

A6 Electrical/Electronic Systems

Grades 9-12

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

A6 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	Priority	AYES Pre Intern	AYES YR2	AYES Job Sheet
A. General Electrical System Diagnosis				
1. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	P-1		A6/U3/L1	A6A01
2. Identify and interpret electrical/electronic system concern; determine necessary action.	P-1		A6/U3/L1	A6A01
3. Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins.	P-1		A6/U3/L2	A6A03
4. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).	P-1		A6/U3/L2	A6A03
5. Diagnose electrical/electronic integrity for series, parallel and series-parallel circuits using principles of electricity (Ohm's Law).	P-1		A6/U1/L8 A6/U15/L2	A6A05
6. Use wiring diagrams during diagnosis of electrical circuit problems.	P-1		A6/U3/L1	A6A06

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7. Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems.	P-1	A6/U1/L4 A6/U1/L6		A6A07
8. Check electrical circuits with a test light; determine necessary action.	P-2	A6/U3/L3		A6A08
9. Measure source voltage and perform voltage drop tests in electrical/electronic circuits using a voltmeter; determine necessary action.	P-1		A6/U3/L3 A6/U15/L2	A6A09
10. Measure current flow in electrical/electronic circuits and components using an ammeter; determine necessary action.	P-1		A6/U3/L3 A6/U15/L2	A6A10
11. Check continuity and measure resistance in electrical/electronic circuits and components using an ohmmeter; determine necessary action.	P-1		A6/U3/L3 A6/U15/L2	A6A11
12. Check electrical circuits using fused jumper wires; determine necessary action.	P-2	A6/U3/L3 A6/U15/L2		A6A12
13. Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.	P-1	A6/U3/L4 A6/U15/L2		A6A13
14. Measure and diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine necessary action.	P-1		A6/U4/L3	A6A14
15. Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action.	P-1		A6/U7/L1	A6A15

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16.	Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action.	P-1		A6/U3/L3 A6/U7/L1	A6A16
17.	Remove and replace terminal end from connector	P-1		A6/U3/L3 A6/U7/L1 A6/U15/L2	A6A17
18.	Repair connectors and terminal ends.	P-1		A6/U3/L3 A6/U7/L1 A6/U15/L2	A6A17
19.	Repair wiring harness (including CAN/BUS systems).	P-1		A6/U3/L3 A6/U7/L1 A6/U15/L2	A6A17
20.	Perform solder repair of electrical wiring.	P-1	A6/U7/L1 A6/U15/L2		A6A20
21.	Identify location of hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures	P-3		A6/U4/L4	A6A21
B. Battery Diagnosis and Service					
1.	Perform battery state-of-charge (conductance) test; determine necessary action.	P-1	A6/U4/L3		A6B01
2.	Perform battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action.	P-1	A6/U4/L3		A6B02

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3. Maintain or restore electronic memory functions.	P-1		A6/U4/L2	A6B03
4. Inspect, clean, fill, and replace battery.	P-2	A6/U4/L2		A6B04
5. Perform slow/fast battery charge.	P-2	A6/U4/L2		A6B05
6. Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.	P-1	A6/U4/L2		A6B06
7. Start a vehicle using jumper cables and a battery or auxiliary power supply.	P-1	A6/U4/L2		A6B07
8. Identify high voltage circuits of electric or hybrid electric vehicle and related safety precautions.	P-3		A6/U4/L4	A6B08
9. Identify electronic modules, security systems and/or radios that require reinitialization or code entry following battery disconnect.	P-2		A6/U13/L3	A6B09
10. Identify hybrid vehicle auxiliary (12v) battery service, repair and test procedures.	P-3		A6/U4/L4	A6B10

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C. Starting System Diagnosis and Repair					
1.	Perform starter current draw tests; determine necessary action.	P-1	A6/U6/L2		A6C01
2.	Perform starter circuit voltage drop tests; determine necessary action.	P-1	A6/U6/L2		A6C02
3.	Inspect and test starter relays and solenoids; determine necessary action.	P-2		A6/U6/L2	A6C03
4.	Remove and install starter in a vehicle.	P-1	A6/U6/L3		A4C04
5.	Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action.	P-2		A6/U6/L2	A6C05
6.	Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.	P-2		A6/U6/L2	A6C06
D. Charging System Diagnosis and Repair					
1.	Perform charging system output test; determine necessary action.	P-1	A6/U5/L2		A6D01
2.	Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions.	P-1		A6/U5/L2	A6D02

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3. Inspect, adjust, or replace generator (alternator) drive belts, pulleys, and tensioners; check pulley and belt alignment.	P-2	A6/U5/L3		A6D03
4. Remove, inspect, and install generator (alternator).	P-1		A6/U5/L3	A6D04
5. Perform charging circuit voltage drop tests; determine necessary action.	P-1		A6/U5/L2	A6D05
E. Lighting Systems Diagnosis and Repair				
1. Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action.	P-1		A6/U8/L2	A6E01
2. Inspect, replace, and aim headlights and bulbs.	P-2	A6/U8/L2		A6E02
3. Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action	P-2		A6/U8/L2	A6E03
4. Identify system voltage and safety precautions associated with high intensity discharge headlights.	P-3		A6/U8/L2	A6E04
F. Gauges, Warning Devices, & Driver Information Systems Diagnosis and Repair				
1. Inspect and test gauges and gauge sending units for cause of intermittent, high, low, or no gauge readings; determine necessary action.	P-1		A6/U9/L1	A6F01
2. Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action.	P-3		A6/U9/L1 A6/U15/L1	A6F02

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3.	Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action.	P-1		A6/U9/L1 A6/U15/L1	A6F03
4.	Inspect and test sensors, connectors, and wires of electronic (digital) instrument circuits; determine necessary action.	P-3	A6/U9/L1		A6F04
G. Horn and Wiper/Washer Diagnosis and Repair					
1.	Diagnose incorrect horn operation; perform necessary action.	P-2		A6/U2/L1	A6G01
2.	Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action.	P-2		A6/U3/L4	A6G02
3.	Diagnose incorrect washer operation; perform necessary action.	P-2		A6/U3/L4	A6G03
H. Accessories Diagnosis and Repair					
1.	Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action.	P-2		A6/U10/L1	A6H01
2.	Diagnose incorrect heated glass, mirror, or seat operation; determine necessary action.	P-2		A6/U10/L1	A6H02
3.	Diagnose incorrect electric lock operation; determine necessary action.	P-2		A6/U10/L1	A6H03

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4.	Diagnose incorrect operation of cruise control systems; determine necessary action. (NC)	P-3		A6/U13/L1	A6H04
5.	Diagnose supplemental restraint system (SRS) concerns; determine necessary action. (Note: Follow manufacturer's safety procedures to prevent accidental deployment.) (NC)	P-1		A6/U13/L2	A6H05
6.	Disarm and enable the airbag system for vehicle service.	P-1		A6/U13/L3	A6H06
7.	Diagnose radio static and weak, intermittent, or no radio reception; determine necessary action.	P-3		A6/U10/L1 A6/U13/L3	A6H07
8.	Remove and reinstall door panel.	P-1	A6/U10/L1		A6H08
9.	Diagnose body electronic system circuits using a scan tool; determine necessary action.	P-2		A6/U14/L3	A6H09
10.	Check for module communication (LAN/ CAN/ BUS) errors using a scan tool.	P-3		A6/U14/L3	A6H10
11.	Diagnose the cause of false, intermittent, or no operation of anti-theft system.	P-2		A6/U10/L2	A6H11