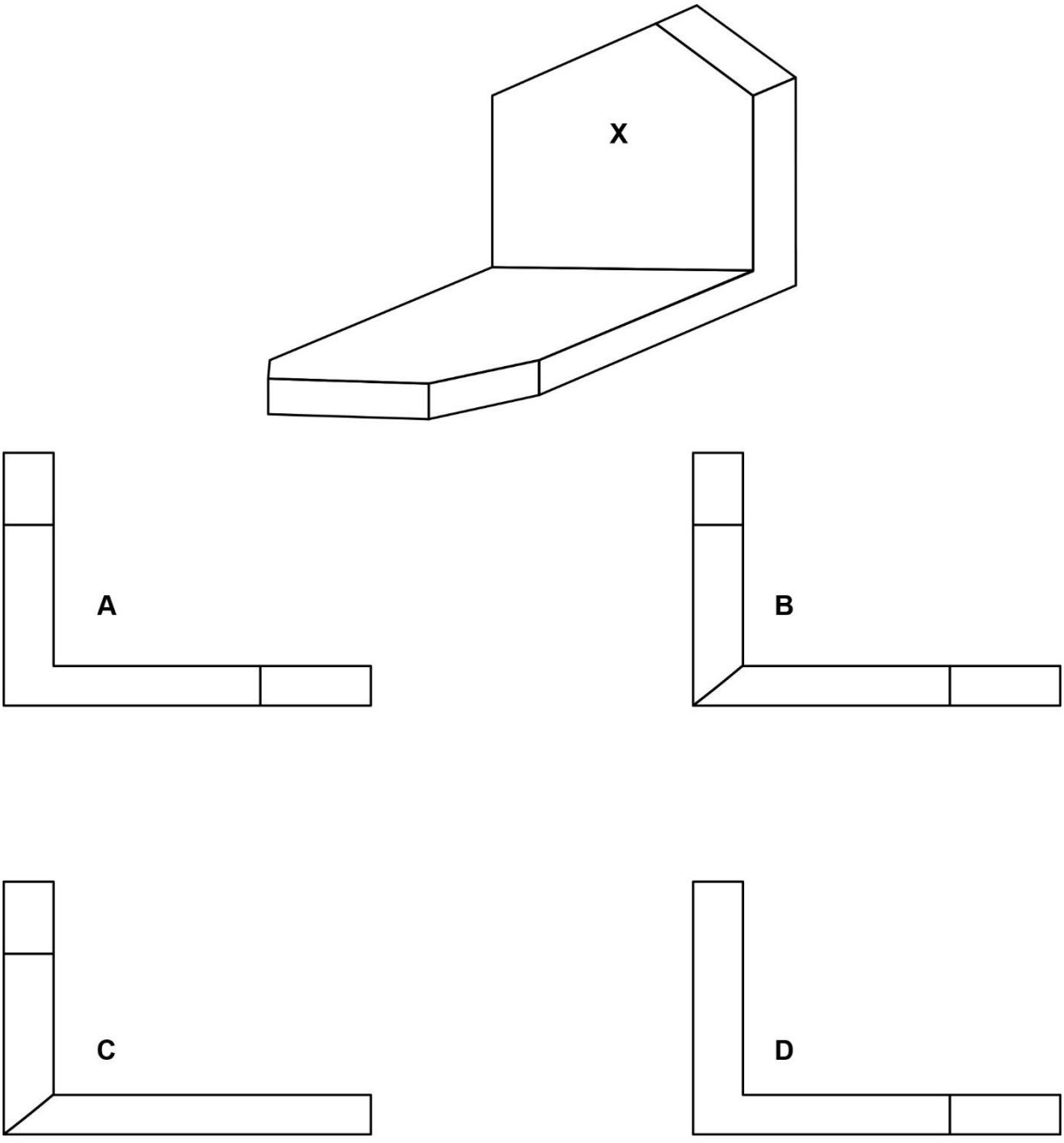
17



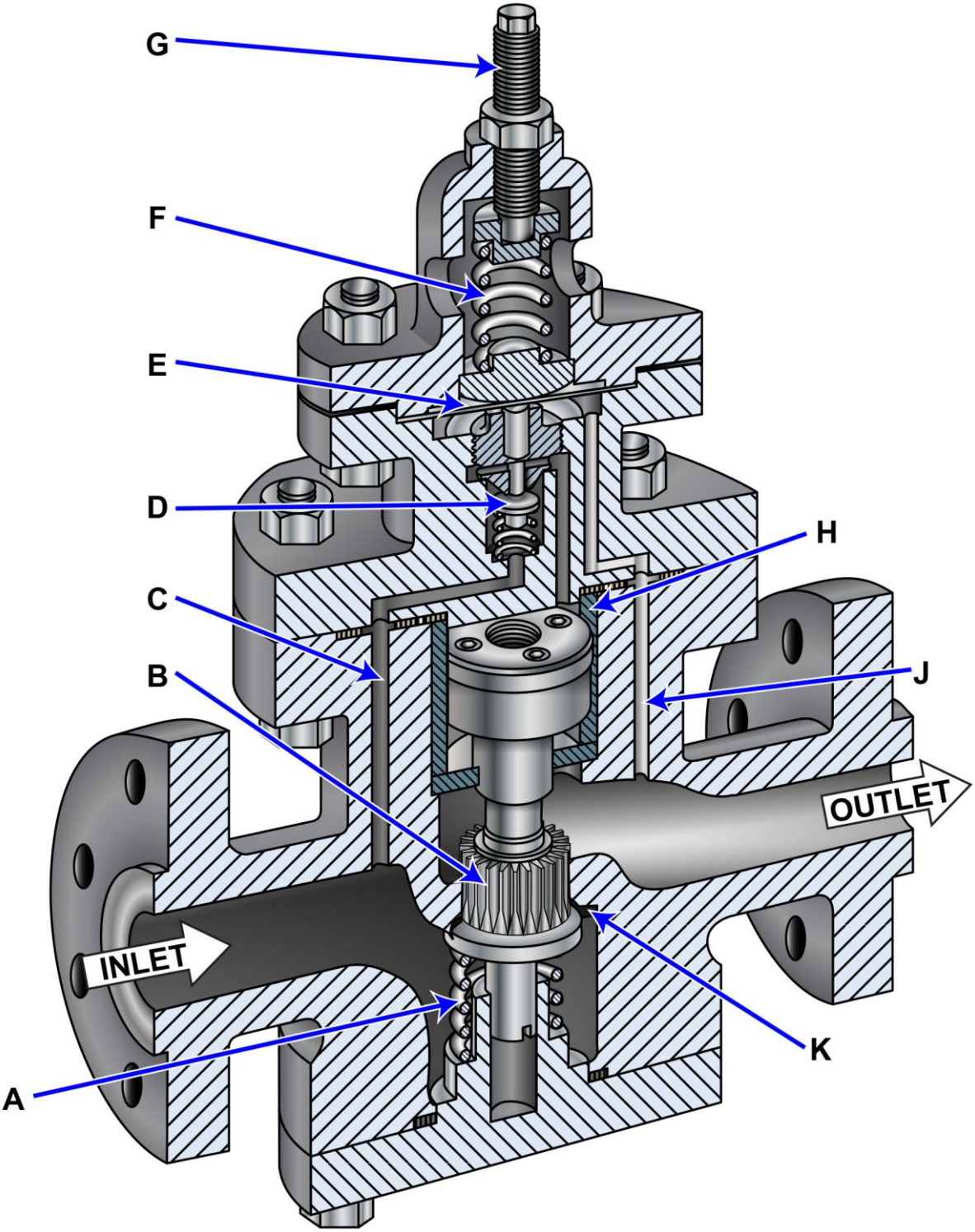
EL-0088



GS-0022

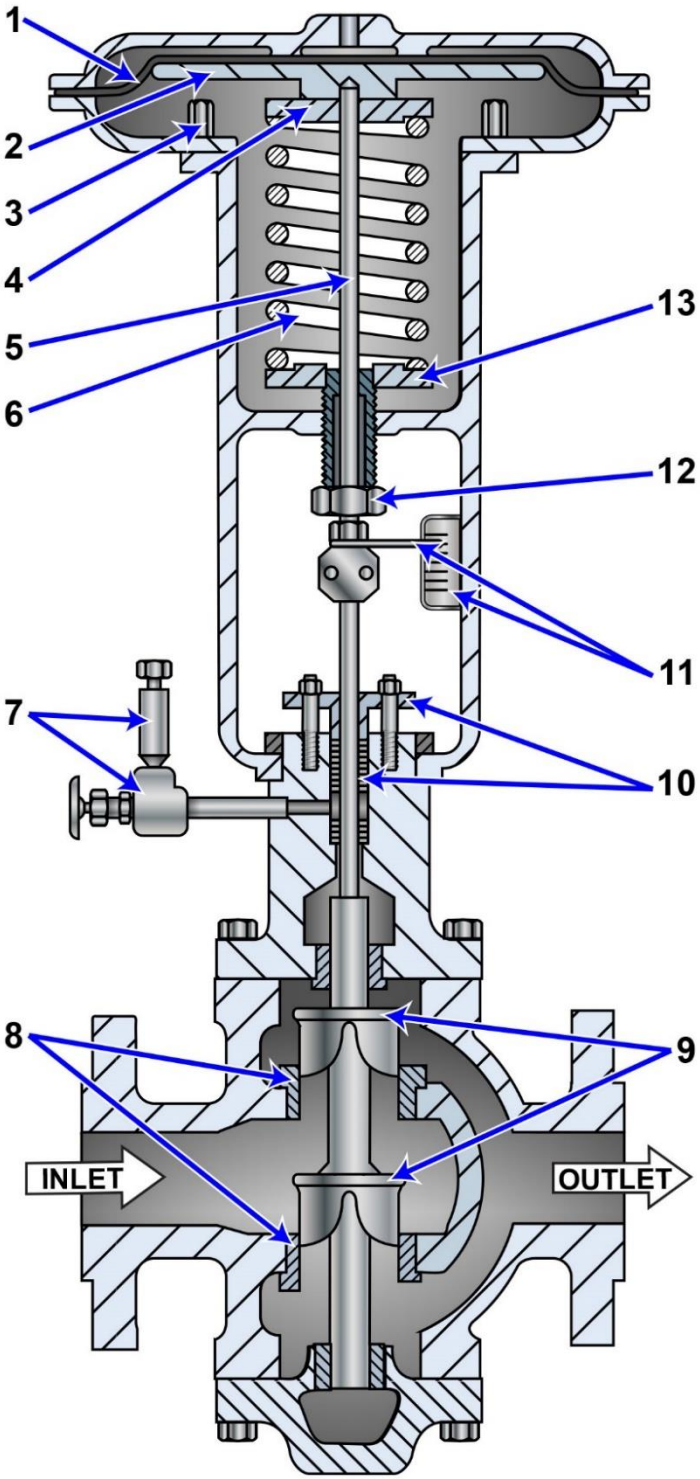


GS-0044



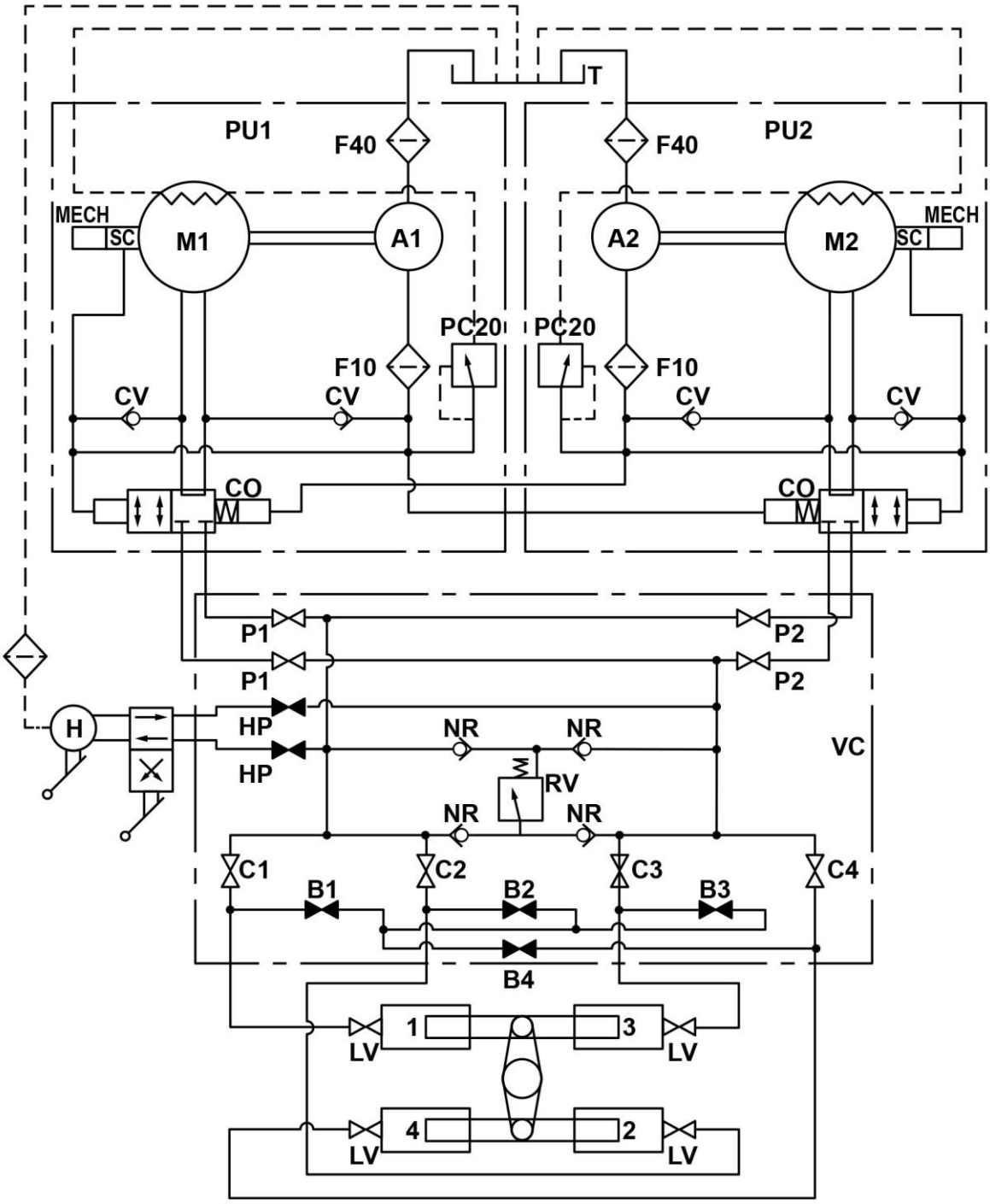
Adapted for testing purposes only from Les-Sonic Self Contained Pressure/Temperature Regulators

GS-0051

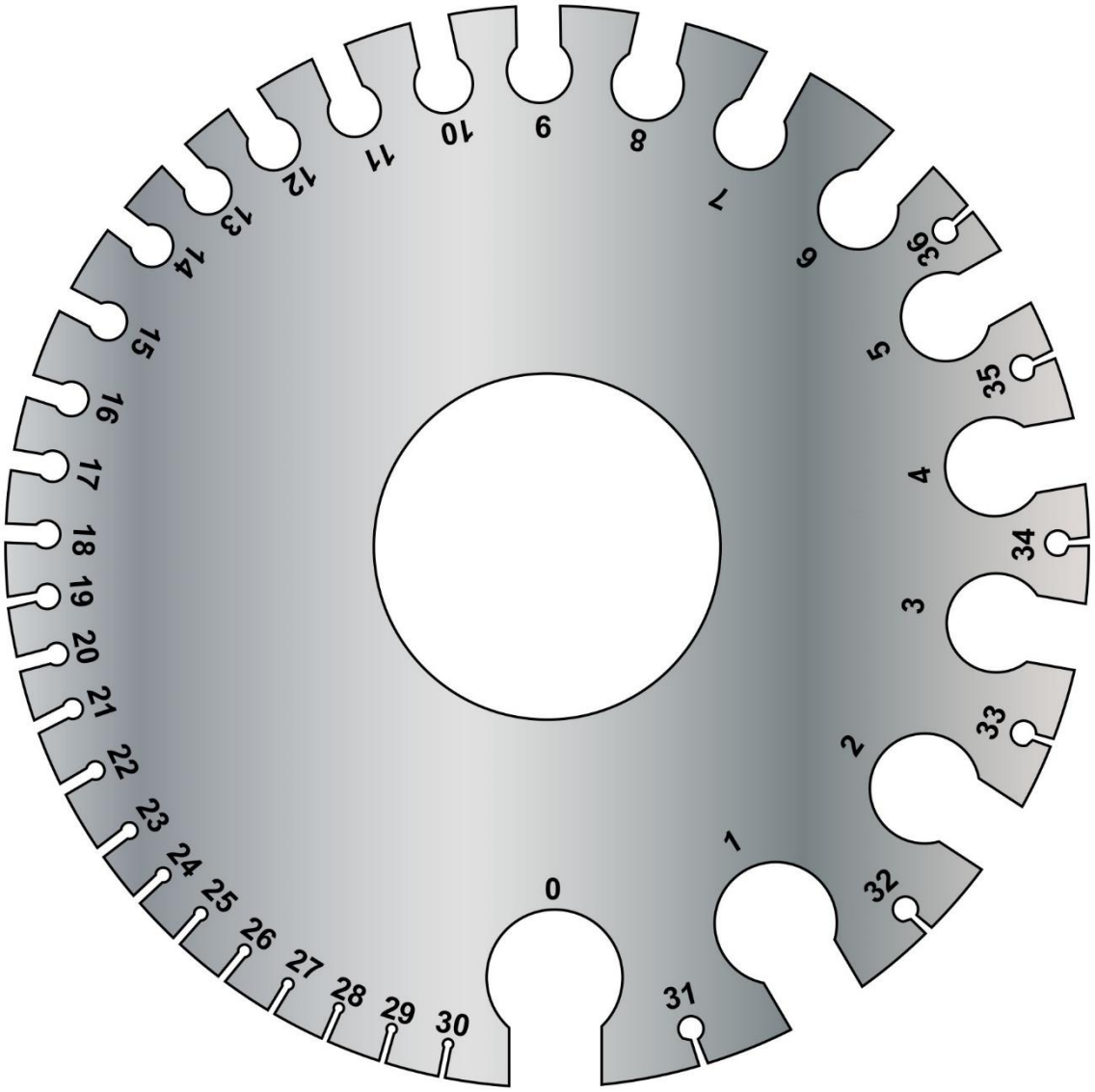


Adapted for testing purposes only from MOLLAND
The Maritime Engineering Reference Book

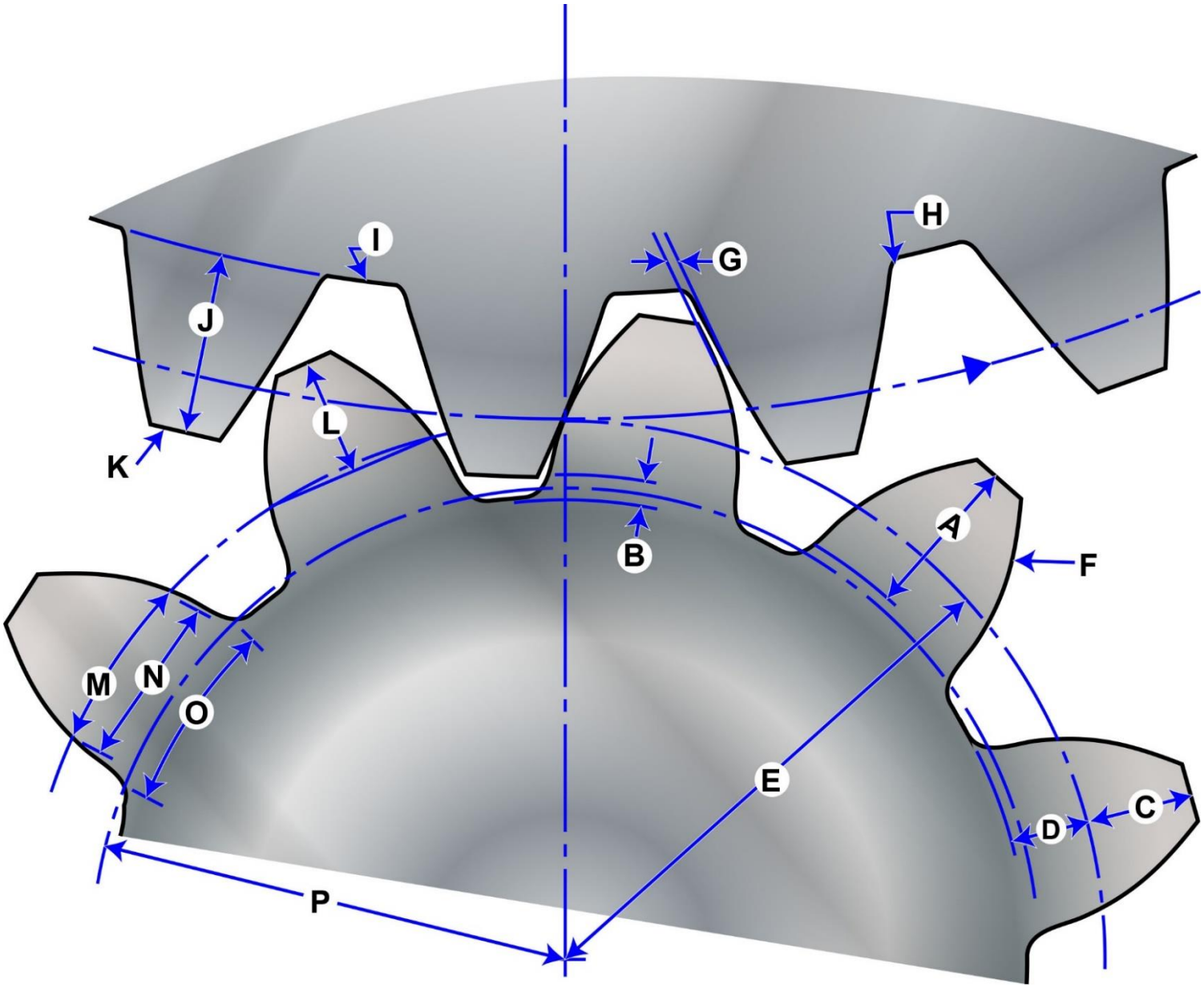
GS-0067



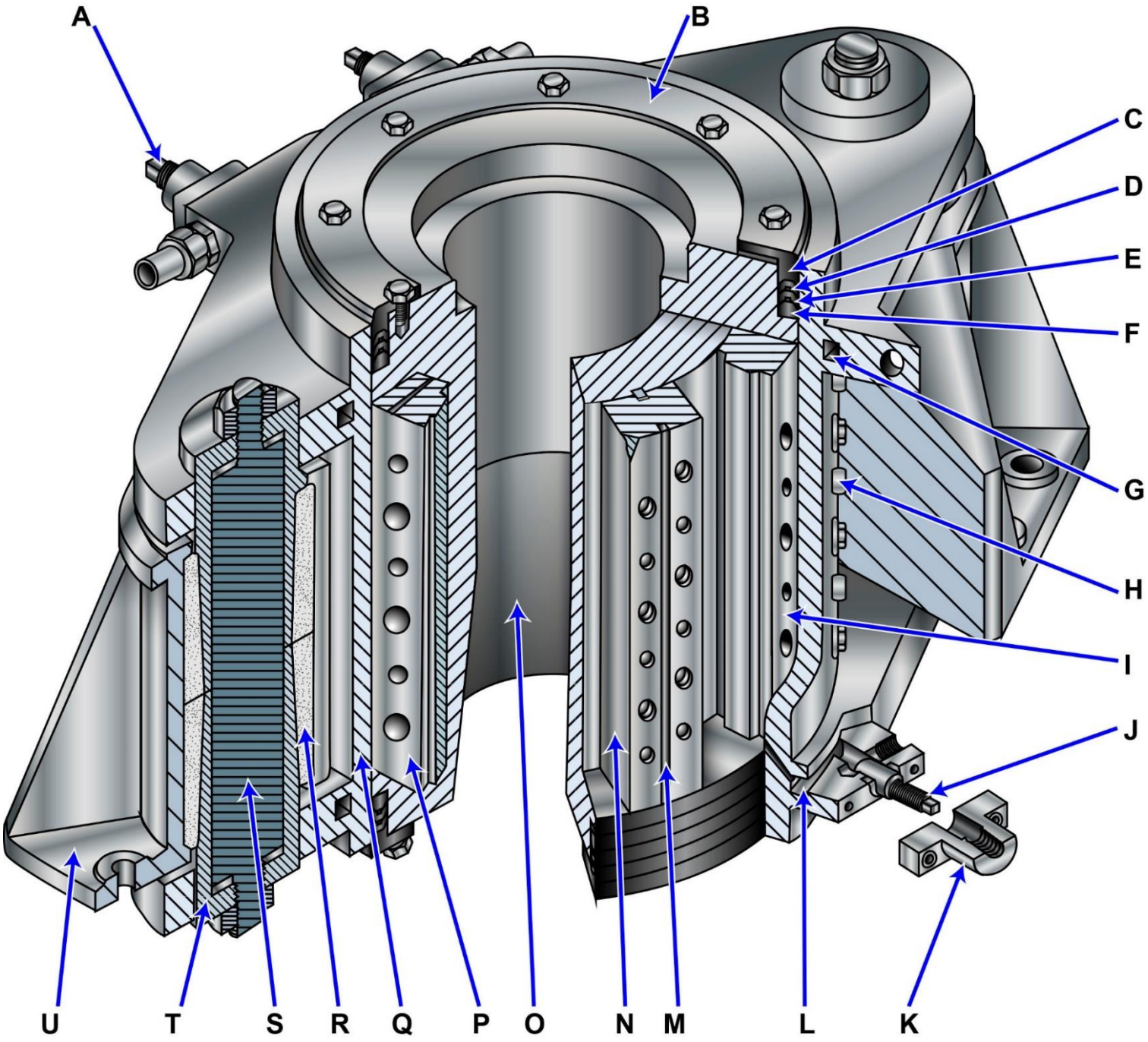
GS-0079



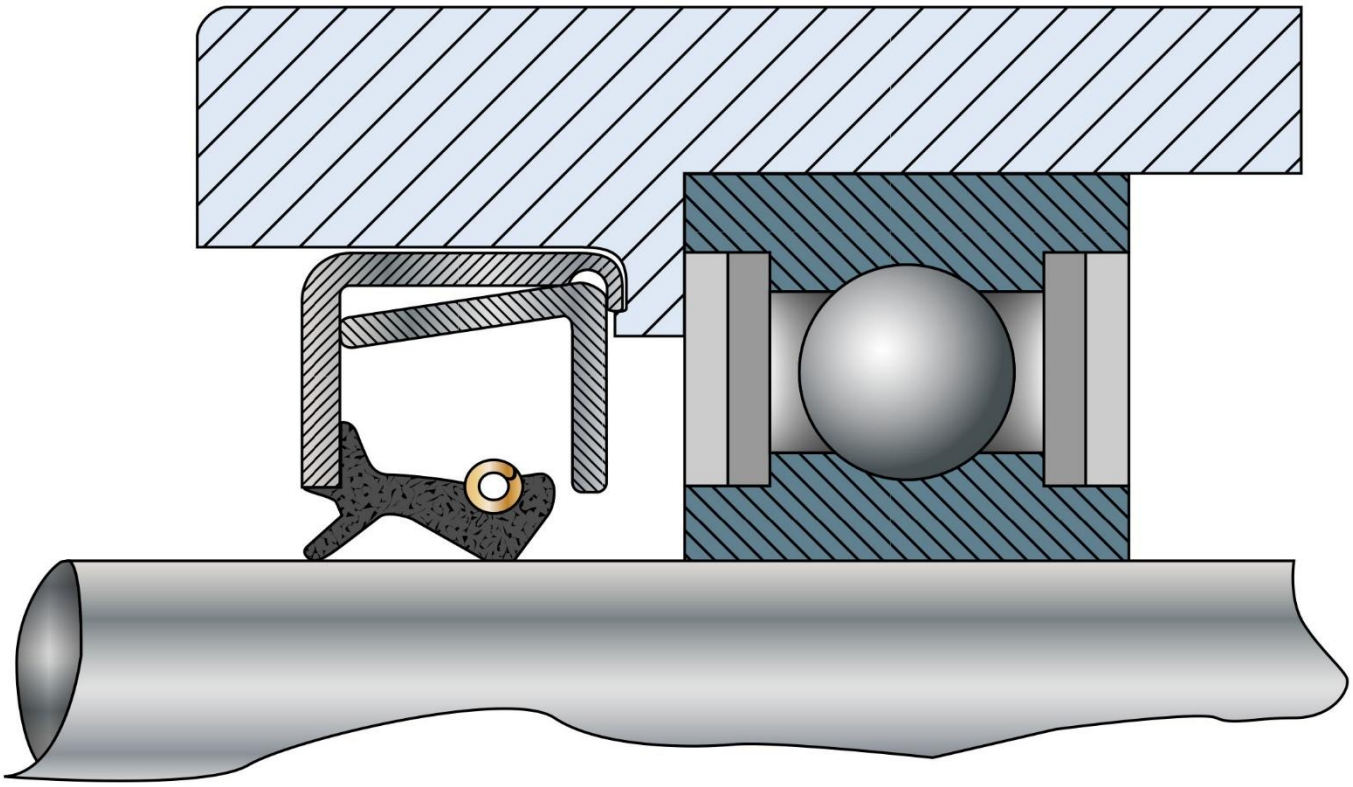
GS-0111



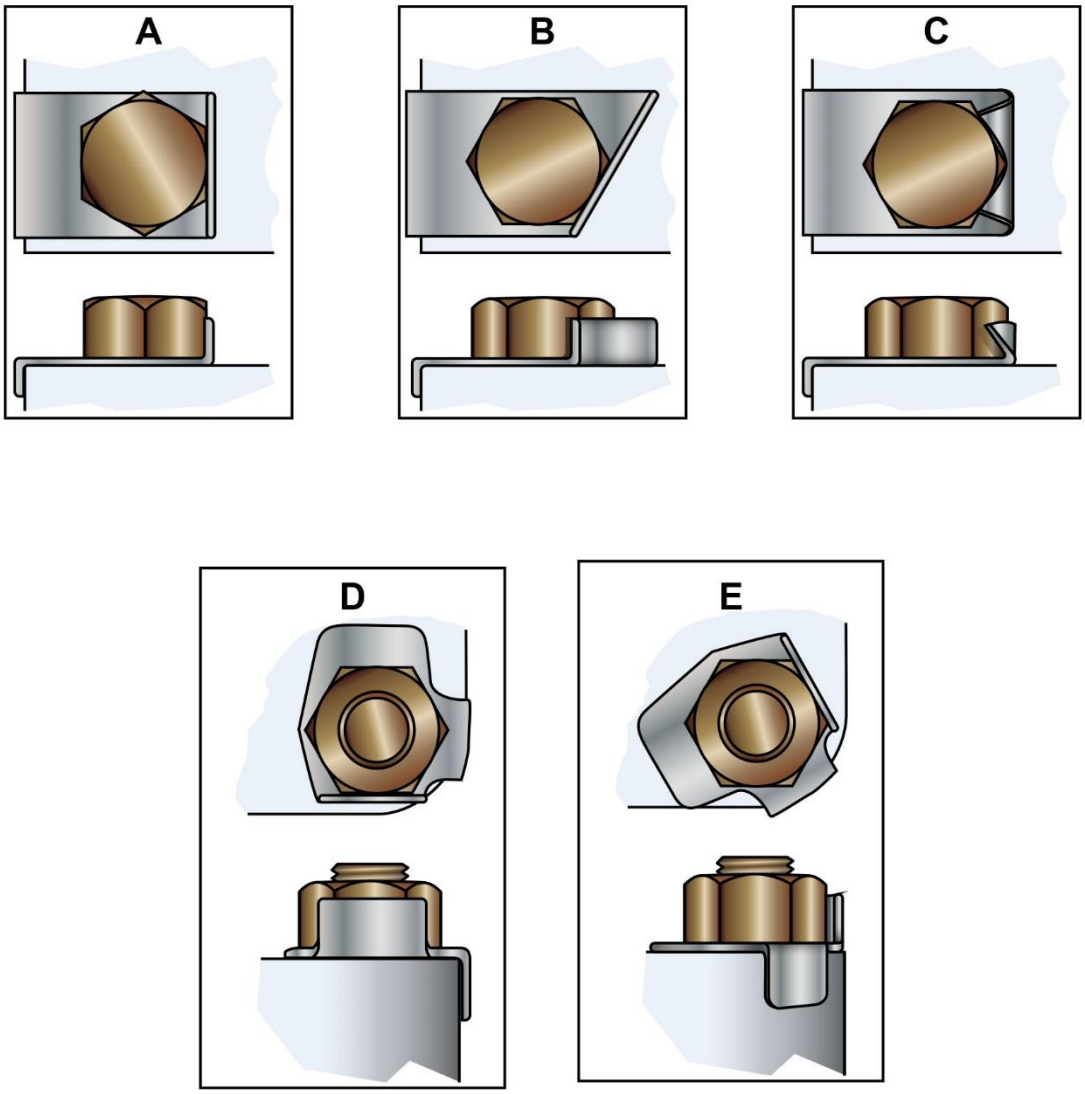
GS-0116



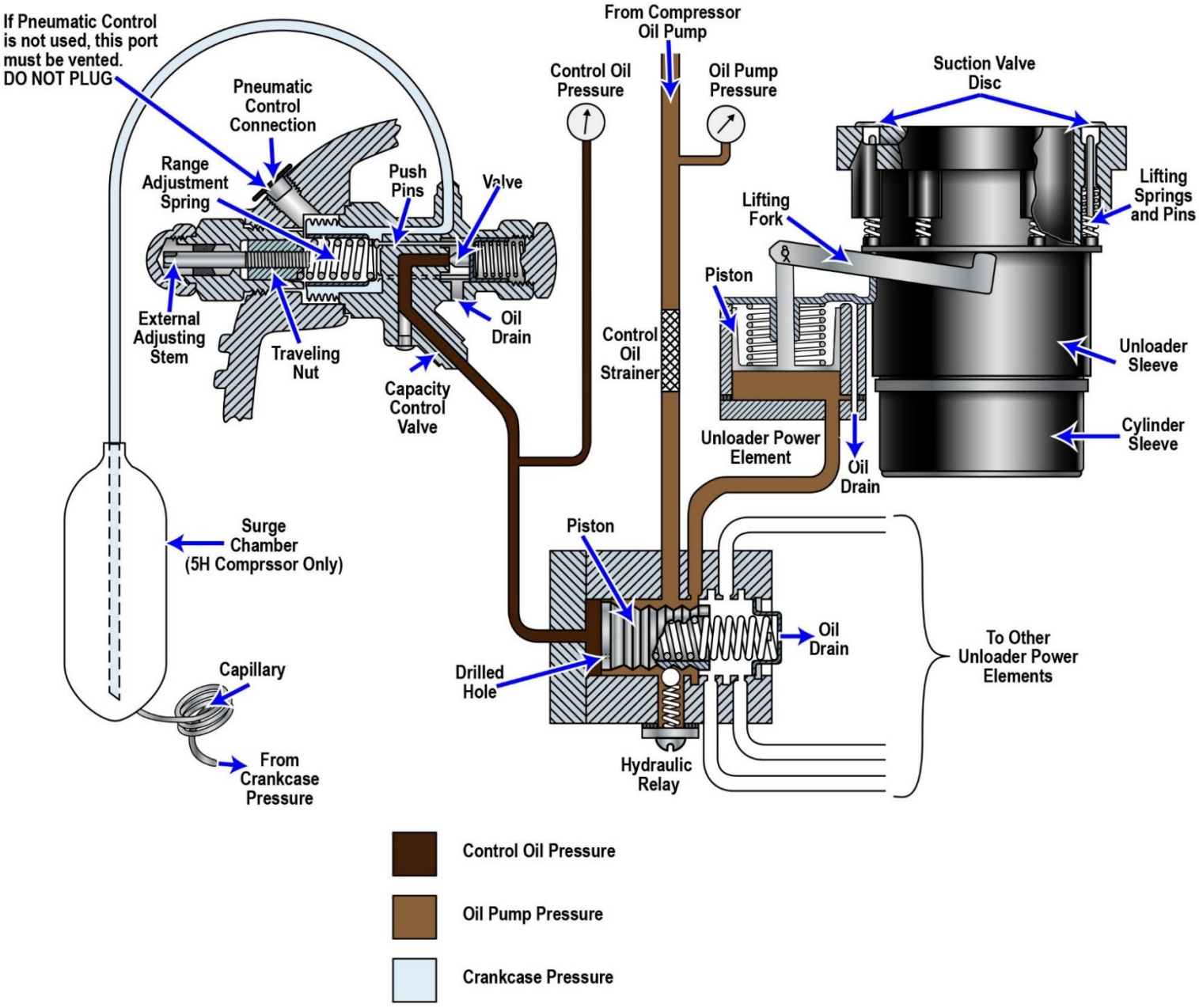
GS-0152



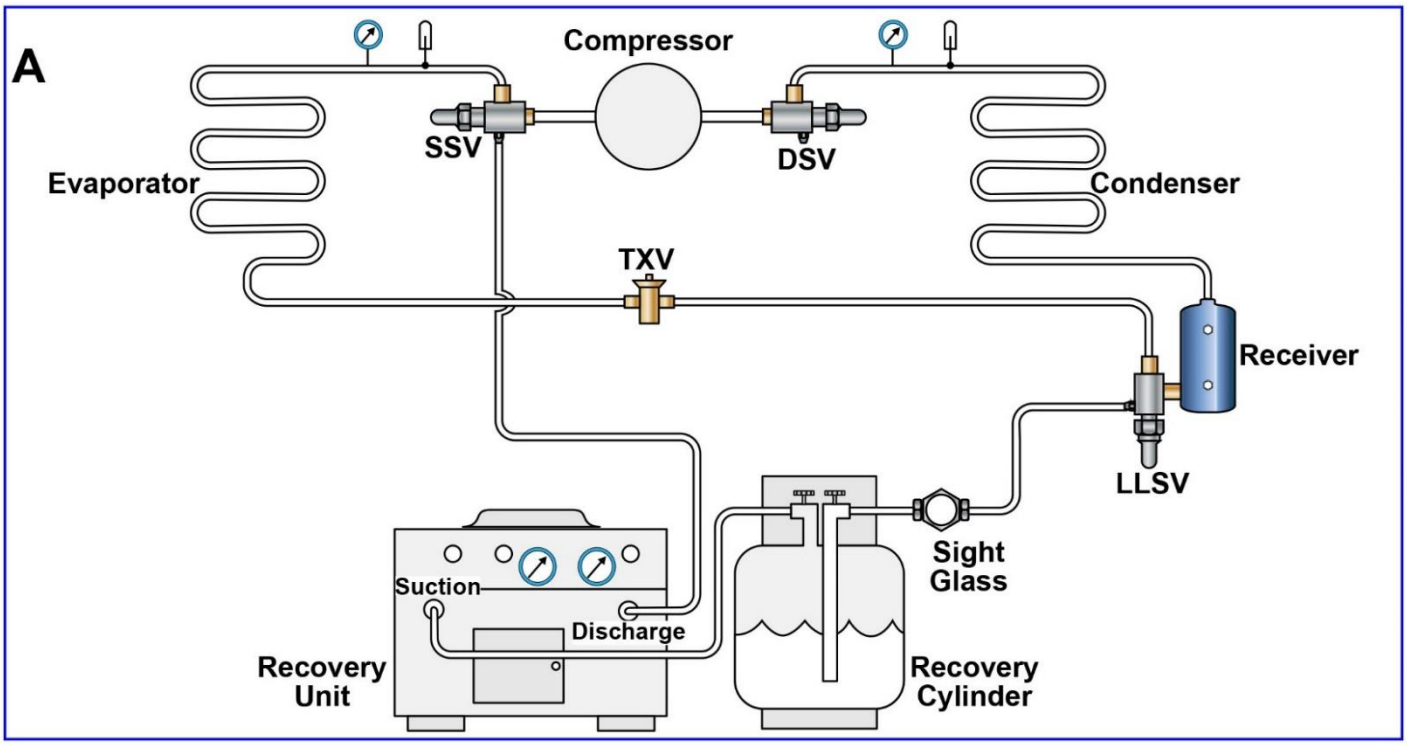
GS-0156

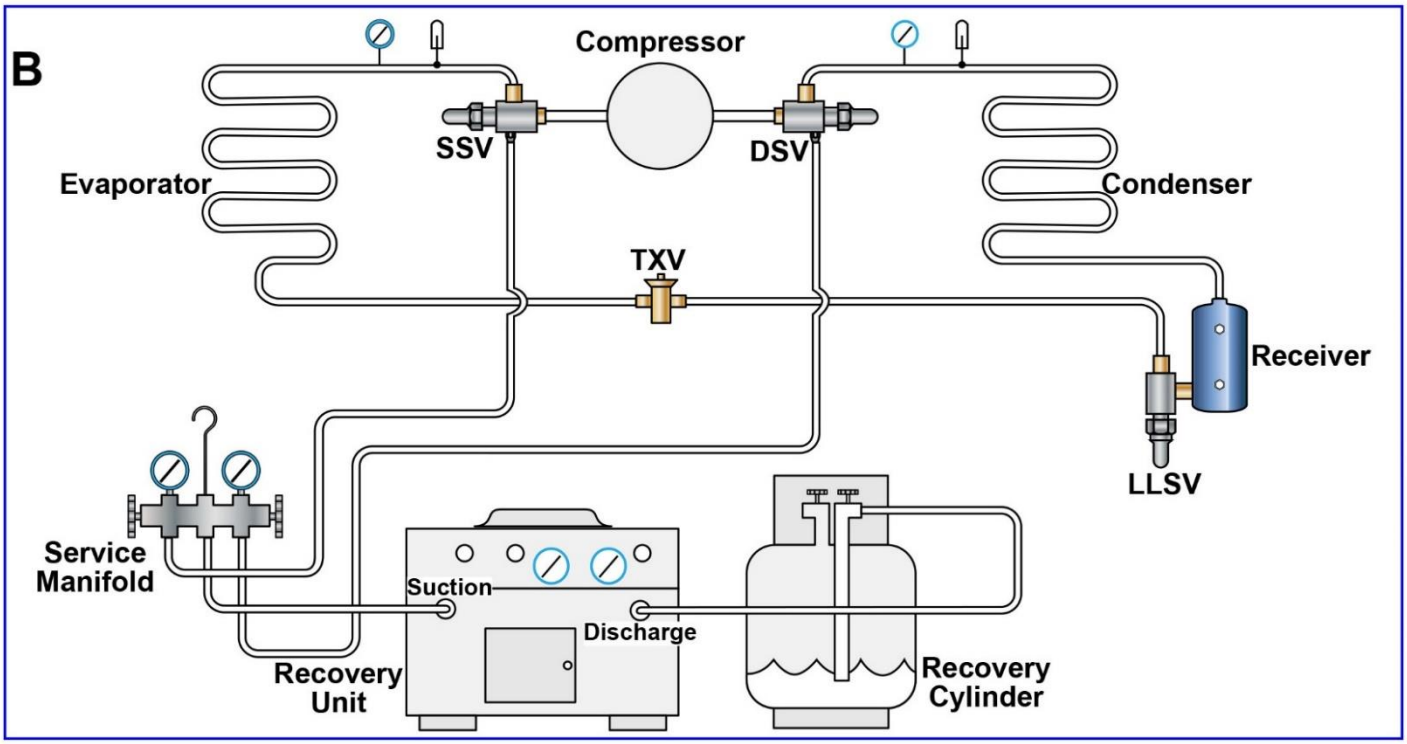


RA-0013



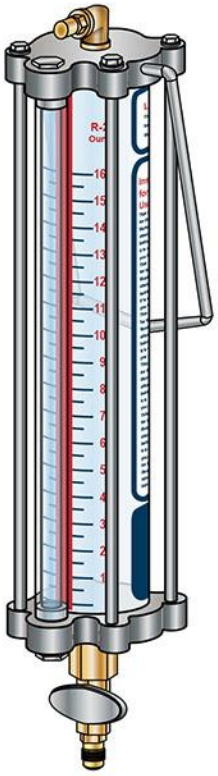
RA-0033



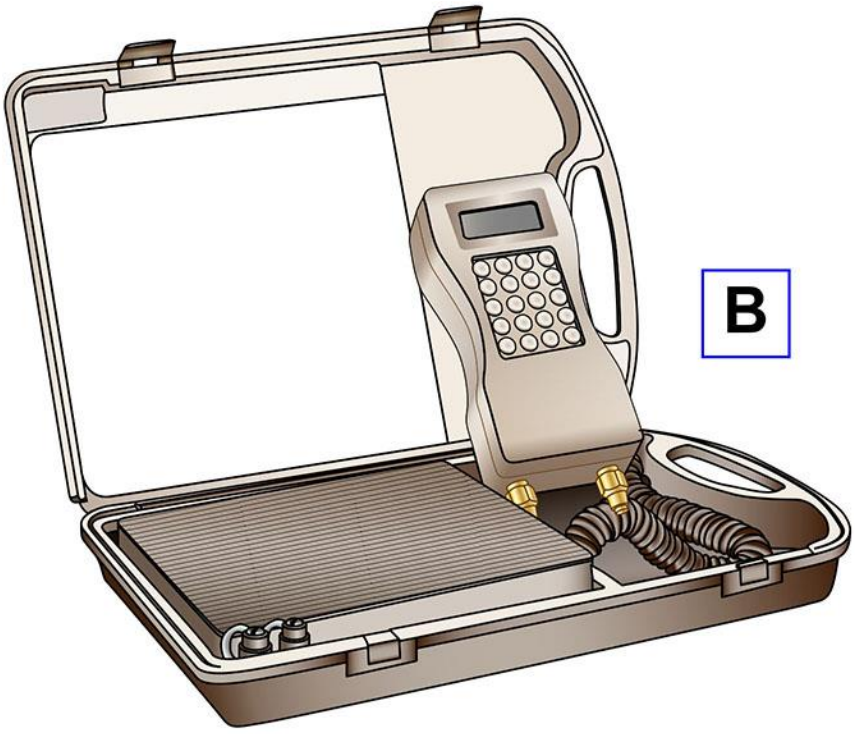


RA-0045

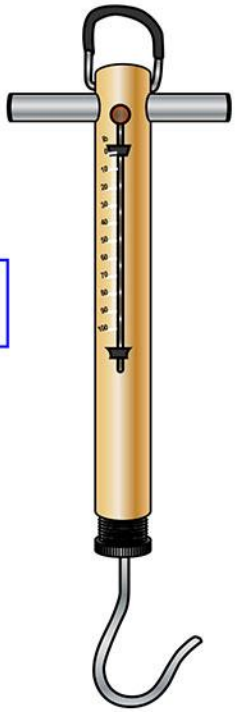
A



B



C



D