

Lovejoy Junior Lab Off-Site Learning Packet Day 8

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Program/Class SR AST

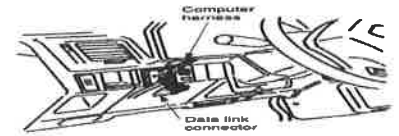
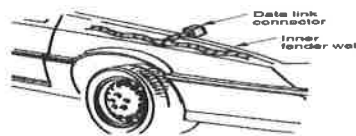
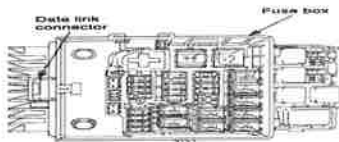
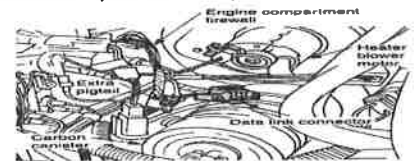
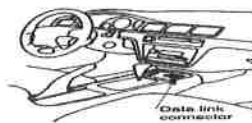
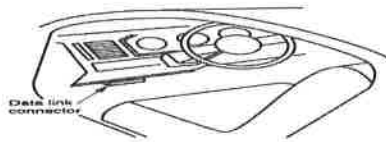
Period 5 - 8

Activities:

Chapter 24 ON-Board Diagnostic and scan tools

1. Students will be able to identify 5 out of 6 locations for scan tool data link connectors.

- On late-model vehicles, data link connector mounts under dash
 - Easily accessible from driver's seat
- In older vehicles, adapter is needed, so scan tool's connector will fit vehicle's pre-OBD II pin



configurations

2. Students will be able to identify how scan tools can read info from vehicle with 100% accuracy.

1. Modern scan tools give prompts in display windows
2. Scan tool may ask you to input VIN information

3. Students will be able to list 7 out of 8 request that a scan tool can perform.

1. Stored diagnostic trouble codes
2. Fault description
3. Datastream information
4. Run tests
5. Oxygen sensor monitoring

6. Failure record
7. Freeze frame
8. Troubleshooting

4. Students will be able to define the difference between failure records of obdI and OBDII with 100% accuracy.

1. Failure record (OBD II) or failure recorder (OBD I)
 - Counts number of times trouble code occurs
2. OBD II systems
 - Counts number of times engine reached operating temperature since last trouble code occurred
3. OBD I systems
 - Failure recorder counts number of keystarts since last trouble code occurred

5. Students will be able to identify how DTC's are labeled with 100% accuracy.

1. Early on-board diagnostic systems were not standardized
2. OBD II requires use of set of standardized alpha-numeric trouble codes
3. Each trouble code identifies same problem in all vehicles, regardless of manufacturer

6. Students will be able to list the 5 out of 6 steps in identifying DTC's.

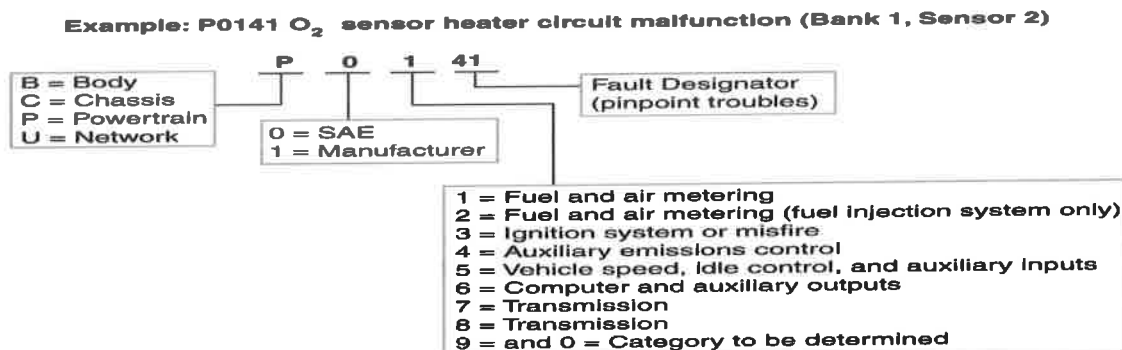
1. Contain a letter and a four-digit number
2. Letter indicates general function of affected system
3. First digit indicates whether code is standard trouble code or nonuniform code
4. Standard trouble codes, or SAE codes
 - Indicated by zero (0)
5. Nonuniform codes
 - Nonstandard codes assigned by manufacturers
 - One (1) after system
6. Second digit indicates specific system function where fault is located

7. Students will be able to identify what the letters and numbers stand for in the DTC with 100% accuracy.

1. Code's last two digits

1. Refer to specific fault designation

2. Pinpoint exactly which component or circuit of system might be at fault and problem type



8. Students will be able to list the 2 kinds of failure types with 100% accuracy.

1. Hard failure

– Problem that is always present in a computer system

- Disconnected wire

2. Soft failure or intermittent failure

– Problem only occurs under certain conditions

3. General circuit failure

4. Low-input failure

5. High-input failure

6. Improper range/performance failure

1. Students will be able to identify data streams with 100% accuracy.

1. DataStream values or diagnostic scan values

– Produced by vehicle's computer

– Give electrical operating values of sensors, actuators, and circuits

– Values can be read on scan tool's digital display

– Compared to known normal values in service manual

2. Performed by triggering ECM's on-board diagnostic system with ignition key in on position but without engine running
 3. Allows access to any stored trouble codes
 4. Usually performed before key-on/engine-on diagnostics
 5. Wiggle test or "flex" test
 6. Many computer system failures, especially intermittent failures, caused by loose, dirty, or corroded connections
 7. If engine operation changes suddenly when connector or wire is flexed, problem located at or near that point
 8. Performed with engine running at full operating temperature
 9. Check condition of sensors, actuators, computer, and wiring while operating under normal conditions
 10. Involves activating various switches while using scan tool
 - To instruct which switch to move and monitor operation
 - Quickly indicate if switch works normally
 11. Uses scan tool to order vehicle's computer to energize specific output devices with engine on or off
 12. Lets you find out if actuators work
 13. Actuator diagnostic tests considered intrusive tests
 14. Actuator diagnostic tests might
 - Fire or prevent firing of ignition coil
 - Open and close fuel injectors
 - Cycle idle speed motor or solenoid
 - Energize digital EGR valve solenoids
 15. Scan tool will give readouts showing whether there is trouble with any actuators
10. Students will be able to identify why road testing with a scan tool is needed with 100% accuracy.
1. With a scan tool
 1. Check for problems while driving vehicle
 2. Most common methods include
 3. Grounding one of data link connector terminals with jumper wire and reading flashing code on dash-mounted check engine light

4. Connecting analog voltmeter to vehicle ground and to one terminal on the data link connector while jumping from pigtail (extra wire) to data link connector
5. Code produced by meter's needle movement
6. Simulate conditions present when trouble happens
2. Turning ignition key on and off several times within a few seconds and reading flashing code on dash-mounted check engine light
3. Pushing two dash-mounted climate control buttons at the same time and reading dash display
4. Refer to service manual for detailed instructions
5. Observe check engine light as it flashes on and off
6. Note analog voltmeter's needle as it deflects back and forth
7. Watch test light connected to data link connector flash on and off
8. Read digital display in climate control panel or driver's information center
9. Observe LED display on ECM's side

Trouble code No.	Code detecting condition	Trouble area
P0171	When the air-fuel ratio feedback is stable after engine warming up, the fuel trim is considerably in error on the RICH side.	<ul style="list-style-type: none"> • Air Intake (hose loose) • Fuel line pressure • Injector blockage • Heated oxygen sensor malfunction • Mass airflow meter • Engine coolant temperature sensor
P0171	When the air-fuel ratio feedback is stable after engine warming up, the fuel trim is considerably in error on the LEAN side.	<ul style="list-style-type: none"> • Fuel line pressure • Injector leak, blockage • Heated oxygen sensor malfunction • Mass airflow meter • Engine coolant temperature sensor

1. Erasing trouble codes or clearing diagnostic codes
 - Clears stored codes from computer memory after system repairs have been made
2. In most cases, codes automatically erase after 30–50 engine starts or warm-ups

Various methods used to erase trouble codes

1. Use a scan tool
2. Disconnect battery ground cable or strap
3. Unplug fuse to ECM

Assessment:

Students will receive 10 points for work sheet pages 132 to 134

23. Why does a scan tool require VIN information?

24. Why should you always correct the cause of the lowest number diagnostic trouble code first?

25. OBD II requires all auto manufacturers to use a set of _____ standardized _____ trouble codes.

26. What does the letter in all OBD II trouble codes represent?

27. What does the first digit of an OBD II trouble code indicate?

28. The second number in the OBD II code indicates the _____ of the system where the fault is located.

29. What do the last two digits of an OBD II trouble code indicate?

30. Define *hard failure*.

31. Define *soft failure*.

Name _____

For questions 32–35, match the following terms and identifying phrases.

- | | |
|--|---|
| <p>_____ 32. The circuit or component has a fixed value, no output, or an output that is out of specifications.</p> <p>_____ 33. Produces a voltage, current, or signal frequency below normal operating parameters.</p> <p>_____ 34. Results when the signal reaching the on-board computer has more voltage, more current, or a higher frequency signal than normal.</p> <p>_____ 35. Occurs when a sensor or actuator is producing values slightly lower or higher than normal.</p> | <p>(A) High-input failure</p> <p>(B) General circuit failure</p> <p>(C) Improper range/performance failure</p> <p>(D) Low-input failure</p> |
|--|---|

36. _____ produced by the vehicle's computer give electrical _____ operating values of sensors, actuators, and circuits.

37. How is the computer's key-on/engine-off diagnostics mode activated?

38. What should be done if you work in the key-on/engine-off diagnostic mode for over 30 minutes?

39. List the procedures used to perform a wiggle test.

40. What is the function of engine-on/key-on diagnostics?

41. A(n) _____ test involves activating various switches _____ while using a scan tool.

Energizing OBD I Systems without a Scan Tool

42. List at least two methods of activating the on-board diagnostics of a vehicle using an OBD I system without using a scan tool.

43. List five different ways to read computer trouble codes without the use of a scan tool.

(A) _____

(B) _____

(C) _____

(D) _____

(E) _____

44. Name the different ways trouble codes can be read on older vehicles.

45. Normally, trouble codes will be automatically erased after _____ engine starts or warm-ups.

- (A) 30-50
- (B) 50-60
- (C) 70-80
- (D) 80-90

46. Describe three methods used to erase trouble codes from the computer.
