

U.S.C.G. Merchant Marine Exam

DDE-Unlimited HP

Q625 Electrical-Electronic-Control Engineering

(Sample Examination)

Choose the best answer to the following Multiple Choice Questions

1. When placed in a magnetic field, which of the materials listed will maintain the highest permeability?

- (A) Bakelite
- (B) Glass
- (C) Aluminum
- (D) Soft iron

If choice D is selected set score to 1.

2. A signal derived from an amplifier output and returned to the amplifier input is called what type of signal?

- (A) monitoring signal
- (B) feedback signal
- (C) reverse signal
- (D) inverse signal

If choice B is selected set score to 1.

3. In a series circuit, which value will remain unchanged at all places in the circuit?

- (A) Inductance
- (B) Voltage
- (C) Current
- (D) Resistance

If choice C is selected set score to 1.

4. What would be the indication of a grounded switch or cable as measured by a megohmmeter?

- (A) being unsteady in the low range
- (B) "zero"
- (C) being unsteady in the high range
- (D) infinity

If choice B is selected set score to 1.

5. What is an advantage of DC motors over AC motors?

- (A) DC motors can be started across the line whereas AC motors cannot
- (B) DC motors offer a more effective means of controlling speed than AC motors
- (C) DC motors require less maintenance than AC motors
- (D) DC motors are less expensive than AC motors

If choice B is selected set score to 1.

- 6.** Some shipboard high voltage systems have the neutral point of the generators bonded to the ship's hull with a neutral grounding resistor. What is the purpose of this resistor?
- (A) To completely eliminate ground fault current
 - (B) To maximize the magnitude of the ground fault current
 - (C) To prevent nuisance ground fault trips
 - (D) To minimize the magnitude of the ground fault current

If choice D is selected set score to 1.

- 7.** In what applications are germanium semiconductor diodes commonly used?
- (A) potentiometers
 - (B) rectifiers
 - (C) power sources
 - (D) photocells

If choice B is selected set score to 1.

- 8.** As shown in the illustration, what statement is true concerning each of the system gateways?
Illustration EL-0098
- (A) Each connects one of two redundant automation area networks with both redundant cargo process area networks.
 - (B) Each connects one of two redundant automation area networks with both redundant engine control process area networks.
 - (C) Each connects one of two redundant automation area networks with one of two redundant engine control process area networks and one of two redundant cargo process area networks.
 - (D) Each connects one of two redundant automation area networks with the other automation area network.

If choice C is selected set score to 1.

- 9.** What can be the cause of excessive heat or burning contacts in an operating motor controller?
- (A) low motor starting torque
 - (B) burned out operating coil
 - (C) high ambient temperature
 - (D) loose connections or low contact pressure

If choice D is selected set score to 1.

10. A 125 volt DC motor is rated at 10 kW. What is the current rating of the motor?

- (A) 4.6 amps
- (B) 8.0 amps
- (C) 46.2 amps
- (D) 80 amps

If choice D is selected set score to 1.

11. 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.

12. As shown in all four diagrams included in the illustration, what type of logic circuit is represented?
Illustration EL-0227

- (A) NOR gate
- (B) OR gate
- (C) AND gate
- (D) NAND gate

If choice B is selected set score to 1.

13. Referring to the illustration what is the position of the three circuit breakers labeled in figure "A", "B", and "C" respectively? Illustration EL-0033

- (A) Circuit breaker in figure "A" is in the **OFF** position. Circuit breaker in figure "B" is in the **TRIPPED** position. Circuit breaker in figure "C" is in the **ON** position.
- (B) Circuit breaker in figure "A" is in the **ON** position. Circuit breaker in figure "B" is in the **TRIPPED** position. Circuit breaker in figure "C" is in the **OFF** position.
- (C) Circuit breaker in figure "A" is in the **ON** position. Circuit breaker in figure "B" is in the **OFF** position. Circuit breaker in figure "C" is in the **TRIPPED** position.
- (D) Circuit breaker in figure "A" is in the **OFF** position. Circuit breaker in figure "B" is in the **ON** position. Circuit breaker in figure "C" is in the **TRIPPED** position.

If choice D is selected set score to 1.

14. As shown in the illustrated wound-rotor induction motor, what statement is true concerning motor lead connections? Illustration EL-0148

- (A) The "M1, M2, and M3" motor leads are directly connected to the rotor windings and the "T1, T2, and T3" motor leads are connected to the stator windings via slip rings and brushes.
- (B) The "T1, T2, and T3" motor leads are connected to the rotor windings via slip rings and brushes and the "M1, M2, and M3" motor leads are directly connected to the stator windings.
- (C) The "M1, M2, and M3" motor leads are connected to the rotor windings via slip rings and brushes and the "T1, T2, and T3" motor leads are directly connected to the stator windings.
- (D) The "T1, T2, and T3" motor leads are directly connected to the rotor windings and the "M1, M2, and M3" motor leads are connected to the stator windings via slip rings and brushes.

If choice C is selected set score to 1.

15. In referring to figure "E" of the illustration, what statement is true concerning the functional purpose of the coupling transformer? Illustration EL-0075

- (A) The transformer functions as a filter by removing the DC component from the varying DC input to produce an AC output shifted 90° from the input.
- (B) The transformer functions as a filter by removing the DC component from the varying DC input to produce an AC output in phase with the input.
- (C) The transformer functions as a voltage transformer by changing the magnitude of the peak to peak AC voltage at the output proportional to the turns ratio.
- (D) The transformer functions as a filter by removing the DC component from the varying DC input to produce an AC output shifted 180° from the input.

If choice A is selected set score to 1.

16. What is the name of the type of motor control circuit that will not permit automatic restarting after power is restored, following a power failure?

- (A) low voltage protection
- (B) overload lockout
- (C) reduced voltage restart
- (D) low voltage release

If choice A is selected set score to 1.

17. When a megohmmeter is used to test insulation, what condition causes the gradual rise of the pointer reading as a result of continued cranking?

- (A) the dielectric-absorption effect of the insulation
- (B) good conductor resistance
- (C) the inductive reactance of the windings
- (D) the leakage of current along the surface of dirty insulation

If choice A is selected set score to 1.

18. When testing insulation resistance of electric equipment and machinery, ideally when should the insulation resistance be tested for the lowest normal insulation values?

- (A) every time the brush rigging is adjusted
- (B) every 30 days whether the machine is in use or not
- (C) immediately after starting up the machine
- (D) immediately after shutting down the machine

If choice D is selected set score to 1.

19. What is the most common and reliable type of circuit breaker used for high voltage practice aboard ship?

- (A) oil-break
- (B) gas-break
- (C) air-break
- (D) vacuum-break

If choice D is selected set score to 1.

20. Assuming that the electrolyte has had sufficient time to be uniformly diffused throughout the cell, if the open-circuit cell voltage as measured by a digital multimeter is 2.12, what would be the approximate specific gravity?

- (A) 1.260
- (B) 1.270
- (C) 1.280
- (D) 1.290

If choice C is selected set score to 1.

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

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

If choice D is selected set score to 1.

22. What is the most reliable and preferred method for determining the state of charge of a wet cell NiCad battery?

- (A) Measuring the specific gravity of each cell with a hydrometer.
- (B) Measuring the battery voltage with a digital voltmeter during charge or discharge.
- (C) Measuring the battery voltage with a solenoid type voltage tester during charge or discharge.
- (D) Measuring the temperature corrected specific gravity of each cell with a hydrometer and thermometer.

If choice B is selected set score to 1.

23. Which of the following illustrated manual motor starters represents the wiring diagram illustrated in figure "A"? Illustration EL-0023

- (A) 1
- (B) 2
- (C) 3
- (D) 4

If choice A is selected set score to 1.

24. Which of the following methods should be used to dress the face of silver-plated contacts?

- (A) Knurling with a knurling tool
- (B) Filing with a mill file
- (C) Burnishing with a burnishing tool
- (D) Sanding with 0000 sandpaper

If choice D is selected set score to 1.

25. What type of local area network physical topology features point-to-point interconnection between all communicating devices and is the least vulnerable to a break in communication?

- (A) Mesh
- (B) Bus
- (C) Star
- (D) Ring

If choice A is selected set score to 1.

26. As shown in figure "A" of the illustration, with the switch closed what statement is true if " R_1 " and " R_2 " have unequal resistance values? Illustration EL-0019

- (A) The energy dissipated in " R_1 " will be the same as the energy dissipated in " R_2 ".
- (B) The voltage drop across " R_1 " will not be equal to the voltage drop across " R_2 ".
- (C) The current flow through " R_1 " will equal the current flow through " R_2 ".
- (D) The current flow through " R_1 " will differ from the current flow through " R_2 ".

If choice D is selected set score to 1.

27. As the electrolyte level in the cells of a lead-acid battery evaporates over time, what will tend to happen to the specific gravity of the electrolyte in the cells as the level drops due to evaporation?

- (A) Although the specific gravity will change due to evaporation, there is no predictable tendency either way.
- (B) The specific gravity of the electrolyte will decrease as only the sulfuric acid will evaporate from the electrolyte solution.
- (C) The specific gravity of the electrolyte will remain unchanged as both the water and sulfuric acid will evaporate from the electrolyte solution.
- (D) The specific gravity of the electrolyte will increase as only the water will evaporate from the electrolyte solution.

If choice D is selected set score to 1.

28. Concerning the operating characteristics of a synchronous motor, what statement is true?

- (A) The synchronous motor initially starts as a synchronous motor and when it approaches synchronous speed, the motor continues to run as a synchronous motor.
- (B) The synchronous motor initially starts as a synchronous motor and when it approaches synchronous speed, the motor then runs as an induction motor.
- (C) The synchronous motor initially starts as an induction motor and when it approaches synchronous speed, the motor continues to run as an induction motor.
- (D) The synchronous motor initially starts as an induction motor and when it approaches synchronous speed, the motor then runs as a synchronous motor.

If choice D is selected set score to 1.

29. How is a wattmeter electrically connected in a circuit?

- (A) In parallel
- (B) In series
- (C) Inductively
- (D) In series-parallel

If choice D is selected set score to 1.

30. Which of the following statements is true concerning step-down transformer operation?

- (A) The voltage supplied to the primary side is greater than the voltage produced by the secondary side.
- (B) The current drawn by the primary side is greater than the current delivered from the secondary side.
- (C) The kVA consumed by the primary side is greater than the kVA produced by the secondary side.
- (D) The voltage supplied to the primary side is lower than the voltage produced by the secondary side.

If choice A is selected set score to 1.

31. Upon failure of the normal power supply, how is the emergency generator placed on the line to feed power to the emergency bus?

- (A) line connection feeder
- (B) power failure alarm bus
- (C) main bus tie feeder
- (D) automatic bus transfer device

If choice D is selected set score to 1.

32. Which figure shown in the illustration represents the schematic symbol shown in figure "2"?
Illustration EL-0034

- (A) figure "A"
- (B) figure "B"
- (C) figure "C"
- (D) figure "D"

If choice B is selected set score to 1.

33. What could prevent a lead-acid battery from accepting a full charge?

- (A) Attempting to force charging current into the battery in the opposite direction to that which occurs during discharge.
- (B) Topping off low electrolyte levels (due to evaporation) with distilled water.
- (C) Leaving the battery in a discharged condition for a great length of time.
- (D) Coating terminal posts with an antioxidant grease approved for battery use.

If choice C is selected set score to 1.

34. As shown in the illustration, which of the following pieces of equipment is supplied with a circuit breaker providing both overload and short-circuit protection? Illustration EL-0165

- (A) Lube Oil Service Pump No.1
- (B) Sewage Treatment Plant
- (C) Cargo Oil Transfer Pump No.1
- (D) S.W. Cooling Circ. Pump No.1

If choice B is selected set score to 1.

35. If the motor shown in the illustration will not start when the "off-run" switch is placed in the run position, which of the listed components should be checked FIRST? Illustration EL-0017

- (A) check the main contactor coil for continuity, replace as necessary
- (B) check the overload relay for tripped condition, reset as necessary
- (C) check the overload relay (OL) heaters for continuity, replace as necessary
- (D) check the disconnect switch open, open as necessary

If choice B is selected set score to 1.

36. 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.

37. As shown in figure "A" of the illustration, the load-commutated inverter drive illustrated has how many pulses? Illustration EL-0159

- (A) 3
- (B) 6
- (C) 9
- (D) 12

If choice B is selected set score to 1.

38. 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 low starting torque and low stator current
- (B) relatively low starting torque and high stator current
- (C) relatively high starting torque and high stator current
- (D) relatively high starting torque and low stator current

If choice D is selected set score to 1.

39. Referring to the illustration pertaining to the semi-automatic navigation light panel circuit, if the buzzer sounds and the masthead indicator light comes on, what statement is true concerning acknowledging and responding to the alarm while minimizing the danger to navigation? Illustration EL-0108

- (A) The buzzer is immediately silenced by turning the masthead transfer switch in the line section off. The masthead light can only be illuminated by replacing the burned out bulb.
- (B) The buzzer is immediately silenced by turning the masthead transfer switch in the line section to the secondary lamp position. The masthead light will then immediately illuminate.
- (C) The buzzer is immediately silenced by turning the master switch in the master section off. The masthead light can only be illuminated by replacing the burned out bulb.
- (D) The buzzer cannot be silenced and the masthead light cannot be illuminated until the burned out masthead lamp is replaced.

If choice B is selected set score to 1.

- 40.** Under unusual circumstances, it may be required to operate a ship's service generator above its rated kVA. What supplemental casualty control action will be required?
- (A) Increase the cooling water flow, while maintaining air temperatures below the dew point for increased cooling effect.
 - (B) While maintaining the rated system voltage, lower the operating frequency to at least 5% below the rated system frequency.
 - (C) While maintaining the rated system frequency, lower the operating voltage to at least 5% below the rated system voltage.
 - (D) Increase the cooling water flow, while maintaining air temperatures above the dew point to avoid any condensation.

If choice D is selected set score to 1.

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

If choice C is selected set score to 1.

- 42.** Which of the following is a disadvantage of electric drive propulsion systems?
- (A) Propulsion motors are required along with electrical power generation machinery.
 - (B) Main propulsion power may also be directed to ships electrical service distribution.
 - (C) The propeller speed and direction of rotation are easily controllable.
 - (D) Location of electric power generation machinery is flexible.

If choice A is selected set score to 1.

- 43.** Which of the electronic schematic symbols represents the capacitor illustrated in figure "1" of the illustration? Illustration EL-0015
- (A) A
 - (B) B
 - (C) C
 - (D) D

If choice B is selected set score to 1.

44. Which statement is true concerning a split-phase induction motor?

- (A) Motor speed can be readily adjusted from zero to full speed.
- (B) Motor rotation can be reversed by reversing the leads on the starting winding.
- (C) Motor rotation can be reversed without changing the windings or leads.
- (D) The motor will run as a generator with the proper wiring.

If choice B is selected set score to 1.

45. As shown in figure "A" of the digital multimeter screen shown in the illustration, what would be the significance of the symbol indicated by "1" being illuminated? Illustration EL-0047

- (A) the meter is subjected to a potentially unsafe voltage
- (B) the selector switch is selected for continuity/diode test and the secondary function push button is toggled for continuity
- (C) the meter test leads are placed in the wrong terminal jacks for the test being performed
- (D) the meter is in range of a wireless signal

If choice B is selected set score to 1.

46. A split-phase induction squirrel-cage motor will not start and come up to speed, even though the rated voltage, rated frequency, and rated load are applied. Which of the following troubles would be suspected?

- (A) a shorted rotor bar
- (B) a shorted centrifugal switch
- (C) a shorted thermal protector
- (D) an open run or start winding

If choice D is selected set score to 1.

47. What should be included in the routine periodic maintenance checks for electrical motors?

- (A) checking for watertight integrity
- (B) checking for speed droop
- (C) checking for vibration
- (D) checking for reactive power

If choice C is selected set score to 1.

48. How is electrical conductor insulation classed? Example: insulation class H

- (A) conductor current carrying capacity
- (B) conductor ampacity
- (C) voltage rating of the insulation
- (D) limiting internal hot spot temperature

If choice D is selected set score to 1.

49. Which electrical schematic symbol shown in the illustration represents a normally closed thermostat?
Illustration EL-0059

- (A) 1
- (B) 6
- (C) 8
- (D) 9

If choice C is selected set score to 1.

50. Why are external shunts sometimes used with ammeters?

- (A) to reduce reactive power factor error
- (B) to prevent damage to the meter movement from heat generated by the internal shunt
- (C) to permit shunts with larger resistances to be utilized
- (D) to increase meter sensitivity

If choice B is selected set score to 1.

51. Which of the following statements about a three-phase wye connected alternator is correct?

- (A) The line voltage is 1.73 times the phase voltage.
- (B) The phase current is 1.73 times the line current.
- (C) The phase voltage is 1.73 times the line voltage.
- (D) The line current is 1.73 times the phase current.

If choice A is selected set score to 1.

52. Referring to the sound-powered telephone circuit shown in the illustration, what statement is true?
Illustration EL-0093

- (A) The sound-powered telephone circuitry consists of selective-talk and selective-ringing circuits.
- (B) The sound-powered telephone circuitry consists of a selective-talk circuit and a common-ringing circuit.
- (C) The sound-powered telephone circuitry consists of a common-talk circuit and a selective-ringing circuit.
- (D) The sound-powered telephone circuitry consists of common-talk and common-ringing circuits.

If choice C is selected set score to 1.

53. When power is restored after a complete power failure, how will the steering gear pump motor which was on-line respond?

- (A) It will restart automatically
- (B) It will have to be reset manually
- (C) It will have to be restarted manually
- (D) It will trip its overload relays

If choice A is selected set score to 1.

54. Which of the following pictures shown in the illustration is a control transformer, usually used to step down line voltage for supplying reduced voltage control circuits? Illustration EL-0177

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

If choice B is selected set score to 1.

55. Grounds occurring in electrical machinery as a result of insulation failure may result from deterioration over time and excessive heat. What could be another contributing cause?

- (A) extended periods of vibration
- (B) extended operation at normal loads
- (C) extended periods of operation at low ambient temperature
- (D) extended periods of operation at low load

If choice A is selected set score to 1.

56. Ships requiring rapid maneuvering response with a degree of propeller shaft control are most likely to use what type of drive system?

- (A) Gas turbine geared drive
- (B) Steam turbine geared drive
- (C) Direct or geared diesel drive
- (D) Diesel-electric drive

If choice D is selected set score to 1.

57. As shown in the illustrated devices and symbols, which of the symbols shown in the illustration represents a standard normally closed relay contact? Illustration EL-0005

- (A) E
- (B) F
- (C) I
- (D) K

If choice B is selected set score to 1.

58. In monitoring an impressed current cathodic hull protection system, it is important to insure that the propeller screw receives the same cathodic protection as the hull. What should be checked for?

- (A) Insure adequate grounding carbon brush pressure on the rotating shaft and check brushes for wear.
- (B) Insure adequate individual anode current to the anode closest to the propulsion shafting as it passes through the hull.
- (C) No checks are necessary since the propeller screw is bronze and needs no protection.
- (D) Nothing can be done short of checking the propeller screw at dry-dock availabilities.

If choice A is selected set score to 1.

59. As shown in figure "A" of the ungrounded distribution system with possible ground faults shown in the illustration, under what conditions would an outage likely occur due to a ground fault causing a circuit breaker to trip? Illustration EL-0129

- (A) two ground faults associated with different phases
- (B) a single ground fault associated with any phase
- (C) ground faults do not result in outages regardless of the number and location of faults
- (D) two ground faults associated with the same phase

If choice A is selected set score to 1.

60. What type of motor is generally used in DC propulsion drive systems?

- (A) series-wound
- (B) permanent magnet
- (C) differentially compounded
- (D) shunt-wound

If choice D is selected set score to 1.

61. Which of the procedures or conditions listed could result in damaging a transistor beyond repair?

- (A) Installing a transistor whose current rating exceeds the design circuit current.
- (B) Applying silicone grease between the heat sink and the transistor mounting.
- (C) Providing insufficient voltage to the input circuit.
- (D) Providing incorrect polarity to the collector circuit.

If choice D is selected set score to 1.

62. What type of electrical diagram for the electrical distribution system is shown in the illustration?
Illustration EL-0014

- (A) The diagram is a block diagram.
- (B) The diagram is a ladder or line diagram (schematic).
- (C) The diagram is a one-line diagram.
- (D) The diagram is a wiring diagram.

If choice C is selected set score to 1.

63. Using the temperature correction factor for the winding insulation temperature graph shown in the illustration, what would be the correction factor and the corrected temperature to 40 degrees C for a motor with an insulation resistance of 4 megohms measured at 50 degrees C? Illustration EL-0046

- (A) The temperature correction factor is 0.5 and the corrected resistance is 2 megohms at 40 degrees C.
- (B) The temperature correction factor is 0.5 and the corrected resistance is 8 megohms at 40 degrees C.
- (C) The temperature correction factor is 2 and the corrected resistance is 2 megohms at 40 degrees C.
- (D) The temperature correction factor is 2 and the corrected resistance is 8 megohms at 40 degrees C.

If choice D is selected set score to 1.

64. What should you be aware of when checking the specific gravity of the battery electrolyte with a hydrometer?

- (A) depending on the temperature it may be necessary to correct for temperature
- (B) the battery is discharged when the float is highest in the electrolyte
- (C) a hydrometer reading is accurate if taken immediately after water is added to the cell
- (D) the battery is fully charged when the float sinks deepest into the electrolyte

If choice A is selected set score to 1.

65. Assuming the vessel has an engine control room, where is an engineers' assistance-needed alarm required to produce an audible signal?

- (A) The crew's and officers' mess
- (B) The engineers' accommodation spaces
- (C) The wheelhouse/navigational bridge
- (D) The engine room/machinery space

If choice B is selected set score to 1.

66. In a three-phase, squirrel-cage type, induction motor, how is the primary rotating magnetic field established?

- (A) current induced in the rotor windings
- (B) laminated steel core and aluminum conductors in the rotor
- (C) interaction of the magnetic field caused by the induced current in the squirrel-cage bars with the magnetic field of the stator
- (D) application of a three-phase voltage supply to the stator windings

If choice D is selected set score to 1.

67. If a three-phase motor controlled by the control circuit illustrated in figure "B" of the illustration is running in the forward direction, which of the following sequences must occur before the motor will reverse rotation? Illustration EL-0011

- (A) First, the motor must be stopped via the stop button, then normally open 'F' contacts must re-close, and finally the reverse start button must be depressed.
- (B) First, the motor must be stopped via the stop button, then normally closed 'F' contacts must re-open, and finally the reverse start button must be depressed.
- (C) First, the motor must be stopped via the stop button, then normally closed 'F' contacts must re-close, and finally the reverse start button must be depressed.
- (D) First, the motor must be stopped via the stop button, then normally open 'F' contacts must re-open, and finally the reverse start button must be depressed.

If choice C is selected set score to 1.

68. As shown in the illustrated harmonic analysis diagram, which figure represents the fundamental (or first harmonic)? Illustration EL-0163

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

If choice B is selected set score to 1.

69. Which station's emergency loudspeaker must allow for two-way communication?

- (A) Accommodation spaces station
- (B) Crew's quarters station
- (C) Lifeboat embarkation station
- (D) Passenger assembly station

If choice C is selected set score to 1.

70. At a minimum threshold, how many milliamps of current through the body produces a condition where most people would suffer ventricular fibrillation and could only be resuscitated with a ventricular defibrillator?

- (A) 3 to 7 mA
- (B) 10 to 16 mA
- (C) 30 mA
- (D) 75 mA for 5 sec.

If choice D is selected set score to 1.

EL-0005



A



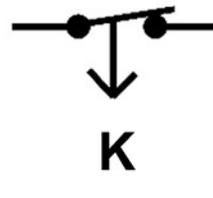
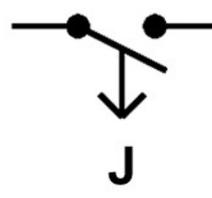
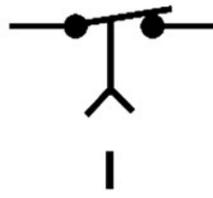
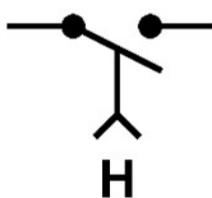
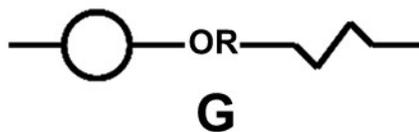
B



C

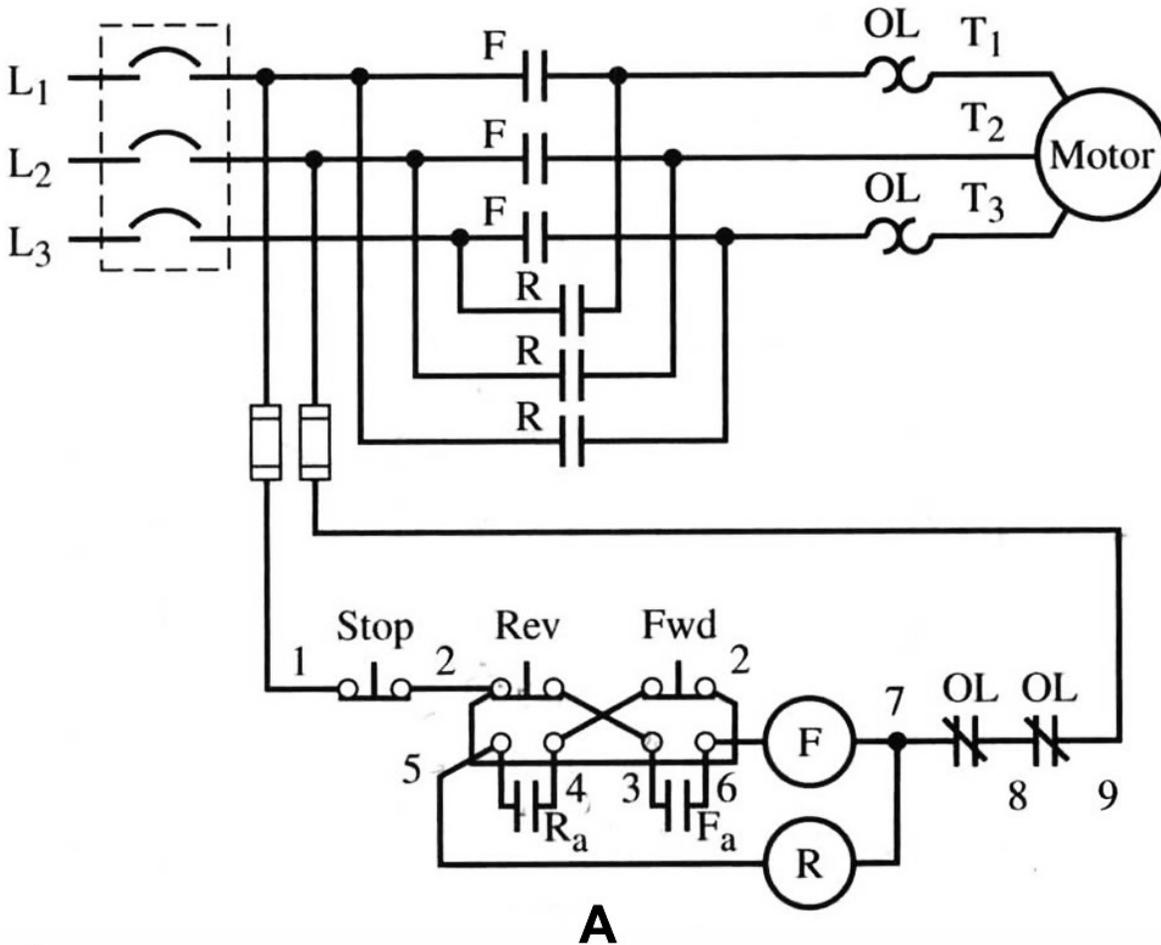


D

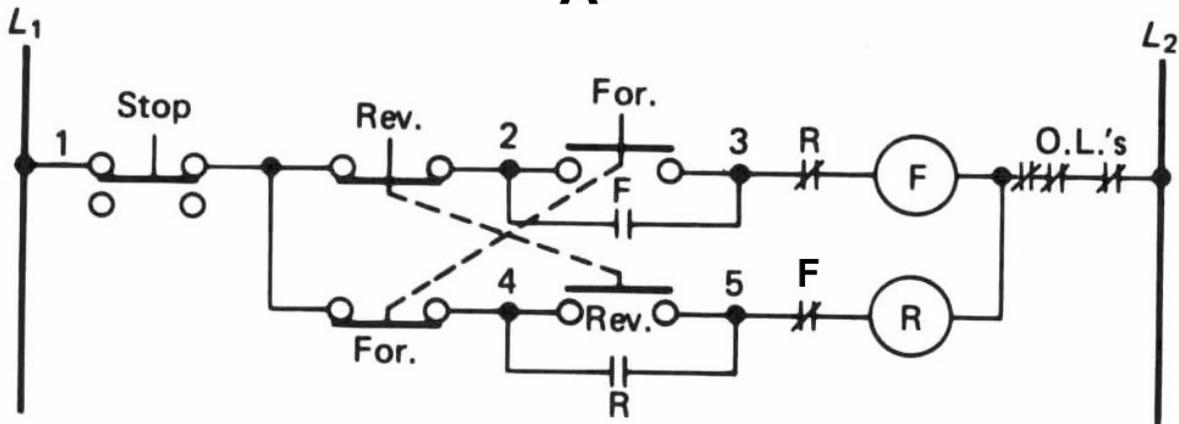


Adapted for testing purposes only
Further reproduction prohibited without permission.

EL-0011



A



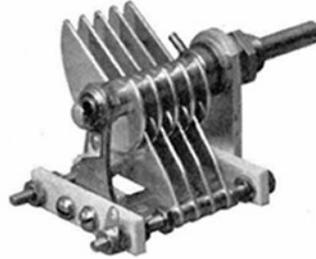
B

Adapted for testing purposes only from HUBERT, Operating, Testing and Preventive Maintenance of Electrical Power Apparatus. Copyright © 2003 by Pearson Education. Further reproduction prohibited without permission.

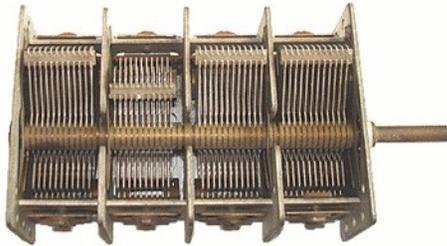
EL-0015



1



2



3



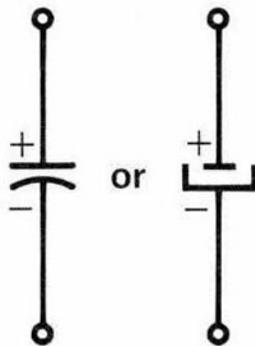
or



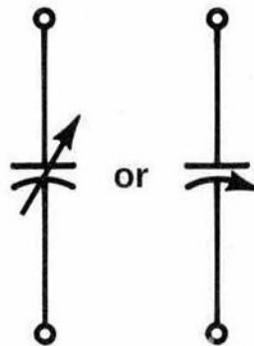
4



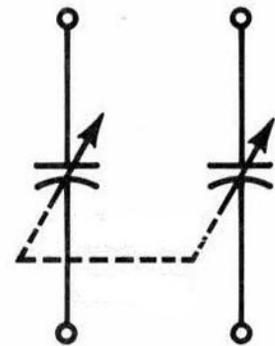
A



B



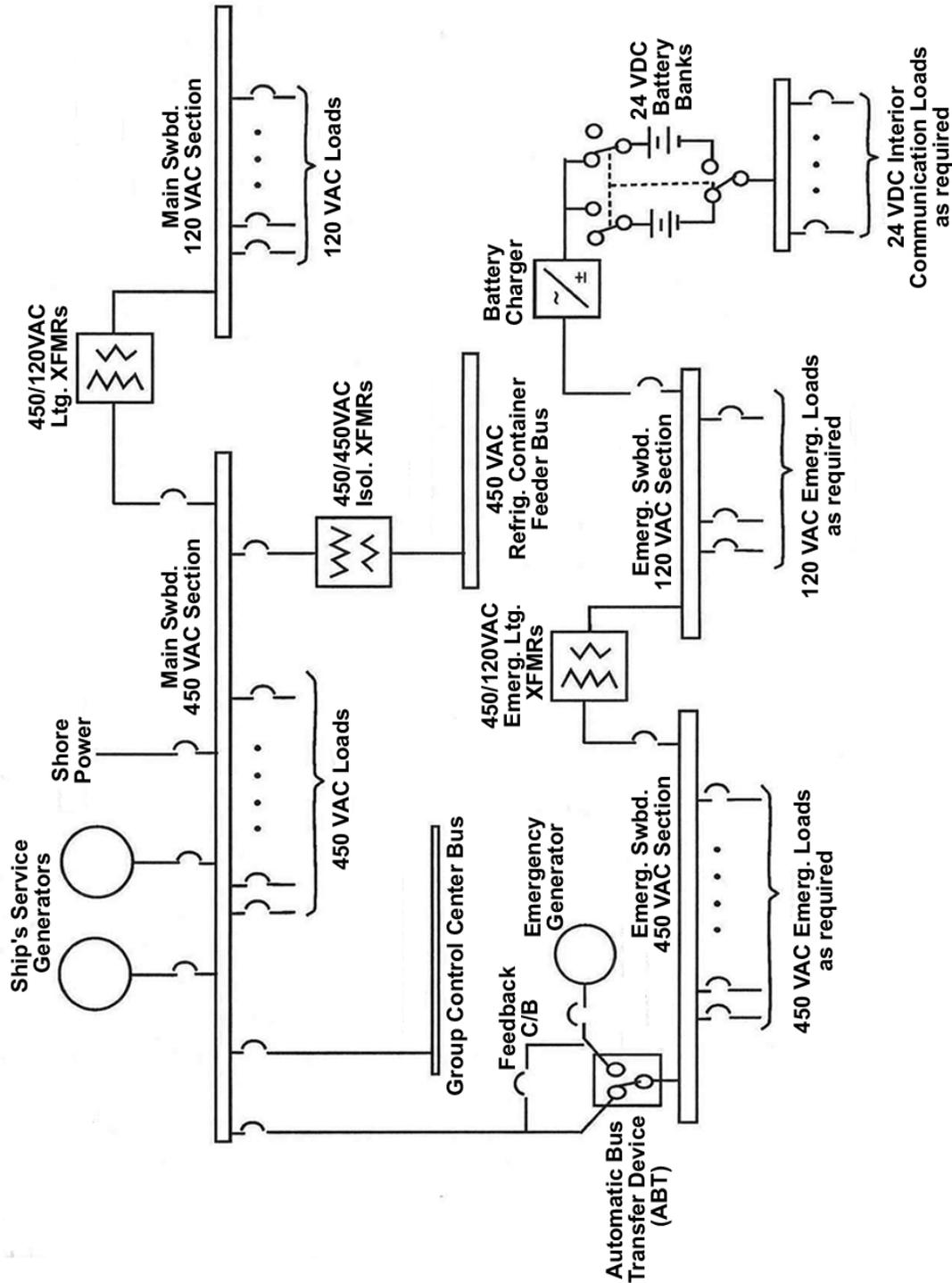
C



D

Adapted for testing purposes only
Further reproduction prohibited without permission.

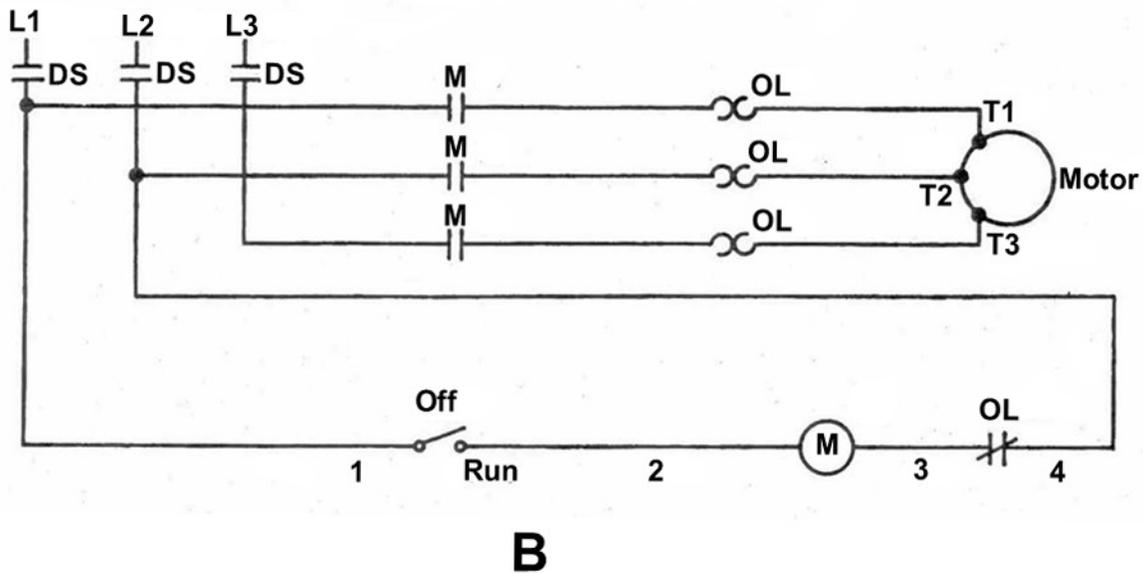
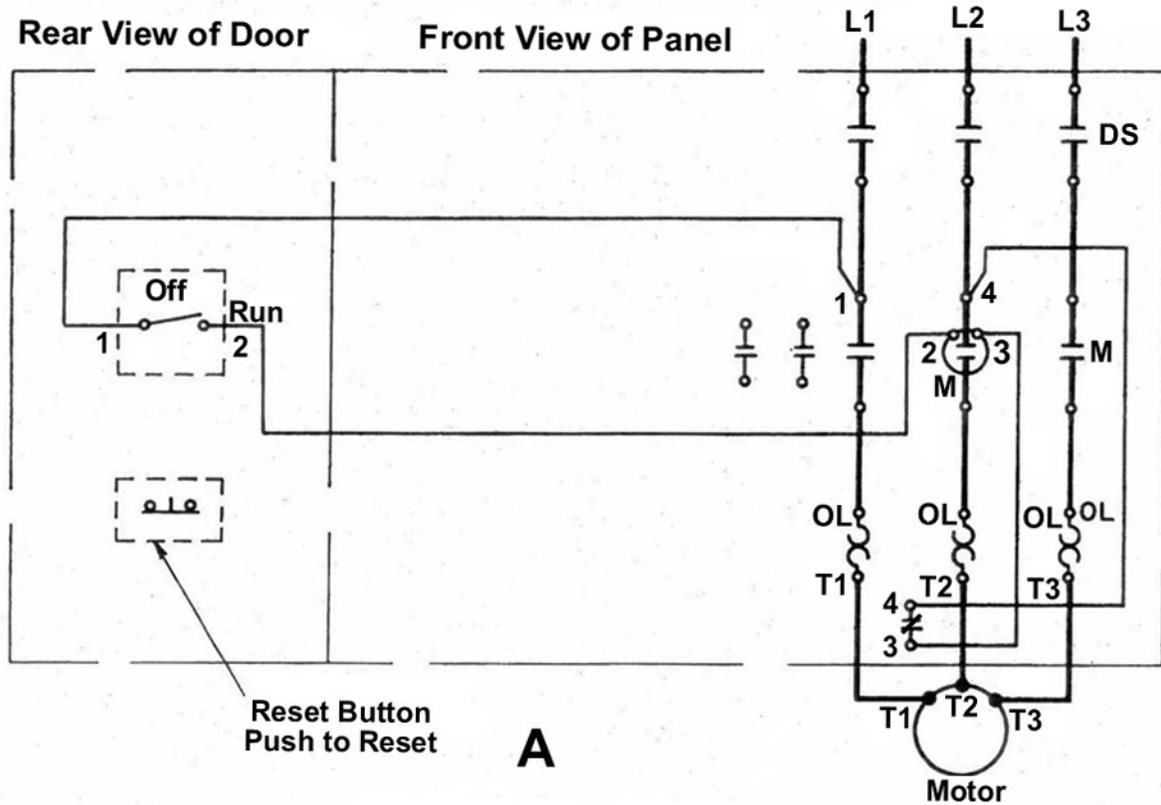
EL-0014



Adapted for testing purposes only from HUNT, Modern Marine Engineer's Manual, Vol. II.
 © 2002 Cornell Maritime Press. Reproduced with permission from Cornell Maritime Press, a
 division of Schiffer Publishing, Ltd.

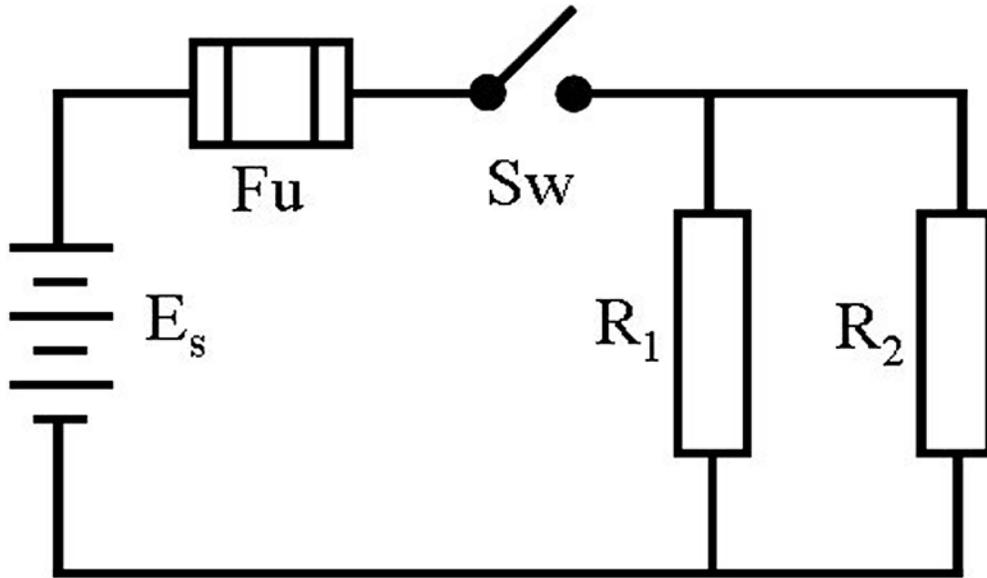
Further reproduction prohibited without permission.

EL-0017

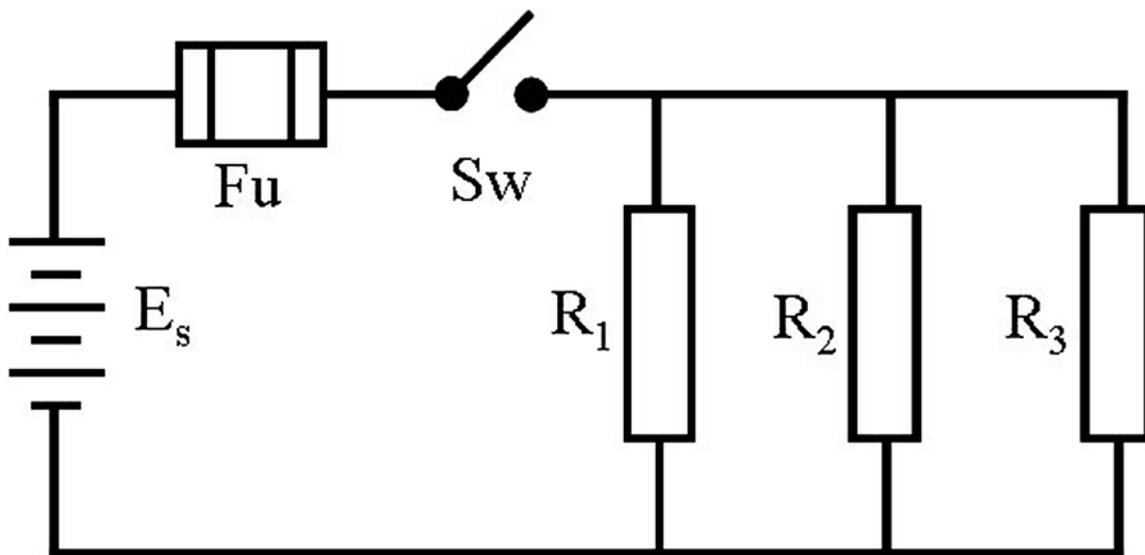


Adapted for testing purposes only from HARRINGTON, Marine Engineering. © 1992 SNAME.
 Reproduced with permission from The Society of Naval Architects and Marine Engineers.
 Further reproduction prohibited without permission.

EL-0019



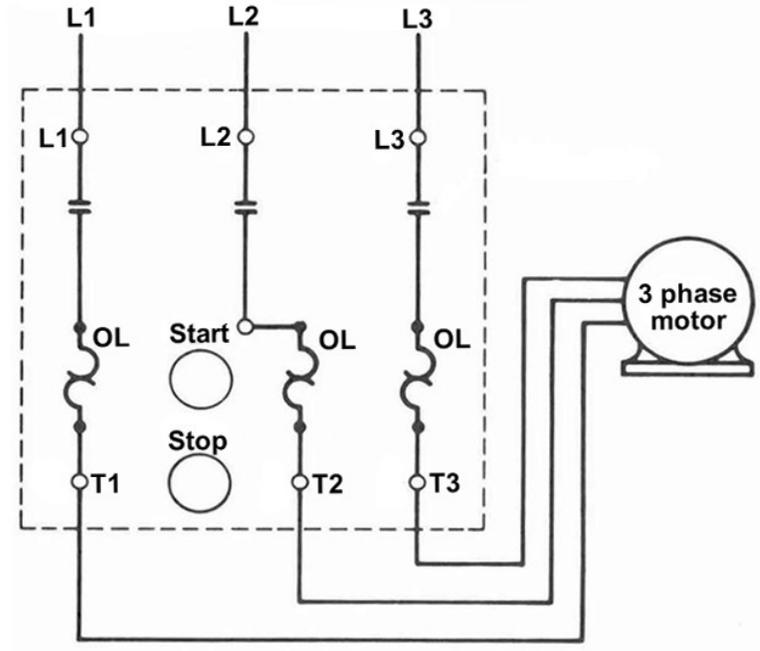
A



B

Adapted for testing purposes only
Further reproduction prohibited without permission.

EL-0023



A



Adapted for testing purposes only from ROSENBURG/HAND. Electric Motor Repair.
© 2002 Delmar Learning, a part of Cengage Learning, Inc. Reproduced with permission.
www.cengage.com/permissions

Further reproduction prohibited without permission.

EL-0033



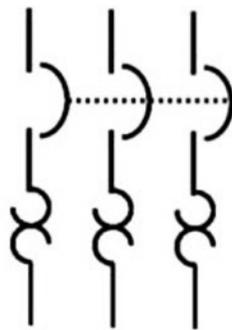
A



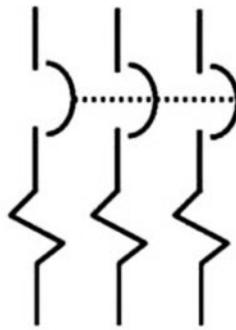
B



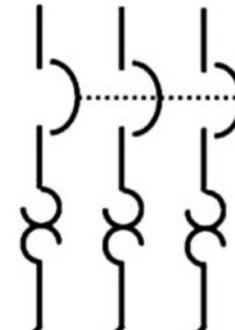
C



1



2



3

Adapted for testing purposes only
Further reproduction prohibited without permission.

EL-0034



A



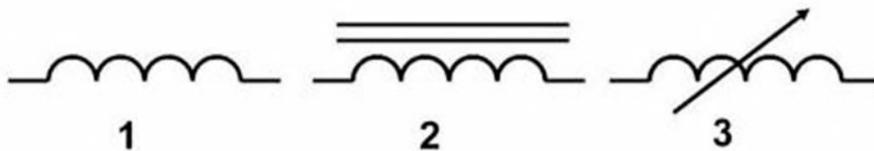
B



C

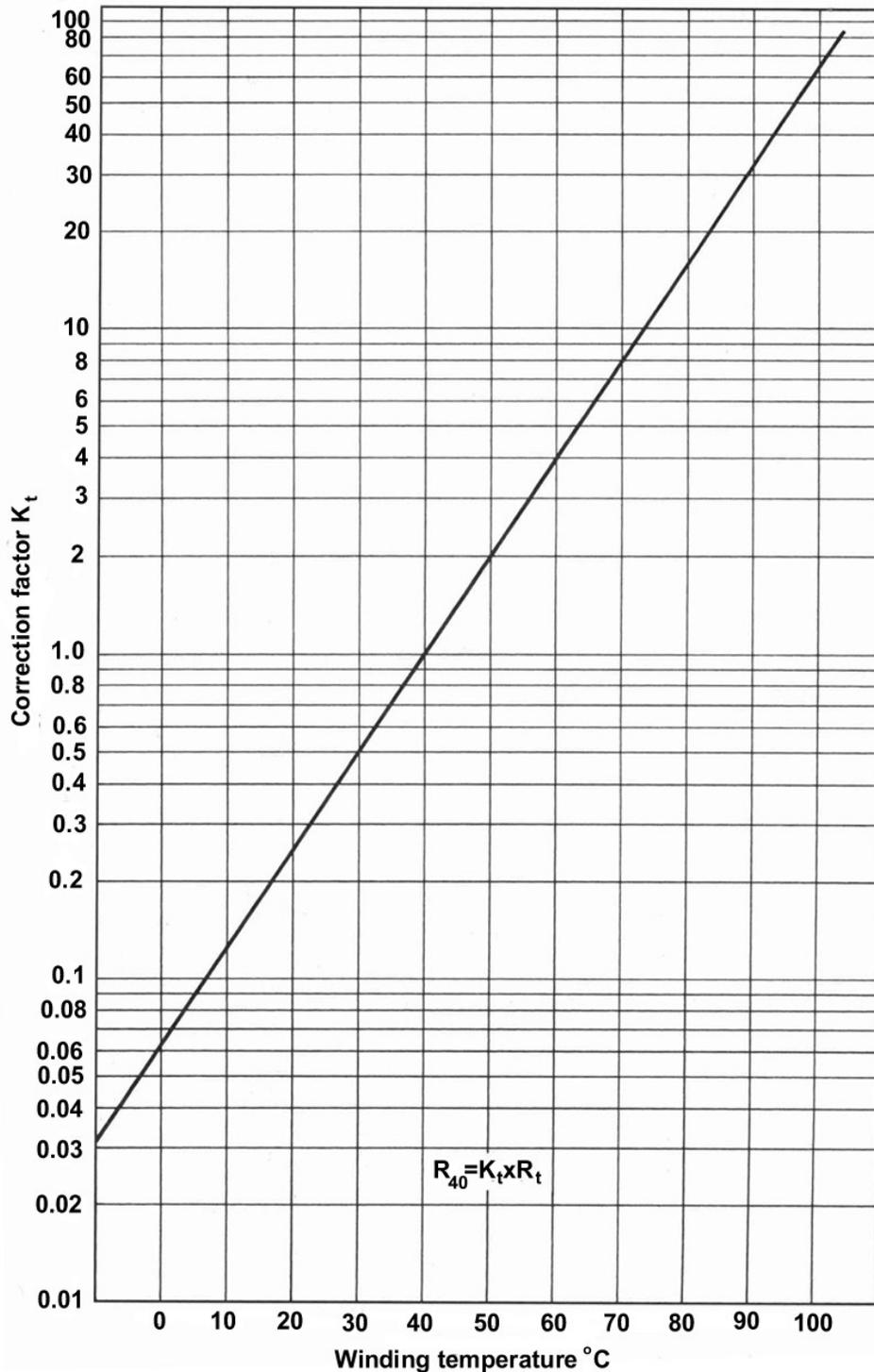


D



Adapted for testing purposes only
Further reproduction prohibited without permission.

EL-0046



Adapted for testing purposes only from HUBERT, Operating, Testing and Preventive Maintenance of Electrical Power Apparatus. © 2003 Pearson Education. Reproduced with permission from Pearson Education, Inc.

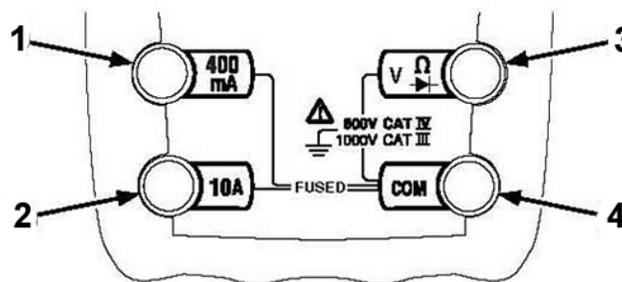
Further reproduction prohibited without permission.

EL-0047



Switch Position	Measurement Function
1	\tilde{V} Hz
2	\bar{V}
3	$m\bar{V}$
4	Ω ⎓
5	\tilde{I} ⎓
6	\bar{I} mA
7	\tilde{I} ~A

B



C

Adapted for testing purposes only from Fluke, Model 77 User's Manual, © Fluke. Reproduced with permission from Fluke Corporation.

Further reproduction prohibited without permission.

EL-0059



A



B



C



D



E



F



1



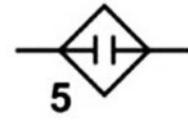
2



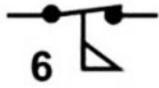
3



4



5



6



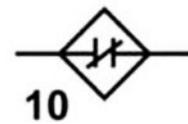
7



8



9



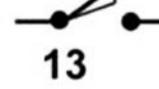
10



11



12



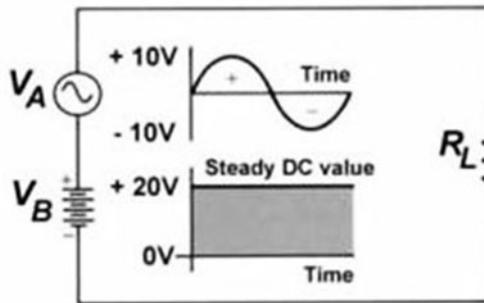
13



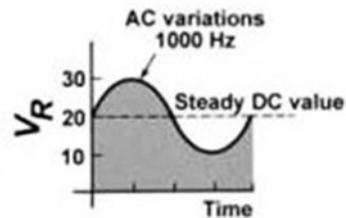
14

Adapted for testing purposes only
Further reproduction prohibited without permission.

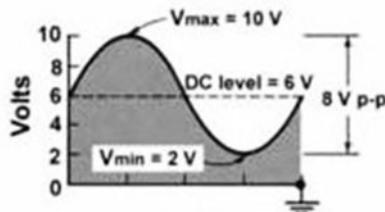
EL-0075



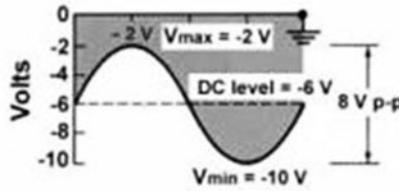
A



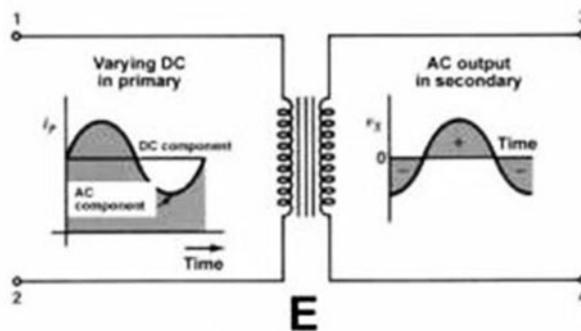
B



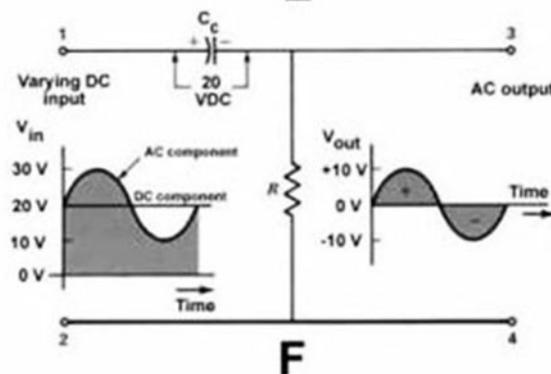
C



D



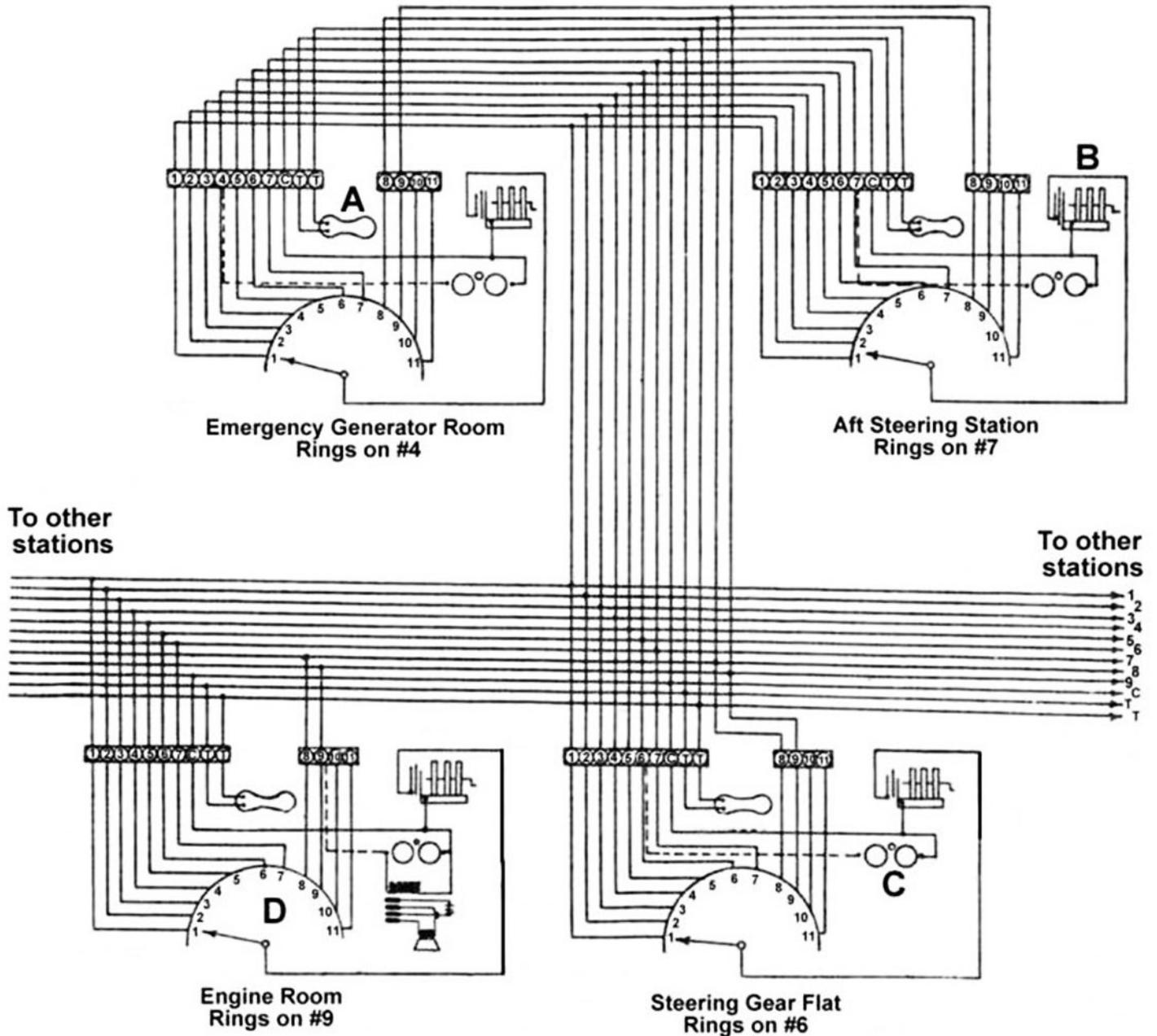
E



F

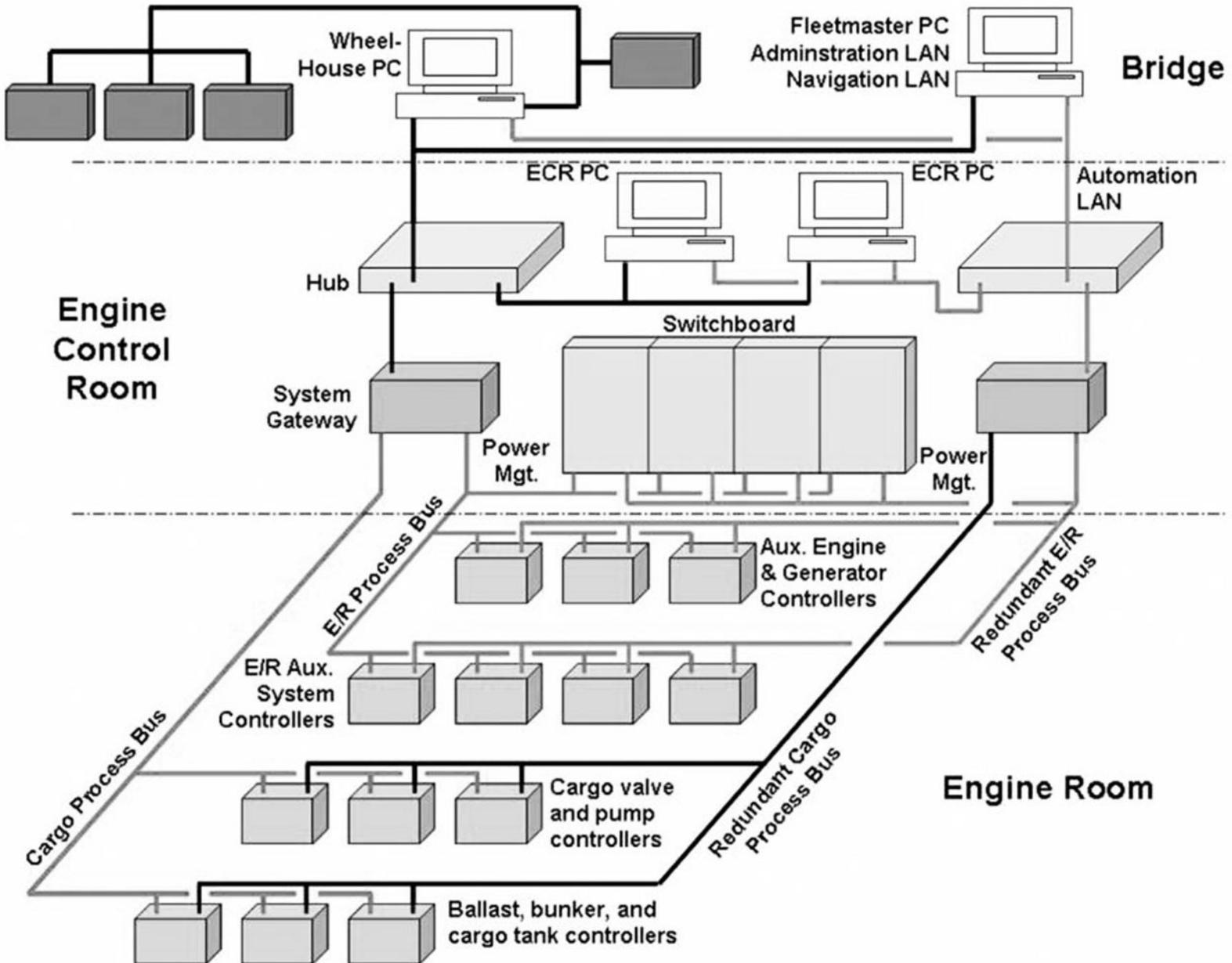
Adapted for testing purposes only
Further reproduction prohibited without permission.

EL-0093



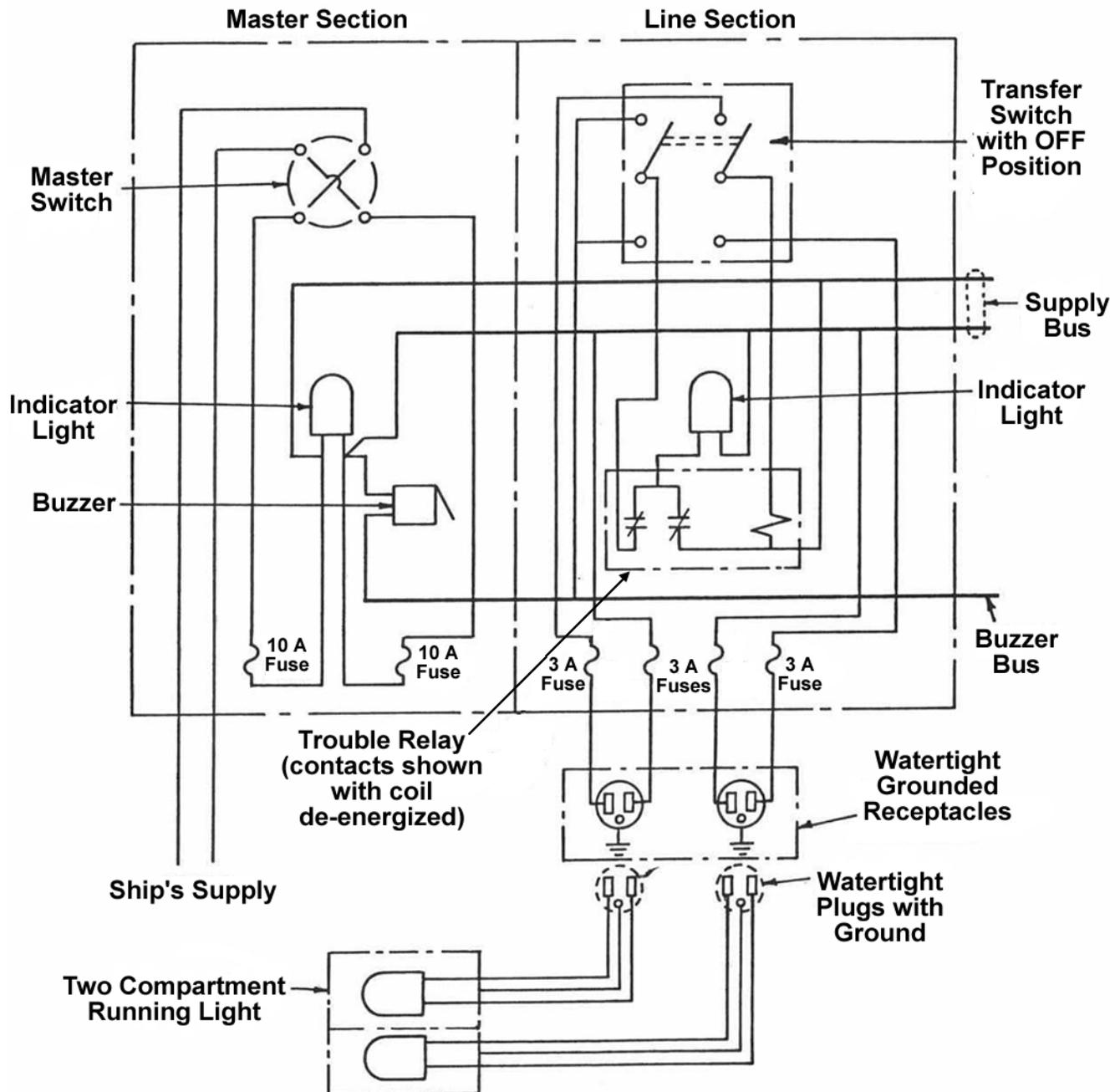
Adapted for testing purposes only
Further reproduction prohibited without permission.

EL-0098



Adapted for testing purposes only
Further reproduction prohibited without permission.

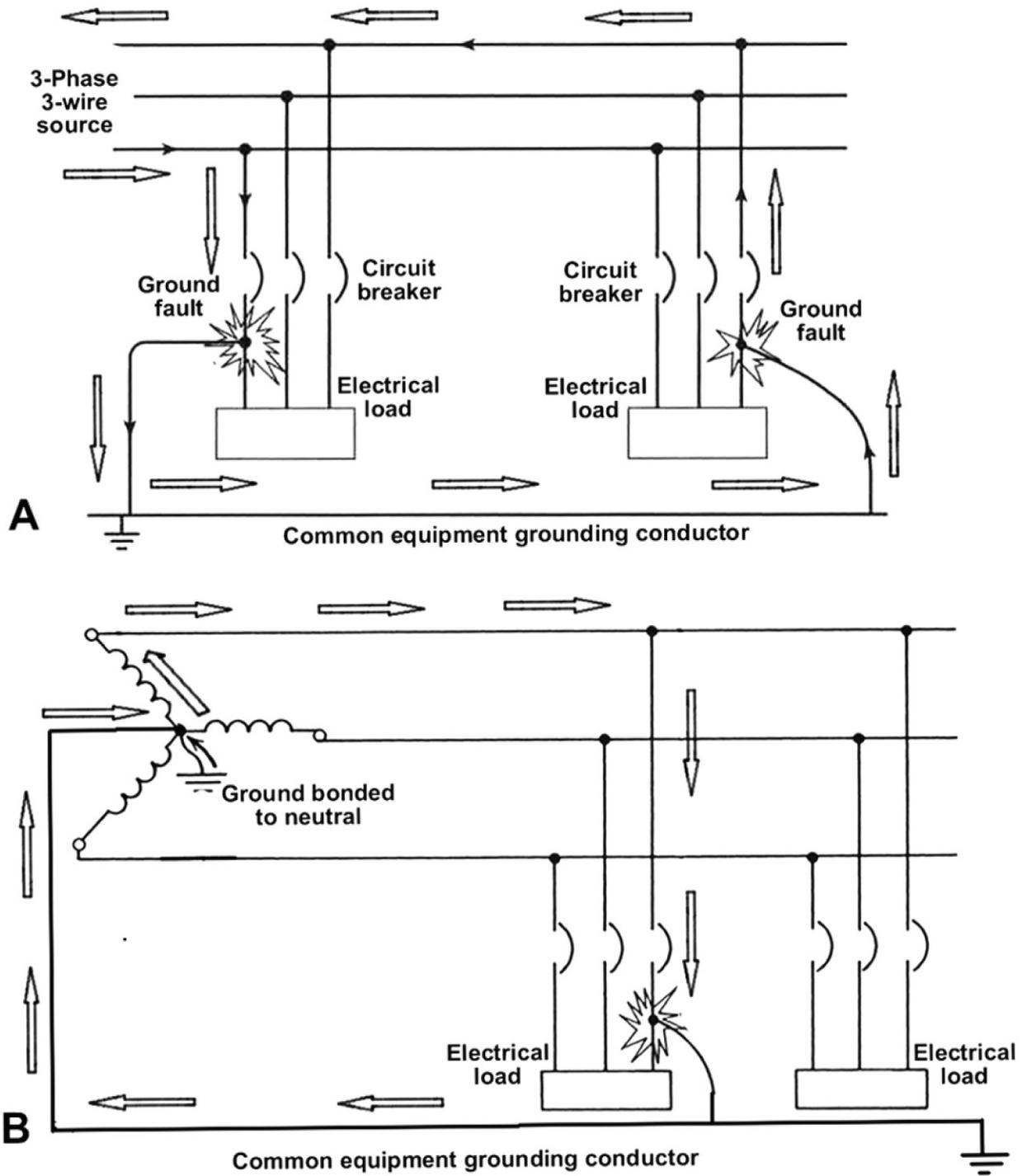
EL-0108



Adapted for testing purposes only from HUNT, Modern Marine Engineer's Manual, Vol. II.
© 2002 Cornell Maritime Press. Reproduced with permission from Cornell Maritime Press, a
division of Schiffer Publishing, Ltd.

Further reproduction prohibited without permission.

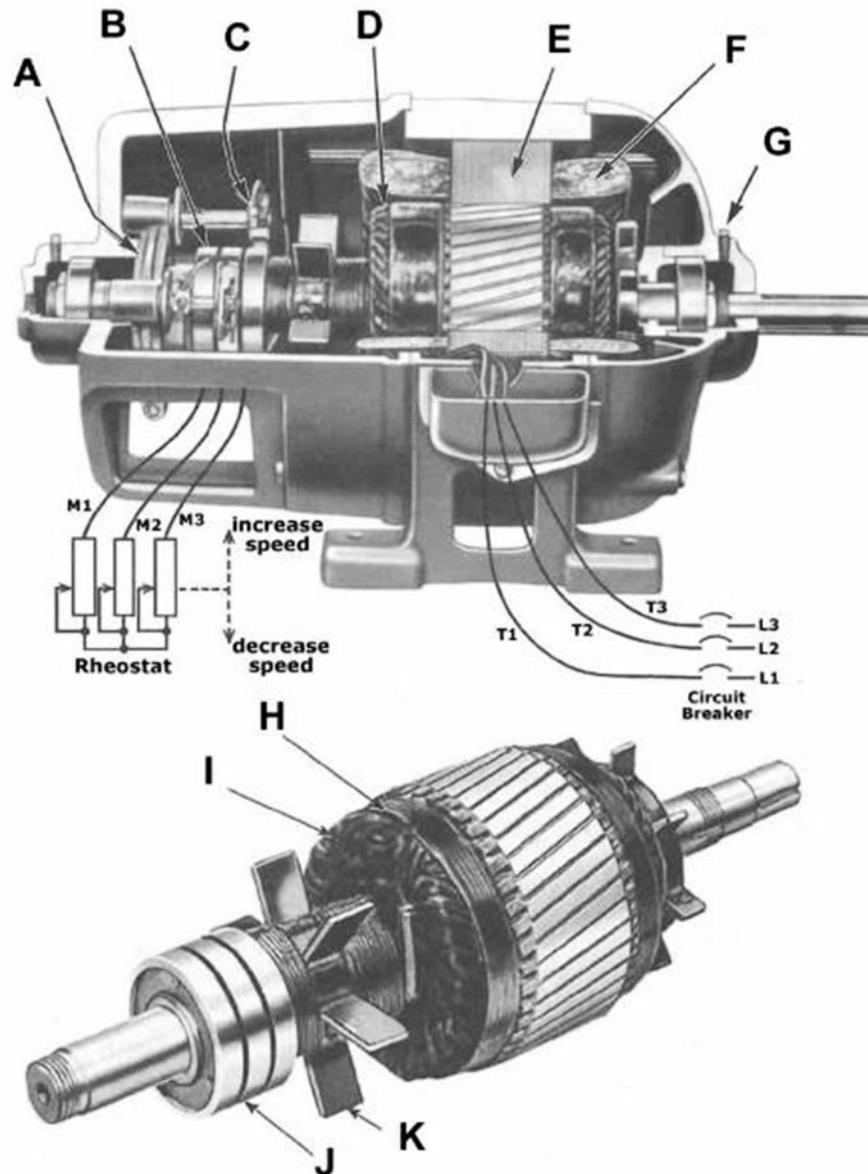
EL-0129



Adapted for testing purposes only from HUBERT, Operating, Testing and Preventive Maintenance of Electrical Power Apparatus. © 2003 Pearson Education. Reproduced with permission from Pearson Education, Inc.

Further reproduction prohibited without permission.

EL-0148



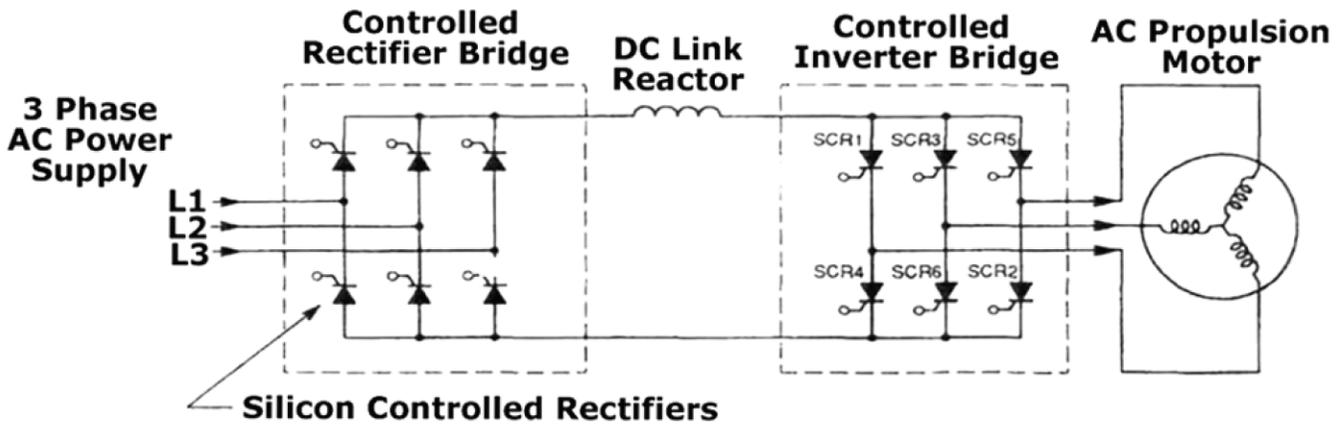
Adapted for testing purposes only from HUBERT, Operating, Testing, and Preventive Maintenance of Electrical Power Apparatus

Copyright © 2003 by Pearson Education

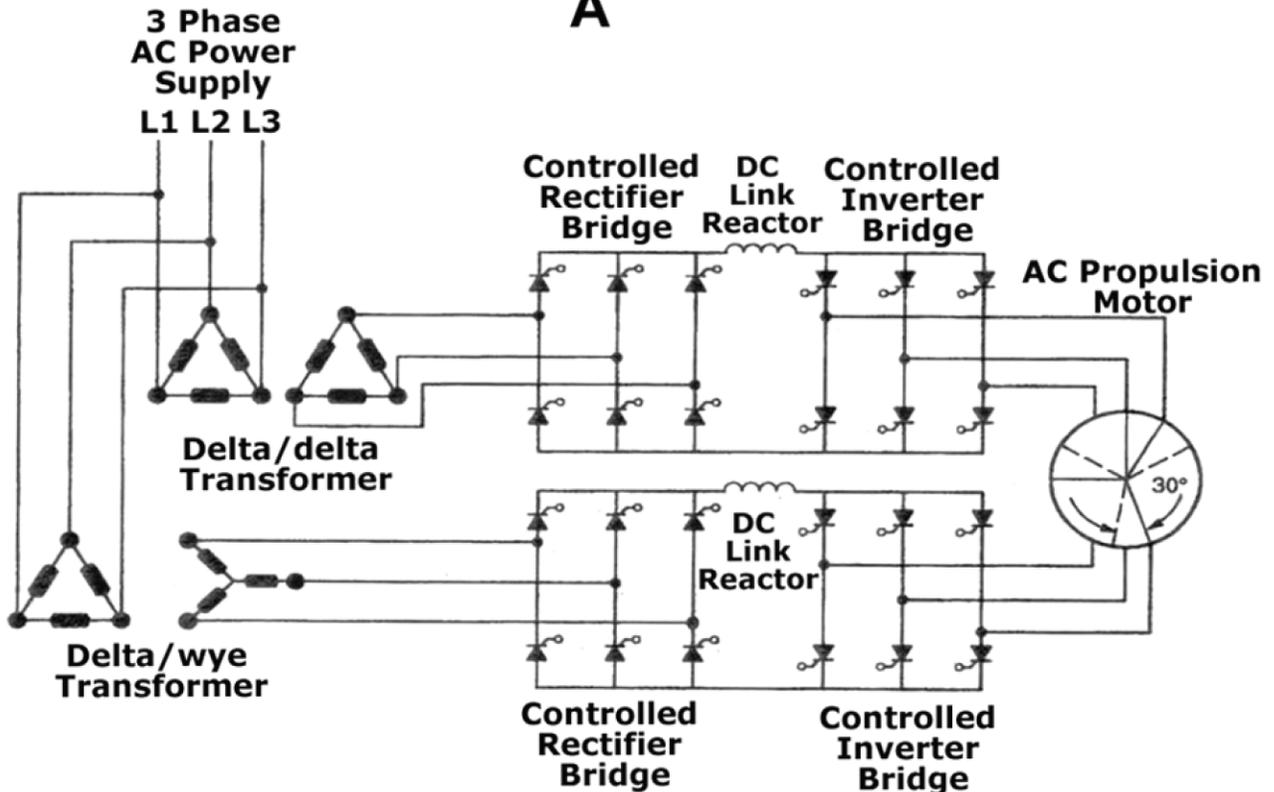
Reproduced with permission from Pearson Education, Inc.

Further reproduction prohibited without permission.

EL-0159



A

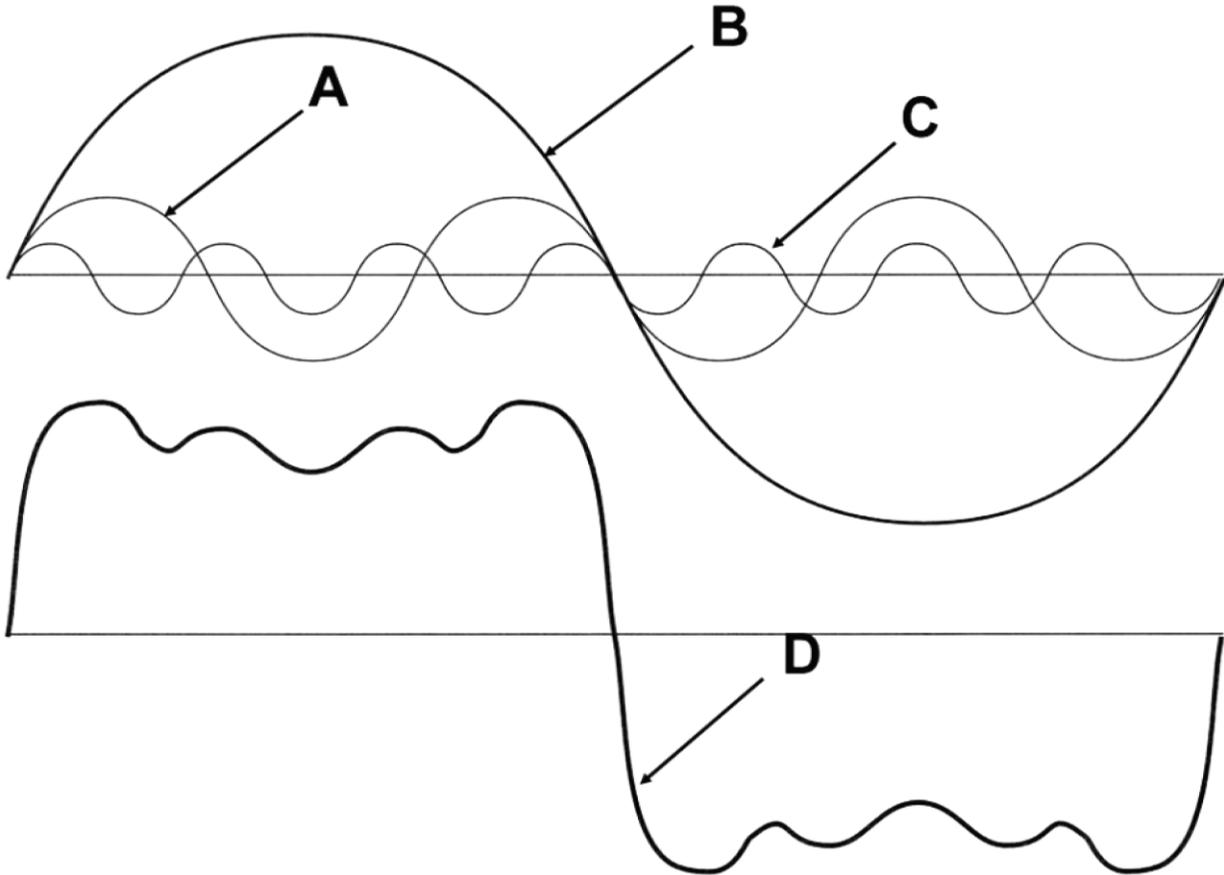


B

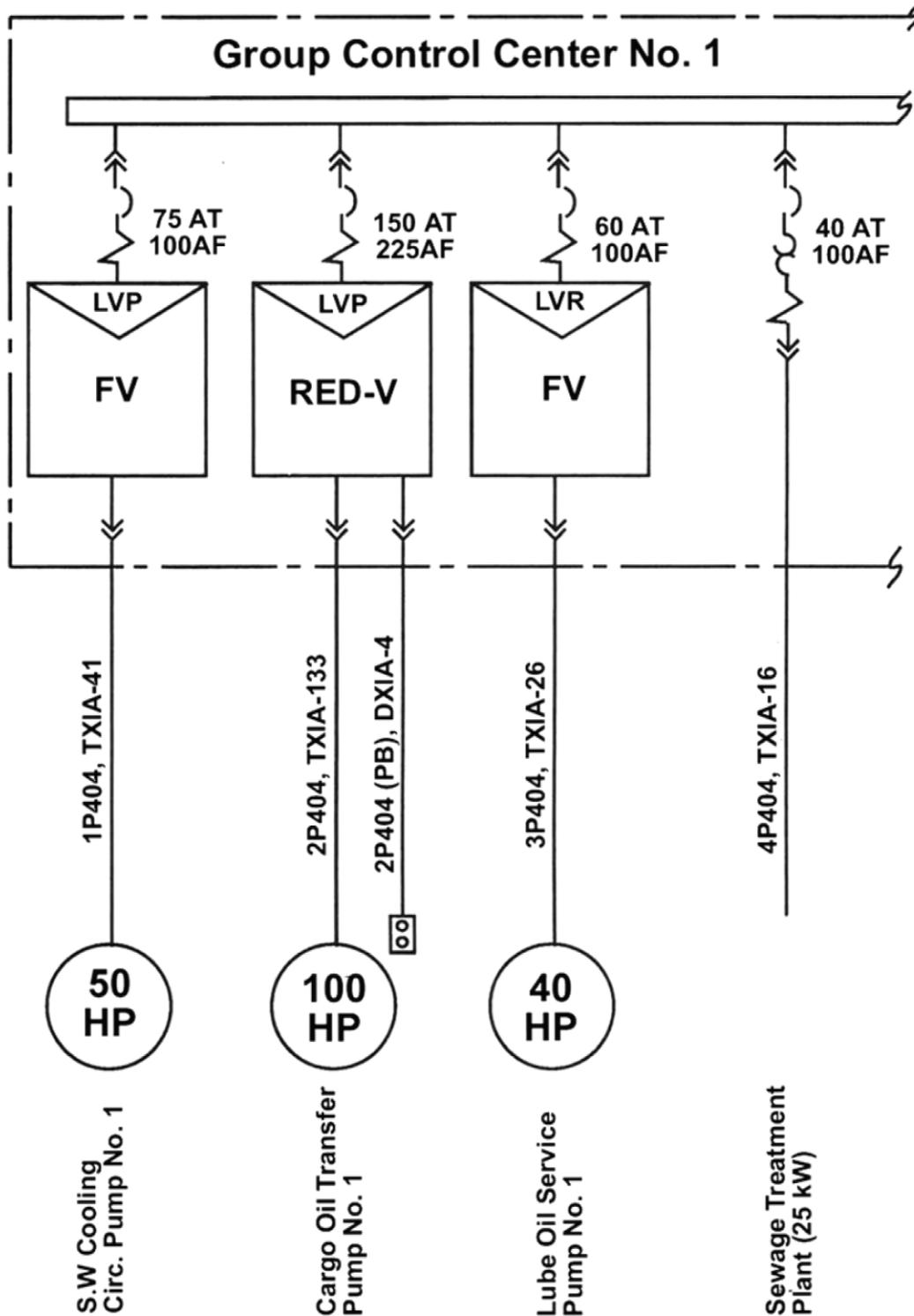
Adapted for testing purposes only from HARRINGTON, Marine Engineering. © 1992 SNAME.
Reproduced with permission from The Society of Naval Architects and Marine Engineers.

Further reproduction prohibited without permission.

EL-0163



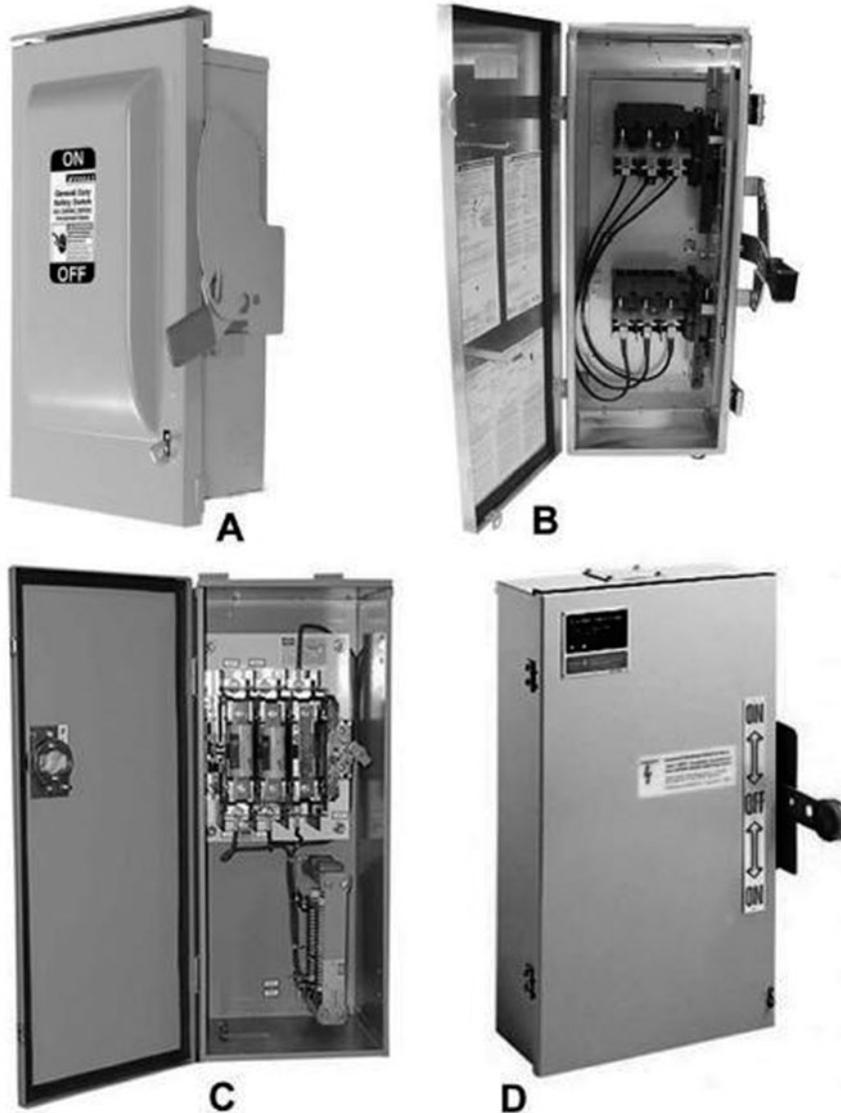
EL-0165



Adapted for testing purposes only from HUNT, Modern Marine Engineer's Manual, Vol. II.
 © 2002 Cornell Maritime Press. Reproduced with permission from Cornell Maritime Press,
 a division of Schiffer Publishing, Ltd.

Further reproduction prohibited without permission.

EL-0176



Adapted for testing purposes only
Further reproduction prohibited without permission.

EL-0177



A



B



C



D

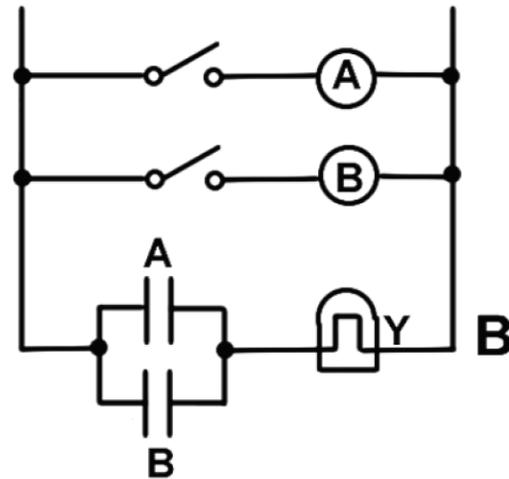
Adapted for testing purposes only
Further reproduction prohibited without permission.

EL-0227

A

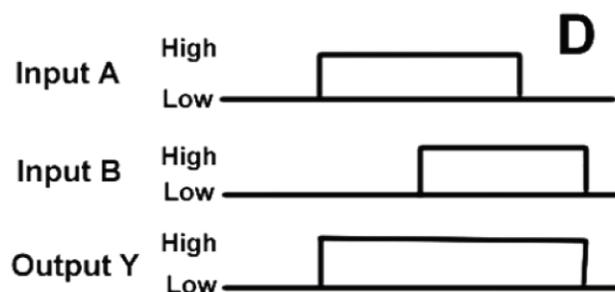
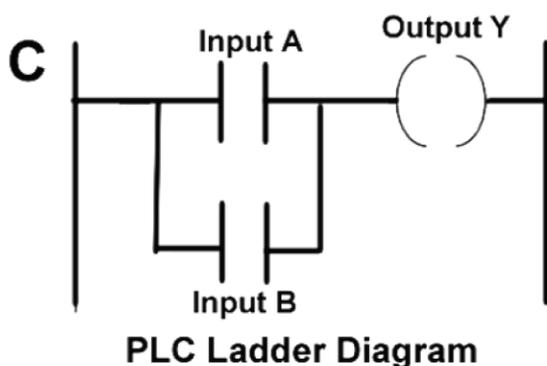
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

Truth Table



Equivalent Relay
Circuit Diagram

Relay and PLC Logic Compared



PLC Input/output Diagram

Figures A and B

Adapted for testing purposes only from HERMAN, Industrial Motor Control

© 2010 Delmar Learning, a part of Cengage Learning, Inc.

Reproduced with permission.

www.cengage.com/permissions

Further reproduction prohibited without permission.