

LAB – SCAN TOOL

KINGBOLEN S600

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 done PROPERLY, SAFELY and CORRECTLY. 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:			
SYSTEMS AND SERVICING			
	<p>This scan tool can talk to:</p> <p>ABS – Antilock Brake System SRS – Supplemental Restraint System ECM – Engine Control Module TCM – transmission Control Module</p>		
	<p>This scan tool can service:</p> <p>OIL – Reset oil change service interval BRAKE – Reset Brake Pad service life monitor SAS – Reset Steering Angle Sensor when servicing the steering system ETS – Reset Electronic Throttle System to default state after servicing BMS – Test and Reset Battery Management System when changing batteries DPF – Reset Diesel Particulate Filter when servicing TPMS – Reset Tire Pressure Monitoring System when changing/rotating tires BLEED – Opens and closes the ABS valves to properly bleed Anti-Lock Brake Systems</p>		

SAFETY

SAFETY FIRST!

- Always perform automotive testing in a safe environment.
- Wear safety eye protection that meets CSA/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.

DATA/DIAGNOSTIC LINK CONNECTOR

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

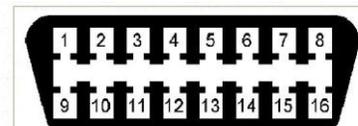
Where is it in this vehicle?

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

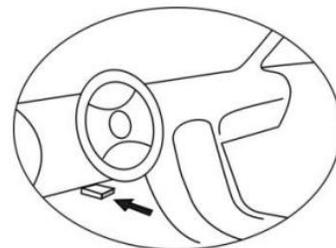
TWO TERMS YOU NEED TO KNOW:

KOEO – "Key On Engine Off"

KOER – "Key On Engine Running"



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



STOP!!!

INSTRUCTOR'S INITIALS:

CODES, DATA, PIDS

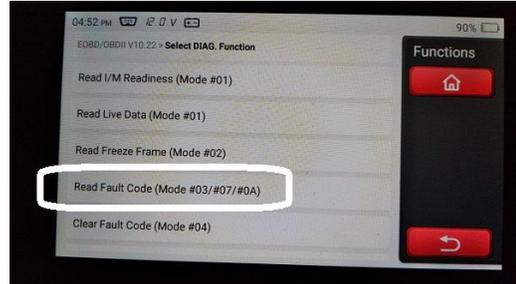
Hit **[ENTER]** at each module to explore "**READ FAULT CODE**," as well as watch "**LIVE DATA**" and in some cases **ACTUATE** specific **TESTS**.

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 a real issue.

PERMANENT CODES are only on cars with "CAN Protocols" (*CAN-Bus started showing up around 2008 in North America*)

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



(Student Record So Far: 15 codes!)

If the Scanner says "**Manufacturer Specific Codes Are Found!**" you will need to tell the scanner who the Manufacturer is (Ford, Chevy, etc) in order for it to know how to read them.

STOP!!!

INSTRUCTOR'S INITIALS:

LIVE DATA MODE

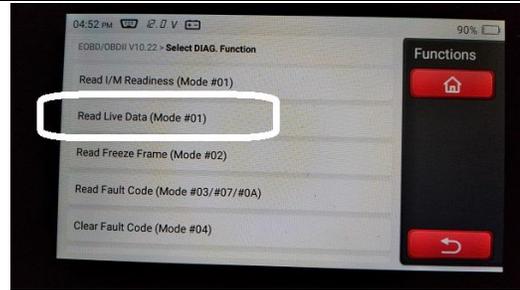
Select "**READ LIVE DATA MODE (DATA STREAM)**" so you can actually read what the computer is actually seeing. **You can also record the data for later.**

What you are seeing, are PIDs "**Parameter IDentification**" - the INPUTS from sensors the computer looks at to make changes to the system.

Have the vehicle "**KEY ON, ENGINE RUNNING**" (KOER)

NOTE: NOT ALL MANUFACTURERS OR VEHICLES GIVE YOU THE SAME (OR ALL) PIDS

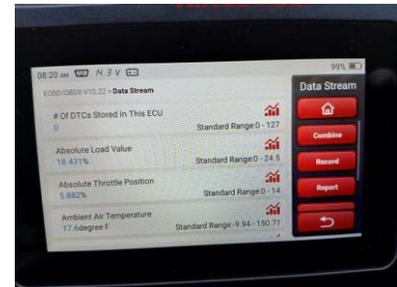
NOTE: NOT ALL SCAN TOOLS WILL SEE THE SAME (OR ALL) PIDS



- **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 – roughly the % filling of the cylinder)
- **SHRTFT1 (&2):** _____
(Short Term Fuel Trim – "ADHD" 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, less is "vacuum")
- **LOAD:** _____
(Percent cylinder filling)
- **SparkAdv:** _____
(Spark Advance – this fluctuates to maintain a stable idle)

<<< This is done **KOER**
(Key On, Engine Running)

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



IF ANY OF **^^^THIS^^^** LIVE DATA CAN BE SHOWN AS A GRAPH, YOU WILL SEE A GRAPH SYMBOL. CHECK AND SEE! vvv



Throttle-Position vvv

<<< **CIRCLE THE DATA THAT HAS A GRAPH**

STOP!!!

INSTRUCTOR'S INITIALS:

VACUUM TEST

This is not an actual "Feature" of the scan tool per se, but something you use to get an insight into the condition of your engine.

On the "LIVE DATA" screen, select the **MAP** – it should have a "G" to the right of it – this means it can show you a **GRAPH**. No **MAP** listed? You could probably use **LOAD**. Use the **RIGHT ARROW** to go into **GRAPH** mode. Make sure the units are METRIC, that is – measuring Atmospheric Pressure in kPa (KiloPascals), **not** PSI (Pounds per Square inch)

IDLE TEST

Record the **IDLING** manifold pressure (expected: 25-35kPa)

CHECK [✓] the needle movement:

- [] **STEADY** and 25-35 – Most engines typically idle here, this is "normal"
- [] **STEADY** and 35-45 – Engine may have an Ignition Timing problem
- [] **STEADY** and 45-65 – Engine may have late Valve Timing (timing chain jumped?)
- [] **STEADY** and >65 – Engine may have a significant intake manifold leak
- [] **FLUCTUATING** – Engine may have a mechanical problem (burned valve?)

SNAP TEST

SNAP the throttle wide open but **DO NOT LINGER – DO NOT HIT OR BOUNCE OFF THE REV LIMITER!** (**VERY BAD** for an engine). Try to hit 85kPa or higher.

Highest Number you hit: _____ kPa (expected: >85kPa)

Lowest Number it rebounded to: _____ kPa (expected: >IDLE)

CHECK [✓] the needle movement:

- [] **RETURNS** to about 5kPa or more below IDLE reading –this is "normal"
- [] **RETURNS** to idle reading – Engine may have weak rings
- [] **STAYS AT 100kPa** – You just blew up your engine

CRUISE TEST

Slowly increase the **ENGINE SPEED** to about **3000rpm** (cruising speed on the highway). Record the **CRUISE** manifold pressure (expected: >IDLE)

CHECK [✓] the needle movement:

- [] **STEADY** and > IDLE – this is "normal"
- [] **DROPPING WHILE ACCELERATING** – Engine may have plugged exhaust

This has traditionally been done with a VACUUM GAUGE, but many modern engines do not always provide a convenient place to connect the gauge

100kPa is FULL Atmosphere Pressure (ZERO Vacuum)

0kPa is ZERO Atmosphere (COMPLETE Vacuum) Outer Space?

STOP!!!

INSTRUCTOR'S INITIALS:

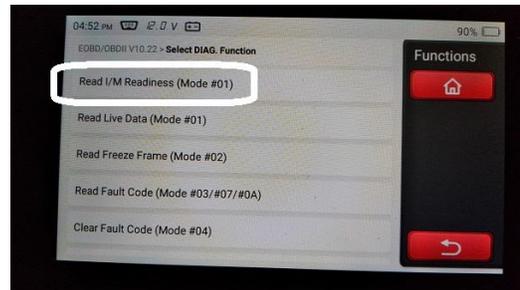
READ I/M READINESS

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 is NOT completed does not mean it's broken, it means it just hasn't completed its full test yet.



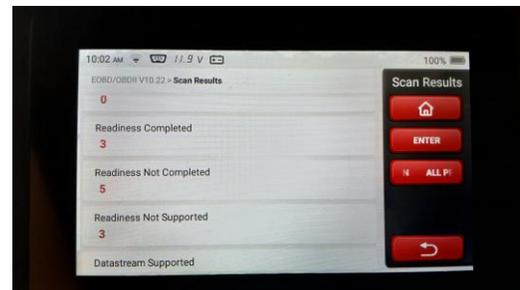
This might be through **DIAGNOSTICS** on the front screen with the colored squares, or through **OBD & IM** once you're in Diagnostics (*depends on the vehicle*)

Go into **READ I/M READINESS** and wait for the computer to gather its data.



If you have recently been driving and the engine has not been shut off, all Emission tests should have been completed.

The image shown to your right was taken from a car that had not been running and had not completed all its tests:



Go into **READINESS COMPLETED** and list the tests that have been completed:

Go into **READINESS NOT COMPLETED** and list the tests that have NOT been completed. Record "N/A" if there are NO unfinished tests (ie: ALL are finished).

Tests That Cannot Complete indicate a problem and must be repaired. This vehicle will not pass an Emissions Test until this is fixed.

STOP!!!

INSTRUCTOR'S INITIALS:

ON BOARD MONITORING TEST (MODE #06)

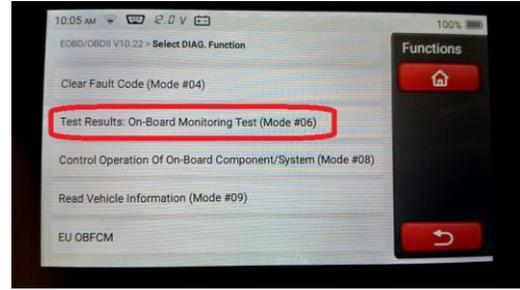
For this, you will need the engine running, and preferably has attempted to complete the I/M Readiness Tests.

From the **MAIN MENU**, go into **DIAGNOSTICS** and scroll down and click:

"TEST RESULTS: ON-BOARD MONITORING TEST (MODE #06)"

MODE #06 shows the results of automated "on-board" tests that the computer does to look, test, and ensure, that emission control components and systems are working properly.

This is a good place to be when you are trying to diagnose a problem – it will show you where the vehicle tests have specifically failed.



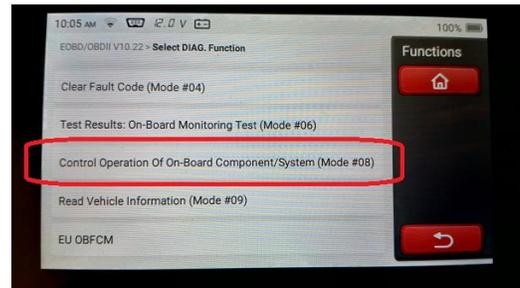
CONTROL OPERATION OF ON-BOARD COMPONENT/SYSTEM (MODE#08)

For this, you will need the engine running.

MODE #08 allows you to actually perform (or "force") some of the tests that the computer does. Only "Bi-Directional" scan tools can do this.

This allows you to look at and test **WHY** a component/system test failed. You can follow the computer's signal and measurements and find out "who dropped the ball."

IF your car allows this feature, pick **FOUR** tests, and have it perform the tests. Record what it gives you (some results might be weird gobbled-gook code that you will need the **Factory Service Manual** (Google: **FSM**) to decode. Get **EXTRA** marks if you decode what it says:



1. Test: _____ Results: _____

2. Test: _____ Results: _____

3. Test: _____ Results: _____

4. Test: _____ Results: _____

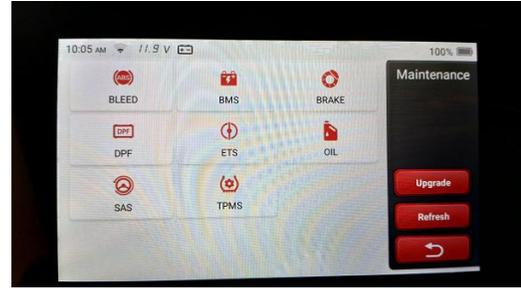
STOP!!!

INSTRUCTOR'S INITIALS:

MAINTENANCE

THIS PART IS OPTIONAL IT DEPENDS ON WHAT YOU NEED TO DO

This scan tool has the wonderful ability to set or reset various **MAINTENANCE** items of your vehicle.



When **BLEEDING BRAKES**, cars with Antilock Brakes Systems (ABS) need to be able to access/activate the ABS system to properly bleed the brakes. Poke around in here to do this.

When **REPLACING A BATTERY**, some modern cars "adjust" things based on the aging of the battery. When you install a fresh battery, you need to reset the computer's "adjustment" so it knows it actually has a new and fresh battery. Not doing so may cause your new battery to die prematurely. Poke around here to do this

When **SERVICING BRAKES**, some cars have sensors to let you know that your brakes are worn out. This may need to be reset when doing a brake job. Poke around here to do this.

DIESEL ENGINES have a service indicator that must be reset when changing the Diesel Particulate Filter (DPF). Poke around here.

ELECTRONIC THROTTLE SYSTEM may need resetting after servicing. Any change, and you need to "reset" where the throttle's reality is.

OIL CHANGES will need the service interval indicator reset so it can warn you the next time the oil needs to be changed.

STEERING ANGLE SENSOR is part of the power steering system – when servicing, you may need to remind the system where "straight ahead" is.

TIRE PRESSURE MONITOR SYSTEM will need to be reset when sensors are changed, or when wheels get rotated around the vehicle.

WHAT OPTIONAL FEATURES DID YOU PLAY WITH?

CONCLUSION

WHAT USEFUL INFORMATION CAN YOU TELL THE OWNER ABOUT THEIR VEHICLE?

STOP!

INSTRUCTOR'S INITIALS!!!