

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

### QMED

#### Q802 Electrician

#### (Sample Examination)

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

1. In preparing the surface of a metal for application of primers and finish coats, which of the listed hand tools would be best used to clean up welds and other areas where there is pitting?

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

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

2. Which of the following precautions should be taken when troubleshooting various power circuits using a digital multimeter?

- (A) When in the manual ranging mode, always preset the meter to the next higher range than the amount of voltage expected in the circuit.
- (B) Always remember that the unit is polarity sensitive and if used on DC circuits reversing the leads may result in high temperatures within the tester.
- (C) Never connect the device to circuits where potentials greater than 120 volts may be present, as the internal electronics can only withstand small currents.
- (D) Never use this type of meter on circuits greater than 60 Hz as the meter may not register voltages over 60 Hz.

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

3. A bearing using an oiling ring as a means of static oil feed must occasionally be serviced by removing the wear particles, grit, and moisture. How is this accomplished?

- (A) Draining the bottom of the strainer housing.
- (B) Changing the filter element.
- (C) Draining the bottom of the bearing lube oil sump.
- (D) Rotating the handle of the lube oil strainer.

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

4. The number of cycles per second occurring in AC voltage is known as what characteristic?

- (A) frequency
- (B) phase angle
- (C) half mode
- (D) wave form

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

5. 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"

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

6. 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 one test lead on the shaft and the other to each of the disconnected motor leads in succession and compare resistances.
- (B) Use a growler, listening for noise and vibration levels to diminish when the growler blade is positioned over an open stator coil.
- (C) Use an ohmmeter, placing the test leads across each pair of disconnected motor leads in succession and compare resistances.
- (D) Use a growler, listening for noise and vibration levels to increase when the growler blade is positioned over an open stator coil.

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

7. Large size pipe can be easily rotated with a \_\_\_\_\_.

- (A) strongback
- (B) basin wrench
- (C) monkey wrench
- (D) chain pipe wrench

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

8. The motor fails to start on an attempted startup. With the start button depressed, a voltmeter reading between 1 and 5, as illustrated in figure "A", indicates line voltage available to the control circuit, what should be your next step in the troubleshooting process? Illustration EL-0007

- (A) ensure that the disconnect switch (DS) is closed
- (B) attempt to reset the overload relay and determine the cause of the overload if applicable
- (C) test the contactor coil "M" for continuity and replace if necessary
- (D) test the stop button for continuity and replace if necessary

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

- 9.** 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 tubes of the lube oil cooler and through the shell of the jacket water cooler.
  - (B) Sea water flows through the tubes of the jacket water cooler and through the shell of the lube oil cooler.
  - (C) Sea water flows through the tubes of both the lube oil and jacket water coolers.
  - (D) Sea water flows through the shells of both the lube oil and jacket water coolers.

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

- 10.** Which practices should be followed at all times when using an electric grinding machine?

- (A) Be properly trained in the use of this tool.
- (B) Be certain that the frame is properly grounded.
- (C) Wear goggles or face shield.
- (D) Each of the above practices.

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

- 11.** For what reason should engine room watchstanders make periodic checks on the loads carried by electric motors?

- (A) exceeding nameplate currents shortens useful life
- (B) low loads necessitate frequent insulation cleaning
- (C) residual magnetism may increase
- (D) energy is wasted if full loading is not utilized

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

- 12.** A pump is defined as a device that \_\_\_\_\_.

- (A) imparts energy to a fluid to move it from point "A" to point "B"
- (B) is to develop a pressure differential
- (C) creates a vacuum to move a liquid in all installations
- (D) produces pressure

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

- 13.** When would be the safest time to close the ship's main switchboard "shore power" circuit breaker?

- (A) when the ship's generators have been disconnected from the main bus
- (B) only after the ship's generators have been directly paralleled to those on shore
- (C) if a quick disconnect coupling is used
- (D) at any time in a shipyard

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

**14.** A triac thyristor functions as a control device and can be thought of to function similarly as which of the following circuits?

- (A) two NPN transistors in parallel with a common base lead
- (B) a diode in series with a temperature sensitive capacitor
- (C) a triode tube with an extra heavy grid element
- (D) a bidirectional SCR with a common gate

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

**15.** With all other factors considered equal (such as voltage, conducting path through the body and the duration of contact), contact with an energized electrical system conductor of which system type would produce the most damaging effect?

- (A) DC systems
- (B) 60 Hz AC systems
- (C) 10 kHz AC systems
- (D) All the above systems would be equally as damaging

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

**16.** In the flow of one cycle of single phase alternating current past any given point in a circuit, how many times will the current peak to a maximum or minimum?

- (A) one time
- (B) two times
- (C) three times
- (D) four times

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

**17.** In managing a situation involving multiple injuries, the rescuer must be able to \_\_\_\_\_.

- (A) prescribe treatment for the victim
- (B) accurately diagnose the ailment or injury
- (C) provide the necessary medication
- (D) rapidly evaluate the seriousness of obvious injuries

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

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

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

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

**19.** The crosshatch design on the end of piece "3" in the illustration shown indicates that \_\_\_\_\_.  
Illustration GS-0020

- (A) the piece is screwed into piece 2
- (B) the piece is made of mild carbon steel
- (C) piece 3 is knurled in that area
- (D) piece 3 is made of stainless steel

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

**20.** The principle personnel hazard unique to Halon fire extinguishers is \_\_\_\_\_.

- (A) skin irritation
- (B) eye irritation produced immediately after discharge from cylinder
- (C) inhaling toxic vapors produced when exposed directly to a flame for extended periods
- (D) displacement of oxygen

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

**21.** 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

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

**22.** 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) using strip heaters inside the switch box
- (B) installing a light bulb in the pedestal stand
- (C) coating the switch box internals with epoxy sealer
- (D) venting the switch box regularly

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

**23.** When troubleshooting AC motors, what can a portable growler be used to locate?

- (A) shorted stator coils
- (B) open field coils
- (C) grounded field coils
- (D) grounded stator coils

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

**24.** In figure "2" of the diagram shown in the illustration, the three-phase power transformer has a step-down turns ratio of four to one. If a three-phase 440 volt supply is connected to terminals "A1-B1-C1", what voltage should develop across terminals "A2-B2-C2"? Illustration EL-0084

- (A) 64 volts
- (B) 110 volts
- (C) 190 volts
- (D) 762 volts

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

**25.** 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) Be certain that the replacement diode has the same polarity as the one removed.
- (C) The replacement diode must be dipped in varnish prior to installation to protect against humidity.
- (D) Never alter the diode alignment to cause a change in the neutral plane.

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

**26.** Which of the following statements is correct for the illustrated circuit in figure "B"? Illustration EL-0020

- (A) "R1", "R2", and "R3" are connected in parallel.
- (B) The voltages measured across "R1", "R2", and "R3" are equal.
- (C) "R1", "R2", and "R3" are connected in series.
- (D) The total resistance equals  $1/R1 + 1/R2 + 1/R3$ .

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

**27.** Fusible plugs are installed in fire-tube boilers to \_\_\_\_\_.

- (A) provide a means of draining the boiler
- (B) warn the engineer of low water level
- (C) cool the crown sheet at high firing rates
- (D) open the burners' electrical firing circuits

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

**28.** In terms of the battery electrolyte, when performing maintenance of alkaline batteries what should be done?

- (A) replace the electrolyte every 5 years
- (B) replace the electrolyte when the volts per cell drops below 1.8 VDC
- (C) wear protective gloves and goggles when handling electrolyte
- (D) check the electrolyte weekly using a hydrometer

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

**29.** What is the power consumed by "R<sub>2</sub>" in the circuit illustrated in figure "B", if the applied voltage is 24 volts and the resistance of R<sub>1</sub> is 3 ohms, R<sub>2</sub> is 4 ohms, and R<sub>3</sub> is 5 ohms, respectively?  
Illustration EL-0020

- (A) 16 watts
- (B) 20 watts
- (C) 24 watts
- (D) 28 watts

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

**30.** The advantage of using a dry chemical fire extinguishing agent is \_\_\_\_\_.

- (A) permanent extinguishment regardless of the reignition sources
- (B) its excellent cooling ability
- (C) its good stability and nontoxicity
- (D) all of the above

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

**31.** 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) farads
- (C) mhos
- (D) ohms

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

**32.** Pressure in an operating hydraulic system is developed \_\_\_\_\_.

- (A) only by the pump as its primary function
- (B) by the thermal input to the system's fluid
- (C) solely by the charge applied by the accumulators
- (D) by resistance to the fluid flow through the system

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



**33.** Which of the following devices would be forbidden to use as a primary means of electrical isolation?

- (A) circuit breaker
- (B) fused disconnect switch
- (C) non-fused disconnect switch
- (D) start/stop push button station

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

**34.** What is an ammeter used to measure?

- (A) total or partial circuit resistance
- (B) circuit continuity
- (C) current flow in a circuit
- (D) the voltage between two points in a circuit

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

**35.** Universal motors will operate on AC or DC current. In what application is this type of motor generally?

- (A) forced draft fans
- (B) turbo-electric main motors
- (C) large pump motors
- (D) portable tools

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

**36.** When the cotton cover of a fire hose becomes oily or greasy, it should be washed with a solution of mild soapy fresh water and \_\_\_\_\_.

- (A) a soft-bristled brush
- (B) a wire brush
- (C) paint thinner
- (D) cornstarch

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

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

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

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

**38.** The push button on the handset of a ship's sound-powered telephone must be depressed in order to do what?

- (A) ring the station being called
- (B) talk then released to listen
- (C) both talk and listen
- (D) listen then released to talk

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

**39.** The individual 6 volt lead-acid batteries, when connected as shown in the illustration, as a battery bank would produce how many volts? Illustration EL-0070

- (A) 6
- (B) 12
- (C) 18
- (D) 24

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

**40.** Which of the listed devices would be installed in the air compressor discharge line between the compressor and receiver of a control air system?

- (A) Vacuum breaker
- (B) Moisture separator
- (C) Lubricator
- (D) P-I converter

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

**41.** The lengthening of a crack formed in the shell plating of a ship may be prevented by \_\_\_\_\_.

- (A) cutting a square notch at each end of the crack
- (B) chipping out and slot welding the entire crack
- (C) welding brackets across both ends of the crack
- (D) drilling a hole at each end of the crack

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

**42.** How does a circuit breaker differ from a fuse?

- (A) a circuit breaker gives no visual indication of having opened the circuit, a fuse universally does
- (B) a circuit breaker trips to break the circuit and may be reset, a fuse may not be reset
- (C) a circuit breaker is enclosed in a tube of insulating material with metal ferrules at each end, a fuse is not
- (D) a circuit breaker melts and must be replaced, a fuse does neither

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

**43.** What type of eye protection affords the best protection from dust and airborne abrasives?

- (A) Full-face shield
- (B) Eyecup safety goggles
- (C) Standard safety glasses
- (D) Side-shielded safety glasses

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

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

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

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

**45.** The hydraulic pump which would be mounted on the unit shown in the illustration, may begin to cavitate if \_\_\_\_\_. Illustration GS-0118

- (A) "C" were not kept clean
- (B) "A" were allowed to remain open
- (C) "E" were not tightened enough
- (D) "H" were to be removed and the system operated for thirty minutes without it being replaced

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

**46.** The FIRST requirement for logical troubleshooting of any system requires the troubleshooter to do what?

- (A) identify the probable cause of a symptom
- (B) recognize what is normal operation
- (C) determine what tools you will need
- (D) isolate the faulty component

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

**47.** A pipe coupling is a fitting having \_\_\_\_\_.

- (A) inside threads on both ends
- (B) a left-hand twist
- (C) outside threads on both ends
- (D) outside threads on one end and inside threads on one end

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

**48.** You are fighting a class "B" fire with a portable dry chemical extinguisher. The discharge should be directed \_\_\_\_\_.

- (A) at the seat of the fire, starting near the edge
- (B) at the main body of the fire
- (C) to bank off a bulkhead onto the fire
- (D) over the top of the fire

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

**49.** You are about to enter a compartment to investigate a suspected smoldering fire. If you're not wearing a self-contained breathing apparatus, you should test the compartment's atmosphere to determine if there is/are \_\_\_\_\_.

- (A) a toxic atmosphere in the compartment
- (B) an explosive mixture in the compartment
- (C) sufficient oxygen to sustain human life
- (D) all of the above

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

**50.** In terms of consistency (or "stiffness"), what is the most common grade of grease for most marine applications as set forth by the National Lubricating Grease Institute (NLGI)?

- (A) NLGI 000
- (B) NLGI 0
- (C) NLGI 2
- (D) NLGI 6

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

**51.** With respect to motors, how is ambient temperature defined?

- (A) temperature of the compartment where the motor is located
- (B) amount of temperature rise with no load
- (C) normal operating temperature, less the room temperature
- (D) amount of temperature developed by an operating motor

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

**52.** Which of the following statements describes the difference between the primary windings and the secondary windings of an ideal 2:1 stepdown voltage transformer?

- (A) The secondary windings can only provide half as much current as the primary windings.
- (B) The secondary windings use smaller wires than the primary windings.
- (C) The secondary windings have half as many turns as the primary windings.
- (D) The secondary windings have twice as much resistance as the primary windings.

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

**53.** An across-the-line starter is typically used for which of the following applications?

- (A) Low resistance starting of DC motors
- (B) Low torque starting of small motors
- (C) Full voltage starting of motors
- (D) Reduced current starting of large motors

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

**54.** A large oil fire on the weather deck of a ship can be effectively fought using \_\_\_\_\_.

- (A) soda acid
- (B) dry chemical
- (C) high velocity fog
- (D) foam

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

**55.** A capacitor is to be tested with a digital multimeter set up to measure ohms. If the meter is connected to a shorted capacitor, how would the meter display respond?

- (A) immediately display a very low resistance with the value then continuously rising to a value of OL
- (B) immediately display a very low resistance value which remains low
- (C) immediately display a value of OL with the value then continuously dropping to a low value
- (D) immediately display a value of OL which remains at OL

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

**56.** If a shipboard AC generator experiences a failure to produce a voltage, what may be the cause?

- (A) a rotating slip ring
- (B) excessive locked-rotor current
- (C) failure of the exciter generator
- (D) the brushes shifting out of the neutral plane

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

**57.** In a typical automatic fire alarm system, which of the listed actions will cause an indication of a fire to be given in the annunciator cabinet?

- (A) A rise in temperature activating a heat detector.
- (B) A manual fire alarm box is activated.
- (C) The fire alarm test push button is operated.
- (D) All of the above.

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

**58.** What communications system would be operational despite a loss of ship's electrical power?

- (A) Emergency loudspeaker system
- (B) Call-bell system
- (C) Ship's service telephone system
- (D) Sound-powered telephone system

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

**59.** In general, how are nickel-cadmium storage batteries superior to lead-acid batteries?

- (A) they can remain idle and keep a full charge for a long time
- (B) they need fewer cells in series and use less mounting space
- (C) they put out higher voltages and require no maintenance
- (D) they are less costly to replace

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

**60.** If a three-phase induction motor is operated under a light load and it develops an open in one of its supply lines, what will be the result?

- (A) the motor will speed up due to the reduced number of poles
- (B) the motor will run cooler due to reduced current flow
- (C) the motor will continue to run, but will vibrate and have reduced torque
- (D) the motor will stop

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

**61.** Why do roller bearings have higher loading capacities than ball bearings?

- (A) They have a greater tolerance for high-speed applications.
- (B) They are subject to less pitting and metal fatigue.
- (C) They are installed with tighter clearances.
- (D) They have a greater contact area.

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

**62.** In the system shown in the illustration, the engine room station is unable to signal any other station, nor is any other station able to signal the engine room station. The engine room station can, however, ring itself by proper positioning of its selector switch. What is the most probable cause of this problem? Illustration EL-0093

- (A) The coil of component "C" of the problem station is open-circuited.
- (B) The selector switch is grounded at the problem station diverting current from the other stations' ringing devices.
- (C) The switch at component "A" of the problem station is stuck open.
- (D) There is an open between terminal "C" of the problem station and the common wire of the multi-conductor cable to the other stations.

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

**63.** If rotor-to-stator air gap readings for an electrical generating machine have changed significantly from the last reading, what should be checked?

- (A) insulation readings and machine cleanliness
- (B) the prime mover thrust bearing for wear
- (C) the field coil bolts for the proper torque values
- (D) the generator bearings for wear

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

**64.** To prevent blowback when attempting to light off an idle boiler, what statement is true?

- (A) The boiler fuel oil supply header temperature must be maintained above the flash point of the fuel, the furnace floor should be free of oil, and there should be sufficient combustible gases in the furnace.
- (B) The boiler fuel oil supply header temperature must be maintained below the pour point of the fuel, the furnace floor should be free of oil, and the furnace should be purged.
- (C) The boiler fuel oil supply header temperature must be maintained at the temperature necessary to obtain proper atomization of the fuel, the furnace floor should be free of oil, and the furnace should be purged.
- (D) The boiler fuel oil supply header temperature must be maintained at the temperature necessary to obtain proper atomization of the fuel, the furnace floor should be free of oil, and there should be sufficient combustible gases in the furnace.

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

**65.** For what purpose is the variable resistance placed in the rotor circuit of a wound-rotor induction motor provided?

- (A) vibration control
- (B) frequency control
- (C) voltage control
- (D) speed control

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

**66.** Suppose a remote valve operator is fitted with a gearbox. What is the purpose of the gearbox?

- (A) The gearbox is strictly used to change the orientation of the handwheel to the valve stem. The gearbox is never used to reduce the turning effort.
- (B) The gearbox may be used to change the orientation of the handwheel to the valve stem, or it may be used to reduce the turning effort, OR both.
- (C) The gearbox may be used to change the orientation of the handwheel to the valve stem, or it may be used to reduce the turning effort, but NEVER both.
- (D) The gearbox is strictly used to reduce the turning effort. The gearbox is never used to change the orientation of the handwheel to the valve stem.

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

**67.** In electronic circuitry, what does the abbreviation "PCB" commonly represent?

- (A) personal computer bits
- (B) pulse coded binary
- (C) poly-coated braid
- (D) printed circuit board

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

**68.** Which extinguishing agent is most likely to allow reflash as a result of not cooling the fuel below its ignition temperature?

- (A) Water fog
- (B) Water stream
- (C) CO<sub>2</sub>
- (D) Foam

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

**69.** While loading bulk oil, you notice oil on the water near the barge. Which of the following actions should you carry out FIRST?

- (A) Notify the Coast Guard
- (B) Notify terminal superintendent
- (C) Search the vessel for leaks
- (D) Stop loading

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

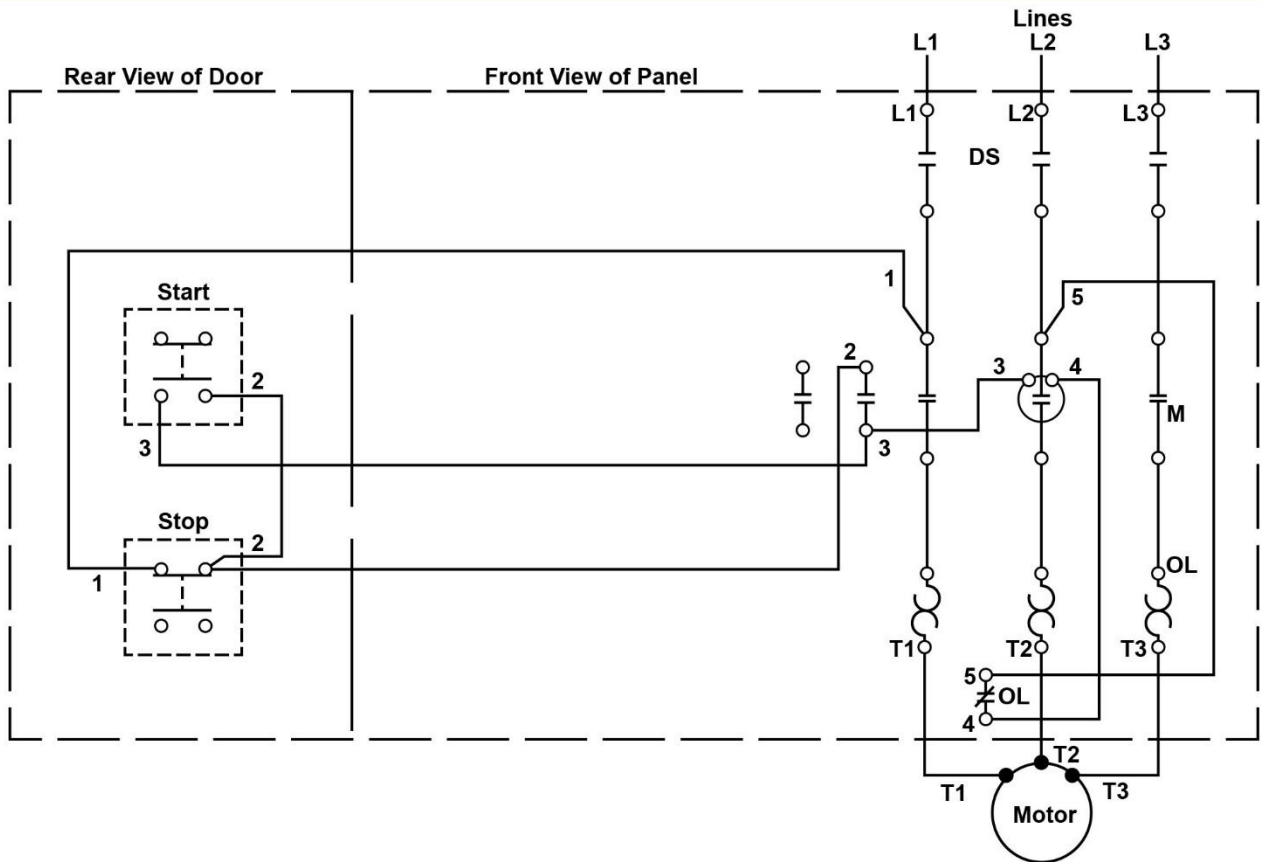
**70.** An increase in which of the listed conditions will increase the speed of a synchronous electric motor?

- (A) Voltage
- (B) Inductance
- (C) Frequency
- (D) Armature current

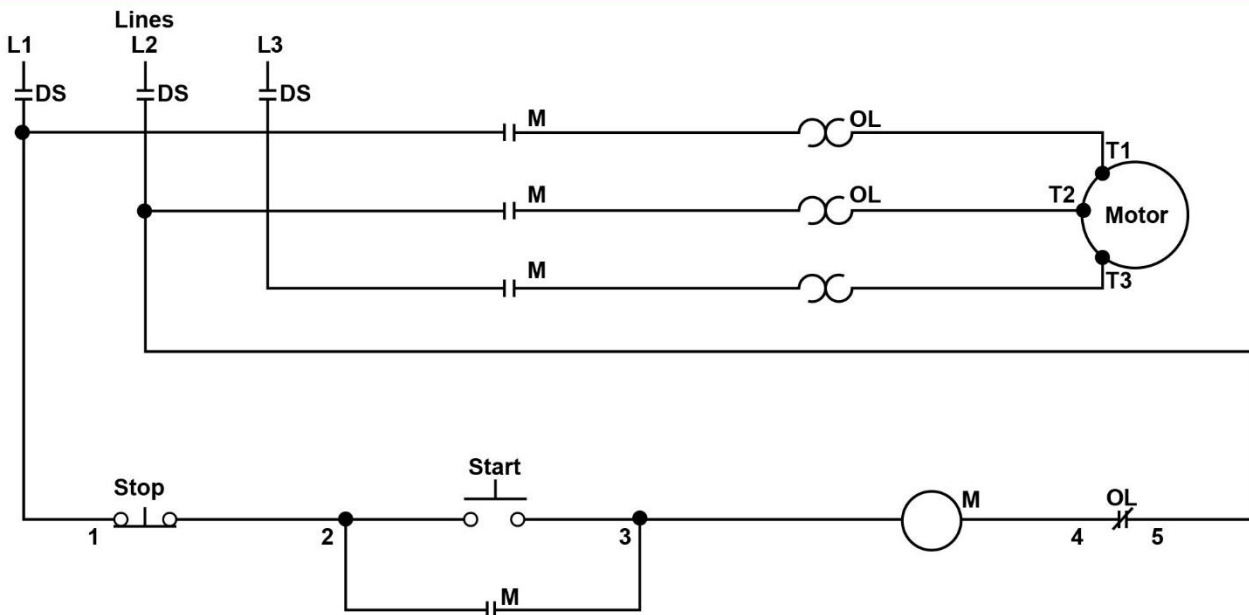
*If choice C is selected set score to 1.*



## EL-0007

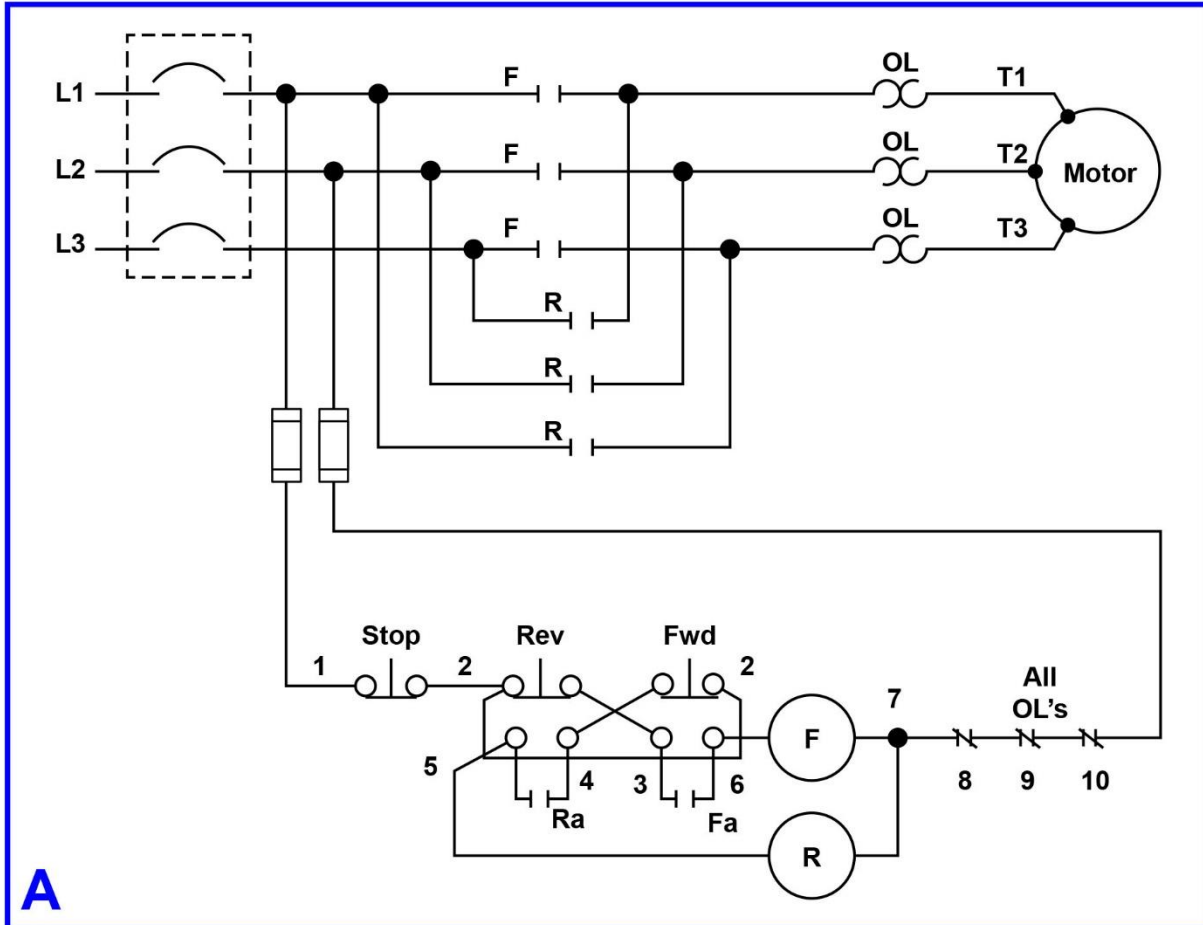


**A**

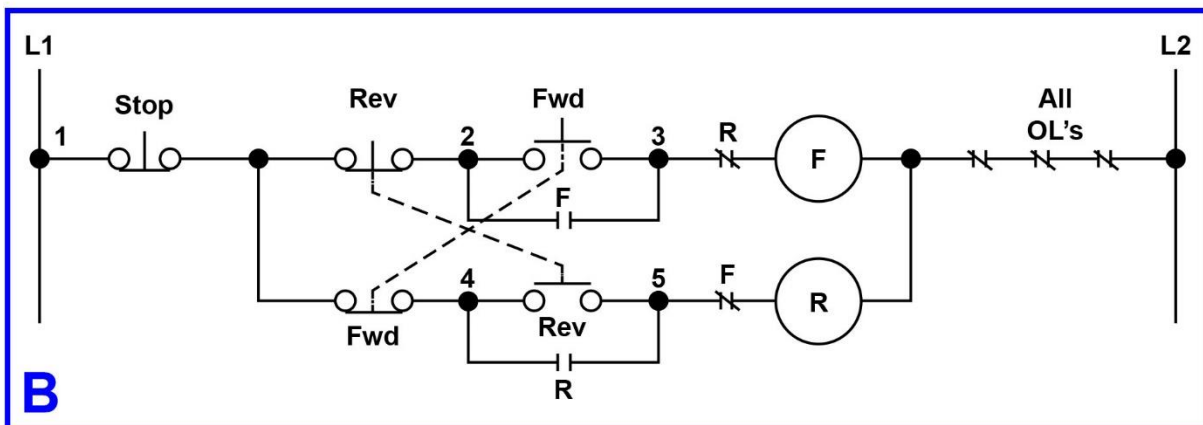


**B**

## EL-0011



**A**



**B**

Figure A

Adapted for testing purposes only from HUBERT,  
Operating, Testing, and Preventive Maintenance of  
Electrical Power Apparatus

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Figure B

Adapted for testing purposes only from ROSENBERG,  
Electric Motor Repair, Third Edition

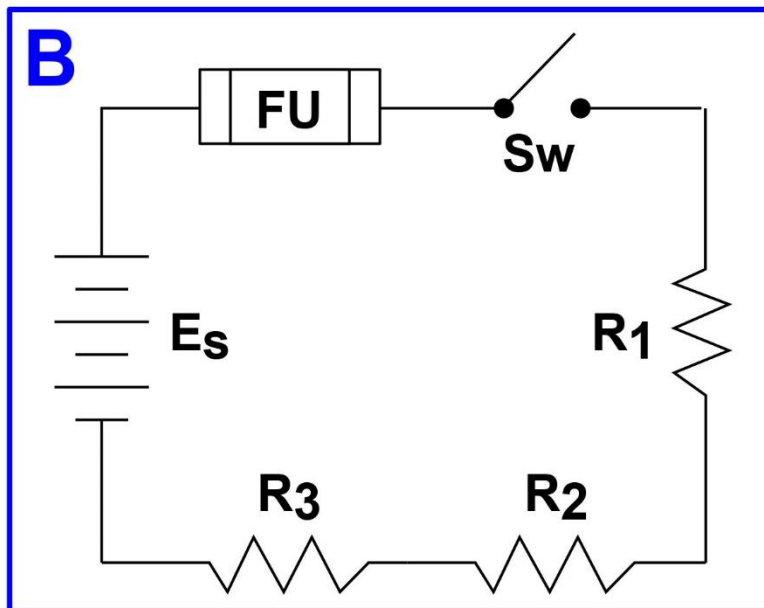
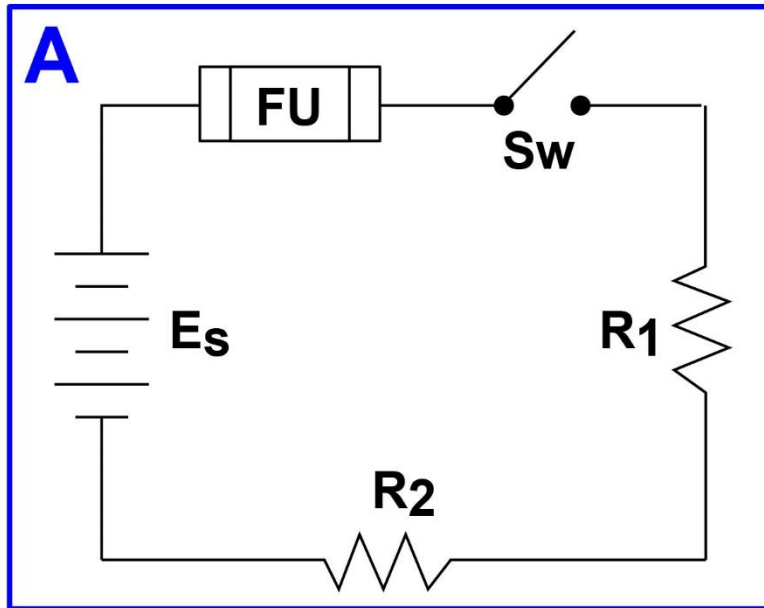
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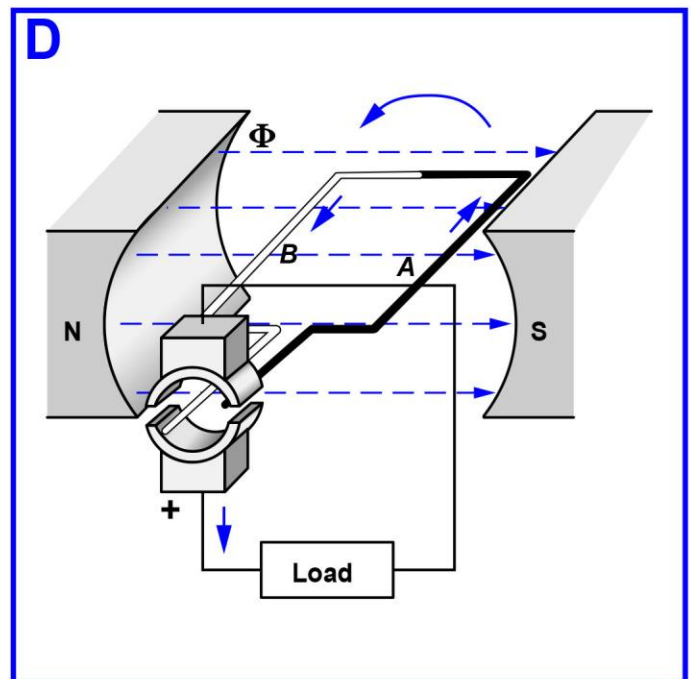
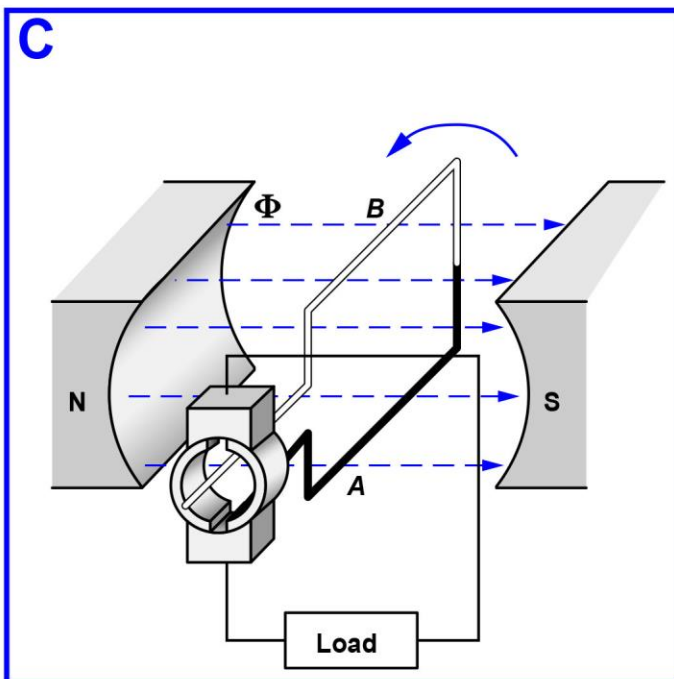
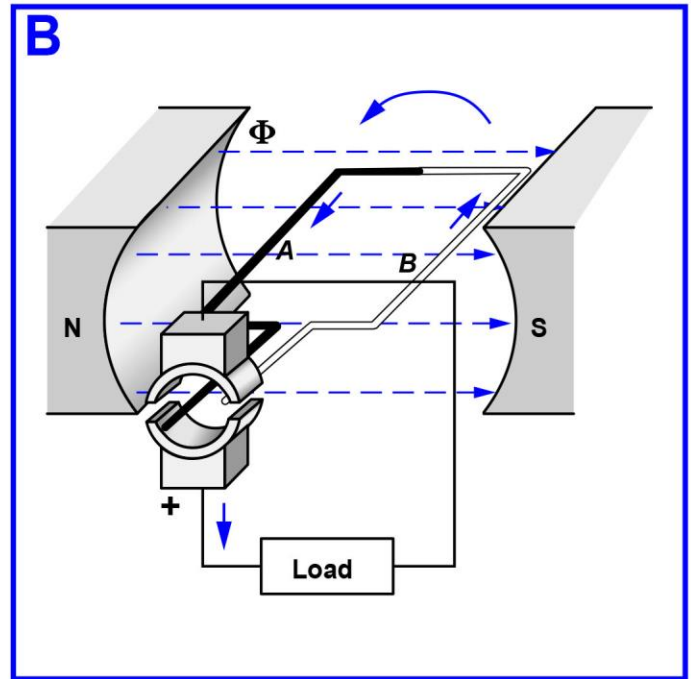
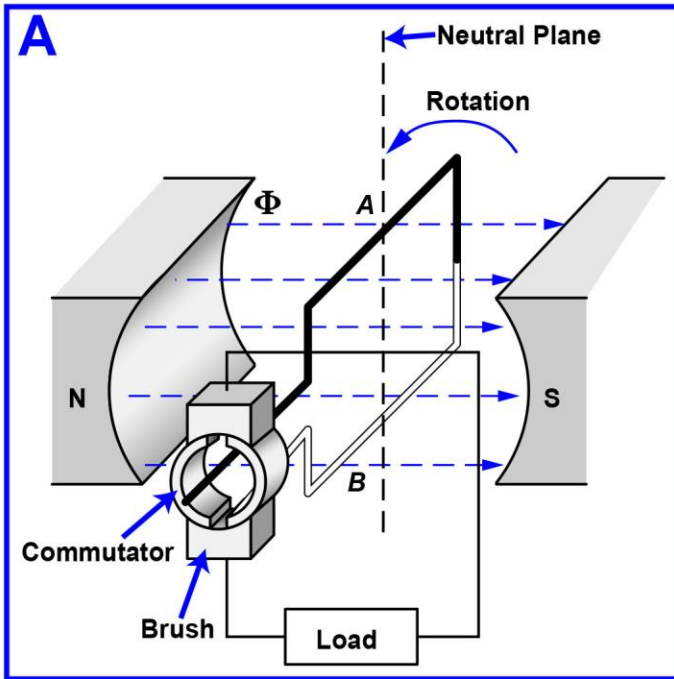
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Q802 Electrician

## EL-0020



## EL-0028

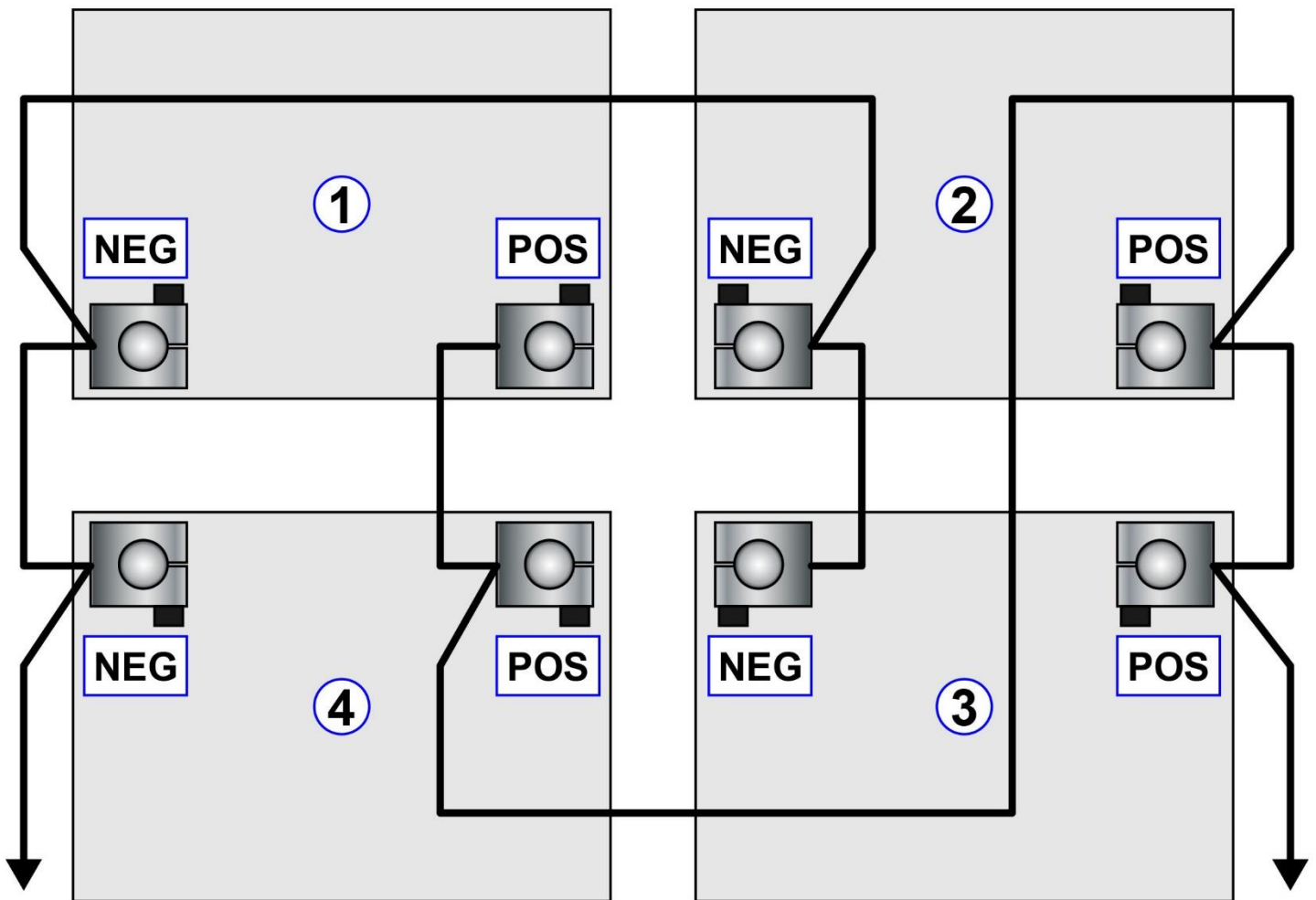


Adapted for testing purposes only from HUBERT, Operating, Testing and Preventive Maintenance of Electrical Power Apparatus.

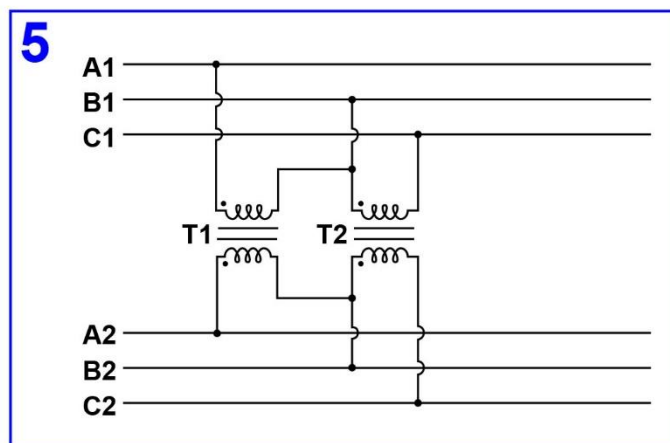
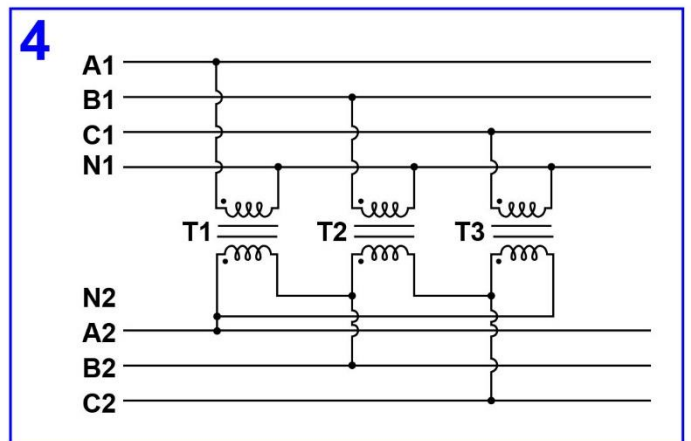
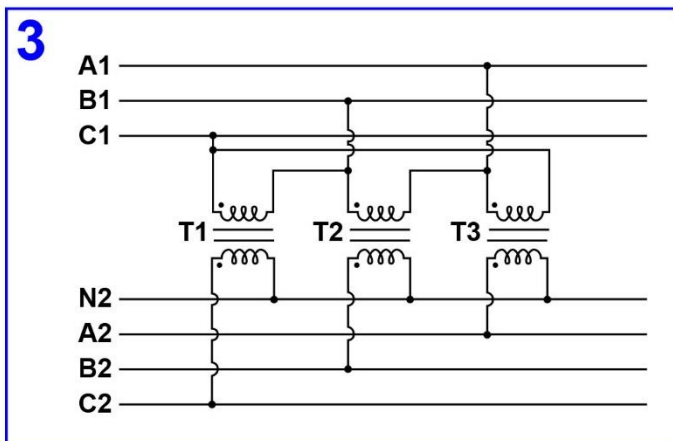
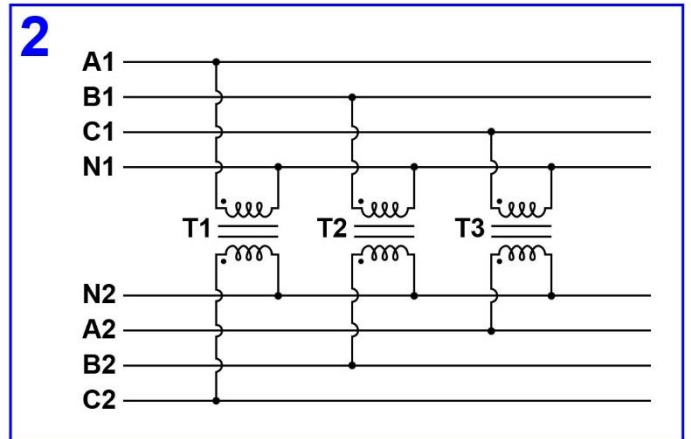
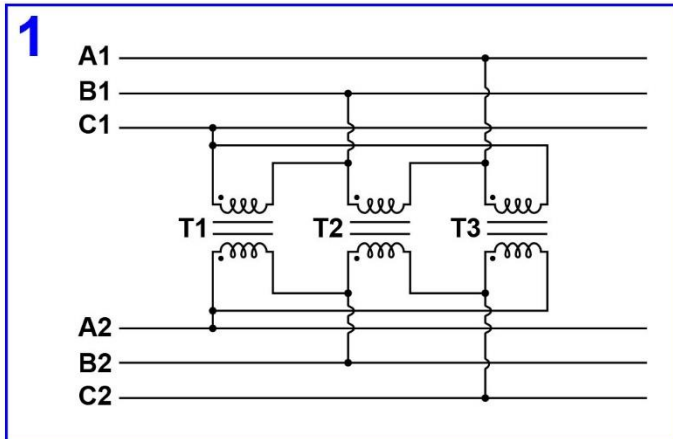
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## EL-0070



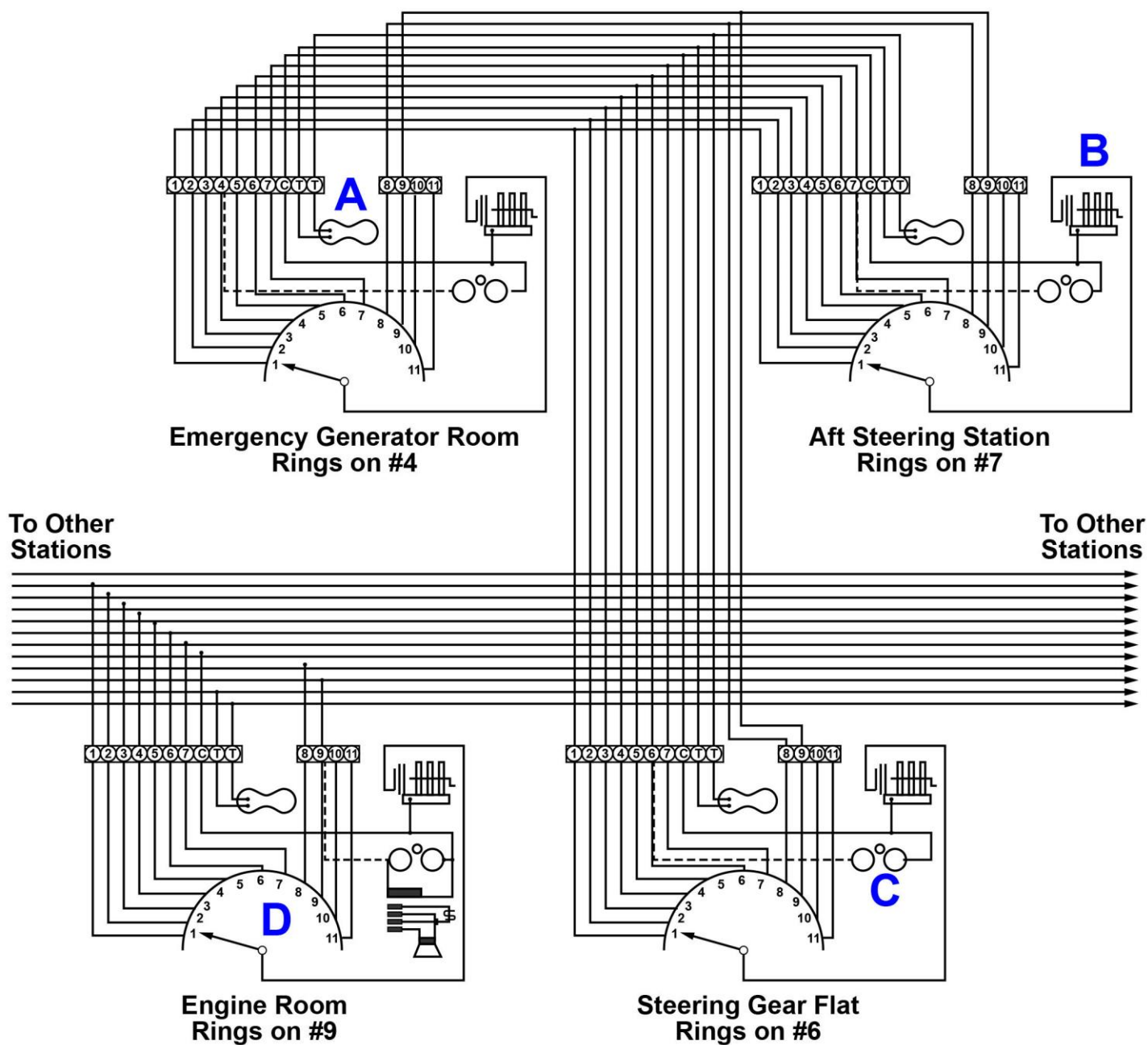
## EL-0084



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Maintenance of Electrical Power Apparatus  
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## EL-0093



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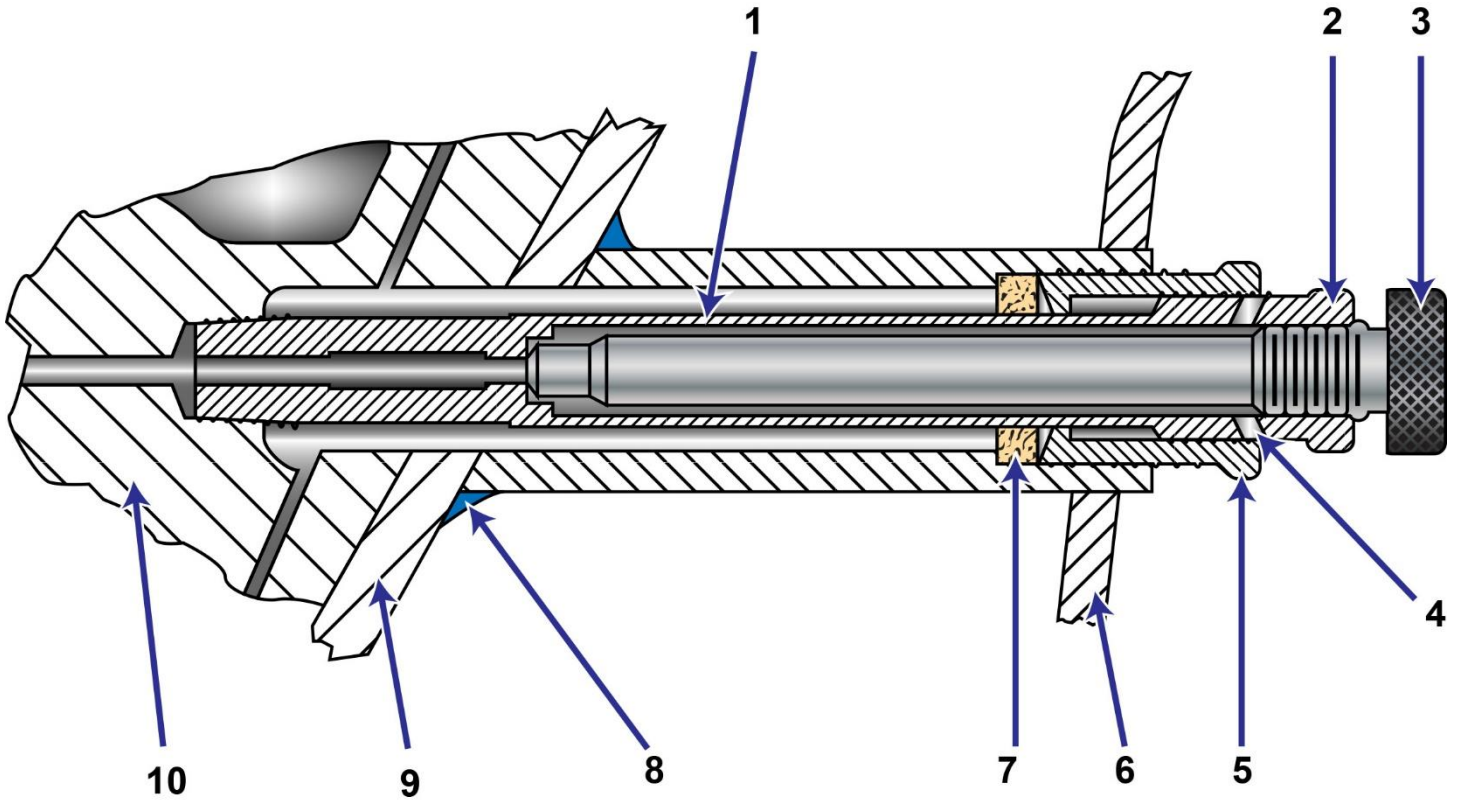
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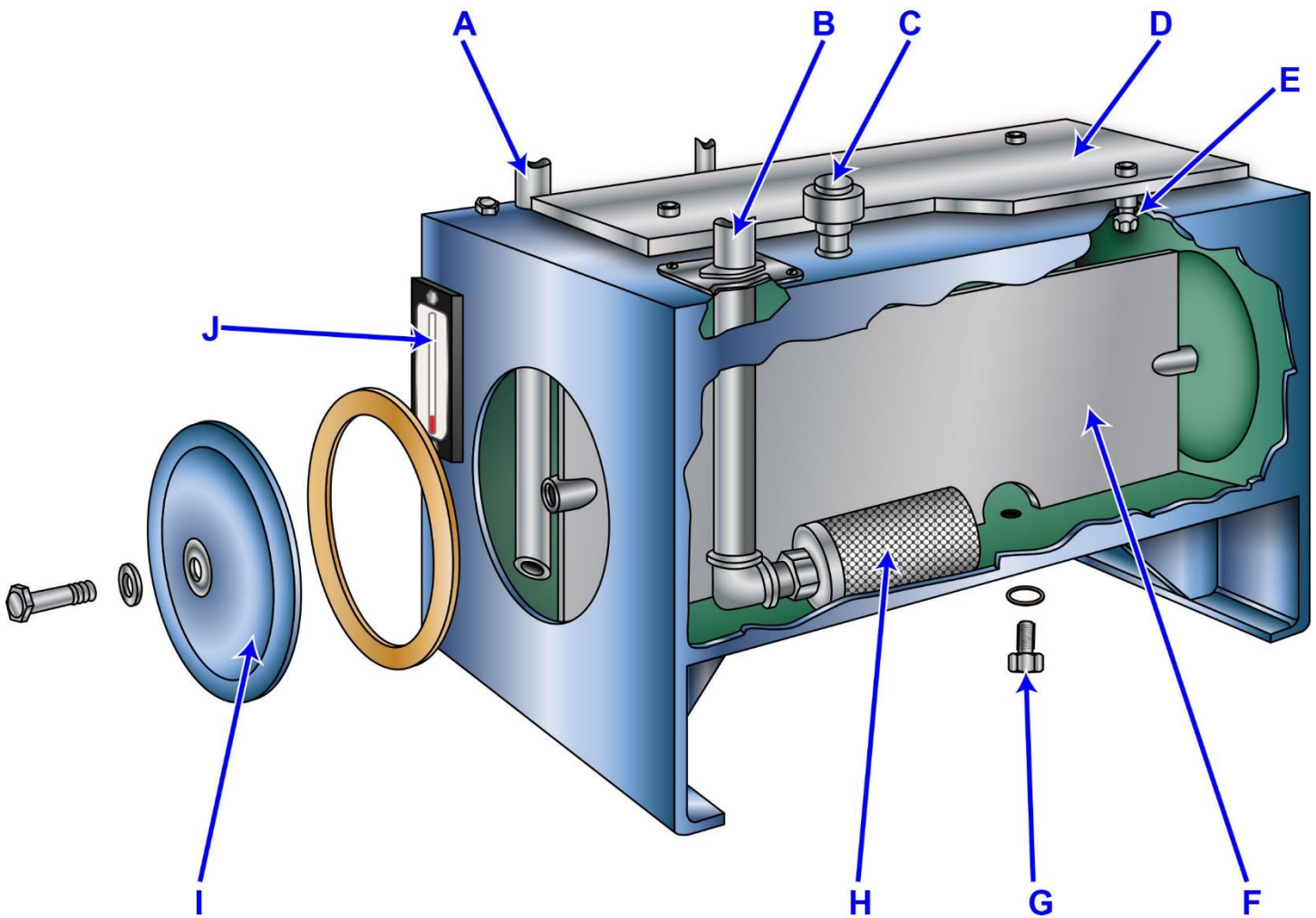


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Marine Engine/Systems, 1<sup>st</sup> Edition

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## GS-0118



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