JOB SHEET 92

Ignition System Inspection and Component Testing (Distributor Vehicle)

Name: _____ Station: _____ Date: _____

NATEF Correlation

This Job Sheet addresses the following NATEF task(s):

8.C.2 Inspect and test ignition primary and secondary circuit wiring and solid state components; test ignition coil(s); perform necessary action. (P-1)

8.C.3 Inspect and test crankshaft and camshaft position sensor(s); perform necessary action. (P-1)

Performance Objective(s)

Upon completion of this Job Sheet, you will be able to understand how to properly test and inspect electronic distributor ignition systems. You will also be able to test the individual circuits and components that relate to the operation and timing of the ignition system as well as test camshaft and/or crankshaft sensors.

Tools and Materials

Service manual
Technician's tool set
DMM
Feeler gauge set or spark plug gapping tool
Fused jumper wire
Tape measure
Scan tool

Protective Clothing/Equipment

Goggles or safety glasses with side shields

Describe the vehicle being worked on:

Year	Make	Model	VIN	Engine type and size

PROCEDURE

1. Check the firing order to make sure that the spark plug wires are installed correctly. Visually inspect each of the spark plug wires and spark plug boots. Note how the wires are routed and secured in wire looms for reinstallation.

Task Completed _____

2. Remove the spark plug wires and check the resistance and length of each wire. Record your readings below.

Cylinder	1	2	3	4	5	6	7	8
Resistance								
Length								
Condition								

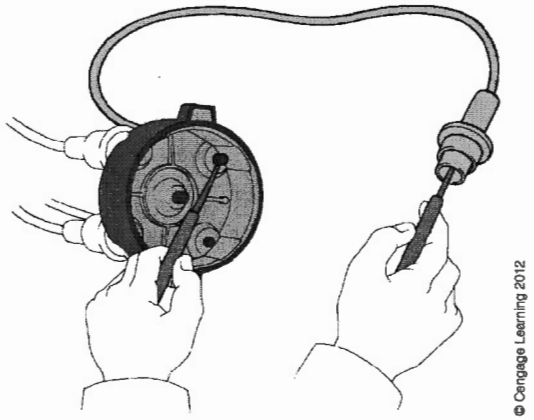


Figure 38.16 Checking the resistance of a spark plug wire and distributor cap.

3. What type of spark plug is supposed to be used in this vehicle?

_____

4. Remove each of the spark plugs, visually inspect them, and report their condition below.

Cylinder	1	2	3	4	5	6	7	8
Condition								

5. Measure the gap of each spark plug and report it below.

Cylinder	1	2	3	4	5	6	7	8
Gap								

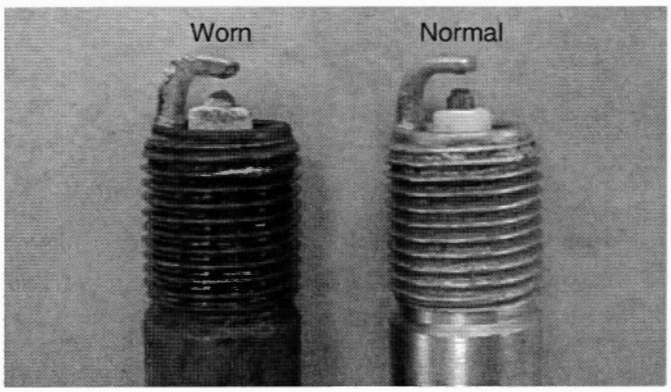


Figure 38.5 Worn and normal spark plugs.

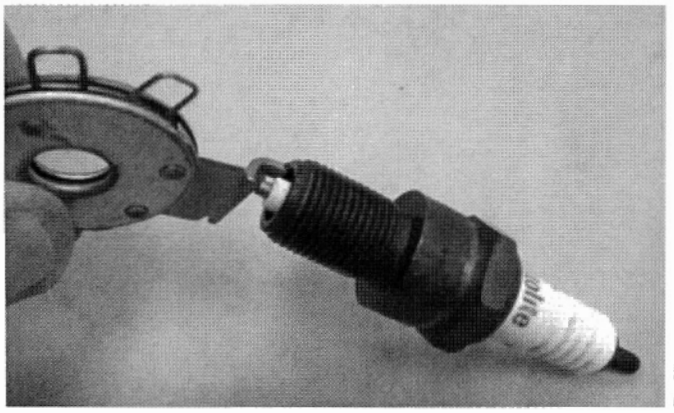
6. Do the spark plugs require repair or replacement?

_____

7. If needed, adjust the gap of the spark plugs and reinstall them, or replace the spark plugs. What is their torque specification?

_____

Note: *Apply antiseize compound to the spark plug threads before installing them. Do not apply too much antiseize; a light coating on the threads is all that is needed.*



Tim Gilles

Figure 38.7 This tool is used to bend the ground electrode to set the gap.

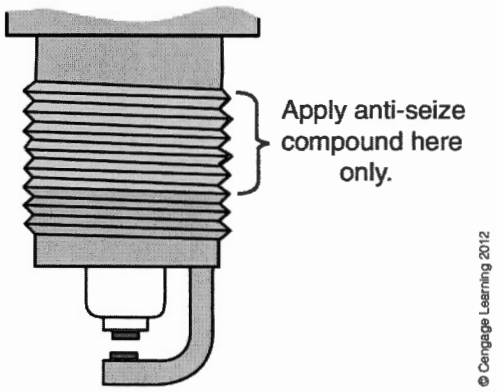


Figure 38.11 A small amount of antiseize compound can be applied to the upper area of the spark plug threads.

8. Check to see if the distributor cap is seated properly.

Task Completed _____

9. Remove the distributor cap and visually inspect the cap and rotor for cracks, chips, and carbon tracking. Replace it if needed.

Task Completed _____

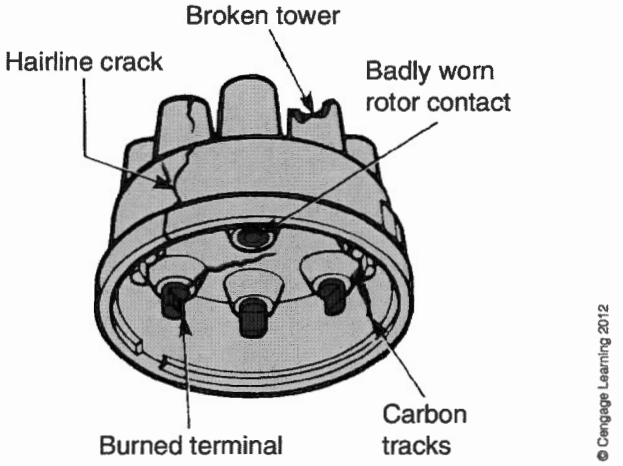


Figure 38.19 Places where a distributor cap can be damaged or worn.

10. If the vehicle has a pickup coil, use the ohmmeter to check the resistance of the coil and compare it to the manufacturer's specification. Does it have the correct resistance?

_____

Note: *You can also check the pickup coil by measuring the AC voltage while the engine is cranking. This is best done with an analog meter or a digital storage oscilloscope.*

11. If the vehicle has a pickup coil, measure the air gap with a feeler gauge. What is the clearance?

_____

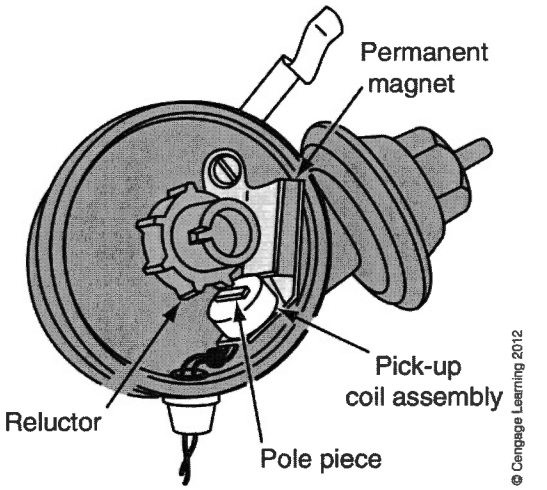


Figure 37.20 A magnetic-type AC generator pickup.

12. Compare your reading to the manufacturer's specification and adjust as needed.

Task Completed _____

13. If the vehicle has a Hall-effect switch (crankshaft or camshaft sensor), connect the voltmeter to the output wire and ground. Turn the ignition on. Move a steel feeler gauge back and forth between the sensor and the magnet. Report what the voltmeter reads when you do this.

_____

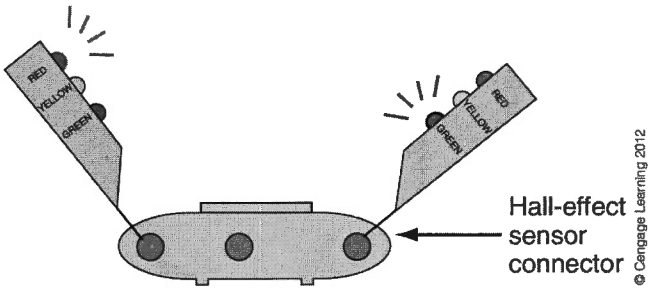


Figure 38.28 Testing a Hall-effect switch with a logic probe. On one side, the red light should come on. The green light should illuminate when the probe is touched to the other side.

14. Locate the ignition coil and disconnect the primary and secondary wiring.

Task Completed _____

15. Test the coil by measuring the resistance on the primary side and the secondary side of the coil. Report your findings below.

Primary coil resistance _____

Secondary coil resistance _____

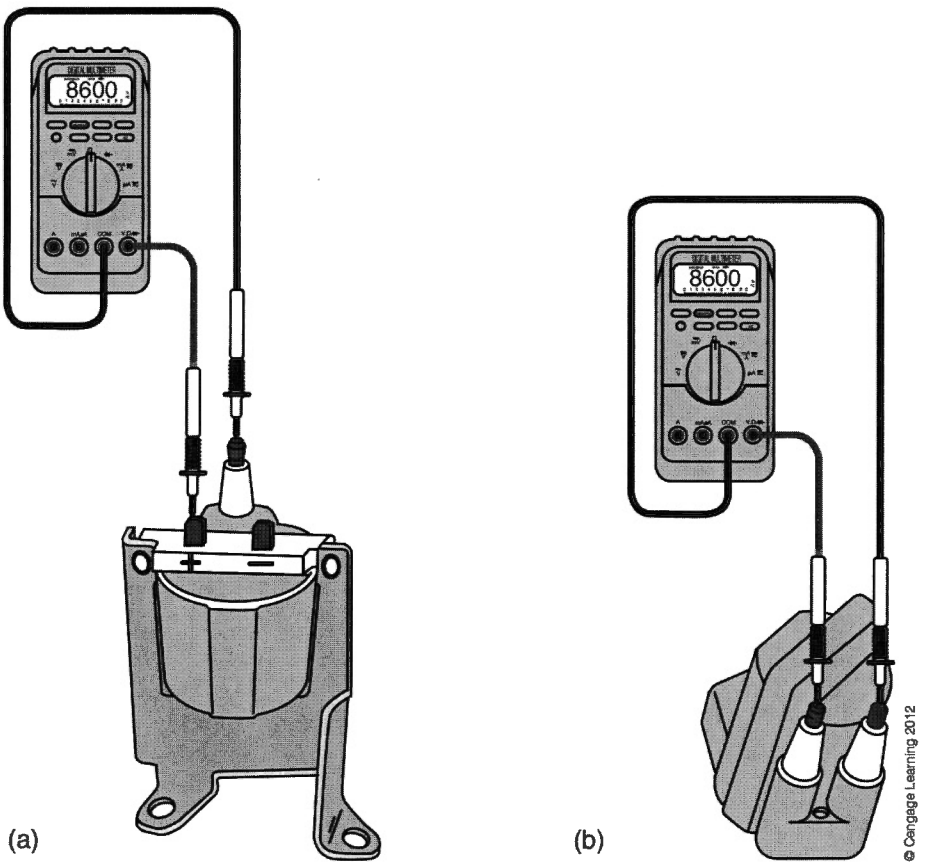


Figure 38.22 (a) Checking the resistance in coil windings. (b) Checking a waste spark coil.

16. Do your readings indicate a problem with the coil?

_____

17. Connect the voltmeter to a known good ground and the B+ connection of the primary circuit of the coil. Crank the engine and check for voltage. Does the primary circuit have voltage present?

_____

18. Reconnect the coil connections and start the engine. Check the voltage drop of the ground side of the primary coil circuit. Does the reading indicate a problem?

_____

19. Using a scan tool, connect to the vehicle and view/graph the camshaft sensor and/or crankshaft sensor(s) output below.

20. Does this appear to be normal or is there a problem?

_____

Problems Encountered

_____

_____

_____

INSTRUCTOR EVALUATION

- ☐ 4 Mastered Task
- ☐ 3 Able to Perform Task Independently; Some Additional Training Suggested
- ☐ 2 Able to Perform Task with Close Supervision; Requires Additional Training
- ☐ 1 Unable to Perform Task
- ☐ 0 Not Attempted

Comments

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Instructor Name: _____ Date: _____

Instructor Signature: _____

JOB SHEET 93

Ignition System Inspection and Component Testing (DIS or COP Vehicle)

Name: _____ Station: _____ Date: _____

NATEF Correlation

This Job Sheet addresses the following NATEF task(s):

8.C.2 Inspect and test ignition primary and secondary circuit wiring and solid state components; test ignition coil(s); perform necessary action. (P-1)

8.C.3 Inspect and test crankshaft and camshaft position sensor(s); perform necessary action. (P-1)

Performance Objective(s)

Upon completion of this Job Sheet, you will be able to understand how to properly test and inspect electronic distributorless ignition systems (DIS). You will also be able to test the individual circuits and components that relate to the operation and timing of the ignition system as well as test camshaft and/or crankshaft sensors.

Tools and Materials

Service manual
Technician's tool set
DMM
Tape measure
Scan tool
DSO
Feeler gauge set or spark plug gapping tool

Protective Clothing/Equipment

Goggles or safety glasses with side shields

Describe the vehicle being worked on:

Year	Make	Model	VIN	Engine type and size

PROCEDURE

Note: *This Job Sheet can be used for COP or direct ignition vehicles by omitting #1, #2, and #8.*

1. Check the firing order to make sure that the spark plug wires are installed and paired correctly. Visually inspect each of the spark plug wires and spark plug boots. Note how the wires are routed and secured in wire looms for reinstallation.

Task Completed _____

2. Remove the spark plug wires and check the resistance and length of each wire. Record your readings below.

Cylinder	1	2	3	4	5	6	7	8
Resistance								
Length								
Condition								

3. What type of spark plug is supposed to be used in this vehicle?

_____

4. Remove each of the spark plugs, visually inspect them, and report their condition below.

Cylinder	1	2	3	4	5	6	7	8
Condition								

5. Measure the gap of each spark plug and report it below.

Cylinder	1	2	3	4	5	6	7	8
Gap								

6. Do the spark plugs require repair or replacement?

_____

7. Reinstall (or replace) the spark plugs. What is their torque specification?

_____

Note: *Apply antiseize compound to the spark plug threads before installing them. Do not apply too much antiseize; a light coating on the threads is all that is needed.*

8. Visually inspect the coil towers of the coil pack for burns, corrosion, and any signs of arcing.

Task Completed _____

9. Are there any TSBs related to the ignition system of this vehicle?

_____

10. Remove each of the coil packs and test the coil for resistance on the primary and secondary sides. Report your findings below.

Primary coil resistance _____

Secondary coil resistance _____

11. Reinstall the coil packs. What is their torque specification?

_____

12. Locate the ignition control module.

Task Completed _____

13. Test the B+ wire of the ignition control module for voltage.

Task Completed _____

14. With the engine running, test the ground wire connection of the ignition control module for voltage drop. What is your reading?

_____

15. Where are the crankshaft and camshaft sensors located for this vehicle?

_____

_____

16. Visually inspect the crank and cam sensor wiring connections.

Task Completed _____

17. Using the feeler gauge measure the air gap of the crank sensor (if applicable).

_____

18. Set up the DSO to measure voltage over time and connect it to the crankshaft or camshaft sensor output wire and a known good ground.

Task Completed _____

19. Start the engine and let it idle. Draw the graph that was displayed on the DSO below.

20. Refer to the service manual. Does the crank sensor appear to be working properly?

_____

Problems Encountered

_____

_____

_____

INSTRUCTOR EVALUATION

- ☐ 4 Mastered Task
- ☐ 3 Able to Perform Task Independently; Some Additional Training Suggested
- ☐ 2 Able to Perform Task with Close Supervision; Requires Additional Training
- ☐ 1 Unable to Perform Task
- ☐ 0 Not Attempted

Comments

_____

_____

Instructor Name: _____ Date: _____

Instructor Signature: _____