

**2014
Medium/Heavy Truck
Standards**

Summary of Changes



3/13/2014

Summary of Changes

1. Medium/Heavy Truck Minimum Requirements

There was no change to the minimum requirements for accreditation, including hours and areas of accreditation.

2. Instructor Qualifications

There was no change to instructor qualification.

3. Addition of Standard 12 – E-Learning

WRITTEN POLICIES AND PROCEDURES MUST BE FOLLOWED WHEN E-LEARNING CURRICULAR MATERIALS ARE USED OUTSIDE OF SCHEDULED CLASSROOM/LAB/SHOP TIME FOR THE PURPOSE OF MEETING NATEF INSTRUCTIONAL HOUR REQUIREMENTS. (This applies only to programs that are using e-learning to meet program hour requirements. This is a go/no go Standard that requires validation of a ‘yes’ response to each of the criteria.)

4. Task List And Assumptions

Added a statement that required supplemental tasks will be taught

5. Required Supplemental Tasks – the following were added

Personal Standards (see Standard 7.9)

1. Reports to work daily on time; able to take directions and motivated to accomplish the task at hand.
2. Dresses appropriately and uses language and manners suitable for the workplace.
3. Maintains appropriate personal hygiene
4. Meets and maintains employment eligibility criteria, such as drug/alcohol-free status, clean driving record, etc.
5. Demonstrates honesty, integrity and reliability

Work Habits / Ethic (see Standard 7.10)

1. Complies with workplace policies/laws
2. Contributes to the success of the team, assists others and requests help when needed.
3. Works well with all customers and coworkers.
4. Negotiates solutions to interpersonal and workplace conflicts.
5. Contributes ideas and initiative
6. Follows directions
7. Communicates (written and verbal) effectively with customers and coworkers.
8. Reads and interprets workplace documents; writes clearly and concisely.
9. Analyzes and resolves problems that arise in completing assigned tasks.
10. Organizes and implements a productive plan of work.

11. Uses scientific, technical, engineering and mathematics principles and reasoning to accomplish assigned tasks
12. Identifies and address the needs of all customers, providing helpful, courteous and knowledgeable service and advice as needed.

Shop and Personal Safety (see Standard)

1. Identify general shop safety rules and procedures.
2. Utilize safe procedures for handling of tools and equipment.
3. Identify and use proper placement of floor jacks and jack stands.
4. Identify and use proper procedures for safe lift operation.
5. Utilize proper ventilation procedures for working within the lab/shop area.
6. Identify marked safety areas.
7. Identify the location and the types of fire extinguishers and other fire safety equipment.
8. Demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment.
9. Identify the location and use of eye wash stations.
10. Identify the location of the posted evacuation routes.
11. Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.
12. Identify and wear appropriate clothing for lab/shop activities.
13. Secure hair and jewelry for lab/shop activities.
14. Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.
15. Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.).
16. Locate and demonstrate knowledge of material safety data sheets (MSDS)
17. Tools and Equipment
18. Identify tools and their usage in automotive applications.
19. Identify standard and metric designation.
20. Demonstrate safe handling and use of appropriate tools.
21. Demonstrate proper cleaning, storage, and maintenance of tools and equipment.
22. Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper).
23. Preparing Vehicle for Service
24. Identify information needed and the service requested on a repair order.
25. Identify purpose and demonstrate proper use of fender covers, mats.
26. Demonstrate use of the three C's (concern, cause, and correction).

6. Task List Changes – the following reflects only those tasks that were changed, added or removed as indicated in red.

I. DIESEL ENGINES
A. General

- | | | |
|----|---|------------------------------|
| 1. | Inspect fuel, oil, <u>Diesel Exhaust Fluid (DEF)</u> and coolant levels, and condition; determine needed action. | P-1 |
| 2. | Identify the causes of engine fuel, oil, coolant, air, and other leaks; determine needed action. | P-1 |
| 4. | Observe engine exhaust smoke color and quantity; determine needed action. | P-3
<u>P-2</u> |
| 5. | Identify causes of <u>Check engine</u> -no cranking, cranks but fails to start, hard starting, and starts but does not continue to run problems; determine needed action. | P-1 |
| 6. | Identify causes of engine surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and shutdown problems; determine needed action. | P-1 |
| 7. | Identify engine vibration problems; determine needed action. | P-2 |
| 8. | Check and record electronic diagnostic codes, and trip/operational data; monitor electronic data; verify customer programmable parameters; clear codes; determine further diagnosis. | P-1 |

B. Cylinder Head and Valve Train

- | | | |
|---------------|---|---------------------------|
| 1. | Remove, clean, inspect for visible damage, and replace cylinder head(s) assembly. | P-1 |
| 2. | Clean and inspect threaded holes, studs, and bolts for serviceability; determine needed action. | P-1 |
| 3. | Inspect cylinder head for cracks/damage; check mating surfaces for warpage; check condition of passages; inspect core/expansion and gallery plugs; determine needed action. | P-1 <u>P-2</u> |
| 9. | Inspect, measure, and replace/reinstall overhead camshaft; measure/adjust end play and backlash. | P-2 <u>P-3</u> |
| 11. | Adjust valve bridges (crossheads); adjust valve clearances and injector settings. | P-1 <u>P-2</u> |

C. Engine Block

- | | | |
|-----|---|---------------------------|
| 12. | Inspect connecting rod and bearings for wear patterns; measure pistons, pins, retainers, and bushings; perform needed action. | P-2 <u>P-3</u> |
|-----|---|---------------------------|

- 16. Inspect ~~and measure~~ crankshaft vibration damper; determine needed action. P-3

D. Lubrication Systems

- 6. Inspect turbocharger lubrication ~~and cooling~~ systems; determine needed action. P-2

E. Cooling System

- 5. Recover coolant, flush, and refill with recommended coolant/additive package; bleed cooling system. P-1

- 8. Inspect, clean, and pressure test radiator; ~~p~~Pressure test cap, tank(s), and recovery systems; determine needed action. P-1

- 10. ~~Inspect turbo charger cooling systems, determine needed action.~~ P-2

F. Air Induction and Exhaust Systems

- 2. Perform intake manifold pressure (boost) test; determine needed action. ~~P-1~~P-3

- 3. ~~Perform exhaust~~Check exhaust back pressure ~~test~~; determine needed action. ~~P-2~~P-3

- 5. Inspect ~~and test~~ turbocharger(s) (variable ratio/geometry VGT), pneumatic, hydraulic, electronic controls, and actuators. ~~P-3~~P-2

- 9. Inspect, clean, and test charge air cooler assemblies; ~~inspect aftercooler assemblies~~; replace as needed. P-2

- 11. Inspect exhaust after treatment devices; determine necessary action. ~~P-3~~P-2

- 13. Inspect ~~and test~~ exhaust gas recirculation (EGR) system including EGR valve, cooler, piping, filter, electronic sensors, controls, and wiring; determine needed action. ~~P-3~~P-2

G. Fuel System

1. Fuel Supply System

5. Inspect and test ~~low~~-pressure regulator systems (check valves, pressure regulator valves, and restrictive fittings); determine needed action. P-1

2. Electronic Fuel Management System

2. Interface with vehicle's on-board computer; perform diagnostic procedures using ~~recommended~~-electronic ~~diagnostic equipment and~~service tool(s) (to include PC based software and/or data scan tools); determine needed action. P-1
7. Using ~~recommended~~-electronic ~~diagnostics~~service tool(s) (~~to include PC based software and/or data scan tools~~), access and interpret customer programmable parameters. ~~P-2~~P-1
8. ~~Inspect, test, and adjust electronic unit injectors (EUI); determine needed action.~~Perform on-engine inspections, tests and adjustments on electronic unit injectors (EUI); determine needed action. P-2
10. Perform cylinder contribution test utilizing ~~recommended~~-electronic ~~diagnostics~~service tool. P-1
11. Perform on-engine inspections and tests on hydraulic electronic unit injectors (HEUI) and system electronic controls; determine needed action. P-2
12. Perform on-engine inspections and tests on hydraulic electronic unit injector (HEUI) high pressure oil supply and control systems; determine needed action. P-2
13. Perform on-engine inspections and tests on high pressure common rail (HPCR) type injection systems; determine needed action. ~~P-3~~P-2
14. Inspect high pressure injection lines, hold downs, fittings and seals; determine needed action. ~~P-3~~P-2

H. Engine Brakes

1. Inspect and adjust engine compression/exhaust brakes; determine needed action. ~~P-3~~P-2

2. Inspect, test, and adjust engine compression/exhaust brake control circuits, switches, and solenoids; ~~repair or replace as needed~~ determine needed action. P-3
3. Inspect engine compression/exhaust brake housing, valves, seals, lines, and fittings; ~~repair or replace as needed~~ determine needed action. P-3

II. DRIVE TRAIN

A. Clutch

3. Inspect, adjust, repair, ~~or~~ and replace hydraulic clutch slave and master cylinders, lines, and hoses; bleed system. P-2
9. Inspect and replace pilot bearing. P-2P-1
10. ~~Remove and-reinstall, inspect~~ flywheel, inspect mounting area on crankshaft, rear main oil seal, and measure crankshaft end play; determine needed action. P-2P-1
11. Inspect flywheel, starter ring gear and measure flywheel face and pilot bore runout; determine needed action. P-2P-1

B. Transmission

1. Identify causes of transmission noise, shifting concerns, lockup, jumping-out-of-gear, overheating, and vibration problems; determine needed action. P-1
9. Inspect transmission oil filters and coolers and related components; replace as needed. P-2
13. Inspect and test transmission temperature gauge wiring harnesses and sensor/sending unit; determine needed action. P-2
16. Use appropriate ~~diagnostic-electronic service~~ tool(s) and procedures to diagnose automated mechanical transmission problems; check and record diagnostic codes, clear codes, and interpret digital multimeter (DMM) readings; determine needed action. P-1
17. Inspect and test operation of automatic transmission electronic shift controls, shift solenoids, shift motors, indicators, speed and range sensors, electronic/transmission control units (ECU/TCU), neutral/in gear and reverse switches, and wiring harnesses. P-3P-2

- 18. Inspect and test operation of automatic transmission electronic shift selectors, switches, displays, ~~and~~ indicators, ~~and~~ wiring harnesses. P-3P-2
- 19. Use appropriate ~~diagnostic~~ electronic service tool(s) and procedures to diagnose automatic transmission problems; check and record diagnostic codes, clear codes, and interpret digital multimeter (DMM) readings; determine needed action. P-3

C. Driveshaft and Universal Joint

- 4. Measure driveline angles; determine needed action. P-2P-1

D. Drive Axle

- 8. Measure ring gear runout; determine needed action. P-3P-2
- 12. Measure and adjust side bearing preload and ring gear backlash. P-3P-2
- 13. Check and interpret ring gear and pinion tooth contact pattern; determine needed action. P-3P-2
- 21. Inspect and test drive axle temperature gauge wiring harnesses and sending unit/sensor; determine needed action. P-2
- 22. Clean, inspect, lubricate and replace wheel bearings; replace seals and wear rings; inspect and replace retaining hardware; adjust drive axle wheel bearings. Verify end play with dial indicator method. P-1

III. BRAKES

A. Air Brakes

1. Air Supply and Service Systems

- 4. Inspect air compressor drive gear, belts, and coupling, adjust or replace as needed. P-3
- 5. Inspect air compressor inlet; inspect oil supply and coolant lines, fittings, and mounting brackets; repair or replace as needed. P-2P-1
- 10. Inspect and test brake application (foot/treadle) valve, fittings, and mounts; check pedal operation; replace as needed. P-1

2. Mechanical/Foundation Brakes

3. Identify type. ~~I~~nspect and service slack adjusters; perform needed action. P-1
4. Inspect camshafts, tubes, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor pins, and springs; replace as needed. P-1
5. Inspect, clean, and adjust air disc brake caliper assemblies; determine needed repairs. ~~P-3~~P-2

3. Parking Brakes

3. Inspect and test parking (spring) brake application and release valve; replace as needed. ~~P-2~~P-1
- ~~5. Identify and test anti compounding brake function.~~ P-1

B. Hydraulic Brakes

1. Hydraulic System

- ~~2. Check brake pedal pushrod length; adjust as needed.~~ P-3
3. Inspect and test master cylinder for internal/external leaks and damage; replace as needed. ~~P-1~~P-2
4. Inspect hydraulic system brake lines, flexible hoses, and fittings for leaks and damage; replace as needed. ~~P-2~~P-1
6. Inspect and test brake pressure differential valve and warning light circuit switch, bulbs/LEDs, wiring, and connectors; repair or replace as needed. P-2
7. Inspect disc brake caliper assemblies; replace as needed. ~~P-2~~P-1
8. Inspect/test brake fluid; bleed and/or flush system; determine proper fluid type. ~~P-2~~P-1

2. Mechanical/Foundation Brakes

2. Inspect and measure rotors; perform needed action. ~~P-2~~P-1
3. Inspect and measure disc brake pads; inspect mounting hardware; perform needed action. ~~P-2~~P-1

C. Air and Hydraulic Antilock Brake Systems (ABS) and Automatic Traction Control (ATC)

1. Observe antilock brake system (ABS) warning light operation (includes ~~trailer and~~ dash mounted trailer ABS warning light); determine needed action. P-1
2. Diagnose antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or ~~specified test equipment (scan tool, PC computer)~~ electronic service tool(s); determine needed action. P-1
6. Bleed the ABS hydraulic circuits. ~~following manufacturers' procedures.~~ P-2
9. Verify power line carrier (PLC) operations. P-2

D. Wheel Bearings

1. Clean, inspect, lubricate and replace wheel bearings and races/cups; replace seals and wear rings; inspect spindle/tube; inspect and replace retaining hardware; adjust wheel bearings. Verify end play with dial indicator method. P-1
2. ~~Inspect or replace extended service wheel bearing assemblies~~ Identify, inspect or replace unitized/preset hub bearing assemblies. P-3P-2

IV. SUSPENSION AND STEERING

A. Steering Systems

1. Steering Column

3. Check ~~and adjust~~ cab mounting and adjust ride height. P-3P-2
4. ~~Center the steering wheel as needed.~~ Remove the steering wheel (includes steering wheels equipped with electrical/electronic controls and components); install and center the steering wheel. Inspect, test, replace, and calibrate steering angle sensor. P-1

2. Steering Units

4. Perform power steering system pressure, temperature, and flow tests; determine needed action. P-2P-3

9. Inspect, adjust, repair, or replace integral type power steering gear(s) (single and/or dual) and mountings. P-1P-2

3. Steering Linkage

2. Check and adjust steering (wheel) stops; verify relief pressures. P-1
3. Inspect and lubricate steering ~~arms and linkages~~ components. P-1

B. Suspension Systems

2. Inspect and service kingpins, steering knuckle bushings, locks, bearings, seals, and covers; determine needed action. P-1
4. Inspect leaf springs, center bolts, clips, pins and bushings, shackles, ~~slippers~~ U-bolts, insulators, brackets, and mounts; determine needed action. P-1
9. Measure and adjust ride height; determine needed action. P-1

C. Wheel Alignment Diagnosis, Adjustment, and Repair

4. Check and adjust toe settings. ; ~~adjust as needed.~~ P-1

D. Wheels and Tires

3. Remove and install steering and drive axle wheel/tire assemblies; torque mounting hardware to specifications with torque wrench. P-1
4. Inspect tire for proper application, (size, load range, position, and tread design); determine needed action. P-3P-2
5. Inspect wheel/rims for proper application, hand hold alignment, load range, size, and design; determine needed action. P-3P-2
6. Check operation of tire pressure monitoring system (TPMS); determine needed action if applicable. P-3

E. Frame and Coupling Devices

1. Inspect, service, and/or adjust fifth wheel, pivot pins, bushings, locking mechanisms, and mounting hardware. P-2P-1
5. Inspect, repair, or replace pintle hooks and draw bars, if applicable. P-3P-2

V. ELECTRICAL/ELECTRONIC SYSTEMS

B. Battery

1. Identify battery type.; ~~P~~perform appropriate battery load test; determine needed action. P-1
5. Charge battery using appropriate method for battery type. ~~using slow or fast charge method as appropriate.~~ P-1
9. Identify and test low voltage disconnect (LVD) systems; determine needed repair. P-2

C. Starting System

2. Inspect and test components (key switch, push button and/or magnetic switch) and wires and harnesses in the starter control circuit; replace as needed. P-2
3. Inspect and test, starter relays and solenoids/switches; replace as needed. P-2P-1
4. Remove and replace starter; inspect flywheel ring gear or flex plate. P-2P-1

D. Charging System Diagnosis and Repair

6. Remove and replace alternator. P-2P-1
7. Inspect, repair, or replace cables, wires, and connectors in the charging circuit. P-2P-1

E. Lighting Systems

1. Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic ~~diagnostic equipment and service~~ tool(s) (including PC based software and/or data scan tools); determine needed action. P-1
7. Inspect and test interior cab light circuit switches, bulbs/LEDs, sockets, low voltage disconnect (LVD), connectors, terminals, wires, and control components/modules; repair or replace as needed. P-2
11. Inspect and test reverse lights and warning device circuit switches, bulbs/LEDs, sockets, horns, buzzers, connectors, terminals, wires and control components/modules; repair or replace as needed. P-2P-1

F. Gauges and Warning Devices

1. Interface with vehicle's on-board computer; perform diagnostic procedure, verify instrument cluster operations using recommended electronic ~~diagnostic equipment and service~~ tool(s) (including PC based software and/or data scan tools); determine needed action. P-1
5. Inspect and test warning devices (lights and audible) circuit sensor/sending units, bulbs/LEDs, sockets, connectors, wires, and control components/modules; repair or replace as needed. ~~P-2~~P-1

G. Related Electrical Systems

1. Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic ~~diagnostic equipment and service~~ tool(s) (including PC based software and/or data scan tools); determine needed action. P-1
2. Identify causes of constant, intermittent, or no horn operation; determine needed action. ~~P-2~~P-2
3. Inspect and test horn circuit relays, horns, switches, connectors, wires, clock springs, and control components/modules; repair or replace as needed. P-2
11. Identify causes of slow, intermittent, or no power ~~side~~ window operation; determine needed action. P-3
12. Inspect and test motors, switches, relays, connectors, terminals, wires, and control components/modules of power ~~side~~ window circuits; repair or replace as needed. P-3
17. Inspect and test engine cooling fan electrical control components/modules, wiring; repair or replace as needed. P-2

VI. HEATING, VENTILATION, & AIR CONDITIONING

B. A/C System and Components

1. A/C System - General

7. Identify ~~contaminated-contamination in the~~ A/C system components ~~and hoses~~; determine needed action. P-3

8. Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic service tool(s)(including PC based software and/or data scan tools); determine needed action. P-2

2. Compressor and Clutch

4. Inspect, test, adjust, service, or replace A/C compressor clutch components or assembly. P-2
6. Inspect, test, or replace A/C compressor. P-2P-1

3. Evaporator, Condenser, and Related Components

- ~~3. Inspect A/C condenser for proper air flow.~~ P-1
4. Inspect and test A/C system condenser, ~~and mountings;~~ Check for proper airflow and mountings; determine needed action. P-2P-1

C. Heating and Engine Cooling Systems

6. Inspect water pump ~~for leaks and bearing play;~~ determine needed action. P-2P-1

D. Operating Systems and Related Controls

1. Electrical

6. Inspect and test electric actuator motors, relays/modules, switches, sensors, wiring, and protection devices; determine needed action. P-3P-2
7. Inspect and test HVAC system electrical/electronic control panel assemblies; determine needed action. P-3P-2
8. Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic service tool(s) (including PC based software and/or data scan tools); determine needed action. P-2

VII. PREVENTIVE MAINTENANCE and INSPECTION

A. Engine System

3. Air Induction and Exhaust System

5. Check operation of engine compression/exhaust brake. P-1P-2

8. Inspect diesel exhaust fluid (DEF) system, to include tanks, lines, gauge pump, and filter. P-1

9. Inspect selective catalyst reduction (SCR) system, including diesel exhaust fluid (DEF) for proper levels, leaks, mounting and connections. P-2

4. Cooling System

7. Check coolant for contamination, additive package concentration, aeration, and protection level (freeze point). P-1

9. Inspect water pump. ~~for leaks and bearing play.~~ P-1

5. Lubrication System

2. Take an engine oil sample for analysis. P-1

B. Cab and Hood

1. Instruments and Controls

4. Check operation of electronic power take off (PTO) and engine idle speed controls (if applicable). ~~P-1~~P-2

7. Using ~~diagnostic~~electronic service tool(s) or on-board diagnostic system; retrieve engine monitoring information; check and record diagnostic codes and trip/operational data (including engine, transmission, ABS, and other systems). P-1

2. Safety Equipment

2. Check condition of spare fuses, safety triangles, fire extinguisher, and all required decals. P-1

3. Hardware

7. Record all observed physical damage. ~~P-1~~P-2

8. Lubricate all cab and hood grease fittings. ~~P-1~~P-2

4. Heating, Ventilation, & Air Conditioning (HVAC)

1. Inspect A/C condenser and lines for condition and visible leaks; check mountings. ~~P-1~~P-2

- | | | |
|----|--|--------|
| 2. | Inspect A/C compressor and lines for condition and visible leaks; check mountings. | P-1P-2 |
|----|--|--------|

D. Frame and Chassis

1. Air Brakes

- | | | |
|---------------|---|----------------|
| 2. | Record air governor <u>cut-in and</u> cut-out setting (psi). | P-1 |
| 8. | Check air governor cut-in pressure. Moved | P-1 |
| 20. | Check condition and operation of hand brake (trailer) control valve, <u>if applicable</u> . | P-1P-2 |

2. Hydraulic Brakes

- | | | |
|----|---|-----|
| 4. | Check operation of hydraulic system: pedal travel, pedal effort, pedal feel, (drift) . | P-1 |
| 5. | Inspect calipers for leakage, <u>binding</u> and damage. | P-1 |

3. Drive Train

- | | | |
|-----|---|--------|
| 5. | Check transmission case, seals, filter, hoses, <u>lines</u> , and cooler for cracks and leaks. | P-1 |
| 14. | Change drive axle(s) oil and filter/ <u>screen, if applicable</u> ; check and clean magnetic plugs. | P-1P-2 |
| 16. | Change transmission oil and filter, <u>if applicable</u> ; check and clean magnetic plugs. | P-1P-2 |
| 18. | Check <u>transmission</u> range shift operation. | P-1 |

4. Suspension and Steering Systems

- | | | |
|----------------|--|----------------|
| 1. | Check steering wheel operation for free play or <u>and</u> binding. | P-1 |
| 6. | Check kingpins <u>s</u> for wear. | P-1 |
| 14. | Check toe setting. | P-1 |
| 15. | Check tandem axle alignment and spacing. | P-1 |

5. Tires and Wheels

- 3. Inspect valve caps and stems; ~~replace as needed~~ determine needed action. P-1
- 6. Check ~~for loose lugs; check wheel~~ mounting hardware; determine needed action condition; service as needed. P-1
- ~~7. Retorque lugs in accordance with manufacturers' specifications.~~ P-1
- 8. Inspect wheels for cracks, ~~or~~ damage and proper hand hold alignment. P-1
- 9. Check tire matching (diameter and tread) on single and dual tire ~~installations applications~~. P-1

6. Frame and Fifth Wheel

- 4. Check pintle hook assembly and mounting, if applicable. P-1P-2
- 5. Lubricate all fifth wheel grease fittings and plate, if applicable. P-1

VIII. HYDRAULICS

B. Pumps

- 2. Identify causes of pump failure, unusual pump noises, temperature, flow, and leakage problems; determine needed action. P-2P-1
- 3. Determine pump type, rotation, and drive system. P-2P-1

C. Filtration/ Reservoirs (Tanks)

- 4. Take a hydraulic oil sample for analysis. P-2P-1
- 6. Inspect and repair or replace reservoir, sight glass, vents, caps, mounts, valves, screens, supply and return lines. P-2P-1

D. Hoses, Fittings, and Connections

- 3. Assemble hoses, tubes, connectors, and fittings in accordance with manufacturers' specifications; use proper procedures to avoid contamination. P-2P-1
- 4. Inspect and replace fitting seals and sealants. P-2P-1

E. Control Valves

1. Pressure test system safety relief valve; determine needed action. P-2P-1
2. Perform control valve operating pressure and flow tests; determine needed action. P-2P-1
3. Inspect, test, and adjust valve controls (electrical/electronic, mechanical, and pneumatic). P-2P-1
4. Identify causes of control valve leakage problems (internal/external); determine needed action. P-2P-1

F. Actuators

2. Identify the cause of seal failure; determine needed repairs. P-2P-1
3. Identify the cause of incorrect actuator movement and leakage (internal and external); determine needed repairs. P-2P-1
4. Inspect actuator mounting, frame components, and hardware for looseness, cracks, and damage; determine needed action. P-2P-1
5. Remove, repair, and/or replace actuators in accordance with manufacturers' recommended procedures. P-2P-1
6. Inspect actuators for dents, cracks, damage, and leakage; determine needed action. P-2P-1

6. Task List Priority Item Totals (by area)

I. Diesel Engines

P-1 = ~~39~~35 95% = ~~37~~33 tasks
 P-2 = ~~26~~32 70% = ~~18~~22 tasks
 P-3 = ~~24~~21 25% = ~~6~~5 tasks

DE Total Tasks 2007 – 89 2014 - 88

II. Drive Train

P-1 = ~~23~~27 95% = ~~22~~26 tasks
 P-2 = ~~17~~18 70% = ~~12~~13 tasks
 P-3 = ~~17~~12 25% = ~~4~~3 tasks

DT Total Tasks 2007 – 57 2014 – 57

III. Brakes

P-1 = ~~30~~39 95% = ~~29~~37 tasks
 P-2 = ~~14~~9 70% = ~~10~~6 tasks
 P-3 = ~~10~~7 25% = ~~3~~2 tasks

BR Total Tasks 2007 – 54 2014 – 55

IV. Suspension & Steering

P-1 = ~~23~~22 95% = ~~22~~21 tasks
 P-2 = ~~11~~12 70% = ~~8~~8 tasks
 P-3 = 11 25% = 3 tasks

SS Total Tasks 2007 – 45 2014 – 45

V. Electrical/Electronic Systems

P-1 = ~~34~~38 95% = ~~29~~36 tasks
 P-2 = ~~24~~15 70% = ~~15~~11 tasks
 P-3 = 12 25% = 3 tasks

EE Total Tasks 2007 – 64 2014 - 65

VI. Heating, Ventilation, & Air Conditioning

P-1 = ~~29~~31 95% = ~~28~~29 tasks
 P-2 = ~~16~~17 70% = ~~11~~12 tasks
 P-3 = ~~12~~10 25% = ~~3~~3 tasks

HVAC Total Tasks 2007 – 57 2014 - 58

VII. Preventative Maintenance Inspection

P-1 = ~~145~~132 95% = ~~138~~125 tasks
 P-2 = ~~0~~11 70% = ~~8~~8 tasks
 P-3 = 0

PMI Total Tasks 2007 – 145 2014 - 143

VII Hydraulics

I.

P-1 = ~~12~~27 95% = ~~11~~26 tasks
 P-2 = ~~20~~5 70% = ~~14~~6 tasks
 P-3 = 0

Hydraulics Total Tasks 2007 – 32 2014 - 32

Total Tasks

<u>2007</u>	<u>2014</u>
543	543

7. TOOLS AND EQUIPMENT

HAND TOOLS

Flashlight/Inspection Light

Socket Set - 3/8" Drive: 3/8" - 3/4" U.S. Standard Depth (12 point), ~~Impact or Chrome~~
3/8" - 3/4" U.S. Deep (6 point), ~~Impact or Chrome~~
10mm - 19mm Metric Standard Depth (6 point), ~~Impact or Chrome~~
10mm - 19mm Metric Deep (6 point), ~~Impact or Chrome~~

Socket Set - 1/2" Drive: 1/2" - 1 1/8" Shallow, ~~Impact or Chrome~~
7/16" - 1 1/8" Deep, ~~Impact or Chrome~~
13mm - 32mm Shallow, ~~Impact or Chrome~~
13mm - 32mm Deep, ~~Impact or Chrome~~

GENERAL LAB/SHOP EQUIPMENT

Belt Tension Gauge/Belt Wear Gauge

Combination Wrench Set - 3/8" - 1 1/2" and 6mm - ~~24mm~~32mm

Diagnostic Information ~~Reader Platform~~- PC with appropriate software and/or internet-access
~~drive~~ for reading-accessing electronic service information

~~Diagnostic Tool~~Electronic Service Tool- PC or Data Scan Tool with appropriate software

Brass Feeler Gauge

Jacks - (~~Bottle Style~~), Air Jack, Frame Jack, Etc.

~~Oxy-Acetylene~~ Oxy-Gas Torch Set

Pressure Gauge - (0 - 300 psi), (0 - 3000 psi), ~~(0 - 150 psi)~~

Safety (Jack) Stands - (minimum ~~40~~6 ton)

SPECIALTY TOOLS AND EQUIPMENT

DIESEL ENGINES

Cooling System Vacuum Fill ~~Machine (optional)~~Equipment

Diesel Exhaust Fluid (DEF) Refractometer

Manometer - (Water) or Magnehelic Gauge (optional)

SUSPENSION & STEERING

Ball Joint Separator

~~Flow Meter~~ - Power Steering Power Steering Analyzer

BRAKES

Drum Brake Gauge/Micrometer
Power Line Carrier Tester (PLC)

ELECTRICAL/ELECTRONIC SYSTEMS

Battery Charger (~~200 AMP Minimum~~) AGM Compatible

PREVENTIVE MAINTENANCE

Tire Mating Square

DRIVE TRAIN

Air Pressure Guage (0 psi – 150 psi)

HEATING, VENTILATION, AND AIR CONDITIONING

A/C Compressor Clutch ~~Pullers~~ Removal and Installation Tools
A/C Refrigerant Identifier

Halogen Leak Detector (for HFCs)*/UV Leak Detection Set

HYDRAULICS

Stop Watch

8. DEFINITIONS

EDUCATIONAL TERMS – No changes

9. ABBREVIATIONS – the following abbreviations are now clearly identified as appropriate throughout the task lists

AC – Alternating Current

A/C – Air Conditioning