

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 -15 and chapters 22-23 & appendix
 NFPA 1936, **Standard for Powered Rescue Tool Systems**, 2005 Edition,
 NFPA 1911, **Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus**,
 chapter 6 and chapter 22 & Appendix

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

Auto Electricity & Electronics , James Duffy, Goodheart-Wilcox 1-708-687-5000 or the book can be ordered from www.amazon.com

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.

Class One ES-Key/USM Network Multiplexing Manual, page 1 thru 11, can be download for no charge from

http://www.class1.com/_Downloads/class1/manuals/ES-Key-USM.pdf

V-MUX 6-Step Troubleshooting Guide & V-MUX Relationship Guide download for no charge from

<http://www.weldoninc.com/pages/downloads/Sixsteps.pdf> and <http://weldoninc.com/pages/downloads/RelationshipsReport.pdf>

Any manufacturers operational and troubleshooting manual, such as Class1 Intelli-tank manual and Electronic Pressure Governor Manual

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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|------------------------------|---------------------|-------------------|
| a. Components and terms | (7) Soft start | (14) Voltage Drop |
| (1) Single phase | (8) Frequency | (15) Testing |
| (2) Three phase | (9) Sine wave | (16) Hertz |
| (3) Neutral wire | (10) Photo resistor | |
| (4) Ground wire | (11) Resistor | |
| (5) Bonding | (12) True Power | |
| (6) Inrush / startup current | (13) Prime Movers | |

b. Application and Troubleshooting

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|------------------------|--|
| (1) Wiring connections | (7) NFPA standards |
| (2) Wiring methods | A. Conductors |
| (3) Repair techniques | B. Polarity verification |
| A. Tools | C. Circuits |
| B. Electrical | D. Remote power Distribution |
| C. Harness connectors | E. Transfer switch |
| (4) Receptacle types | F. Grounding |
| (5) Wire routing | G. Testing |
| (6) Diagnostic tools | H. Out of Service |
| | (8) Effects of voltage drops on components |
| | (9) Portable Equipment |
| | A. Maximum voltage supplied to |

c. Installations

- | | |
|-------------------------------------|------------------------------|
| (1) Receptacles | (2) Light masts |
| A. Mounting height in wet locations | (3) Wiring |
| B. Switching | A. Connection to frame rails |

2. System Knowledge

- | | |
|---------------------|----------------------------|
| a. Circuit drawings | (7) Pulse Width Modulation |
| (1) Resistor | (8) Capacitor |
| (2) Diode | (9) Pressure Governor |
| (3) Rectifier | (10) Potentiometer |
| (4) Transistors | (11) AND gate |
| A. Bipolar | (12) OR gate |
| B. Field effect | |
| (5) Thermistors | |
| (6) Wire Splice | |

b. Circuit protection

- | | |
|---------------------------------------|------------------------------|
| (1) Over current protection | (4) Wet/dry listings |
| (2) Circuit rating | (5) Circuit breaker switches |
| (3) Ground fault circuit interrupters | |

c. Transfer switches

d. Power transmission

- (1) Branch circuits
 (2) Distribution remote

e. Amperage loads

f. Component information

- (1) capacitor
 (2) relays

3. Sources

- a. Shoreline power
- b. Invertors & converters
 - (1) Dynamic power
 - (2) Static power
- c. Generators
 - (1) Interlocks
 - (2) Generator installation
 - A. Requirements
 - B. Voltage regulation
 - (3) Drives

- (4) Generator Governors
- (5) Generator Diagnostics
- (6) Drive Diagnostics
- (7) Generator poles
- (8) Hydraulic generators
 - A. Capacitor effects
 - B. PTO inspection
 - C. Filters
 - D. Hose reversal

4. Accessories

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

- 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

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
- (3) Testing
 - A. Electromagnetic interference
- (4) Parallel & Series wiring
- (5) System Knowledge
 - A. Auxiliary battery
- (6) Sensors

6. Multiplex Systems

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

- 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

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

- f. Proximity switches
- g. Engine Controls
 - (1) Throttle position sensor
 - (2) Electronic unit injector
 - (3) Sensors
- h. Vehicle data recorder
- i. Ground connections