
DIAGNOSTICS
Using OBD II
WITH ANDREW FISCHER
WTI
WORLDPAC Training Institute
TST
SEMINARS

Resources:

rlescalambre.net

motorcraftservice.com

FORD SERVICE INFO

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Register Today

Have a Discount Code?

Have Registration Code?

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Home | Service Info | Training | Key Code | Diagnostic Tool Support ▾ | Free Resources ▾

- OBDII Theory & Operation
- Owner Information
- Instruction Sheets
- Paper/CD Manuals
- Quick Guides
- Tools & Equipment
- Reference Guides (includes Rescue Cards)
- Towing & Loading

FORD SERVICE INFO

Home | Service Info | Training | Key Code | Diagnostic Tool Support | Free Resources

OBDII Theory & Operation

The general descriptions (below) provide an overview of the OBD system used on Ford, Lincoln and Mercury vehicles since 1996.

To find the specific items listed here, you will need a Workshop Manual subscription which contains the PC/ED Manual.

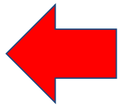
Look in Section 1 of the PC/ED Manual to find:	• Description and operation of the OBD monitors including parameters being monitored, malfunction thresholds, enable criteria, execution frequency and duration for each monitor • OBD parameters that deviate from the typical parameters • Systems, components, or parts causing indicator light to illuminate • Interpreting "mode 6" data • Information to identify and diagnose other systems or components • Multiplex interactivity information
Look in Section 4 of the PC/ED Manual to find:	• OEM-specific DTCs (i.e., P1XXX codes) • Diagnostic Trouble Codes relating to the monitor
Look in Section 5 of the PC/ED Manual to find:	• Trouble shooting guides or trouble shooting information

OBD-II System Summary for Ford/Lincoln/Mercury

Look up Your Vehicle

Select Your Year

Select Your Model

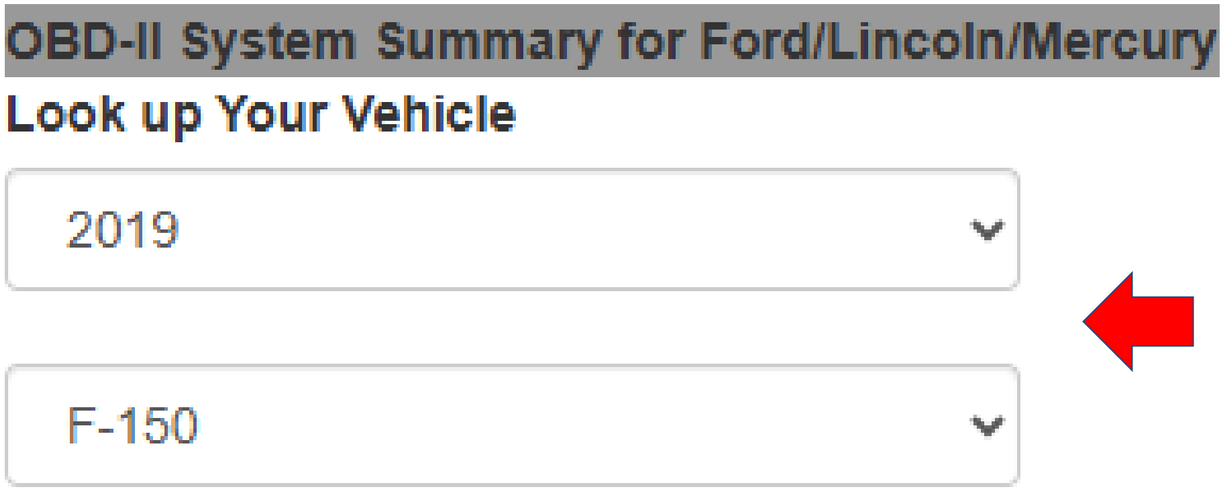


or

Enter Your VIN

Find My Vehicle | Reset

Resources:


OBD-II System Summary for Ford/Lincoln/Mercury
Look up Your Vehicle
2019
F-150

Resources:

OBD-II System Summary for Ford/Lincoln/Mercury

OBD Operation Summary for Diesel - MY 2019

OBD Operation Summary for Gasoline - MY 2019

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Scan Tools


TOPDON
10:12 PM
Diagnostics
IMMO
Maintenance
Update
Folder
Library
Tester
User Info
UltraDiag


ZEUS
Snap-on


Diagnostics
Service
Remote Expert
DVI
ADAS
Measurement
Data Manager
Update
AUTEL


X-431 TurboIII
SCAN VEHICLE
LAUNCH

Build A Process

Diagnostic Process

- Vehicle is pushed, pulled, or driven into the service bay.
- A battery maintainer is installed on the vehicle.
- A full system scan is performed. All modules. Record/saved.
- If monitor readiness is not pulled on the pre-scan this is done and documented.
- Freeze frame failure is retrieved if available and documented.
- The vehicle's battery is tested. This is often overlooked.
- Look up any related TSB's
- Fluid level's checked
- A test drive is performed if it is driveable.

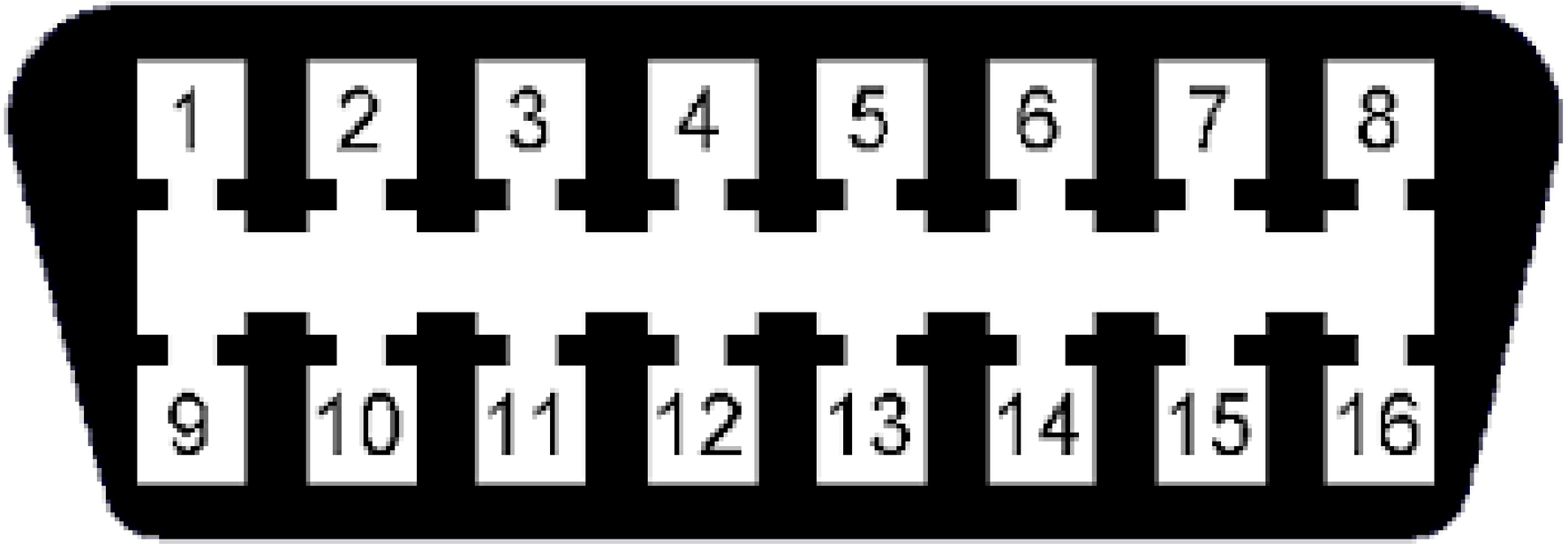
Why OBD2?

Why was OBD2 introduced?

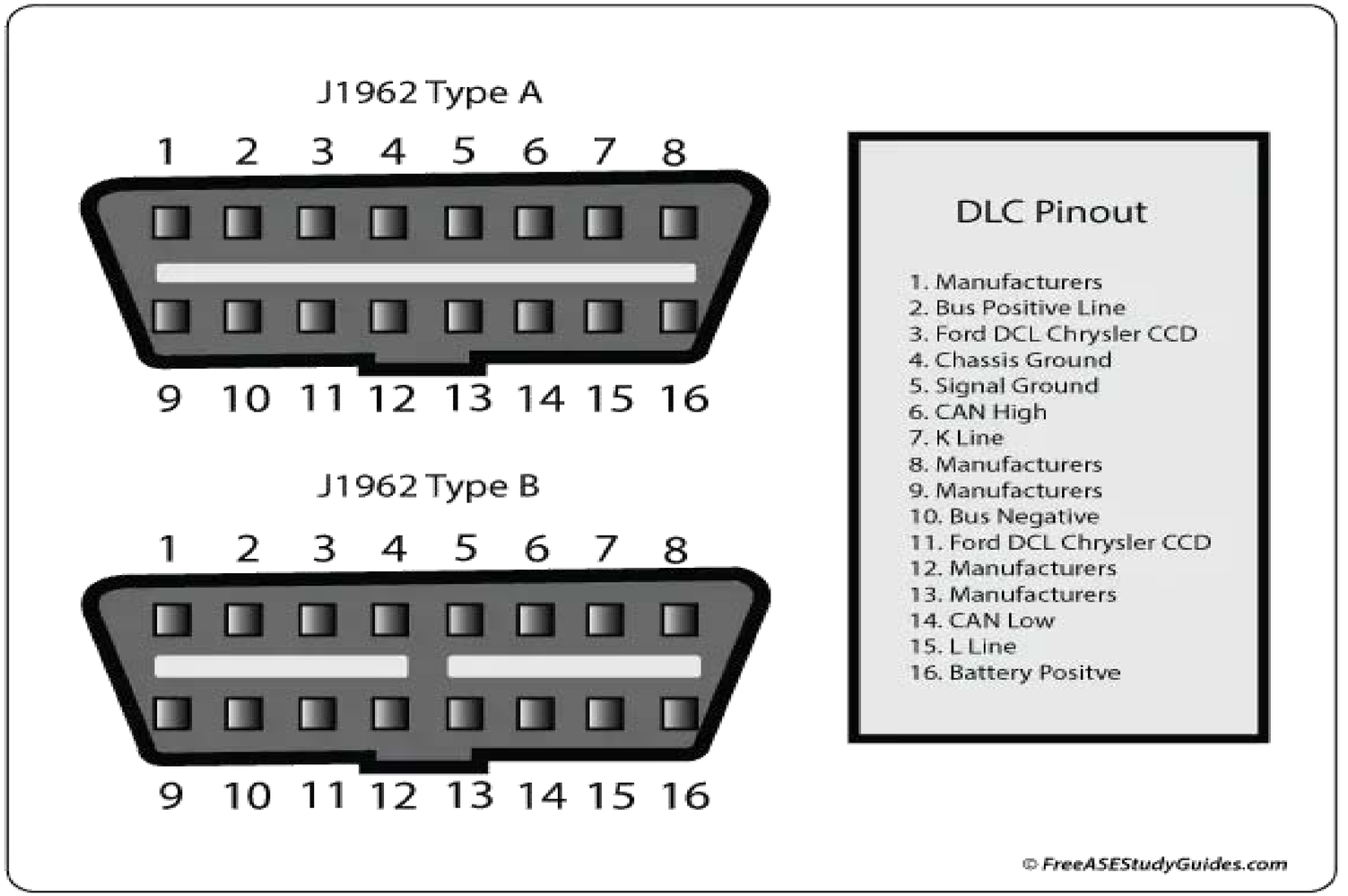
Standardization

- Same DLC (data link connector)
- Code definitions and meanings
- Data Display
- Monitors

SAE J-1962



Most Common DLC PINS



OBD Modes

10 Modes of Operation

Understanding these modes and their functions help with:

- No Code Runability Conditions
- Pending Failures
- Repair Verification
- Software Updates
- Recent Code Clearing Events
- So much more

OBD Modes

MODE $01: Readiness Monitor Status and Parameter Identification (PID)

MODE $02: Freeze Frame Data (FFD)

MODE $03: Emissions Related Diagnostic Trouble Code (DTC)

MODE $04: Clear/Reset Emissions Related Data

MODE $05: Oxygen Monitors Test Results

MODE $06: Onboard Monitoring Test Results

MODE $07: Two Trip Pending DTC

MODE $08: Request Control of On-Board Component

MODE $09: Request Vehicle Information

MODE $0a: Permanent Diagnostic Trouble Codes

OBD Modes Objectives

What does this mean for us in the service bay?

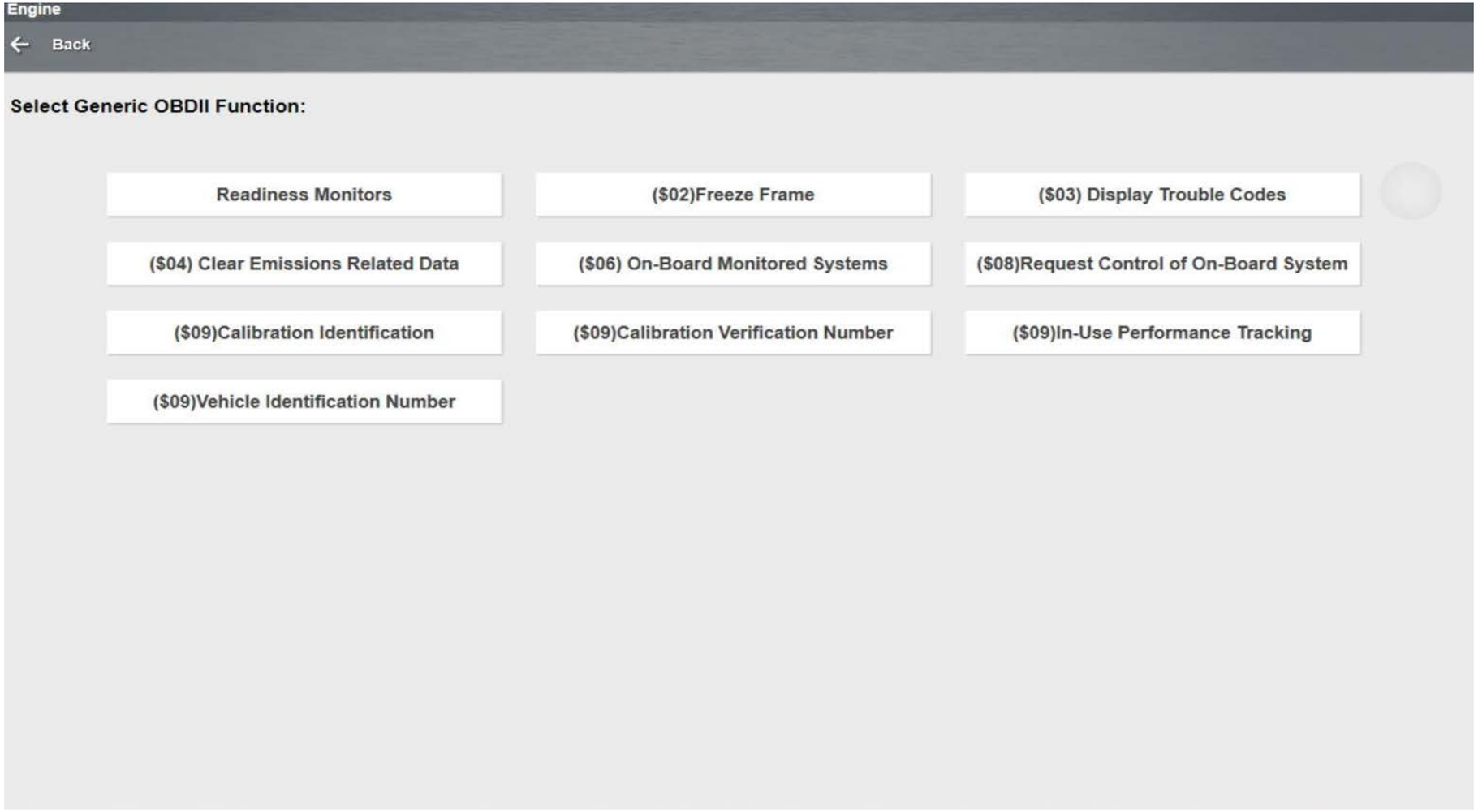
What can we use all of this for?

Can this all be utilize for our day to day runability concerns?

Can the Global side be used for primary diagnostics?

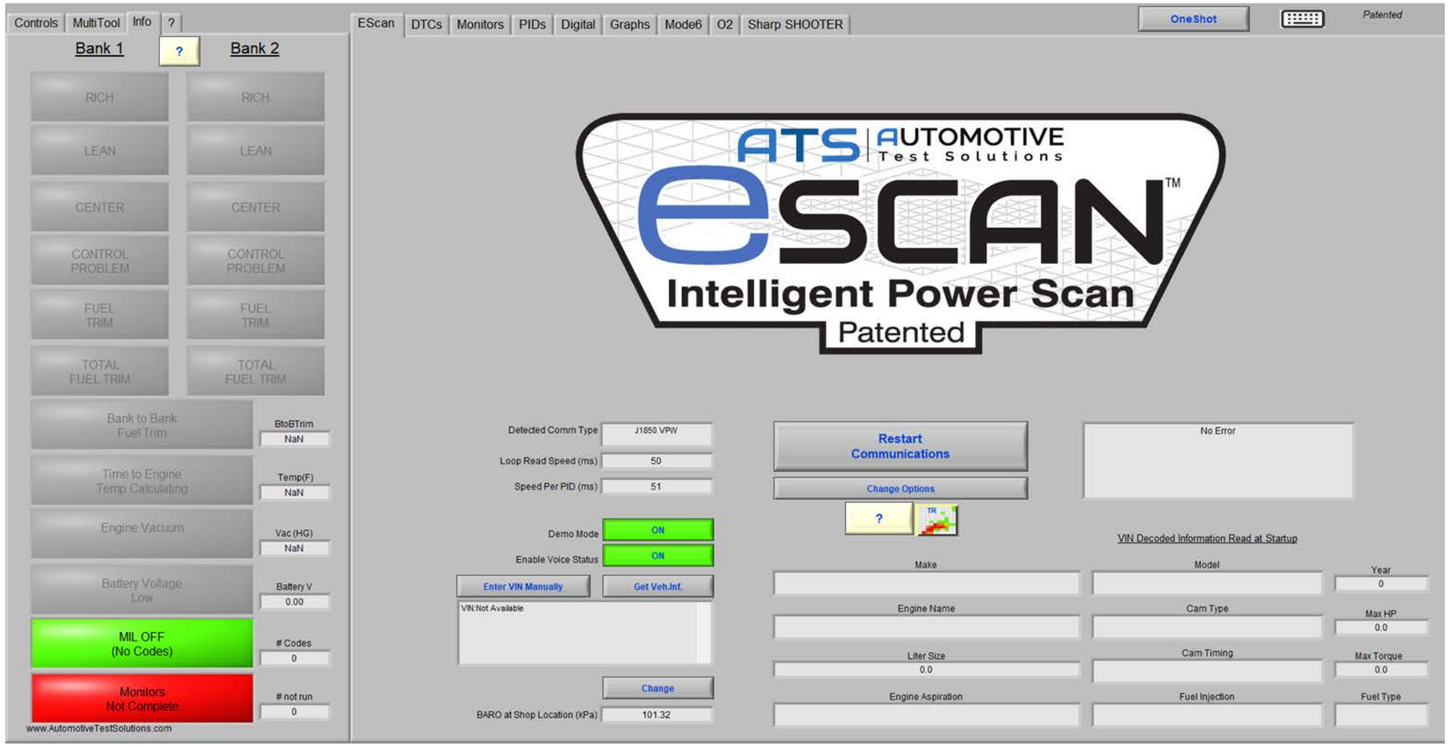
Is there a benefit in using Global over the Enhanced side of the scan tool?

OBD Modes, Not All Modes Given

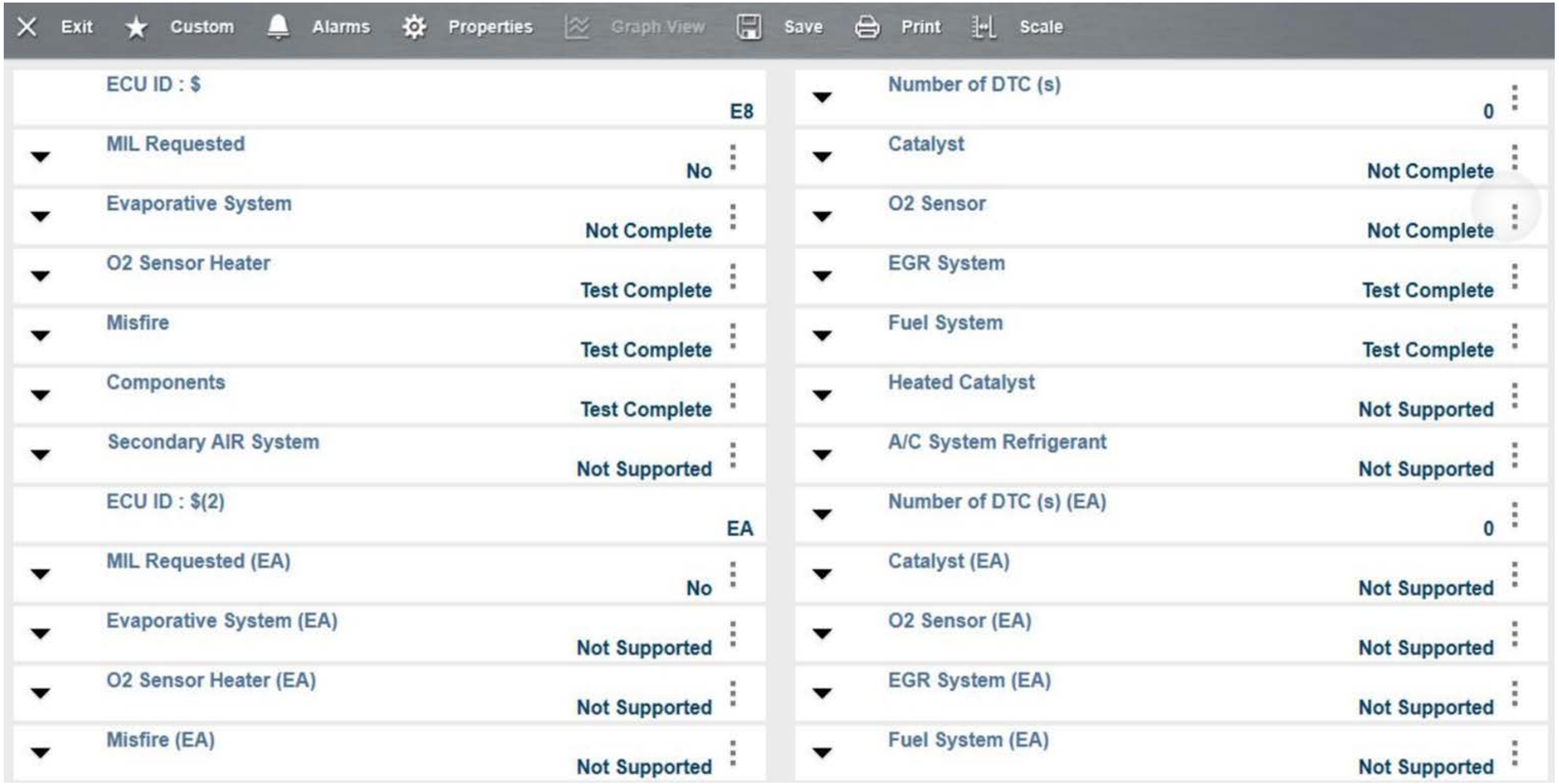


Global/OBD Layout

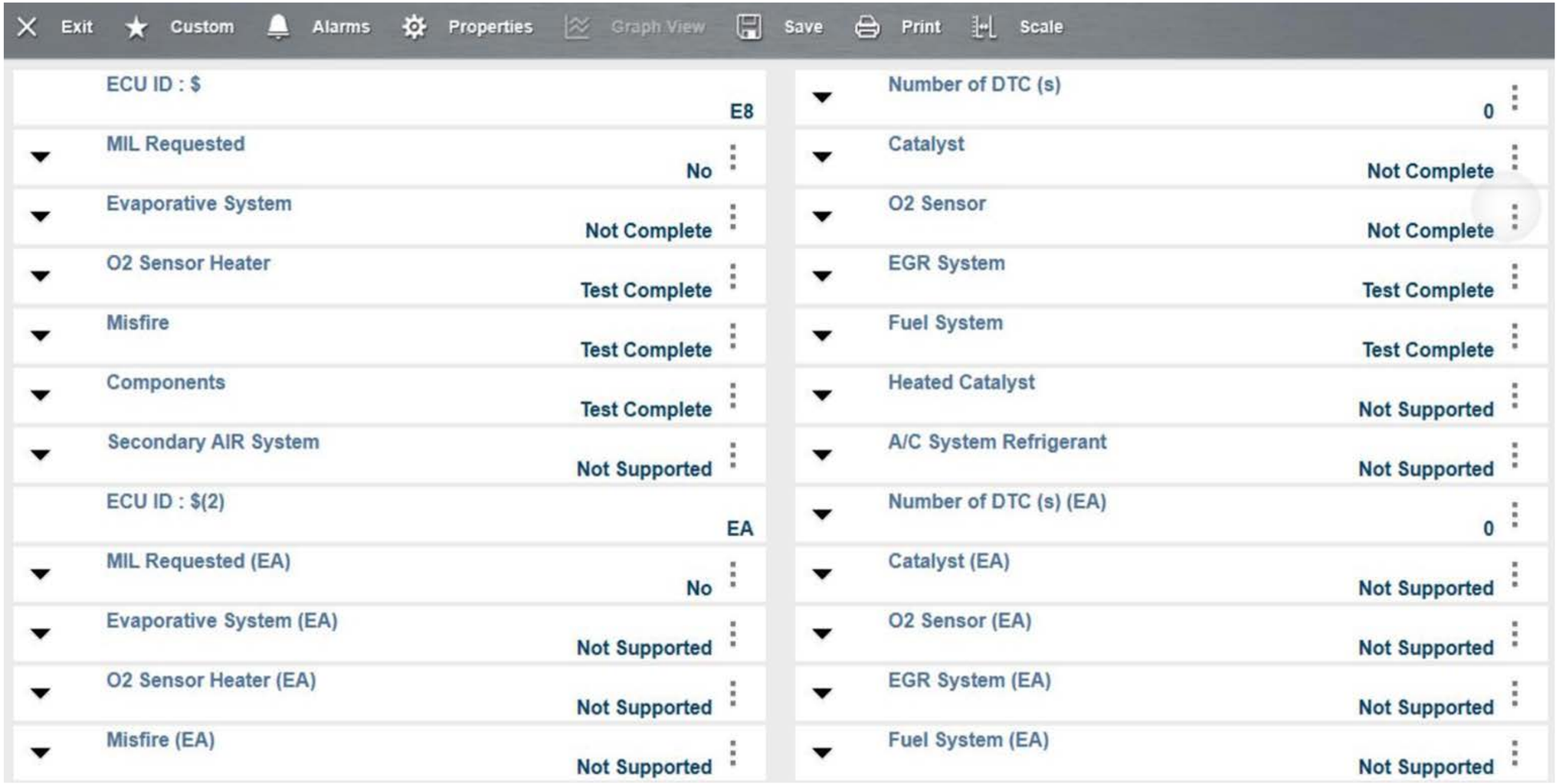
Global/OBD Layout



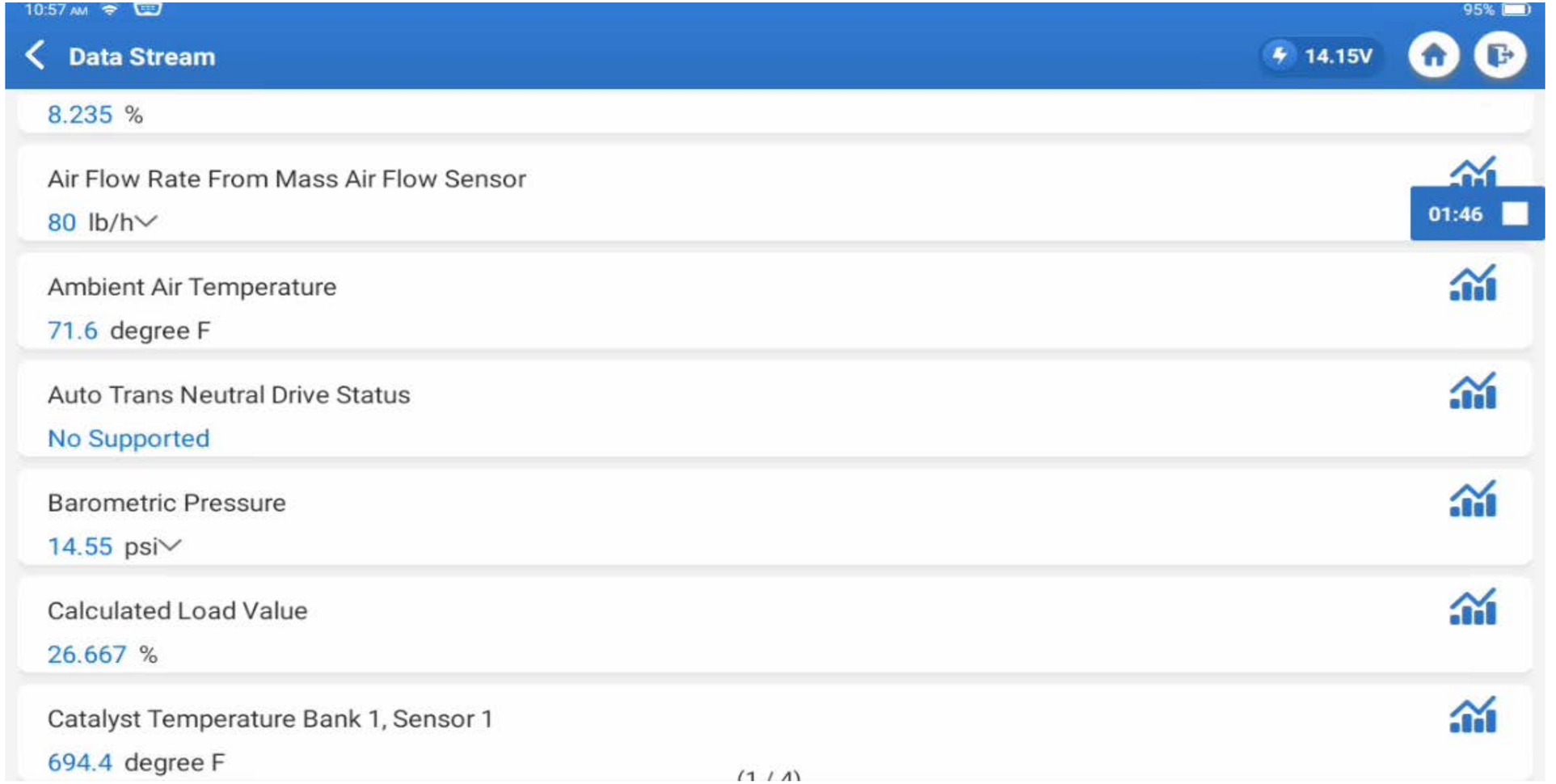
MODE $01


Exit
Custom
Alarms
Properties
Graph View
Save
Print
Scale
ECU ID : $
E8
MIL Requested
No
Evaporative System
Not Complete
O2 Sensor Heater
Test Complete
Misfire
Test Complete
Components
Test Complete
Secondary AIR System
Not Supported
ECU ID : $(2)
EA
MIL Requested (EA)
No
Evaporative System (EA)
Not Supported
O2 Sensor Heater (EA)
Not Supported
Misfire (EA)
Not Supported
Number of DTC (s)
0
Catalyst
Not Complete
O2 Sensor
Not Complete
EGR System
Test Complete
Fuel System
Test Complete
Heated Catalyst
Not Supported
A/C System Refrigerant
Not Supported
Number of DTC (s) (EA)
0
Catalyst (EA)
Not Supported
O2 Sensor (EA)
Not Supported
EGR System (EA)
Not Supported
Fuel System (EA)
Not Supported

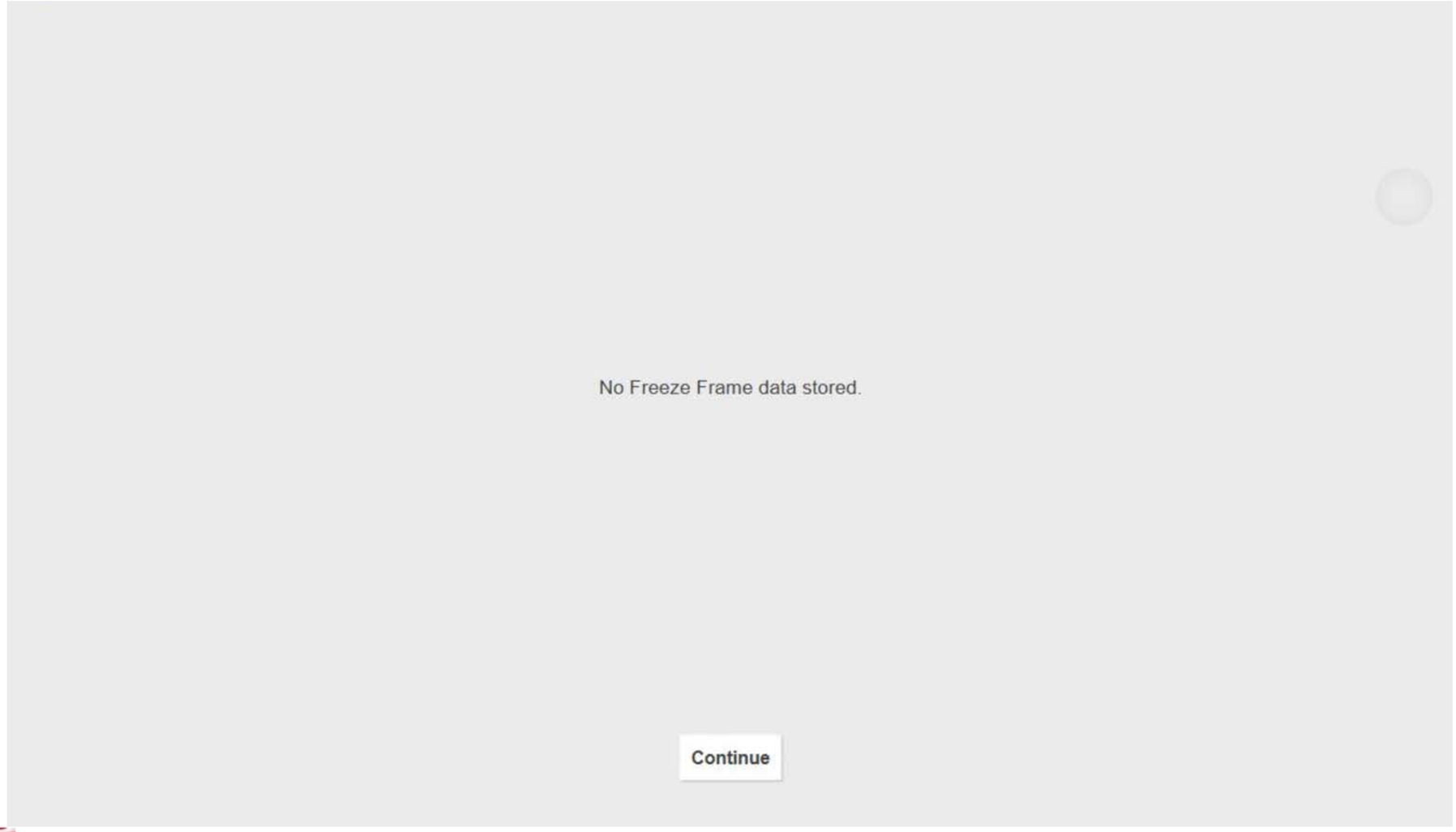
MODE $01 Monitors



MODE $01 Data PIDs



MODE $02 Freeze Frame



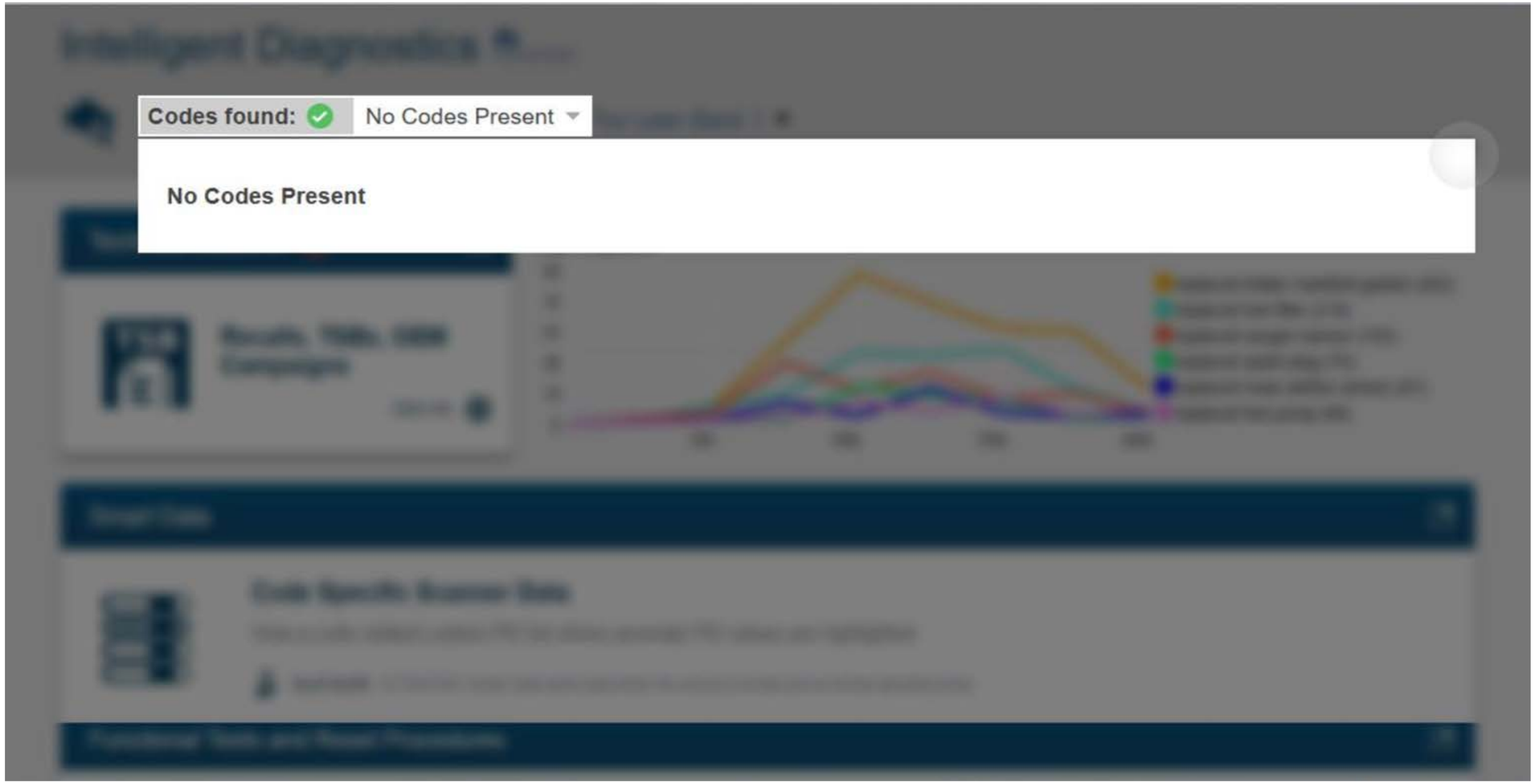
MODE $02 Freeze Frame

SAE J1979 Mode 2 (Service $02)

OBD-II diagnostic service that requests powertrain freeze frame data, displaying a snapshot of sensor values at the specific time a diagnostic trouble code (DTC) was set.

It allows for diagnosis of emission-related faults by providing a "snapshot" of operating conditions like RPM, load, and temperatures.

MODE $03 Emissions Related DTC's



Vehicle System Report

2009 BMW 3-Series (E90/E91/E92/E93)

VIN
WBAPK73519A454318

Created
June 3, 2025 4:22 PM

Thanks for visiting us. Below is a report that highlights any potential issues on your 2009 BMW 3-Series (E90/E91/E92/E93).

DIAGNOSTIC HEALTH SCAN

A check of all available systems on your vehicle was made.

Needs Attention

- Engine (DME/DDE)
- Transmission (EGS)
- Antilock Brakes (ABS/ASC/DSC)
- Airbag (MRS/ACSM)
- Footwell Module (FRM)
- Gateway (GW)
- Instrument Panel (KOMBI)
- Junction Box Electronics (JBE)
- Rain Light Sensor (RLS)
- Roof Function Centre (FZD)
- Transfer Box (VGS)
- Telematics Control Unit (TCU)
- User Interface / Radio
- OBDII (Engine)

Enhanced Codes

CODE SCAN RESULTS
Systems Analyzed: 23

⚠ Systems w/ Codes

Engine (DME/DDE)

2E85	Electric Water Pump, Communication
2A87	VANOS Outlet, Mechanical
2F9E	Thermal Oil Level Sensor
2E9F	Oil State Sensor
2D16	Air Mass Meter, Signal
2D0F	Hot Film Air Mass Sensor , Signal
2D5A	Monitor, Engine Torque Limit
2E8D	Intelligent Battery Sensor, Signal Transmission
2E83	Electric Water Pump, Reduced Power Operation
2DEC	Power Management, Battery Monitor

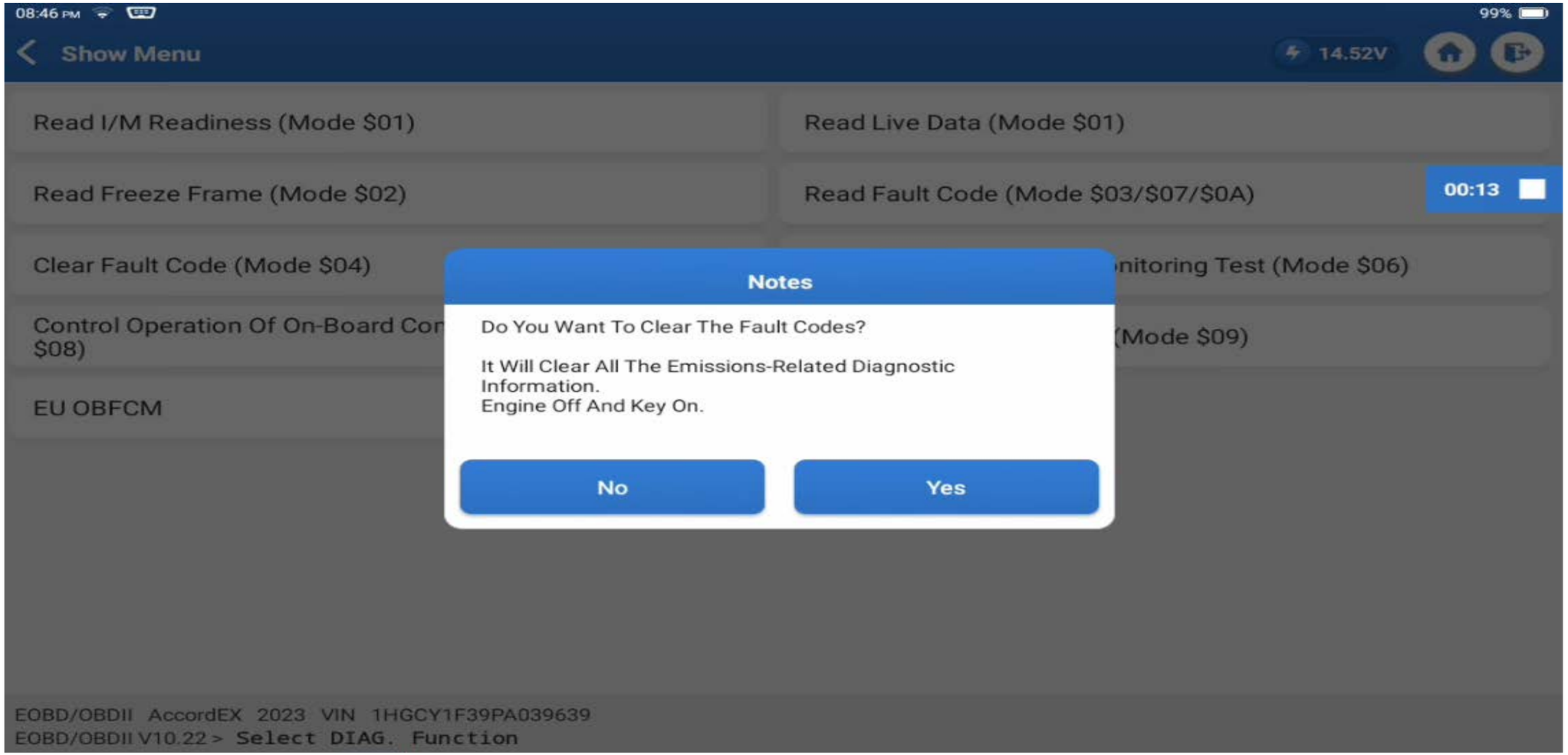
Global OBD Codes

OBDII (Engine)

P0015 'B' Camshaft Position - Timing Over-Retarded (Bank 1)

P116E Manufacturer Specific

MODE $04 Clear Emissions Related Data

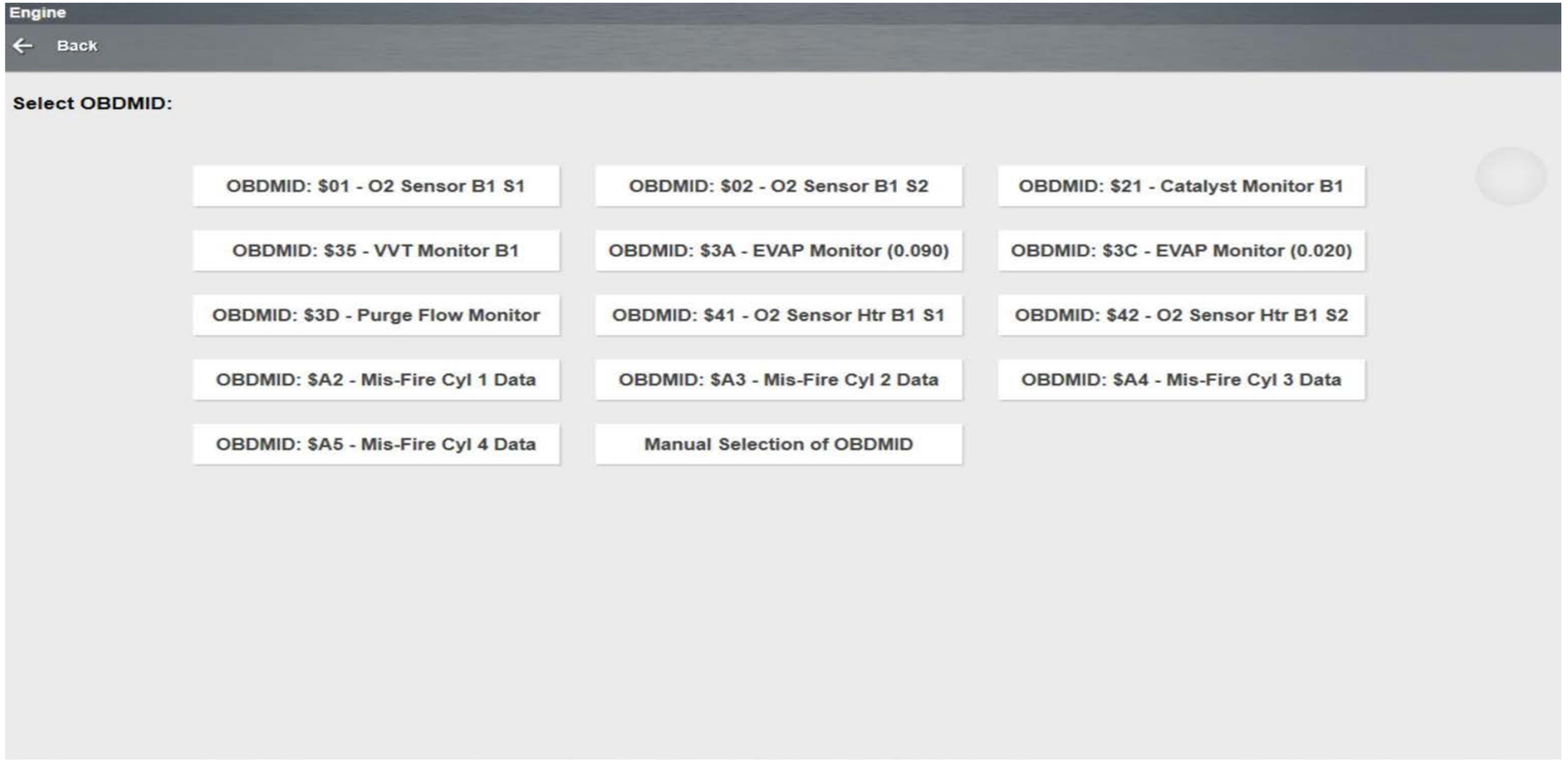


Mode $05 Oxygen Sensor Monitoring

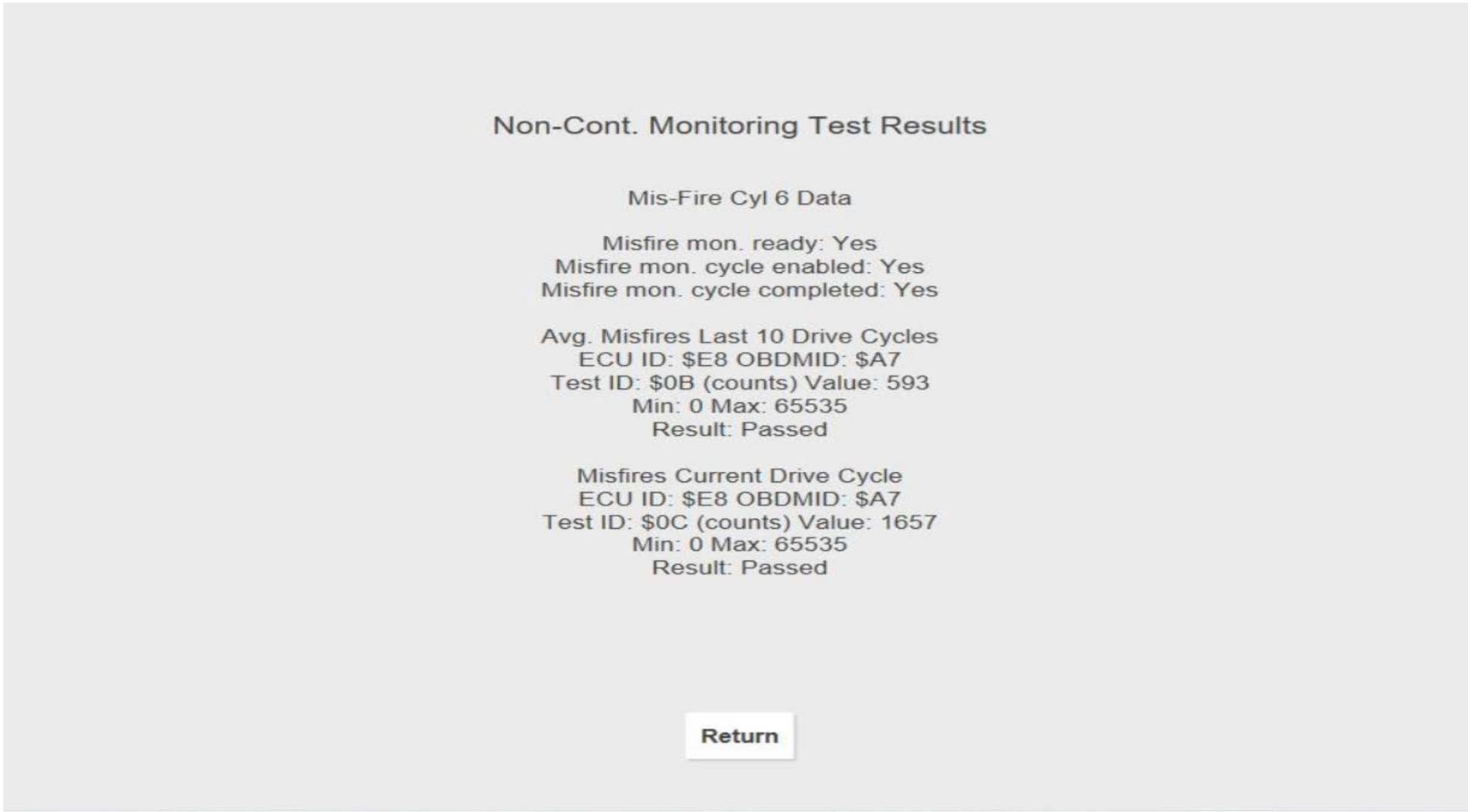
Why no mode 5?

- After attempting multiple different vehicles mode $05 data was never found separate.
- Is it safe to assume Mode $06 covers Mode $05?

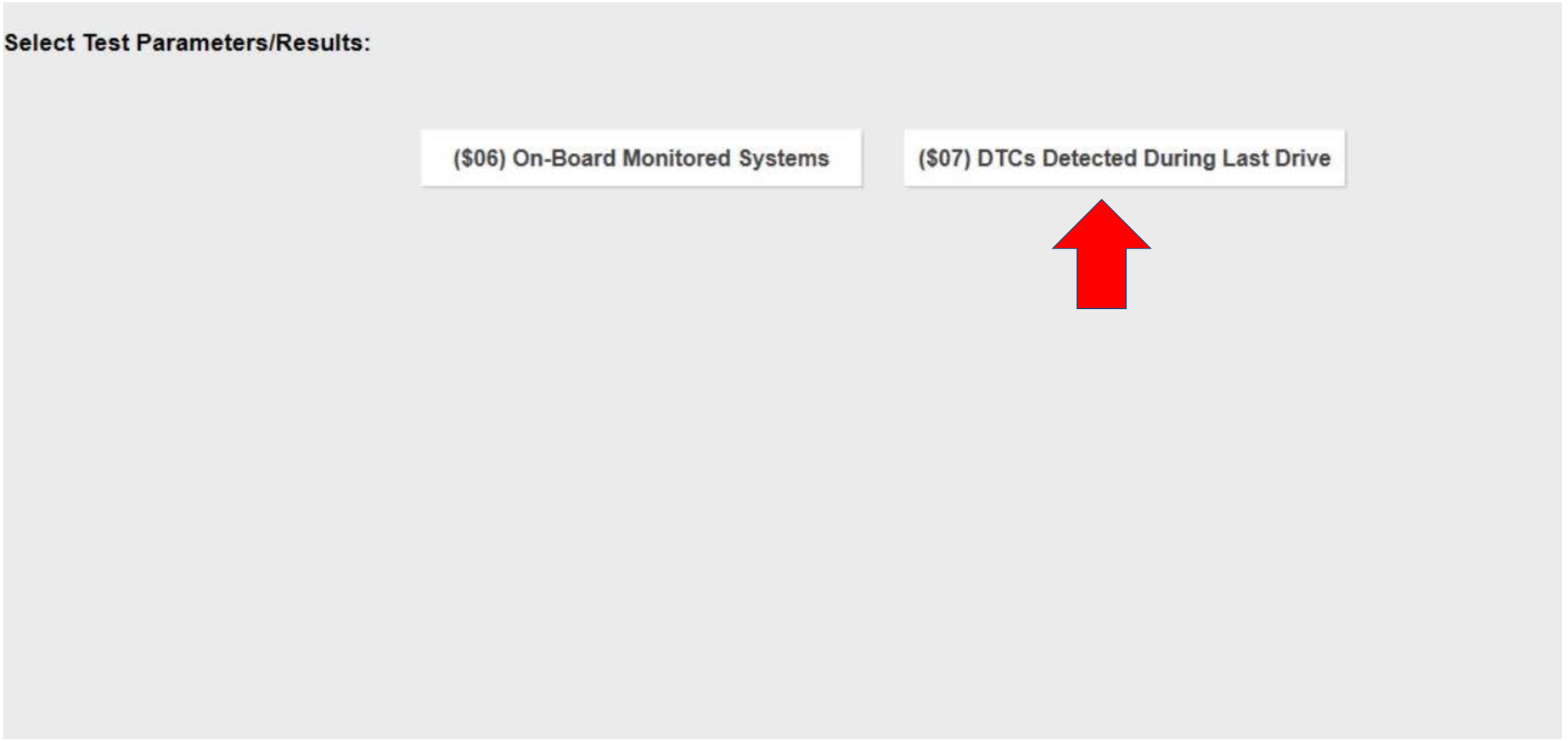
Mode $06 Onboard Monitoring Test Results



Mode $06 Onboard Monitoring Test Results



Mode $07 Two Trip/Pending DTCs

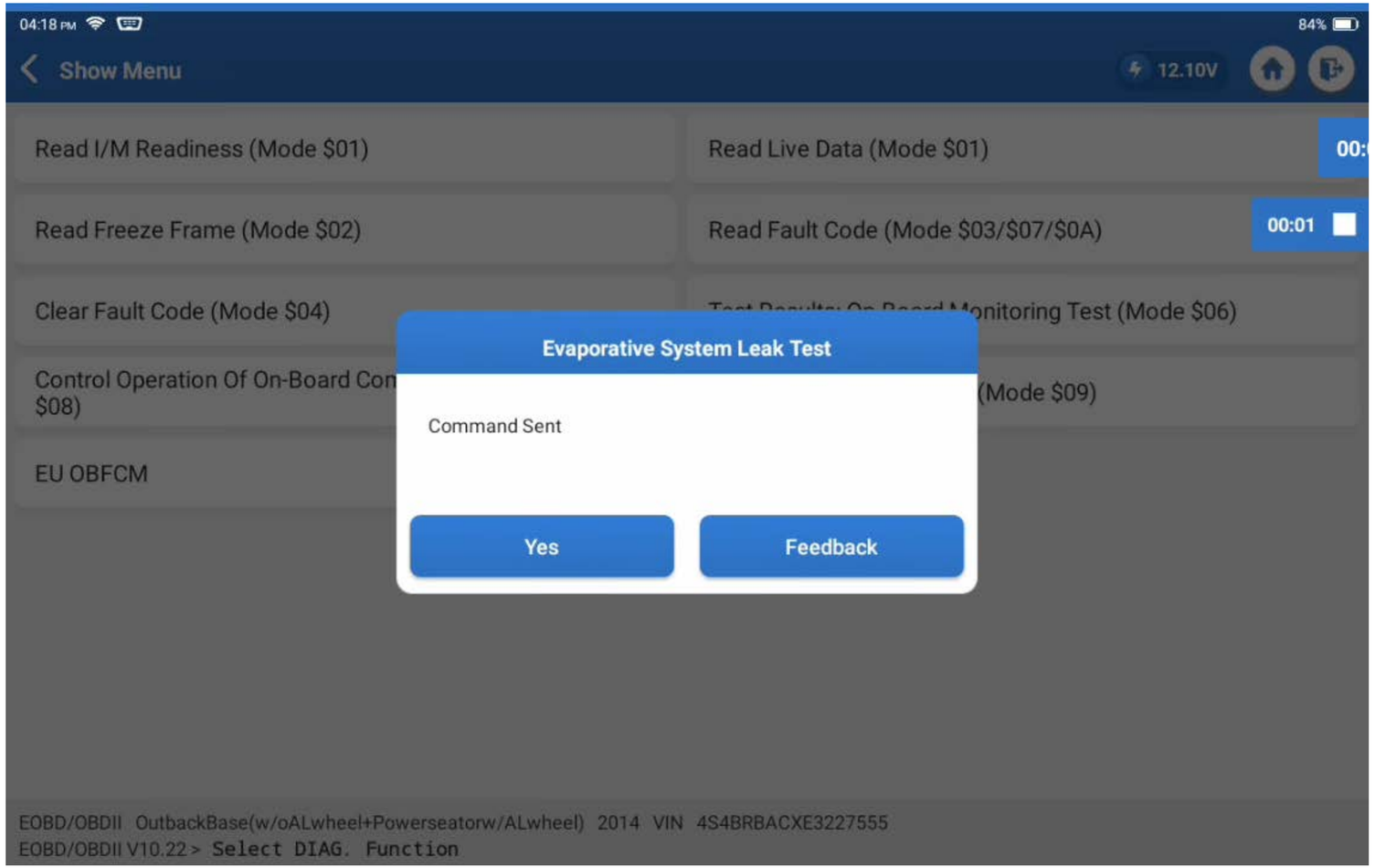


DTC Types

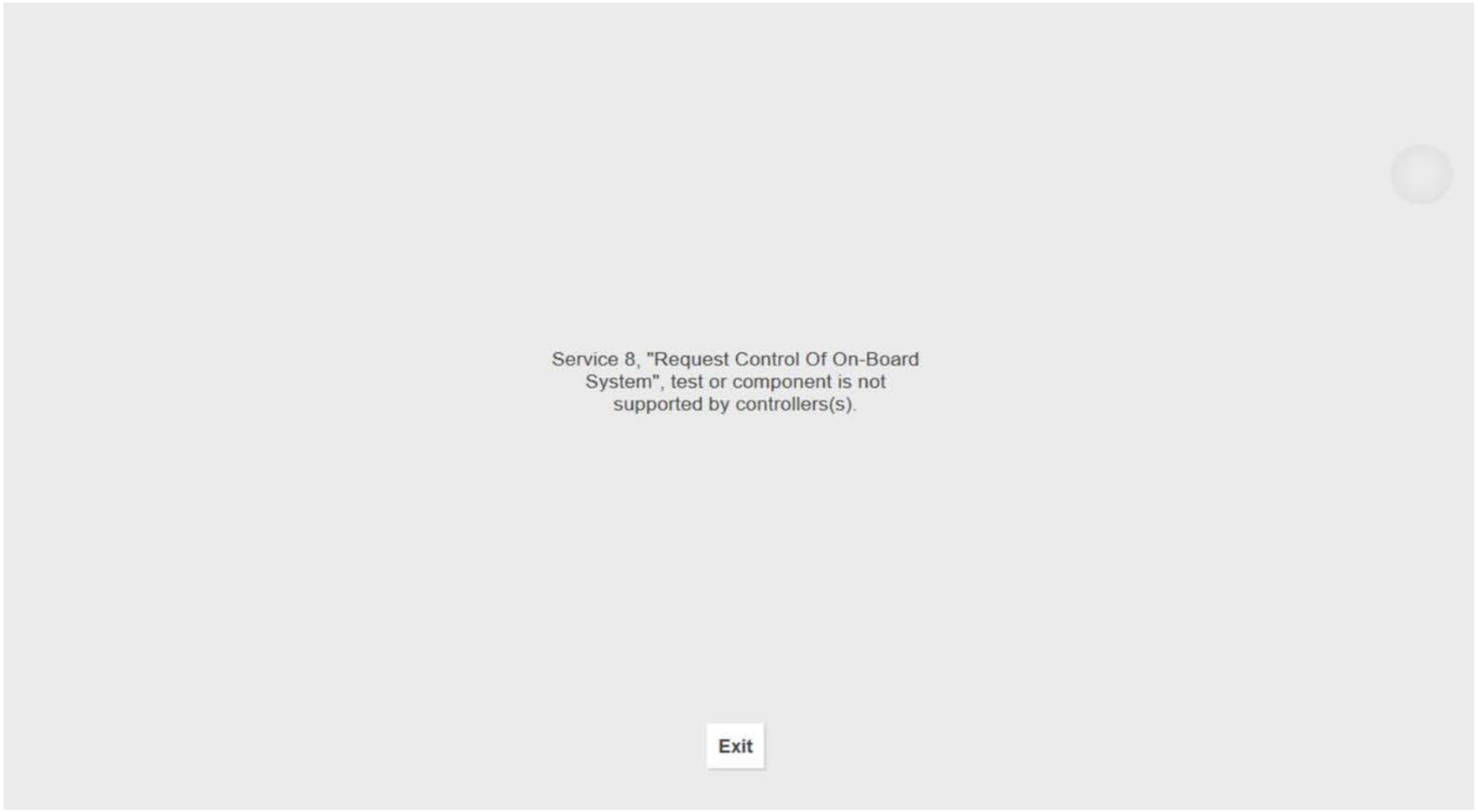
- Type A: Hard fault
  - Instantly turns on the MIL/CEL
- Type B: Intermittent/2 Trip
  - Needs to fail 2 consecutive trips
- Type C: Informational/ OE
  - Most OE's non-MIL/CEL illuminating

Service information is your best resource

Mode $08 Request of On-Board Component



Mode $08 Request of On-Board Component

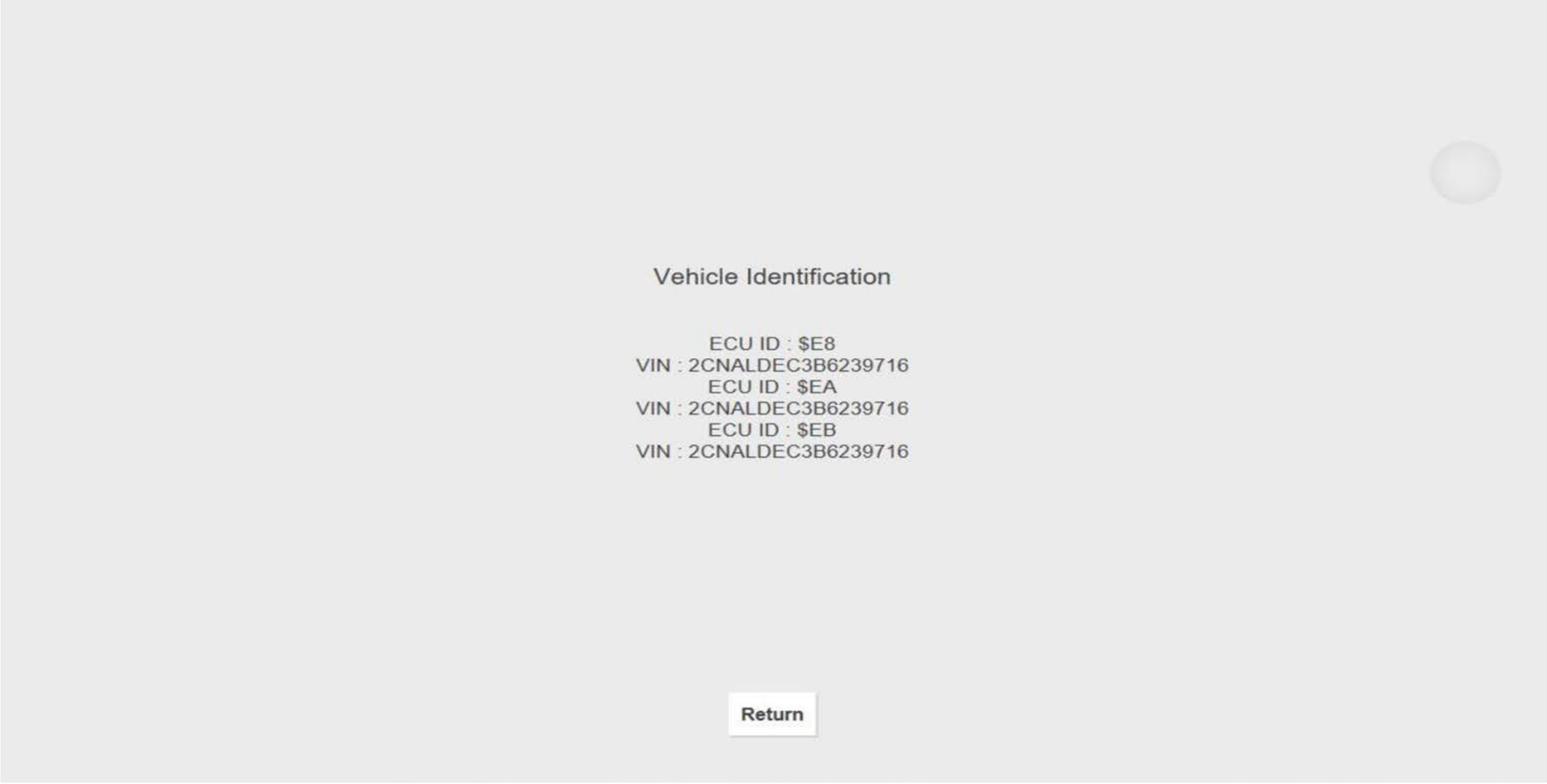


Mode $09 Request Vehicle Information

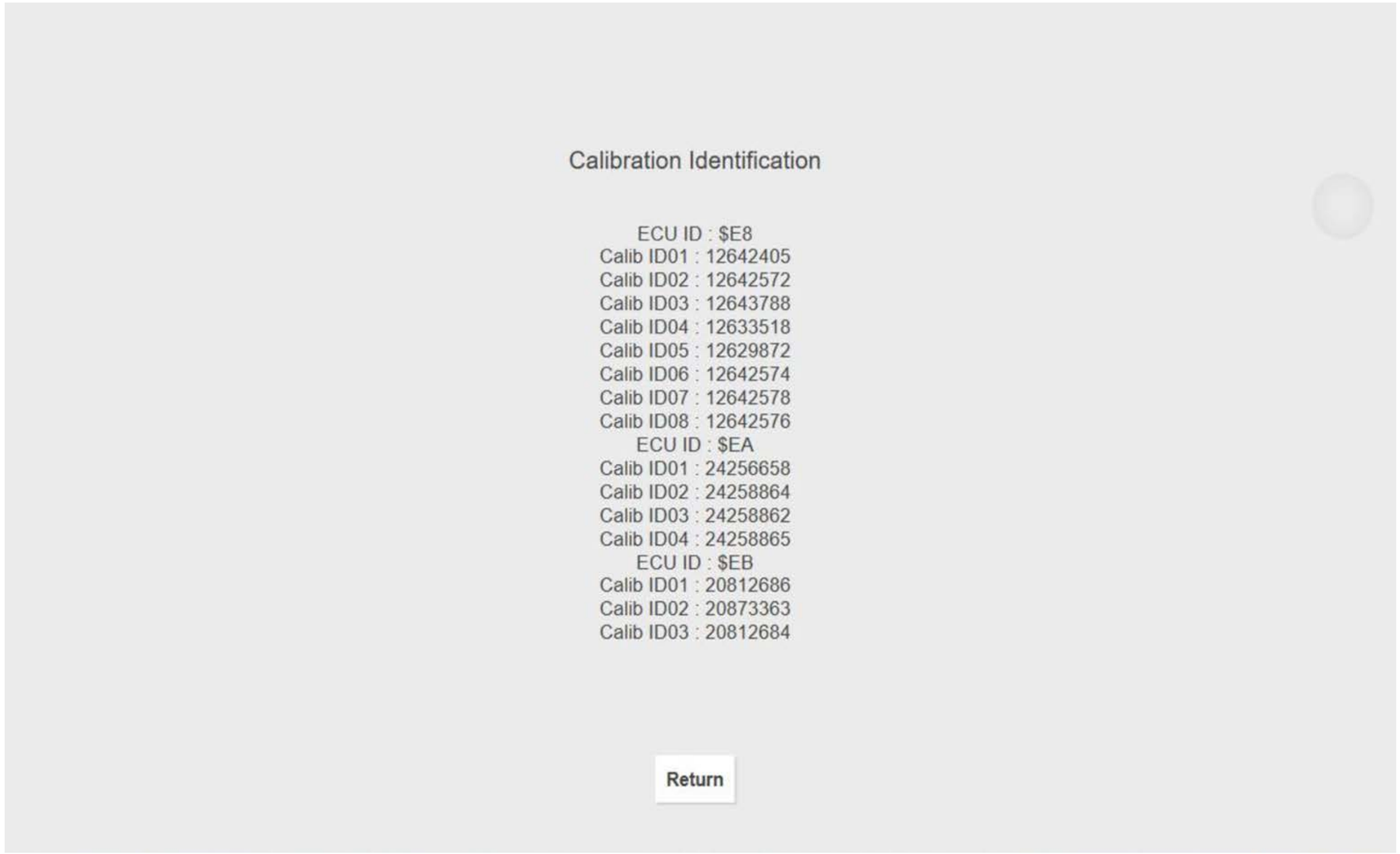
Select Service:

- Vehicle Identification Number (VIN)
- Calibration Identification
- Calibration Verification Number (CVN)
- ECU's Acronym and Text Name
- Engine Serial Number (ESN)
- Exhaust Regulation/Type Approval Number (EROTAN)
- World Wide Harmonized OBD Support Information
- Fueled Engine Operation Ignition Cycle Counter
- Distance Traveled Since EVAP Monitoring Decision

Mode $09 Request Vehicle Information



Mode $09 Request Vehicle Information



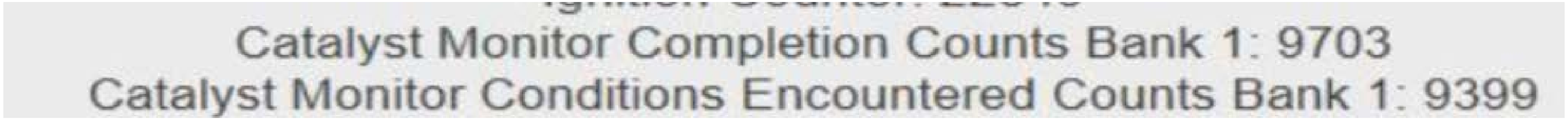
Mode $09 Request Vehicle Information

Service $09 In-use Performance Tracking for spark ignition engines

ECU ID - $E8:
OBD Monitoring Conditions Encountered Counts: 9549
Ignition Counter: 22849
Catalyst Monitor Completion Counts Bank 1: 9703
Catalyst Monitor Conditions Encountered Counts Bank 1: 9399
Catalyst Monitor Completion Counts Bank 2: 0
Catalyst Monitor Conditions Encountered Counts Bank 2: 0
Oxygen Sensor Monitor Completion Counts Bank 1: 6671
Oxygen Sensor Monitor Conditions Encountered Counts Bank 1: 9424
Oxygen Sensor Monitor Completion Counts Bank 2: 0
Oxygen Sensor Monitor Conditions Encountered Counts Bank 2: 0
EGR and/or VVT Monitor Completion Condition Counts: 14277
EGR and/or VVT Monitor Conditions Encountered Counts: 9545
AIR Monitor Completion Condition Counts (Secondary Air): 0
AIR Monitor Conditions Encountered Counts (Secondary Air): 0
EVAP Monitor Completion Condition Counts: 1961
EVAP Monitor Conditions Encountered Counts: 2384
Secondary Oxygen Sensor Monitor Completion Counts Bank 1: 10915
Secondary Oxygen Sensor Monitor Conditions Encountered Counts Bank 1: 9411
Secondary Oxygen Sensor Monitor Completion Counts Bank 2: 0
Secondary Oxygen Sensor Monitor Conditions Encountered Counts Bank 2: 0

Next

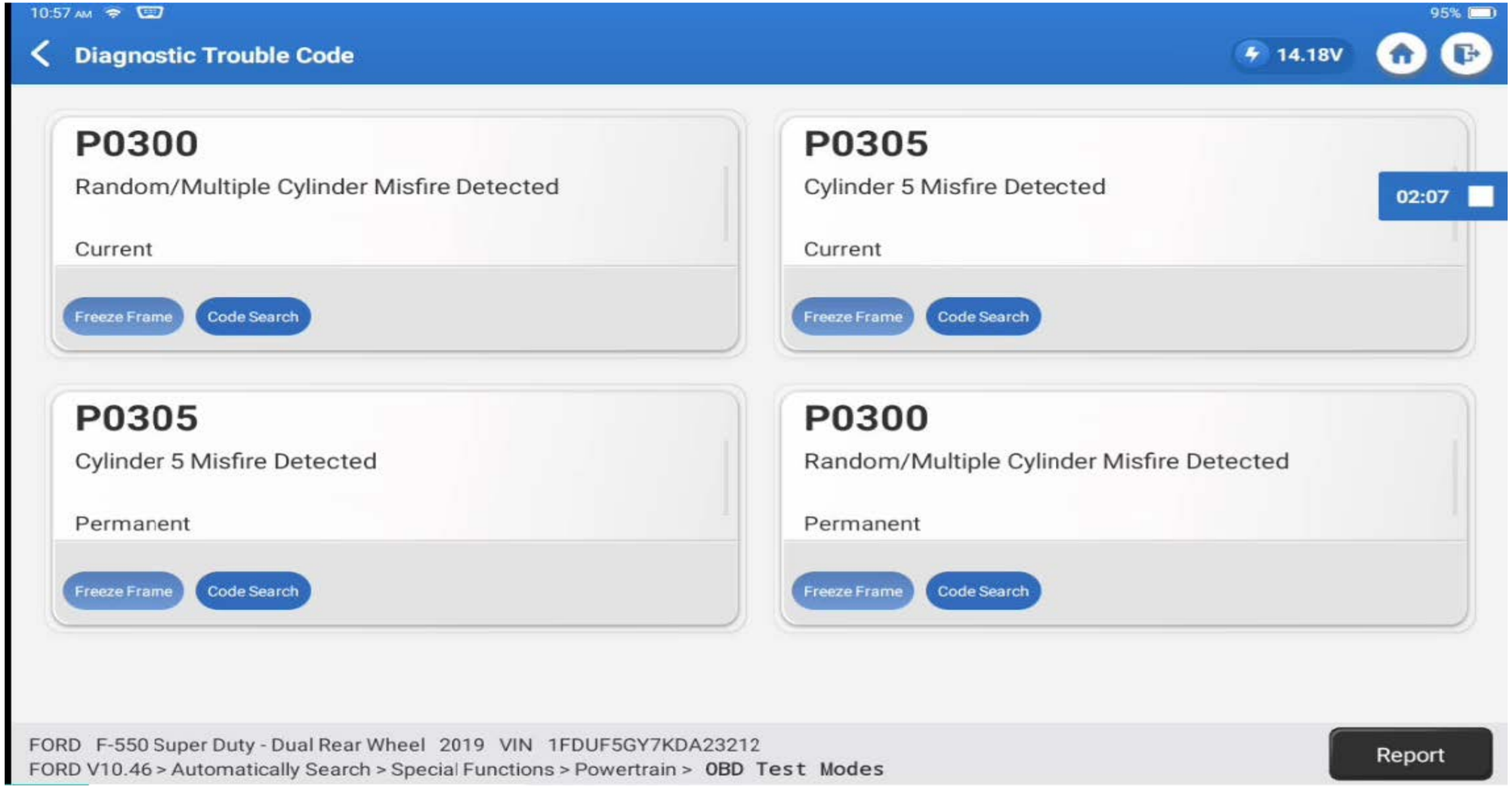
In-Use Monitor Performance Ratio (IUMPR)



Completions = 9703
Conditions = 9399

9703/9399= 1.03

Mode $0A Permanent DTC's

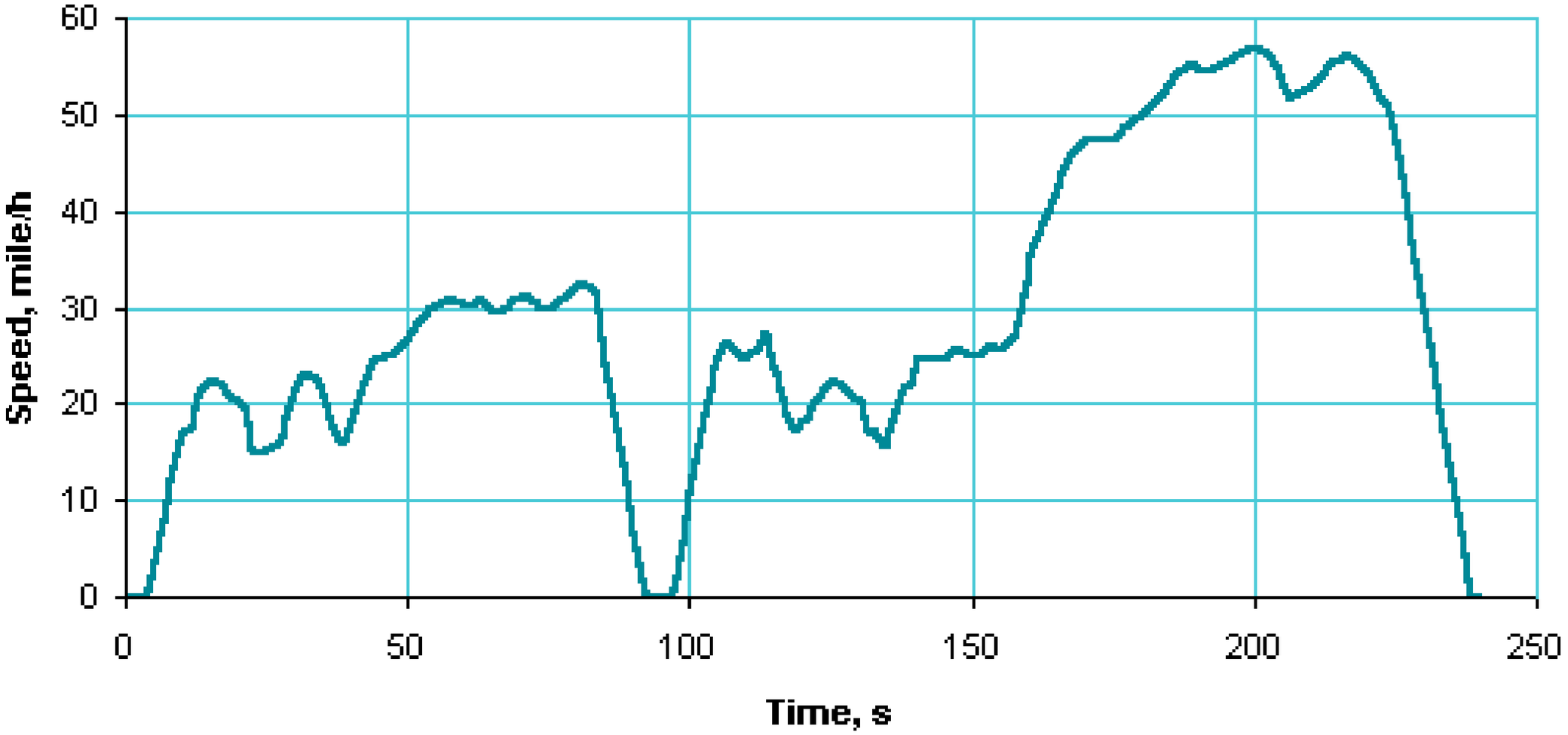


Analytical Test Drive

- Idle no load
- Light acceleration/ tip in
- Wide Open Throttle (WOT)
- Decel/ DCFCO
- Light acceleration to a steady speed cruise state
- Back to idle no load

Repeatable drives = Repeatable Results

Analytical Test Drive



Case Study

2011 Jeep Liberty

1J4PN2GK8BW588369

2011 Jeep Liberty

Vin: 1J4PN2GK8BW588369

Date: 2/27/24

Mileage: 157002

Complaint: Will not pass emissions.

Observations: Vehicle has already been to the Indiana Emission Diagnostic Technician for referral. Vehicle has failed 5 times.

2011 Jeep Liberty

Baseline:

- Vehicle has failed 5 times.
- Emissions Technician observed the rear oxygen sensors not moving.
- Do not diagnose the failure!
  - DIAGNOSE THE VEHICLE!!!!

Date: 02/27/2024 10:11 AM

Vehicle System Report

2011 Jeep Liberty (4WD)

VIN
1J4PN2GK8BW588369

Odometer
157,022

Created
February 27, 2024 10:11 AM

Thanks for visiting us. Below is a report that highlights any potential issues on your 2011 Jeep Liberty (4WD).

DIAGNOSTIC HEALTH SCAN

A check of all available systems on your vehicle was made.

Needs Attention

- Engine
- Transmission
- Central Gateway (TIPM)
- Radio
- Tire Pressure Monitor (TPM)
- Wireless Control Module (WCM)

February 27, 2024 10:11 AM

CODE SCAN RESULTS

Systems Analyzed: 10

⚠ Systems w/ Codes

Engine

P0706 Transmission Range Sensor Rationality
P0513 Invalid Skim Key

Transmission

P0706 Transmission Range Sensor Rationality
P0513 Invalid Skim Key

OBDII Codes ($03)
OBDII Permanent Codes ($0A)

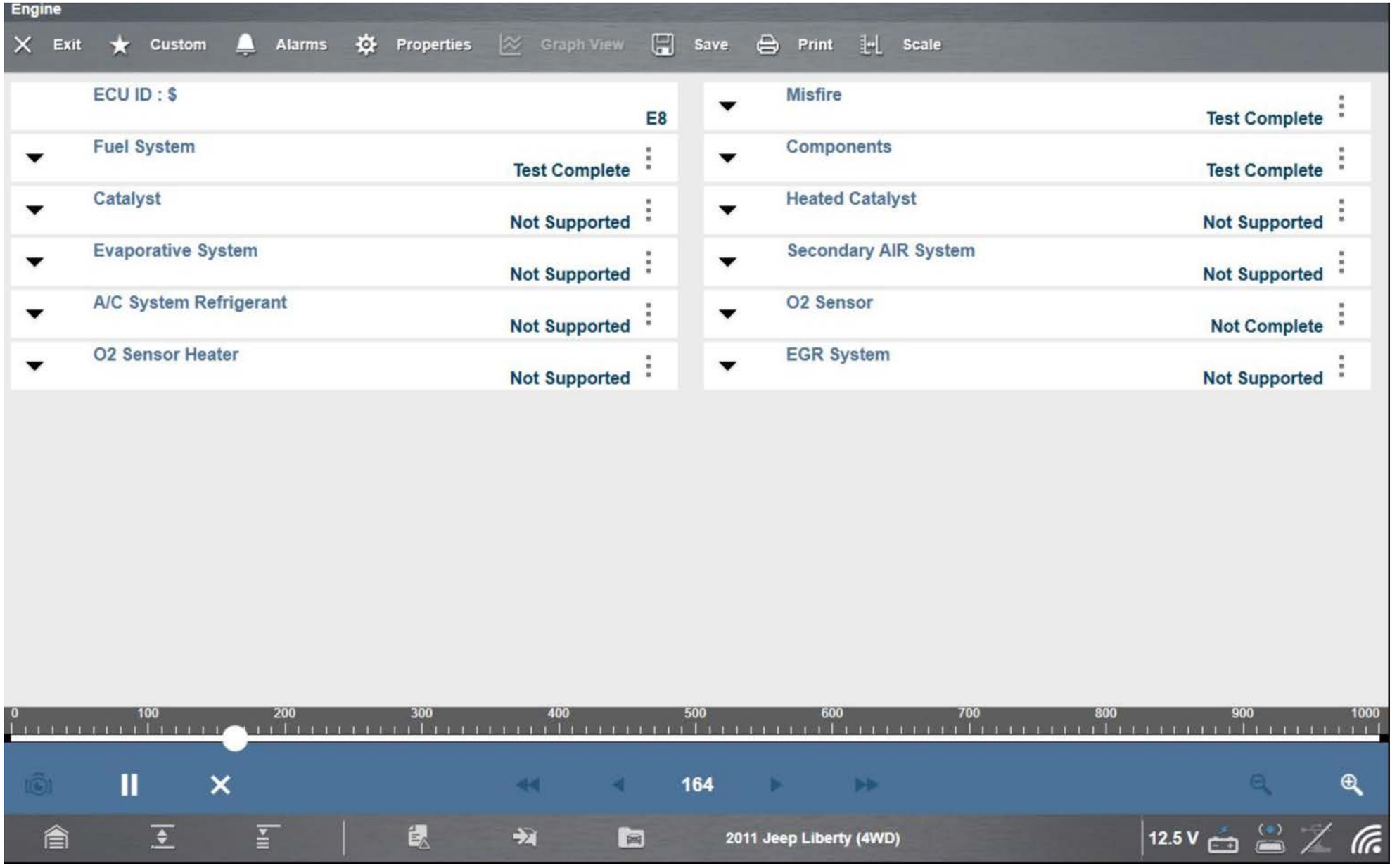
READINESS MONITORS

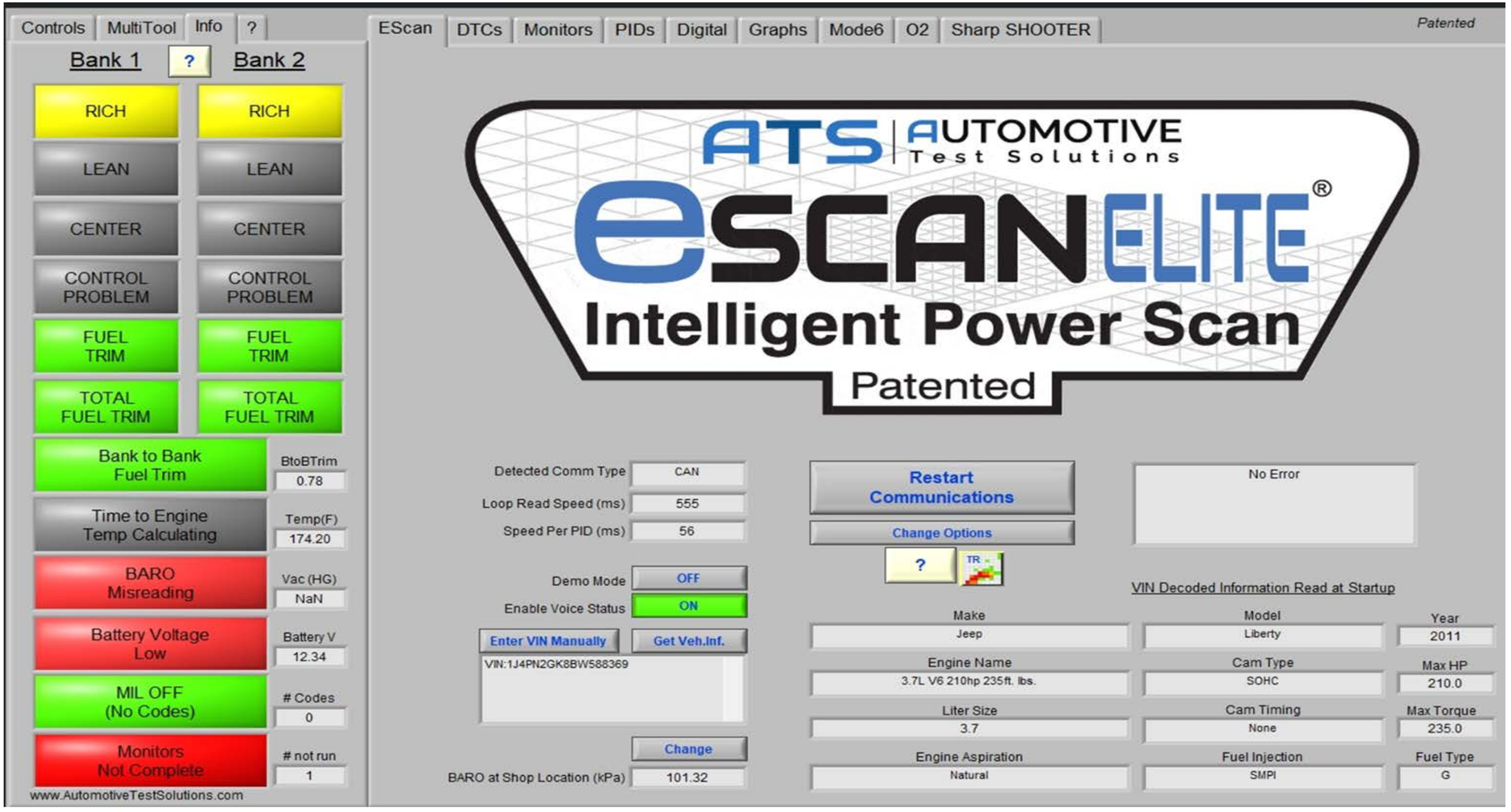
Complete

Misfire
Fuel System
Comprehensive Component

Not Complete

Oxygen Sensor


Engine
Exit
Custom
Alarms
Properties
Graph View
Save
Print
Scale
ECU ID : $
E8
Fuel System
Test Complete
Catalyst
Not Supported
Evaporative System
Not Supported
A/C System Refrigerant
Not Supported
O2 Sensor Heater
Not Supported
Misfire
Test Complete
Components
Test Complete
Heated Catalyst
Not Supported
Secondary AIR System
Not Supported
O2 Sensor
Not Complete
EGR System
Not Supported
0
100
200
300
400
500
600
700
800
900
1000
164
2011 Jeep Liberty (4WD)
12.5 V

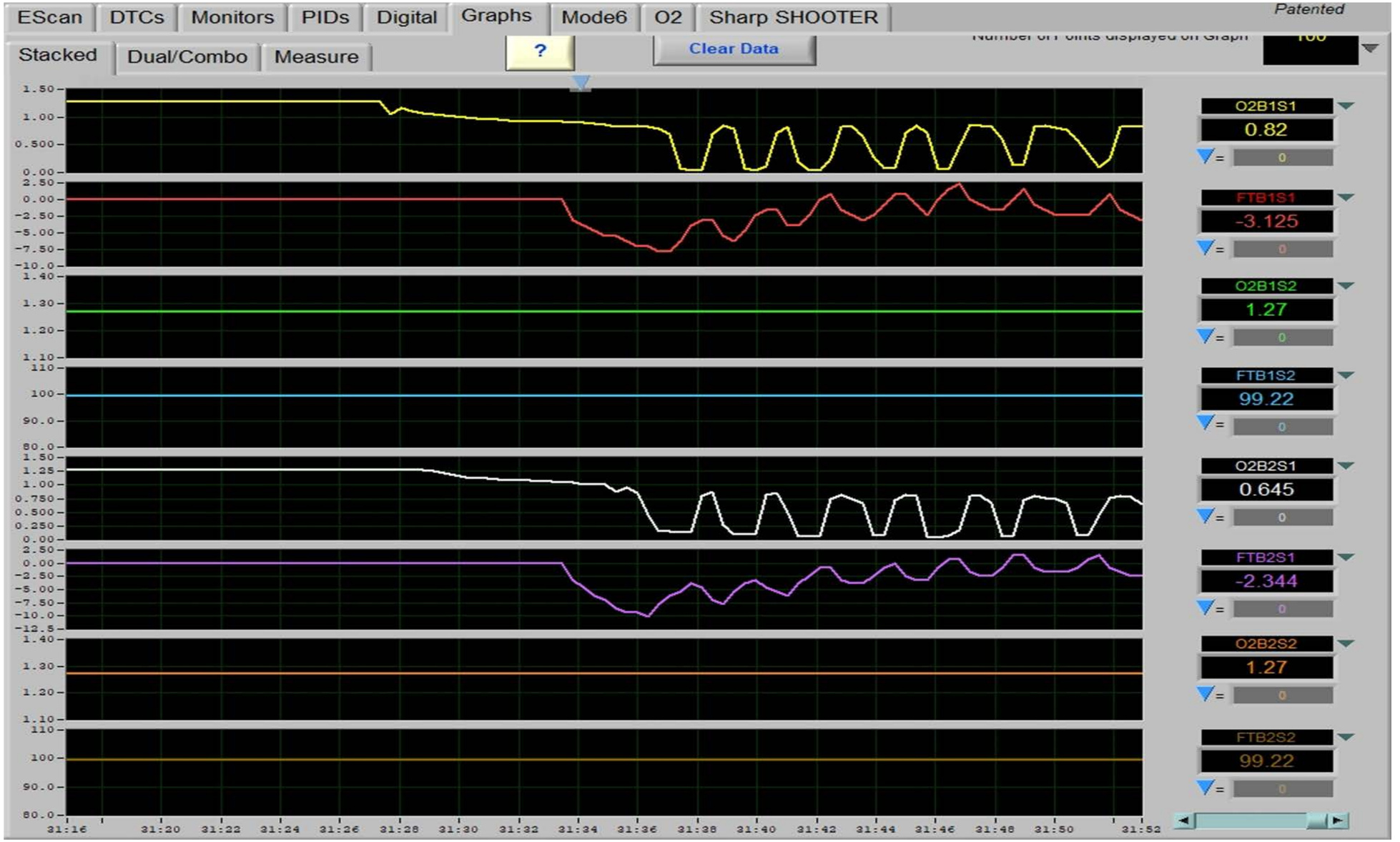

Controls
MultiTool
Info
?
Bank 1
?
Bank 2
RICH
RICH
LEAN
LEAN
CENTER
CENTER
CONTROL PROBLEM
CONTROL PROBLEM
FUEL TRIM
FUEL TRIM
TOTAL FUEL TRIM
TOTAL FUEL TRIM
Bank to Bank Fuel Trim
BtoBTrim
0.78
Time to Engine Temp Calculating
Temp(F)
174.20
BARO Misreading
Vac (HG)
NaN
Battery Voltage Low
Battery V
12.34
MIL OFF (No Codes)
Codes
0
Monitors Not Complete
not run
1
www.AutomotiveTestSolutions.com
EScan
DTCs
Monitors
PIDs
Digital
Graphs
Mode6
O2
Sharp SHOOTER
Patented
ATS AUTOMOTIVE Test Solutions
eSCAN ELITE®
Intelligent Power Scan
Patented
Detected Comm Type
CAN
Loop Read Speed (ms)
555
Speed Per PID (ms)
56
Demo Mode
OFF
Enable Voice Status
ON
Enter VIN Manually
Get Veh.Inf.
VIN:1J4PN2GK8BW588369
Change
BARO at Shop Location (kPa)
101.32
Restart Communications
Change Options
?
No Error
VIN Decoded Information Read at Startup
Make
Jeep
Model
Liberty
Year
2011
Engine Name
3.7L V6 210hp 235ft. lbs.
Cam Type
SOHC
Max HP
210.0
Liter Size
3.7
Cam Timing
None
Max Torque
235.0
Engine Aspiration
Natural
Fuel Injection
SMPI
Fuel Type
G

2011 Jeep Liberty

Observations so far:

- The vehicle shows most of the monitors are not supported.
- Multiple scan tools back this up.
- The oxygen monitor is not running.

Let's look at o2's and devise a plan of attack.


EScan
DTCs
Monitors
PIDs
Digital
Graphs
Mode6
O2
Sharp SHOOTER
Patented
Stacked
Dual/Combo
Measure
?
Clear Data
O2B1S1
0.82
FTB1S1
-3.125
O2B1S2
1.27
FTB1S2
99.22
O2B2S1
0.645
FTB2S1
-2.344
O2B2S2
1.27
FTB2S2
99.22
31:16
31:20
31:22
31:24
31:26
31:28
31:30
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31:36
31:38
31:40
31:42
31:44
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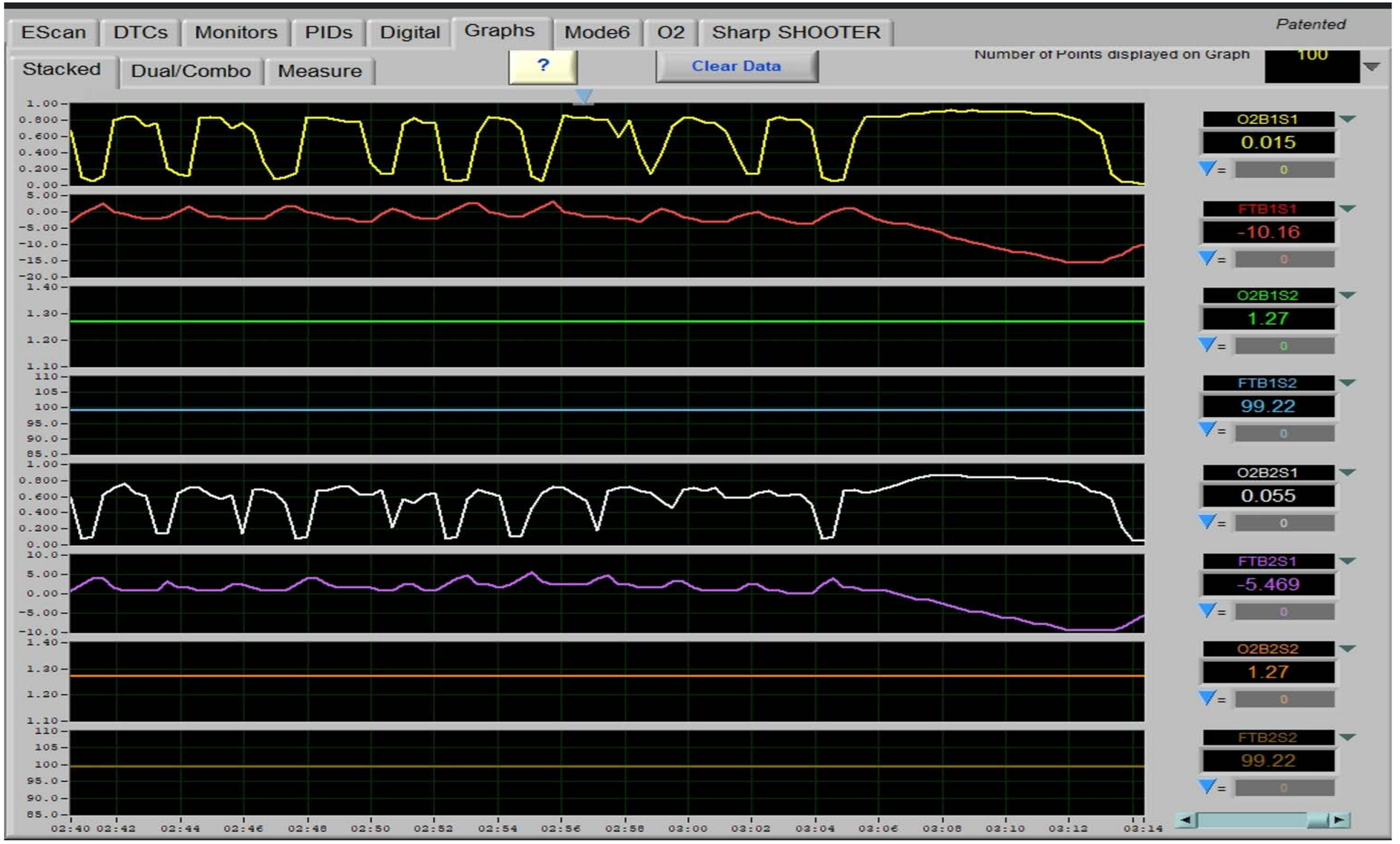
31:48
31:50
31:52

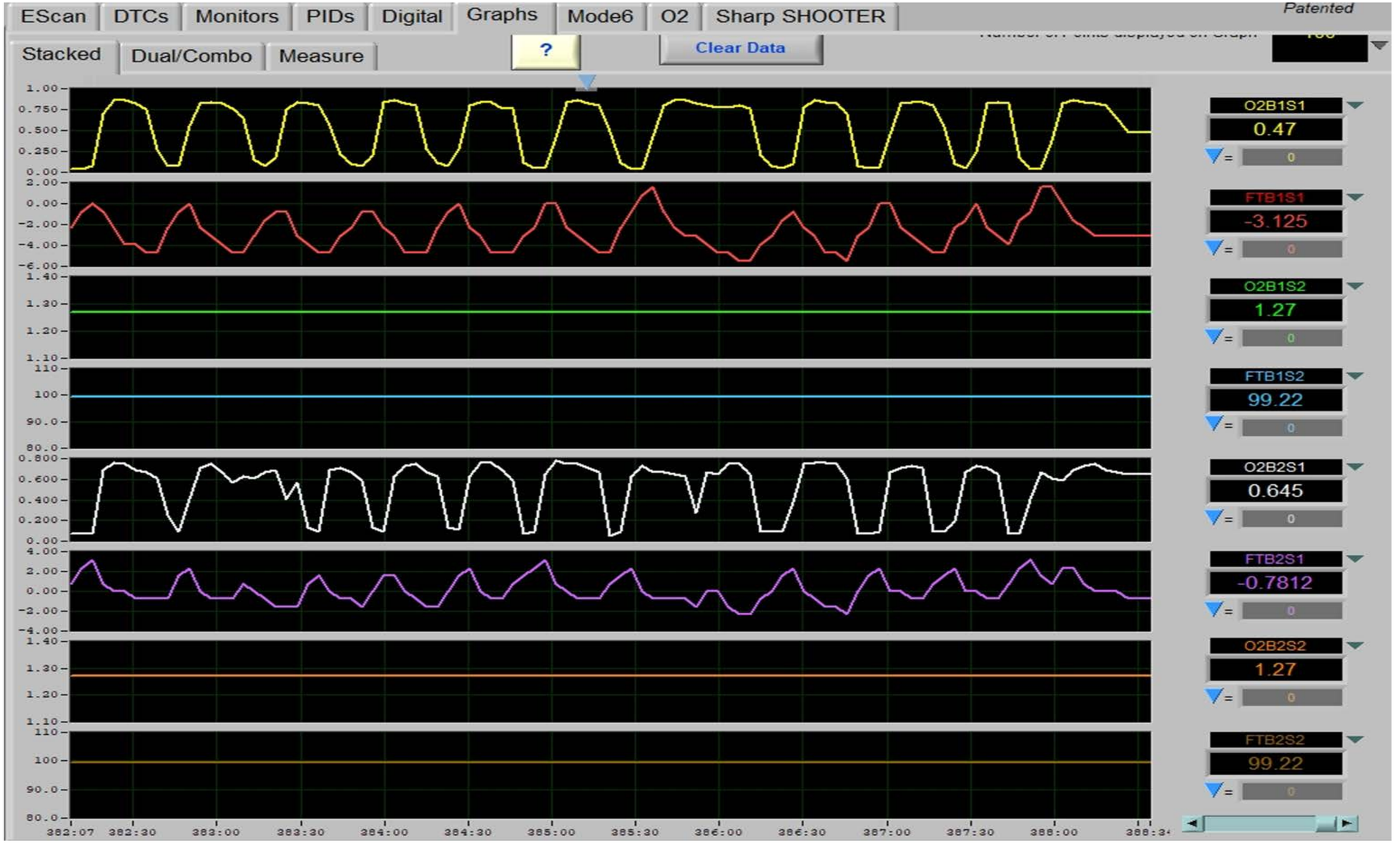

EScan
DTCs
Monitors
PIDs
Digital
Graphs
Mode6
O2
Sharp SHOOTER
Patented
Stacked
Dual/Combo
Measure
?
Clear Data
Number of Points displayed on Graph
100
O2B1S1
0.015
FTB1S1
-10.16
O2B1S2
1.27
FTB1S2
99.22
O2B2S1
0.055
FTB2S1
-5.469
O2B2S2
1.27
FTB2S2
99.22
02:40 02:42 02:44 02:46 02:48 02:50 02:52 02:54 02:56 02:58 03:00 03:02 03:04 03:06 03:08 03:10 03:12 03:14

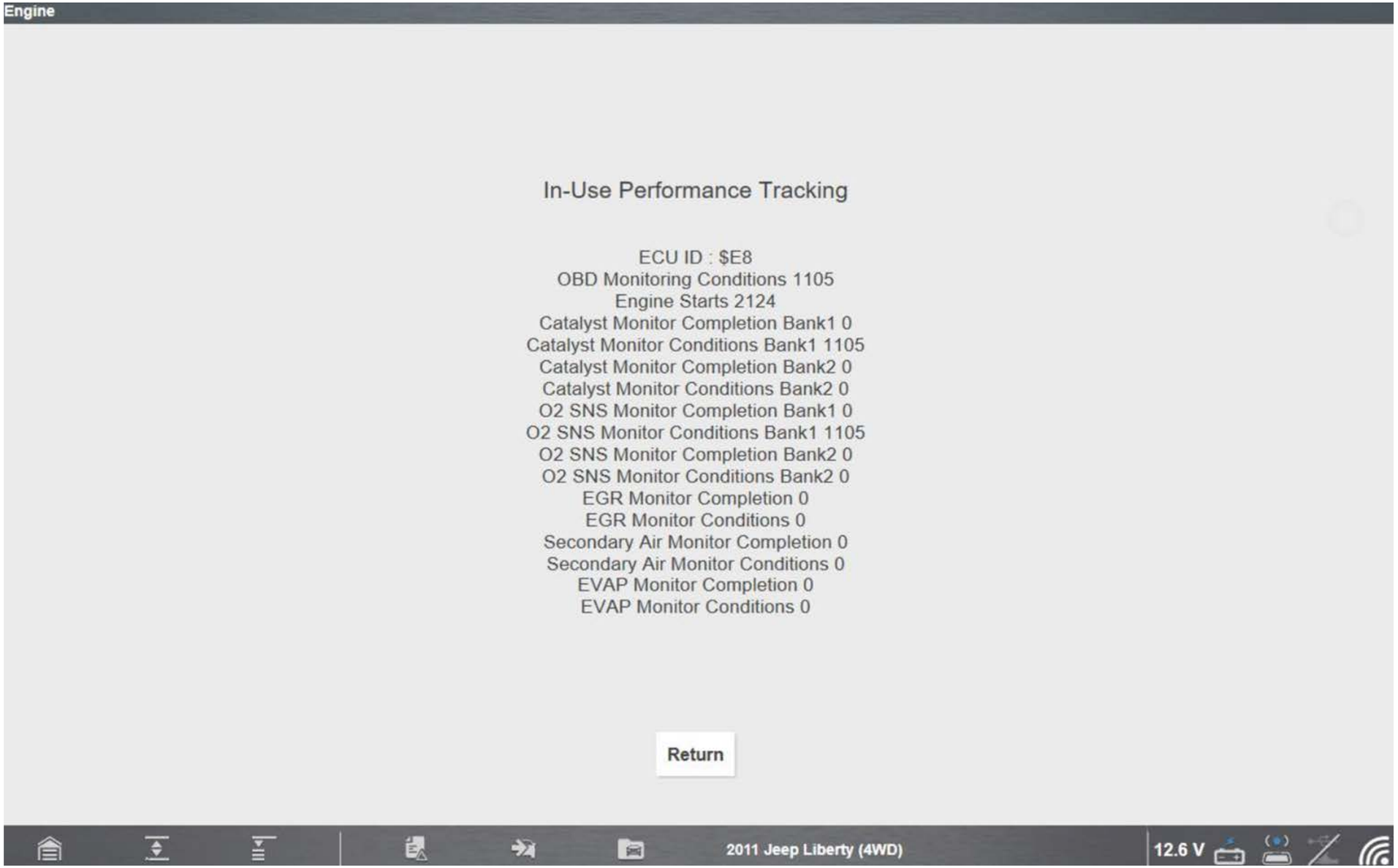
2011 Jeep Liberty

The emissions technicians observations are correct.

The rear oxygen sensors in OBD are reading the bias voltage.

What are a couple tests we could do to see if this is true, or if the pcm is lying to us?


EScan
DTCs
Monitors
PIDs
Digital
Graphs
Mode6
O2
Sharp SHOOTER
Patented
Stacked
Dual/Combo
Measure
?
Clear Data
O2B1S1
0.47
FTB1S1
-3.125
O2B1S2
1.27
FTB1S2
99.22
O2B2S1
0.645
FTB2S1
-0.7812
O2B2S2
1.27
FTB2S2
99.22


Engine
In-Use Performance Tracking
ECU ID : $E8
OBD Monitoring Conditions 1105
Engine Starts 2124
Catalyst Monitor Completion Bank1 0
Catalyst Monitor Conditions Bank1 1105
Catalyst Monitor Completion Bank2 0
Catalyst Monitor Conditions Bank2 0
O2 SNS Monitor Completion Bank1 0
O2 SNS Monitor Conditions Bank1 1105
O2 SNS Monitor Completion Bank2 0
O2 SNS Monitor Conditions Bank2 0
EGR Monitor Completion 0
EGR Monitor Conditions 0
Secondary Air Monitor Completion 0
Secondary Air Monitor Conditions 0
EVAP Monitor Completion 0
EVAP Monitor Conditions 0
Return
2011 Jeep Liberty (4WD)
12.6 V

2011 Jeep Liberty

Observations & Thoughts:

- The PCM does not react to shorting the o2 sensor to ground.
  - The data does not change, and a code does not set.
- Performance Tracking shows the monitors have not ran….
  - EVER.
- What conclusions can we make with the data we currently have?
  - Failed PCM
  - A Tune (on a Liberty?!?!)
  - Software issues

2011 Jeep Liberty

Before we get carried away:

- Contacted the emissions program to get history on this vin.
- The vehicle rejected/failed on 9-22-23, 9-26-23, 12-9-23, 1-9-24, and 2-10-24
- The vehicle has history passes 6-9-15, 9-21-17, 9-14-21, and was not tested in 2019.
- This information proves that this vehicle has had the ability to pass the emissions test and all monitors previously.

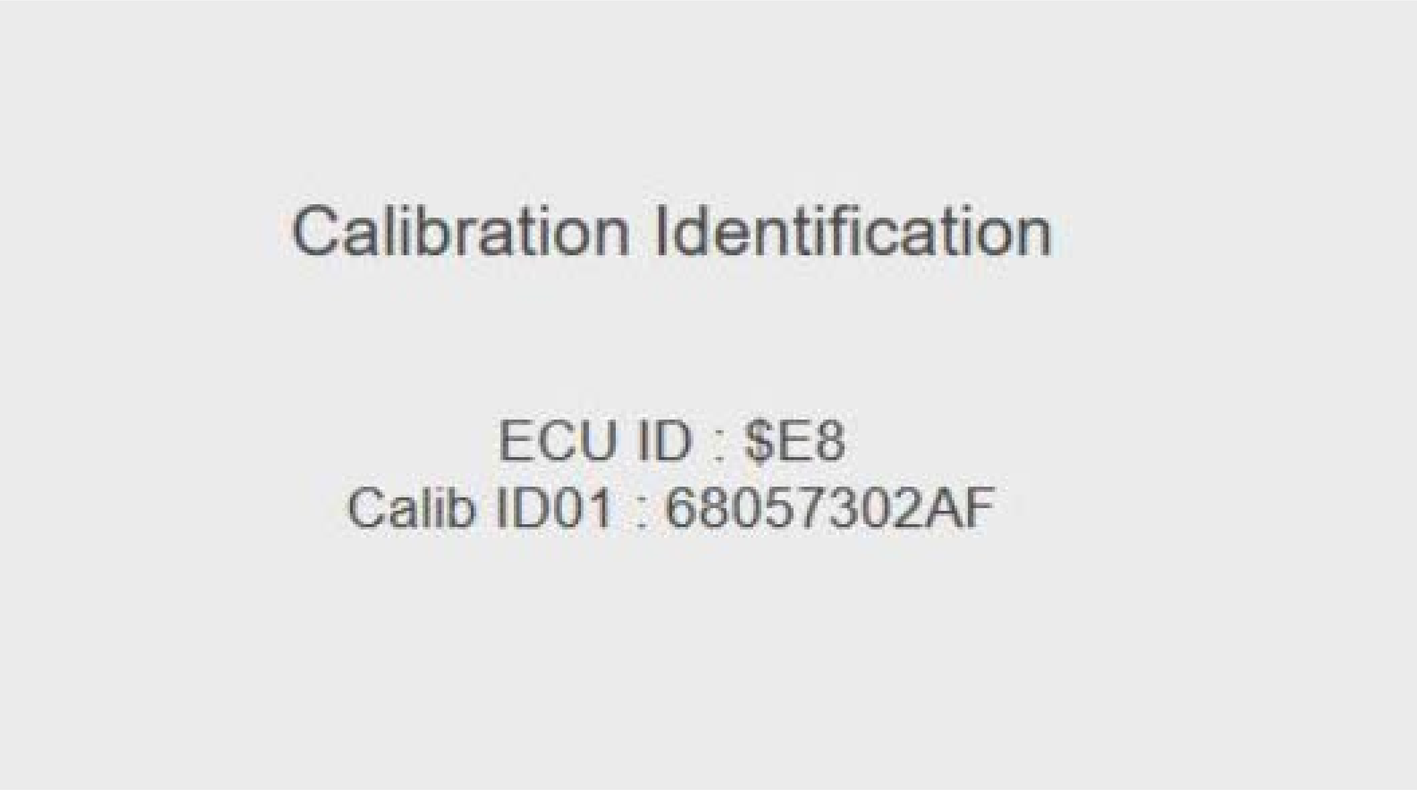

MOPAR®
P/N R5150583AC
S/N 4396691
10/31/19

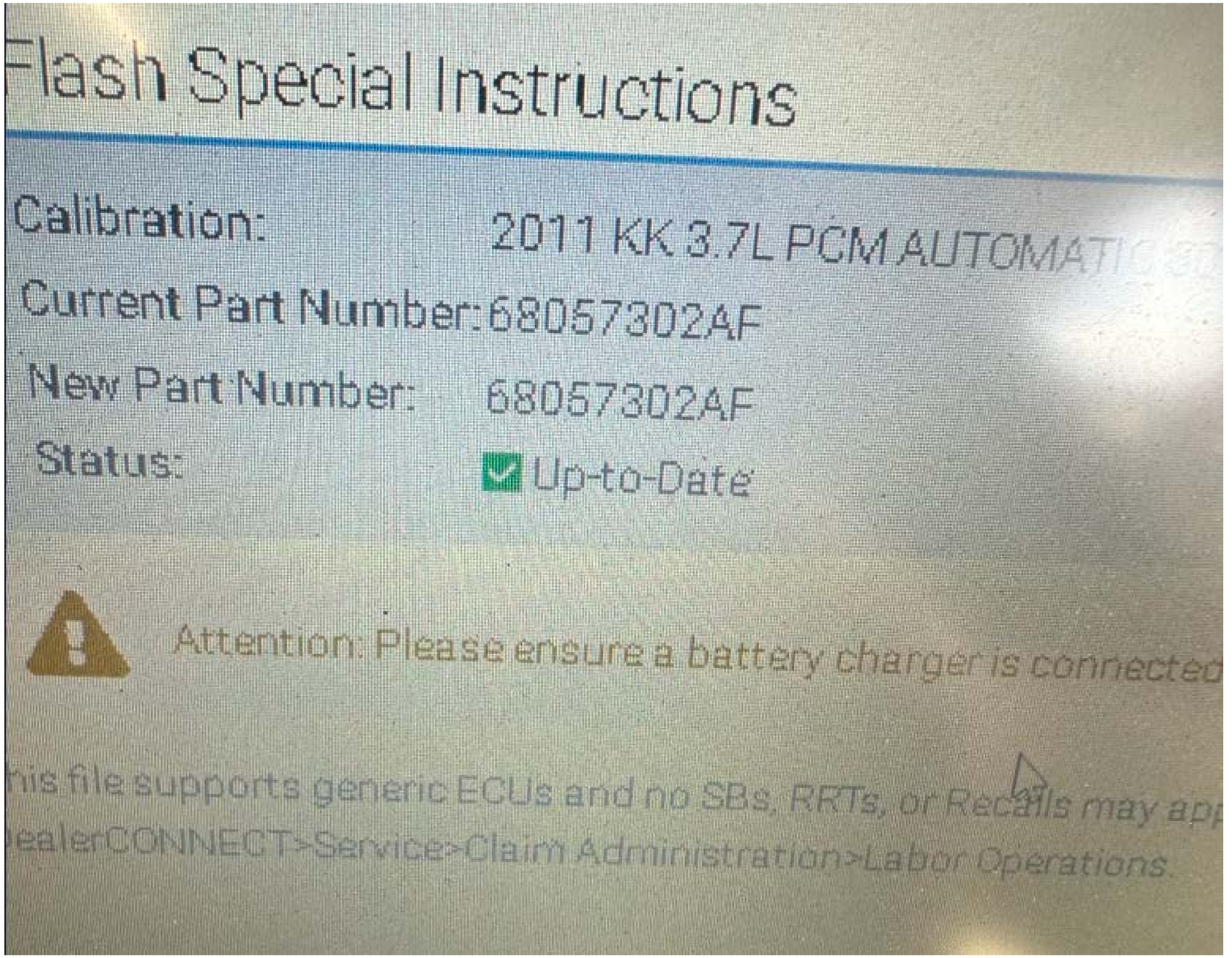
2011 Jeep Liberty

Making access to the PCM:

- Has a reman sticker from MOPAR.
- Also has yellow markings from a salvage yard.

2011 Jeep Liberty




Flash Special Instructions
Calibration: 2011 KK 3.7L PCM AUTOMATIC
Current Part Number: 680573024F
New Part Number: 680573024F
Status: Up-to-Date
Attention: Please ensure a battery charger is connected
his file supports generic ECUs and no SBs, RRTs, or Recalls may app
ealerCONNECT>Service>Claim Administration>Labor Operations.

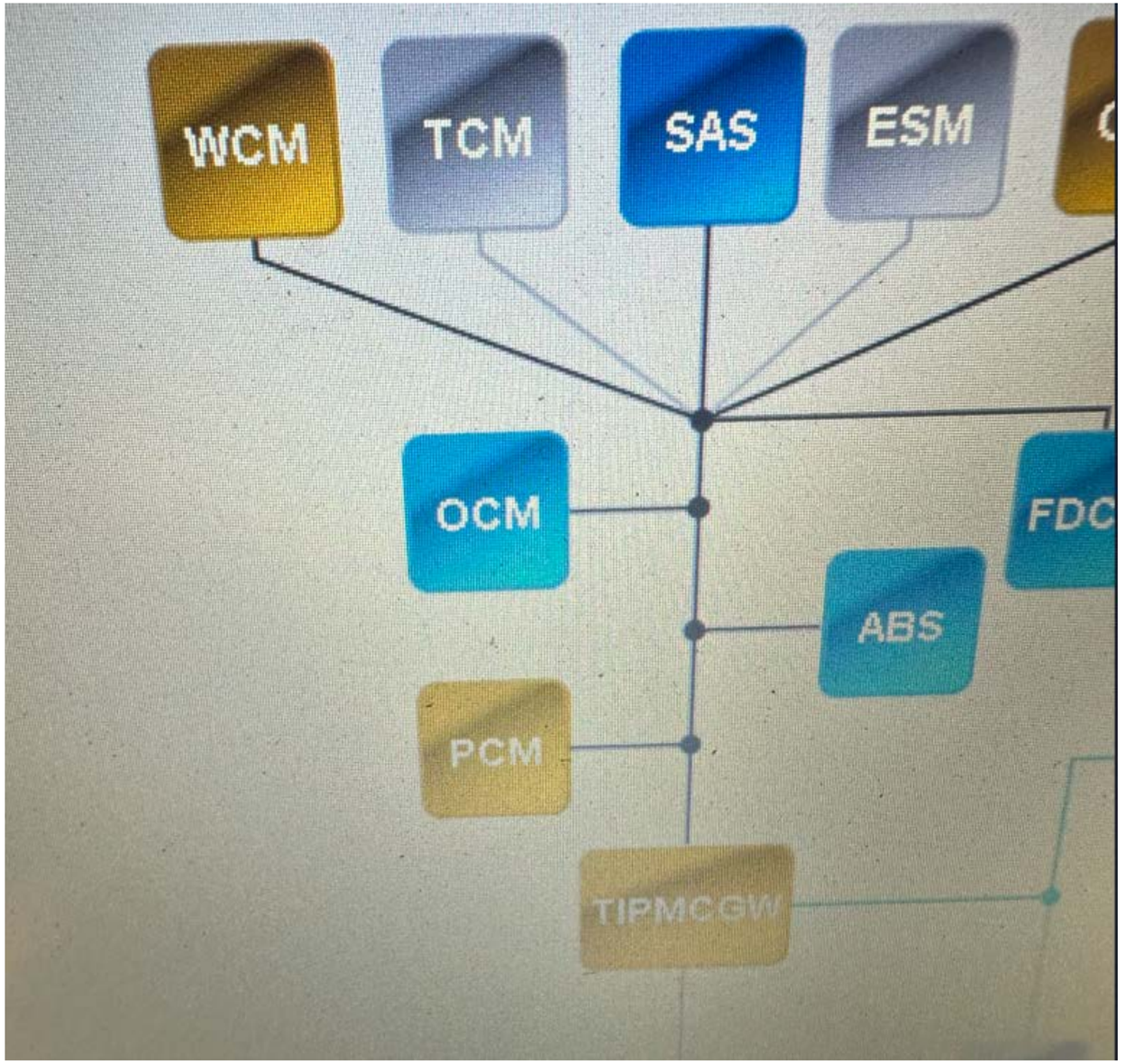
2011 Jeep Liberty

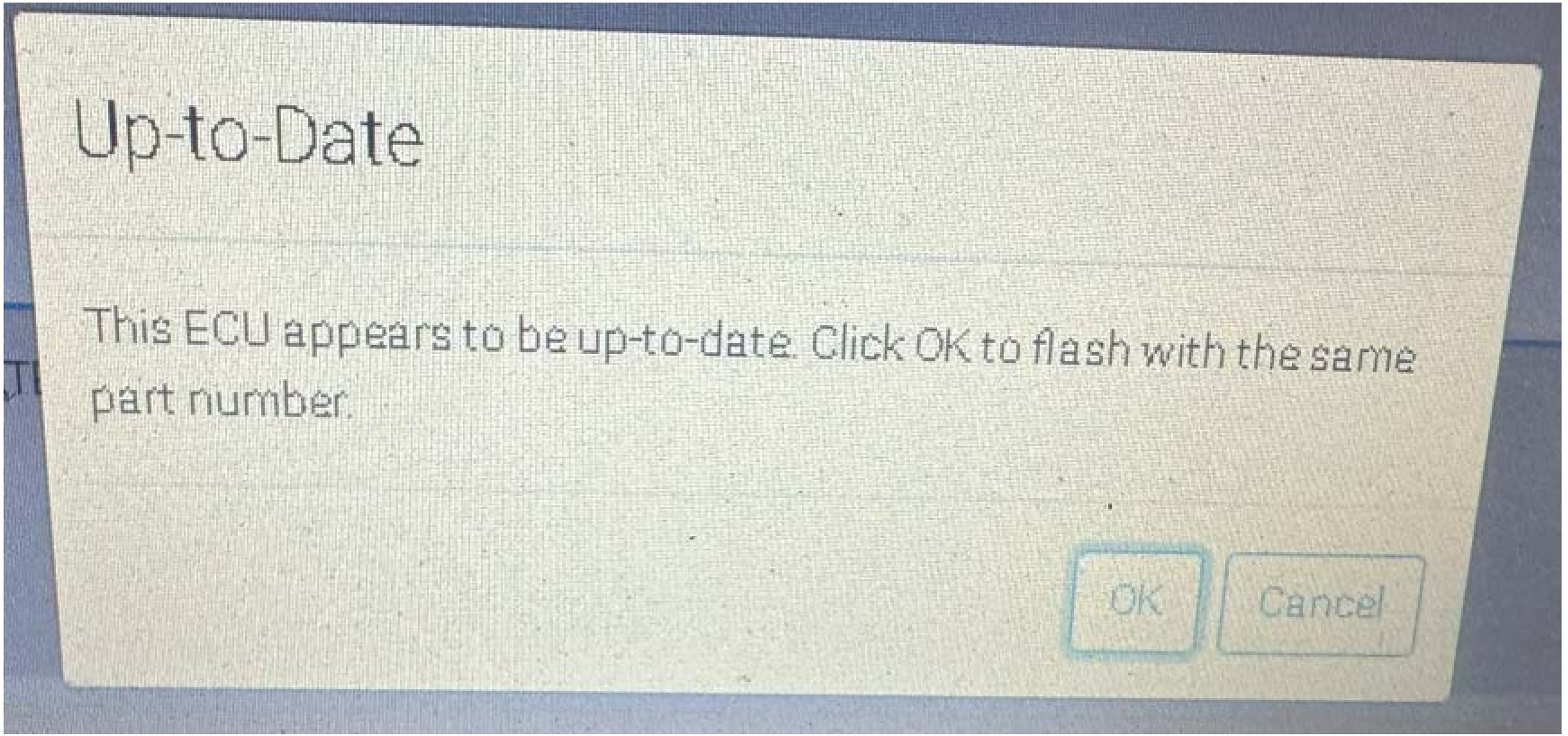
Now what?!?!?!

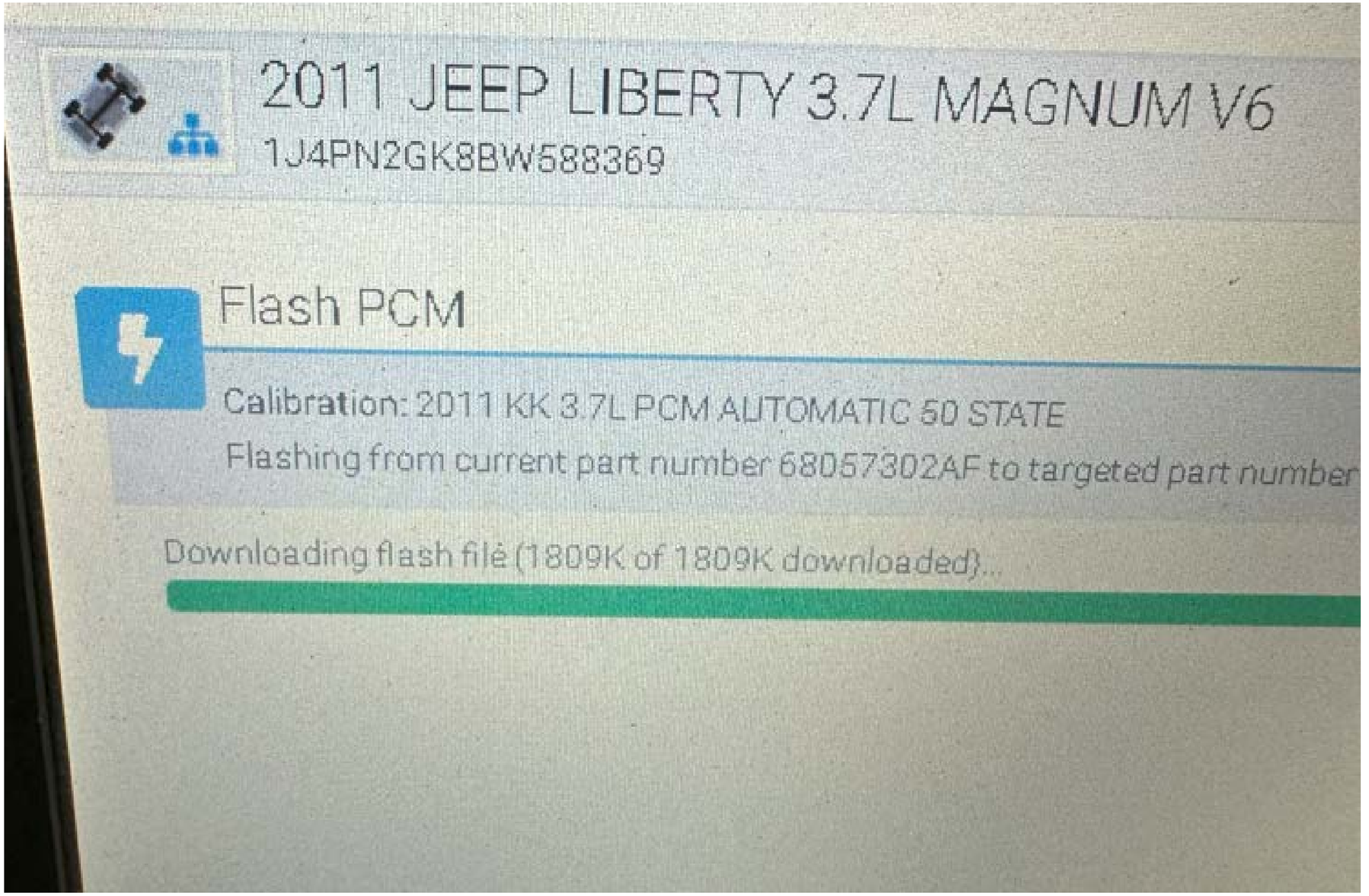
- Software is checked and documented.
- The software is then checked with wiTECH
- Software is the most current and up-to-date available.
- How would you proceed?
  - Flash over existing?
  - New ECM?

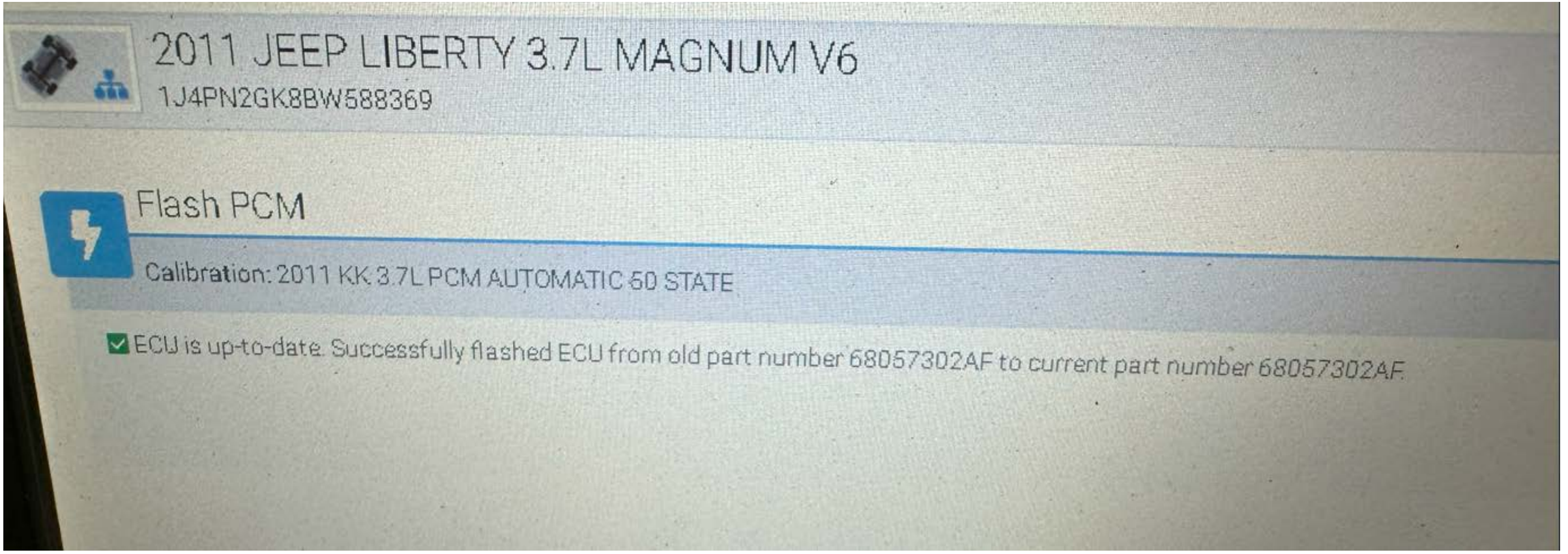
2011 Jeep Liberty

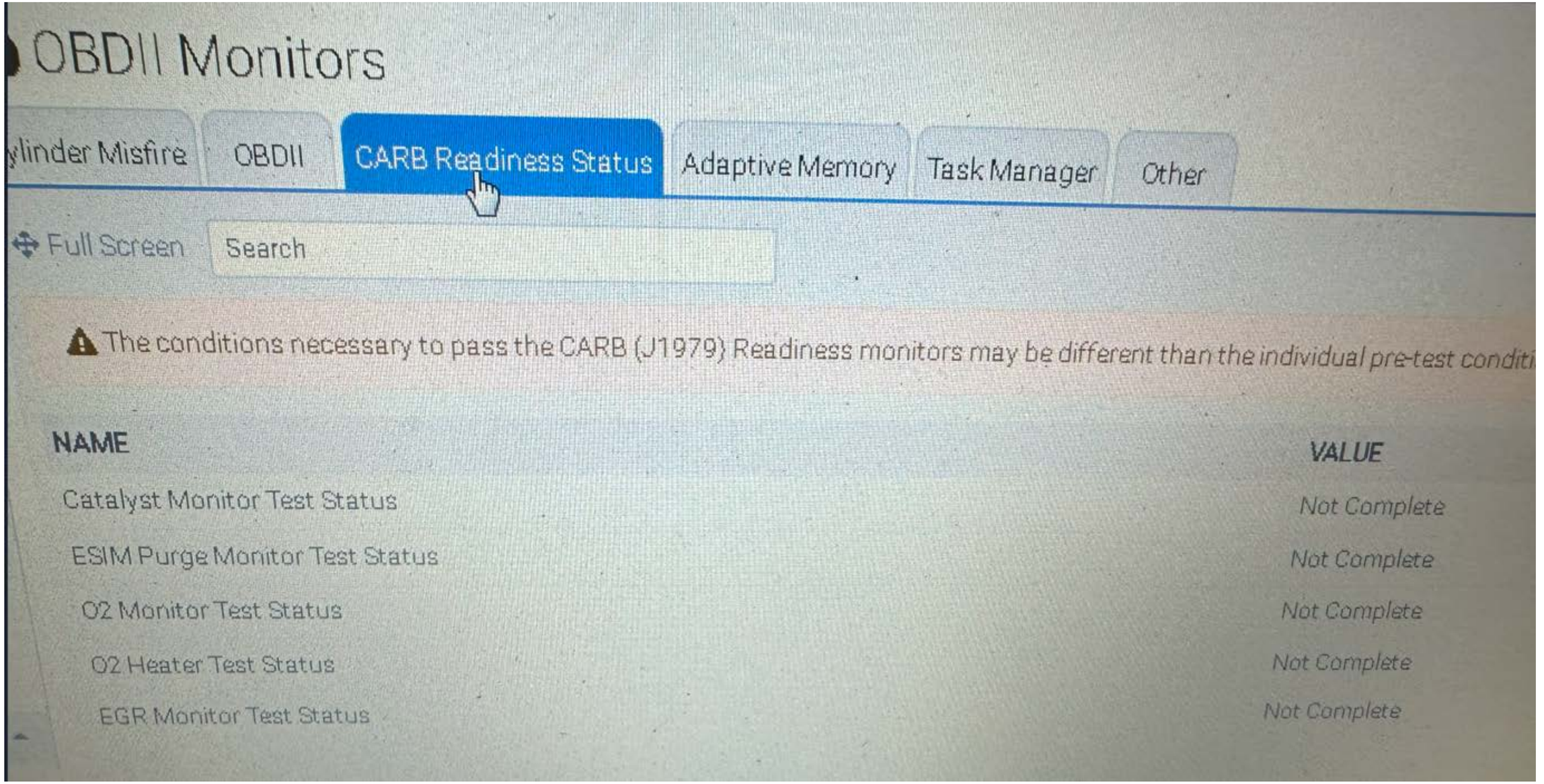
- The reman/used ECM offers a lot of questions.
- The client is contacted to inquire about the ecm.
  - ECM was purchased from a salvage yard last year.
  - Original ECM had a no start condition at that time.
  - Programmed at a local dealership.
- We advised client.
  - Installed the same flash.


WCM
TCM
SAS
ESM
OCM
FDC
ABS
PCM
TIPMCGW


Up-to-Date
This ECU appears to be up-to-date. Click OK to flash with the same part number.
OK
Cancel


2011 JEEP LIBERTY 3.7L MAGNUM V6
1J4PN2GK8BW588369
Flash PCM
Calibration: 2011 KK 3.7L PCM AUTOMATIC 50 STATE
Flashing from current part number 68057302AF to targeted part number
Downloading flash file (1809K of 1809K downloaded)...


2011 JEEP LIBERTY 3.7L MAGNUM V6
1J4PN2GK8BW588369
Flash PCM
Calibration: 2011 KK 3.7L PCM AUTOMATIC 50 STATE
ECU is up-to-date. Successfully flashed ECU from old part number 68057302AF to current part number 68057302AF.


OBDII Monitors
ylinder Misfire
OBDII
CARB Readiness Status
Adaptive Memory
Task Manager
Other
Full Screen
Search
The conditions necessary to pass the CARB (J1979) Readiness monitors may be different than the individual pre-test conditi
NAME
VALUE
Catalyst Monitor Test Status
Not Complete
ESIM Purge Monitor Test Status
Not Complete
O2 Monitor Test Status
Not Complete
O2 Heater Test Status
Not Complete
EGR Monitor Test Status
Not Complete


O2 Sensor
Back
Scale
Save
2/1 O2 Volts (0-1) (V)
0.82
0.82
0.06
1/1 O2 Volts (0-1) (V)
0.80
0.84
0.06
2/2 O2 Volts (0-1) (V)
0.65
0.69
0.61
1/2 O2 Volts (0-1) (V)
0.69
0.73
0.67
Engine Speed (RPM)
822
882
860
840
811

2011 Jeep Liberty

READINESS MONITORS

Complete

Misfire
Fuel System
Comprehensive Component

Not Complete

EGR/VVT
Catalyst
Evaporative System
Oxygen Sensor
Oxygen Sensor Heater

2011 Jeep Liberty

Conclusion:

- Vehicle had a new PCM installed last year for a no start condition.
- Somehow the software was “corrupted”.
- Flashing over the existing software fixed the monitor status.
- Vehicle passed emissions test.

2018 Ford F-150

2018 Ford F-150 2.7L EcoBoost

1FTEW1EP3JFB83506

Mileage: 86,738

Complaint: Check engine lamp on. P0430

Date: 02/12/2025 8:27 AM

Vehicle System Report

2018 Ford F-150

VIN
1FTEW1EP3JFB83506

Odometer
86,738

Created
February 12, 2025 8:27 AM

Thanks for visiting us. Below is a report that highlights any potential issues on your 2018 Ford F-150.

DIAGNOSTIC HEALTH SCAN

A check of all available systems on your vehicle was made.

Needs Attention

- Engine
- Transmission
- Body Control Module
- Tire Pressure Monitor
- Controls Interface Module - Front
- OBDII Permanent Codes ($0A)

2018 F-150

READINESS MONITORS

Complete

Misfire
Fuel System
Comprehensive Component
EGR/VVT
Oxygen Sensor
Oxygen Sensor Heater

Not Complete

Catalyst
Evaporative System

2018 F-150

Background:

- Vehicle originally came in with a P0430.
- Aftermarket cat and 4 new sensors installed.
- Vehicle returns with P0430
- OEM cats installed
- P0430 returns

P0430 - Catalyst System Efficiency Below Threshold (Bank 2)

Description:	This DTC sets when the bank 2 catalyst system efficiency is below the acceptable threshold.			
Possible Causes:	• Damaged heated oxygen sensor (HO2S) • Exhaust leaks • Damaged exhaust manifold • Damaged catalytic converter • Oil contamination • Cylinder misfiring • Downstream HO2S wires incorrectly connected • Damaged exhaust system pipe • Damaged muffler and tailpipe assembly • Leaking fuel injector • Oil contamination of the catalyst • Damaged turbocharger • Base engine concerns			
Diagnostic Aids:	Under normal closed loop fuel conditions, high efficiency catalysts have oxygen storage capability. As catalyst efficiency deteriorates, its ability to store oxygen declines. Refer to Section 1, Catalyst Efficiency Monitor, for additional information.Diagnose any base engine concerns. Refer to the Workshop Manual Section 303-00, Engine System.			
Application		**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All		GO to Pinpoint Test HF.		

2 HF: Catalyst Efficiency Monitor And Exhaust Systems

This pinpoint test is intended to diagnose the following:

- catalytic converter
- exhaust system

HF1 CHECK FOR DTCS

Are DTCs P0420 or P0430 present?

Yes	GO to HF2.
No	For symptoms without DTCs, GO to HF7. For all others, RETURN to Section 3, Symptom Charts for further direction.

HF2 CHECK FOR OTHER DTCS

Note: *Internal deterioration of a catalytic converter is usually caused by abnormal engine operation upstream of the catalyst. Events that can produce higher than normal temperatures in the catalyst are particularly suspect. For example, misfiring can cause higher than normal catalyst operating temperatures.*

Note: *Make sure the customer has not noticed a high engine oil consumption. An engine that consumes oil at a high rate deposits high levels of phosphorus on the catalyst and reduces the catalyst efficiency.*

- Carry out the PCM self-test.

2018 F-150

HF Catalyst Test

1. Check for DTC’s P0420 and P0430
2. Check for other DTC’s
3. Check ECM wiring harness
4. Check fuel pressure
5. Check for biased FRP sensor
6. Check for leaks in exhaust system
7. Check for exhaust restrictions
8. Check for excessive back pressure
9. Check for excessive back pressure with specialized tooling
10. Check manifold vacuum
11. Carry out the drive cycle

2018 F-150

HF6 CHECK FOR LEAKS IN THE EXHAUST SYSTEM

NOTICE: Pressure above 241 kPa (35 psi) can cause damage to system components. Regulate the shop air to 34.4 kPa (5 psi) before connecting to the system.

- Pressurize the exhaust system at the exhaust pipe outlet with 34.4 kPa (5 psi) regulated shop air.
- Check the exhaust system for leaks using a soap and water solution.
- Apply the soap and water solution to the following areas:
  - the exhaust flanges and gaskets
  - the universal HO2S and mounting surface
  - the exhaust system in between the universal HO2S and rear HO2S
  - the downstream HO2S and mounting surface
  - the exhaust system within 15.25 cm (6 inches) of the downstream HO2S and mounting surface
- Check the exhaust flange bolts for correct torque.
- Check the downstream HO2S for correct torque.

2018 F-150

TECHNICAL SERVICE BULLETIN **24-2184**

2.7L EcoBoost - Illuminated MIL With DTC P0420 And/Or P0430 06 June 2024

This bulletin supersedes 24-2115. Reason for update: revised Service Procedure

Model:

Ford 2018-2020 F-150	Engine: 2.7L EcoBoost

Markets: North American markets only

Issue: Some 2018-2020 F-150 vehicles equipped with a 2.7L EcoBoost may exhibit an illuminated MIL with DTC P0420 and/or P0430 stored in the PCM. This may be due to calibration and controls sensitivity. To correct the condition, follow the Service Procedure to perform the catalyst stabilization drive cycle.

Action: Follow the Service Procedure to correct the condition if the vehicle meets the following criteria:

- 2018-2020 F-150
- 2.7L engine
- Illuminated MIL with DTCs P0420 and/or P0430 stored in the PCM

2018 F-150

Catalytic Converter LH

Removal

NOTE: *If the catalytic converter is not being replaced, the HO2S and the catalyst monitor sensor do not need to be removed from the catalytic converter. Disconnecting the electrical connectors is still necessary.*

2018 F-150

*** Non-Cont. Monitoring Test Results ***

Catalyst Monitor B2

Catalyst mon. ready: No
Catalyst mon. cycle enabled: No
Catalyst mon. cycle completed: No

Manufacturer Specific Test
ECU ID: $E8 OBDMID: $22
Test ID: $81 Value: 0.750
Min: 0.000 Max: 0.660
Result: Failed

*** Non-Cont. Monitoring Test Results ***

Catalyst Monitor B1

Catalyst mon. ready: No
Catalyst mon. cycle enabled: No
Catalyst mon. cycle completed: No

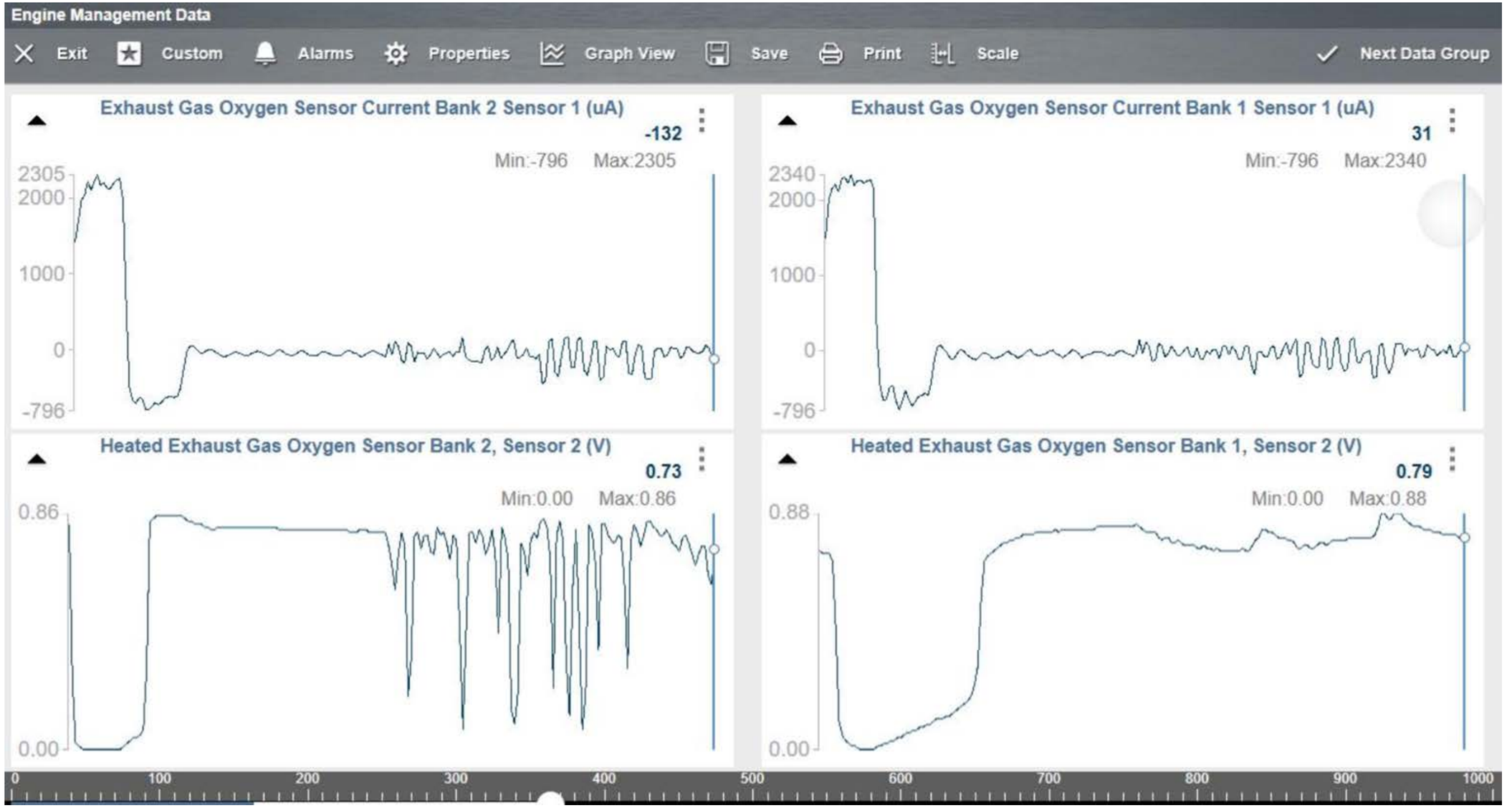
Manufacturer Specific Test
ECU ID: $E8 OBDMID: $21
Test ID: $81 Value: 0.285
Min: 0.000 Max: 0.691
Result: Passed

Generic OBD-II Freeze Frame

Exit

ECU ID : $	E8
ENGINE SPEED(RPM)	1547
RELATIVE THROTTLE POSITION(%)	6.3
ACCELERATOR PEDAL POSITION D(%)	21.2
TIME SINCE ENGINE START(s)	392
FUEL SYSTEM 1	CLOSED LOOP
Ambient Air Temperature (°F)	57
Engine Coolant Temperature (°F)	197
Barometric Pressure (inHg)	28.9
SHORT TERM FUEL TRIM BANK 1(%)	7.0
SHORT TERM FUEL TRIM BANK 2(%)	6.3
O2S VOLTAGE BANK 1 - SENSOR 2(V)	0.125
O2S CURRENT BANK 1-SENSOR 1(mA)	-374
CATALYST TEMPERATURE B2-S1 (°F)	1025.6

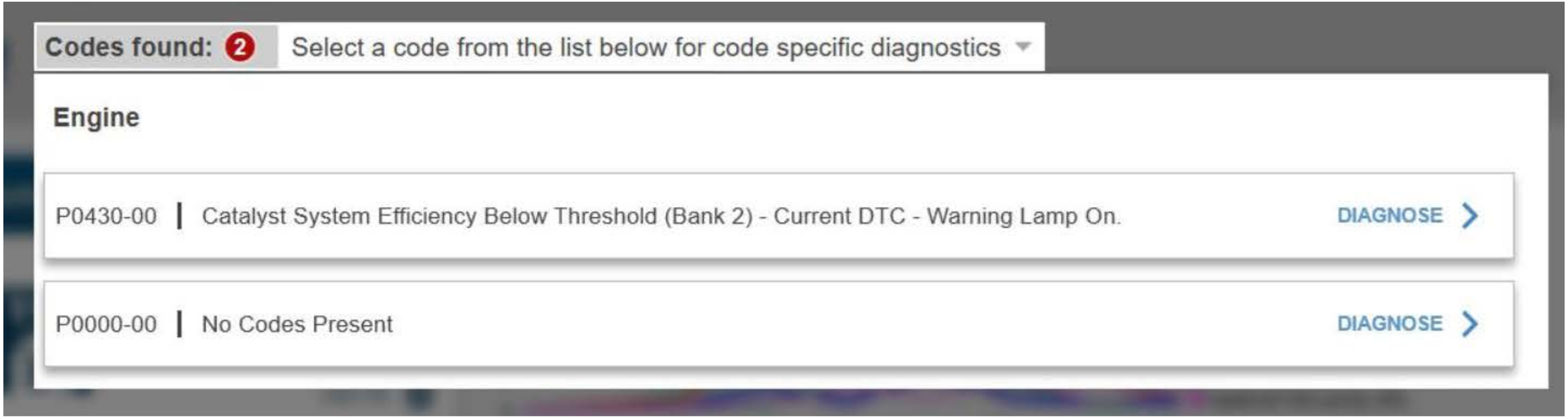
FAULT CODE DISPLAY	P0430 Catalyst System Efficiency Below Threshold (Bank 2)
ABSOLUTE THROTTLE POSITION(%)	16.5
COMMANDED THROTTLE ACT.CONTROL(%)	7.8
ACCELERATOR PEDAL POSITION E(%)	10.6
COMMANDED EQUIVALENCE RATIO	0.841
FUEL SYSTEM 2	CLOSED LOOP
Intake Air Temperature (°F)	93
INTAKE MAP (inHg)	13.8
IGNITION TIMING ADVANCE (°)	29.5
LONG TERM FUEL TRIM BANK 1(%)	-1.4
LONG TERM FUEL TRIM BANK 2(%)	0.8
SHORT TERM FUEL TRIM B1-S2(%)	Not Used
CATALYST TEMPERATURE B1-S1 (°F)	1025.6
FUEL LEVEL INPUT(%)	31.8


Engine Management Data
Exit
Custom
Alarms
Properties
Graph View
Save
Print
Scale
Next Data Group
Exhaust Gas Oxygen Sensor Current Bank 2 Sensor 1 (uA)
-132
Min:-796 Max:2305
2305
2000
1000
0
-796
Exhaust Gas Oxygen Sensor Current Bank 1 Sensor 1 (uA)
31
Min:-796 Max:2340
2340
2000
1000
0
-796
Heated Exhaust Gas Oxygen Sensor Bank 2, Sensor 2 (V)
0.73
Min:0.00 Max:0.86
0.86
0.00
Heated Exhaust Gas Oxygen Sensor Bank 1, Sensor 2 (V)
0.79
Min:0.00 Max:0.88
0.88
0.00
0
100
200
300
400
500
600
700
800
900
1000


Engine Management Data
Exit
Custom
Alarms
Properties
Graph View
Save
Print
Scale
Next Data Group
Heated Exhaust Gas Oxygen Sensor Bank 1, Sensor 2 (V)
0.80
Min:0.00 Max:0.95
0.95
0.00
Heated Exhaust Gas Oxygen Sensor Bank 2, Sensor 2 (V)
0.75
Min:0.00 Max:0.91
0.91
0.00
Exhaust Gas Oxygen Sensor Current Bank 1 Sensor 1 (uA)
94
Min:-1117 Max:2535
2535
2000
1000
0
-1117
Exhaust Gas Oxygen Sensor Current Bank 2 Sensor 1 (uA)
31
Min:-1101 Max:2469
2469
2000
1000
0
-1101


Engine Management Data
Exit
Custom
Alarms
Properties
Graph View
Save
Print
Scale
Next Data Group
Heated Exhaust Gas Oxygen Sensor Bank 1, Sensor 2 (V)
0.67
Min:0.00 Max:0.95
0.95
0.00
Heated Exhaust Gas Oxygen Sensor Bank 2, Sensor 2 (V)
0.76
Min:0.00 Max:0.91
0.91
0.00
Exhaust Gas Oxygen Sensor Current Bank 1 Sensor 1 (uA)
43
Min:-1097 Max:2535
2535
2000
1000
0
-1097
Exhaust Gas Oxygen Sensor Current Bank 2 Sensor 1 (uA)
39
Min:-1101 Max:2469
2469
2000
1000
0
-1101

2018 F-150


Codes found: 2
Select a code from the list below for code specific diagnostics
Engine
P0430-00 | Catalyst System Efficiency Below Threshold (Bank 2) - Current DTC - Warning Lamp On.
DIAGNOSE
P0000-00 | No Codes Present
DIAGNOSE

Thank You!!!

There is not enough space in the book for all of the “thank you’s” I owe. But a few people deserve a huge shout out. First and foremost, Mr. Rick Escalambre for all of his help, guidance, support, and mentorship on this project. Behind the scenes that no one sees, Bruce Ward, Gary Carlson, Keith DeFazio, Lonnie Horn, and who could ever forget Mark Warren? But most importantly Sandra Juarez, you make it all happen! From the bottom of my heart, THANK YOU, THANK YOU, and THANK YOU all again! None of this ever happens without all of you. WTI as been nothing short of amazing to work with.

Thank you “G” Truglia! For all of the years of support and always offering wisdom. The industry is in a better place because of you and your efforts to empower it. TST sets the bar and I can never thank you enough for this opportunity.

Fellow technicians, I am one of you in the bays every day selling our souls 6 minutes at a time! (Thank you for that Justin Morgan) The support and love you all have shared with me for the last few years is nothing short of amazing. I hope I make you all proud and give some inspiration that if this guy right here can do this stuff, anyone can! And I mean that with the most sincerity.

Nothing but love from me always!

-Andy Fischer

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