



TEST SPECIFICATIONS AND TASK LISTS FOR THE NATIONAL AUTOMOTIVE STUDENT SKILLS STANDARDS ASSESSMENT

MEDIUM / HEAVY TRUCK

The National Automotive Student Skills Standards Assessment (NA3SA) for M/H Truck is currently comprised of two exams: Diesel Engines and Electrical/Electronic Systems.

The task lists are simply lists of the tasks involved in the process of diagnosing and repairing problems in the various vehicle systems. The tasks may also be thought of as competencies. Every question found on the NA3SA exams is keyed to one of these tasks. The tasks are organized into content categories, and these content categories, along with the number of questions included in each category, comprise the test specifications. Every form of the exams will be built to meet these specifications.

Students preparing for the NA3SA exams should review the tasks (competencies) listed, and note areas where further preparation may be needed. It also helps students to note how many questions will be included on the exams in each content area.

Technical Areas

DIESEL ENGINES	2
ELECTRICAL/ELECTRONIC SYSTEMS	6

DIESEL ENGINES

Content Area	Questions In Test
A. General	7
B. Cylinder Head And Valve Train	4
C. Engine Block	3
D. Lubrication System	4
E. Cooling System	7
F. Air Induction, Exhaust Systems and Engine Brakes	7
G. Fuel System	8
Required To Pass: TBD of 40	40

A. General

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

B. Cylinder Head and Valve Train

1. Remove, clean, inspect for visible damage, and replace cylinder head(s) assembly.
2. Clean and inspect threaded holes, studs, and bolts for serviceability; determine needed action.
3. Inspect cylinder head for cracks/damage; check mating surfaces for warpage; check condition of passages; inspect core/expansion and gallery plugs; determine needed action.
4. Disassemble head and inspect valves, guides, seats, springs, retainers, rotators, locks, and seals; determine needed action.
5. Measure valve head height relative to deck and valve face-to-seat contact; determine needed action.
6. Inspect injector sleeves and seals; measure injector tip or nozzle protrusion; determine needed action.
7. Inspect valve train components; determine needed action.
8. Reassemble cylinder head.

9. Inspect, measure, and replace/reinstall overhead camshaft; measure/adjust end play and backlash.
10. Inspect electronic wiring harness and brackets for wear, bending, cracks, and looseness; determine needed action.
11. Adjust valve bridges (crossheads); adjust valve clearances and injector settings.

C. Engine Block

1. Perform crankcase pressure test; determine needed action.
2. Remove, inspect, service, and install pans, covers, gaskets, seals, wear rings, and crankcase ventilation components.
15. Check condition of piston cooling jets (nozzles); determine needed action.
16. Inspect and measure crankshaft vibration damper; determine needed action.
17. 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.
18. Inspect flywheel/flexplate (including ring gear) and mounting surfaces for cracks and wear; measure runout; determine needed action.

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; determine needed action.
2. Check engine oil level, condition, and consumption; determine needed action.
3. Inspect and measure oil pump, drives, inlet pipes, and pick-up screens; check drive gear clearances; determine needed action.
4. Inspect oil pressure regulator valve(s), by-pass and pressure relief valve(s), oil thermostat, and filters; determine needed action.
5. Inspect, clean, and test oil cooler and components; determine needed action.
6. Inspect turbocharger lubrication and cooling systems; determine needed action.
7. Determine proper lubricant and perform oil and filter change.

E. Cooling System

1. Check engine coolant type, level, condition, and consumption; test coolant for freeze protection and additive package concentration; determine needed action.
2. Test coolant temperature and check operation of temperature and level sensors, gauge, and/or sending unit; determine needed action.
3. Inspect and reinstall/replace pulleys, tensioners and drive belts; adjust drive belts and check alignment.
4. Inspect thermostat(s), by-passes, housing(s), and seals; replace as needed.
5. Recover, flush, and refill with recommended coolant/additive package; bleed cooling system.

6. Inspect coolant conditioner/filter assembly for leaks; inspect valves, lines, and fittings; replace as needed.
7. Inspect water pump and hoses; replace as needed.
8. Inspect, clean, and pressure test radiator, pressure cap, tank(s), and recovery systems; determine needed action.
9. Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud; replace as needed.

F. Air Induction, Exhaust Systems and Engine Brakes

1. Perform air intake system restriction and leakage tests; determine needed action.
2. Perform intake manifold pressure (boost) test; determine needed action.
3. Perform exhaust back pressure test; determine needed action.
4. Inspect turbocharger(s), wastegate, and piping systems; determine needed action.
5. Inspect and test turbocharger(s) (variable ratio/geometry VGT), pneumatic, hydraulic, electronic controls, and actuators.
6. Check air induction system: piping, hoses, clamps, and mounting; service or replace air filter as needed.
7. Remove and reinstall turbocharger/wastegate assembly.
8. Inspect intake manifold, gaskets, and connections; replace as needed.
9. Inspect, clean, and test charge air cooler assemblies; inspect aftercooler assemblies; replace as needed.
10. Inspect exhaust manifold, piping, mufflers, and mounting hardware; repair or replace as needed.
11. Inspect exhaust after treatment devices; determine necessary action.
12. Inspect and test preheater/inlet air heater, or glow plug system and controls; perform needed action.
13. Inspect and test exhaust gas recirculation (EGR) system including EGR valve, cooler, piping, filter, electronic sensors, controls, and wiring; determine needed action.
14. Inspect and adjust engine compression/exhaust brakes; determine needed action.
15. Inspect, test, and adjust engine compression/exhaust brake control circuits, switches, and solenoids; repair or replace as needed.
16. Inspect engine compression/exhaust brake housing, valves, seals, lines, and fittings; repair or replace as needed.

G. Fuel System

1. Fuel Supply System

1. Check fuel level, and condition; determine needed action.

2. Perform fuel supply and return system tests; determine needed action.
3. Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, supply and return lines and fittings; determine needed action.
4. Inspect, clean, and test fuel transfer (lift) pump, pump drives, screens, fuel/water separators/indicators, filters, heaters, coolers, ECM cooling plates, and mounting hardware; determine needed action.
5. Inspect and test low pressure regulator systems (check valves, pressure regulator valves, and restrictive fittings); determine needed action.
6. Check fuel system for air; determine needed action; prime and bleed fuel system; check primer pump.

2. Electronic Fuel Management System

1. Inspect and test power and ground circuits and connections; measure and interpret voltage, voltage drop, amperage, and resistance readings using a digital multimeter (DMM); determine needed action.
2. Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic diagnostic equipment and tools (to include PC based software and/or data scan tools); determine needed action.
3. Check and record electronic diagnostic codes and trip/operational data; monitor electronic data; clear codes; determine further diagnosis.
4. Locate and use relevant service information (to include diagnostic procedures, flow charts, and wiring diagrams).
5. Inspect and replace electrical connector terminals, seals, and locks.
6. Inspect and test switches, sensors, controls, actuator components, and circuits; adjust or replace as needed.
7. Using recommended electronic diagnostic tools (to include PC based software and/or data scan tools), access and interpret customer programmable parameters.
8. Inspect, test, and adjust electronic unit injectors (EUI); determine needed action.
9. Remove and install electronic unit injectors (EUI) and related components; recalibrate ECM (if applicable).
10. Perform cylinder contribution test utilizing recommended electronic diagnostic tool.
11. Perform on-engine inspections and tests on hydraulic electronic unit injectors and system electronic controls; determine needed action.
12. Perform on-engine inspections and tests on hydraulic electronic unit injector high pressure oil supply and control systems; determine needed action.
13. Perform on-engine inspections and tests on common rail type injection systems; determine needed action.
14. Inspect high pressure injection lines, hold downs, fittings and seals; determine needed action.

ELECTRICAL/ELECTRONIC SYSTEMS

Content Area	Questions In Test
A. General Electrical Systems	9
B. Battery	4
C. Starting Systems	6
D. Charging System Diagnosis and Repair	5
E. Lighting Systems	5
F. Gauges and Warning Devices	4
G. Related Electrical Systems	7
Required To Pass: TBD of 40	40

A. General Electrical Systems

1. Read and interpret electrical/electronic circuits using wiring diagrams.
2. Check continuity in electrical/electronic circuits using appropriate test equipment.
3. Check applied voltages, circuit voltages, and voltage drops in electrical/electronic circuits using appropriate test equipment.
4. Check current flow in electrical/electronic circuits and components using appropriate test equipment.
5. Check resistance in electrical/electronic circuits and components using appropriate test equipment.
6. Locate shorts, grounds, and opens in electrical/electronic circuits.
7. Identify parasitic (key-off) battery drain problems; perform tests; determine needed action.
8. Inspect and test fusible links, circuit breakers, relays, solenoids, and fuses; replace as needed.
9. Inspect and test spike suppression devices; replace as needed.
10. Check frequency and pulse width signal in electrical/electronic circuits using appropriate test equipment.

B. Battery

1. Perform battery load test; determine needed action.
2. Determine battery state of charge using an open circuit voltage test.
3. Inspect, clean, and service battery; replace as needed.
4. Inspect and clean battery boxes, mounts, and hold downs; repair or replace as needed.
5. Charge battery using slow or fast charge method as appropriate.
6. Inspect, test, and clean battery cables and connectors; repair or replace as needed.
7. Jump start a vehicle using jumper cables and a booster battery or appropriate auxiliary power supply using proper safety procedures.
8. Perform battery capacitance test; determine needed action.

C. Starting System

1. Perform starter circuit cranking voltage and voltage drop tests; determine needed action.
2. Inspect and test components (key switch, push button and/or magnetic switch) and wires in the starter control circuit; replace as needed.
3. Inspect and test, starter relays and solenoids/switches; replace as needed.
4. Remove and replace starter; inspect flywheel ring gear or flex plate.

D. Charging System Diagnosis and Repair

1. Test instrument panel mounted volt meters and/or indicator lamps; determine needed action.
2. Identify causes of a no charge, low charge, or overcharge problems; determine needed action.
3. Inspect and replace alternator drive belts, pulleys, fans, tensioners, and mounting brackets; adjust drive belts and check alignment.
4. Perform charging system voltage and amperage output tests; perform AC ripple test; determine needed action.
5. Perform charging circuit voltage drop tests; determine needed action.
6. Remove and replace alternator.
7. Inspect, repair, or replace cables, wires, and connectors in the charging circuit.

E. Lighting Systems

1. Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic diagnostic equipment and tools (including PC based software and/or data scan tools); determine needed action.
2. Identify causes of brighter than normal, intermittent, dim, or no headlight and daytime running light (DRL) operation.
3. Test, aim, and replace headlights.
4. Test headlight and dimmer circuit switches, relays, wires, terminals, connectors, sockets, and control components/modules; repair or replace as needed.
5. Inspect and test switches, bulbs/LEDs, sockets, connectors, terminals, relays, wires, and control components/modules of parking, clearance, and taillight circuits; repair or replace as needed.
6. Inspect and test instrument panel light circuit switches, relays, bulbs/LEDs, sockets, connectors, terminals, wires, and printed circuits/control modules; repair or replace as needed.
7. Inspect and test interior cab light circuit switches, bulbs, sockets, connectors, terminals, wires, and control components/modules; repair or replace as needed.
8. Inspect and test tractor-to-trailer multi-wire connector(s); repair or replace as needed.
9. Inspect, test, and adjust stoplight circuit switches, bulbs/LEDs, sockets, connectors, terminals, wires and control components/modules; repair or replace as needed.

10. Inspect and test turn signal and hazard circuit flasher(s), switches, relays, bulbs/LEDs, sockets, connectors, terminals, wires and control components/modules; repair or replace as needed.
11. Inspect and test reverse lights and warning device circuit switches, bulbs/LEDs, sockets, horns, buzzers, connectors, terminals, wires and control components/modules; repair or replace as needed.

F. Gauges and Warning Devices

1. Interface with vehicle's on-board computer; perform diagnostic procedure using recommended electronic diagnostic equipment and tools (including PC based software and/or data scan tools); determine needed action.
2. Identify causes of intermittent, high, low, or no gauge readings; determine needed action.
3. Identify causes of data bus-driven gauge malfunctions; determine needed action.
4. Inspect and test gauge circuit sensor/sending units, gauges, connectors, terminals, and wires; repair or replace as needed.
5. Inspect and test warning devices (lights and audible) circuit sensor/sending units, bulbs/LEDs, sockets, connectors, wires, and control components/modules; repair or replace as needed.
6. Inspect, test, replace, and calibrate (if applicable) electronic speedometer, odometer, and tachometer systems.

G. Related Electrical Systems

1. Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic diagnostic equipment and tools (including PC based software and/or data scan tools); determine needed action.
2. Identify causes of constant, intermittent, or no horn operation; determine needed action.
3. Inspect and test horn circuit relays, horns, switches, connectors, wires, and control components/modules; repair or replace as needed.
4. Identify causes of constant, intermittent, or no wiper operation; diagnose the cause of wiper speed control and/or park problems; determine needed action.
5. Inspect and test wiper motor, resistors, park switch, relays, switches, connectors, wires and control components/modules; repair or replace as needed.
6. Inspect wiper motor transmission linkage, arms, and blades; adjust or replace as needed.
7. Inspect and test windshield washer motor or pump/relay assembly, switches, connectors, terminals, wires, and control components/modules; repair or replace as needed.
8. Inspect and test side view mirror motors, heater circuit grids, relays, switches, connectors, terminals, wires and control components/modules; repair or replace as needed.
9. Inspect and test heater and A/C electrical components including: A/C clutches, motors, resistors, relays, switches, connectors, terminals, wires, and control components/modules; repair or replace as needed.
10. Inspect and test auxiliary power outlet, integral fuse, connectors, terminals, wires, and control components/modules; repair or replace as needed.

11. Identify causes of slow, intermittent, or no power side window operation; determine needed action.
12. Inspect and test motors, switches, relays, connectors, terminals, wires, and control components/modules of power side window circuits; repair or replace as needed.
13. Inspect and test block heaters; determine needed repairs.
14. Inspect and test cruise control electrical components; repair or replace as needed.
15. Inspect and test switches, relays, controllers, actuator/solenoids, connectors, terminals, and wires of electric door lock circuits.
16. Check operation of keyless and remote lock/unlock devices; determine needed action.
17. Inspect and test engine cooling fan electrical control components/modules; repair or replace as needed.
18. Identify causes of data bus communication problems; determine needed action.