

## U.S.C.G. Merchant Marine Exam

QMED

Q802 Electrician

(Sample Examination)

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

1. When the compressed air reservoir is placed in line with an air compressor and is used as an aftercooler, what must be done with the reservoir?
- A. It must be fitted with a manhole.
  - B. It must be fitted with a sight glass.
  - C. It must be fitted with a moisture trap at the inlet.
  - D. It must be frequently drained of condensed water.

Correct answer: D

2. What type of grease is the most commonly used aboard ship?
- A. Lime-based grease
  - B. Calcium-based grease
  - C. Lithium-based grease
  - D. Aluminum-based grease

Correct answer: C

3. In general, what type of starter would be used to connect a three-phase induction motor to full line voltage at the instant of start-up?
- A. VFD starters
  - B. resistor starters
  - C. autotransformer starters
  - D. across-the-line starters

Correct answer: D

4. Which of the following methods should be used to test for an 'open' stator winding coil in a wye-connected AC squirrel cage induction motor?
- A. Use an ohmmeter, placing the test leads across each pair of disconnected motor leads in succession and compare resistances.
  - B. Use a growler, listening for noise and vibration levels to increase when the growler blade is positioned over an open stator coil.
  - C. Use an ohmmeter, placing one test lead on the shaft and the other to each of the disconnected motor leads in succession and compare resistances.
  - D. Use a growler, listening for noise and vibration levels to diminish when the growler blade is positioned over an open stator coil.

Correct answer: A

5. In testing a three-phase delta-connected winding for an open circuit using an ohmmeter, what must be done?
- A. if possible, open the delta-connections to avoid shunting the phase being tested
  - B. measure the voltage across the open connections while testing
  - C. test the windings as parallel groups to avoid short circuiting
  - D. test each phase with all connections intact

Correct answer: A

6. As a firefighting medium, CO<sub>2</sub> can be dangerous under certain conditions as it can cause \_\_\_\_\_.
- A. carbon monoxide poisoning
  - B. freeze burns and blistering
  - C. undulation
  - D. hallucinations

Correct answer: B

7. When performing routine AC motor maintenance what should be included?
- A. rotor balance check
  - B. temperature readings at normal loads to detect abnormal temperature rises
  - C. verifying RPM if a synchronous motor
  - D. inspection of the motor's internals for loose rotor bars or field poles

Correct answer: B

8. How can the loss of residual magnetism in an alternator or generator be corrected?
- A. running the rotor in the opposite direction for 5 minutes
  - B. running the generator at normal speed with the field rheostat fully counterclockwise
  - C. allowing the generator to run at 10% of normal speed for 5 minutes
  - D. using a storage battery or battery charger to 'flash' the field

Correct answer: D

9. The use of a needle valve in a piping system is recommended when requiring \_\_\_\_\_.
- A. close regulation of flow
  - B. no pressure drops
  - C. no back flow
  - D. high-pressure drops

Correct answer: A

10. Moisture damage, as a result of condensation occurring inside of the cargo winch master switches, can be reduced by the use of what installed equipment?
- A. venting the switch box regularly
  - B. coating the switch box internals with epoxy sealer
  - C. installing a light bulb in the pedestal stand
  - D. using strip heaters inside the switch box

Correct answer: D

11. If you hear the general alarm sounded 3 times supplemented by 3 short blasts of the whistle, what does this indicate?
- A. Dismissal from a boat drill.
  - B. Dismissal from fire and emergency.
  - C. Abandon ship.
  - D. Fire and emergency.

Correct answer: B

**12.** How much is the nominal open-circuit voltage of one cell of a fully charged lead-acid battery?

- A. 1.5 volts
- B. 2 volts
- C. 6 volts
- D. 12 volts

Correct answer: B

**13.** 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.

Correct answer: C

**14.** If a lifeboat winch allows a lifeboat to descend to the water at an excessive speed, you should \_\_\_\_\_.

- A. adjust the centrifugal brake mechanism
- B. remove unnecessary weight from the boat
- C. adjust the davit mounted limit switches
- D. engage the motor friction clutch bands

Correct answer: A

**15.** In performing routine maintenance of a ship's service alternator, what should be included?

- A. periodic cleaning of the air filters or screens
- B. megger testing of all rectifying diodes
- C. lubricating exciter slip rings
- D. changing the pedestal bearing insulation yearly

Correct answer: A

**16.** What should be the primary consideration when choosing a battery for a particular application?

- A. ambient temperature rise
- B. stability under charge
- C. terminal polarity
- D. amp-hour capacity

Correct answer: D

**17.** In what application is a remote valve operator most likely to be located outside the machinery space when the valve itself is located within the machinery space?

- A. A valve located in a compressed air line.
- B. A valve located in a fuel oil transfer line.
- C. A valve located in a potable water transfer line.
- D. A valve located in a sea water cooling line.

Correct answer: B

**18.** If the supply voltage is 220 volts 60 Hz, what is the operating voltage of the motor controller control circuit illustrated in figure "A" of the illustration? Illustration EL-0011

- A. 110 volts DC
- B. 110 volts AC
- C. 220 volts DC
- D. 220 volts AC

Correct answer: D

**19.** In which figure shown in the illustration will the highest voltage be induced? Illustration EL-0028

- A. figure "A" only
- B. figure "B" only
- C. both figures "A" and "C"
- D. both figures "B" and "D"

Correct answer: D

**20.** In a simple DC circuit, the resistance is held constant while the applied voltage is halved. What will be the effect on the current flow as compared to the original current?

- A. double
- B. remain the same
- C. be divided by two
- D. be divided by four

Correct answer: C

**21.** Before working on an electric cargo winch master switch or controller, what should be done?

- A. heat the switch box to remove any moisture
- B. spray the gasket surface with a solvent
- C. drain condensate from the box
- D. open the circuit breaker in the power supply and tag-out

Correct answer: D

**22.** What happens to the current in a series circuit when the voltage remains constant and the resistance increases?

- A. decreases
- B. increases
- C. increases by the square
- D. remains the same

Correct answer: A

**23.** What is the characteristic of the blood flow associated with arterial bleeding?

- A. Dark red blood flowing from the wound in spurts.
- B. Bright red blood flowing from the wound with a steady flow.
- C. Dark red blood flowing from the wound with a steady flow.
- D. Bright red blood flowing from the wound in spurts.

Correct answer: D

**24.** What device can be used to check the calibration of a circuit breaker?

- A. 500-volt megohmmeter
- B. clamp-on voltmeter
- C. portable low voltage high current testing unit
- D. standard digital multimeter

Correct answer: C

**25.** What is the combined effect of inductive reactance, capacitive reactance, and resistance in an alternating current circuit known as?

- A. total reactance
- B. impedance
- C. reactance
- D. resonance

Correct answer: B

**26.** 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

**27.** If an attempted light off of an idle boiler fails, what should be done?

- A. The fuel should be secured to the boiler and the boiler allowed to remain idle for a few minutes before another light off attempt is made.
- B. Another light off attempt (with no limit) can be undertaken before any additional precautions need to be observed.
- C. The fuel should be secured to the boiler and the furnace purged of combustible vapors with the forced draft fan before another light off attempt is made.
- D. Another light off attempt (just one) can be undertaken before any additional precautions need to be observed.

Correct answer: C

**28.** Aqueous Film Forming Foam (AFFF), commonly known as "light water", is especially suitable for fighting \_\_\_\_\_.

- A. any class D fire
- B. oil fires in the engine room bilges
- C. class C fires in paint lockers
- D. all of the above

Correct answer: B

- 29.** What is the functional name of an electrical device which prevents performing two or more actions which will result in a dangerous condition?
- A. mechanical limit device
  - B. electrical interlock device
  - C. monitoring device
  - D. modulating device

Correct answer: B

- 30.** Which of the valves listed for the device shown in the illustration will be open while the unit is operating in the backflush mode? Illustration GS-0153
- A. valve "4"
  - B. valves "4" and "5"
  - C. valves "4" and "14"
  - D. valves "4", "5", and "14"

Correct answer: C

- 31.** As shown in figures "B" and "C" of the illustration, what should be the switch position and which test lead terminal jacks should be used if your intent is to measure DC currents anticipated as high as 200 milliamps? Illustration EL-0047
- A. switch position "7" and terminal jacks "1 and 4"
  - B. switch position "6" and terminal jacks "2 and 4"
  - C. switch position "6" and terminal jacks "1 and 4"
  - D. switch position "7" and terminal jacks "2 and 4"

Correct answer: C

- 32.** What is the power consumed by "R2" in the circuit illustrated in figure "B", if the applied voltage is 24 volts and the resistance of R1 is 3 ohms, R2 is 4 ohms, and R3 is 5 ohms, respectively? Illustration EL-0020
- A. 16 watts
  - B. 20 watts
  - C. 24 watts
  - D. 28 watts

Correct answer: A

- 33.** Which of the following statements represents the important factor that must be considered when replacing a faulty diode in a generators excitation field rectifier assembly?
- A. Replacement of a diode also requires balancing of the rotor with a one-piece rotor lamination to be shrunk fit and keyed to the shaft.
  - B. Never alter the diode alignment to cause a change in the neutral plane.
  - C. The replacement diode must be dipped in varnish prior to installation to protect against humidity.
  - D. Be certain that the replacement diode has the same polarity as the one removed.

Correct answer: D

**34.** The electrolyte used in a nickel-cadmium battery is distilled water and what other substance?

- A. diluted sulfuric acid
- B. lead sulfate
- C. potassium hydroxide
- D. zinc oxide

Correct answer: C

**35.** A definite advantage in the use of water as a fire extinguishing agent is its ability to \_\_\_\_\_.

- A. alternate expansion and contraction as water in liquid state becomes vapor
- B. absorb smoke and gases as water is converted from liquid to vapor
- C. vaporize and rapidly expand as water absorbs heat
- D. rapidly contract as water is converted from a liquid to a vapor

Correct answer: C

**36.** A direct current passing through a wire coiled around a soft iron core is known as what?

- A. piezoelectric device
- B. electromagnet
- C. electromagnetic domain
- D. magnetic shield

Correct answer: B

**37.** Whether analog or digital, what are most AC voltmeters calibrated to measure?

- A. peak-to-peak voltage
- B. average voltage
- C. peak voltage only
- D. root-mean-square voltage

Correct answer: D

**38.** A thermal-magnetic circuit breaker for a 300 kW alternator is rated at 500 amperes at full continuous load. Which of the following conditions will trip the breaker?

- A. Sustained current draw of 450 amperes for 2 hours
- B. Sustained current draw of 500 amperes for 10 minutes
- C. Momentary current draw of 1000 amperes for 3 seconds
- D. Instantaneous current draw of 5,000 amperes

Correct answer: D

**39.** If a sea water-cooled shell-and-tube lubricating oil cooler has the sea water inlet and outlet connections on the opposite end waterboxes, in terms of the number of passes, what statement is true?

- A. The number of fluid passes cannot be determined.
- B. The tube-side fluid flow pattern is single-pass.
- C. The tube-side fluid flow pattern is four-pass.
- D. The tube-side fluid flow pattern is two-pass.

Correct answer: A

**40.** An increase in which of the listed conditions will increase the speed of a synchronous electric motor?

- A. Inductance
- B. Voltage
- C. Frequency
- D. Armature current

Correct answer: C

**41.** AC circuits can possess characteristics of resistance, inductance, and capacitance. In terms of units of measure, how is the capacitive reactance of the circuit expressed?

- A. henrys
- B. mhos
- C. ohms
- D. farads

Correct answer: C

**42.** In comparing a semiconductor diode to a vacuum tube diode, what statement is true?

- A. The semiconductor diode has shorter life, no warmup time, and is less delicate than the vacuum tube diode.
- B. The semiconductor diode has longer life, no warmup time, and is less delicate than the vacuum tube diode.
- C. The semiconductor diode has longer life, longer warmup time, and is less delicate than the vacuum tube diode.
- D. The semiconductor diode has longer life, no warmup time, and is more delicate than the vacuum tube diode.

Correct answer: B

**43.** At a minimum threshold, how many milliamps of current through the body produces a painful sensation that most people would perceive as an electric shock?

- A. 3 to 7 mA
- B. 10 to 16 mA
- C. 30 mA
- D. 100 mA for 2.5 sec.

Correct answer: A

**44.** What is the characteristic of a wound-rotor induction motor, with a high resistance inserted in series with the rotor winding at startup?

- A. relatively high starting torque and low stator current
- B. relatively high starting torque and high stator current
- C. relatively low starting torque and low stator current
- D. relatively low starting torque and high stator current

Correct answer: A

- 45.** Why is it important for double bottom fuel oil tanks not to be topped off when loading fuel at cold temperatures?
- A. Air pockets may cause the fuel to bubble out of the ullage hole.
  - B. Increased viscosity of the product needs higher loading pressure, which increases the chances of a spill.
  - C. Fueling valve may become stuck closed and cause the fuel oil to spill before the valve can be opened.
  - D. A temperature rise of the fuel will cause an overflow from the tank vent.

Correct answer: D

- 46.** For what purpose are time delayed or delayed action-type fuses used?
- A. guard lighting and electronic circuits
  - B. prevent grounds in branch circuits
  - C. permit momentary overloads
  - D. prevent opens in motor circuits

Correct answer: C

- 47.** In a compression type automatic grease cup, the lubricant is forced into the bearing by \_\_\_\_\_.
- A. a Zerk fitting
  - B. gravity flow
  - C. spring force
  - D. a pressure gun

Correct answer: C

- 48.** The Muster List ("Station Bill") shows each crew lifeboat station, their duties during abandonment, basic instructions, and \_\_\_\_\_.
- A. all emergency signals
  - B. work schedule
  - C. instructions for lowering the survival capsule
  - D. the time each weekly drill will be held

Correct answer: A

- 49.** The discharge capacity of the axial piston hydraulic pump, shown in the illustration, is \_\_\_\_\_. Illustration GS-0058
- A. variable set by angle determined by operator
  - B. fixed by the pump housing angle
  - C. fixed by length of the shaft
  - D. variable set by adding shorter or longer cylinder block

Correct answer: B

- 50.** The FIRST requirement for logical troubleshooting of any system requires the troubleshooter to do what?
- A. isolate the faulty component
  - B. recognize what is normal operation
  - C. identify the probable cause of a symptom
  - D. determine what tools you will need

Correct answer: B

**51.** When troubleshooting a lead-acid storage battery, what is the best method for detecting a weak or dead cell?

- A. visually inspecting the electrolyte levels of each cell
- B. taking each cell's temperature with a calibrated mercury thermometer
- C. comparing the specific gravity of the electrolyte in each cell
- D. taking an open circuit voltage test of individual cells

Correct answer: C

**52.** What statement is true concerning portable power tools?

- A. Power tools other than those as approved as double-insulated require the use of two conductor cables, two-prong plugs, and ungrounded receptacles.
- B. Double-insulated power tools require the use of three conductor cables, three-prong plugs, and grounded receptacles.
- C. Unless the power tool is an approved double-insulated type, an ungrounded power tool has the potential to cause a fatal accident due to electrical shock.
- D. A power tool fitted with a three-conductor cable and three-prong plug may be safely used with an ungrounded outlet as long as a three prong receptacle to two prong plug adapter is used.

Correct answer: C

**53.** After extinguishing a paint locker fire using the fixed CO<sub>2</sub> system, the next immediate action is for the space to be \_\_\_\_\_.

- A. opened and burned material removed
- B. checked for the proper oxygen level
- C. opened and doused with water to prevent reflash
- D. left closed with ventilation off until all boundaries are cool

Correct answer: D

**54.** If the bearings of a piece of machinery are fed by a gravity feed lubricating oil system, what statement is true?

- A. The lube oil pump draws a suction on the lube oil reservoir/sump and discharges directly to the bearings. The return oil then gravity drains to the lube oil gravity tank which overflows to the lube oil reservoir/sump.
- B. The lube oil pump draws a suction on the lube oil gravity tank and discharges directly to the bearings. The return oil then gravity drains to the lube oil gravity tank.
- C. The lube oil pump draws a suction on the lube oil reservoir/sump and discharges to the lube oil gravity tank. The oil then gravity-feeds the bearings and the return oil drains to the lube oil reservoir/sump.
- D. The lube oil pump draws a suction on the lube oil reservoir/sump and discharges directly to the bearings. The return oil then gravity-drains to the lube oil reservoir/sump.

Correct answer: C

**55.** In actual applications, electrical connections associated with "R1, R2 and R3" of the transmitter to "R1, R2, and R3" of the indicators shown in figure "C" of the illustration are made by what means? Illustration EL-0092

- A. spliced and taped connections
- B. slip rings and brushes
- C. soldered contacts
- D. solderless crimp-on connectors

Correct answer: B

- 56.** To minimize magnetic field interaction between electrical conductors in physical proximity, what is the best practice?
- A. at right angles and as close as possible to each other
  - B. at right angles and as far as practicable from each other
  - C. parallel to and as far as practicable from each other
  - D. parallel and as close as possible to each other

Correct answer: B

- 57.** It is necessary to cool the bulkheads and decks surrounding a compartment where there is a fire in order to \_\_\_\_\_.
- A. cool the metal below its ignition temperature
  - B. prevent the fire from spreading by the conduction of heat
  - C. prevent oxygen from reaching the flames
  - D. form a dense coating of smothering steam

Correct answer: B

- 58.** You are paralleling two alternators. The synchronizing lamps grow dim and are totally darkened as the synchroscope pointer approaches the 0° position. What does this indicate?
- A. the synchroscope is defective or broken
  - B. the circuit breaker can be closed
  - C. the incoming alternator is running too slowly
  - D. the alternator voltages are 180° apart

Correct answer: B

- 59.** The simplest method to use for determining if a centrifugal pump is operating as designed, is to \_\_\_\_\_.
- A. close off the discharge valve, and watch for a rise in pressure
  - B. momentarily close off the suction valve, and watch for a rise in pressure
  - C. use a clamp-on ammeter and compare the readings to past records
  - D. closely observe the pump discharge temperature

Correct answer: A

- 60.** An internal resistance is placed in series with the meter movement of which of the following instruments?
- A. DC voltmeter
  - B. AC frequency meter
  - C. DC ammeter
  - D. AC ammeter

Correct answer: A

- 61.** Which of the listed instruments can be best used to locate a grounded stator coil in a synchronous motor onboard ship?
- A. Frequency meter
  - B. Voltmeter
  - C. Megohmmeter
  - D. Infrared temperature meter

Correct answer: C

- 62.** What does the component labeled "B" shown in the illustration represent? Illustration EL-0093
- A. selsyn motor
  - B. bridge rectifier
  - C. shielded lamp
  - D. hand-cranked generator

Correct answer: D

- 63.** The illustrated drawing shows a correct front "F" and top "T" view of an object. Of the views labeled "1", "2", "3", and "4", the one that correctly represents the right side view for a third angle projection is \_\_\_\_\_.
- Illustration GS-0132

- A. 1
- B. 2
- C. 3
- D. 4

Correct answer: B

- 64.** In a three-phase, squirrel-cage type, induction motor, how is the primary rotating magnetic field established?
- A. application of a three-phase AC voltage supply to the stator windings
  - B. interaction of the magnetic field caused by the induced current in the squirrel-cage bars with the magnetic field of the stator
  - C. laminated steel core and aluminum conductors in the rotor
  - D. current induced in the rotor windings

Correct answer: A

- 65.** In a compartment that has been completely flooded with water, the greatest pressure will be exerted \_\_\_\_\_.
- A. at a point that is one-third from the bottom of the bulkhead
  - B. at the vertical center of the bulkhead
  - C. along the bottom of any bulkhead
  - D. along the top of the bulkhead

Correct answer: C

**66.** In preparing the surface of a metal for application of primers and finish coats, which of the listed hand tools is appropriate for surfaces with significant pitting?

- A. Hand scraper
- B. Chipping hammer
- C. Wire brush
- D. Sandpaper

Correct answer: C

**67.** The hand brake of a lifeboat winch is \_\_\_\_\_.

- A. manually disengaged when hoisting a boat
- B. applied by dropping the counterweighted lever
- C. controlled by the centrifugal brake mechanism
- D. automatically engaged if lowering speed is excessive

Correct answer: B

**68.** Some heavy-duty screwdrivers are made with a square shank to \_\_\_\_\_.

- A. permit striking with a hammer
- B. prevent the shank from bending
- C. allow it to be used as a pry bar
- D. allow turning with a wrench

Correct answer: D

**69.** When fighting a fire with a portable dry chemical extinguisher you should always \_\_\_\_\_.

- A. bounce the chemical onto the fire from adjacent structural members
- B. attack the fire from the leeward side
- C. direct the stream of chemical toward the base of the fire
- D. spray the chemical across the tops of the flames

Correct answer: C

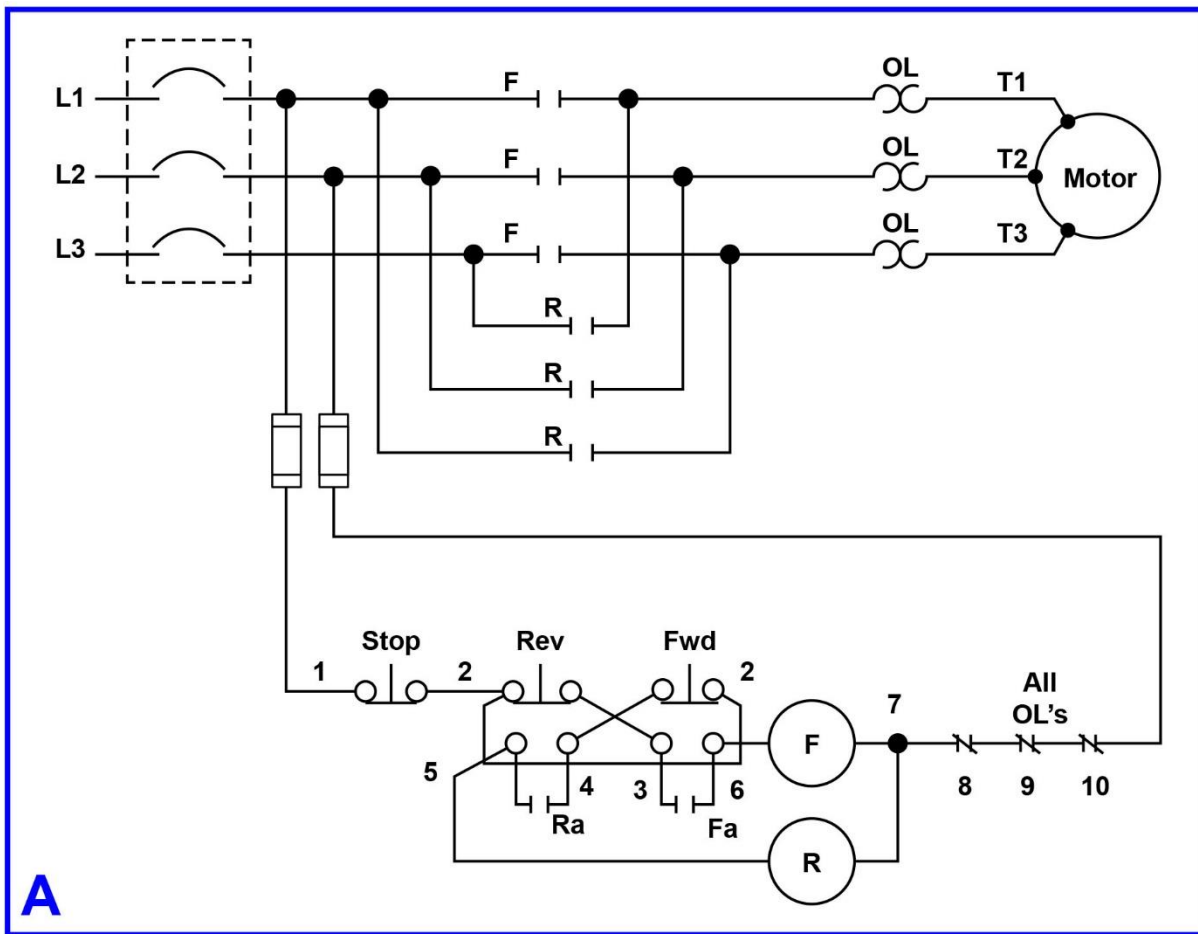
**70.** All portable electric tools should have a ground connection to prevent \_\_\_\_\_.

- A. grounding the plastic case through a short
- B. burning out the motor from an overload
- C. electric shock if the tool is shorted
- D. overloading the motor from a short

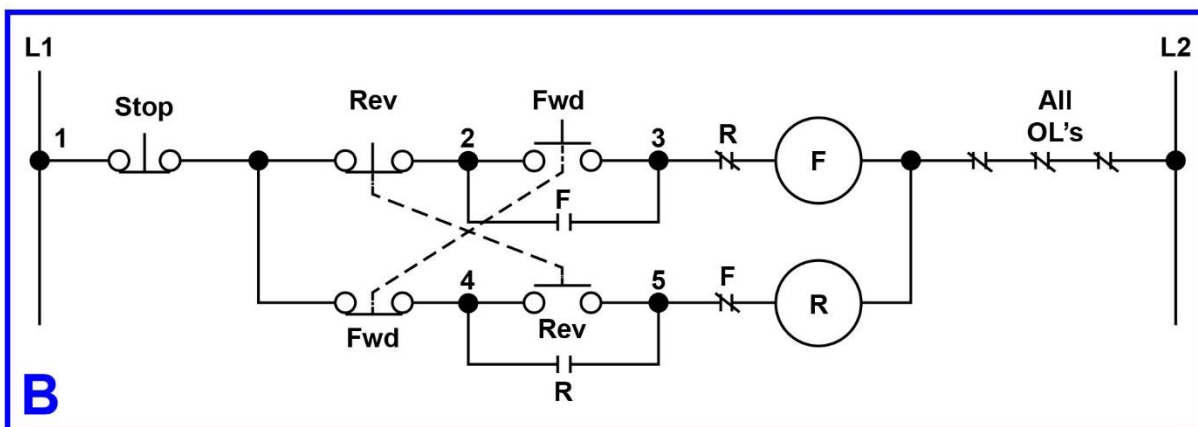
Correct answer: C



## EL-0011



**A**



**B**

**Figure A**

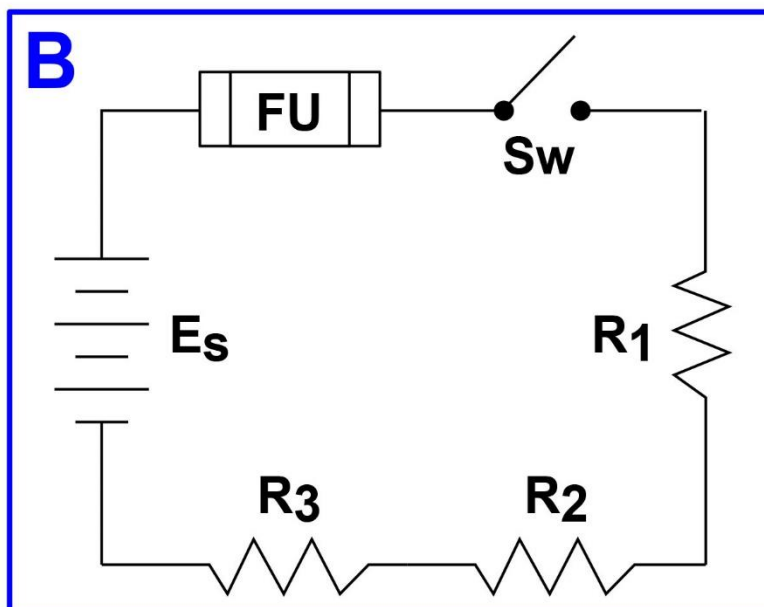
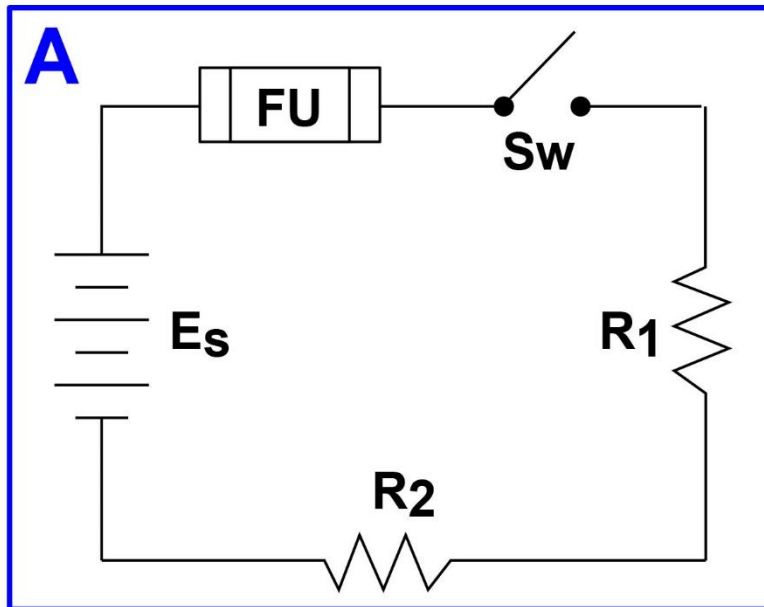
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**Figure B**

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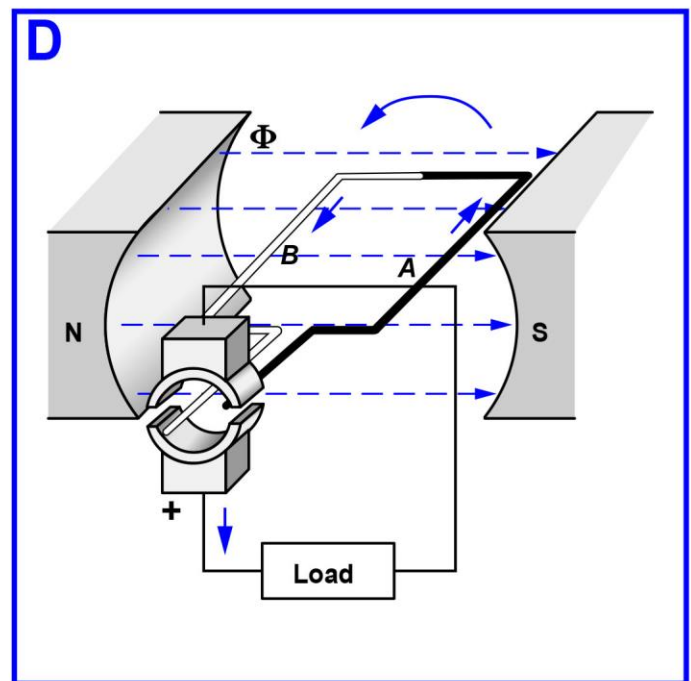
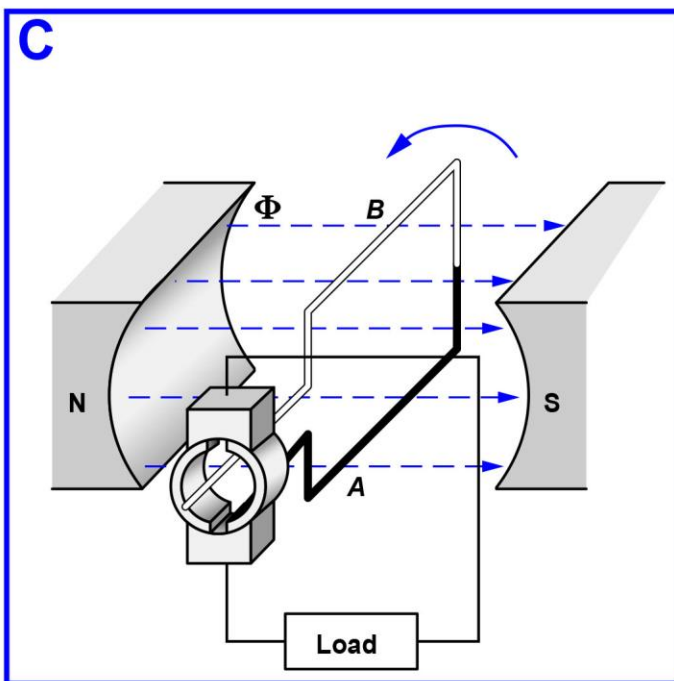
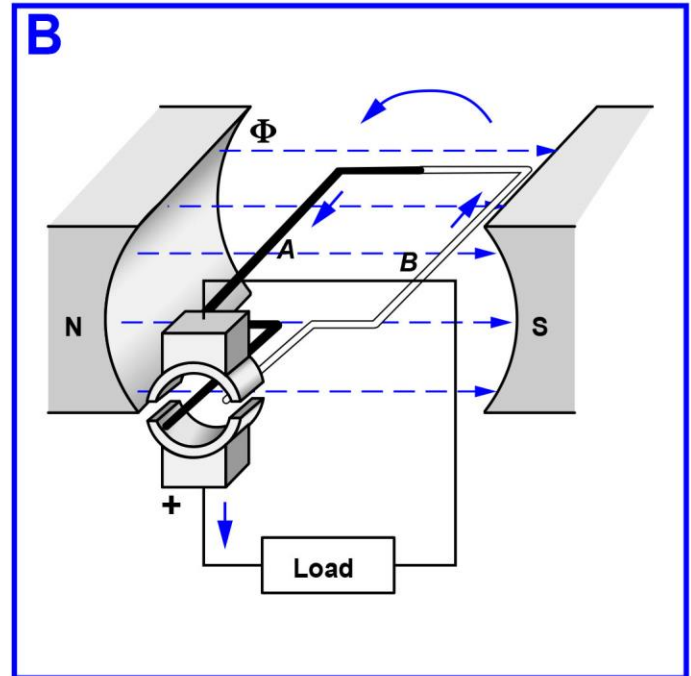
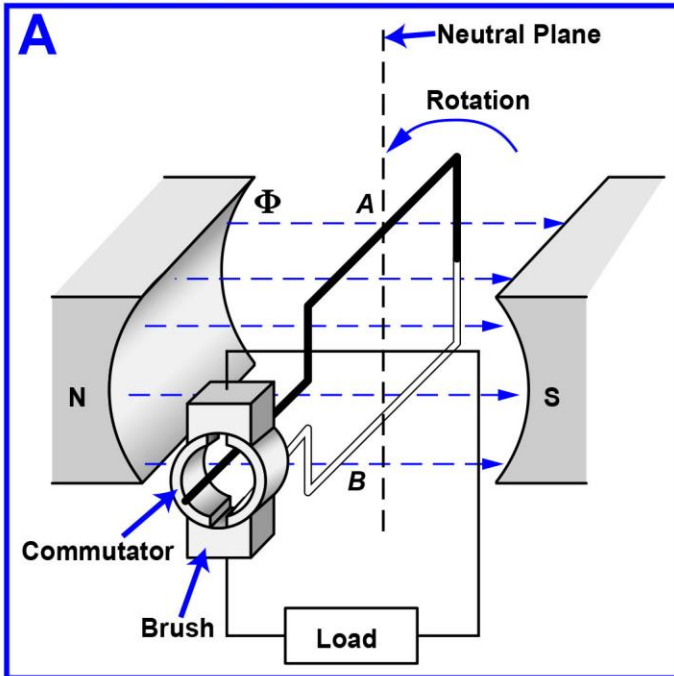
EL-0020



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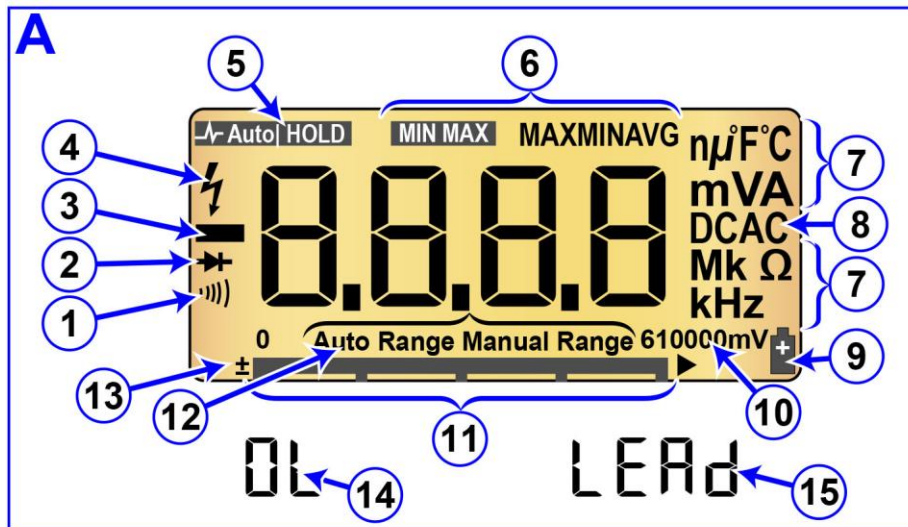
EL-0028



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Maintenance of Electrical Power Apparatus.  
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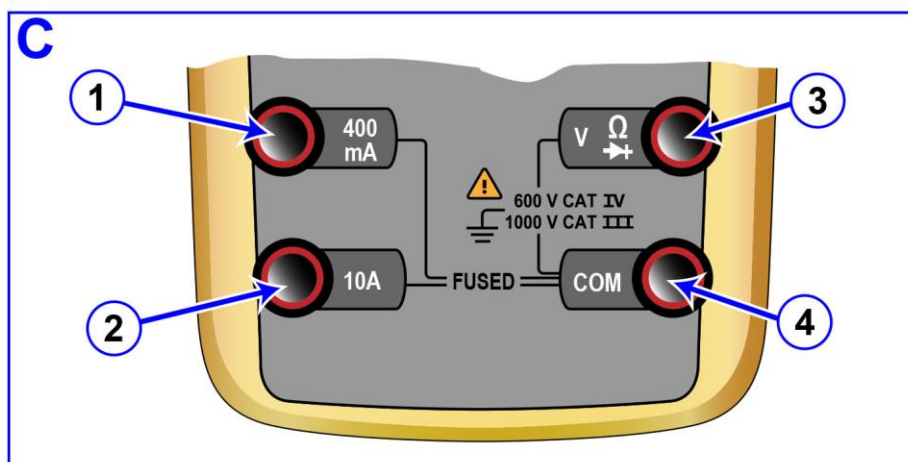


## EL-0047



**B**

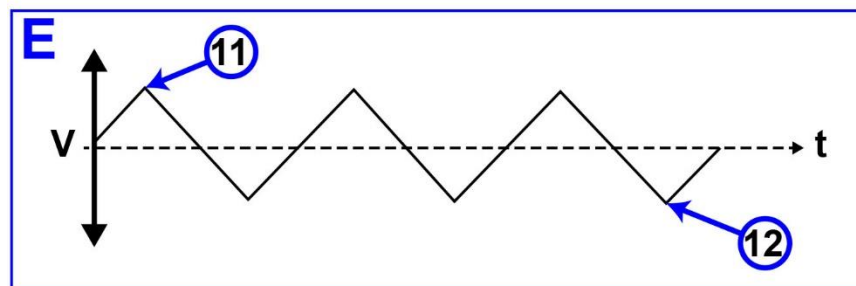
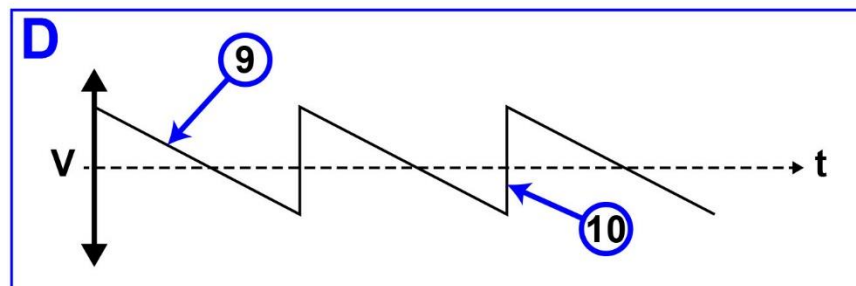
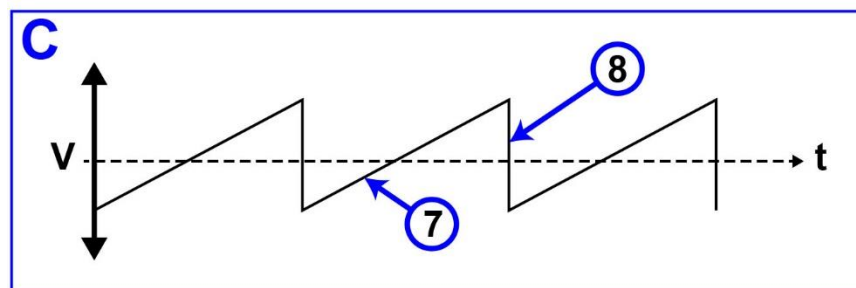
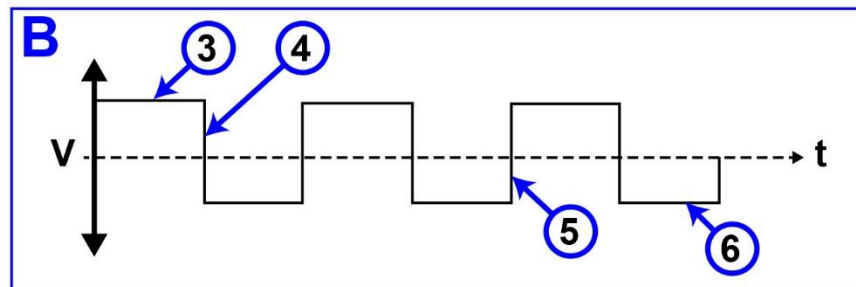
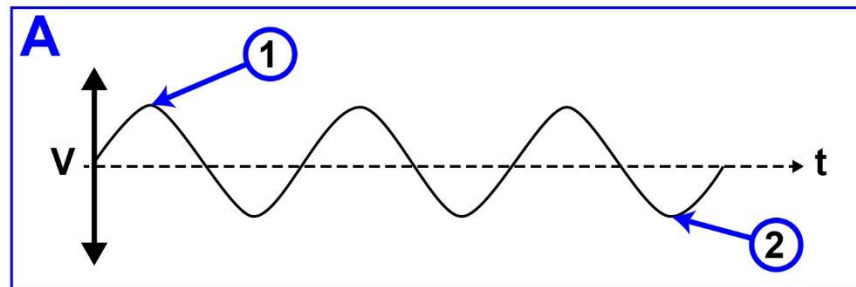
Switch Position	Measurement Function
$\bar{V}$ Hz	1
$\bar{V}$	2
m $\bar{V}$	3
$\Omega$ ⎓	4
)))	5
$\sim$ mA	6
$\sim$ A	7



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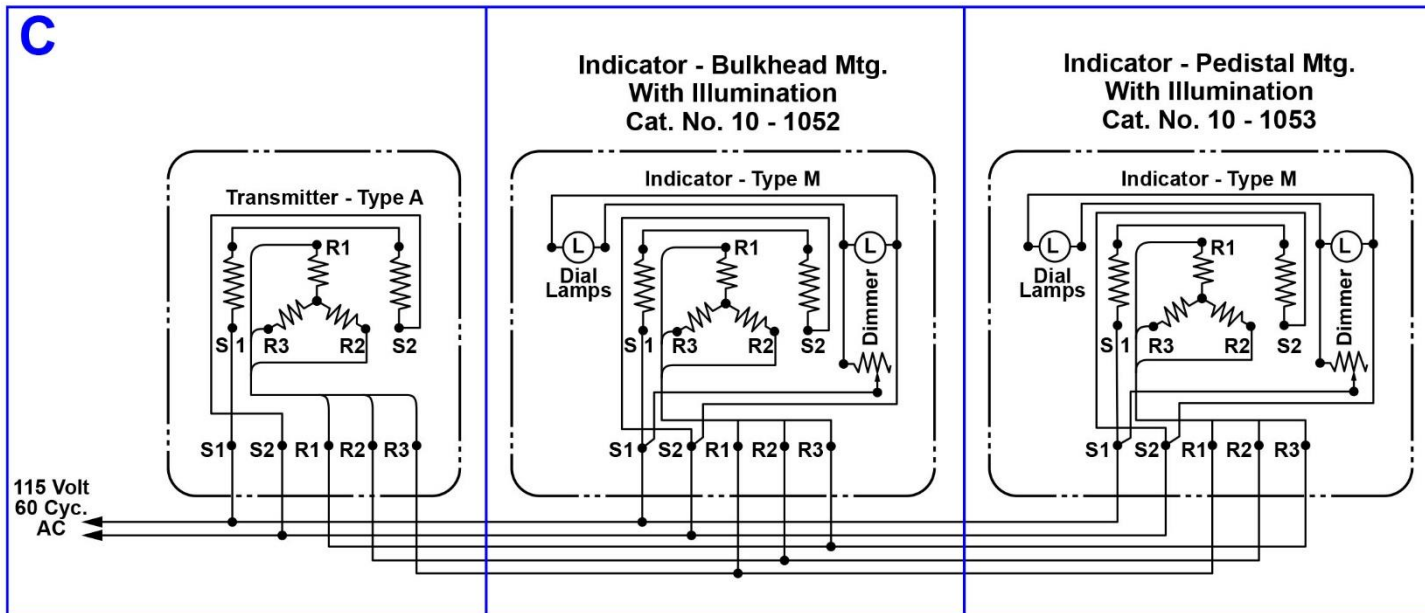
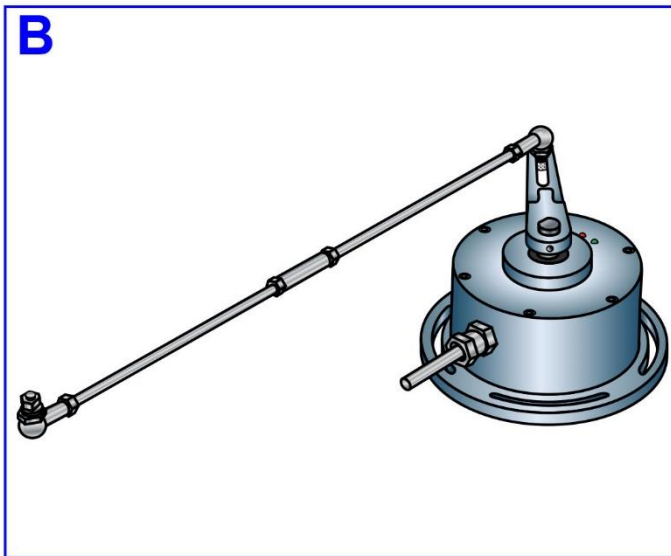
## EL-0088



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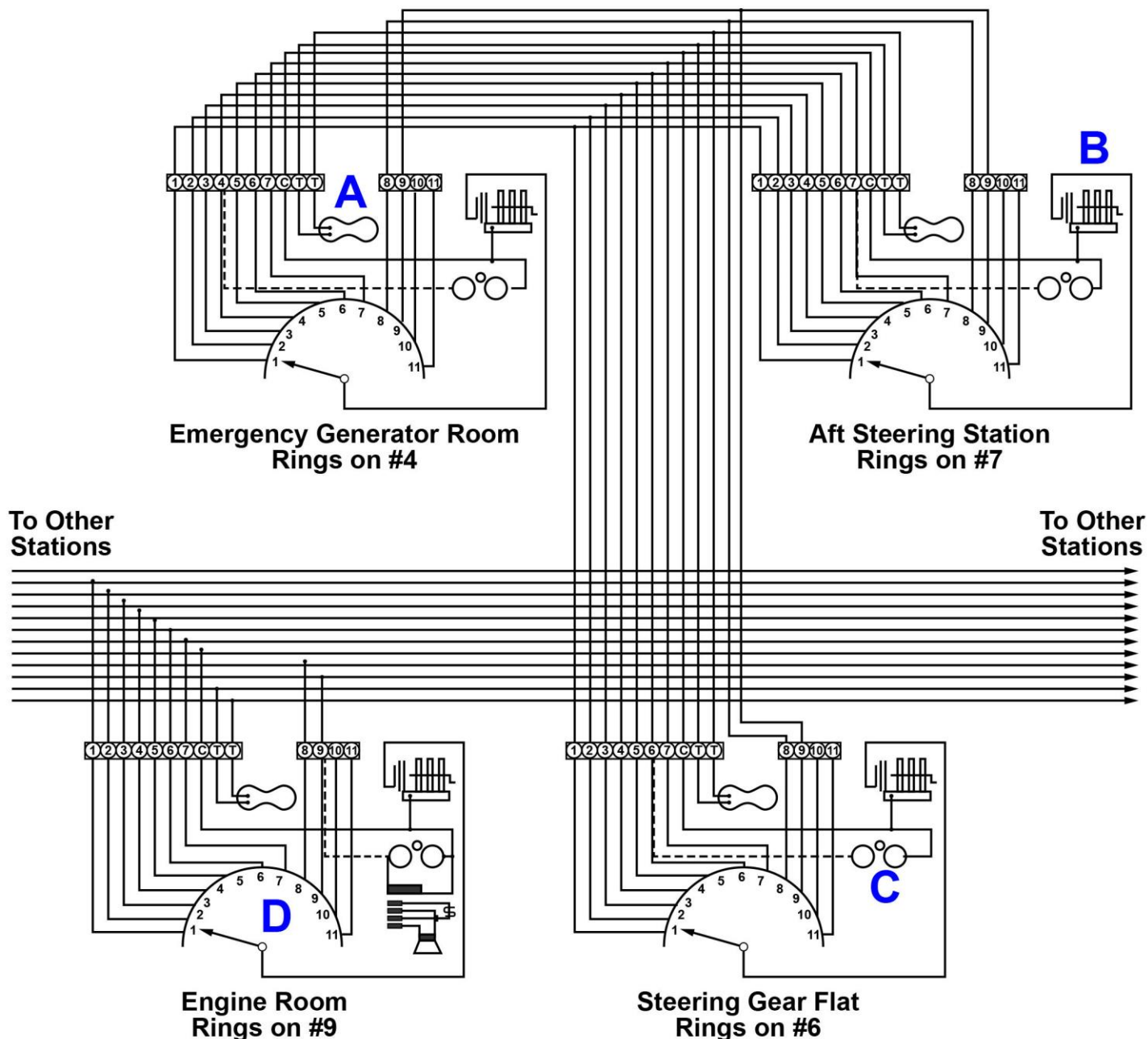
## EL-0092



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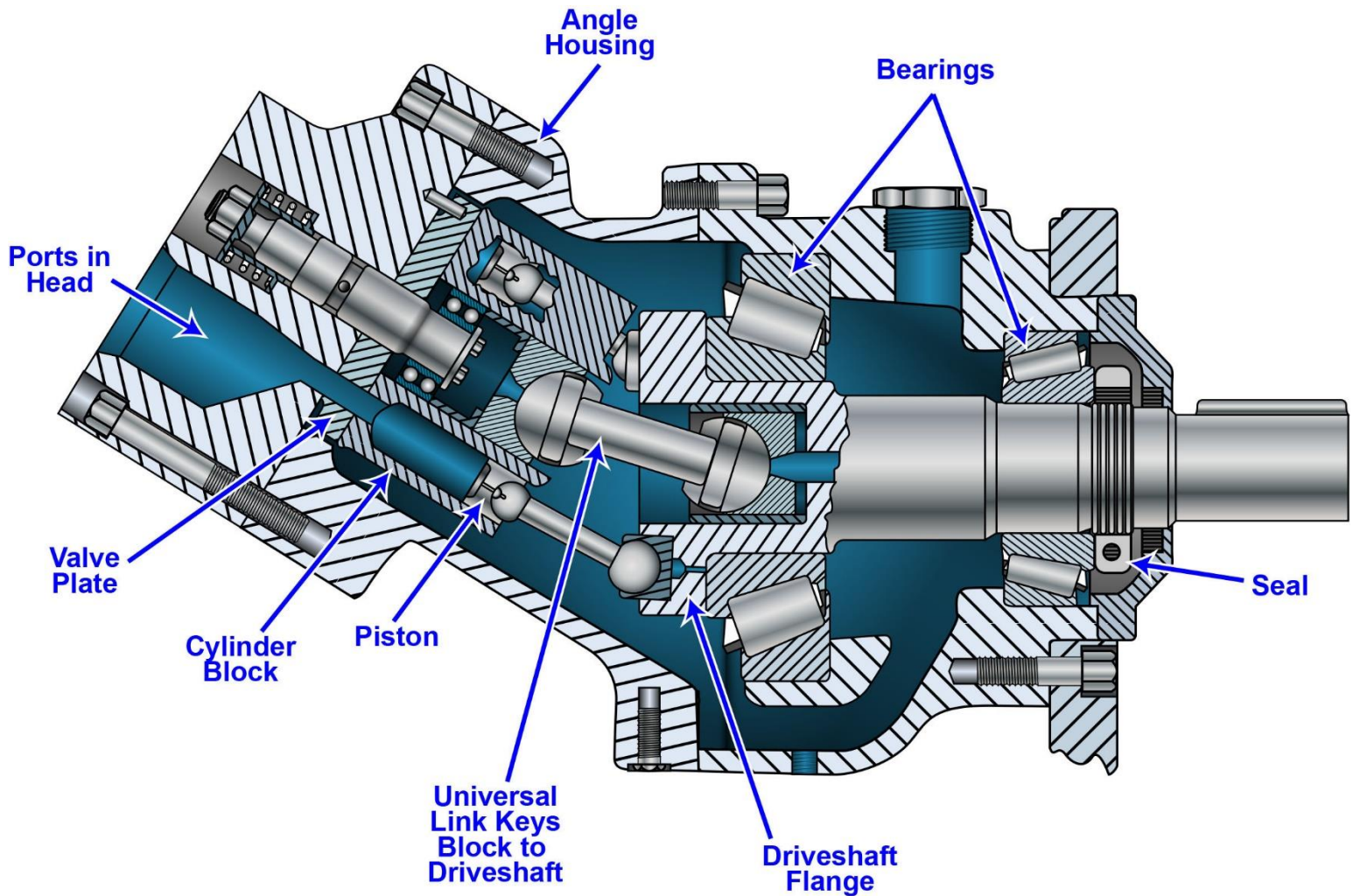
## EL-0093



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## GS-0058

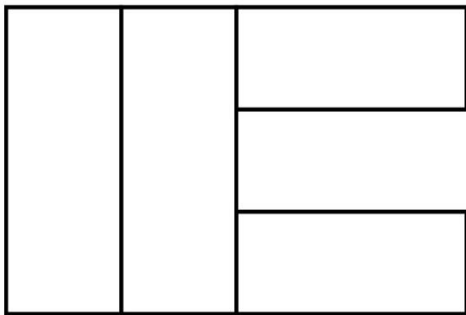


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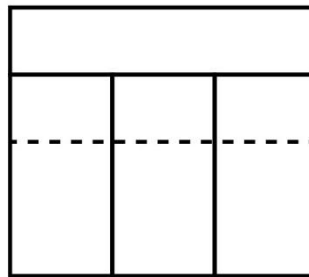


**GS-0132**

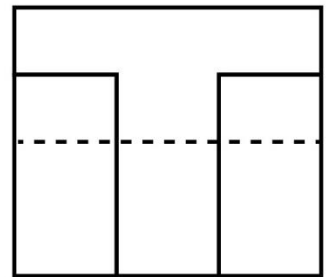
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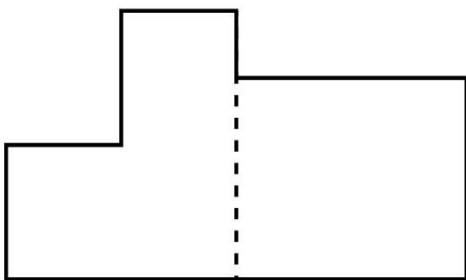
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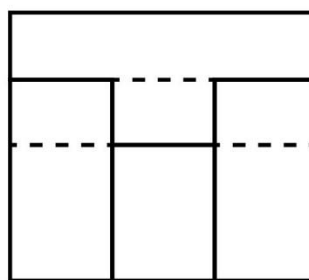
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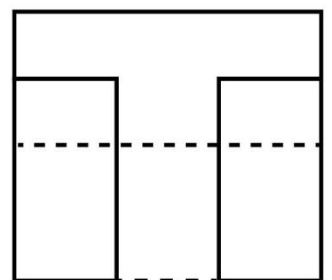
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**3**



**4**

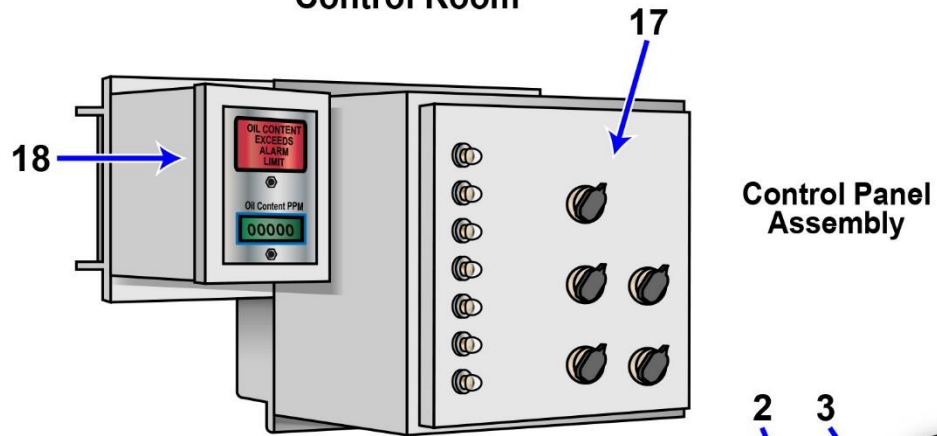


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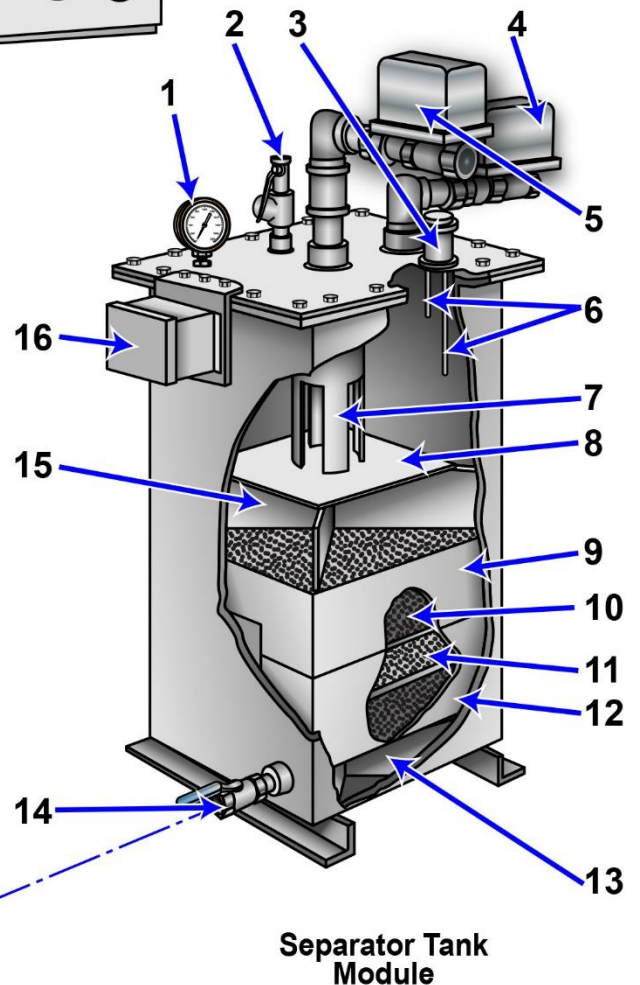
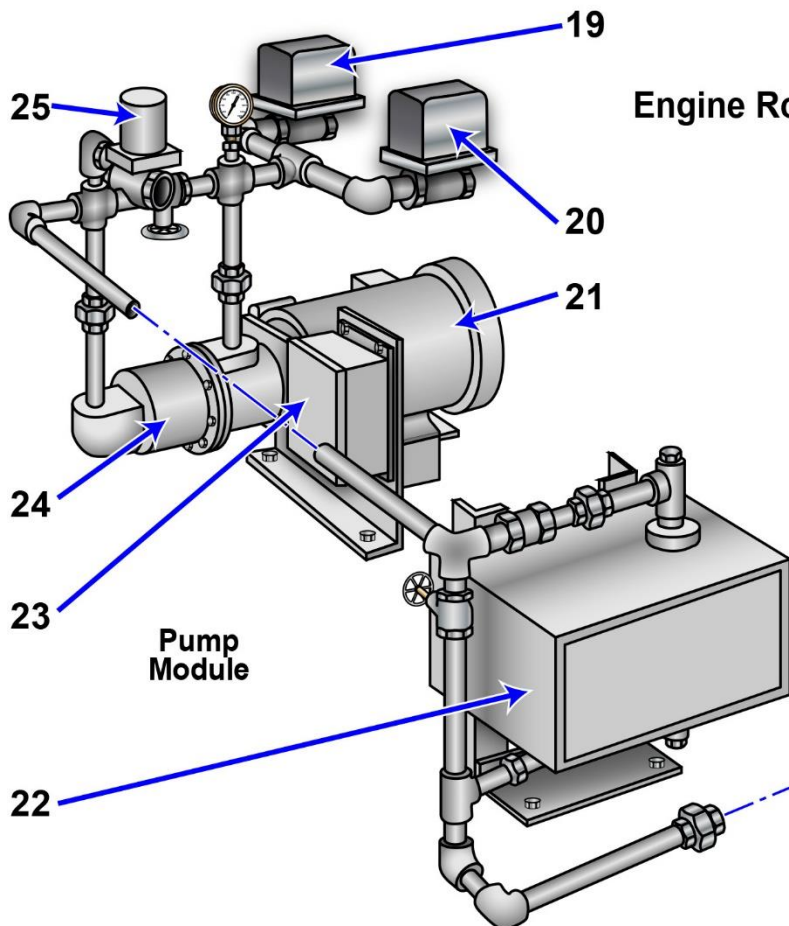


## GS-0153

### Control Room



### Engine Room



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