F-5 Aerial Fire Apparatus February 2017

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

NFPA reference listed below - National Fire Protection Association, Quincy, MA, (800) 344-3555 or www.nfpa.org

NFPA 1901, ***Standard for Automotive Fire Apparatus***, 2009

NFPA 1911, ***Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus***

Introduction to Hydraulic Technology Student Workbook. $25 Can be ordered online from http://www.hydraulicsliteraturestore.com/trma.html

Any *hydraulic reference material with symbols* ***such as Fluid Power Designer Lightning Reference*** Handbook, 8th edition. Available at www.ifps.org/Store/ord_form.htm#books or 856-489-8983

LEARNING OBJECTIVES FOR THE F-5 EXAM

1. Define the terms and phrases commonly used with aerial fire apparatus, operations, and/or testing.

a. NFPA 1901 Chapter 3 Definitions
- (1) rated capacity
- (2) continuous egress
- (3) burst pressure
- (4) live load
- (5) dead load

b. NFPA 1911 Chapter 3 Definitions
- (1) operator
- (2) acoustical testing
- (3) ironing
- (4) twist
- (5) leak
- (6) ultrasonic testing
- (7) magnetic particle test

c. General Knowledge
- (1) cantilever
- (2) races/base rail

d. Lightning Reference Glossary of Terms
- (1) double acting cylinder
- (2) micron
- (3) pilot valve
- (4) shuttle valve
- (5) cracking pressure
- (6) Pascal's law
- (7) motor

2. Identify the design requirements for aerial fire apparatus:

a. Aerial ladder requirements
- (1) rated capacity

b. Elevating platform requirements
c. Water delivery systems on aerials
d. Safety systems used on aerials
e. Operating controls
f. Hydraulic systems and components
- (1) Hose, Tubing, and Fittings

g. Structural components
- (1) Safety factor

h. Stabilizing systems
- (1) Deployment
- (2) Sloping surface

i. Operational time requirements
j. Vehicle components
k. Aerial ladder rated capacity
l. Aerial platform rated capacity
m. Tractor drawn vehicles
n. Aerial ladder mechanisms
o. Aerial platform mechanisms
p. Remote breathing air systems
q. Signs
r. Low voltage electrical systems
s. Driving and crew area
t. Aerial ladder operating positions
u. Communication systems
v. Fold down step requirement
w. Aerial platform water curtain

3. Understand the testing, inspection, and documentation requirements of all aerial fire apparatus.

a. Identify the "Test and Delivery Data Requirements" for aerial fire apparatus as stated in NFPA 1901.
- (1) Road test
- (2) Delivery data requirement
- (3) Quality control test

b. Identify the types of inspections and tests for aerials as stated in NFPA 1911:
- (1) Requirements for inspection and testing
  - (a) Water gauge test
  - (b) Water flow meter test
  - (c) System pressure test
- (2) Extension cylinder
  - (a) Drift test
- (3) Annual testing
- (4) N.D.T. testing
- (5) Horizontal load test
- (6) Weld inspections
- (7) Rotation gear inspection
- (8) Hardness test
- (9) Operational test
- (10) Articulating boom test
- (11) Max elevation load test
- (12) Hydraulic oil testing
- (13) Extension motor brake test
- (14) Turntable inspection and test
- (15) Stabilizer test
- (16) Visual inspection
- (17) Engine speed interlock
- (18) Winch holding capacity

c. General requirements and which standard contains the requirement for:
- (1) Out of service requirements
- (2) Test frequency
- (3) Inspections personnel
- (4) Retired Vehicle

d. Required documentation as per NFPA 1911.

e. Understand accepted procedures for aerial apparatus testing:
- (1) Tool usage
- (2) Extension cable
- (3) Pressure tests
- (4) Stabilizing system

4. Understand and identify hydraulic systems of an aerial apparatus:

a. Identify and understand hydraulic components
- (1) Relief valve
- (2) Filter assemblies and indicators
- (3) Hydraulic actuators
- (4) Counterbalance/holding valves
- (5) Pumps
- (6) Hoses and fittings

b. Identify and understand hydraulic schematics

c. Identify hydraulic symbols
   (1) Relief valve
   (2) Hydraulic cooler
   (3) Fixed displacement hydraulic pump
   (4) Filter strainers
   (5) Hydraulic check valves
   (6) Metering valve
   (7) Pressure reducing valve
   (8) Flow Control Valve

d. Understand principles of hydraulics
   (1) Resistance to flow
   (2) Causes of aerated hydraulic fluid
   (3) Hose sizing and configuration
   (4) Effect of hose size on fluid velocity

e. Understanding and trouble shooting hydraulic systems
   (1) Platform system
   (2) Abnormal noises
   (3) Oil conditions
   (4) Valves
   (5) Actuator
   (6) Stabilizer systems
   (7) Pressure compensated hydraulic pump
   (8) Engine speed control

5. Understand and identify electrical systems of an aerial apparatus

a. Identify electrical components
   (1) Electrical monitors
   (2) Electrical cable reel

b. Identify and understand electrical schematics

c. Identify electrical schematic symbols
   (1) Motor
   (2)Ground
   (3) SPDT Switch
   (4) Diode

d. Understand and troubleshoot electrical systems
   (1) Controllers
   (2) Voltage drops
   (3) Digital controllers
   (4) Commutator/collector rings
   (5) Line voltage systems
   (6) GFCI circuits
   (7) Water monitor electronic controls

6. Describe activities considered to be accepted practice in service and repair of aerial apparatus

a. Maintenance
   (1) Lubrication
   (2) Cable adjustments
   (3) Hydraulic hose replacement criteria
   (4) Filtration
   (5) Parts Criteria

b. Repair procedures
   (1) Identify hydraulic fluid leakage
   (2) Identify fastening devices and requirements
   (3) Line voltage repair procedures

7. Understand the principles of operating aerial apparatus

a. Stabilizing the apparatus
   (1) Emergency procedures
   (2) Stability requirements
   (3) Stabilizer pads
   (4) Short jacking

b. Operating aerial devices from lower controls
c. Operating aerial devices from upper controls
d. Proper cab tilting procedures as per manufacturer's recommendations
e. Safety
f. Interlocks