

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

NFPA 1901, **Standard for Automotive Fire Apparatus**, Chapters 12, 13, 14, 15, 22, 23 & appendix

NFPA 1936, **Standard for Powered Rescue Tool Systems**

NFPA 1911, **Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus**, chapters 6, 25 & Appendix

to order NFPA documents call 800-344-3555 or order online at www.nfpa.org

Fundamental Electrical Troubleshooting, by Dan Sullivan 800-227-1603 www.esitest.com or online retailers

Essentials of Electrical Power Generation, by Dan Sullivan 800-227-1603 www.esitest.com 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 6-Step Troubleshooting Guide v1- v3, V-MUX Input/Output Relationships Report & V-MUX Troubleshooting Checklist

download for no charge from <http://www.akronbrass.com/weldon-v-mux-downloads>, then scroll down to "EVT Study Materials"

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

LEARNING OBJECTIVES FOR THE FA-4 EXAM

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 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 | <ul style="list-style-type: none"> c. Generators <ul style="list-style-type: none"> (1) Interlocks (2) Generator installation <ul style="list-style-type: none"> A. Requirements B. Voltage regulation (3) Drives (4) Generator Governors (5) Generator Diagnostics (6) Drive Diagnostics (7) Generator poles (8) Hydraulic generators <ul style="list-style-type: none"> A. Capacitor effects | <ul style="list-style-type: none"> B. PTO inspection C. Filters D. Hose reversal |
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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) Setup
 - A. Minimum continuous loads
 - B. Programming
 - C. Prioritizing
 - D. Amp loads
 - E. Emergency lighting sequencer
 - (2) Troubleshooting
 - A. Shedding loads
 - B. Interlocks
 - C. Alarms
 - D. Voltage drop testing
 - (3) Testing
 - A. Electromagnetic interference

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
- 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
 - (1) Transducer signal
 - (2) Analog input signal
- e. Transducers

- c. Rescue tools
 - (1) Quik-connect requirements
 - (2) Battery powered
- d. Ladder rack
 - (1) interlocks
- e. Hydraulic power unit
- f. Labeling
 - (1) Requirements
 - A. Operating amperage

- (4) Parallel & Series wiring
- (5) System Knowledge
 - A. Auxiliary battery
- (6) Sensors
- b. Data Recorders
 - (1) Same line rate
 - (2) Memory size
 - (3) Data recorded
- c. Seat belt warning system
 - (1) Warning Devices
 - A. Audible
 - B. Visual
 - (2) Indications

- 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