

Auto Electrical/Electronics

Grades 9-12

Refer to NATEF (National Automotive Technicians Education Foundation) standards, 2013.

ELECTRICAL/ELECTRONIC SYSTEMS

For every task in Electrical/Electronic Systems, the following safety requirement must be strictly enforced: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

VI. ELECTRICAL/ELECTRONIC SYSTEMS

A. General

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| 1. Research applicable vehicle and service information, 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 |
| 3. Use writing diagrams to trace electrical/electronic circuits. | P-1 |
| 4. Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance. | P-1 |
| 5. Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits. | P-2 |
| 6. Check operation of electrical circuits with a test light. | P-2 |
| 7. Check operation of electrical circuits with fused jumper wires. | P-2 |
| 8. Measure key-off battery drain (parasitic draw). | P-1 |
| 9. Inspect and test fusible links, circuit breakers, and fuses; determine necessary action. | P-1 |
| 10. Perform solder repair of electrical wiring. | P-1 |
| 11. Replace electrical connectors and terminal ends. | P-1 |

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B. Battery Service

1. Perform battery state-of-charge test; determine necessary action P-1
2. Confirm proper battery capacity for vehicle applications; perform battery capacity test; determine necessary action. P-1
3. Maintain or restore electronic memory functions. P-1
4. Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs. P-1
5. Perform slow-fast battery charge according to manufacturer's recommendations. P-1
6. Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply. P-1
7. Identify high-voltage circuits of electric or hybrid electric vehicle and related safety precautions. P-3
8. Identify electronic modules, security systems, radios, and other accessories that require re-initialization or code entry after reconnecting vehicle battery. P-1
9. Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures. P-3

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VI. ELECTRICAL/ELECTRONIC SYSTEMS

C. Starting System

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| 1. Perform starter current draw test; determine necessary action. | P-1 |
| 2. Perform starter circuit voltage drop tests; determine necessary action. | P-1 |
| 3. Inspect and test starter relays and solenoids; determine necessary action. | P-2 |
| 4. Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; repair or replace as needed. | P-1 |
| 5. Check and refill diesel exhaust fluid (DEF) | P-3 |

VI. ELECTRICAL/ELECTRONIC SYSTEMS

D. Charging System

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| 1. Perform charging system output test; determine necessary action. | P-1 |
| 2. Inspect, adjust, or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment. | P-1 |
| 3. Remove, inspect, and re-install generator (alternator). | P-2 |
| 4. Perform charging circuit voltage drop tests; determine necessary action. | P-1 |

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E. Lighting Systems

- 1. Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed. P-1
- 2. Aim headlights. P-2
- 3. Identify system voltage and safety precautions associated with high-intensity discharge headlights. P-2

VI. ELECTRICAL/ELECTRONIC SYSTEMS

F. Accessories

- 1. Disable and enable airbag system for vehicle service; verify indicator lamp operation. P-1
- 2. Remove and reinstall door panel. P-1
- 3. Describe the operation of keyless entry/remote-start systems. P-3
- 4. Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators. P-1
- 5. Verify windshield wiper and washer operation; replace wiper blades P-1

EE Total Tasks	
P-1	26
P-2	8
P-3	3
	37