ASE Education Foundation
M/H Truck Program Standards
2025 Revisions Redline Copy

DRAFT-PENDING FINAL APPROVAL

The following sections of the ASE M/H Truck Program Standards were reviewed and revised as shown by a panel of industry and education subject matter experts at a review meeting held February 25-26, 2025, in Sterling, VA. Additions are shown in blue; deletions are shown in red.

- **Assumptions, Foundational Tasks, and Workplace Employability Skills**

Assumptions
A task is a psychomotor or cognitive entry-level learning activity consisting of one or more measurable steps accomplished through an instructor presentation, demonstration, visualization, or a student application.

Theory instruction and hands-on performance of all the basic tasks will provide initial training for **entry-level** employment in the automotive service field or prepare the student for further training. Competency in the tasks will indicate to employers that the graduate has the skills needed for entry-level employment in the medium/heavy truck service field.

1. It is assumed that:
   * at all levels of accreditation, appropriate theory, safety, and support instruction will be required for performing each task;
   * the instruction has included identification and use of appropriate tools and testing and measurement equipment required to accomplish certain tasks;
   * the student has received the necessary training to locate and use current reference and training materials from accepted industry publications and resources; and
   * at all levels of accreditation, the student has developed an understanding of workflow documentation (written or electronic), including the ability to create and update work/repair orders, warranty reports, and inspection reports, to include information regarding problem resolution and the results of the work performed for the customer and manufacturer. This process will incorporate the “Three C’s” (concern, cause, and correction) as a format to communicate this information.

2. It is assumed that:
   * all diagnostic and repair tasks described in this document are to be accomplished in accordance with manufacturer's recommended procedures and safety precautions as published.

3. It is assumed that:
   * individual courses of study will differ across medium/heavy truck technician training programs;
   * development of appropriate learning delivery systems and tests which monitor student progress will be the responsibility of the individual training program;
   * individual training programs being evaluated for accreditation should document performance standards for each task covered and taught in the curriculum;
   * the learning progress of students will be monitored and evaluated against these performance standards; and
   * a system is in place that informs all students of their individual progress through all phases of the training program.

4. It is assumed that:
   * all students will receive instruction in the storage, handling, and use of Hazardous Materials as required in Hazard Communication Title 29, Code of Federal Regulations Part 1910.1200, "Right to Know Law", and state and local requirements; and
   * hazardous and toxic materials will be handled, removed, and recycled or disposed of according to federal, state, and local regulations.

5. It is assumed that:
   * all required Foundational Tasks and Workplace Skills are being taught; and
   * programs teach all eight (8) areas of medium/heavy truck technology included in the task list, with the possible exception of Hydraulics.

Note: The Technology and Maintenance Council (TMC) of the American Trucking Association (ATA) publishes a "Recommended Maintenance Practices Manual" as a resource for industry practices. Contact TMC at tmc.trucking.org for more information.

FOUNDATIONAL TASKS

Each of these tasks are required to be included at all levels of accreditation.

Shop and Personal Safety

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; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment.

8. Identify the location and use of eye wash stations.
9. Identify the location of the posted evacuation routes.
10. Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.
11. Identify and wear appropriate clothing for lab/shop activities.
12. Secure hair and jewelry for lab/shop activities.
13. Demonstrate awareness of the safety aspects of vehicle systems that can operate automatically when the vehicle is off, such as supplemental restraint systems (SRS), electronic brake control systems, and electrified vehicle systems
14. Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, electrified vehicle powertrain, etc.).
15. Locate and demonstrate knowledge of safety data sheets (SDS).
16. Identify and use proper procedures for lock-out/tag-out.
17. Maintain service bay and shared work area cleanliness and organization.

Tools and Equipment

1. Identify tools and their usage in medium/heavy truck applications.
2. Identify standard and metric designation.
3. Demonstrate safe handling and use of appropriate tools.
4. Demonstrate proper cleaning, storage, and maintenance of tools and equipment.
5. Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper, torque wrench, etc.).
6. Identify and report any tools that are damaged and need repair or replacement.

Preparing Vehicle for Service

1. Identify information needed and the service requested on a repair order.
2. Identify purpose and demonstrate proper use of covers and mats.
3. Demonstrate use of the three C's (concern/complaint, cause, and correction).
4. Review vehicle service history if available.
5. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

Preparing Vehicle for Customer

1. Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.).

WORKPLACE EMPLOYABILITY SKILLS

Personal Standards (see Standard 7.7)

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 7.8)

1. Complies with workplace policies/laws, including proper and responsible use of personal electronic devices.
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/electronic 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 addresses the needs of all customers, providing helpful, courteous and knowledgeable service and advice as needed.
13. Respectful of tools and property used in school and workplace environment.
14. Contributes to an inclusive environment where every coworker and customer feels welcomed, heard, and valued.

- **Task List and Specialty Tools – see side-by-side charts below**

ASE MEDIUM/HEAVY TRUCK ACCREDITATION TASK LIST - 2025

The tasks included in the Inspection, Maintenance, and Minor Repair option are entry-level technician inspection tasks designed to introduce the student to correct procedures and practices of vehicle inspection in a teaching/learning environment. They are not intended to satisfy the Annual Federal Vehicle Inspection requirement as prescribed in the Federal Motor Carrier Safety Regulations, Part 396, Appendix A to Subchapter B, Minimum Periodic Inspection Standards.

DIESEL ENGINES

For every task, the following safety task must be strictly enforced: Comply with personal and environmental safety practices associated with eye/foot/hand/hearing protection, clothing, hand tools, power equipment, lifting practices, and ventilation. Handle, store, and dispose of fuels/chemicals/materials in accordance with federal, state, and local regulations.

The first tasks are to listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.

Inspection, Maintenance, and Minor Repair (IMMR) - 540 Hours **I. DIESEL ENGINES** **A. General**		**Truck Service Technology (TST) - 740 Hours** **I. DIESEL ENGINES** **A. General**		**Master Truck Service Technology (MTST) - 1040 Hours** **I. DIESEL ENGINES** **A. General**	
1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.	P-1	1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.	P-1	1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.	P-1
2. Inspect level and condition of fuel, oil, diesel exhaust fluid (DEF), and coolant.	P-1	2. Inspect level and condition of fuel, oil, diesel exhaust fluid (DEF), and coolant.	P-1	2. Inspect level and condition of fuel, oil, diesel exhaust fluid (DEF), and coolant.	P-1

3. Inspect engine assembly for fuel, oil, coolant, air, and other leaks.	P-1	3. Inspect engine assembly for fuel, oil, coolant, air, and other leaks; determine needed action.	P-1	3. Inspect engine assembly for fuel, oil, coolant, air, and other leaks; determine needed action.	P-1
4. Identify system components, configurations, and types of the following: cylinder head(s), valve train, engine block, engine lubrication, engine cooling, air induction, exhaust, fuel, and engine braking.	P-1	4. Identify system components, configurations, and types of the following: cylinder head(s), valve train, engine block, engine lubrication, engine cooling, air induction, exhaust, fuel, and engine braking.	P-1	4. Identify system components, configurations, and types of the following: cylinder head(s), valve train, engine block, engine lubrication, engine cooling, air induction, exhaust, fuel, and engine braking.	P-1
I. DIESEL ENGINES **B. Cylinder Head and Valve Train**		**I. DIESEL ENGINES** **B. Cylinder Head and Valve Train**		**I. DIESEL ENGINES** **B. Cylinder Head and Valve Train**	
1. Inspect external electronic wiring harness and brackets for wear, bending, cracks, and and proper securement~~looseness~~.	P-2	1. Inspect electronic wiring harness and brackets for wear, bending, cracks, and proper securement; determine needed action.	P-1	1. Inspect electronic wiring harness and brackets for wear, bending, cracks, and proper securement; determine needed action.	P-1
		2. Inspect valve train components; determine needed action.	P-2	2. Inspect valve train components; determine needed action.	P-2
		3. Adjust valve bridges (crossheads); adjust valve clearances and injector settings.	P-1	3. Adjust valve bridges (crossheads); adjust valve clearances and injector settings.	P-1
				4. Inspect, measure, and replace/reinstall camshaft; measure end play and backlash; determine needed action.	P-3

				5. Remove, inspect, clean, and reinstall cylinder head; inspect cylinder head and gasket for damage; measure mating surfaces for warpage; check condition of passages, core/expansion plugs, and gallery plugs; inspect threaded holes, studs, dowel pins, and bolts for serviceability; determine needed action.	P-3
I. DIESEL ENGINES **C. Engine Block**		**I. DIESEL ENGINES** **C. Engine Block**		**I. DIESEL ENGINES** **C. Engine Block**	
1. Inspect crankshaft vibration damper; inspect engine mounts.	P-2	1. Inspect crankshaft vibration damper; inspect engine mounts; determine needed action.	P-1	1. Inspect crankshaft vibration damper; inspect engine mounts; determine needed action.	P-1
2. Inspect and maintain crankcase ventilation components.	P-~~3~~2	2. Remove, inspect, service, and install pans, covers, gaskets, seals, wear rings, and crankcase ventilation components.	P-1	2. Remove, inspect, service, and install pans, covers, gaskets, seals, wear rings, and crankcase ventilation components; determine needed action.	P-1
		3. ~~Install and a~~Align flywheel housing; inspect flywheel housing(s) to transmission housing/engine mating surface(s); measure flywheel housing face and bore runout; determine needed action.	P-~~2~~3	3. Install and align flywheel housing; inspect flywheel housing(s) to transmission housing/engine mating surface(s); and measure flywheel housing face and bore runout; determine needed action.	P-2

	4. Inspect flywheel/flexplate (including ring gear) and mounting surfaces for cracks and wear; measure runout; determine needed action.	P-2	4. Inspect flywheel/flexplate (including ring gear) and mounting surfaces for cracks and wear; measure runout; determine needed action.	P-2
			5. Disassemble and clean engine block; inspect engine block for cracks/damage; measure mating surfaces for warpage; check condition of passages, core/expansion plugs, and gallery plugs; inspect threaded holes, studs, dowel pins, and bolts for serviceability; determine needed action.	P-3
			6. Inspect cylinder sleeve counter bore and lower bore; check bore distortion; determine needed action.	P-3
			7. Clean, inspect, and measure cylinder walls or liners for wear and damage; determine needed action.	P-3
			8. Replace/reinstall cylinder liners and seals; check and adjust liner height (protrusion).	P-3
			9. Inspect camshaft bearings for wear and damage; determine needed action.	P-3

		10. Inspect, measure, and replace/reinstall camshaft; measure end play and backlash; determine needed action.	P-3
		11. Clean and inspect crankshaft for surface cracks and journal damage; check condition of oil passages; check passage plugs; measure journal diameter; determine needed action.	P-3
		12. Inspect main bearings for wear patterns and damage; replace as needed; check bearing clearances; check and correct crankshaft end play.	P-3
		13. Inspect, install, and time gear train; measure gear backlash; determine needed action.	P-3
		14. Inspect connecting rod and bearings for wear patterns; measure pistons, pins, retainers, and bushings; determine needed action.	P-3
		15. Determine piston-to-cylinder wall clearance; check ring-to-groove fit and end gap; install rings on pistons.	P-3

				16. Assemble pistons and connecting rods; install in block; install rod bearings and check clearances.	P-3
				17. Check condition of piston cooling jets (nozzles); determine needed action.	P-3
I. DIESEL ENGINES **D. Lubrication Systems**		**I. DIESEL ENGINES** **D. Lubrication Systems**		**I. DIESEL ENGINES** **D. Lubrication Systems**	
1. Test engine oil pressure and check operation of pressure sensor, gauge, and/or sending unit; test engine oil temperature and check operation of temperature sensor.	P-2	1. Test engine oil pressure; check operation of pressure sensor, gauge, and/or sending unit; test engine oil temperature and check operation of temperature sensor; determine needed action.	P-1	1. Test engine oil pressure; check operation of pressure sensor, gauge, and/or sending unit; test engine oil temperature; check operation of temperature sensor; determine needed action.	P-1
2. Check engine oil level, condition, and consumption; take engine oil sample.	P-1	2. Check engine oil level, condition, and consumption; take engine oil sample; determine needed action.	P-1	2. Check engine oil level, condition, and consumption; take engine oil sample; determine needed action.	P-1
3. Determine proper lubricant; perform oil and filter service.	P-1	3. Determine proper lubricant; perform oil and filter service.	P-1	3. Determine proper lubricant; perform oil and filter service.	P-1
		4. Inspect, clean, and test oil cooler and components.	P-2	4. Inspect, clean, and test oil cooler and components; determine needed action.	P-2
		5. Inspect turbocharger lubrication systems.	P-2	5. Inspect turbocharger lubrication systems; determine needed action.	P-2

				6. Inspect and measure oil pump, drives, inlet pipes, and pick-up screens; check drive gear clearances; determine needed action.	P-3
				7. Inspect oil pressure regulator valve(s), by-pass and pressure relief valve(s), oil thermostat, and filters; determine needed action.	P-3
I. DIESEL ENGINES **E. Cooling System**		**I. DIESEL ENGINES** **E. Cooling System**		**I. DIESEL ENGINES** **E. Cooling System**	
1. Check engine coolant type, level, condition, and test coolant for freeze protection and additive package concentration.	P-1	1. Check engine coolant type, level, and condition; test coolant for freeze protection and additive package concentration.	P-1	1. Check engine coolant type, level, and condition; test coolant for freeze protection and additive package concentration.	P-1
2. Verify coolant temperature; check operation of temperature and level sensors, gauge, and/or sending unit.	P-1	2. Test coolant temperature; test operation of temperature and level sensors, gauge, and/or sending unit; determine needed action.	P-1	2. Test coolant temperature; test operation of temperature and level sensors, gauge, and/or sending unit; determine needed action.	P-1
3. Inspect and reinstall/replace pulleys, tensioners and drive belts; adjust drive belts and check alignment.	P-1	3. Inspect and reinstall/replace pulleys, tensioners and drive belts; adjust drive belts and check alignment.	P-1	3. Inspect and reinstall/replace pulleys, tensioners and drive belts; adjust drive belts and check alignment.	P-1

4. Recover coolant, flush, and refill with recommended coolant/additive package; bleed cooling system.	P-2	4. Recover coolant; flush and refill with recommended coolant/additive package; bleed cooling system.	P-1	4. Recover coolant; flush and refill with recommended coolant/additive package; bleed cooling system.	P-1
5. Inspect coolant conditioner/filter assembly for leaks; inspect valves, lines, and fittings; replace as needed.	P-2	5. Inspect coolant conditioner/filter assembly for leaks; inspect valves, lines, and fittings; replace as needed.	P-1	5. Inspect coolant conditioner/filter assembly for leaks; inspect valves, lines, and fittings; replace as needed.	P-1
6. Inspect water pump, hoses, and clamps.	P-1	6. Inspect water pump, hoses, and clamps; determine needed action.	P-1	6. Inspect water pump, hoses, and clamps; determine needed action.	P-1
7. Inspect, and pressure test cooling system(s); pressure test cap, tank(s), and recovery systems; inspect radiator and mountings.	P-1	7. Inspect and pressure test cooling system(s); pressure test cap, tank(s), and recovery systems; inspect radiator and mountings; determine needed action.	P-1	7. Inspect and pressure test cooling system(s); pressure test cap, tank(s), and recovery systems; inspect radiator and mountings; determine needed action.	P-1
8. Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud.-	P-1	8. Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud; determine needed action.	P-1	8. Inspect, test, and repair thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud; determine needed action.	P-1
9. Identify engine block heater(s).	P-2	9. Identify engine block heater(s).	P-2	9. Test engine block heater(s); determine needed action.	P-2
		10. Diagnose engine coolant consumption; determine needed action.	P-1	10. Diagnose engine coolant consumption; determine needed action.	P-1

		11. Inspect thermostat(s), by-passes, housing(s), and seals; replace as needed.	P-1	11. Inspect thermostat(s), by-passes, housing(s), and seals; replace as needed.	P-1
I. DIESEL ENGINES **F. Air Induction and Exhaust Systems**		**I. DIESEL ENGINES** **F. Air Induction and Exhaust Systems**		**I. DIESEL ENGINES** **F. Air Induction and Exhaust Systems**	
1. Inspect turbocharger(s), wastegate(s), and piping systems.	P-2	1. Inspect turbocharger(s), wastegate(s), and piping systems; determine needed action.	P-2	1. Inspect turbocharger(s), wastegate(s), and piping systems; determine needed action	P-2
2. Check air induction system including: cooler assembly, piping, hoses, clamps, and mountings; replace air filter as needed; reset restriction indicator (if applicable).	P-1	2. Check air induction system including: cooler assembly, piping, hoses, clamps, and mountings; replace air filter as needed; reset restriction indicator (if applicable).	P-1	2. Diagnose air induction system problems; inspect, clean, and/or replace cooler assembly, piping, hoses, clamps, and mountings; replace air filter as needed; reset restriction indicator (if applicable).	P-1
3. Inspect intake manifold, gaskets, and connections.	P-1	3. Inspect intake manifold, gaskets, and connections; determine needed action.	P-1	3. Inspect intake manifold, gaskets, and connections; determine needed action.	P-1
		4. Perform air intake system restriction and leakage tests; determine needed action.	P-1	4. Perform air intake system restriction and leakage tests; determine needed action.	P-1
		5. Check exhaust back pressure.	P-3	5. Check exhaust back pressure; determine needed action.	P-3

		6. Inspect variable ratio geometry turbocharger (VGT), controls, and actuators (pneumatic, hydraulic, and electronic).	P-2	6. Inspect variable ratio geometry turbocharger (VGT), controls, and actuators (pneumatic, hydraulic, and electronic); determine needed action.	P-2
		7. Demonstrate knowledge of charge air cooler operation and testing.	P-1	7. Demonstrate knowledge of charge air cooler operation and testing.	P-1
		8. Inspect and/or replace preheater/inlet air heater or glow plug system and controls.	P-3	8. Diagnose preheater/inlet air heater or glow plug system and controls; determine needed action.	P-3
I. DIESEL ENGINES **G. Fuel System**		**I. DIESEL ENGINES** **G. Fuel System**		**I. DIESEL ENGINES** **G. Fuel System**	
1. Check fuel level and condition.	P-1	1. Check fuel level and condition; determine needed action.	P-1	1. Check fuel level and condition; determine needed action.	P-1
2. Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, hoses, lines, and fittings.	P-1	2. Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, hoses, lines, and fittings; determine needed action.	P-1	2. Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, hoses, lines, and fittings; determine needed action.	P-1

3. Inspect low pressure fuel system components (fuel pump, pump drives, screens, fuel/water separators/indicators, hoses, lines, filters, heaters, coolers, ECM cooling plates, check valves, pressure regulator valves, restrictive fittings, and mounting hardware).	P-1	3. Inspect low pressure fuel system components (fuel pump, pump drives, screens, fuel/water separators/indicators, hoses, lines, filters, heaters, coolers, ECM cooling plates, check valves, pressure regulator valves, restrictive fittings, and mounting hardware); determine needed action.	P-1	3. Inspect low pressure fuel system components (fuel pump, pump drives, screens, fuel/water separators/indicators, hoses, lines, filters, heaters, coolers, ECM cooling plates, check valves, pressure regulator valves, restrictive fittings, and mounting hardware); determine needed action.	P-1
4. Replace fuel filter; prime and bleed fuel system.	P-1	4. Replace fuel filter; prime and bleed fuel system.	P-1	4. Replace fuel filter; prime and bleed fuel system.	P-1
5. Inspect high pressure fuel system components (fuel pump, pump drives, hoses, injection lines, filters, hold-downs, fittings, seals, and mounting hardware).	P-1	5. Inspect high pressure fuel system components (fuel pump, pump drives, hoses, injection lines, filters, hold-downs, fittings, seals, and mounting hardware).	P-1	5. Inspect high pressure fuel system components (fuel pump, pump drives, hoses, injection lines, filters, hold-downs, fittings, seals, and mounting hardware).	P-1
		6. Demonstrate knowledge and understanding of the different types of fuel systems.	P-1	6. Demonstrate knowledge and understanding of the different types of fuel systems.	P-1
		7. Perform fuel supply and return system tests; determine needed action.	P-1	7. Perform fuel supply and return system tests; determine needed action.	P-1
I. DIESEL ENGINES **H. Engine Brakes**		**I. DIESEL ENGINES** **H. Engine Brakes**		**I. DIESEL ENGINES** **H. Engine Brakes**	

1. Demonstrate knowledge of engine compression and/or exhaust brake operation.	P-1	1. Demonstrate knowledge of engine compression and/or exhaust brake operation.	P-1	1. Demonstrate knowledge of engine compression and/or exhaust brake operation.	P-1
		2. Inspect and adjust engine compression and/or exhaust brake systems; determine needed action.	P-3	2. Inspect and adjust engine compression and/or exhaust brake systems; determine needed action.	P-3
		3. Inspect, test, and adjust engine compression and/or exhaust brake control circuits, switches, and solenoids; determine needed action.	P-3	3. Inspect, test, and adjust engine compression and/or exhaust brake control circuits, switches, and solenoids; determine needed action.	P-3
I. DIESEL ENGINES **I. Emission Controls**		**I. DIESEL ENGINES** **I. Emission Controls**		**I. DIESEL ENGINES** **I. Emission Controls**	
1. Inspect engine exhaust system, exhaust gas recirculation (EGR) system, and exhaust aftertreatment system for leaks, mounting, proper routing, and damaged or missing components.	P-1	1. Inspect engine exhaust system, exhaust gas recirculation (EGR) system, and exhaust aftertreatment system for leaks, mounting, proper routing, and damaged or missing components; determine needed action.	P-1	1. Inspect engine exhaust system, exhaust gas recirculation (EGR) system, and exhaust aftertreatment system for leaks, mounting, proper routing, and damaged or missing components; determine needed action.	P-1
2. Demonstrate knowledge of exhaust gas recirculation (EGR) system operation including: EGR valve, cooler, piping, electronic sensors, controls, and wiring.	P-2	2. Demonstrate knowledge of exhaust gas recirculation (EGR) system operation including: EGR valve, cooler, piping, electronic sensors, controls, and wiring; determine needed action.	P-1	2. Diagnose problems/faults in the exhaust gas recirculation (EGR) system including: EGR valve, cooler, piping, electronic sensors, controls, and wiring; determine needed action	P-1

3. Demonstrate knowledge of exhaust aftertreatment system components and controls including diesel oxidation catalyst (DOC), selective catalytic reduction (SCR), diesel exhaust fluid (DEF), diesel particulate filter (DPF), sensors and regeneration system operation.	P-2	3. Inspect and test exhaust aftertreatment system components and controls including diesel oxidation catalyst (DOC), selective catalytic reduction (SCR), diesel exhaust fluid (DEF), diesel particulate filter (DPF), and sensors; check regeneration system operation; determine needed action.	P-1	3. Inspect, test, and repair or replace exhaust aftertreatment system components and controls including diesel oxidation catalyst (DOC), selective catalytic reduction (SCR), diesel exhaust fluid (DEF), diesel particulate filter (DPF), and sensors; check regeneration system operation; determine needed action.	P-1
		4. Identify emission control system components and configurations.	P-1	4. Identify emission control system components and configurations.	P-1
		5. Diagnose emissions and driveability concerns caused by the exhaust gas recirculation (EGR) system; inspect, test, service and/or replace electrical/electronic sensors, controls, wiring, tubing, exhaust passages, cooler(s), and hoses of exhaust gas recirculation (EGR) system; determine needed action.	P-~~3~~2	5. Diagnose emissions and driveability concerns caused by the exhaust gas recirculation (EGR) system; inspect, test, service and/or replace electrical/electronic sensors, controls, wiring, tubing, exhaust passages, cooler(s) and hoses of exhaust gas recirculation (EGR) systems; determine needed action.	P-1
		6. Using manufacturers'/service information, interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine needed action.	P-1	6. Using manufacturers'/service information, interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine needed action.	P-1
I. DIESEL ENGINES		**I. DIESEL ENGINES**		**I. DIESEL ENGINES**	

J. Driveability and Electronic Engine Controls		**J. Driveability and Electronic Engine Controls**		**J. Driveability and Electronic Engine Controls**	
1. Check engine operation (starting and running) including: noise, vibration, smoke, etc.	P-~~2~~1	1. Check engine operation (starting and running) including: noise, vibration, smoke, etc.; determine needed action.	P-~~2~~1	1. Diagnose engine operation (starting and running) including: noise, vibration, smoke, etc.; determine needed action.	P-~~2~~1
2. Perform cylinder contribution test using electronic service tool(s).	P-3	2. Perform cylinder contribution test using electronic service tool(s).	P-1	2. Perform cylinder contribution test using electronic service tool(s).	P-1
3. Demonstrate knowledge of computerized control system components and configurations.	P-1	3. Demonstrate knowledge of computerized control system components and configurations.	P-1	3. Demonstrate knowledge of computerized control system components and configurations.	P-1
4. Use appropriate electronic service tool(s) to check and record diagnostic codes; check and record trip/operational data; reset maintenance monitor (if applicable).	P-1	4. Use appropriate electronic service tool(s) to check and record diagnostic codes; check and record trip/operational data; reset maintenance monitor (if applicable)~~,~~ ~~clear diagnostic codes when appropriate~~.	P-1	4. Use appropriate electronic service tool(s)to check and record diagnostic codes; check and record trip/operational data; reset maintenance monitor (if applicable), verify repair; clear diagnostic codes ~~when appropriate~~only when directed.	P-1
5. Access and use service information to locate step-by-step (troubleshooting) procedures.	P-1	5. Access and use service information to perform step-by-step (troubleshooting) diagnosis.	P-1	5. Access and use service information to perform step-by-step (troubleshooting) diagnosis.	P-1

	6. ~~Check~~ Diagnose engine no-crank, cranks but fails to start, hard starting, and starts but does not continue to run problems; determine needed action.	P-2	6. Diagnose engine no-crank, cranks but fails to start, hard starting, and starts but does not continue to run problems; determine needed action.	P-1
	7. ~~Check~~ Diagnose engine surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and/or shut down problems; determine needed action.	P-2	7. Diagnose engine surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and/or shut down problems; determine needed action.	P-1
	8. Perform intake manifold pressure (boost) test; determine needed action.	P-2	8. Perform intake manifold pressure (boost) test; determine needed action.	P-2
	9. Use diagnostic tool, digital multimeter (DMM), and/or digital storage oscilloscope (DSO) to inspect or test computerized engine control system sensors, actuators, circuits, and electronic control modules (ECM).	P-~~1~~2	9. Use diagnostic tool, digital multimeter (DMM), and/or digital storage oscilloscope (DSO) to inspect or test computerized engine control system sensors, actuators, circuits, and electronic control modules (ECM); determine needed action~~s~~.	P-1
	10. Demonstrate knowledge of the process for reprogramming or recalibrating the engine control module.	P-2	10. -Demonstrate knowledge of the process for reprogramming or recalibrating the engine control module.	P-2

		11. Diagnose drivability and emissions problems resulting from malfunctions of interrelated systems (ADAS, HVAC, automatic transmissions, auxiliary power units (APU), non-OEM installed accessories, or similar systems); determine needed action.	P-2	11. Diagnose drivability and emissions problems resulting from malfunctions of interrelated systems (ADAS, HVAC, automatic transmissions, auxiliary power units (APU), non-OEM installed accessories, or similar systems); determine needed action.	P-2
		12. Demonstrate knowledge of failures in the data communications bus networks.	P-2	12. Diagnose failures in the data communications bus networks; determine needed action.	P-2
				13. Demonstrate knowledge of setting performance parameters using electronic service tools and service information system access.	P-3
IMMR Diesel Engines Task Count		**TST Diesel Engines Task Count**		**MTST Diesel Engines Task Count**	
P-1	~~24~~25	P-1	43	P-1	~~46~~47
P-2	10	P-2	15	P-2	~~13~~12
P-3	~~2~~1	P-3	5	P-3	~~21~~22
Total	36	Total	63	Total	~~80~~81

DRIVE TRAIN

For every task, the following safety task must be strictly enforced: Comply with personal and environmental safety practices associated with eye/foot/hand/hearing protection, clothing, hand tools, power equipment, lifting practices, and ventilation. Handle, store, and dispose of fuels/chemicals/materials in accordance with federal, state, and local regulations.

The first tasks are to listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.

Inspection, Maintenance, and Minor Repair (IMMR) - 540 Hours **II. DRIVE TRAIN** **A. General**		**Truck Service Technology (TST) - 740 Hours** **II. DRIVE TRAIN** **A. General**		**Master Truck Service Technology (MTST) - 1040 Hours** **II. DRIVE TRAIN** **A. General**	
1. Research vehicle service information, including fluid type, vehicle service history, service precautions/service mode, and technical service bulletins.	P-1	1. Research vehicle service information, including fluid type, vehicle service history, service precautions/service mode, and technical service bulletins.	P-1	1. Research vehicle service information, including fluid type, vehicle service history, service precautions/service mode, and technical service bulletins.	P-1
2. Identify drive train components, transmission type, and configuration.	P-1	2. Identify drive train components, transmission type, and configuration.	P-1	2. Identify drive train components, transmission type, and configuration.	P-1
3. Use appropriate electronic service tool(s) and procedures to check and record diagnostic codes.	P-1	3. Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; interpret digital multimeter (DMM) readings.~~; clear diagnostic codes when appropriate~~	P-1	3. Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; interpret digital multimeter (DMM) readings; verify repair; clear diagnostic codes ~~when appropriate~~only when directed.	P-1

II. DRIVE TRAIN B. Clutch		II. DRIVE TRAIN B. Clutch		II. DRIVE TRAIN B. Clutch	
1. Inspect and adjust clutch, clutch brake, linkage, cables, levers, brackets, bushings, pivots, springs, and clutch safety switch (includes push-type and pull-type); check pedal height and travel.	P-1	1. Inspect and adjust clutch, clutch brake, linkage, cables, levers, brackets, bushings, pivots, springs, and clutch safety switch (includes push-type and pull-type); check pedal height and travel; determine needed action.	P-1	1. Inspect and adjust clutch, clutch brake, linkage, cables, levers, brackets, bushings, pivots, springs, and clutch safety switch (includes push-type and pull-type); check pedal height and travel; determine needed action.	P-1
2. Inspect clutch primary (master) cylinder fluid level and condition; check clutch primary (master) cylinder, secondary (slave) cylinder, lines, and hoses for leaks and damage.	P-1	2. Inspect clutch master cylinder fluid level and condition; check clutch master cylinder, slave cylinder, lines, and hoses for leaks and damage; determine needed action.	P-1	2. Inspect clutch master cylinder fluid level and condition; check clutch master cylinder, slave cylinder, lines, and hoses for leaks and damage; determine needed action.	P-1
3. Inspect and lubricate release (throw-out) bearing, sleeve, bushings, springs, housing, levers, release fork, fork pads, rollers, shafts, and seals.	P-1	3. Inspect, lubricate, or replace release (throw-out) bearing, sleeve, bushings, springs, housing, levers, release fork, fork pads, rollers, shafts, and seals.	P-1	3. Inspect, lubricate, or replace release (throw-out) bearing, sleeve, bushings, springs, housing, levers, release fork, fork pads, rollers, shafts, and seals.	P-1
		4. Inspect, repair, and/or replace hydraulic clutch secondary (slave) and primary (master) cylinders, lines, and hoses; bleed system.	P-2	4. Inspect, repair, and/or replace hydraulic clutch slave and master cylinders, lines, and hoses; bleed system.	P-2
		5. Inspect and/or replace single-disc clutch pressure plate and clutch disc.	P-1	5. Inspect and/or replace single-disc clutch pressure plate and clutch disc.	P-1

	6. Inspect and/or replace two-plate clutch pressure plate, clutch discs, intermediate plate, and drive pins/lugs.	P-1	6. Inspect and/or replace two-plate clutch pressure plate, clutch discs, intermediate plate, and drive pins/lugs.	P-1
	7. Inspect and/or replace clutch brake assembly; inspect input shaft and bearing retainer; determine needed action.	P-1	7. Inspect and/or replace clutch brake assembly; inspect input shaft and bearing retainer; determine needed action.	P-1
	8. Inspect and/or replace self-adjusting/continuous-adjusting clutch mechanisms.	P-1	8. Inspect and/or replace self-adjusting/continuous-adjusting clutch mechanisms.	P-1
	9. Inspect and/or replace pilot bearing.	P-1	9. Inspect and/or replace pilot bearing.	P-1
	10. Perform clutch actuator/assembly calibration procedure for automated manual transmission (AMT).	P-3	10. Perform clutch actuator/assembly calibration procedure for automated manual transmission (AMT).	P-3
			~~10~~11. Identify causes of clutch noise, binding, slippage, pulsation, vibration, grabbing, dragging, and chatter problems; determine needed action.	P-1

				~~11~~12. Remove and install flywheel; inspect mounting area on crankshaft; inspect and/or replace rear main oil seal; measure crankshaft end play; determine needed action.	P-1
				~~12~~13. Inspect flywheel and starter ring gear; measure flywheel face; measure pilot bore runout; determine needed action.	P-1
				~~13~~14. Inspect flywheel housing-to-transmission housing/engine mating surface(s); measure flywheel housing face and bore runout; determine needed action.	P-2
II. DRIVE TRAIN **C. Transmission**		**II. DRIVE TRAIN** **C. Transmission**		**II. DRIVE TRAIN** **C. Transmission**	
1. Inspect transmission shifter and linkage; inspect transmission mounts, insulators, and mounting bolts.	P-1	1. Inspect transmission shifter and linkage; inspect and/or replace transmission mounts, insulators, and mounting bolts.	P-1	1. Inspect transmission shifter and linkage; inspect and/or replace transmission mounts, insulators, and mounting bolts.	P-1
2. Inspect transmission for leakage.	P-1	2. Inspect transmission for leakage; determine needed action.	P-1	2. Inspect transmission for leakage; determine needed action.	P-1

3. Inspect transmission cover plates, gaskets, seals, and cap bolts; inspect seal surfaces and vents.	P-1	3. Inspect and/or replace transmission cover plates, gaskets, seals, and cap bolts; inspect seal surfaces and vents; determine needed action.	P-1	3. Inspect and/or replace transmission cover plates, gaskets, seals, and cap bolts; inspect seal surfaces and vents; determine needed action.	P-1
4. Check transmission fluid level and condition~~; determine needed action~~.	P-1	4. Check transmission fluid level and condition; determine needed action.	P-1	4. Check transmission fluid level and condition; determine needed action.	P-1
5. Inspect transmission oil filters, coolers, and related components.	P-2	5. Inspect transmission oil filters, coolers, and related components; determine needed action and service as required.	P-2	5. Inspect transmission oil filters, coolers, and related components; determine needed action and service as required.	P-2
6. Inspect speedometer components.	P-2	6. Inspect speedometer components; determine needed action.	P-2	6. Inspect speedometer components; determine needed action.	P-2
7. Inspect and test function of REVERSE light, ~~neutral~~ NEUTRAL start, and warning device circuits.	P-1	7. Inspect and test function of REVERSE light, NEUTRAL start, and warning device circuits; determine needed action.	P-1	7. Inspect and test function of REVERSE light, NEUTRAL start, and warning device circuits; determine needed action.	P-1
		8. Inspect, adjust, and replace transmission covers, rails, forks, levers, bushings, sleeves, detents, interlocks, springs, and lock bolts/safety wires.	P-3	8. Inspect, adjust, and replace transmission covers, rails, forks, levers, bushings, sleeves, detents, interlocks, springs, and lock bolts/safety wires.	P-3

	9. Identify causes of transmission noise, shifting concerns, lockup, jumping out-of-gear, overheating, and vibration problems.	P-1	9. Identify causes of transmission noise, shifting concerns, lockup, jumping out-of-gear, overheating, and vibration problems; determine needed repairs.	P-1
	10. Inspect, test, repair, and/or replace air/electric shift controls, lines, hoses, valves, regulators, filters, and cylinder assemblies.	P-2	10. Inspect, test, repair, and/or replace air/electric shift controls, lines, hoses, valves, regulators, filters, and cylinder assemblies.	P-2
	11. Remove and reinstall transmission.	P-2	11. Remove and reinstall transmission.	P-2
	12. Inspect input shaft, gear, spacers, bearings, retainers, and slingers.	P-3	12. Inspect input shaft, gear, spacers, bearings, retainers, and slingers; determine needed action.	P-3
	13. Inspect and adjust power take-off (PTO) assemblies, controls, and shafts.	P-3	13. Inspect and adjust power take-off (PTO) assemblies, controls, and shafts; determine needed action.	P-3
	14. Inspect and test transmission temperature gauge, wiring harnesses, and sensor/sending unit.	P-2	14. Inspect and test transmission temperature gauge, wiring harnesses, and sensor/sending unit; determine needed action.	P-2

		15. Inspect operation of automatic transmission, components, and controls; diagnose automatic transmission system problems; determine needed action.	P-2	15. Inspect and test operation of automatic transmission, components, and controls; diagnose automatic transmission system problems; determine needed action.	P-2
		16. Inspect operation of automated mechanical transmission (AMT), components, and controls; diagnose ~~automated mechanical transmission~~AMT system problems; determine needed action.	P-2	16. Inspect and test operation of automated mechanical transmission (AMT), components, and controls; diagnose ~~automated mechanical transmission~~AMT system problems; determine needed action.	P-2
II. DRIVE TRAIN **D. Driveshaft and Universal Joints**		**II. DRIVE TRAIN** **D. Driveshaft and Universal Joints**		**II. DRIVE TRAIN** **D. Driveshaft and Universal Joints**	
1. Inspect and service if applicable driveshafts, slip joints, yokes, drive flanges, support bearings, universal joints, boots, seals, and retaining/mounting hardware; check phasing of all shafts.	P-1	1. Inspect, service if applicable, and/or replace driveshafts, slip joints, yokes, drive flanges, support bearings, universal joints, boots, seals, and retaining/mounting hardware; check phasing of all shafts.	P-1	1. Inspect, service if applicable, and/or replace driveshafts, slip joints, yokes, drive flanges, support bearings, universal joints, boots, seals, and retaining/mounting hardware; check phasing of all shafts; determine needed action.	P-1
		2. Identify causes of driveshaft and universal joint noise and vibration problems.	P-1	2. Identify causes of driveshaft and universal joint noise and vibration problems; determine needed action.	P-1
		3. Measure driveline angles; determine needed action.	P-2	3. Measure driveline angles; determine needed action.	P-2

II. DRIVE TRAIN **E. Drive Axles**		**II. DRIVE TRAIN** **E. Drive Axles**		**II. DRIVE TRAIN** **E. Drive Axles**	
1. Check for fluid leaks; inspect drive axle housing assembly, cover plates, gaskets, seals, vent/breather, and magnetic plugs.	P-1	1. Check and repair fluid leaks; inspect drive axle housing assembly, cover plates, gaskets, seals, vent/breather, and magnetic plugs.	P-1	1. Check and repair fluid leaks; inspect drive axle housing assembly, cover plates, gaskets, seals, vent/breather, and magnetic plugs.	P-1
2. Check drive axle fluid level and condition; check drive axle filter~~; determine needed action.~~ .	P-1	2. Check drive axle fluid level and condition; check drive axle filter; determine needed action.	P-1	2. Check drive axle fluid level and condition; check drive axle filter; determine needed action.	P-1
3. Inspect air-operated power divider (inter-axle differential) assembly.	P-2	3. Inspect and/or adjust air-operated power divider (inter-axle differential) assembly including: diaphragms, seals, springs, yokes, pins, lines, hoses, fittings, and controls.	P-2	3. Inspect, adjust, repair, and/or replace air-operated power divider (inter-axle differential) assembly including: diaphragms, seals, springs, yokes, pins, lines, hoses, fittings, and controls.	P-2
4. Inspect drive axle shafts~~; determine needed action~~.	P-2	4. Inspect drive axle shafts; determine needed action.	P-2	4. Inspect drive axle shafts; determine needed action.	P-2
5. Remove and replace wheel assembly; check rear wheel seal and axle flange for leaks~~; determine needed action~~.	P-1	5. Remove and replace wheel assembly; check rear wheel seal and axle flange for leaks; determine needed action.	P-1	5. Remove and replace wheel assembly; check rear wheel seal and axle flange for leaks; determine needed action.	P-1
6. Inspect for drive axle wheel bearing noise and check for wheel bearing damage; replace wheel seal.	P-1	6. Identify causes of drive axle wheel bearing noise and check for wheel bearing damage; determine needed action and replace wheel seal.~~;~~	P-1	6. Identify causes of drive axle wheel bearing noise and check for wheel bearing damage; perform needed action and replace wheel seal.	P-1

	7. Inspect, repair, or replace drive axle lubrication system pump, troughs, collectors, slingers, tubes, and filters.	P-3	7. Inspect, repair, or replace drive axle lubrication system pump, troughs, collectors, slingers, tubes, and filters.	P-3
	8. Identify causes of drive axle(s) drive unit noise and overheating problems.	P-2	8. Identify causes of drive axle(s) drive unit noise and overheating problems; determine needed action.	P-2
	9. Inspect and test drive axle temperature gauge, wiring harnesses, and sending unit/sensor; determine needed action.	P-2	9. Inspect and test drive axle temperature gauge, wiring harnesses, and sending unit/sensor; determine needed action.	P-2
	10. Remove and replace differential carrier assembly.	P-3	10. Remove and replace differential carrier assembly.	P-3
			11. Inspect and/or replace components of differential case assembly including spider gears, cross shaft, side gears, thrust washers, case halves, and bearings.	P-3
			12. Inspect and replace components of locking differential case assembly.	P-3
			13. Inspect differential carrier housing and caps, side bearing bores, and pilot (spigot, pocket) bearing bore; determine needed action.	P-3

				14. Inspect and replace ring and drive pinion gears, spacers, sleeves, bearing cages, and bearings.	P-3
				15. Measure ring gear runout; determine needed action.	P-3
				16. Measure and adjust drive pinion bearing preload.	P-3
				17. Measure and adjust drive pinion depth.	P-3
				18. Measure and adjust side bearing preload and ring gear backlash.	P-3
				19. Check and interpret ring gear and pinion tooth contact pattern; determine needed action.	P-3
				20. Inspect, adjust, or replace ring gear thrust block/screw.	P-3
IMMR Drive Train Task Count		**TST Drive Train Task Count**		**MTST Drive Train Task Count**	
P-1	16	P-1	23	P-1	26
P-2	4	P-2	13	P-2	14
P-3	0	P-3	~~5~~6	P-3	~~15~~16
Total	20	Total	~~41~~42	Total	~~55~~56

BRAKES

For every task, the following safety task must be strictly enforced: Comply with personal and environmental safety practices associated with eye/foot/hand/hearing protection, clothing, hand tools, power equipment, lifting practices, and ventilation. Handle, store, and dispose of fuels/chemicals/materials in accordance with federal, state, and local regulations.

The first tasks are to listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.

Inspection, Maintenance, and Minor Repair (IMMR) - 540 Hours **III. BRAKES** **A. General**		**Truck Service Technology (TST) - 740 Hours** **III. BRAKES** **A. General**		**Master Truck Service Technology (MTST) - 1040 Hours** **III. BRAKES** **A. General**	
1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.	P-1	1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.	P-1	1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.	P-1
2. Identify brake system components and configurations (including air and hydraulic systems, parking brake, power assist, and vehicle dynamic brake systems).	P-1	2. Identify brake system components and configurations (including air and hydraulic systems, parking brake, power assist, and vehicle dynamic brake systems).	P-1	2. Identify brake system components and configurations (including air and hydraulic systems, parking brake, power assist, and vehicle dynamic brake systems).	P-1
3. Identify brake performance problems caused by the mechanical/foundation brake system (air and hydraulic).	P-1	3. Identify brake performance problems caused by the mechanical/foundation brake system (air and hydraulic).	P-1	3. Identify brake performance problems caused by the mechanical/foundation brake system (air and hydraulic).	P-1

4. Use appropriate electronic service tool(s) and procedures to ~~diagnose problems;~~ check and record diagnostic codes~~; interpret digital multimeter (DMM) readings~~.	P-1	4. Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; interpret digital multimeter (DMM) readings; clear diagnostic codes ~~when appropriate~~only when directed.	P-1	4. Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; interpret digital multimeter (DMM) readings; clear diagnostic codes ~~when appropriate~~only when directed.	P-1
III. BRAKES **B. Air Brakes: Air Supply and Service Systems**		**III. BRAKES** **B. Air Brakes: Air Supply and Service Systems**		**III. BRAKES** **B. Air Brakes: Air Supply and Service Systems**	
1. Inspect air supply system components such as compressor, governor, air drier, tanks, and lines; inspect service system components such as lines, fittings, mountings, and valves (hand brake/trailer control, brake relay, quick release, tractor protection, emergency/spring brake control/modulator, pressure relief/safety).	P-1	1. Inspect and test air supply system components such as compressor, governor, air drier, tanks, and lines; inspect service system components such as lines, fittings, mountings, and valves (hand brake/trailer control, brake relay, quick release, tractor protection, emergency/spring brake control/modulator, pressure relief/safety); determine needed action.	P-1	1. Inspect, test, repair, and/or replace air supply system components such as compressor, governor, air drier, tanks, and lines; inspect service system components such as lines, fittings, mountings, and valves (hand brake/trailer control, brake relay, quick release, tractor protection, emergency/spring brake control/modulator, pressure relief/safety); determine needed action.	P-1

2. Verify proper gauge operation and readings; verify low pressure warning alarm operation; perform air supply system tests such as pressure build-up, governor settings, and leakage; drain air tanks and check for contamination.	P-1	2. Test gauge operation and readings; test low pressure warning alarm operation; perform air supply system tests such as pressure build-up, governor settings, and leakage; drain air tanks and check for contamination; determine needed action.	P-1	2. Test gauge operation and readings; test low pressure warning alarm operation; perform air supply system tests such as pressure build-up, governor settings, and leakage; drain air tanks and check for contamination; determine needed action.	P-1
3. Demonstrate knowledge and understanding of air supply and service system components and operations.	P-1	3. Demonstrate knowledge and understanding of air supply and service system components and operations.	P-1	3. Demonstrate knowledge and understanding of air supply and service system components and operations.	P-1
4. Inspect air compressor inlet; inspect oil supply and coolant lines, fittings, and mounting brackets.	P-1	4. Inspect air compressor inlet; inspect oil supply and coolant lines, fittings, and mounting brackets; repair or replace as needed.	P-1	4. Inspect air compressor inlet; inspect oil supply and coolant lines, fittings, and mounting brackets; repair or replace as needed.	P-1
5. Inspect and test one-way (single) check valves, two-way (double) check valves, manual and automatic drain valves.	P-1	5. Inspect and test one-way (single) check valves, two-way (double) check valves, manual and automatic drain valves; determine needed action.	P-1	5. Inspect and test one-way (single) check valves, two-way (double) check valves, manual and automatic drain valves; determine needed action.	P-1
6. Inspect and service air drier filter/cartridge.	P-1	6. Inspect and service air drier systems, filters, valves, heaters, wiring, and connectors; determine needed action.	P-1	6. Inspect and service air drier systems, filters, valves, heaters, wiring, and connectors; determine needed action.	P-1

7. Inspect and test brake application (foot/treadle) valve, fittings, and mounts; check pedal operation.	P-1	7. Inspect and test brake application (foot/treadle) valve, fittings, and mounts; check pedal operation; determine needed action.	P-1	7. Inspect and test brake application (foot/treadle) valve, fittings, and mounts; check pedal operation; determine needed action.	P-1
		8. Inspect air compressor drive gear components (gears, belts, tensioners, and/or couplings); determine needed action.	P-3	8. Inspect air compressor drive gear components (gears, belts, tensioners, and/or couplings); determine needed action.	P-3
III. BRAKES **C. Air Brakes:** **Mechanical/Foundation Brake System**		**III. BRAKES** **C. Air Brakes:** **Mechanical/Foundation Brake System**		**III. BRAKES** **C. Air Brakes:** **Mechanical/Foundation Brake System**	
1. Inspect service brake chambers, diaphragms, clamps, springs, pushrods, clevises, and mounting brackets; determine needed action.	P-1	1. Inspect and test service brake chambers, diaphragms, clamps, springs, pushrods, clevises, and mounting brackets; determine needed action.	P-1	1. Inspect, test, repair, and/or replace service brake chambers, diaphragms, clamps, springs, pushrods, clevises, and mounting brackets; determine needed action.	P-1
2. Identify slack adjuster/brake adjuster type; check free stroke and applied stroke; inspect and lubricate slack adjusters/brake adjusters; determine needed action.	P-1	2. Identify slack adjuster/brake adjuster type; check free stroke and applied stroke; inspect and lubricate slack adjusters/brake adjusters; perform needed action.	P-1	2. Identify slack adjuster/brake adjuster type; check free stroke and applied stroke; inspect and lubricate slack adjusters/brake adjusters; perform needed action.	P-1

3. Inspect and lubricate camshafts (S-cams), tubes, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor pins, and springs; determine needed action.	P-1	3. Inspect and lubricate camshafts (S-cams), tubes, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor pins, and springs; perform needed action.	P-1	3. Inspect and lubricate camshafts (S-cam), tubes, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor pins, and springs; perform needed action.	P-1
4. Remove brake drum; clean and inspect brake drum and mounting surface; measure brake drum diameter; measure brake lining thickness; inspect brake lining condition; determine needed action.	P-1	4. Remove brake drum; clean and inspect brake drum and mounting surface; measure brake drum diameter; measure brake lining thickness; inspect brake lining condition; determine needed action.	P-1	4. Remove brake drum; clean and inspect brake drum and mounting surface; measure brake drum diameter; measure brake lining thickness; inspect brake lining condition; determine needed action.	P-1
5. Inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine needed action.	P-1	5. Inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine needed action.	P-1	5. Inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine needed action.	P-1
6. Inspect, clean, and adjust air disc brake caliper assemblies; inspect and measure disc brake pads; inspect mounting hardware; determine needed action.	P-1	6. Inspect, clean, and adjust air disc brake caliper assemblies; inspect and measure disc brake pads; inspect mounting hardware and replace as required; perform needed action.	P-1	6. Inspect, clean, and adjust air disc brake caliper assemblies; inspect and measure disc brake pads; inspect mounting hardware and replace as required; perform needed action.	P-1
		7. Identify concerns related to the mechanical/foundation brake system including poor stopping, brake noise, premature wear, pulling, grabbing, or dragging; determine needed action.	P-1	7. Diagnose concerns related to the mechanical/foundation brake system including poor stopping, brake noise, premature wear, pulling, grabbing, or dragging; determine needed action.	P-1
III. BRAKES		**III. BRAKES**		**III. BRAKES**	

D. Air Brakes: Parking Brake System		**D. Air Brakes: Parking Brake System**		**D. Air Brakes: Parking Brake System**	
1. Inspect parking (spring) brake chamber for leaks; determine needed action.	P-1	1. Inspect, test, and/or replace parking (spring) brake chamber.	P-1	1. Inspect, test, and/or replace parking (spring) brake chamber.	P-1
2. Inspect and test parking (spring) brake valves, lines, hoses, and fittings; determine needed action.	P-1	2. Inspect, test, and/or replace parking (spring) brake valves, lines, hoses, and fittings.	P-1	2. Inspect, test, and/or replace parking (spring) brake valves, lines, hoses, and fittings.	P-1
3. Inspect and test parking (spring) brake application and release valve; determine needed action.	P-1	3. Inspect, test, and/or replace parking (spring) brake application and release valve.	P-1	3. Inspect, test, and/or replace parking (spring) brake application and release valve.	P-1
4. Manually release (cage) and reset (uncage) parking (spring) brakes.	P-~~2~~1	4. Manually release (cage) and reset (uncage) parking (spring) brakes.	P-~~2~~1	4. Manually release (cage) and reset (uncage) parking (spring) brakes.	P-~~2~~1
5. Demonstrate knowledge of anti-compounding brake function.	P-3	5. Identify and test anti-compounding brake function.	P-2	5. Identify and test anti-compounding brake function; determine needed action.	P-2
6. Demonstrate knowledge of electronically applied parking brake systems.	P-3	6. Demonstrate knowledge of electronically applied parking brake systems.	P-3	6. Demonstrate knowledge of electronically applied parking brake systems.	P-3
III. BRAKES **E. Hydraulic Brakes: Hydraulic System**		**III. BRAKES** **E. Hydraulic Brakes: Hydraulic System**		**III. BRAKES** **E. Hydraulic Brakes: Hydraulic System**	

1. Check primary (master) cylinder fluid level and condition; determine proper fluid type for application.	P-1	1. Check primary (master) cylinder fluid level and condition; determine proper fluid type for application.	P-1	1. Check primary (master) cylinder fluid level and condition; determine proper fluid type for application.	P-1
2. Inspect hydraulic brake system components for leaks and damage.	P-1	2. Inspect hydraulic brake system for leaks and damage; test, repair, and/or replace hydraulic brake system components.	P-1	2. Inspect hydraulic brake system for leaks and damage; test, repair, and/or replace hydraulic brake system components.	P-1
3. Check hydraulic brake system operation including pedal travel, pedal effort, and pedal feel.	P-1	3. Check hydraulic brake system operation including pedal travel, pedal effort, and pedal feel; determine needed action.	P-1	3. Check hydraulic brake system operation including pedal travel, pedal effort, and pedal feel; determine needed action.	P-1
		4. Identify poor stopping, premature wear, pulling, dragging, imbalance, or poor pedal feel caused by problems in the hydraulic system; determine needed action.	P-2	4. Diagnose poor stopping, premature wear, pulling, dragging, imbalance, or poor pedal feel caused by problems in the hydraulic system; determine needed action.	P-2
		5. Test primary (master) cylinder for internal/external leaks and damage; replace as needed.	P-2	5. Test primary (master) cylinder for internal/external leaks and damage; replace as needed.	P-2
		6. Test metering (hold-off), load sensing/proportioning, proportioning, and combination valves; determine needed action.	P-3	6. Test metering (hold-off), load sensing/proportioning, proportioning, and combination valves; determine needed action.	P-3

		7. Test warning light circuit sensors, switches, bulbs/LEDs, wiring, and connectors; determine needed action.	P-2	7. Test warning light circuit sensors, switches, bulbs/LEDs, wiring, and connectors; determine needed action.	P-2
		8. Bleed and/or flush hydraulic brake system.	P-2	8. Bleed and/or flush hydraulic brake system.	P-2
III. BRAKES **F. Hydraulic Brakes: Mechanical/Foundation Brake System**		**III. BRAKES** **F. Hydraulic Brakes: Mechanical/Foundation Brake System**		**III. BRAKES** **F. Hydraulic Brakes: Mechanical/Foundation Brake System**	
1. Clean and ~~i~~inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine needed action.	P-1	1. Clean and ~~i~~inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine needed action.	P-1	1. Clean and inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine necessary action.	P-1
2. Inspect and clean disc brake caliper assemblies; inspect and measure disc brake pads; inspect mounting hardware and slides; determine needed action.	P-1	2. Inspect and clean disc brake caliper assemblies; inspect and measure disc brake pads; inspect mounting hardware and slides; perform needed action.	P-1	2. Inspect and clean disc brake caliper assemblies; inspect and measure disc brake pads; inspect mounting hardware and slides; perform needed action.	P-1

3. Remove brake drum; clean and inspect brake drum and mounting surface; measure brake drum diameter; measure brake lining thickness; inspect brake lining condition; inspect wheel cylinders; determine needed action.	P-3	3. Remove brake drum, clean and inspect brake drum and mounting surface; measure brake drum diameter; measure brake lining thickness; inspect brake lining condition; inspect wheel cylinders; perform needed action.	P-3	3. Remove brake drum, clean and inspect brake drum and mounting surface; measure brake drum diameter; measure brake lining thickness; inspect brake lining condition; inspect wheel cylinders; perform needed action.	P-3
III. BRAKES **G. Hydraulic Brakes: Parking Brake System**		**III. BRAKES** **G. Hydraulic Brakes: Parking Brake System**		**III. BRAKES** **G. Hydraulic Brakes: Parking Brake System**	
1. Check parking brake operation; inspect parking brake application and holding devices.	P-1	1. Check parking brake operation; inspect parking brake application and holding devices; adjust, repair, and/or replace as needed.	P-1	1. Check parking brake operation; inspect parking brake application and holding devices; adjust, repair, and/or replace as needed.	P-1
III. BRAKES **H. Power Assist Systems**		**III. BRAKES** **H. Power Assist Systems**		**III. BRAKES** **H. Power Assist Systems**	
1. Check brake assist/booster system (vacuum or hydraulic) hoses, pump, switches, and control valves; check fluid level and condition (if applicable).	P-1	1. Check brake assist/booster system (vacuum or hydraulic) hoses, pump, switches, and control valves; check fluid level and condition (if applicable).	P-1	1. Check brake assist/booster system (vacuum or hydraulic) hoses, pumps, switches, and control valves; check fluid level and condition (if applicable).	P-1
2. Check operation of emergency (back-up/reserve) brake assist system.	P-1	2. Check operation of emergency (back-up/reserve) brake assist system.	P-1	2. Check operation of emergency (back-up/reserve) brake assist system.	P-1

		3. Identify concerns related to the power assist system (vacuum or hydraulic), including stopping problems caused by the brake assist (~~/~~booster) system; determine needed action.	P-2	3. Identify concerns related to the power assist system (vacuum or hydraulic), including stopping problems caused by the brake assist (booster) system; determine needed action.	P-2
		4. Inspect, test, repair, and/or replace hydraulic brake assist/booster systems, hoses, and control valves.	P-1	4. Inspect, test, repair, and/or replace hydraulic brake assist/booster systems, hoses, and control valves.	P-1
III. BRAKES **I. Vehicle Dynamic Brake Systems (Air and Hydraulic): Antilock Brake System (ABS), Automatic Traction Control (ATC) System, and Electronic Stability Control (ESC) System, Automatic Emergency Braking (AEB) System**		**III. BRAKES** **I. Vehicle Dynamic Brake Systems (Air and Hydraulic): Antilock Brake System (ABS), Automatic Traction Control (ATC) System, and Electronic Stability Control (ESC) System, Automatic Emergency Braking (AEB) System**		**III. BRAKES** **I. Vehicle Dynamic Brake Systems (Air and Hydraulic): Antilock Brake System (ABS), Automatic Traction Control (ATC) System, and Electronic Stability Control (ESC) System, Automatic Emergency Braking (AEB) System**	
1. Observe antilock brake system (ABS) warning light operation including trailer and dash mounted trailer ABS warning light.	P-1	1. Observe antilock brake system (ABS) warning light operation including trailer and dash mounted trailer ABS warning light; determine needed action.	P-1	1. Observe antilock brake system (ABS) warning light operation including trailer and dash mounted trailer ABS warning light; determine needed action.	P-1
2. Observe automatic traction control (ATC) and electronic stability control (ESC) warning light operation.	P-2	2. Observe automatic traction control (ATC) and electronic stability control (ESC) warning light operation; determine needed action.	P-2	2. Observe automatic traction control (ATC) and electronic stability control (ETC) warning light operation; determine needed action.	P-2

3. Test vehicle/wheel speed sensors and circuits.	P-3	3. Test vehicle/wheel speed sensors and circuits; adjust, repair, and/or replace as needed.	P-1	3. Test vehicle/wheel speed sensors and circuits; adjust, repair, and/or replace as needed.	P-1
4. Demonstrate knowledge of Automatic Emergency Braking (AEB) systems.	P-3	4. Demonstrate knowledge of Automatic Emergency Braking (AEB) systems.	P-3	4. Demonstrate knowledge of Automatic Emergency Braking (AEB) systems.	P-3
		5. Identify stopping concerns related to the vehicle dynamic brake systems: ABS, ATC, and ESC; determine needed action.	P-2	5. Identify stopping concerns related to the vehicle dynamic brake systems: ABS, ATC, and ESC; determine needed action.	P-2
		6. Diagnose problems in the vehicle dynamic brake control systems: ABS, ATC, and ESC; determine needed action.	P-3	6. Diagnose problems in the vehicle dynamic brake control systems: ABS, ATC, and ESC; determine needed action.	P-2
		7. Check and test operation of vehicle dynamic brake system (air and hydraulic) mechanical and electrical components; determine needed action.	P-1	7. Check and test operation of vehicle dynamic brake system (air and hydraulic) mechanical and electrical components; determine needed action.	P-1
		8. Bleed ABS hydraulic circuits.	P-2	8. Bleed ABS hydraulic circuits.	P-2
		9. Verify power line carrier (PLC) operation.	P-3	9. Verify power line carrier (PLC) operation.	P-3

III. BRAKES J. Wheel Bearings		III. BRAKES J. Wheel Bearings		III. BRAKES J. Wheel Bearings	
1. Clean, inspect, lubricate, and/or replace wheel bearings and races/cups; replace seals and wear rings; inspect spindle/tube; inspect and replace retaining hardware; adjust wheel bearings; check hub assembly fluid level and condition; verify end play with dial indicator method.	P-1	1. Clean, inspect, lubricate, and/or replace wheel bearings and races/cups; replace seals and wear rings; inspect spindle/tube; inspect and replace retaining hardware; adjust wheel bearings; check hub assembly fluid level and condition; verify end play with dial indicator method.	P-1	1. Clean, inspect, lubricate, and/or replace wheel bearings and races/cups; replace seals and wear rings; inspect spindle/tube; inspect and replace retaining hardware; adjust wheel bearings; check hub assembly fluid level and condition; verify end play with dial indicator method.	P-1
2. Identify, inspect, and/or replace unitized/preset hub bearing assemblies.	P-1	2. Identify, inspect, and/or replace unitized/preset hub bearing assemblies.	P-1	2. Identify, inspect, and/or replace unitized/preset hub bearing assemblies.	P-1
IMMR Brakes Task Count		**TST Brakes Task Count**		**MTST Brakes Task Count**	
P-1	~~31~~32	P-1	~~35~~36	P-1	~~35~~36
P-2	~~2~~1	P-2	~~10~~9	P-2	~~11~~10
P-3	5	P-3	7	P-3	6
Total	38	Total	52	Total	52

SUSPENSION AND STEERING

For every task, the following safety task must be strictly enforced: Comply with personal and environmental safety practices associated with eye/foot/hand/hearing protection, clothing, hand tools, power equipment, lifting practices, and ventilation. Handle, store, and dispose of fuels/chemicals/materials in accordance with federal, state, and local regulations.

The first tasks are to listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.

Inspection, Maintenance, and Minor Repair (IMMR) - 540 Hours **IV. SUSPENSION AND STEERING** **A. General**		**Truck Service Technology (TST) - 740 Hours** **IV. SUSPENSION AND STEERING** **A. General**		**Master Truck Service Technology (MTST) - 1040 Hours** **IV. SUSPENSION AND STEERING** **A. General**	
1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.	P-1	1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.	P-1	1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.	P-1
2. Disable and enable supplemental restraint system (SRS); verify indicator lamp operation.	P-1	2. Disable and enable supplemental restraint system (SRS); verify indicator lamp operation.	P-1	2. Disable and enable supplemental restraint system (SRS); verify indicator lamp operation.	P-1
3. Identify suspension and steering system components and configurations.	P-1	3. Identify suspension and steering system components and configurations.	P-1	3. Identify suspension and steering system components and configurations.	P-1

4. Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; interpret digital multimeter (DMM) readings.	P-1	4. Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; interpret digital multimeter (DMM) readings.~~; clear diagnostic codes when appropriate.~~	P-1	4. Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; interpret digital multimeter (DMM) readings; verify repairs and clear diagnostic codes only when ~~appropriate~~directed.	P-1
IV. SUSPENSION AND STEERING **B. Steering Column**		**IV. SUSPENSION AND STEERING** **B. Steering Column**		**IV. SUSPENSION AND STEERING** **B. Steering Column**	
1. Check steering wheel for free play, binding, and proper centering; inspect and service steering shaft U-joint(s), slip joint(s), bearings, bushings, and seals; phase steering shaft.	P-1	1. Check steering wheel for free play, binding, and proper centering; inspect and service steering shaft U-joint(s), slip joint(s), bearings, bushings, and seals; phase steering shaft.	P-1	1. Check steering wheel for free play, binding, and proper centering; inspect and service steering shaft U-joint(s), slip joint(s), bearings, bushings, and seals; phase steering shaft.	P-1
2. Check operation of tilt and telescoping steering column.	P-1	2. Identify causes of fixed and driver adjustable steering column and shaft noise, looseness, and binding problems.	P-1	2. Diagnose causes of fixed and driver adjustable steering column and shaft noise, looseness, and binding problems.	P-1
3. Check cab mounts, suspension, and ride height.	P-2	3. Check cab mounts and suspension and adjust cab ride height as required.	P-2	3. Check cab mounts and suspension and adjust cab ride height as required.	P-2

		4. Remove the steering wheel (includes steering wheels equipped with electrical/electronic controls and components); install and center the steering wheel.	P-2	4. Remove the steering wheel (includes steering wheels equipped with electrical/electronic controls and components); install and center the steering wheel.	P-2
		5. Inspect, test, replace, and calibrate steering angle sensor.	P-2	5. Inspect, test, replace, and calibrate steering angle sensor.	P-2
IV. SUSPENSION AND STEERING **C. Steering Pump and Gear Units**		**IV. SUSPENSION AND STEERING** **C. Steering Pump and Gear Units**		**IV. SUSPENSION AND STEERING** **C. Steering Pump and Gear Units**	
1. Check power steering pump and gear operation, mountings, lines, and hoses; check fluid level and condition; service filter; inspect system for leaks.	P-1	1. Check power steering pump and gear operation, mountings, lines, and hoses; check fluid level and condition; service filter; inspect system for leaks.	P-1	1. Check power steering pump and gear operation, mountings, lines, and hoses; check fluid level and condition; service filter; inspect system for leaks.	P-1
2. Flush and refill power steering system; purge air from system.	P-2	2. Flush and refill power steering system; purge air from system.	P-1	2. Flush and refill power steering system; purge air from system.	P-1
3. Demonstrate knowledge of poppet valves.	P-3	3. Inspect and/or replace power steering gear(s) (single and/or dual) and mountings; adjust or set poppet valves as required.	P-2	3. Inspect and/or replace power steering gear(s) (single and/or dual) and mountings; adjust or set poppet valves as required.	P-2

		4. Identify causes of power steering system noise, binding, darting/oversteer, reduced wheel cut, steering wheel kick, pulling, non-recovery, turning effort, looseness, hard steering, overheating, fluid leakage, and fluid aeration problems.	P-1	4. Diagnose causes of power steering system noise, binding, darting/oversteer, reduced wheel cut, steering wheel kick, pulling, non-recovery, turning effort, looseness, hard steering, overheating, fluid leakage, and fluid aeration problems.	P-1
		5. Inspect, service, and/or replace power steering reservoir, seals, and gaskets.	P-2	5. Inspect, service, and/or replace power steering reservoir, seals, and gaskets.	P-2
		6. Inspect and/or replace power steering system cooler, lines, hoses, clamps, mountings, and fittings.	P-2	6. Inspect and/or replace power steering system cooler, lines, hoses, clamps, mountings, and fittings.	P-2
IV. SUSPENSION AND STEERING **D. Steering Linkage**		**IV. SUSPENSION AND STEERING** **D. Steering Linkage**		**IV. SUSPENSION AND STEERING** **D. Steering Linkage**	
1. Inspect and lubricate tie rod ends, ball joints, kingpins, pitman arms, idler arms, and other steering linkage components.	P-1	1. Inspect, service, repair, and/or replace tie rod ends, ball joints, kingpins, pitman arms, idler arms, and other steering linkage components.	P-1	1. Inspect, service, repair, and/or replace tie rod ends, ball joints, kingpins, pitman arms, idler arms, and other steering linkage components.	P-1

IV. SUSPENSION AND STEERING E. Suspension Systems		IV. SUSPENSION AND STEERING E. Suspension Systems		IV. SUSPENSION AND STEERING E. Suspension Systems	
1. Inspect shock absorbers, bushings, brackets, and mounts; determine needed action.	P-1	1. Inspect, service, repair, and/or replace shock absorbers, bushings, brackets, and mounts.	P-1	1. Inspect, service, repair, and/or replace shock absorbers, bushings, brackets, and mounts.	P-1
2. Inspect leaf springs, center bolts, clips, pins, bushings, shackles, U-bolts, insulators, brackets, and mounts; determine needed action.	P-1	2. Inspect, repair, and/or replace leaf springs, center bolts, clips, pins, bushings, shackles, U-bolts, insulators, brackets, and mounts.	P-1	2. Inspect, repair, and/or replace leaf springs, center bolts, clips, pins, bushings, shackles, U-bolts, insulators, brackets, and mounts.	P-1
3. Inspect axle and axle aligning devices such as: radius rods, track bars, stabilizer bars, and torque arms; inspect related bushings, mounts, and shims.	P-1	3. Inspect, repair, and/or replace axle and axle aligning devices such as: radius rods, track bars, stabilizer bars, and torque arms; inspect related bushings, mounts, shims and attaching hardware.	P-1	3. Inspect, repair, and/or replace axle and axle aligning devices such as: radius rods, track bars, stabilizer bars, and torque arms; inspect related bushings, mounts, shims and attaching hardware.	P-1
4. Inspect tandem suspension equalizer components.	P-3	4. Inspect, repair, and/or replace tandem suspension equalizer components.	P-3	4. Inspect, repair, and/or replace tandem suspension equalizer components.	P-3
5. Inspect air springs, mounting plates, springs, suspension arms, and bushings.	P-1	5. Inspect, repair, and/or replace air springs, mounting plates, springs, suspension arms, and bushings.	P-1	5. Inspect, repair, and/or replace air springs, mounting plates, springs, suspension arms, and bushings.	P-1
6. Inspect and test air suspension pressure regulator and height control valves, lines, hoses, dump valves, and fittings.	P-1	6. Inspect, test, repair, and/or replace air suspension pressure regulator and height control valves, lines, hoses, dump valves, and fittings.	P-1	6. Inspect, test, repair, and/or replace air suspension pressure regulator and height control valves, lines, hoses, dump valves, and fittings.	P-1

7. Measure and record ride height.	P-2	7. Measure, record and adjust ride height; determine needed action.	P-1	7. Measure, record and adjust ride height; determine needed action.	P-1
		8. Inspect and service kingpins, steering knuckle bushings, locks, bearings, seals, and covers.	P-1	8. Inspect and service kingpins, steering knuckle bushings, locks, bearings, seals, and covers.	P-1
		9. Identify rough ride problems.	P-3	9. Diagnose rough ride problems; determine needed action.	P-3
IV. SUSPENSION AND STEERING **F. Wheel Alignment**		**IV. SUSPENSION AND STEERING** **F. Wheel Alignment Diagnosis and Repair**		**IV. SUSPENSION AND STEERING** **F. Wheel Alignment Diagnosis and Repair**	
1. Demonstrate understanding of alignment angles.	P-~~3~~2	1. Demonstrate understanding of alignment angles.	P-1	1. Demonstrate understanding of alignment angles.	P-1
		2. Identify causes of vehicle wandering, pulling, shimmy, hard steering, and off-center steering wheel problems.	P-1	2. Diagnose causes of vehicle wandering, pulling, shimmy, hard steering, and off-center steering wheel problems.	P-1
		3. Check and record camber.	P-2	3. Check and record camber.	P-2
		4. Check and record caster.	P-2	4. Check, record, and adjust caster.	P-2
		5. Check, record, and adjust toe settings.	P-1	5. Check, record, and adjust toe settings.	P-1

		6. Check rear axle(s) alignment (thrustline/centerline) and tracking.	P-2	6. Check rear axle(s) alignment (thrustline/centerline) and tracking.	P-2
		7. Identify turning/Ackerman angle (toe-out-on-turns) problems.	P-3	7. Identify turning/Ackerman angle (toe-out-on-turns) problems.	P-3
		8. Check front axle alignment (centerline).	P-2	8. Check front axle alignment (centerline).	P-2
IV. SUSPENSION AND STEERING **G. Wheels and Tires**		**IV. SUSPENSION AND STEERING** **G. Wheels and Tires**		**IV. SUSPENSION AND STEERING** **G. Wheels and Tires**	
1. Inspect tire condition; identify tire wear patterns; measure tread depth; verify tire matching (diameter and tread); inspect valve stem and cap; set tire pressure; verify tire pressure monitoring system (TPMS) operation (if applicable).	P-1	1. Inspect tire condition; identify tire wear patterns; measure tread depth; verify tire matching (diameter and tread); inspect valve stem and cap; set tire pressure; verify tire pressure monitoring system (TPMS) operation (if applicable); determine needed action.	P-1	1. Inspect tire condition; identify tire wear patterns; measure tread depth; verify tire matching (diameter and tread); inspect valve stem and cap; set tire pressure; verify tire pressure monitoring system (TPMS) operation (if applicable); determine needed action.	P-1
2. Demonstrate knowledge of causes for wheel/tire vibration, shimmy, pounding, and hop (tramp) problems.	P-2	2. Identify wheel/tire vibration, shimmy, pounding, and hop (tramp) problems; determine needed action.	P-2	2. Diagnose wheel/tire vibration, shimmy, pounding, and hop (tramp) problems; determine needed action.	P-2
3. Check wheel mounting hardware; check wheel condition and runout; remove and install wheel/tire assemblies (steering and drive axle); torque fasteners to manufacturer's specification using torque wrench.	P-1	3. Check wheel mounting hardware; check wheel condition and runout; remove and install wheel/tire assemblies (steering and drive axle); torque fasteners to manufacturer's specification using torque wrench.	P-1	3. Check wheel mounting hardware; check wheel condition and runout; remove and install wheel/tire assemblies (steering and drive axle); torque fasteners to manufacturer's specification using torque wrench.	P-1

4. Demonstrate knowledge of DOT tire identification numbers/markings for new and retread/recap tires; inspect tire and wheel for proper application (size, load range, position, and tread design); determine needed action.	P-2	4. Demonstrate knowledge of DOT tire identification numbers/markings for new and retread/recap tires; inspect tire and wheel for proper application (size, load range, position, and tread design); determine needed action.	P-2	4. Demonstrate knowledge of DOT tire identification numbers/markings for new and retread/recap tires; inspect tire and wheel for proper application (size, load range, position, and tread design); determine needed action.	P-2
IV. SUSPENSION AND STEERING **H. Frame and Coupling Devices**		**IV. SUSPENSION AND STEERING** **H. Frame and Coupling Devices**		**IV. SUSPENSION AND STEERING** **H. Frame and Coupling Devices**	
1. Inspect, service, and/or adjust fifth wheel, pivot pins, bushings, locking mechanisms, mounting hardware, air lines, and fittings.	P-1	1. Inspect, service, and/or adjust fifth wheel, pivot pins, bushings, locking mechanisms, mounting hardware, air lines, and fittings.	P-1	1. Inspect, service, and/or adjust fifth wheel, pivot pins, bushings, locking mechanisms, mounting hardware, air lines, and fittings.	P-1
2. Inspect frame and frame members for cracks, breaks, corrosion, distortion, elongated holes, looseness, and damage.	P-1	2. Inspect frame and frame members for cracks, breaks, corrosion, distortion, elongated holes, looseness, and damage; determine needed action.	P-1	2. Inspect frame and frame members for cracks, breaks, corrosion, distortion, elongated holes, looseness, and damage; determine needed action.	P-1
3. Inspect frame hangers, brackets, and cross members.	P-3	3. Inspect and install and/or replace frame hangers, brackets, and cross members; determine needed action.	P-3	3. Inspect, install, and/or replace frame hangers, brackets, and cross members; determine needed action.	P-3
4. Check pintle hook and mounting (if applicable).	P-2	4. Inspect, repair, or replace pintle hooks and draw bars (if applicable).	P-2	4. Inspect, repair, or replace pintle hooks and draw bars (if applicable).	P-2

		5. Inspect, service, and/or adjust sliding fifth wheel, tracks, stops, locking systems, air cylinders, springs, lines, hoses, and controls.	P-2	5. Inspect, service, and/or adjust sliding fifth wheel, tracks, stops, locking systems, air cylinders, springs, lines, hoses, and controls.	P-2
IMMR Suspension and Steering Task Count		**TST Suspension and Steering Task Count**		**MTST Suspension and Steering Task Count**	
P-1	17	P-1	24	P-1	24
P-2	~~5~~7	P-2	14	P-2	14
P-3	~~4~~3	P-3	4	P-3	4
Total	~~26~~27	Total	42	Total	42

ELECTRICAL/ELECTRONIC SYSTEMS

For every task, the following safety task must be strictly enforced: Comply with personal and environmental safety practices associated with eye/foot/hand/hearing protection, clothing, hand tools, power equipment, lifting practices, and ventilation. Handle, store, and dispose of fuels/chemicals/materials in accordance with federal, state, and local regulations.

Comply with manufacturers' current safety practices, documentation, and training associated with high voltage/electric vehicle lock-out/tag-out and service procedures.

The first tasks are to listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.

Inspection, Maintenance, and Minor Repair (IMMR) - 540 Hours **V. ELECTRICAL/ ELECTRONIC SYSTEMS** **A. General**		**Truck Service Technology (TST) - 740 Hours** **V. ELECTRICAL/ ELECTRONIC SYSTEMS** **A. General**		**Master Truck Service Technology (MTST) - 1040 Hours** **V. ELECTRICAL/ ELECTRONIC SYSTEMS** **A. General**	
1. Research vehicle service information, including vehicle service history, service precautions, and technical service bulletins.	P-1	1. Research vehicle service information including, vehicle service history, service precautions, and technical service bulletins.	P-1	1. Research vehicle service information, including vehicle service history, service precautions, and technical service bulletins.	P-1
2. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).	P-1	2. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).	P-1	2. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).	P-1

3. Demonstrate operation and proper use of digital multimeters and other test equipment when measuring source voltage, voltage drop (including grounds), current flow, continuity, and resistance.	P-1	3. Demonstrate operation and proper use of digital multimeters and other test equipment when measuring source voltage, voltage drop (including grounds), current flow, continuity, and resistance.	P-1	3. Demonstrate operation and proper use of digital multimeters and test equipment when measuring source voltage, voltage drop (including grounds), current flow, continuity, and resistance.	P-1
4. Demonstrate knowledge of the causes and effects of shorts, grounds, opens, and resistance problems in electrical/electronic circuits.	P-1	4. Demonstrate knowledge of the causes and effects of shorts, grounds, opens, and resistance problems in electrical/electronic circuits; identify and locate faults in electrical/electronic circuits.	P-1	4. Demonstrate knowledge of the causes and effects of shorts, grounds, opens, and resistance problems in electrical/electronic circuits; identify and locate faults in electrical/electronic circuits.	P-1
5. Use wiring diagrams to trace electrical/electronic circuits.	P-1	5. Use wiring diagrams during the diagnosis (troubleshooting) of electrical/electronic circuit problems.	P-1	5. Use wiring diagrams during the diagnosis (troubleshooting) of electrical/electronic circuit problems.	P-1
6. Measure parasitic (key-off) battery drain.	P-1	6. Measure parasitic (key-off) battery drain; determine needed action.	P-1	6. Measure parasitic (key-off) battery drain; determine needed action.	P-1
7. Demonstrate knowledge of the function, operation, and testing of fusible links, circuit breakers, relays, solenoids, actuators, diodes, and fuses.	P-1	7. Demonstrate knowledge of the function, operation, and testing of fusible links, circuit breakers, relays, solenoids, actuators, diodes, and fuses; perform inspection and testing; determine needed action.	P-1	7. Demonstrate knowledge of the function, operation, and testing of fusible links, circuit breakers, relays, solenoids, actuators, diodes, and fuses; perform inspection and testing; determine needed action.	P-1

8. Inspect, repair (including solder repair, mechanical crimp repair, and sealed heat shrink), and/or replace connectors, seals, terminal ends, and wiring; verify proper routing and securement.	P-1	8. Inspect, test, repair (including solder repair, mechanical crimp repair, and sealed heat shrink), and/or replace components, connectors, seals, terminal ends, harnesses, and wiring; verify proper routing and securement; determine needed action.	P-1	8. Inspect, test, repair (including solder repair, mechanical crimp repair, and sealed heat shrink), and/or replace components, connectors, seals, terminal ends, harnesses, and wiring; verify proper routing and securement; determine needed action.	P-1
9. Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; interpret digital multimeter (DMM) readings.	P-1	9. Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; interpret digital multimeter (DMM) readings.~~; clear diagnostic codes when appropriate.~~	P-1	9. Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; interpret digital multimeter (DMM) readings~~;~~, verify repair; clear diagnostic codes only when ~~appropriate~~directed.	P-1
10. Check for malfunctions caused by faults in the data bus communications network.	P-2	10. Check for malfunctions caused by faults in the data bus communications network.	P-2	10. Diagnose faults in the data bus communications network; determine needed action.	P-2
11. Identify electrical/electronic system components and configuration.	P-1	11. Identify electrical/electronic system components and configuration.	P-1	11. Identify electrical/electronic system components and configuration.	P-1
		12. Demonstrate operation and proper use of oscilloscopes to check frequency, pulse width, and waveforms of electrical/electronic signals; interpret readings; determine needed repairs.	P-2	12. Demonstrate operation and proper use of oscilloscopes to check frequency, pulse width, and waveforms of electrical/electronic signals; interpret readings; determine needed repairs.	P-2

				13. Demonstrate understanding of the process for software transfer, software updates, and/or reprogramming of electronic modules.	P-3
V. ELECTRICAL/ ELECTRONIC SYSTEMS **B. Battery System (low voltage)**		**V. ELECTRICAL/ ELECTRONIC SYSTEMS** **B. Battery System (low voltage)**		**V. ELECTRICAL/ ELECTRONIC SYSTEMS** **B. Battery System (low voltage)**	
1. Identify battery type and system configuration.	P-1	1. Identify battery type and system configuration.	P-1	1. Identify battery type and system configuration.	P-1
2. Confirm proper battery capacity for application; perform battery state-of-charge test; perform battery capacity test, determine needed action.	P-1	2. Confirm proper battery capacity for application; perform battery state-of-charge test; perform battery capacity test, determine needed action.	P-1	2. Confirm proper battery capacity for application; perform battery state-of-charge test; perform battery capacity test, determine needed action.	P-1
3. Inspect and clean battery, battery cables, connectors, battery boxes, mounts, and hold-downs; determine needed action.	P-1	3. Inspect and clean battery, battery cables, connectors, battery boxes, mounts, and hold-downs; service, repair, or replace as needed.	P-1	3. Inspect and clean battery, battery cables, connectors, battery boxes, mounts, and hold-downs; service, repair or replace as needed.	P-1
4. Charge battery using appropriate method for battery type.	P-1	4. Charge battery using appropriate method for battery type.	P-1	4. Charge battery using appropriate method for battery type.	P-1
5. Jump-start vehicle using a booster battery and jumper cables or using an appropriate auxiliary power supply.	P-1	5. Jump-start vehicle using a booster battery and jumper cables or using an appropriate auxiliary power supply.	P-1	5. Jump-start vehicle using a booster battery and jumper cables or using an appropriate auxiliary power supply.	P-1

6. Identify low voltage disconnect (LVD) systems.	P-2	6. Check low voltage disconnect (LVD) systems; determine needed action.	P-2	6. Check low voltage disconnect (LVD) systems; determine needed action.	P-1
		7. Test battery cables and connectors; repair or replace as needed.	P-1	7. Test battery cables and connectors; repair or replace as needed.	P-1
		8. Identify electrical/electronic modules, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery.	P-3	8. Identify electrical/electronic modules, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery.	P-3
V. ELECTRICAL/ ELECTRONIC SYSTEMS **C. Starting System**		**V. ELECTRICAL/ ELECTRONIC SYSTEMS** **C. Starting System**		**V. ELECTRICAL/ ELECTRONIC SYSTEMS** **C. Starting System**	
1. Demonstrate understanding of starter system operation.	P-1	1. Demonstrate understanding of starter system operation.	P-1	1. Demonstrate understanding of starter system operation.	P-1
2. Perform starter circuit cranking voltage and voltage drop tests.	P-1	2. Perform starter circuit cranking voltage and voltage drop tests; determine needed action.	P-1	2. Perform starter circuit cranking voltage and voltage drop tests; determine needed action.	P-1

3. Inspect starter control circuit switches (key switch, push button, and/or magnetic switch), relays, connectors, terminals, wires, and harnesses (including over-crank protection).	P-1	3. Inspect and test starter control circuit switches (key switch, push button, and/or magnetic switch), relays, connectors, terminals, wires, and harnesses (including over-crank protection); determine needed action.	P-1	3. Inspect and test starter control circuit switches (key switch, push button, and/or magnetic switch), relays, connectors, terminals, wires, and harnesses (including over-crank protection); determine needed action.	P-1
		4. Identify causes of no-crank or slow crank condition; differentiate between electrical and engine mechanical problems; determine needed action.	P-1	4. Diagnose causes of no-crank or slow crank condition; differentiate between electrical and engine mechanical problems; determine needed action.	P-1
		5. Perform starter current draw tests; determine needed action.	P-3	5. Perform starter current draw tests; determine needed action.	P-3
		6. Remove and replace starter; inspect flywheel ring gear or flex plate.	P-2	6. Remove and replace starter; inspect flywheel ring gear or flex plate.	P-2
V. ELECTRICAL/ ELECTRONIC SYSTEMS **D. Charging System**		**V. ELECTRICAL/ ELECTRONIC SYSTEMS** **D. Charging System**		**V. ELECTRICAL/ ELECTRONIC SYSTEMS** **D. Charging System**	
1. Identify and understand operation of the alternator.	P-1	1. Identify and understand operation of the alternator.	P-1	1. Identify and understand operation of the alternator.	P-1
2. Check instrument panel mounted gauges and/or indicator lamps.	P-1	2. Test instrument panel mounted gauges and/or indicator lamps; determine needed action.	P-1	2. Test instrument panel mounted gauges and/or indicator lamps; determine needed action.	P-1

3. Inspect alternator drive belt condition; check pulleys and tensioners for wear; check fans and mounting brackets; verify proper belt alignment.	P-1	3. Inspect, adjust, and/or replace alternator drive belt; check pulleys and tensioners for wear; check fans and mounting brackets; verify proper belt alignment; determine needed action.	P-1	3. Inspect, adjust, and/or replace alternator drive belt; check pulleys and tensioners for wear; check fans and mounting brackets; verify proper belt alignment; determine needed action.	P-1
4. Inspect cables, wires, and connectors in the charging circuit including remote sense circuit.	P-1	4. Inspect cables, wires, and connectors in the charging circuit including remote sense circuit; determine needed action.	P-1	4. Inspect cables, wires, and connectors in the charging circuit including remote sense circuit; determine needed action	P-1
5. Perform charging system voltage and amperage output tests; perform AC ripple test.	P-1	5. Perform charging system voltage and amperage output tests; perform AC ripple test; determine needed action.	P-1	5. Perform charging system voltage and amperage output tests; perform AC ripple test; determine needed action.	P-1
		6. Perform charging circuit voltage drop tests; determine needed action.	P-1	6. Perform charging circuit voltage drop tests; determine needed action.	P-1
		7. Remove, inspect, and/or replace alternator.	P-2	7. Remove, inspect, and/or replace alternator.	P-2
V. ELECTRICAL/ ELECTRONIC SYSTEMS **E. Lighting Systems**		**V. ELECTRICAL/ ELECTRONIC SYSTEMS** **E. Lighting Systems**		**V. ELECTRICAL/ ELECTRONIC SYSTEMS** **E. Lighting Systems**	
1. Inspect for brighter-than-normal, intermittent, dim, or no-light operation; determine needed action.	P-1	1. Identify causes of brighter-than-normal, intermittent, dim, or no-light operation; determine needed action.	P-1	1. Diagnose causes of brighter-than-normal, intermittent, dim, or no-light operation; determine needed action.	P-1

2. Test, replace, and aim headlights.	P-3	2. Test, replace, and aim headlights	P-3	2. Test, replace, and aim headlights.	P-3
3. Inspect cables, wires, and connectors in the lighting systems.	P-1	3. Inspect cables, wires, and connectors in the lighting systems.	P-1	3. Inspect cables, wires, and connectors in the lighting systems.	P-1
4. Inspect tractor-to-trailer electrical connectors, cables, and holders.	P-1	4. Inspect tractor-to-trailer electrical connectors, cables, and holders.	P-1	4. Diagnose faults in tractor-to-trailer electrical connector(s), cables, and holders; determine needed action.	P-2
		5. Inspect switches, relays, bulbs/LEDs, wires, terminals, connectors, sockets, and control components/modules of exterior lighting systems; determine needed action.	P-2	5. Diagnose faults in switches, relays, bulbs/LEDs, wires, terminals, connectors, sockets, and control components/modules of exterior lighting systems; determine needed action.	P-2
		6. Inspect switches, relays, bulbs/LEDs, wires, terminals, connectors, sockets, and control components/modules of interior lighting systems; determine needed action.	P-2	6. Diagnose faults in switches, relays, bulbs/LEDs, wires, terminals, connectors, sockets, and control components/modules of interior lighting systems; determine needed action.	P-2
		7. Inspect switches, relays, bulbs/LEDs, wires, terminals, connectors, sockets, and control components/modules of auxiliary lighting circuits; determine needed action	P-2	7. Diagnose faults in switches, relays, bulbs/LEDs, wires, terminals, connectors, sockets, and control components/modules of auxiliary lighting circuits; determine needed action.	P-2

V. ELECTRICAL/ ELECTRONIC SYSTEMS **F. Instrument Cluster and Driver Information Systems**		**V. ELECTRICAL/ ELECTRONIC SYSTEMS** **F. Instrument Cluster and Driver Information Systems**		**V. ELECTRICAL/ ELECTRONIC SYSTEMS** **F. Instrument Cluster and Driver Information Systems**	
1. Check gauge and warning indicator operation.	P-1	1. Check gauge and warning indicator operation.	P-1	1. Check gauge and warning indicator operation.	P-1
2. Demonstrate knowledge of the sensor/sending units, gauges, switches, relays, bulbs/LEDs, wires, terminals, connectors, sockets, printed circuits, and control components/modules of the instrument cluster, driver information system, and warning systems.	P-2	2. Identify faults in the sensor/sending units, gauges, switches, relays, bulbs/LEDs, wires, terminals, connectors, sockets, printed circuits, and control components/modules of the instrument cluster, driver information systems, and warning systems; determine needed action.	P-2	2. Diagnose faults in the sensor/sending units, gauges, switches, relays, bulbs/LEDs, wires, terminals, connectors, sockets, printed circuits, and control components/modules of the instrument cluster, driver information systems, and warning systems; determine needed action.	P-2
		3. Inspect electronic speedometer, odometer, and tachometer systems.	P-3	3. Inspect, test, replace, and calibrate (if applicable) electronic speedometer, odometer, and tachometer systems.	P-3

V. ELECTRICAL/ ELECTRONIC SYSTEMS **G. Cab and Chassis Electrical Systems**		**V. ELECTRICAL/ ELECTRONIC SYSTEMS** **G. Cab and Chassis Electrical Systems**		**V. ELECTRICAL/ ELECTRONIC SYSTEMS** **G. Cab and Chassis Electrical Systems**	
1. Check operation of horn(s), wiper/washer, and occupant restraint systems.	P-1	1. Check operation of horn(s), wiper/washer, and occupant restraint systems.	P-1	1. Diagnose operation of horn(s), wiper/washer, and occupant restraint systems.	P-1
		2. Demonstrate knowledge of the operation of advanced driver assistance systems (ADAS) and related circuits (such as: speed control, collision avoidance, lane departure warning and assist, and camera systems).	P-3	2. Demonstrate knowledge of the operation of advanced driver assistance systems (ADAS) and related circuits (such as: speed control, collision avoidance, lane departure warning and assist, and camera systems).	P-3
		3. Demonstrate knowledge of comfort and convenience systems and related circuits (such as: power windows, power seats, power locks, remote keyless entry, steering wheel controls, and cruise control).	P-3	3. Demonstrate knowledge of comfort and convenience systems and related circuits (such as: power windows, power seats, power locks, remote keyless entry, steering wheel controls, and cruise control).	P-3
		4. Demonstrate knowledge of entertainment systems and related circuits (such as: radio, DVD, navigation, speakers, antennas, and voice-activated accessories).	P-3	4. Demonstrate knowledge of entertainment systems and related circuits (such as: radio, DVD, navigation, speakers, antennas, and voice-activated accessories).	P-3

		5. Demonstrate knowledge of power inverter, protection devices, connectors, terminals, wiring, and control components/modules of auxiliary power systems.	P-3	5. Demonstrate knowledge of power inverter, protection devices, connectors, terminals, wiring, and control components/modules of auxiliary power systems.	P-3
		6. Demonstrate knowledge of telematics systems.	P-3	6. Demonstrate knowledge of telematics systems.	P-3
V. ELECTRICAL/ ELECTRONIC SYSTEMS **H. Electrified Vehicle High Voltage Safety**		**V. ELECTRICAL/ ELECTRONIC SYSTEMS** **H. Electrified Vehicle High Voltage Safety**		**V. ELECTRICAL/ ELECTRONIC SYSTEMS** **H. Electrified Vehicle High Voltage Safety**	
1. Demonstrate knowledge of hazards related to high voltage system/electric vehicles, including electrocution, fire, explosion, arc flash, gases and fumes, hazardous chemicals, and EMF, and how to properly respond to emergency situations.	P-1	1. Demonstrate knowledge of hazards related to high voltage system/electric vehicles, including electrocution, fire, explosion, arc flash, gases and fumes, hazardous chemicals, and EMF, and how to properly respond to emergency situations.	P-1	1. Demonstrate knowledge of hazards related to high voltage system/electric vehicles, including electrocution, fire, explosion, arc flash, gases and fumes, hazardous chemicals, and EMF, and how to properly respond to emergency situations.	P-1
2. Demonstrate knowledge of high voltage system and component coloring, warning labels, lights, signage, and lock-out/tag-out procedures.	P-1	2. Demonstrate knowledge of high voltage system and component coloring, warning labels, lights, signage, and lock-out/tag-out procedures.	P-1	2. Demonstrate knowledge of high voltage system and component coloring, warning labels, lights, signage, and lock-out/tag-out procedures.	P-1

3. Demonstrate ability to identify which components and circuits contain high voltage.	P-1	3. Demonstrate ability to identify which components and circuits contain high voltage.	P-1	3. Demonstrate ability to identify which components and circuits contain high voltage.	P-1
4. Demonstrate knowledge of steps needed to assess possible hazards prior to servicing a high voltage/electric vehicle, including awareness of automatic systems that may operate while the key switch/ignition is off.	P-1	4. Demonstrate knowledge of steps needed to assess possible hazards prior to servicing a high voltage/electric vehicle, including awareness of automatic systems that may operate while the key switch/ignition is off.	P-1	4. Demonstrate knowledge of steps needed to assess possible hazards prior to servicing a high voltage/electric vehicle, including awareness of automatic systems that may operate while the key switch/ignition is off.	P-1
5. Understand limitations on which systems, components, and circuits of a high voltage/electric vehicle a technician is capable of safely servicing based on their level of training and qualification~~.~~, and vehicle manufacturers service guidelines and warranty.	P-1	5. Understand limitations on which systems, components, and circuits of a high voltage/electric vehicle a technician is capable of safely servicing based on their level of training and qualification~~.~~ , and vehicle manufacturers service guidelines and warranty.	P-1	5. Understand limitations on which systems, components, and circuits of a high voltage/electric vehicle a technician is capable of safely servicing based on their level of training and qualification, and vehicle manufacturers service guidelines and warranty. ~~.~~	P-1
		6. Demonstrate knowledge of special multimeters, insulated tools, and other test equipment required for use in high voltage/electric vehicle circuits.	P-3	6. Demonstrate knowledge of special multimeters, insulated tools, and other test equipment required for use in high voltage/electric vehicle circuits.	P-2
		7. Demonstrate knowledge of personal protective equipment (PPE) required for use in high voltage/electric vehicle circuits.	P-3	7. Demonstrate knowledge of personal protective equipment (PPE) required for use in high voltage/electric vehicle circuits.	P-2

		8. Demonstrate knowledge of proper procedures used to disconnect/isolate the high voltage traction battery.	P-3	8. Demonstrate knowledge of proper procedures used to disconnect/isolate the high voltage traction battery.	P-2
		9. Demonstrate knowledge of the use of a live-dead-live test to verify isolation of the high voltage traction battery.	P-3	9. Demonstrate knowledge of the use of a live-dead-live test to verify isolation of the high voltage traction battery.	P-2
		10. Demonstrate knowledge of the testing and verification of ground circuit isolation between vehicle chassis ground and the high voltage circuits and components.	P-3	10. Demonstrate knowledge of the testing and verification of ground circuit isolation between vehicle chassis ground and the high voltage circuits and components.	P-2
IMMR Electrical/Electronic Systems Task Count		**TST Electrical/Electronic Systems Task Count**		**MTST Electrical/Electronic Systems Task Count**	
P-1	~~32~~33	P-1	36	P-1	36
P-2	3	P-2	9	P-2	14
P-3	1	P-3	14	P-3	10
Total	~~36~~37	Total	59	Total	60

HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)

For every task, the following safety task must be strictly enforced: Comply with personal and environmental safety practices associated with eye/foot/hand/hearing protection, clothing, hand tools, power equipment, lifting practices, and ventilation. Handle, store, and dispose of fuels/chemicals/materials in accordance with federal, state, and local regulations.

The first tasks are to listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.

Inspection, Maintenance, and Minor Repair (IMMR) - 540 Hours **VI. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)** **A. General**		**Truck Service Technology (TST) - 740 Hours** **VI. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)** **A. General**		**Master Truck Service Technology (MTST) - 1040 Hours** **VI. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)** **A. General**	
1. Research vehicle service information, including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins.	P-1	1. Research vehicle service information, including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins.	P-1	1. Research vehicle service information, including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins.	P-1
2. Identify heating, ventilation, and air conditioning (HVAC) components and configuration.	P-1	2. Identify heating, ventilation, and air conditioning (HVAC) components and configuration.	P-1	2. Identify heating, ventilation, and air conditioning (HVAC) components and configuration.	P-1

3. Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; interpret digital multimeter (DMM) readings.	P-1	3. Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; interpret digital multimeter (DMM) readings~~; clear diagnostic codes when appropriate~~.	P-1	3. Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; interpret digital multimeter (DMM) readings, verify repairs~~;~~ clear diagnostic codes only when directed.~~appropriate.~~	P-1
		4. Identify and interpret heating and air conditioning problems.	P-1	4. Diagnose heating and air conditioning problems; determine needed action.	P-1
		5. Identify refrigerant type; test for contamination; select and connect proper gauge set/test equipment; record temperature and pressure readings.	P-1	5. Identify refrigerant type; test for contamination; select and connect proper gauge set/test equipment; record temperature and pressure readings.	P-1
		6. Demonstrate knowledge of A/C system performance test.	P-1	6. Perform A/C system performance test; determine needed action.	P-1
		7. Demonstrate knowledge of A/C system leak test.	P-1	7. Perform A/C system leak test; determine needed action.	P-1
		8. Inspect condition of refrigerant oil removed from A/C system; determine needed action.	P-1	8. Inspect condition of refrigerant oil removed from A/C system; determine needed action.	P-1
		9. Determine oil type and oil capacity for system application and/or component replacement.	P-1	9. Determine oil type and oil capacity for system application and/or component replacement.	P-1

VI. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) B. Refrigeration System Components		VI. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) B. Refrigeration System Components		VI. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) B. Refrigeration System Components	
1. Inspect A/C compressor drive belts, pulleys, and tensioners; verify proper belt alignment.	P-1	1. Inspect, remove, and replace A/C compressor drive belts, pulleys, and tensioners; verify proper belt alignment.	P-1	1. Inspect, remove, and replace A/C compressor drive belts, pulleys, and tensioners; verify proper belt alignment.	P-1
2. Check A/C system operation; visually inspect A/C components for signs of leaks; check A/C monitoring system (if applicable).	P-1	2. Check A/C system operation including system pressures; visually inspect A/C components for signs of leaks; check A/C monitoring system (if applicable).	P-1	2. Check A/C system operation including system pressures; visually inspect A/C components for signs of leaks; check A/C monitoring system (if applicable).	P-1
3. Inspect A/C condenser for airflow restrictions; determine needed action.	P-1	3. Inspect A/C condenser for airflow restrictions; determine needed action.	P-1	3. Inspect A/C condenser for airflow restrictions; determine needed action.	P-1
4. Inspect evaporator housing water drain.	P-1	4. Inspect evaporator housing water drain; determine needed action.	P-1	4. Inspect evaporator housing water drain; perform needed action.	P-1
		5. Inspect A/C compressor assembly; check compressor clutch air gap; determine needed action.	P-1	5. Inspect, test, service, and/or replace A/C compressor assembly; check compressor clutch air gap.	P-1
		6. Inspect AC system hoses, lines, fittings, O-rings, seals, and service valves; determine needed action.	P-1	6. Inspect, service, and/or replace A/C system hoses, lines, fittings, O-rings, seals, and service valves.	P-1

		7. Inspect receiver/drier or accumulator/drier; determine needed action.	P-1	7. Inspect, remove, and/or replace receiver/drier or accumulator/drier.	P-1
		8. Inspect expansion valve or orifice (expansion) tube; determine needed action.	P-1	8. Inspect, remove, and/or replace expansion valve or orifice (expansion) tube.	P-1
		9. Demonstrate knowledge of A/C system conditions that cause the protection devices (pressure, thermal, and/or control module) to interrupt system operation.	P-2	9. Diagnose A/C system conditions that cause the protection devices (pressure, thermal, and/or control module) to interrupt system operation; determine needed action.	P-2
		10. Demonstrate knowledge of procedure to remove and reinstall evaporator.	P-3	10. Demonstrate knowledge of procedure to remove and reinstall evaporator.	P-2
		11. Demonstrate knowledge of procedure to inspect and/or replace condenser.	P-3	11. Demonstrate knowledge of procedure to inspect and/or replace condenser.	P-2
VI. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) **C. Heating, Ventilation, and Engine Cooling Systems**		**VI. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)** **C. Heating, Ventilation, and Engine Cooling Systems**		**VI. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)** **C. Heating, Ventilation, and Engine Cooling Systems**	
1. Inspect engine cooling system and heater system hoses and pipes.	P-1	1. Inspect engine cooling system and heater system hoses and pipes; determine needed action.	P-1	1. Inspect engine cooling system and heater system hoses and pipes; determine needed action.	P-1

2. Inspect HVAC system-heater ducts, doors, hoses, cabin filters, and outlets.	P-1	2. Inspect HVAC system heater ducts, doors, hoses, cabin filters, and outlets; determine needed action.	P-1	2. Inspect HVAC system heater ducts, doors, hoses, cabin filters, and outlets; determine needed action.	P-1
3. Identify the source of A/C system odors.	P-2	3. Identify the source of A/C system odors; determine needed action.	P-2	3. Identify the source of A/C system odors; determine needed action.	P-1
		4. Identify temperature control problems in the HVAC system; determine needed action.	P-2	4. Diagnose temperature control problems in the HVAC system; determine needed action.	P-2
		5. Demonstrate knowledge of the procedures to remove, inspect, reinstall, and/or replace engine coolant and heater system components.	P-3	5. Demonstrate knowledge of the procedures to remove, inspect, reinstall, and/or replace engine coolant and heater system components.	P-2

VI. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) **D. Operating Systems and Related Controls**		**VI. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)** **D. Operating Systems and Related Controls**		**VI. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)** **D. Operating Systems and Related Controls**	
1. Verify HVAC system blower motor operation; confirm proper air distribution; confirm proper temperature control.	P-1	1. Verify HVAC system blower motor operation; confirm proper air distribution; confirm proper temperature control; determine needed action.	P-1	1. Verify HVAC system blower motor operation; confirm proper air distribution; confirm proper temperature control; determine needed action.	P-1
		2. Inspect and test HVAC system blower motors, resistors, switches, relays, wiring, and protection devices.	P-1	2. Inspect and test HVAC system blower motors, resistors, switches, relays, wiring, and protection devices; determine needed action.	P-1
		3. Demonstrate knowledge of A/C compressor clutch control systems.	P-2	3. Diagnose A/C compressor clutch control systems; determine needed action.	P-2
		4. Demonstrate knowledge of the vacuum, mechanical, and electrical components and controls of the HVAC system.	P-2	4. Diagnose malfunctions in the vacuum, mechanical, and electrical components and controls of the HVAC system; determine needed action.	P-3
VI. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) **E. Refrigerant Recovery, Recycling, and Handling**		**VI. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)** **E. Refrigerant Recovery, Recycling, and Handling**		**VI. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)** **E. Refrigerant Recovery, Recycling, and Handling**	

		1. Demonstrate knowledge of correct use and maintenance of refrigerant handling equipment.	P-1	1. Demonstrate knowledge of correct use and maintenance of refrigerant handling equipment.	P-1
		2. Demonstrate knowledge of how to identify A/C system refrigerant; test for sealants; recover, evacuate, and charge A/C system; add refrigerant oil as required.	P-1	2. Demonstrate knowledge of how to identify A/C system refrigerant; test for sealants; recover, evacuate, and charge A/C system; add refrigerant oil as required.	P-1
		3. Demonstrate knowledge of how to recover, recycle, label, and store refrigerant in accordance with EPA Section 609 guidelines.	P-1	3. Demonstrate knowledge of how to recover, recycle, label, and store refrigerant in accordance with EPA Section 609 guidelines.	P-1
IMMR HVAC Task Count		**TST HVAC Task Count**		**MTST HVAC Task Count**	
P-1	10	P-1	24	P-1	25
P-2	1	P-2	5	P-2	6
P-3	0	P-3	3	P-3	1
Total	11	Total	32	Total	32

CAB

For every task, the following safety task must be strictly enforced: Comply with personal and environmental safety practices associated with eye/foot/hand/hearing protection, clothing, hand tools, power equipment, lifting practices, and ventilation. Handle, store, and dispose of fuels/chemicals/materials in accordance with federal, state, and local regulations.

The first tasks are to listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.

Inspection, Maintenance, and Minor Repair (IMMR) - 540 Hours **VII. CAB** **A. General**		**Truck Service Technology (TST) - 740 Hours** **VII. CAB** **A. General**		**Master Truck Service Technology (MTST) - 1040 Hours** **VII. CAB** **A. General**	
1. Research vehicle service information including, vehicle service history, service precautions, and technical service bulletins.	P-1	1. Research vehicle service information, including, vehicle service history, service precautions, and technical service bulletins.	P-1	1. Research vehicle service information, including vehicle service history, service precautions, and technical service bulletins.	P-1
2. Use appropriate electronic service tool(s) and procedures to ~~diagnose problems;~~check and record diagnostic codes; interpret digital multimeter (DMM) readings.	P-1	2. Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; interpret digital multimeter (DMM) readings.~~; clear diagnostic codes when appropriate.~~	P-1	2. Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; interpret digital multimeter (DMM) readings, verify repair; clear diagnostic codes only when ~~appropriate~~directed.	P-1

VII. CAB **B. Instruments and Controls**		**VII. CAB** **B. Instruments and Controls**		**VII. CAB** **B. Instruments and Controls**	
1. Inspect mechanical key condition; check operation of ignition switch; check operation of indicator lights, warning lights and/or alarms; check instruments; record oil pressure and system voltage; check operation of electronic power take-off (PTO) and engine idle speed controls (if applicable).	P-1	1. Inspect mechanical key condition; check operation of ignition switch; check operation of indicator lights, warning lights and/or alarms; check instruments; record oil pressure and system voltage; check operation of electronic power take-off (PTO) and engine idle speed controls (if applicable).	P-1	1. Inspect mechanical key condition; check operation of ignition switch; check operation of indicator lights, warning lights and/or alarms; check instruments; record oil pressure and system voltage; check operation of electronic power take-off (PTO) and engine idle speed controls (if applicable).	P-1
2. Check operation of all accessories.	P-1	2. Check operation of all accessories.	P-1	2. Check operation of all accessories.	P-1
3. Demonstrate knowledge of operation of auxiliary power unit (APU)/electric power unit (EPU).	P-3	3. Demonstrate knowledge of operation of auxiliary power unit (APU)/electric power unit (EPU).	P-3	3. Demonstrate knowledge of operation of auxiliary power unit (APU)/electric power unit (EPU).	P-3
VII. CAB **C. Safety Equipment**		**VII. CAB** **C. Safety Equipment**		**VII. CAB** **C. Safety Equipment**	
1. Check operation of horns (electric and air); check warning device operation (reverse, air pressure, etc.); check condition of spare fuses, safety triangles, fire extinguisher, and all required decals; inspect seat belts and sleeper restraints; inspect condition of wiper blades and arms.	P-1	1. Test operation of horns (electric and air); test warning device operation (reverse, air pressure, etc.); check condition of spare fuses, safety triangles, fire extinguisher, and all required decals; inspect seat belts and sleeper restraints; inspect condition of wiper blades, arms, and linkage; determine needed action.	P-1	1. Test operation of horns (electric and air); test warning device operation (reverse, air pressure, etc.); check condition of spare fuses, safety triangles, fire extinguisher, and all required decals; inspect seat belts and sleeper restraints; inspect condition of wiper blades, arms, and linkage; determine needed action.	P-1

VII. CAB **D. Hardware**		**VII. CAB** **D. Hardware**		**VII. CAB** **D. Hardware**	
1. Check operation of wipers and washer; inspect windshield glass for cracks or discoloration; check sun visor; check seat condition, operation, and mounting; check door glass and window operation; verify operation of door and cab locks; inspect steps and grab handles; inspect mirrors, mountings, brackets, and glass.	P-1	1. Test operation of wipers and washer; inspect windshield glass for cracks or discoloration; check sun visor; check seat condition, operation, and mounting; check door glass and window operation; verify operation of door and cab locks; inspect steps and grab handles; inspect mirrors, mountings, brackets, and glass; determine needed action.	P-1	1. Test operation of wipers and washer; inspect windshield glass for cracks or discoloration; check sun visor; check seat condition, operation, and mounting; check door glass and window operation; verify operation of door and cab locks; inspect steps and grab handles; inspect mirrors, mountings, brackets, and glass; determine needed action.	P-1
2. Record all physical damage.	P-2	2. Record all physical damage.	P-2	2. Record all physical damage.	P-2
3. Lubricate all cab grease fittings; inspect and lubricate door and hood hinges, latches, strikers, lock cylinders, safety latches, linkages, and cables.	P-2	3. Lubricate all cab grease fittings; inspect and lubricate door and hood hinges, latches, strikers, lock cylinders, safety latches, linkages, and cables.	P-2	3. Lubricate all cab grease fittings; inspect and lubricate door and hood hinges, latches, strikers, lock cylinders, safety latches, linkages, and cables.	P-2
4. Inspect cab mountings, hinges, latches, linkages, and ride height.	P-1	4. Inspect cab mountings, hinges, latches, linkages, and ride height; determine needed action.	P-1	4. Inspect cab mountings, hinges, latches, linkages, and ride height; determine needed action.	P-1
5. Inspect quarter fender, mud flaps, reflectors, brackets, and reflective/conspicuity tape.	P-1	5. Inspect quarter fender, mud flaps, reflectors, brackets, and reflective/conspicuity tape; determine needed action.	P-1	5. Inspect quarter fender, mud flaps, reflectors, brackets, and reflective/conspicuity tape; determine needed action.	P-1

IMMR Cab Task Count	
P-1	8
P-2	2
P-3	1
Total	11

TST Cab Task Count	
P-1	8
P-2	2
P-3	1
Total	11

MTST Cab Task Count	
P-1	8
P-2	2
P-3	1
Total	11

HYDRAULICS

For every task, the following safety task must be strictly enforced: Comply with personal and environmental safety practices associated with eye/foot/hand/hearing protection, clothing, hand tools, power equipment, lifting practices, and ventilation. Handle, store, and dispose of fuels/chemicals/materials in accordance with federal, state, and local regulations.

Comply with manufacturers' and industry accepted safety practices associated with equipment lock out/tag out, pressure line release, implement support (blocked or resting on ground), and articulated cylinder devices/machinery safety locks.

The first tasks are to listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.

Inspection, Maintenance, and Minor Repair (IMMR) - 540 Hours **VIII. HYDRAULICS** **A. General**		**Truck Service Technology (TST) - 740 Hours** **VIII. HYDRAULICS** **A. General**		**Master Truck Service Technology (MTST) - 1040 Hours** **VIII. HYDRAULICS** **A. General**	
1. Research vehicle service information, including vehicle service history, service precautions, fluid type, and technical service bulletins.	P-3	1. Research vehicle service information, including vehicle service history, service precautions, fluid type, and technical service bulletins.	P-3	1. Research vehicle service information, including vehicle service history, service precautions, fluid type, and technical service bulletins.	P-3
2. Verify placement of equipment/component safety labels and placards.	P-3	2. Verify placement of equipment/component safety labels and placards; determine needed action.	P-3	2. Verify placement of equipment/component safety labels and placards; determine needed action.	P-3
3. Identify hydraulic system components; locate filtration system components; service filters and breathers.	P-3	3. Identify hydraulic system components; locate filtration system components; service filters and breathers.	P-3	3. Identify hydraulic system components; locate filtration system components; service filters and breathers.	P-3

4. Check fluid level and condition; take a hydraulic fluid sample for analysis.	P-3	4. Check fluid level and condition; take a hydraulic fluid sample for analysis; determine needed action.	P-3	4. Check fluid level and condition; purge and/or bleed system; take a hydraulic fluid sample for analysis; determine needed action.	P-3
5. Inspect hoses and connections for leaks, damage, proper routing, and proper protection.	P-3	5. Inspect hoses and connections for leaks, damage, proper routing, and proper protection; determine needed action.	P-3	5. Inspect hoses and connections for leaks, damage, proper routing, and proper protection; determine needed action.	P-3
6. Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; interpret digital multimeter (DMM) readings.	P-3	6. Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; interpret digital multimeter (DMM) readings.~~; clear diagnostic codes when appropriate.~~	P-3	6. Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; interpret digital multimeter (DMM) readings; clear diagnostic codes only when ~~appropriate~~directed.	P-3
7. Read and interpret hydraulic system diagrams and schematics.	P-3	7. Read and interpret hydraulic system diagrams and schematics.	P-3	7. Read and interpret hydraulic system diagrams and schematics.	P-3
				8. Perform system temperature, pressure, flow, and cycle time tests; determine needed action.	P-3
				9. Perform system operational tests; determine needed action.	P-3
VIII. HYDRAULICS **B. Pumps**		**VIII. HYDRAULICS** **B. Pumps**		**VIII. HYDRAULICS** **B. Pumps**	

		1. Identify causes of pump failure, unusual pump noises, temperature, flow and leakage problems; determine needed action.	P-3
		2. Determine pump type, rotation, and drive system.	P-3
		3. Remove and install pump; prime and/or bleed system.	P-3
		4. Inspect pump inlet and outlet for restrictions and leaks; determine needed action.	P-3
VIII. HYDRAULICS **C. Filtration/Reservoirs (Tanks)**	**VIII. HYDRAULICS** **C. Filtration/Reservoirs (Tanks)**	**VIII. HYDRAULICS** **C. Filtration/Reservoirs (Tanks)**	
		1. Identify type of filtration system; verify filter application and flow direction.	P-3
		2. Identify causes of system contamination; determine needed action.	P-3
		3. Inspect, repair, and/or replace reservoir, sight glass, vents, caps, mounts, valves, screens, supply, and return lines.	P-3

VIII. HYDRAULICS **D. Hoses, Fittings, and Connections**	**VIII. HYDRAULICS** **D. Hoses, Fittings, and Connections**	**VIII. HYDRAULICS** **D. Hoses, Fittings, and Connections**	
		1. Diagnose causes of component leakage, damage, and restriction; determine needed action.	P-3
		2. Assemble hoses, tubes, connectors, and fittings.	P-3
VIII. HYDRAULICS **E. Control Valves**	**VIII. HYDRAULICS** **E. Control Valves**	**VIII. HYDRAULICS** **E. Control Valves**	
		1. Pressure test system safety relief valve; determine needed action.	P-3
		2. Perform control valve operation pressure and flow tests; determine needed action.	P-3
		3. Inspect, test, and adjust valve controls (electrical/electronic, mechanical, and pneumatic).	P-3
		4. Identify causes of control valve leakage problems (internal and external); determine needed action.	P-3

		5. Inspect pilot control valve linkages, cables, and PTO controls; adjust, repair, or replace as needed.	P-3
VIII. HYDRAULICS **F. Actuators**	**VIII. HYDRAULICS** **F. Actuators**	**VIII. HYDRAULICS** **F. Actuators**	
		1. Identify actuator type (single-acting, double-acting, multi-stage, telescopic, and motor).	P-3
		2. Identify the cause of seal failure; determine needed action.	P-3
		3. Identify the cause of incorrect actuator movement and/or leakage (internal and external); determine needed action.	P-3
		4. Inspect actuator mounting, frame components, and hardware for looseness, cracks, and damage; determine needed action.	P-3
		5. Remove, repair, and/or replace actuators.	P-3

				6. Inspect actuators for dents, cracks, damage, and leakage; determine needed action.	P-3
IMMR Hydraulics Task Count		**TST Hydraulics Task Count**		**MTST Hydraulics Task Count**	
P-1	0	P-1	0	P-1	0
P-2	0	P-2	0	P-2	0
P-3	7	P-3	7	P-3	29
Total	7	Total	7	Total	29

- **Tools and Equipment**

Local employer needs and the availability of funds are key factors for determining each program's structure and operation. The Program Standards recognize that not all programs have the same needs, nor do all programs teach 100 % of the tasks. Therefore, the basic philosophy for the tools and equipment requirement is as follows: for all tasks which are taught in the program, the training should be as thorough as possible with the tools and equipment necessary for those tasks. In other words, if a program does not teach a particular task, the tool from the tool list associated with that task is not required (unless of course it is required for a task that is taught in another area).

The tool lists are organized into four basic categories: Hand Tools, Personal Protective Equipment, General Lab/Shop Equipment, and Specialty Tools and Equipment. The specialty tools section is further separated into the eight truck categories. When referring to the tools and equipment list, please note the following:

A. The organization of the tool list is not intended to dictate how a program organizes its tool crib or student tool sets (i.e., which tools should be in a student set, if utilized, and which should be in the tool crib or shop area).

B. Quantities for each tool or piece of equipment are determined by the program needs; however, sufficient quantities to provide quality instruction should be on hand.

C. For Specialty Tools and Equipment, the program need only have those tools for the level being accredited.

D. Programs may meet the equipment requirements by borrowing special equipment or providing for off-site instruction (e.g., in a dealership or independent repair shop). Use of borrowed or off-site equipment must be appropriately documented.

E. No specific brand names for tools and equipment are specified or required.

F. Although the Program Standards recommend that programs encourage their students to begin to build their own individual tools sets prior to entry into the industry, there is no requirement to do so. NOTE: Industry surveys indicate that most (90%) employers require that a candidate for employment provide his/her own basic hand tool set in order to be hired as an entry-level truck technician.

HAND TOOLS

Contained in individual sets or the tool crib in sufficient quantities to permit efficient instruction.

Chisels:		Scraper - 1" Wide or Larger	
Cold 5/8", 3/4"		Screwdriver - Blade Type:	
Combination Wrenches:		1", 6", 9", and 12"	
Standard (3/8" - 1") (up to 1 1/4" optional)		Offset	
Metric (6mm - 19mm) (up to 24mm optional)		Screwdriver - Phillips:	
Digital Multimeter (DMM) - Minimum 10 Meg Ohm Impedance		1" #2	
Files and handles:		6" #1, #2	
Coarse 12"		12" #3	
Fine 12"		Socket Set - 1/4" Drive:	
Half Round 12"		3/16" - 1/2" Standard Depth	
Flare Nut Wrench Set:		3/16" - 1/2" Deep	
3/8" - 3/4"		4mm - 13mm Standard Depth	
7mm - 19mm		4mm - 13mm Deep	
Flashlight/Inspection Light/Drop Light		Extensions - Short, Medium, and Long	
Hammers:		Ratchet Handle	
16 oz. Ball Peen		Socket Set - 3/8" Drive (12-point recommended, Non-Impact or Chrome):	
24 oz. Ball Peen		3/8" - 3/4" Standard Depth~~(~~	
Soft Face		3/8" - 3/4" Deep	
Hex Key Wrench Sets:		10mm - 19mm Standard Depth	
Standard (.050" - 3/8") (7/16" - 1/2" optional)		10mm - 19mm Deep	
Metric (2mm - 12mm)		Extensions - Short, Medium, and Long	
Inspection Mirror		Ratchet Handle	
Machinists/Mechanics Steel Rule			
Magnetic Pickup Tool			
Pliers:		Socket Set - 1/2" Drive (Non-Impact or Chrome):	
Adjustable (Tongue & Groove)		1/2" - 1 1/8" Standard Depth	
Electrical - Crimper/Stripper		1/2" - 1 1/8" Deep	
Locking		13mm - 24mm Standard Depth~~()~~	
Needle Nose		13mm - 24mm Deep~~()~~	
Side Cutters		Breaker Bar	
Slip Joint		Extensions - Short, Medium, and Long	
Pry Bar		Ratchet Handle	
Punches:			
Aligning		Universal Joint Set – ¼", 3/8", and ½" drive	
Brass		Tape Measure - 25'	
Center		Tire Marker/Crayon/Pen	
Pin (3/16" - 3/8")		Tire Tread Depth Gauge	
Starter (3/16" - 3/8")		Tool Box	
Taper		Wire Brush	

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment (PPE) such as the items listed below should be available for all staff and students in accordance with OSHA and/or state requirements and as needed for the tasks being taught. **Safety glasses are required to be worn at all times by everyone in the lab/shop area.**

Aprons		Eye Protection – Goggles (required for tasks with splash hazards)	
Chemical Resistant Gloves		Hearing Protection	
Closed Toed Shoes/Boots (Sturdy Leather Upper and Safety Toe recommended)		Face Shields	
Cut Resistant Gloves		N95/KN95 Masks	
Eye Protection - Safety Glasses (with side panels)			

GENERAL LAB/SHOP EQUIPMENT

The tools and equipment on this list are used in general lab/shop work but are not generally considered to be individually owned hand tools. A well-equipped, accredited program should have all of these general tools and equipment readily available and in sufficient quantity to provide quality instruction. A few items on this General Lab/Shop Equipment list are specifically needed for programs accredited at the Truck Service Technology (TST) level and/or the Master Truck Service Technology (MTST) level. Those are indicated by the appropriate acronym.

Adjustable Wrenches (up to 18")		Feeler gauges - Blade Type:	
Air Blow Gun – Rubber Tip (per OSHA requirements)		0.005" - 0.050"	
A/C Condenser/Radiator Fin Comb Set		0.005 mm - 0.070 mm	
Axle Shaft Removal Tool/Puller		Filter Wrenches - Small, Medium, and Large	
Belt Tension Gauge		Funnels	
Belt Wear Gauge		Gear Oil Dispenser	
Bushing Driver Set		Grease Gun	
C-Clamps		Grinder (Bench or Pedestal)	
Cleaning Tank (per OSHA and Local Requirements)		Hack Saw	
Chisel Holder		Hammers:	
Clutch Adjusting Tools		48 oz. Ball Peen	
Combination Wrench Sets:		24 oz. Brass	
Standard 1 1/16"~~"~~ - 1 1/2"		12 lb. Hand Sledge	
Metric 21 mm - 32 mm		Heat Tool/Gun	
Standard Offset 3/8" - 3/4"		Hydraulic Press - 20 Ton Minimum (TST & MTST Pgms)	
Metric Offset 7 mm - 15 mm		Impact Driver Set (Manual/Hand)	
Coolant Conditioner Test Kit (Test Strips)		Impact Wrenches:	
Cooling System Pressure Tester and Adapters		1/2" Drive (Air or Electric) with Impact Sockets	
Creepers		3/4" Drive (Air or Electric) with Impact Sockets	
Diagnostic Information Platform - PC with appropriate software and/or internet access for ~~reading~~ electronic service information		1" Drive (Air or Electric) with Impact Sockets ~~(TST and MTST Programs)~~	
Dial Indicator Set - Magnetic Base		Impact Universal Joints - 3/8", 1/2"	
Digital or Analog Caliper - Standard and Metric		Jacks - Bottle-style, Air Jack, Frame Jack, etc.	
Drain Pans		Lifting Chains (TST and MTST Programs)	
Drills:		Lifting Eyes (TST and MTST Programs)	
3/8" variable speed, reversible		Method for removing brake/clutch dust contamination (Parts Cleaner) meeting EPA Standards	
1/2" variable speed, reversible		Micrometers (Digital or Analog):	
Drill Bit Set: 1/16" - 1/2"		Outside - Standard Set (0" - 6")	
Electronic Service Tool - PC or Data Scan Tool with Appropriate Software		Outside - Metric Set (0 mm - 150 mm)	
Extractor Set (Broken Bolt)		Inside - Standard Set (0" - 6~~"~~")	
		Depth - Standard Set (0" - 6")	

Pipe Wrenches (~~Up to 18" or~~ 24" or larger)		Tap and Die Sets (Standard and Metric)	
Pliers:		Thermometer / Hand-held Infrared	
Snap Ring - Internal		Thread Chaser Set	
Snap Ring – External		Tire Cage (MTST Programs)	
Portable Crane/Engine Hoist - 2 Ton Minimum (MTST Programs)		Tire Dolly (Optional)	
Pressure Gauge Set (TST and MTST Programs):		Tire Gauge - Master (For Tire Gauge Calibration Checks)	
0-300 psi		Tire Inflator Chuck - Truck	
0-150 psi		Tire Pressure Gauge - Truck	
Puller Sets (TST and MTST Programs):		Torch Set: Oxy-Acetylene (optional)	
Two-Jaw		Torque Angle Gauge (TST and MTST Programs)	
Three-Jaw		Torque Multiplier with Adapters (TST and MTST Programs) (Optional)	
Refractometer (Coolant/Battery)		Torque Wrenches:	
Safety (Jack) Stands - Minimum 6 Ton		1/4" Drive (~~0 -~~at least 150 lb. in. capacity)	
Seal Puller/Installer		3/8" Drive (~~0 -~~at least 100 lb. ft. capacity)	
Socket Sets:		1/2" Drive (at least~~0 -~~ 250 lb. ft. capacity)	
3/4" Drive Set		3/4" Drive (~~up to~~ at least 600 lb. ft. capacity)	
Axle Nut Sockets		Tubing Cutter/Flaring Set (standard and metric)	
Crow's Feet (Standard and Metric)		Valve Core Replacement Tool - Tire	
Hex Key Drivers (Standard 3/16" - 3/4" and Metric 4mm - 19mm)		Wheel Chocks	
Torx ® Drive T15 - T55		Wheel Dolly (Optional)	
Torx ® Drive E4 - E18		Wheel Seal Puller and Driver Set	
Wheel Fastener Socket Set		Wheel Weight Tool	
Soldering Tool/Gun		~~12 volt Test Light (optional)~~	
Stop Watch (optional)		Laser belt alignment tool (optional)	
12V Electrical circuit loading/testing tool (optional)			

SPECIALTY TOOLS AND EQUIPMENT

This section covers the tools and equipment a lab/shop should have for training in any given specialty area. This equipment is specialized, and it must be available in the lab/shop or to the program through a local business. No specific type or brand names are identified because they will vary in each local situation. A check mark indicates that tool is appropriate for performing tasks at that accreditation level.

For all tasks which are taught in the program, the training should be as thorough as possible with the tools and equipment necessary for those tasks. In other words, if a program does not teach a particular task, the tool associated with that task is not required.

DIESEL ENGINES	IMMR	TST	MTST	
Charge Air Cooler Tester			✓	
Cooling System Vacuum Fill Equipment	✓	✓	✓	
Diagnostic Smoke Machine (Optional)		✓	✓	
Diesel Exhaust Fluid (DEF) Refractometer	✓	✓	✓	
Engine Stands		✓	✓	
Fan Hub Wrenches		✓	✓	
Fuel System/Air Induction System Dust Cover Cap Set		✓	✓	
Fuel System Priming Tool (Optional)	✓	✓	✓	
Injector Removal Tool(s)		✓	✓	
Liner Installer (universal)			✓	
Liner Puller (universal)			✓	
Manometer - (Water) or Magnehelic Gauge (optional)			✓	
Oscilloscope		✓	✓	
Precision Straight Edge		✓	✓	
Protrusion Gauge (Cylinder Liner Height)			✓	
Ring Compressor		✓	✓	
Ring Expander(s)			✓	
Soft Jaw Vise or Adapters	✓	✓	✓	
Vibration Damper Puller (Optional)		✓	✓	
Oil Sample Retrieval System (Optional)	✓	✓	✓	

DRIVE TRAIN	IMMR	TST	MTST	
3/4" Drive Pinion Nut Sockets		✓	✓	
Aligning Studs - 3/8", 1/2", & 5/8"		✓	✓	
Blind Hole/Pilot Bearing Puller		✓	✓	
Clutch Disc Aligning Tools		✓	✓	
Clutch Jack and/or Transmission Jack Attachments		✓	✓	
Protractor (Angle Gauge)		✓	✓	
Transmission Jack		✓	✓	
U-Joint Puller		✓	✓	
Yoke Puller		✓	✓	

BRAKES	IMMR	TST	MTST	
Air Pressure Gauge Set	✓	✓	✓	
Bearing Packer (optional)	✓	✓	✓	

Bearing Race Installer	✓	✓	✓	
Brake Bleeder	✓	✓	✓	
Brake Fluid Tester or Test Strips	✓	✓	✓	
Brake Lining Thickness Gauge	✓	✓	✓	
Brake Rotor (Disc) Micrometer	✓	✓	✓	
Brake Spring Tool for Foundation Brakes		✓	✓	
Disc Caliper Tool for Compressing Caliper Pistons		✓	✓	
Drum Brake Gauge	✓	✓	✓	
Slack Adjuster Installation Index Tool (Templates)	✓	✓	✓	
Trailer Electrical Cord Tester	✓	✓	✓	
Brake Spring Caging Bolts	✓	✓	✓	

SUSPENSION AND STEERING	**IMMR**	**TST**	**MTST**	
Air Hammer with Chisels		✓	✓	
Alignment Equipment: Minimum to perform tasks (including tandem alignment)		✓	✓	
Ball Joint Separator		✓	✓	
Fifth Wheel Test Pin	✓	✓	✓	
Pitman Arm Puller		✓	✓	
Power Steering Analyzer		✓	✓	
Tape Measure (50’)	✓	✓	✓	
Tire Square	✓	✓	✓	

ELECTRICAL/ELECTRONIC SYSTEMS	**IMMR**	**TST**	**MTST**	
Battery Charger (AGM/Gel Compatible)	✓	✓	✓	
Battery Terminal Adapters	✓	✓	✓	
Die Type Terminal Crimper (optional)	✓	✓	✓	
Oscilloscope		✓	✓	
Inductive (Clamp-on) Ammeter	✓	✓	✓	
Jumper Cable Set (Heavy-Duty) or Auxiliary Power Supply (Jump Box)	✓	✓	✓	
Low Amperage Automatic Charger or equivalent device to maintain shop batteries	✓	✓	✓	
Starting, Charging, and Battery System Tester – capacitive type	✓	✓	✓	
Terminal Repair Kits	✓	✓	✓	
Test Lead Kit	✓	✓	✓	
Insulation Tester/Multimeter and leads (~~recommended~~optional) – must meet CAT III 600 volt, CAT III 1000 volt, or CAT IV 600 Volt rating		✓	✓	
Electrical Insulating Gloves (recommended) – must meet CAT 0 1000 VAC and 1500 VDC electrical safety glove rating – may have expired certification if used for demonstration only		✓	✓	
Insulated Retrieval Hook (optional)		✓	✓	

HEATING, VENTILATION, AND AIR CONDITIONING	**IMMR**	**TST**	**MTST**	
A/C Leak Detection Tool (Halogen or UV Dye)	✓	✓	✓	

A/C Manifold Gauge Set meeting EPA Regulations and SAE "J" Standards		✓	✓	
A/C Recovery/Recharging and/or Recycling Station meeting EPA Regulations and SAE "J" Standards		✓	✓	
A/C Refrigerant Identifier		✓	✓	
Non-Leather Gloves	✓	✓	✓	
Heater Hose Clamp-Off Tool		✓	✓	
Measuring Cup		✓	✓	
Micron Meter (Electronic Vacuum Gauge) – (optional)		✓	✓	
Orifice Tube Remover		✓	✓	
Portable Vacuum Pump (may be included with Recovery/Recycling/Recharging Station)		✓	✓	
Spring Lock Coupler Removers (optional)		✓	✓	
Thermometer	✓	✓	✓	
Valve Core (Shrader Type) Replacement Tool		✓	✓	
A/C oil injector tool (optional – for R-1234yf)		✓	✓	

HYDRAULICS	**IMMR**	**TST**	**MTST**	
Fittings and adapters for specific applications			✓	
Hose Crimper Tool and Pump (either air over hydraulic or hand pump)- (optional)			✓	
1000 PSI Liquid Filled or Electronic Gauge and Hose Assembly			✓	
5000 PSI Liquid Filled or Electronic Gauge and Hose Assembly			✓	
Pressure/Flow Meter			✓	
Thermometer (up to 250 degrees) Standard or Infrared			✓	

- **Definitions – Educational and Technical Terms**

DEFINITIONS – EDUCATIONAL TERMS

1. **ARTICULATION:** A formal written agreement, usually between a secondary and post-secondary institution that are geographically within a reasonable daily commuting distance of each other. The agreement will clearly denote students completing specific secondary courses in accordance with predetermined performance criteria will have partially completed commensurate requirements for a completion certificate or diploma awarded by the postsecondary institution. Commensurate requirements could be in the form of credit equivalents, advanced placement, task completion, etc. at the post-secondary institution.

2. **CURRICULUM:** All the objectives of the lesson plan with respect to the content and learning activities, arranged in a sequence for a particular instructional area. An orderly arrangement of integrated subjects, activities, time allocations, and experiences which students pursue for the attainment of a specific educational goal.

3. **COMPETENCY: (Hands-on)** - Performance of task to the level or degree specified in the performance standard and curriculum for the task.

4. **COMPETENCY: (Written)** – Understanding of task to the level or degree specified in the performance standard and curriculum for the task.

5. **CRITERION REFERENCED MEASURE(S):** An exercise based on a performance objective for a task and designed to measure attainment of that objective. (Also called performance test(s) or criterion-referenced test.)

6. **E-LEARNING:** An electronically based, instructor managed, and student driven learning process— may be outside or in place of the regularly scheduled classroom and support of lab/shop required time frame—*and includes integrated and scored auditable assessment and reporting* in compliance with the ASE Education Foundation's e-learning general framework criteria.

7. **GOAL:** A statement of the intended outcome of participation in the training program.

8. **HOUR:** For ASE Education Foundation purposes, as instructional hour as defined by a school's accrediting entity (e.g. state agency (SEA) or regional or national accrediting body). Different SEAs or accrediting bodies may count instructional hours differently. For example, if a 90-minute block is recognized as two hours of instruction by a school's accrediting entity and meets 180 days a year, you would calculate 2 x 180 = 360 instructional hours for the year for ASE program accreditation.

9. **LIVE WORK:** The processing, assignment, and student performance of the appropriate tasks on vehicles donated by manufacturers or other sources, customer-owned, and other training vehicles.

10. **LEARNING MANAGEMENT SYSTEM (LMS):** An electronically based, instructor managed, and student driven process that enhances and/or supplements learning—outside the regularly scheduled classroom and lab/shop time frame—*and includes integrated and scored auditable assessment and reporting* in compliance with the ASE Education Foundation's e-learning general framework criteria.

11. **MASTERY:** (See Competency – Hands-on and Competency - Written).

12. **OBJECTIVE, PERFORMANCE:** A written statement describing an intended outcome (competent task performance) in terms of student performance. (also called "behavioral" objective or instructional objective).

13. **ON-VEHICLE SERVICE AND REPAIR WORK:** The processing, assignment, and student performance of the appropriate tasks on vehicles donated by manufacturers or other sources, customer-owned, and other training vehicles.

14. **PERSONAL CHARACTERISTIC:** Attributes that are not readily measurable and are generally in the affective or cognitive domains.

15. **PRIORITY RATINGS:** Indicates the minimum percentage of tasks that a program must include in its curriculum in order to be accredited.

16. **STANDARD:** "...Something established for use as a rule or basis of comparison in measuring or judging capacity, quantity, content, extent, value, quality, etc." Webster's New World Dictionary (1991)

17. **STANDARD – (PERFORMANCE):** A written specification of the results of acceptable task performance.

18. **STANDARD – (PERSONAL):** An attribute or characteristic of an individual that facilitates entry into or advancement within an occupation.

19. **STANDARD – (PROGRAM):** A specific quality or desired characteristic of a training program designed to prepare individuals for employment or advancement.

20. **TASK:** A psychomotor or cognitive entry-level learning activity consisting of one or more measureable steps accomplished through an instructor presentation, demonstration, visualization or a student application.

21. **<u>TRAINING STATION</u>:** An area with appropriate tools and equipment, large enough to allow the development of both safety and competency in task performance.

22. **<u>WORK-BASED LEARNING:</u>** For ASE program accreditation purposes, work-based learning is a formalized and structured credit bearing instructional dimension of the automotive training program that is an integral part of the institution's master schedule, is available to all automotive students at the appropriate grade level, and meets the following criteria:

a) A written customized training plan and performance standards that each student is expected to meet, to be signed off by the student, the student's parent or legal guardian, the authorized work-based learning site representative, and the work-based learning coordinator.

b) A written agreement between the sponsoring educational institution and the work-based learning site that is in compliance with state/federal rules and regulations governing work-based learning programs.

c) A written plan of oversight and supervision designating who has the authority to coordinate, monitor and evaluate the work-based learning program, including individual student performance.

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<u>Must</u> or <u>shall</u> is an imperative need, duty or requirement; an essential or indispensable item; mandatory.

<u>Should</u> is used to express a recommendation, not mandatory, but attainment would increase program quality.

<u>May</u> or <u>could</u> expresses freedom to follow a suggested alternative.

DEFINITIONS – TECHNICAL TERMS

1. ADJUST - To bring components to specified operational settings.

2. ALIGN - To restore the proper position of components.

3. ANALYZE - Assess the condition of a component or system.

4. ASSEMBLE (REASSEMBLE) - To fit together the components of a device or system.

5. BALANCE - To establish correct linear, rotational or weight relationship.

6. BATTERY – LOW VOLTAGE/SLI - (starting, lighting, and ignition): 12 or 24 volt batteries used in common automotive and medium/heavy duty vehicles.

7. BATTERY – HIGH VOLTAGE/TRACTION - High voltage batteries designed for powering vehicle traction motors.

8. BLEED - To remove air from a closed system.

9. CAN - Controller Area Network. CAN is a network protocol (SAE J2284/J1939/ISO 15765-4) used to interconnect a network of electronic control modules.

10. CHARGE - To bring to a specified state, e.g., battery or air conditioning system.

11. CHECK - To verify condition by performing an operational or comparative examination.

12. CLEAN - To rid component of foreign matter for the purpose of reconditioning, repairing, measuring or reassembling.

13. DEGLAZE - To remove a smooth glossy surface.

14. DEMONSTRATE - To show the understanding of components or systems.

15. DESCRIBE - To represent or give an account of the component or system.

16. DETERMINE - To establish the procedure to be used to perform the necessary repair.

17. DETERMINE NECESSARY/NEEDED ACTION - Indicates that the diagnostic routine(s) is the primary emphasis of a task. The student is required to perform the diagnostic steps and communicate the diagnostic outcomes and corrective actions required addressing the concern or problem. The training program determines the communication method

(worksheet, test, verbal communication, or other means deemed appropriate) and whether the corrective procedures for these tasks are actually performed.

18. DIAGNOSE - To identify the cause of a problem.

19. DISASSEMBLE - To separate a component's parts as a preparation for cleaning, inspection or service.

20. DISCHARGE - To empty a storage device or system.

21. DISCONNECT/DECOMMISSION/DEPOWER – To physically and electrically separate high voltage circuits and components from the high voltage battery/power source.

22. EVACUATE - To remove air, fluid or vapor from a closed system by use of a vacuum pump.

23. FLUSH - To internally clean a component or system.

24. HIGH VOLTAGE - Voltages of ~~25~~ 30 volts AC or ~~50~~ 60 volts DC and greater.

25. HONE - To restore or resize a bore by using rotating cutting stones.

26. IDENTIFY - To describe the component or system.

27. INSPECT - To verify condition of component or system via visual examination.

28. INSULATION – Protective materials that are non-conductive appropriately rated for the voltages present in the circuit or device.

29. INTERPRET - To explain the operation/condition of component or system.

30. ISOLATION – The physical and electrical separation between the high voltage propulsion system circuits and the vehicle chassis.

31. JUMP START - To use an auxiliary power supply to assist a battery to crank an engine.

32. LOCATE - Determine or establish a specific spot or area.

~~32.~~33. LOW VOLTAGE - Voltages of less than 30 volts AC or 60 volts DC.

~~33.~~34. MEASURE - To determine existing dimensions/values for comparison to specifications.

~~34.~~35. NETWORK - A system of interconnected electrical modules or devices.

~~35.~~36. ON-BOARD DIAGNOSTICS (OBD) - Diagnostic protocol which monitors computer inputs and outputs for failures.

~~36.~~37. PARASITIC DRAW - Electrical loads which are still present when the ignition circuit is OFF.

~~37.~~38. PERFORM - To accomplish a procedure in accordance with established methods and standards.

~~38.~~39. PERFORM NECESSARY ACTION - Indicates that the student is to perform the diagnostic routine(s) and perform the corrective action item. Where various scenarios (conditions or situations) are presented in a single task, at least one of the scenarios must be accomplished.

~~39.~~40. PURGE - To remove air or fluid from a closed system.

~~40.~~41. REMOVE - To disconnect and separate a component from a system.

~~41.~~42. REPAIR - To restore a malfunctioning component or system to operating condition.

~~42.~~43. REPLACE - To exchange a component; to reinstall a component.

~~43.~~44. RESURFACE - To restore correct finish.

~~44.~~45. SERVICE - To perform a procedure as specified in the owner's or service manual.

~~45.~~46. SERVICE DISCONNECT – A device for deactivation of an electrical circuit when conducting checks and services of the high voltage vehicle electrical propulsion system.

~~46.~~47. TEST - To verify condition through the use of meters, gauges or instruments.

~~47.~~48. TORQUE - To tighten a fastener to specified degree or tightness (in a given order or pattern if multiple fasteners are involved on a single component).

~~48.~~49. VERIFY - To confirm that a problem exists after hearing the customer's concern; or to confirm the effectiveness of a repair.

~~49.~~50. VOLTAGE DROP - A reduction in voltage (electrical pressure) caused by the resistance in a component or circuit.

- **Standards 11 & 12 – Limits for WBL and E-Learning**

STANDARD 11 – WORK-BASED LEARNING

WRITTEN POLICIES AND PROCEDURES MUST BE USED FOR ALL PROGRAM-SANCTIONED WORK-BASED LEARNING AND APPRENTICESHIP ACTIVITIES.

(This standard applies only to programs that are using work-based learning or apprenticeship training to meet minimum program hour requirements for the program's type and level of accreditation. A maximum of 25% of the instructional-hours requirement may be met by applicable work-based learning activities, e-learning activities, or a combination of both work-based learning and e-learning activities.)

Standard 11.1 – Standards
The work-based learning component must be an integral part of the automotive program and available to all students. Students spend part of the scheduled time, either on a daily basis or in a block-time configuration, on-site in related classroom instruction and part of the scheduled time off-site in a related and structured work environment.

Standard 11.2 – Agreements
All legally binding agreements should be written and signed by the student, the student's parent (if the student is under 18 years of age), the employer and the program instructor or the institution's designated work-based learning coordinator.

Standard 11.3 – Supervision
A supervising truck instructor or supervising work-based learning coordinator should be assigned responsibility, authority, and time to coordinate and monitor work-based learning components.

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.

(This standard applies only to programs that are using e-learning to meet minimum program hour requirements. A maximum of 25% of the instructional-hours requirement may be met

by applicable work-based learning activities, e-learning activities, or a combination of both work-based learning and e-learning activities.)

Standard 12.1 – Access
Students must have access to the appropriate technology needed to access e-learning materials.

Standard 12.2 – Curriculum and Student Progress
All content/tasks taught by e-learning must be identified and a record of each student's progress must be maintained through the use of a Learning Management System (LMS).

Standard 12.3 – Advisory Committee Input
E-learning, for the purpose of meeting hour requirements, should be discussed and approved by the Advisory Committee.

- **Program Hours, P-1/P-2/P-3 percentages, Instructor Qualifications, Update Training Requirement, Evaluation Team Members**

MEDIUM/HEAVY TRUCK MINIMUM REQUIREMENTS

1. Programs must meet the following hour requirements based on the level of accreditation sought.

Inspection, Maintenance, & Minor Repair	**540 hours** combined classroom and lab/shop instructional activities
Truck Service Technology	**740 hours** combined classroom and lab/shop instructional activities
Master Truck Service Technology	**1040 hours** combined classroom and lab/shop instructional activities

The ASE Education Foundation accepts what each school's accrediting entity (e.g. state education agency (SEA) or regional or national accrediting body) defines as an instructional hour. Because different SEAs or accrediting bodies may count instructional hours differently, this policy accommodates the unique situation in each school.

For example, if a 90-minute block is recognized as two hours of instruction by a school's accrediting entity and meets 180 days a year, you would calculate 2 x 180 = 360 instructional hours for the year. If it is a 2-year program where the time block for the second year is the same as the first, you would calculate 360 X 2 =720 total program hours.

2. The Program Standards recognize that program content requirements vary by program type and by regional employment needs. Therefore, flexibility has been built into the task list by assigning each task a priority number. **A program must include in their curriculum the designated percentage of tasks (or more) in each priority numbered category (P-1, P-2, and P-3) to be accredited.** For IMMR, TST, and MTST Medium/Heavy Truck programs, the following minimum percentages are required:

At least 90% of all Priority 1 (P-1) tasks must be taught
At least 70% of all Priority 2 (P-2) tasks must be taught
At least 25% of all Priority 3 (P-3) tasks must be taught

Inspection, Maintenance and Minor Repair (IMMR)

P-1 = ~~138~~141 90% = ~~124~~ 127 tasks

P-2 = ~~27~~28 70% = ~~19~~ 20 tasks

P-3 = ~~20~~ 18 25% = 5 tasks

Required ~~Supplemental~~ Foundational Tasks = ~~47~~48

Total Minimum Required Tasks = ~~195~~200

Truck Service Technology (TST)

P-1 = ~~193~~194 90% = ~~174~~ 175 tasks

P-2 = ~~68~~67 70% = ~~48~~ 47 tasks

P-3 = ~~46~~47 25% = 12 tasks

Required ~~Supplemental~~ Foundational Tasks = ~~47~~48

Total Minimum Required Tasks = ~~281~~282

Master Truck Service Technology (MTST)

P-1 = ~~200~~202 90% = ~~180~~ 182 tasks

P-2 = ~~74~~ 72 70% = ~~52~~ 50 tasks

P-3 = ~~87~~89 25% = 22 tasks

Required ~~Supplemental~~ Foundational Tasks = ~~47~~48

Total Minimum Required Tasks = ~~301~~302

3. All IMMR instructors must be ASE certified in T4, T6, T8, and one other Medium/Heavy Truck certification (T2, T3, T5, T7).

   All TST and MTST instructors must hold current ASE certifications in T6 and T8, and in any other medium/heavy truck area(s) (T2, T3, T4, T5, and/or T7) they teach.

Instructor Qualifications		
IMMR	T6, T8	T4 plus one other Medium/Heavy Truck ASE Certification.
TST **MTST**		Instructor Area(s) Taught. Program must cover T2-T8

T2 – Diesel Engines	T6 – Electrical/Electronic Systems
T3 – Drive Train	T7 – Heating, Ventilation, & Air Conditioning
T4 – Brakes	T8 – Preventive Maintenance Inspection
T5 – Suspension & Steering	

4. All instructors must complete twenty (20) hours of recognized industry technical update training each year, relevant to their program. Instructors may substitute ten (10) hours of documented hands-on work as a technician in a retail or fleet medium/heavy truck repair business outside the school (e.g., part-time work or summer externship) for one (1) hour of update technical training, up to a maximum of ten (10) hours of update technical training each year, toward the annual update training requirement. The work must be related to the areas they teach and take place in the same year for which substitute credit is sought. The ASE Education Foundation reserves the right to verify all hands-on work information reported and determine whether it meets all requirements.

QUALIFICATIONS OF ON-SITE EVALUATION TEAM MEMBERS

The program requesting accreditation is responsible for recruiting and recommending on-site evaluation team members. The ETL must approve individuals recommended by the program. The on-site evaluation team members must be practicing medium/heavy truck technicians, or service managers or shop owners with prior experience as service technicians, from businesses in the area served by the training program.

Evaluation team members must have:

1. at least three years full-time experience as a general medium/heavy truck technician and currently employed as a medium/heavy duty technicians, educator, field service engineer, OEM or aftermarket technical specialist, or medium/heavy truck service facility manager or owner.

ASE medium/heavy truck certification is recommended but not required. If you cannot find team members to meet the above requirements, consult with your ASE Education Foundation field manager.

In addition to the ETL, the Initial Accreditation evaluation team has three team members. ~~If the program is manufacturer-specific (e.g., ASEP, ASSET, T-TEN, etc.) it is recommended that the team members be from dealers associated with that manufacturer.~~ If the program is generic, it is recommended the team members be from a mixture of dealer and aftermarket repair facilities.

In addition to the ETL, the Renewal of Accreditation evaluation team has two team members. ~~If the program is manufacturer-specific (e.g., ASEP, ASSET, T-TEN, etc.) it is recommended the team members be from dealers associated with that manufacturer.~~ If the program is generic, it

is recommended the team members be from a mixture of dealer and aftermarket repair facilities.

Each program requesting accreditation must also identify their choice for an alternate evaluation team member should one of the other team members be unable to participate on the date(s) of the evaluation.

Team members may be advisory committee members as long as they did not participate in the program self-evaluation.

Team members must not be former instructors or graduates of the program within the past three years or relatives of the administrator or instructor.

Each program must identify their selections on the On-Site Evaluation Team Member List which is part of the application for Initial or Renewal of Accreditation.