

Reference Materials: Note: Exam may contain "accepted practice" type questions not found in the reference material listed below.

NFPA 1900: Standard for Aircraft Rescue and Firefighting Vehicles, Automotive Fire Apparatus, Wildland Fire Apparatus, and Automotive Ambulances (**NFPA 1901 Chapters 10, 11, 21, 22 & Annex A**) 2024 edition

NFPA 1960, Standard for Fire Hose Connections, Spray Nozzles, Manufacturer's Design of Fire Department Ground Ladders, Fire Hose, and Powered Rescue Tools (**NFPA 1936 Chapters 22**) 2024 edition

NFPA 1910: Standard for the Inspection, Maintenance, Refurbishment, Testing and Retirement of In-Service Emergency Vehicles and Marine Firefighting Vessels (**NFPA 1911 Chapters 6, 26 & Annex A**) 2024 edition
to order NFPA documents call 800-344-3555 or order online at www.nfpa.org

Fundamental Electrical Troubleshooting, by Dan Sullivan 800-227-1603 <http://www.esitest.com/182.html> or online retailers

Essentials of Electrical Power Generation, by Dan Sullivan 800-227-1603 <http://www.esitest.com/183.html> or online retailers

Guide to Hydraulic Power Generation, Russell Scott Dixon. Call the EVT office at 847-426-4075 to request a copy to be emailed to you for no charge for a limited time, compliments of Scott Dixon.

V-MUX Six-Step Troubleshooting Guide v1- v3, V-MUX Input/Output Relationships Report & V-MUX Troubleshooting Checklist download for no charge from <http://www.akronbrass.com> then to Vehicle Electronics, Firmware & Software, Manuals

Any manufacturers operational and troubleshooting manual or Engine manufacturers electronic diagnostic manuals

LEARNING OBJECTIVES

The technician shall understand the concepts, terms, and phrases related to:

1. A/C Line Voltage

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| <ul style="list-style-type: none"> a. Components and terms <ul style="list-style-type: none"> (1) Single phase (2) Three phase (3) Neutral wire (4) Ground wire (5) Bonding (6) Inrush / startup current (7) Soft start (8) Frequency (9) Sine wave (10) Photo resistor (11) Resistor (12) True Power (13) Prime Movers (14) Voltage Drop (15) Testing (16) Hertz | <ul style="list-style-type: none"> b. Application and Troubleshooting <ul style="list-style-type: none"> (1) Wiring connections (2) Wiring methods (3) Repair techniques <ul style="list-style-type: none"> A. Tools B. Electrical C. Harness connectors (4) Receptacle types (5) Wire routing (6) Diagnostic tools (7) NFPA standards <ul style="list-style-type: none"> A. Conductors B. Polarity verification C. Circuits D. Remote power Distribution E. Transfer switch F. Grounding G. Testing <ul style="list-style-type: none"> (a) Full load test H. Out of Service | <ul style="list-style-type: none"> (8) Effects of voltage drops on components (9) Portable Equipment <ul style="list-style-type: none"> A. Maximum voltage supplied to c. Installations <ul style="list-style-type: none"> (1) Receptacles <ul style="list-style-type: none"> A. Mounting height in wet locations B. Switching (2) Light masts (3) Wiring <ul style="list-style-type: none"> A. Connection to frame rails |
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2. System Knowledge

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| <ul style="list-style-type: none"> a. Circuit drawings <ul style="list-style-type: none"> (1) Resistor (2) Diode (3) Rectifier (4) Transistors <ul style="list-style-type: none"> A. Base B. Emitter C. Collector (5) Thermistors (6) Wire Splice (7) Pulse Width Modulation | <ul style="list-style-type: none"> (8) Capacitor (9) Pressure Governor (10) Potentiometer (11) AND gate (12) OR gate b. Circuit protection <ul style="list-style-type: none"> (1) Over current protection (2) Circuit rating (3) Ground fault circuit interrupters (4) Wet/dry listings (5) Circuit breaker switches | <ul style="list-style-type: none"> c. Transfer switches d. Power transmission <ul style="list-style-type: none"> (1) Branch circuits (2) Distribution remote e. Amperage loads f. Component information <ul style="list-style-type: none"> (1) capacitor (2) relays g. Wire connections <ul style="list-style-type: none"> (1) Wire Symbols h. Crimping tools |
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3. Sources

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| <ul style="list-style-type: none"> a. Shoreline power b. Invertors & converters <ul style="list-style-type: none"> (1) Dynamic power (2) Static power c. Generators <ul style="list-style-type: none"> (1) Interlocks | <ul style="list-style-type: none"> (2) Generator installation <ul style="list-style-type: none"> A. Requirements B. Voltage regulation (3) Drives (4) Generator Governors (5) Generator Diagnostics | <ul style="list-style-type: none"> (6) Drive Diagnostics (7) Generator poles (8) Hydraulic generators <ul style="list-style-type: none"> A. Capacitor effects B. PTO inspection C. Filters |
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D. Hose reversal

4. **Accessories**

- a. Cable reels
- b. Scene lighting
 - (1) Requirements
 - (2) Interlocks
 - (3) Light masts
 - (4) Remote towers
 - (5) Operational testing

5. **Low Voltage Systems**

- a. Load managers/sequencers
 - (1) 1900/1910
 - A. Inspection and Maintenance
- b. Troubleshooting
 - (1) Testing
 - A. Voltage drop test
 - B. Functional test
- c. Low Voltage System Knowledge
 - (1) Parallel & Series wiring
 - (2) PWM
 - (3) Manufacture Recommendations
 - (4) Inspection & Maintenance
 - (5) Kirchoff's Law

6. **Multiplex Systems**

- a. Components
 - (1) V-MUX modules
 - A. Hercules node
 - B. Vista node
 - C. Mini node
 - D. Deutsch connectors
 - (2) Sensors
 - A. Active
 - B. Passive
 - (3) Class 1 ES-Key Modules
- b. Interface
 - (1) Fast idle function
 - (2) PEER to PEER

7. **Operations**

- a. Load minder
- b. Water tank level indicating system
- c. Rotation limiting
- d. Pressure governor
- e. Transducers

- c. Rescue tools
 - (1) Quik-connect requirements
 - (2) Battery powered
- d. Hydraulic power unit
- e. Winches

- d. Data Recorders
 - (1) Data recorded
- e. Seat Belt Warning System
 - (1) Warning Devices
 - A. Audible
 - B. Visual
- f. 1901
 - (1) Power Supply
 - (2) Low Voltage Batteries

- c. Programming
 - (1) Interlocks
 - (2) Control Module
 - (3) Reports
 - (4) Communication
- d. Terminology
 - (1) CAN
- e. Troubleshooting
 - (1) VMUX
 - (2) Welding
 - (3) CAN
- f. System Knowledge
 - (1) Wiring
 - (2) Amount of components
 - (3) Effect of AC voltage

- f. Proximity switches
- g. Engine Controls
 - (1) Throttle position sensor
 - (2) Electronic unit injector
 - (3) Sensors
 - (4) ECU
 - (5) D.P.F. Systems
- h. Vehicle data recorder
- i. Ground connections