

**Reference Materials:** Note: This exam may contain some "accepted practice" type questions not found in the reference material **NFPA 1911**, *Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus 2007* edition. National Fire Protection Association, Quincy, MA, (800) 344-3555 or [www.nfpa.org](http://www.nfpa.org)

**Allison Publications:** The new EVS (Emergency Vehicle Series) lineup will include the 3000EVS and 4000EVS close ratio models and the 3500EVS and 4500EVS wide ratio models.

**Mechanics tips booklets and Operators Manuals can be downloaded online for no charge at [www.allisontransmission.com](http://www.allisontransmission.com)**

Mechanics Tips Booklets:

HT 700, # MT1366EN

HT 700 Electronic, #MT1958EN

MT4007EN MT4015EN

3000/4000 MT 3004EN

1000/2000 MT 3190EN

Operators Manuals:

# OM3656EN, 3000/4000 EVS

MT/MTB 648/HT/HTB 741 # OM1957EN

1000/2000 EVS OM 3761EN

Preventive Maintenance Manuals

AT/MT/HT # PM2572EN

Miscellaneous Manuals

MD/HD Product Lines Principles of Operation

# PO2454EN

Troubleshooting Manuals

Drive line Troubleshooting # TS2714EN

WT Troubleshooting # TS2470EN

WTEC III Troubleshooting #TS2973EN

On-Highway Troubleshooting #TS1838EN

In-Chassis Maintenance:

1000/2000 GN4008EN

Optional Service Manuals (not required)

MT 600 #SM1317EN

HT 700 # SM1270EN

HT 700 Electronic #SM2004EN

CEC 1 Electronic Controls #TS2712EN

MD Products, # SM2148EN

HD Products, # SM2457EN

1000/2000 TS3977EN

3000/4000 TS3989EN

Note: Allison "DOC" for PC-service tool has a digital full version of all series electronic troubleshooting manuals imbedded in the computer program.

### LEARNING OBJECTIVES FOR THE F-6 EXAM

**1. Operating Principles:** Understand basic operating principles of Allison On-Highway transmissions as found in emergency vehicles to include:

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| <p>a. Hydraulic systems</p> <ol style="list-style-type: none"> <li>(1) Clutch applications</li> <li>(2) Rear governor operation</li> <li>(3) Clutch apply sequence</li> </ol> <p>b. Torque Converters</p> <ol style="list-style-type: none"> <li>(1) Components of a torque converter</li> <li>(2) Function of a torque converter</li> <li>(3) Lock up clutch operation</li> </ol> <p>c. Driving Tips</p> <ol style="list-style-type: none"> <li>(1) Downhill braking/using engine to slow the vehicle</li> <li>(2) Proper towing techniques</li> <li>(3) Coasting</li> <li>(4) Cold weather starts</li> <li>(5) Using hydraulic retarder</li> </ol> | <p>d. Model Numbers</p> <ol style="list-style-type: none"> <li>(1) Model number breakdown</li> <li>(2) Location of number on transmission</li> </ol> <p>e. Water Pump Operations</p> <ol style="list-style-type: none"> <li>(1) Shift sequence</li> </ol> <p>f. External Component Identification</p> <ol style="list-style-type: none"> <li>(1) Mechanical modulator</li> <li>(2) Shift selectors</li> <li>(3) Neutral safety switch</li> </ol> <p>g. World Transmission shift selector function</p> <p>h. World transmission lockup mode</p> |
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**2. Preventive Maintenance Support:** Understand preventive maintenance support of the Allison Transmission as found in emergency vehicles to include:

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| <p>a. PTO Installation</p> <ol style="list-style-type: none"> <li>(1) Gaskets / sealing material</li> <li>(2) Sealing compounds</li> </ol> <p>b. Dipstick Calibrations &amp; Fluid Levels</p> <ol style="list-style-type: none"> <li>(1) Fluid level checks</li> <li>(2) Hot check</li> <li>(3) Fluid types</li> <li>(4) Filter and fluid change intervals</li> <li>(5) Level check using shift selector</li> <li>(6) Sump screen</li> <li>(7) Calibration</li> <li>(8) Electronic fluid check procedure</li> <li>(9) Filter recommendations</li> <li>(10) Oil filter change procedures</li> </ol> | <p>c. Identification of shift selector control</p> <ol style="list-style-type: none"> <li>(1) Identification</li> <li>(2) External linkage adjustments</li> <li>(3) Manual selector shaft and retaining nut</li> </ol> <p>d. Driveline and Output flanges</p> <ol style="list-style-type: none"> <li>(1) Retaining nut reuse</li> <li>(2) Phasing and angularity</li> <li>(3) Output flange and seal</li> <li>(4) Removal and installation of output flange</li> <li>(5) Driveline inspections</li> </ol> <p>e. NFPA 1915 PM inspections</p> <p>f. NFPA 1915 Out-of-Service criteria</p> <p>g. NFPA 1915 service recommendations</p> <p>h. Periodic inspection and care</p> <ol style="list-style-type: none"> <li>(1) vehicle cooling system check</li> <li>(2) fluid leak repair</li> </ol> |
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**3. Troubleshooting Procedures:** Understand basic troubleshooting procedures. Identify problems that can be corrected in chassis requiring seeking outside assistance to include:

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| <p>a. Driveline</p> <ol style="list-style-type: none"> <li>(1) Driveline test (coast)</li> <li>(2) Power train test (road speed)</li> <li>(3) Engine test (RPM)</li> </ol> <p>b. Shift complaints</p> <ol style="list-style-type: none"> <li>(1) Diagnosis</li> </ol> | <ol style="list-style-type: none"> <li>(2) Lock up pressure</li> <li>(3) Governor malfunction</li> <li>(4) Pump mode</li> <li>(5) Governor identification</li> <li>(6) Shift inhibits</li> </ol> |
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- c. PTO installations
  - (1) Backlash adjustments(1)External identifications
  - (2) Pressure port locations
  - (3) Signal port locations
- d. Fluid checks
  - (1) Impact of aerated fluid
  - (2) Fluid levels
  - (3) Noise occurring
  - (4) Fluid leak diagnostics
  - (5) Contaminations
  - (6) Breather
  - (7) NFPA 1915 leakage classes
  - (8) High fluid temperature

- e. Stall Test
  - (1) Purpose
  - (2) Warning/caution
- f. Diagnostic reference material
  - (1) Code descriptions
  - (2) Power and ground
  - (3) Opens, shorts, short to ground
  - (4) Understanding schematics
  - (5) Welding precautions
  - (6) Range selection/ shift inhibit
- g. Checks and Adjustments
  - (1) Road test

**4. Electronic Controls:** Basic understanding of Allison electronic controls to include:

- a. Electronic control systems
  - (1) Electronic software series
  - (2) MT-HT voltage requirements
  - (3) Power and ground connections
  - (4) Trouble code display MT and HT
  - (5) Continuity checks
  - (6) "Do not shift" MT and HT
  - (7) Clearing trouble codes MT and HT
  - (8) TPS adjustments
  - (9) VIM fused circuits
  - (10) Welding caution
  - (11) Identification of WTEC 2 controls
  - (12) Identification of WTEC 3 controls
  - (13) Identification of 4<sup>th</sup> generation controls(1)
- b. World Transmission EVS 3000, 4000 trouble codes
  - (1) Number of stored trouble codes
  - (2) Checking logged diagnostic codes
  - (3) Main codes and sub codes
  - (4) "Check trans" light action
  - (5) Mobile radio installation locations (RFI)
  - (6) Intermittent Faults
  - (7) "Do Not Shift" light
- c. 1000/2000 series
  - (1) Accessing diagnostic trouble codes (DTC)

**5. Output Retarder:** Understanding of Allison Transmissions output retarders to include:

- a. Components
  - (1) MT and HT descriptions
  - (2) Accumulator
  - (3) Accumulator locations
- b. Retarder operating parameters
  - (1) Fluid temperature
  - (2) Activation signal
  - (3) Oil cooler
  - (4) MT and HT retarder malfunction
  - (5) Safety feature

**6. Reference Materials:** Understanding of Allison Transmission reference material to include:

- a. Understanding Allison Reference Material
  - (1) Owner assistance
  - (2) Stall test procedures
  - (3) Adjustment procedures for TPS and mechanical modulator
  - (4) Engine to transmission adaptation requirements
  - (5) Oil change intervals
  - (6) Speed sensors
  - (7) Reverse signal switch
  - (8) [www.allisontransmission.com](http://www.allisontransmission.com)
  - (9) Obtaining technical assistance