

LAB – SCAN TOOL

AUTEL AL439

FOR 1996+ VEHICLES ONLY



Students: 1. _____ Date: _____
 2. _____ Block: _____

Fill in each box with the appropriate information.

Be sure to have the Instructor’s initials before moving on to the next step - these are there to ensure everything is SAFE and CORRECT. Each team member must be able to answer questions from your instructor to receive credit for this lab.

VEHICLE IDENTIFICATION			
Year:		Make:	
Model:		Mileage:	
VIN Number:			
SAFETY			
	<ul style="list-style-type: none"> • Always perform automotive testing in a safe environment. • Wear safety eye protection that meets ANSI standards. • Keep clothing, hair, hands, tools, test equipment, etc. away from all moving or hot engine parts. • Connect and run the SHOP EXHAUST SYSTEM to the vehicle when running • Put blocks in front of the drive wheels and never leave the vehicle unattended while running tests. • Use extreme caution when working around the ignition coil, distributor cap, ignition wires and spark plugs. These components create hazardous voltages when the engine is running. • Put the transmission in PARK (for automatic transmission) or NEUTRAL (for manual transmission) and make sure the parking brake is engaged. • NOTE the location of fire extinguishers. • Don't connect or disconnect any test equipment while the ignition is on or the engine is running. • Keep the scan tool dry, clean, free from oil/water or grease. Use a mild detergent on a clean cloth to clean the outside of the scan tool, when necessary. 		
STOP!!!	INSTRUCTOR’S INITIALS:		

DATA/DIAGNOSTIC LINK CONNECTOR

Somewhere around your knees you will find a connection port that looks like the one on the right.

Where is it in this vehicle?

Plug in the SCAN TOOL, and it should light up and turn on. You don't usually need the key on for this.

TWO TERMS YOU NEED TO KNOW:

KOEO – "Key On Engine Off"
Engine Running"

KOER – "Key On

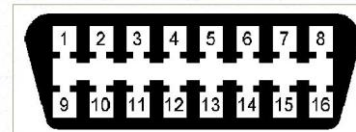
Once the SCAN TOOL in on, look for the icon to retrieve **DIAGNOSTIC TROUBLE CODES**

STORED CODES are where there is for sure a problem.

PENDING CODES are where the computer thinks there is a problem, but it might not be lingering enough to be an issue.

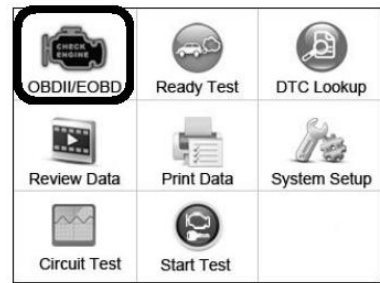
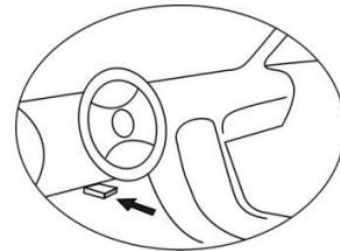
PERMANENT CODES are only on cars with "CAN Protocols."

What **CODES** are reported? (**DO NOT DELETE THEM YET**)



PIN	DESCRIPTION	PIN	DESCRIPTION
1	Vendor Option	9	Vendor Option
2	J1850 Bus +	10	J1850 BUS
3	Vendor Option	11	Vendor Option
4	Chassis Ground	12	Vendor Option
5	Signal Ground	13	Vendor Option
6	CAN (J-2234) High	14	CAN (J-2234) Low
7	ISO 9141-2 K-Line	15	ISO 9141-2 Low
8	Vendor Option	16	Battery Power

OBD-II Connector and Pinout



If the Scanner says **"Manufacturer Specific Codes Are Found!"** you will need to tell the scanner what the vehicle is.

STOP!!!

INSTRUCTOR'S INITIALS:

LIVE DATA

In "LIVE DATA" you can actually read what the computer is actually seeing. Here you can also record the data for later.

What you are seeing, are PIDs "Proportional-Integral-Derivative," which is a math calculation using sensors in order to make changes to the system. Math.

KOER (*Key On, Engine Running*)

Record the following data (it might have different names):

- **DTC-CNT:** _____
(Diagnostic Trouble Code Count)

- **ECT:** _____
(Engine Coolant Temp)

- **IAT:** _____
(Intake Air Temperature)

- **TP:** _____
(Throttle Position)

- **RPM:** _____
(Revolutions Per Minute)

- **Load_PCT:** _____
(Load Percent)

- **SHRTFT1 (&2):** _____
(Short Term Fuel Trim – "ADHD" of correction)

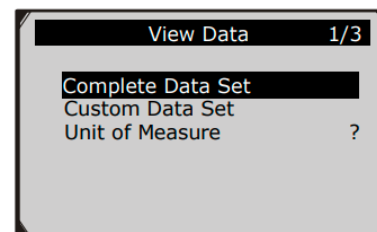
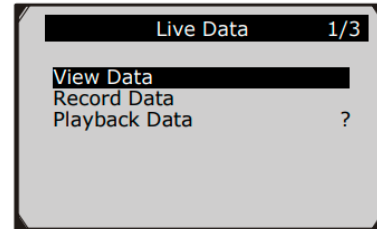
- **LTFT1 (&2):** _____
(Long Term Fuel Trim – "long haul" correction)

- **O2B1S1 (&B2S1):** _____
(O2 Voltage for tuning; LEAN < 0.47V (stoichiometric) < RICH)

- **O2B1S2 (&B2S2):** _____
(O2 Voltage for Emissions; LESS than O2B1S1 = GOOD)

- **MAP:** _____
(Manifold Absolute Pressure, 100kPa is atmosphere)

- **SparkAdv:** _____
(Spark Advance)



Live Data 6

DTC_CNT	0
FUELSYS1	0L
FUELSYS2	-- ?
LOAD_PCT (%)	0.0
ETC(°C)	-40
SHRTFT1 (%)	99.2

IF ANY OF THIS LIVE DATA CAN BE SHOWN AS A GRAPH, YOU WILL SEE A LETTER "G" WHEN IT IS HIGHLIGHTED.

<<< CIRCLE THE DATA THAT HAS A GRAPH

STOP!!!

INSTRUCTOR'S INITIALS:

I/M READINESS

I/M READINESS: This is testing and monitoring to see if the vehicle's Emission Controls are working correctly. Some vehicles require certain drive cycles or modes of operation to be completed before these tests check out ok. An I/M READINESS that says "NO" doesn't mean it's not working correctly, it just may not have completed the full test yet.

Go into READY TEST and wait for the computer to gather its data. Which ones have checkmarks??



Complete this screen with the information you see:

I/M Readiness	
MIL	IGN
DTC	Pd DTC
MIS	EVAP
FUE	AIR
CCM	O2S
CAT	HRT
HCAT	EGR

- ✓ "OK" -- Indicates that a particular monitor being checked has completed its diagnostic testing.
- ✗ "INC" -- Indicates that a particular monitor being checked has not completed its diagnostic testing.
- ⊘ "N/A" -- The monitor is not supported on the vehicle.

GREEN LED: All systems OK

YELLOW LED: Could mean you have a Stored or Pending Diagnostic Trouble Code (DTC), or Monitors have not finished their diagnostic testing.

RED LED: System is NOT OK, and must be repaired. This vehicle will not pass an Emissions Test until this is fixed.

STOP!!!

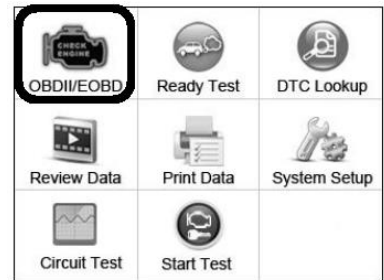
INSTRUCTOR'S INITIALS:

O2 MONITOR TEST (OBDII VEHICLES)

Go into OBDII section and select the **DIAGNOSTICS** Menu

Choose **O2 MONITOR TEST**

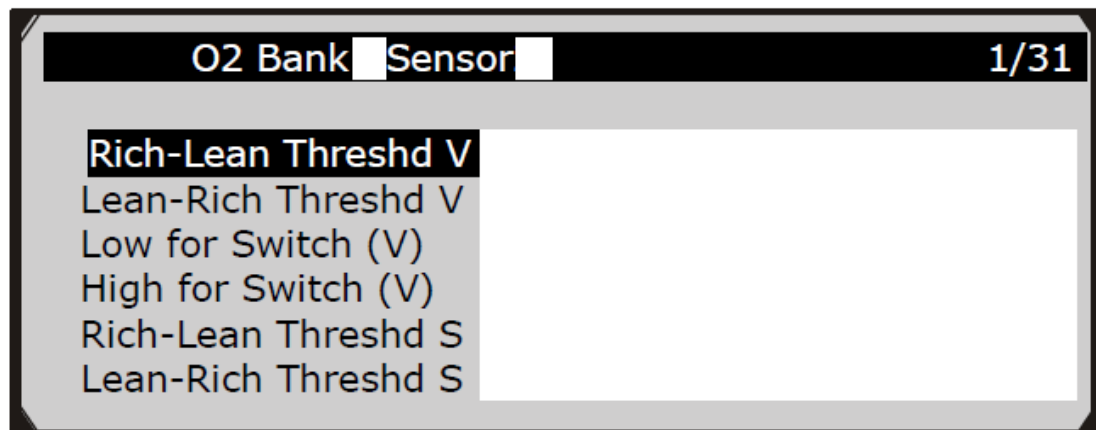
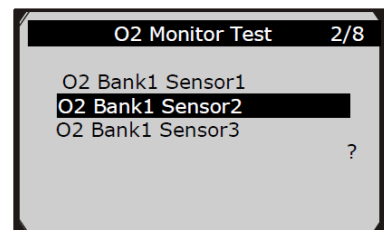
Select the **O2 Sensor** that you want to test, and click **OK**



**NOTE! YOUR VEHICLE
MIGHT NOT SUPPORT THIS MODE
(IT WON'T SHOW UP)**

JUST SKIP THIS AND MOVE TO NEXT SECTION

**Record the data you find in the
available sections:**

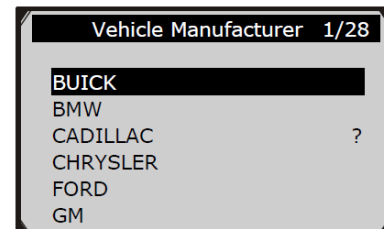


ON-BOARD MONITOR TEST

You can test only what Emission Component tests the car gives you to test.

From the **OBDII** section, go to the **DIAGNOSTICS** menu

Select **ON BOARD MON. TESTS**. You may be prompted to select the vehicle **MAKE**



(continued...)

Scroll through the available tests, and pick FOUR DIFFERENT MONITOR TESTS (ie: not ALL "O2" tests)

Write down what test you chose, and what the results were:

TEST	RESULT
_____	_____
_____	_____
_____	_____
_____	_____

On-Board Mon. Test 1/19

HO2S Monitor

HO2S Monitor
Catalyst Monitor
EVAP Monitor
EVAP Monitor
EVAP Monitor

On-Board Mon. Test 1/31

O2 Mon. B1S1

O2 Mon. B1S2
O2 Mon. B1S3
O2 Mon. B1S4
O2 Mon. B2S1
O2 Mon. B2S2

HO2S11 Voltage amplitu

ID	11
MOD	\$10
TEST(volts)	400 ?
MIN(volts)	1E1
MAX(volts)	-----
STS	OK

COMPONENT TESTS

The Component Test tells the on-board computer to perform its Leak Test of the EVAP (Evaporative Emissions) System.

This scan tool might not be successful in ENDING the test, so you may want to consult the Service manual (NOT the Owner's Manual) to find out how to end the test.

It is possible that the on-board computer does not let scan tools perform these tests. In which case, it will let you know.

What results (if any) did the scan tool give you?

What information should you provide to the Vehicle

Owner about your test results??

Component Test

Evap Leak Test

?

Component Test

Command Sent!

Press any key to con.

Component Test

The selected mode is not supported

Press any key to con.

STOP!!!

INSTRUCTOR'S INITIALS:

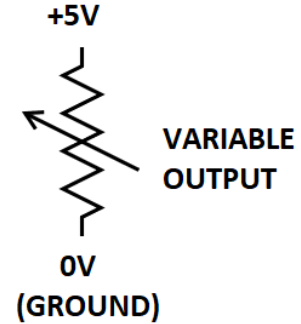
THROTTLE POSITION SENSOR TEST

This test requires that there is a functioning battery in the Scan Tool.

The Throttle Position Sensor (TPS) is the only way the computer knows what your foot is doing. It unfortunately doesn't last forever, and if it no longer gives the correct signal to the computer, you're going to have driveability issues.

Most TPS's have:

- 5V SOURCE *Not 5V? Signal WILL be faulty*
- Variable Signal *Could just be faulty*
- 0V GROUND *Not 0V? Signal WILL be faulty*



Typically, the SIGNAL wire will be the MIDDLE of the three.

Key ON, Engine OFF (KOEO)

From the Main Screen of the Scan Tool, select CIRCUIT TEST FUNCTION

Find DC VOLTAGE

BACK PROBE each outer TPS connection with a safety pin so it hopefully contacts the wire connection inside, and touch the RED probe to the safety pin, with the BLACK probe on the battery NEGATIVE Post. You should expect to see 5V

OUTER Wire 1

What did you measure?
Is this POWER or GROUND?



OUTER Wire 2

What did you measure?
Is this POWER or GROUND?



To test the sensor output, switch to AC VOLTAGE

BACK PROBE the middle TPS connection with a safety pin so it hopefully contacts the wire connection inside, and touch the RED probe to the safety pin, with the BLACK probe on the battery NEGATIVE Post. Move the throttle with your hand. It should display a smooth graph as you move the throttle smoothly

MIDDLE Wire

Sketch what you saw
Is it SMOOTH?

STOP!

INSTRUCTOR'S INITIALS!!!

STARTER TEST

This test merely measures the voltage that the battery drops to while the engine is cranking. It is a rough estimate of the condition of the Starting System.

The Starting System consists of the Battery, the Battery Connections (both + and -), the Battery Cables, and the Starter Motor. Faults in any of these components typically result in a LOW voltage reading during this test.

EITHER: Connect the Scan Tool to the **OBD port**

OR: connect the **Red** and **Black** test leads directly to the **Battery +** and **-** (respectively)

Go to **Start Test** from the main menu.

You should see the current Battery Voltage on the screen. I would expect it to be over 12V with the car NOT running.

Press **OK** and the Scan Tool will prompt you to start the engine. A cranking voltage **lower than 9.6V** is usually indicating a problem.

CIRCLE
the result
you got:

Decision	Action
CRANKING NORMAL	The starter voltage is normal and the starting system is OK. (Figure 8.3)
CRANKING ABNORMAL	The vehicle can't start and there is a problem with the starting system. Check the battery, connection, wiring and starter. (Figure 8.4)
CRANKING LOW	The starter voltage is low and you'd better check the starter system before a problem happens. (Figure 8.5)
CHARGE BATTERY	The starter voltage is low and the battery is discharged. Fully charge the battery and retest the starter system. (Figure 8.6)
NO START	If you didn't start engine to continue the test, the scan tool wait for two minutes and abort the test. (Figure 8.7)

STOP!

INSTRUCTOR'S INITIALS!!!

CHARGING TEST

This test merely measures the voltage that the Charging System provides to the battery while the engine is running. It is a rough estimate of the condition of the Charging System. Most Charging Systems produce upwards of 14.5V while cruising at about 2000rpm.

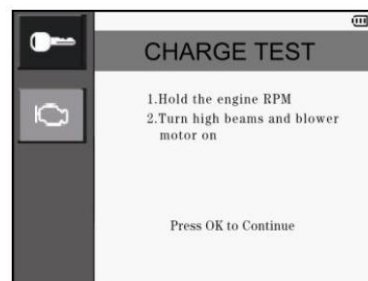
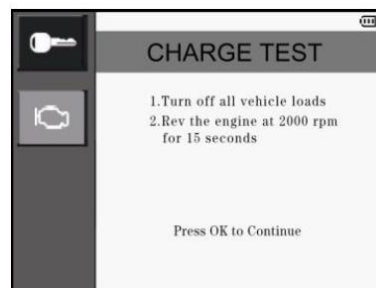
The Charging System consists of the Battery, the Battery Connections (both + and -), the Battery Cables, and the Alternator. Faults in any of these components typically result in LOW or NO charging voltage reading during this test.

EITHER: Connect the Scan Tool to the **OBD port**

OR: connect the **Red** and **Black** test leads directly to the **Battery +** and **-** (respectively)

Go to **Start Test** from the main menu, and select **Charge Test**.

Press **OK** and follow the prompts on the Scan Tool.



CIRCLE the result you got:

Based on your test results, what do you need to tell the owner of this vehicle?

Decision	Action
NORMAL	The charging system is showing normal output. No problem detected. (Figure 8.12)
LOW OUTPUT	<p>There is a problem with the charging system. The alternator is not providing enough current to power the system's electrical loads and charge the battery. (Figure 8.13)</p> <ul style="list-style-type: none"> ❖ Check the belts to ensure the alternator is rotating with the engine running. Replace broken or slipping belts and retest. ❖ Check the connections from the alternator to the battery. If the connection is loose or heavily corroded, clean or replace the cable and retest.
HIGH OUTPUT	<p>There is a problem with the charging system. The voltage output from the alternator to the battery exceeds the normal limits of a functioning regulator. (Figure 8.14)</p> <ul style="list-style-type: none"> ❖ Check to ensure there are no loose connections and that the ground connection is normal. ❖ If the connection is OK, check the regulator. <p>NOTE: Most alternators have a built-in regulator requiring you to replace the alternator. In older vehicles that use external voltage regulators, you may need to replace only the voltage regulator.</p>
EXCESSIVE RIPPLE	<p>One or more diodes in the alternator aren't functioning or there's stator damage, which is shown by an excessive amount of AC ripple current supplied to the battery. (Figure 8.15)</p> <ul style="list-style-type: none"> ❖ Make sure the alternator mounting is sturdy and that the belts are in good shape and functioning properly. ❖ If the mounting and belts are good, check the alternator.

STOP!

INSTRUCTOR'S INITIALS!!!