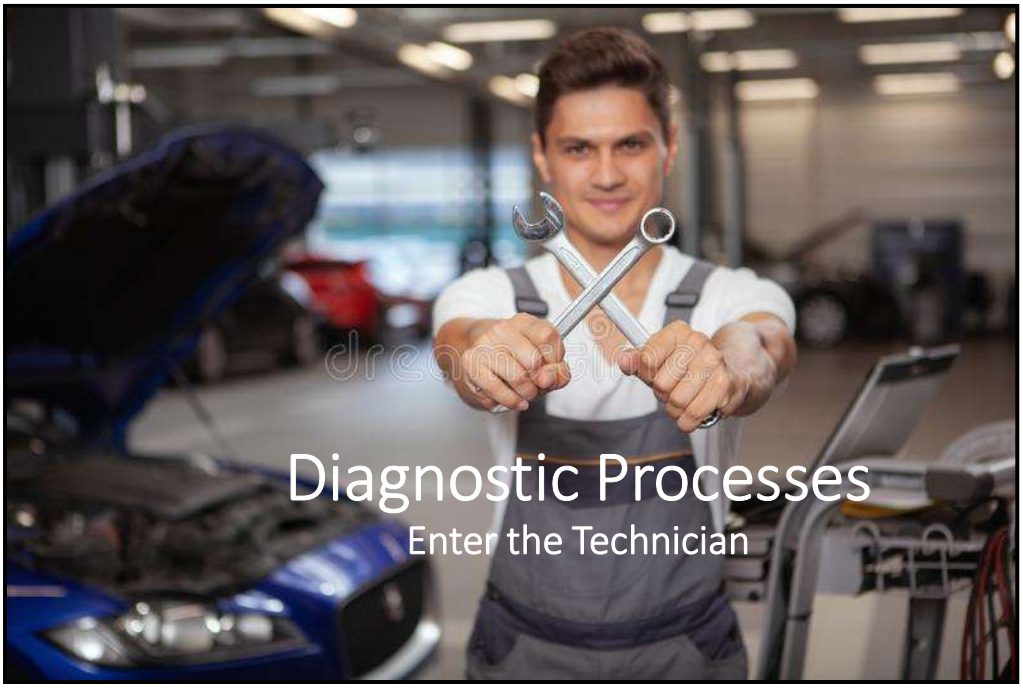

Diagnostic Process

- Description and Operation
  - How does it all Work?
- Verify the Concern
  - Confirm that the Complaint is Valid
- Verify the VIN Information
  - Confirm that there is not a VIN mismatch

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Diagnostic Process

- Check for Codes/Freeze Frame/TSB Search
  - Review Code Descriptors carefully
- Perform Visual Checks/Test Procedures
- Movement No 1
  - Technician Seeks Path
- Movement No 2
  - Technician Walks Path

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Diagnostic Process

- Perform Visual Checks/Test Procedures-Cont'd
- Movement No 3
  - Technician Completes Path
- Movement No 4
  - Technician whips its Tail

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Description and Operation

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2011 Hyundai Sonata L4-2.4 Liter (GDI)

Observations Noted

- The vehicle has an issue in terms of communication. The immobilizer system is down.
- It is clear that an understanding of how the Hyundai immobilizer system works is evident
- We must carefully review Description and Operation.

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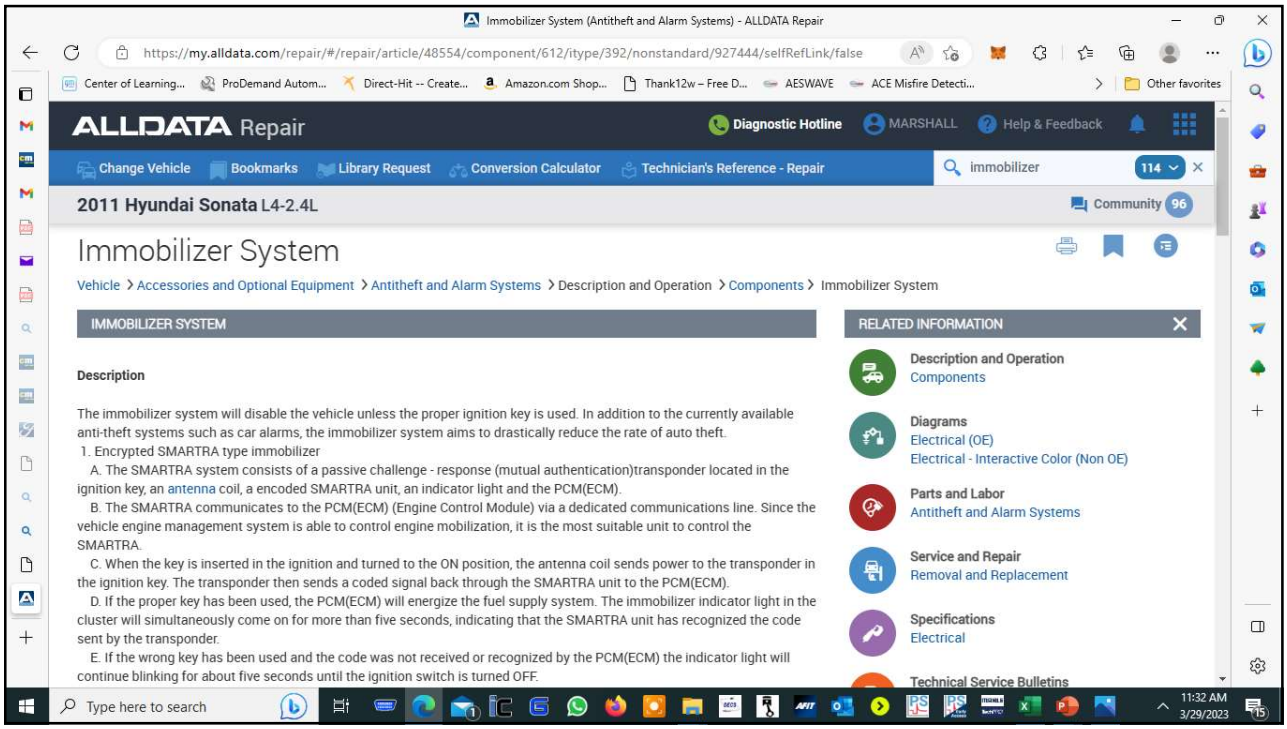
Proximity Smart Key
System Tester
CAR
SENS LEVEL
KEY
311.5 MHz
OK
TDB003
The Diagnostic BOX


Proximity Smart Key
System Tester
316.3MHz
SIGNAL STRENGTH
OK
TDB003
The Diagnostic BOX


Immobilizer System (Antitheft and Alarm Systems) - ALLDATA Repair
https://my.alldata.com/repair/#/repair/article/48554/component/612/itype/392/nonstandard/927444/selfRefLink/false
ALLDATA Repair
Diagnostic Hotline
MARSHALL
Help & Feedback
Change Vehicle
Bookmarks
Library Request
Conversion Calculator
Technician's Reference - Repair
immobilizer
114
2011 Hyundai Sonata L4-2.4L
Community 96
Immobilizer System
Vehicle > Accessories and Optional Equipment > Antitheft and Alarm Systems > Description and Operation > Components > Immobilizer System
IMMOBILIZER SYSTEM
Description
The immobilizer system will disable the vehicle unless the proper ignition key is used. In addition to the currently available anti-theft systems such as car alarms, the immobilizer system aims to drastically reduce the rate of auto theft.
1. Encrypted SMARTRA type immobilizer
A. The SMARTRA system consists of a passive challenge - response (mutual authentication)transponder located in the ignition key, an antenna coil, a encoded SMARTRA unit, an indicator light and the PCM(ECM).
B. The SMARTRA communicates to the PCM(ECM) (Engine Control Module) via a dedicated communications line. Since the vehicle engine management system is able to control engine mobilization, it is the most suitable unit to control the SMARTRA.
C. When the key is inserted in the ignition and turned to the ON position, the antenna coil sends power to the transponder in the ignition key. The transponder then sends a coded signal back through the SMARTRA unit to the PCM(ECM).
D. If the proper key has been used, the PCM(ECM) will energize the fuel supply system. The immobilizer indicator light in the cluster will simultaneously come on for more than five seconds, indicating that the SMARTRA unit has recognized the code sent by the transponder.
E. If the wrong key has been used and the code was not received or recognized by the PCM(ECM) the indicator light will continue blinking for about five seconds until the ignition switch is turned OFF.
RELATED INFORMATION
Description and Operation
Components
Diagrams
Electrical (OE)
Electrical - Interactive Color (Non OE)
Parts and Labor
Antitheft and Alarm Systems
Service and Repair
Removal and Replacement
Specifications
Electrical
Technical Service Bulletins
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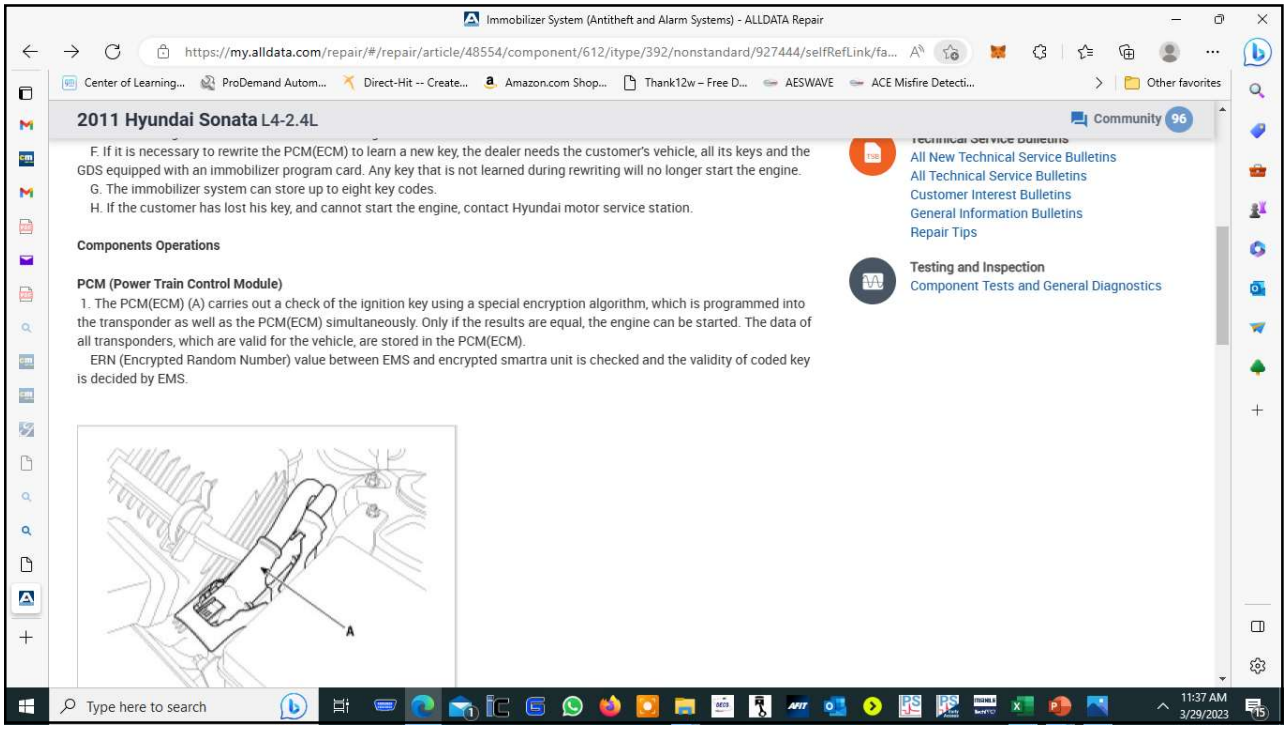
3/29/2023


Immobilizer System (Antitheft and Alarm Systems) - ALLDATA Repair
https://my.alldata.com/repair/#/repair/article/48554/component/612/itype/392/nonstandard/927444/selfRefLink/fa...
2011 Hyundai Sonata L4-2.4L
Community 96
F. If it is necessary to rewrite the PCM(ECM) to learn a new key, the dealer needs the customer's vehicle, all its keys and the GDS equipped with an immobilizer program card. Any key that is not learned during rewriting will no longer start the engine.
G. The immobilizer system can store up to eight key codes.
H. If the customer has lost his key, and cannot start the engine, contact Hyundai motor service station.
Components Operations
PCM (Power Train Control Module)
1. The PCM(ECM) (A) carries out a check of the ignition key using a special encryption algorithm, which is programmed into the transponder as well as the PCM(ECM) simultaneously. Only if the results are equal, the engine can be started. The data of all transponders, which are valid for the vehicle, are stored in the PCM(ECM).
ERN (Encrypted Random Number) value between EMS and encrypted smartra unit is checked and the validity of coded key is decided by EMS.
A
All New Technical Service Bulletins
All Technical Service Bulletins
Customer Interest Bulletins
General Information Bulletins
Repair Tips
Testing and Inspection
Component Tests and General Diagnostics
Type here to search
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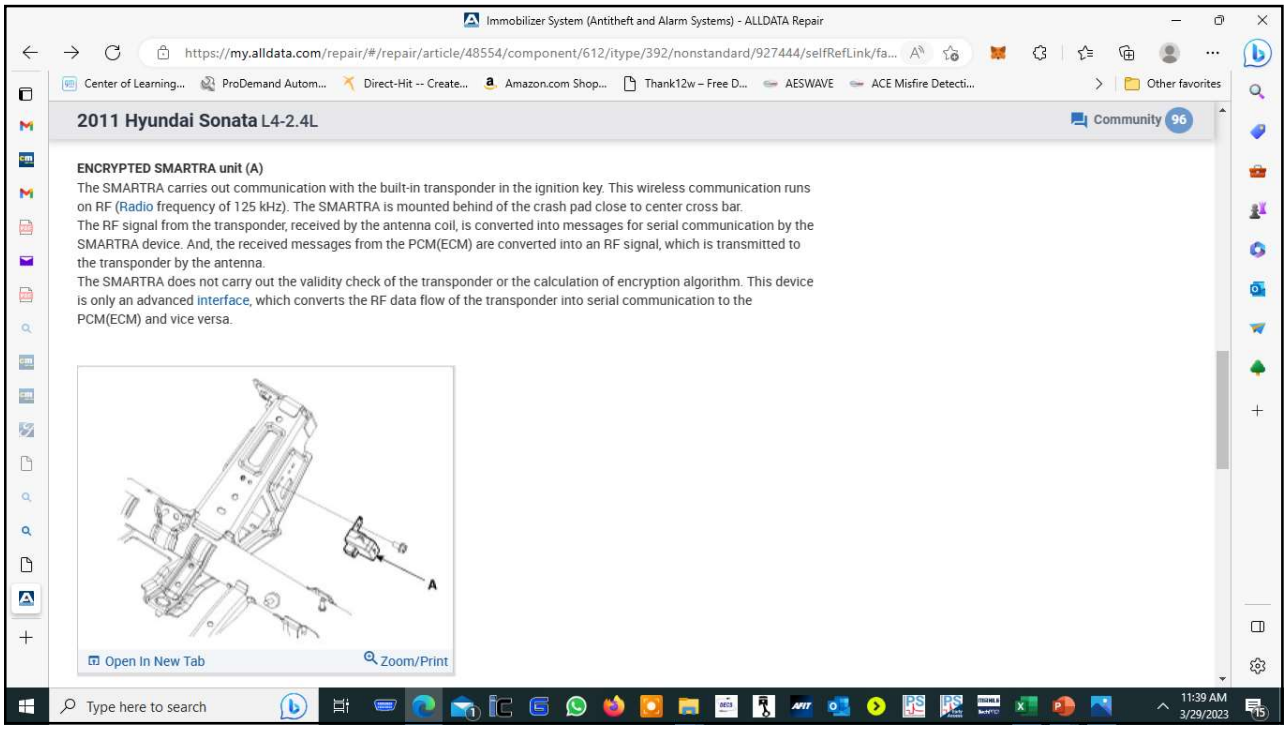
3/29/2023


Immobilizer System (Antitheft and Alarm Systems) - ALLDATA Repair
https://my.alldata.com/repair/#/repair/article/48554/component/612/itype/392/nonstandard/927444/selfRefLink/fa...
Center of Learning...
ProDemand Autom...
Direct-Hit -- Create...
Amazon.com Shop...
Thank12w – Free D...
AESWAVE
ACE Misfire Detecti...
Other favorites
2011 Hyundai Sonata L4-2.4L
Community 96
ENCRYPTED SMARTRA unit (A)
The SMARTRA carries out communication with the built-in transponder in the ignition key. This wireless communication runs on RF (Radio frequency of 125 kHz). The SMARTRA is mounted behind of the crash pad close to center cross bar.
The RF signal from the transponder, received by the antenna coil, is converted into messages for serial communication by the SMARTRA device. And, the received messages from the PCM(ECM) are converted into an RF signal, which is transmitted to the transponder by the antenna.
The SMARTRA does not carry out the validity check of the transponder or the calculation of encryption algorithm. This device is only an advanced interface, which converts the RF data flow of the transponder into serial communication to the PCM(ECM) and vice versa.
A
Open In New Tab
Zoom/Print
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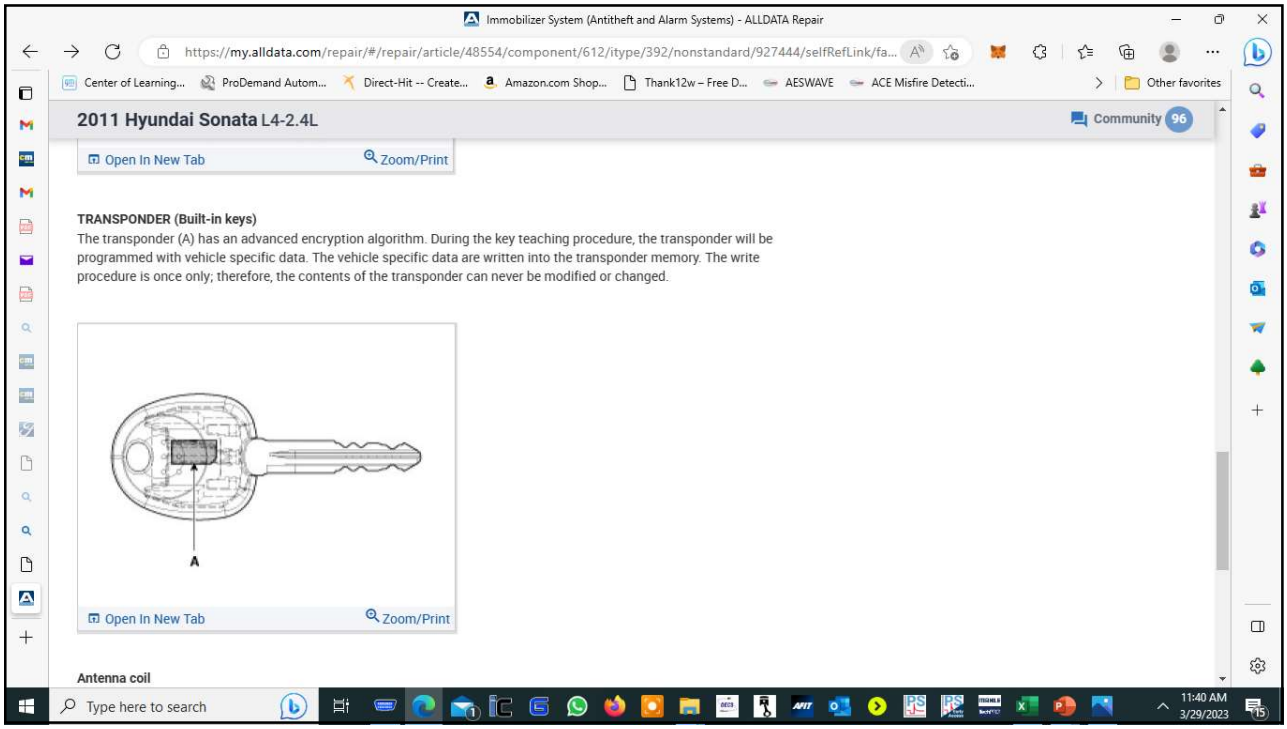
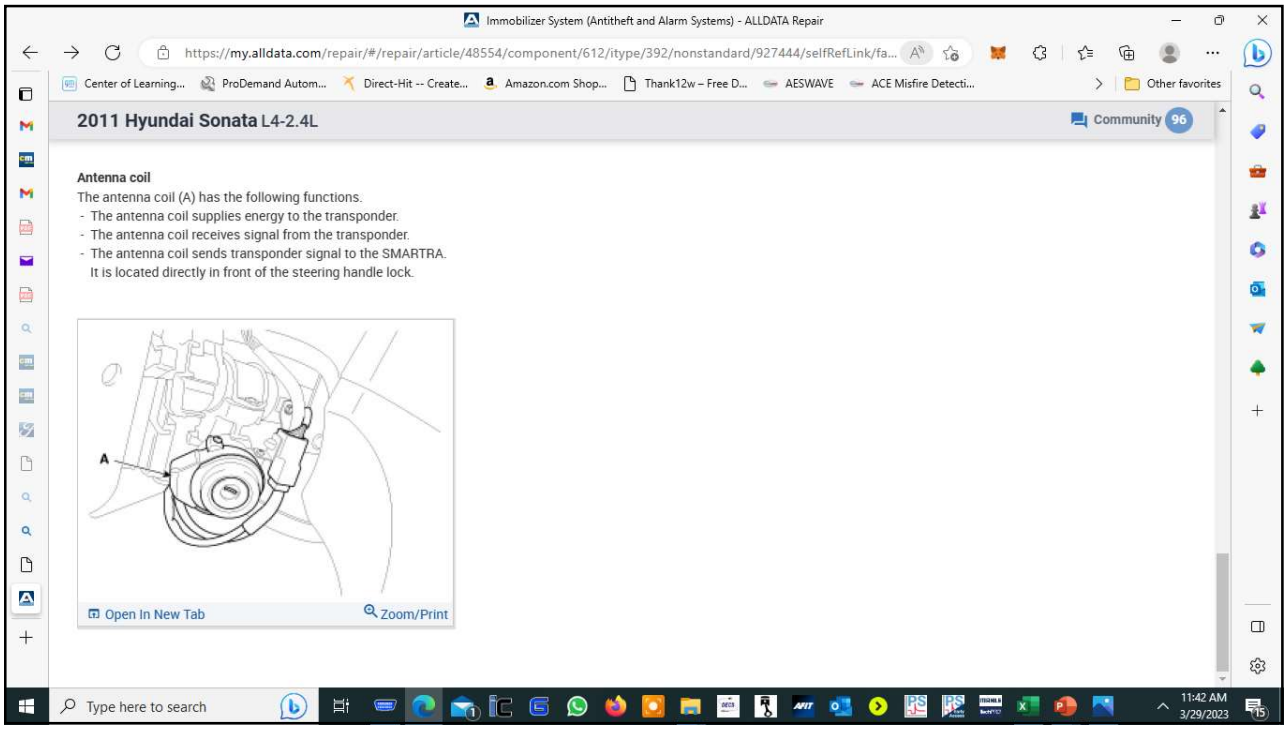
3/29/2023


Immobilizer System (Antitheft and Alarm Systems) - ALLDATA Repair
https://my.alldata.com/repair/#/repair/article/48554/component/612/itype/392/nonstandard/927444/selfRefLink/fa...
Center of Learning...
ProDemand Autom...
Direct-Hit -- Create...
Amazon.com Shop...
Thank12w – Free D...
AESWAVE
ACE Misfire Detecti...
Other favorites
2011 Hyundai Sonata L4-2.4L
Community 96
Open In New Tab
Zoom/Print
TRANSPONDER (Built-in keys)
The transponder (A) has an advanced encryption algorithm. During the key teaching procedure, the transponder will be programmed with vehicle specific data. The vehicle specific data are written into the transponder memory. The write procedure is once only; therefore, the contents of the transponder can never be modified or changed.
A
Open In New Tab
Zoom/Print
Antenna coil
Type here to search
11:40 AM
3/29/2023



Verify the Concern

A Case Study

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2012 Ford Explorer – 2.0 Liter Ecoboost

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Observations Noted

- The vehicle owner complains that there is a ‘ “Check Engine Light” On. The vehicle appears to have intermittent misfire activity.
- The shop has replaced the coil no. 4. But, the engine continues to misfire intermittently on that cylinder.
- An attempt must be made to confirm the customers concern.

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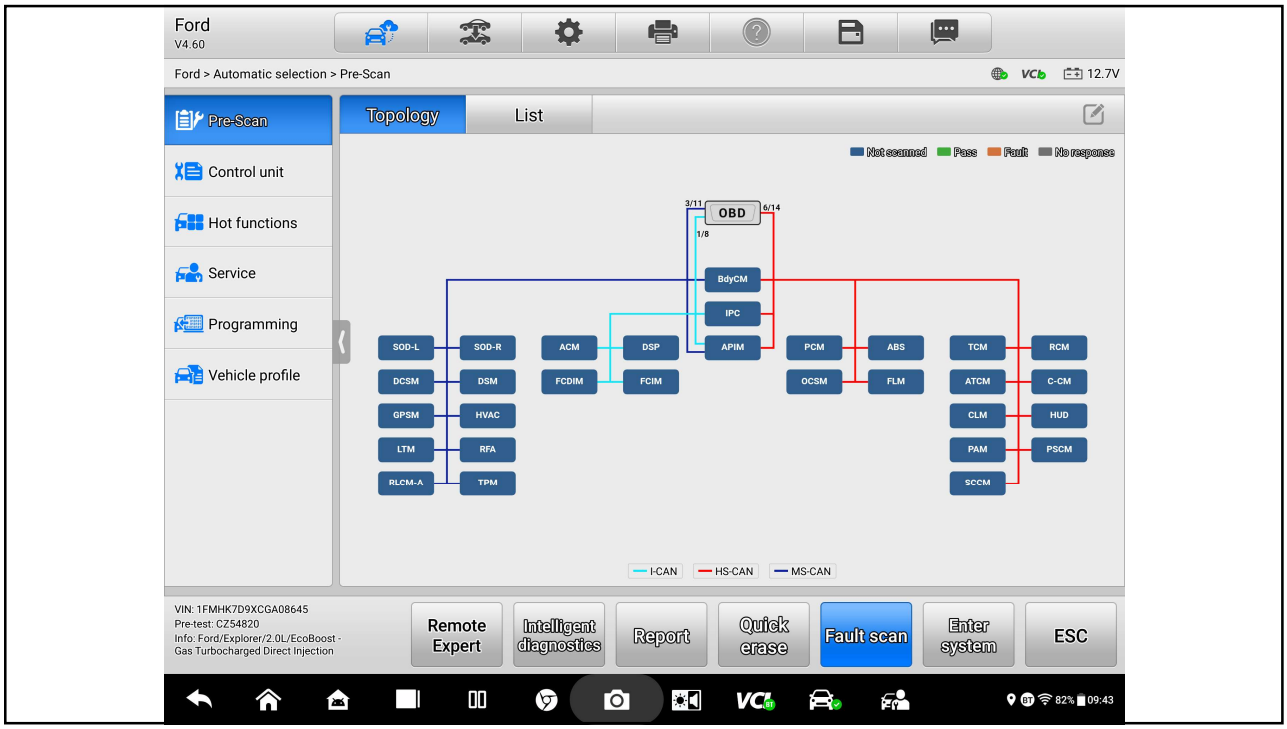
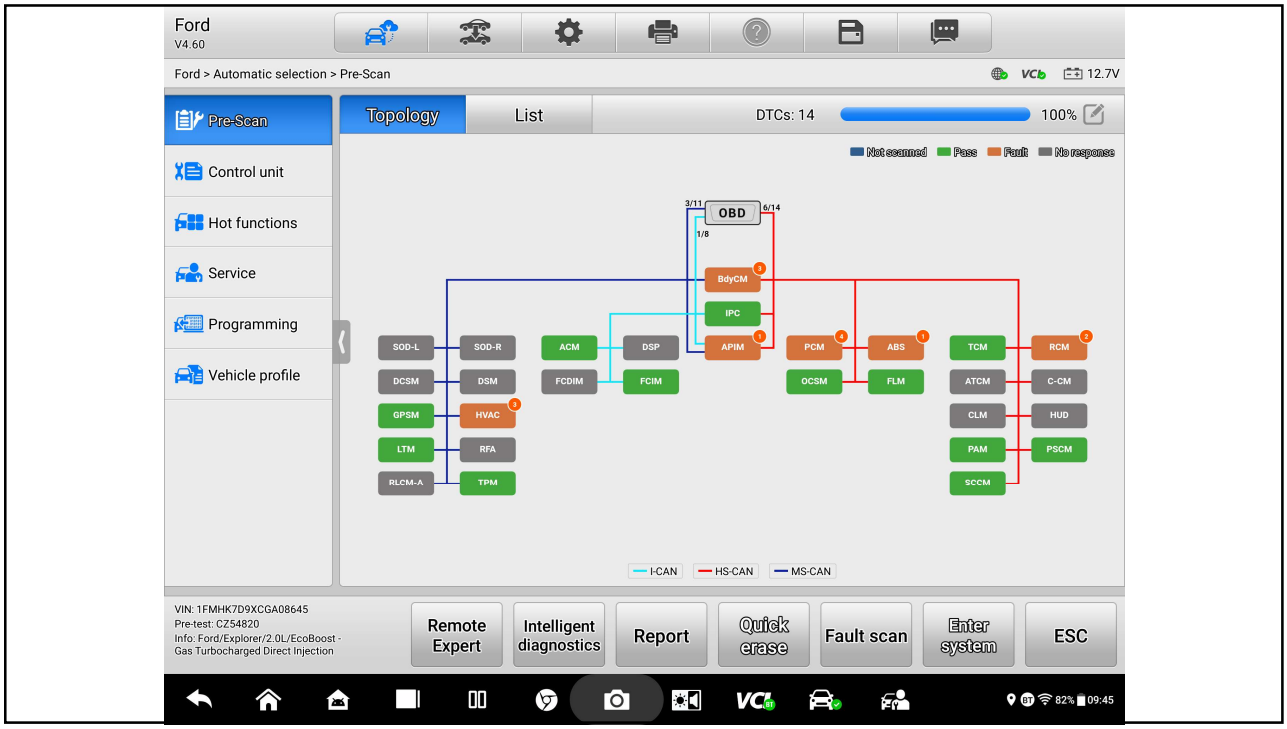
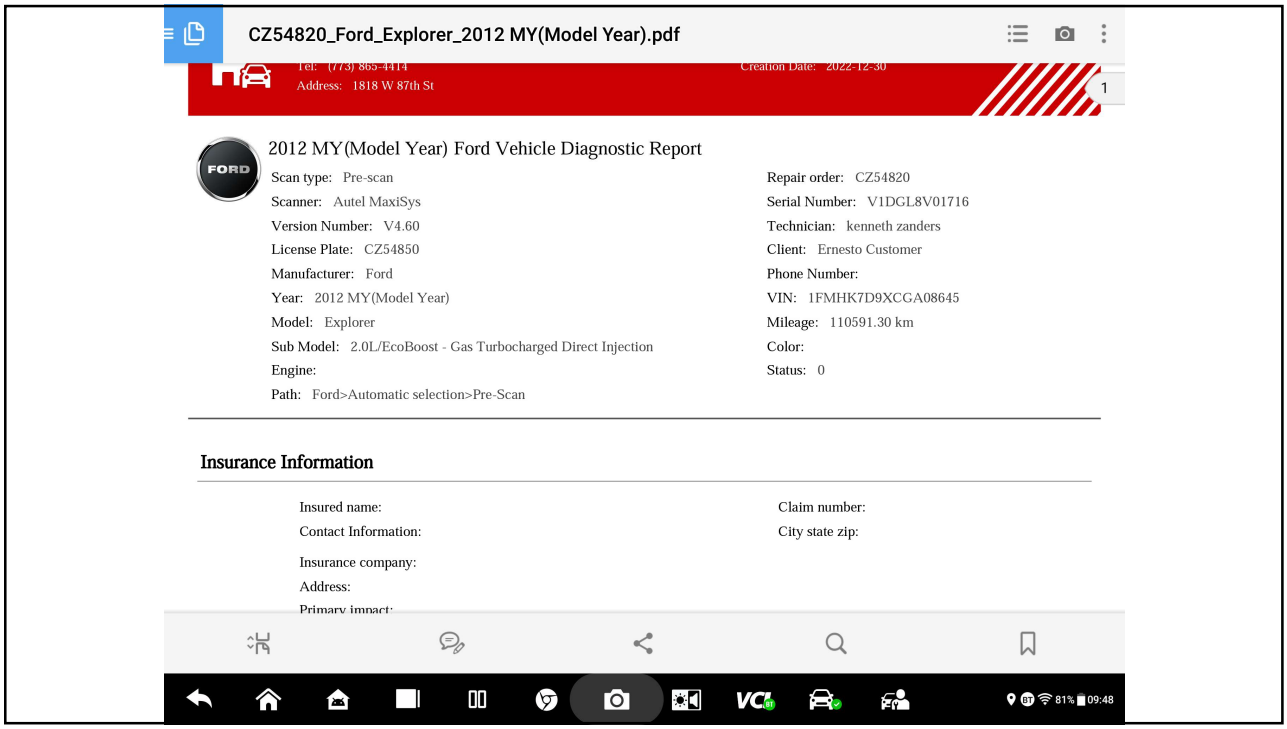
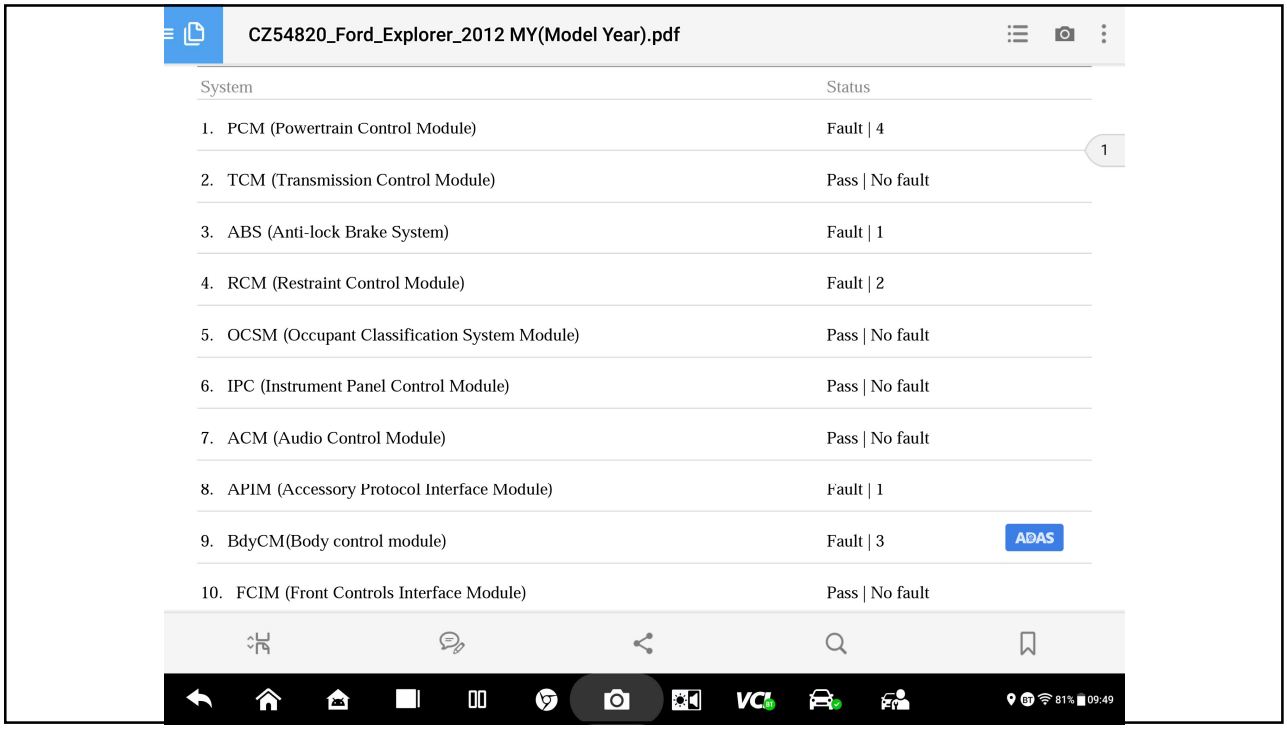
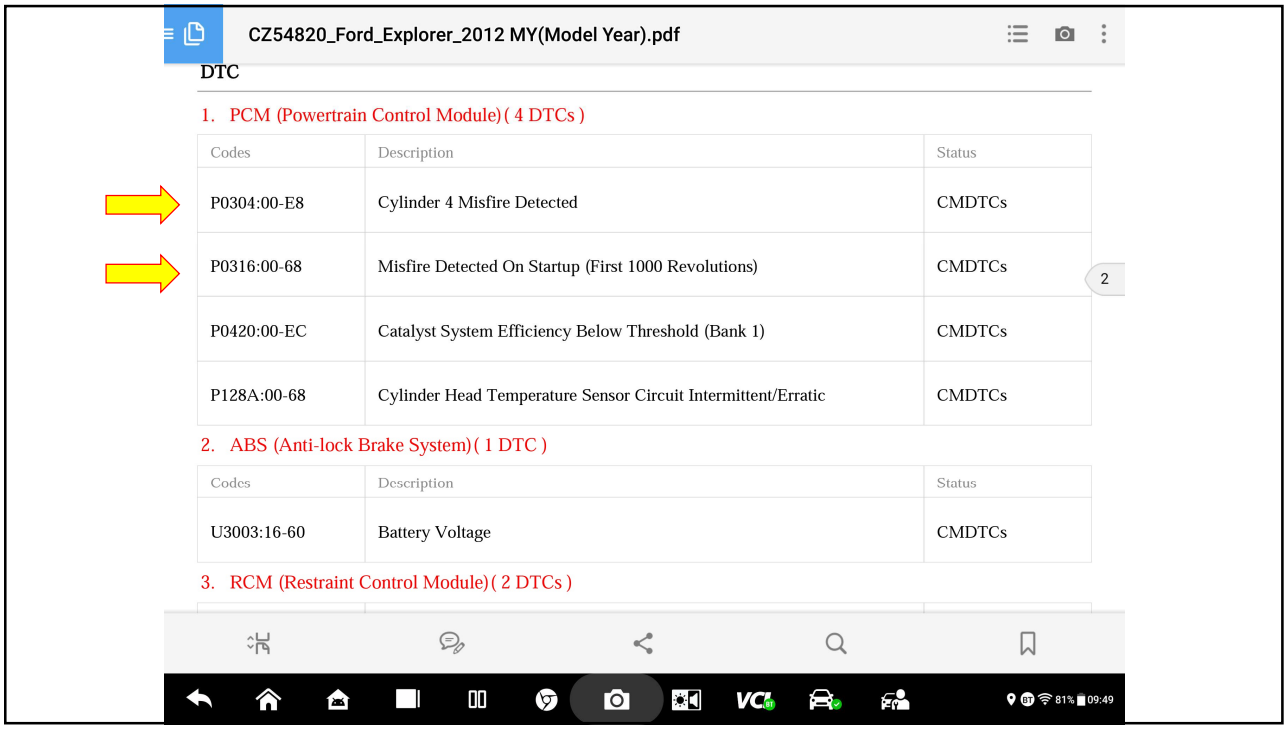

Ford
V4.60
Ford > Automatic selection > Pre-Scan
12.7V
Pre-Scan
Control unit
Hot functions
Service
Programming
Vehicle profile
Topology
List
Not scanned
Pass
Fault
No response
OBD
3/11
6/14
1/8
BdyCM
IPC
APIM
SOD-L
SOD-R
ACM
DSP
PCM
ABS
TCM
RCM
DCSM
DSM
FCDIM
FCIM
OCSM
FLM
ATCM
C-CM
GPSM
HVAC
CLM
HUD
LTM
RFA
PAM
PSCM
RLCM-A
TPM
SCCM
I-CAN
HS-CAN
MS-CAN
VIN: 1FMHK7D9XCGA08645
Pre-test: CZ54820
Info: Ford/Explorer/2.0L/EcoBoost - Gas Turbocharged Direct Injection
Remote Expert
Intelligent diagnostics
Report
Quick erase
Fault scan
Enter system
ESC
82%
09:43

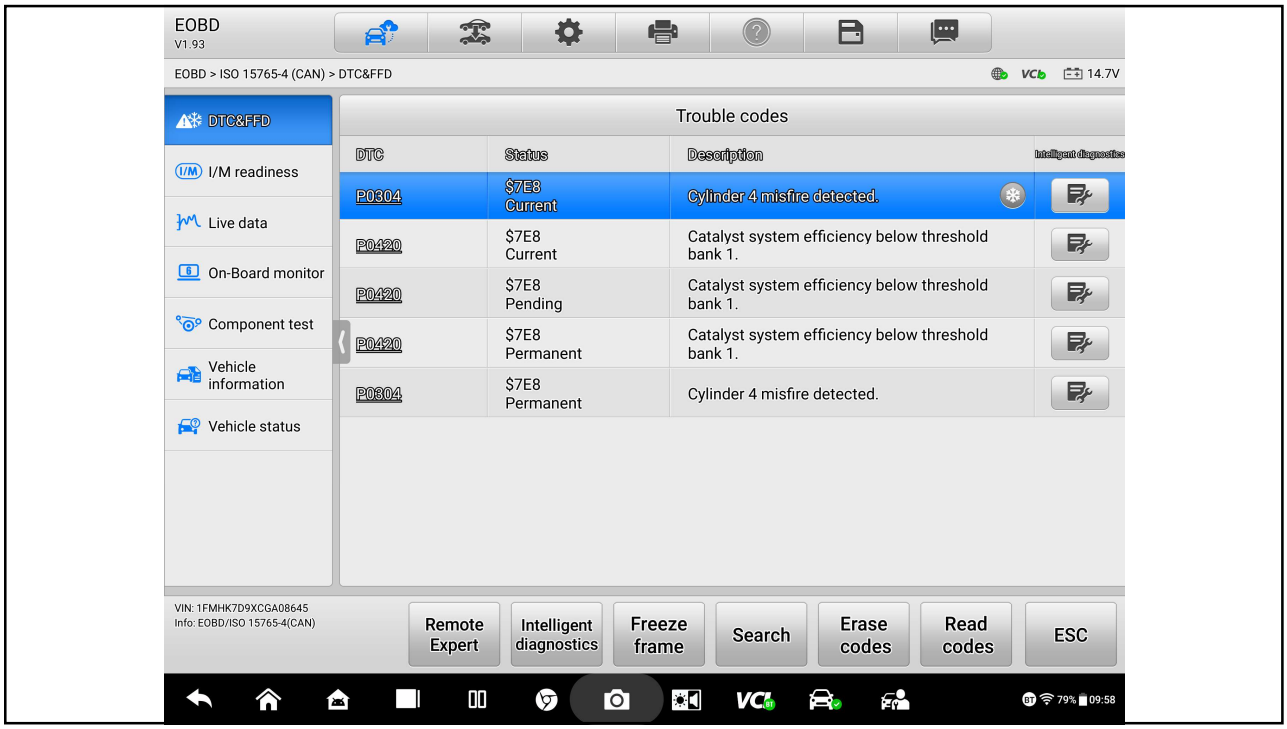

Ford
V4.60
Ford > Automatic selection > Pre-Scan
12.7V
Pre-Scan
Control unit
Hot functions
Service
Programming
Vehicle profile
Topology
List
DTCs: 14
100%
Not scanned
Pass
Fault
No response
OBD
3/11
6/14
1/8
BdyCM
IPC
APIM
SOD-L
SOD-R
ACM
DSP
PCM
ABS
TCM
RCM
DCSM
DSM
FCDIM
FCIM
OCSM
FLM
ATCM
C-CM
GPSM
HVAC
CLM
HUD
LTM
RFA
PAM
PSCM
RLCM-A
TPM
SCCM
I-CAN
HS-CAN
MS-CAN
VIN: 1FMHK7D9XCGA08645
Pre-test: CZ54820
Info: Ford/Explorer/2.0L/EcoBoost - Gas Turbocharged Direct Injection
Remote Expert
Intelligent diagnostics
Report
Quick erase
Fault scan
Enter system
ESC
82%
09:45

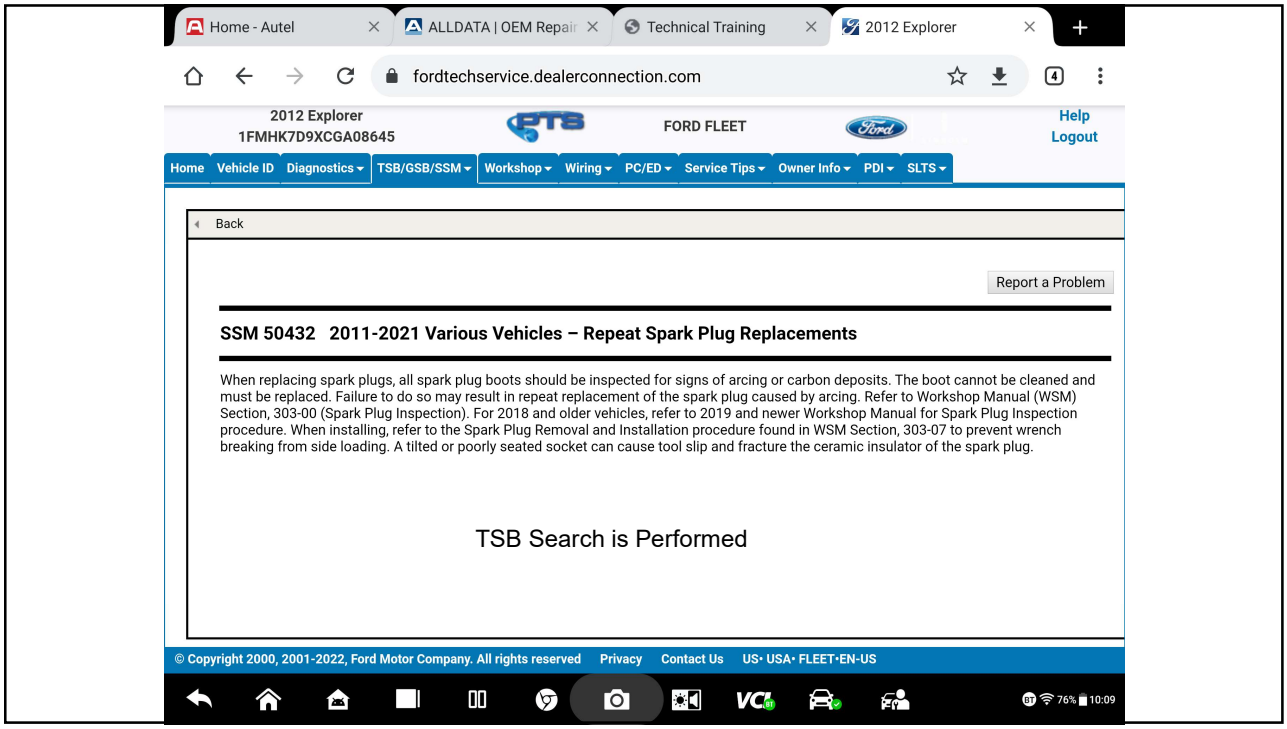

CZ54820_Ford_Explorer_2012 MY(Model Year).pdf
Tel: (773) 865-4414
Address: 1818 W 87th St
Creation Date: 2022-12-30
1
2012 MY(Model Year) Ford Vehicle Diagnostic Report
Scan type: Pre-scan
Scanner: Autel MaxiSys
Version Number: V4.60
License Plate: CZ54850
Manufacturer: Ford
Year: 2012 MY(Model Year)
Model: Explorer
Sub Model: 2.0L/EcoBoost - Gas Turbocharged Direct Injection
Engine:
Path: Ford>Automatic selection>Pre-Scan
Repair order: CZ54820
Serial Number: V1DGL8V01716
Technician: kenneth zanders
Client: Ernesto Customer
Phone Number:
VIN: 1FMHK7D9XCGA08645
Mileage: 110591.30 km
Color:
Status: 0
Insurance Information
Insured name:
Contact Information:
Insurance company:
Address:
Primary impact:
Claim number:
City state zip:
81% 09:48


CZ54820_Ford_Explorer_2012 MY(Model Year).pdf
System
Status
1. PCM (Powertrain Control Module) Fault | 4
2. TCM (Transmission Control Module) Pass | No fault
3. ABS (Anti-lock Brake System) Fault | 1
4. RCM (Restraint Control Module) Fault | 2
5. OCSM (Occupant Classification System Module) Pass | No fault
6. IPC (Instrument Panel Control Module) Pass | No fault
7. ACM (Audio Control Module) Pass | No fault
8. APIM (Accessory Protocol Interface Module) Fault | 1
9. BdyCM(Body control module) Fault | 3
ADAS
10. FCIM (Front Controls Interface Module) Pass | No fault
1
81% 09:49


CZ54820_Ford_Explorer_2012 MY(Model Year).pdf
DTC
1. PCM (Powertrain Control Module) (4 DTCs)
Codes
Description
Status
P0304:00-E8
Cylinder 4 Misfire Detected
CMDTCs
P0316:00-68
Misfire Detected On Startup (First 1000 Revolutions)
CMDTCs
P0420:00-EC
Catalyst System Efficiency Below Threshold (Bank 1)
CMDTCs
P128A:00-68
Cylinder Head Temperature Sensor Circuit Intermittent/Erratic
CMDTCs
2. ABS (Anti-lock Brake System) (1 DTC)
Codes
Description
Status
U3003:16-60
Battery Voltage
CMDTCs
3. RCM (Restraint Control Module) (2 DTCs)
2


Ford
V4.60
Ford > Automatic selection > Control unit > PCM (Powertrain Control Module) > Live data
14.7V
Name
3 items selected
Value
Range
Unit
Long term fuel trim 1(%)
Rear O2 Fuel Trim - Bank 1(%)
Short term fuel trim 1(%)
15.62
-1.13
1.56
03:40
03:41
03:42
03:43
03:44
03:45
03:46
03:47
03:48
03:49
Cancel All
Show all
Cancel merging
To Top
Setting
Clear Data
Freeze
Record
Review
Back


EOBD
V1.93
EOBD > ISO 15765-4 (CAN) > DTC&FFD
14.7V
DTC&FFD
I/M readiness
Live data
On-Board monitor
Component test
Vehicle information
Vehicle status
Trouble codes
DTC
Status
Description
P0304
$7E8 Current
Cylinder 4 misfire detected.
P0420
$7E8 Current
Catalyst system efficiency below threshold bank 1.
P0420
$7E8 Pending
Catalyst system efficiency below threshold bank 1.
P0420
$7E8 Permanent
Catalyst system efficiency below threshold bank 1.
P0804
$7E8 Permanent
Cylinder 4 misfire detected.
VIN: 1FMHK7D9XCGA08645
Info: EOBD/ISO 15765-4(CAN)
Remote Expert
Intelligent diagnostics
Freeze frame
Search
Erase codes
Read codes
ESC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2012 Explorer
fordtechservice.dealerconnection.com
2012 Explorer
1FMHK7D9XCGA08645
FORD FLEET
Help
Logout
Home
Vehicle ID
Diagnostics
TSB/GSB/SSM
Workshop
Wiring
PC/ED
Service Tips
Owner Info
PDI
SLTS
Back
Report a Problem
SSM 50432 2011-2021 Various Vehicles – Repeat Spark Plug Replacements
When replacing spark plugs, all spark plug boots should be inspected for signs of arcing or carbon deposits. The boot cannot be cleaned and must be replaced. Failure to do so may result in repeat replacement of the spark plug caused by arcing. Refer to Workshop Manual (WSM) Section, 303-00 (Spark Plug Inspection). For 2018 and older vehicles, refer to 2019 and newer Workshop Manual for Spark Plug Inspection procedure. When installing, refer to the Spark Plug Removal and Installation procedure found in WSM Section, 303-07 to prevent wrench breaking from side loading. A tilted or poorly seated socket can cause tool slip and fracture the ceramic insulator of the spark plug.
TSB Search is Performed
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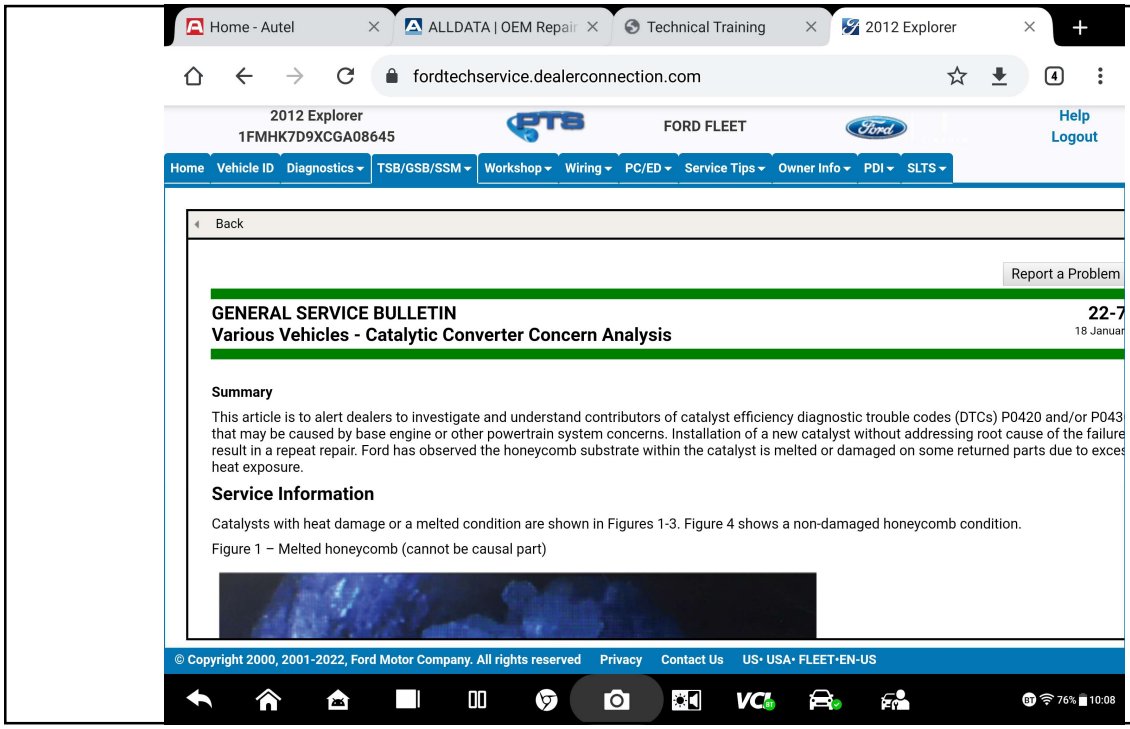
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Wiring
PC/ED
Service Tips
Owner Info
PDI
SLTS
Back
Report a Problem
GENERAL SERVICE BULLETIN
Various Vehicles - Catalytic Converter Concern Analysis
22-7
18 Januar
Summary
This article is to alert dealers to investigate and understand contributors of catalyst efficiency diagnostic trouble codes (DTCs) P0420 and/or P043
that may be caused by base engine or other powertrain system concerns. Installation of a new catalyst without addressing root cause of the failure
result in a repeat repair. Ford has observed the honeycomb substrate within the catalyst is melted or damaged on some returned parts due to exces
heat exposure.
Service Information
Catalysts with heat damage or a melted condition are shown in Figures 1-3. Figure 4 shows a non-damaged honeycomb condition.
Figure 1 – Melted honeycomb (cannot be causal part)
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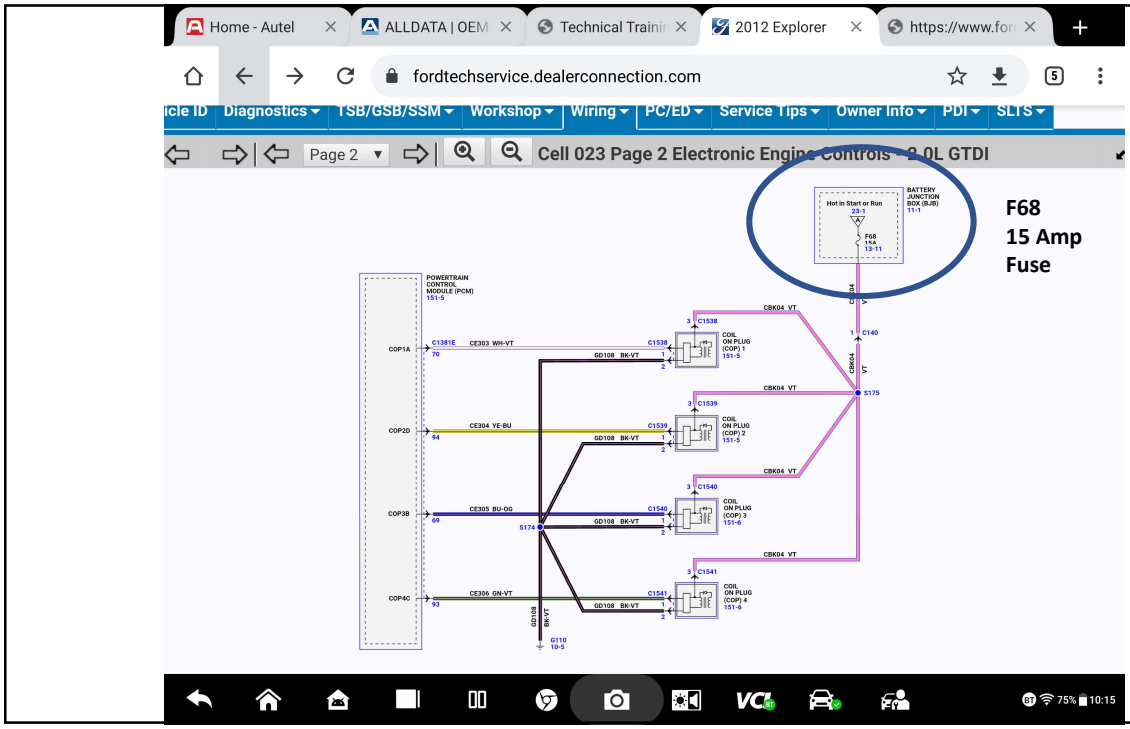
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2012 Explorer
https://www.for
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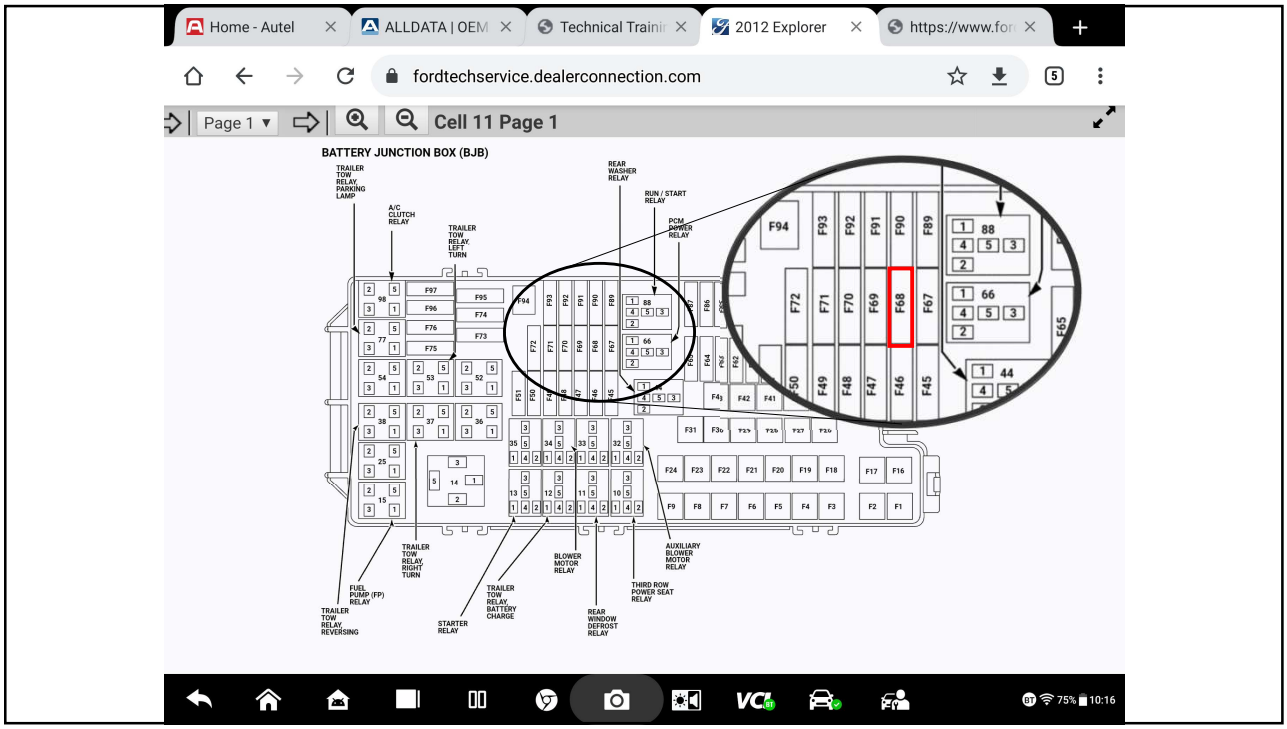
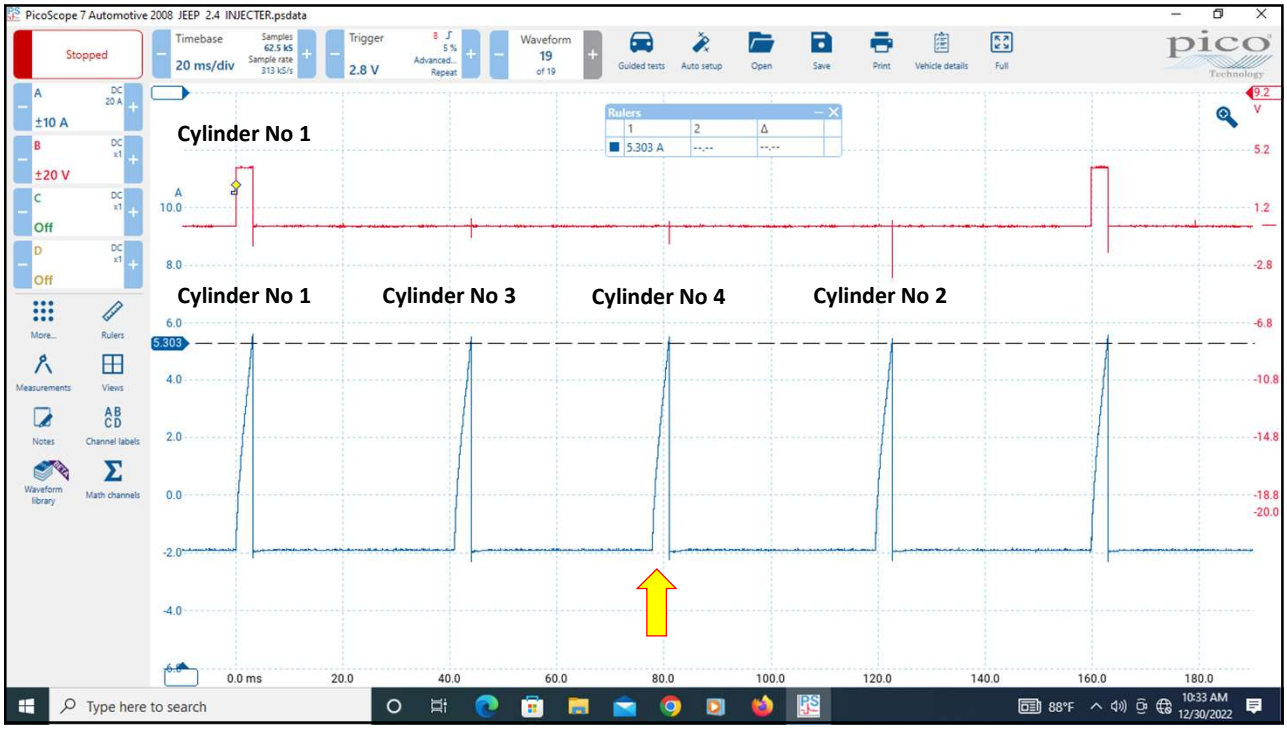
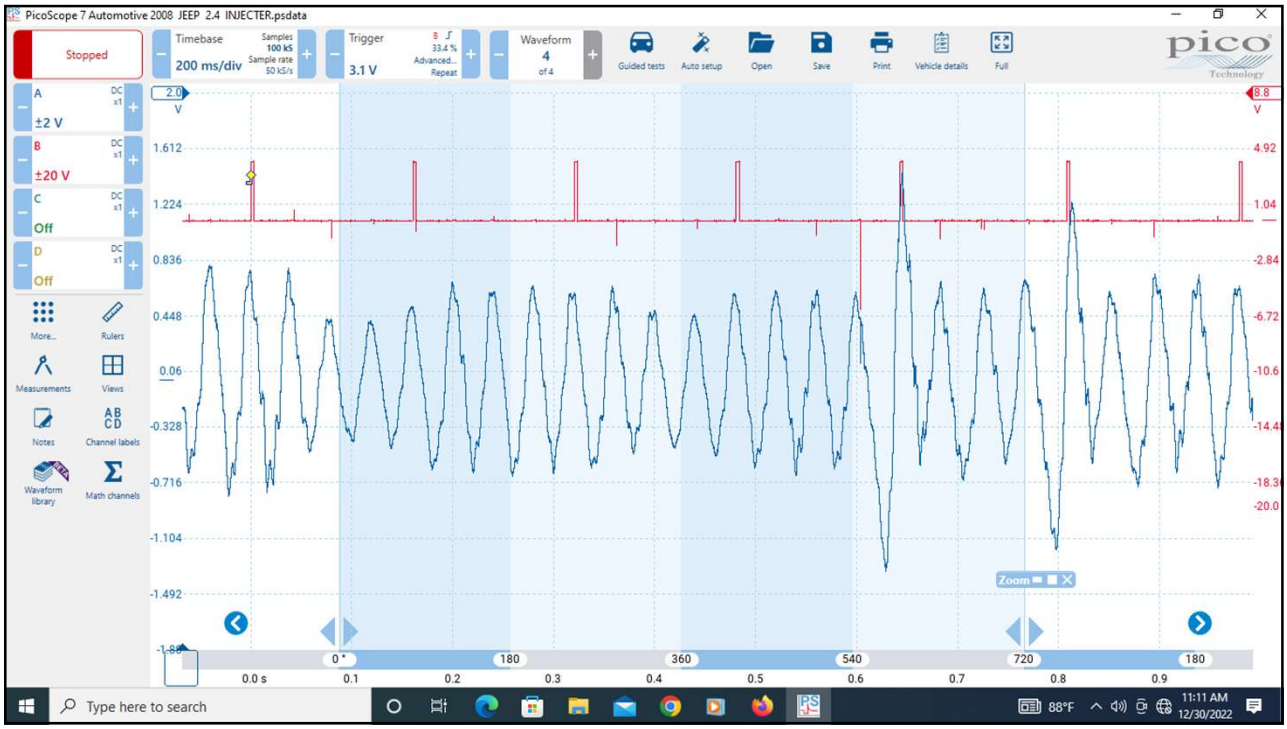
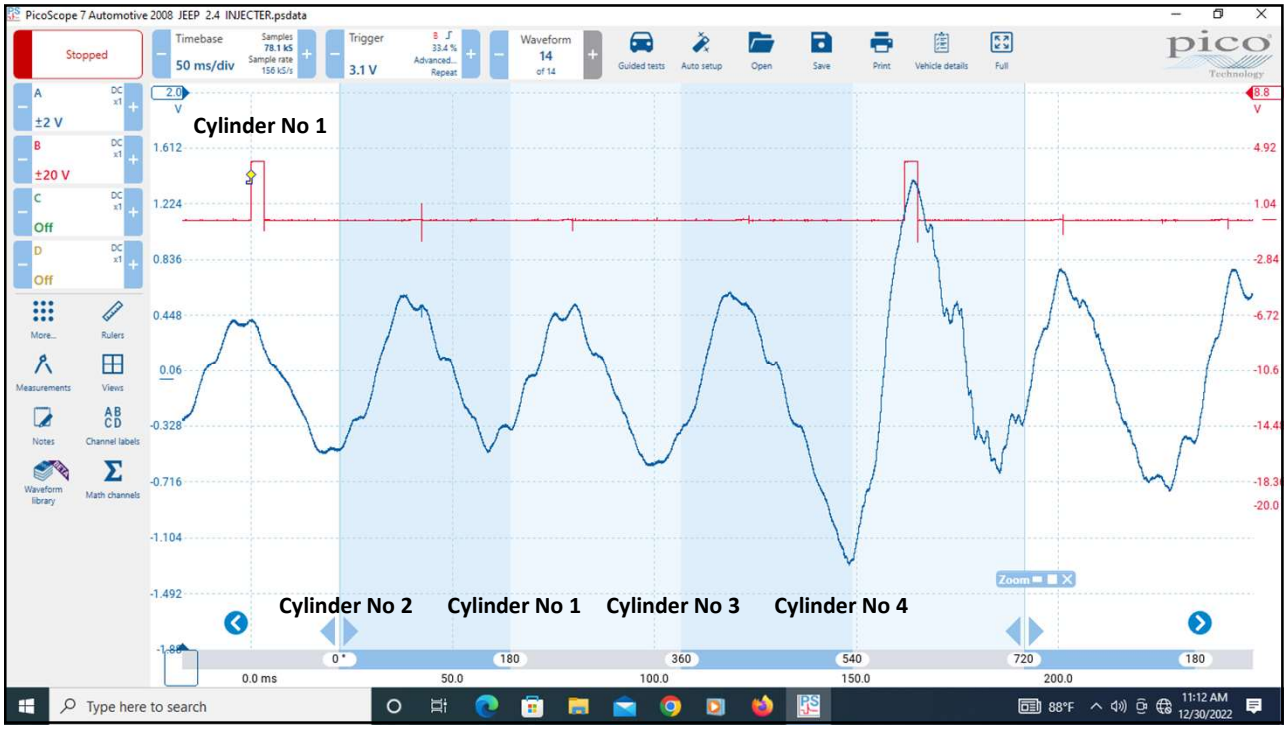
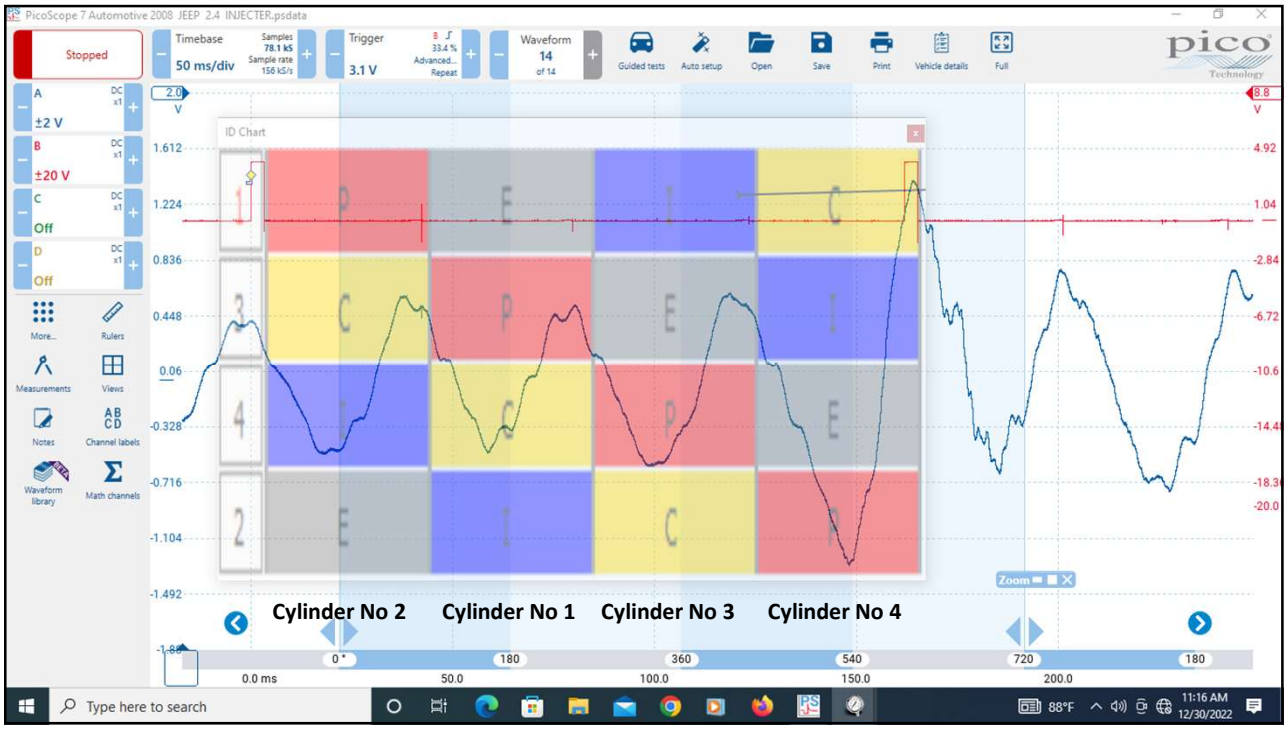
Workshop
Wiring
PC/ED
Service Tips
Owner Info
PDI
SLTS
Page 2
Cell 023 Page 2 Electronic Engine Controls
F68
15 Amp
Fuse


Home - Autel
ALLDATA | OEM
Technical Traini
2012 Explorer
https://www.for
fordtechservice.dealerconnection.com
Page 1
Cell 11 Page 1
BATTERY JUNCTION BOX (BJB)
TRAILER TOW RELAY, PARKING LAMP
A/C CLUTCH RELAY
TRAILER TOW RELAY LEFT TURN
REAR WASHER RELAY
RUN / START RELAY
PCM POWER RELAY
TRAILER TOW RELAY, RIGHT TURN
FUEL PUMP (FP) RELAY
TRAILER TOW RELAY, REVERSING
STARTER RELAY
TRAILER TOW RELAY, BATTERY CHARGE
BLOWER MOTOR RELAY
REAR WINDOW DEFROST RELAY
THIRD ROW POWER SEAT RELAY
AUXILIARY BLOWER MOTOR RELAY


PicoScope 7 Automotive 2008 JEEP 2.4 INJECTER.psdata
Stopped
Timebase
20 ms/div
Trigger
2.8 V
Waveform
19
of 19
Guided tests
Auto setup
Open
Save
Print
Vehicle details
Full
Rulers
Cylinder No 1
Cylinder No 1
Cylinder No 3
Cylinder No 4
Cylinder No 2
5.303
0.0 ms
20.0
40.0
60.0
80.0
100.0
120.0
140.0
160.0
180.0
Type here to search
88°F
10:33 AM
12/30/2022


PicoScope 7 Automotive 2008 JEEP 2.4 INJECTER.psdata
Stopped
Timebase
200 ms/div
Trigger
3.1 V
Waveform
4
of 4
Guided tests
Auto setup
Open
Save
Print
Vehicle details
Full
pico
Technology
A
±2 V
B
±20 V
C
Off
D
Off
More...
Rulers
Measurements
Views
Notes
Channel labels
Waveform library
Math channels
2.0
V
1.612
1.224
0.836
0.448
0.06
-0.328
-0.716
-1.104
-1.492
8.8
V
4.92
1.04
-2.84
-6.72
-10.6
-14.4
-18.3
-20.0
Zoom
0 °
180
360
540
720
180
0.0 s
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Type here to search
88°F
11:11 AM
12/30/2022


PicoScope 7 Automotive 2008 JEEP 2.4 INJECTER.psdata
Stopped
Timebase
50 ms/div
Trigger
3.1 V
Waveform
14
of 14
Guided tests
Auto setup
Open
Save
Print
Vehicle details
Full
pico
Technology
Cylinder No 1
Cylinder No 2
Cylinder No 1
Cylinder No 3
Cylinder No 4
0.0 ms
50.0
100.0
150.0
200.0
Type here to search
88°F
11:12 AM
12/30/2022


Cylinder No 2
Cylinder No 1
Cylinder No 3
Cylinder No 4


TERRA TRAC® HTS
TERRA TRAC® AT II
Cylinder No 1
Cylinder No 2
Cylinder No 3
Cylinder No 4

Conclusion

- The sparkplugs have become a forgotten part of the ignition system.
- The suggested maintenance schedule still applies to all modern day vehicles
- The quick fix is not the way to go on modern day automotive products.

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Verify the VIN Information

A Case Study

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Observations Noted

- This vehicle has been involved in a fire. The vehicle was declared a total loss by the owners insurance company.
- A local shop decides that they may be able to bring this vehicle back to life.
- The shop performs a harness and PCM replacement. The vehicle cranks, but will not start.

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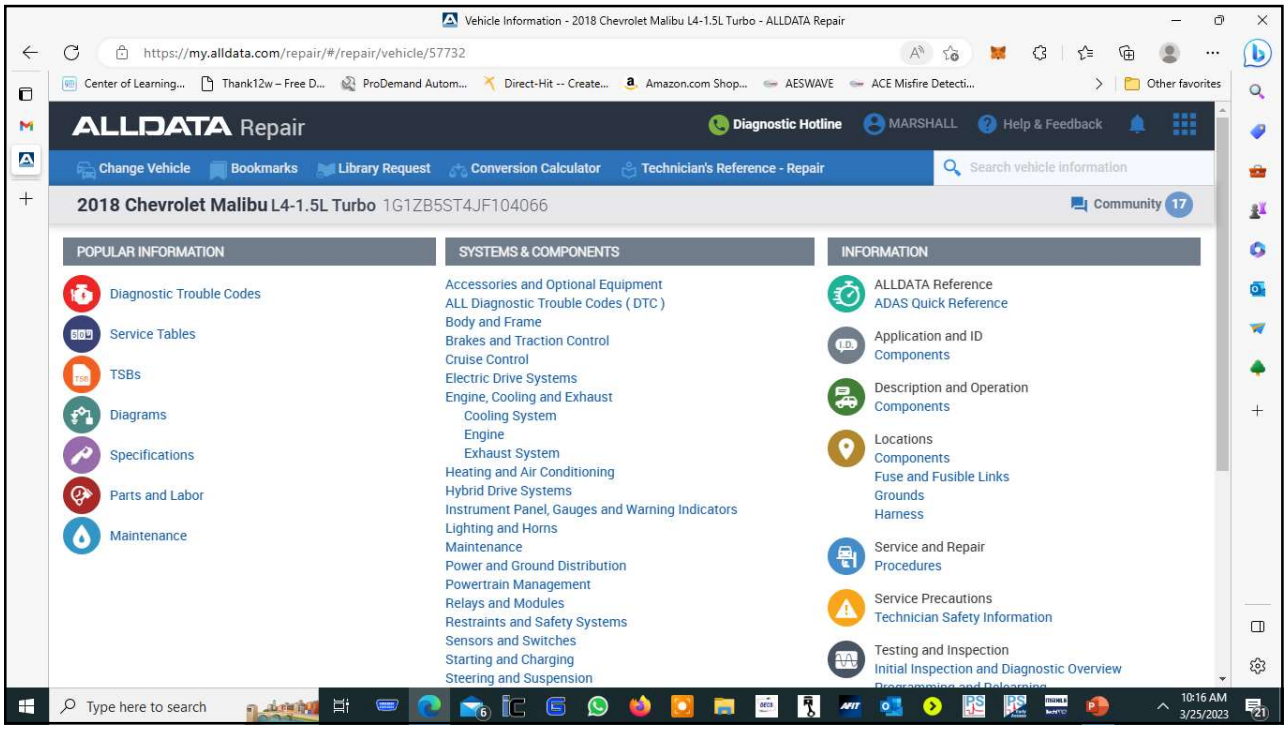
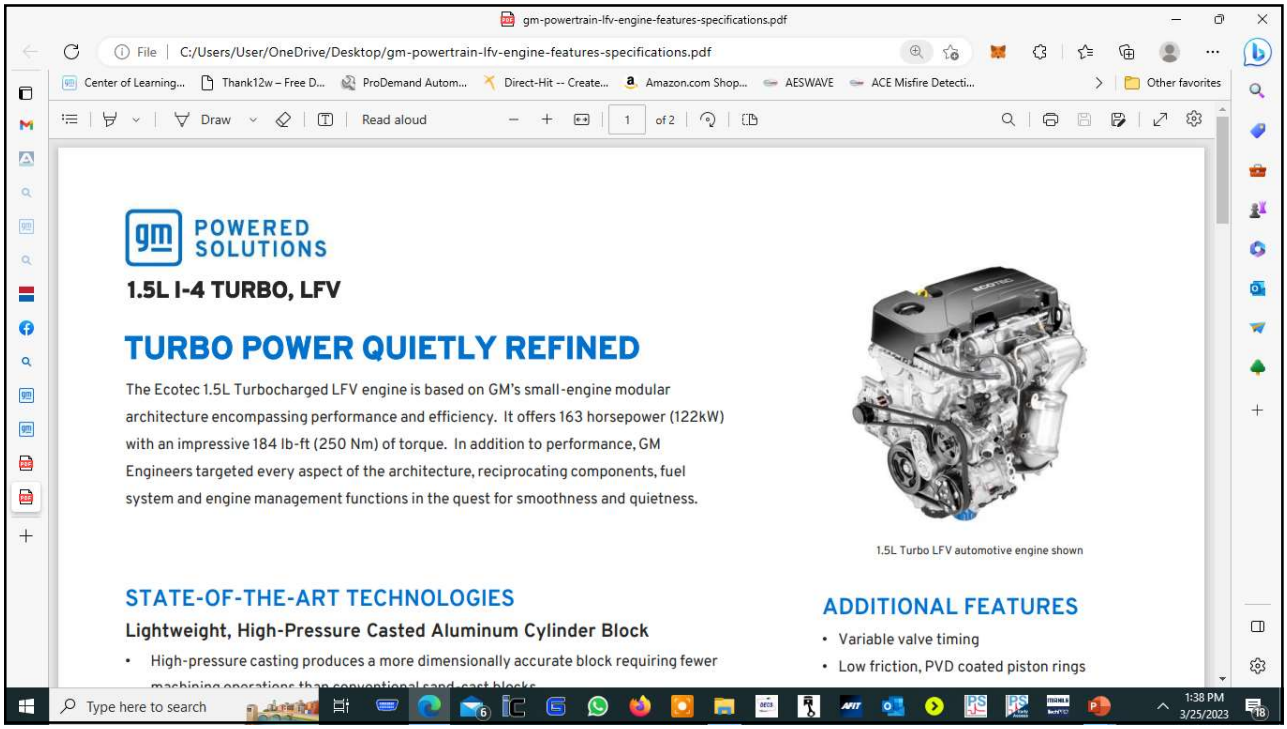

Vehicle Information - 2018 Chevrolet Malibu L4-1.5L Turbo - ALLDATA Repair
https://my.alldata.com/repair/#/repair/vehicle/57732
ALLDATA Repair
Diagnostic Hotline
MARSHALL
Help & Feedback
Change Vehicle
Bookmarks
Library Request
Conversion Calculator
Technician's Reference - Repair
Search vehicle information
2018 Chevrolet Malibu L4-1.5L Turbo 1G1ZB5ST4JF104066
Community 17
POPULAR INFORMATION
Diagnostic Trouble Codes
Service Tables
TSBs
Diagrams
Specifications
Parts and Labor
Maintenance
SYSTEMS & COMPONENTS
Accessories and Optional Equipment
ALL Diagnostic Trouble Codes (DTC)
Body and Frame
Brakes and Traction Control
Cruise Control
Electric Drive Systems
Engine, Cooling and Exhaust
Cooling System
Engine
Exhaust System
Heating and Air Conditioning
Hybrid Drive Systems
Instrument Panel, Gauges and Warning Indicators
Lighting and Horns
Maintenance
Power and Ground Distribution
Powertrain Management
Relays and Modules
Restraints and Safety Systems
Sensors and Switches
Starting and Charging
Steering and Suspension
INFORMATION
ALLDATA Reference
ADAS Quick Reference
Application and ID
Components
Description and Operation
Components
Locations
Components
Fuse and Fusible Links
Grounds
Harness
Service and Repair
Procedures
Service Precautions
Technician Safety Information
Testing and Inspection
Initial Inspection and Diagnostic Overview
Type here to search
10:16 AM
3/25/2023


gm-powertrain-lfv-engine-features-specifications.pdf
File | C:/Users/User/OneDrive/Desktop/gm-powertrain-lfv-engine-features-specifications.pdf
Draw
Read aloud
1
of 2
POWERED SOLUTIONS
1.5L I-4 TURBO, LFV
TURBO POWER QUIETLY REFINED
The Ecotec 1.5L Turbocharged LFV engine is based on GM's small-engine modular architecture encompassing performance and efficiency. It offers 163 horsepower (122kW) with an impressive 184 lb-ft (250 Nm) of torque. In addition to performance, GM Engineers targeted every aspect of the architecture, reciprocating components, fuel system and engine management functions in the quest for smoothness and quietness.
1.5L Turbo LFV automotive engine shown
STATE-OF-THE-ART TECHNOLOGIES
Lightweight, High-Pressure Casted Aluminum Cylinder Block
• High-pressure casting produces a more dimensionally accurate block requiring fewer
ADDITIONAL FEATURES
• Variable valve timing
• Low friction, PVD coated piston rings
Type here to search
1:38 PM
3/25/2023

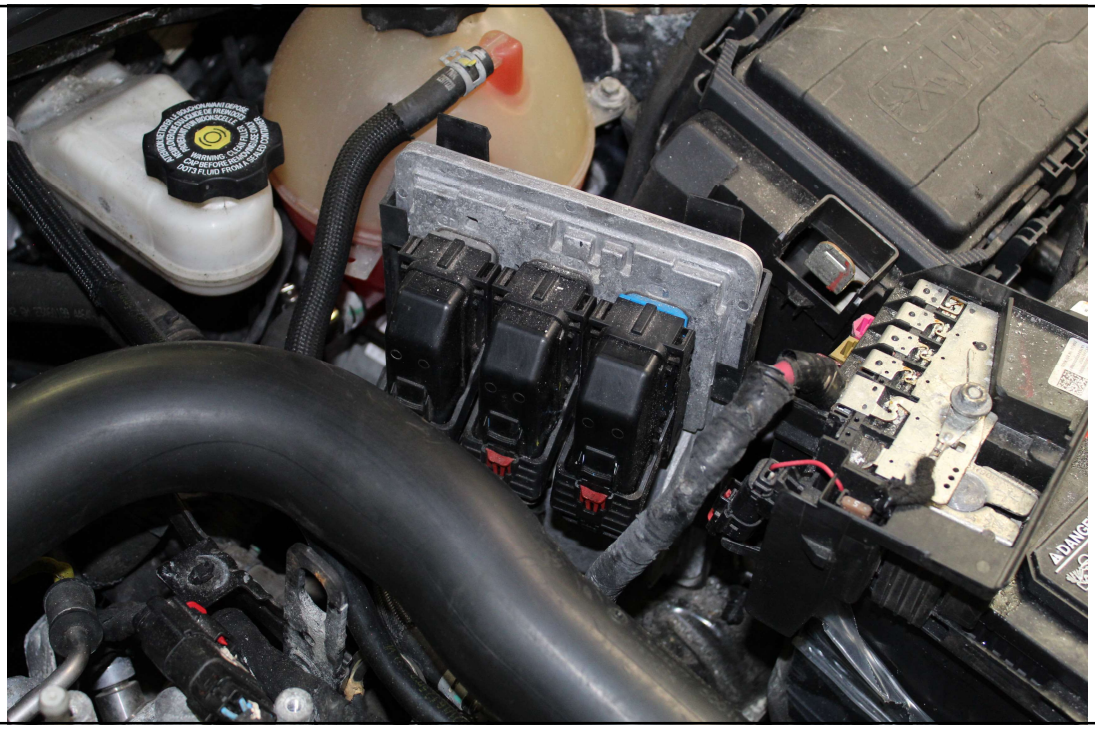
1.5-liter Ecotec four-cylinder (LFV)

- Steve Kiefer, GM's vice president of global powertrain, explained that the company currently sees 11 variants of this engine hitting the market by 2017, in 27 models, spread throughout five brands. Fully deployed, GM expects to build about 2.5 million of the engines in five GM plants around the world.


84-MONTH
NISSAN

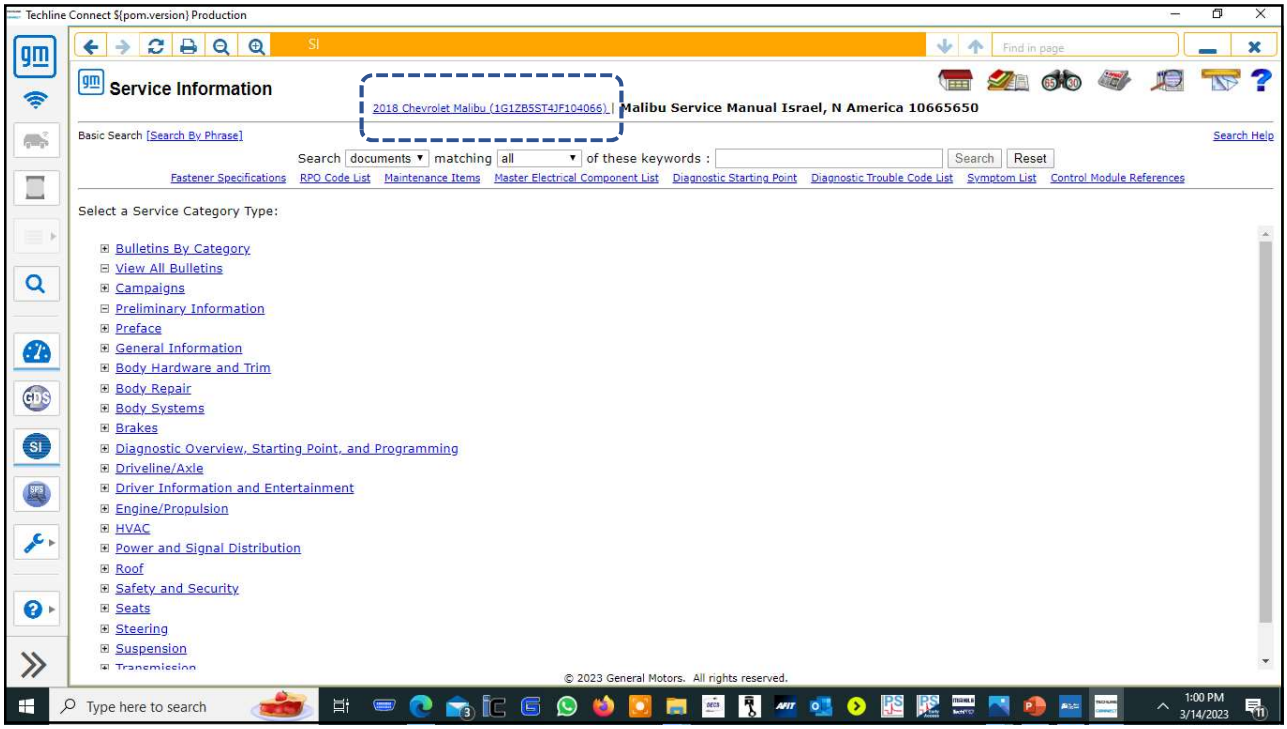

DANGER / POISON
SHIELD EYES
EXPLOSIVE GASES
NO SPARKS FLAMES
SULFURIC ACID
10/21
84-MONTH
NISSAN
24-MONTH


DANGER / POISON
10/21
NISSAN




GM
1G1ZB5ST4JF104066


MFD BY GENERAL MOTORS LLC
06/17
GVWR
1834 KG
4043 LB
GAWR FRT
946 KG
2086 LB
GAWR RR
888 KG
1957 LB
THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S. FEDERAL MOTOR VEHICLE SAFETY, BUMPER, AND THEFT PREVENTION STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.
1G1ZB5ST4JF104066
TYPE: PASS CAR
MODEL: 461ZC69
410Y
QR code readers can be used to get regular production option codes by scanning here


Techline Connect ${pom.version} Production
Service Information
2018 Chevrolet Malibu (1G1ZB5ST4JF104066)
Malibu Service Manual Israel, N America 10665650
Basic Search [Search By Phrase]
Search Help
Search documents matching all of these keywords :
Search
Reset
Fastener Specifications
RPO Code List
Maintenance Items
Master Electrical Component List
Diagnostic Starting Point
Diagnostic Trouble Code List
Symptom List
Control Module References
Select a Service Category Type:
Bulletins By Category
View All Bulletins
Campaigns
Preliminary Information
Preface
General Information
Body Hardware and Trim
Body Repair
Body Systems
Brakes
Diagnostic Overview, Starting Point, and Programming
Driveline/Axle
Driver Information and Entertainment
Engine/Propulsion
HVAC
Power and Signal Distribution
Roof
Safety and Security
Seats
Steering
Suspension
Transmission
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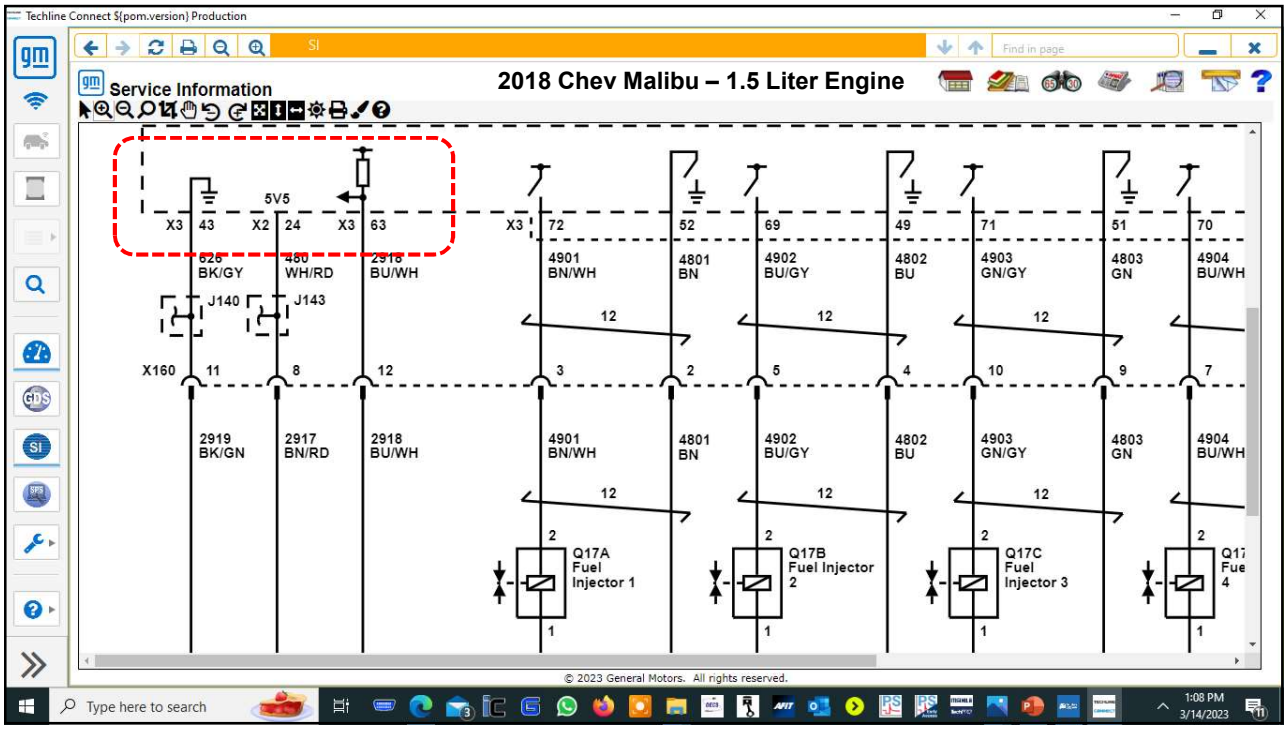
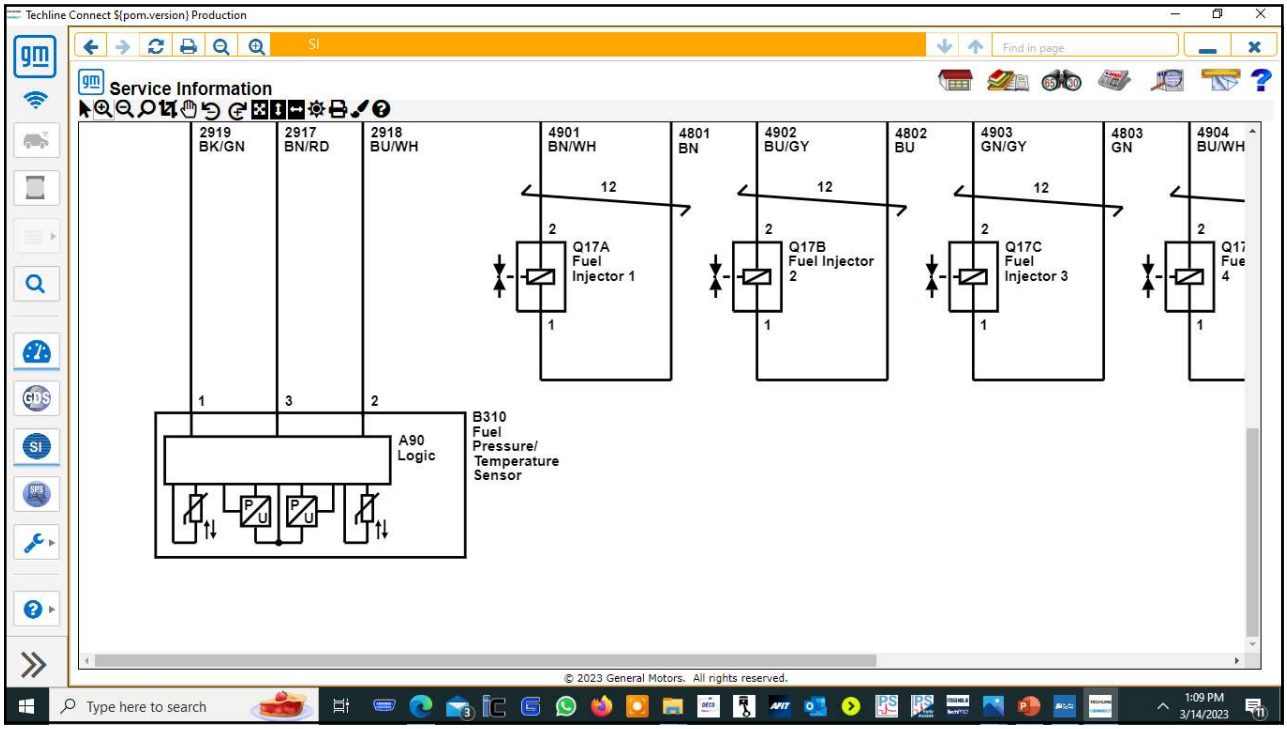
Type here to search
1:00 PM
3/14/2023


Techline Connect ${pom.version} Production
Service Information
2018 Chev Malibu – 1.5 Liter Engine
5V5
X3 43
X2 24
X3 63
626 BK/GY
480 WH/RD
2916 BU/WH
J140
J143
X160 11
8
12
2919 BK/GN
2917 BN/RD
2918 BU/WH
X3 72
52
69
49
71
51
70
4901 BN/WH
4801 BN
4902 BU/GY
4802 BU
4903 GN/GY
4803 GN
4904 BU/WH
12
3
2
5
4
10
9
7
Q17A Fuel Injector 1
Q17B Fuel Injector 2
Q17C Fuel Injector 3
Q17 Fue 4
© 2023 General Motors. All rights reserved.
Type here to search
1:08 PM
3/14/2023


Techline Connect ${pom.version} Production
Service Information
2919 BK/GN
2917 BN/RD
2918 BU/WH
4901 BN/WH
4801 BN
4902 BU/GY
4802 BU
4903 GN/GY
4803 GN
4904 BU/WH
12
2
1
Q17A Fuel Injector 1
Q17B Fuel Injector 2
Q17C Fuel Injector 3
Q17 Fue 4
1
3
2
A90 Logic
B310 Fuel Pressure/ Temperature Sensor
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Type here to search
1:09 PM
3/14/2023

2017 Chev Malibu

Actual Vehicle Scan

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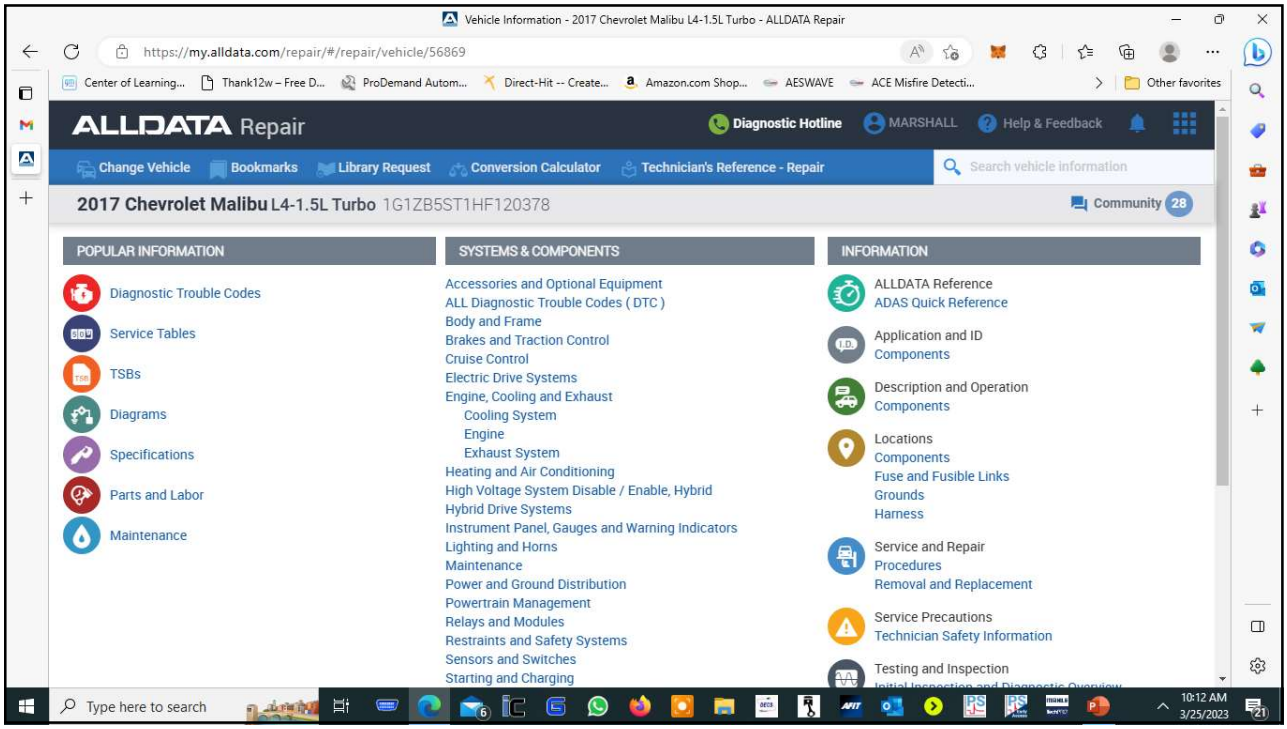
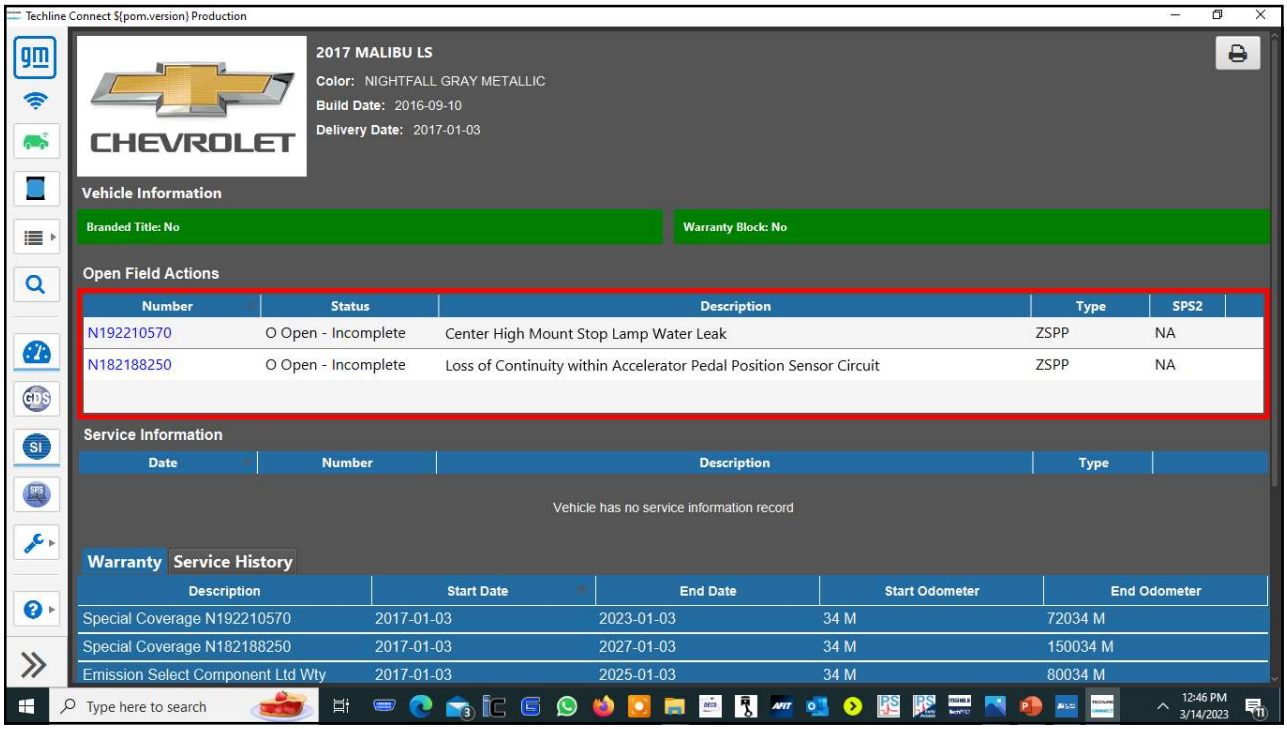
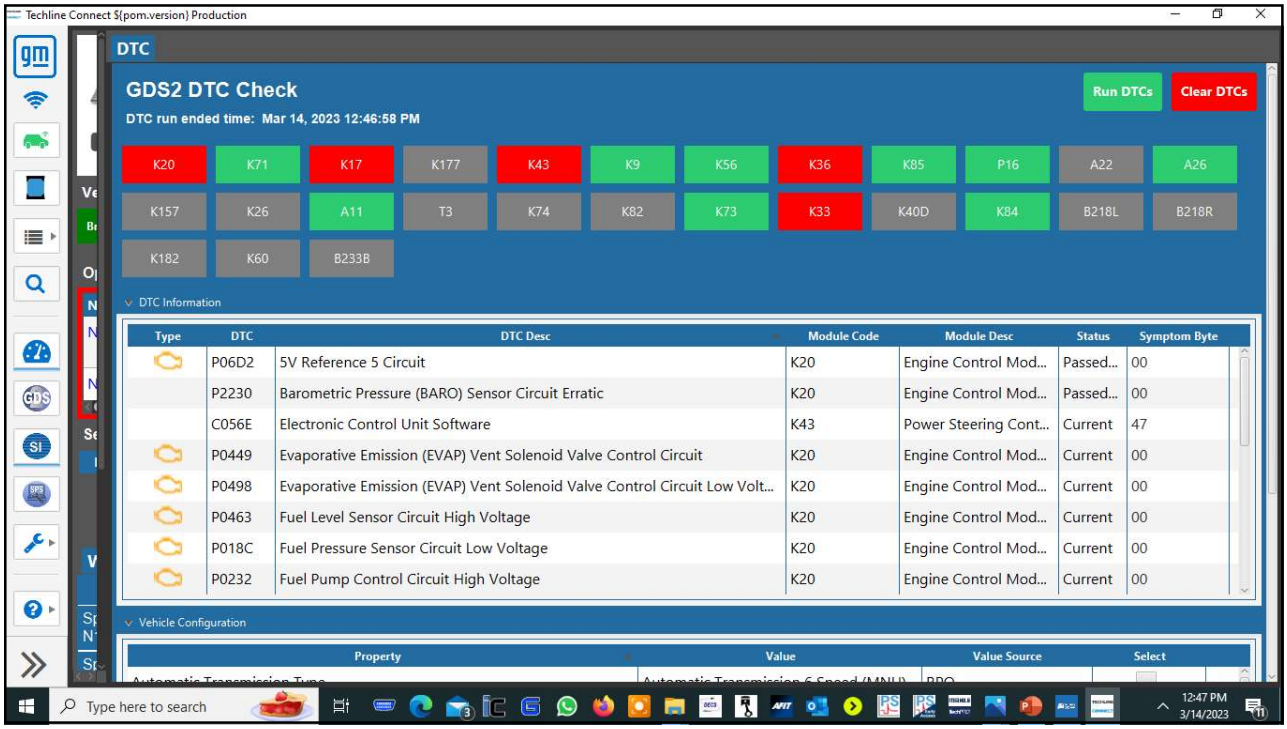
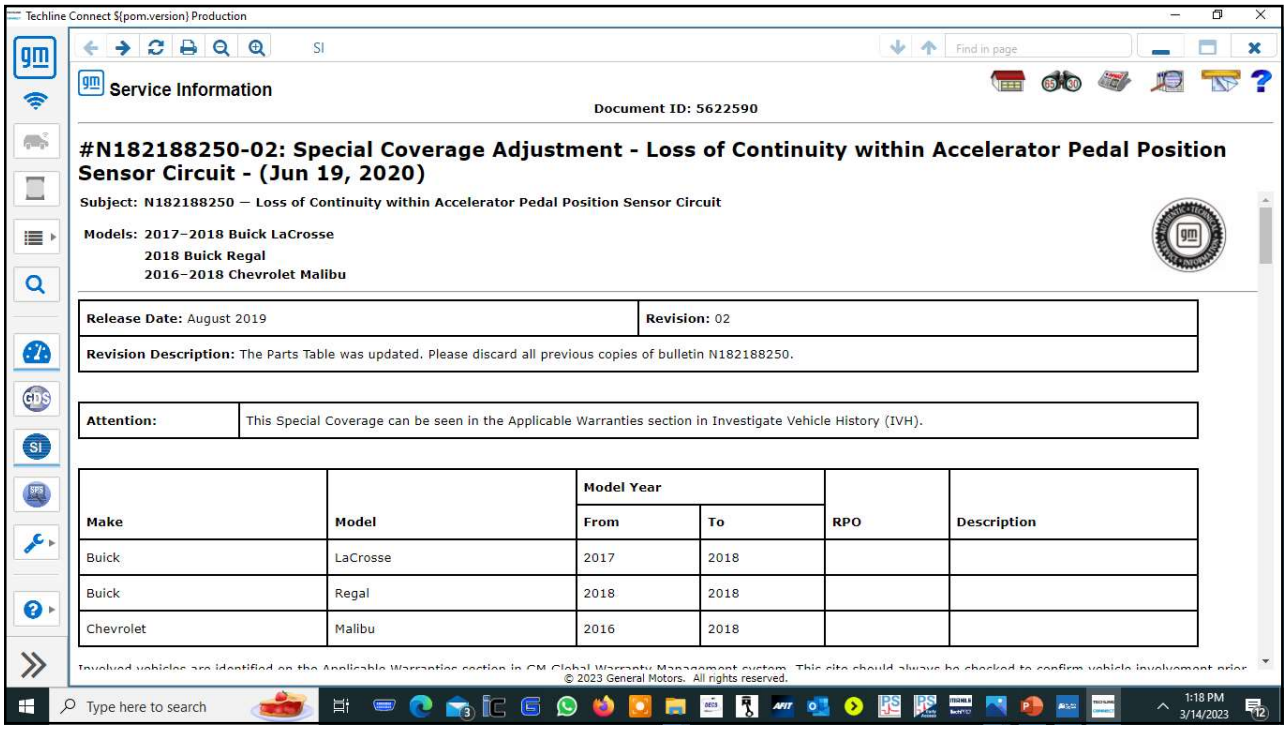



Techline Connect ${pom.version} Production
2017 MALIBU LS
Color: NIGHTFALL GRAY METALLIC
Build Date: 2016-09-10
Delivery Date: 2017-01-03
Vehicle Information
Branded Title: No
Warranty Block: No
Open Field Actions
Number
Status
Description
Type
SPS2
N192210570
O Open - Incomplete
Center High Mount Stop Lamp Water Leak
ZSPP
NA
N182188250
O Open - Incomplete
Loss of Continuity within Accelerator Pedal Position Sensor Circuit
ZSPP
NA
Service Information
Date
Number
Description
Type
Vehicle has no service information record
Warranty
Service History
Description
Start Date
End Date
Start Odometer
End Odometer
Special Coverage N192210570
2017-01-03
2023-01-03
34 M
72034 M
Special Coverage N182188250
2017-01-03
2027-01-03
34 M
150034 M
Emission Select Component Ltd Wty
2017-01-03
2025-01-03
34 M
80034 M
Type here to search
12:46 PM
3/14/2023


Techline Connect ${pom.version} Production
DTC
GDS2 DTC Check
DTC run ended time: Mar 14, 2023 12:46:58 PM
Run DTCs
Clear DTCs
K20
K71
K17
K177
K43
K9
K56
K36
K85
P16
A22
A26
K157
K26
A11
T3
K74
K82
K73
K33
K40D
K84
B218L
B218R
K182
K60
B233B
DTC Information
Type
DTC
DTC Desc
Module Code
Module Desc
Status
Symptom Byte
P06D2
5V Reference 5 Circuit
K20
Engine Control Mod...
Passed...
00
P2230
Barometric Pressure (BARO) Sensor Circuit Erratic
K20
Engine Control Mod...
Passed...
00
C056E
Electronic Control Unit Software
K43
Power Steering Cont...
Current
47
P0449
Evaporative Emission (EVAP) Vent Solenoid Valve Control Circuit
K20
Engine Control Mod...
Current
00
P0498
Evaporative Emission (EVAP) Vent Solenoid Valve Control Circuit Low Volt...
K20
Engine Control Mod...
Current
00
P0463
Fuel Level Sensor Circuit High Voltage
K20
Engine Control Mod...
Current
00
P018C
Fuel Pressure Sensor Circuit Low Voltage
K20
Engine Control Mod...
Current
00
P0232
Fuel Pump Control Circuit High Voltage
K20
Engine Control Mod...
Current
00
Vehicle Configuration
Property
Value
Value Source
Select
Type here to search
12:47 PM
3/14/2023


Techline Connect ${pom.version} Production
Service Information
Document ID: 5622590
#N182188250-02: Special Coverage Adjustment - Loss of Continuity within Accelerator Pedal Position Sensor Circuit - (Jun 19, 2020)
Subject: N182188250 — Loss of Continuity within Accelerator Pedal Position Sensor Circuit
Models: 2017–2018 Buick LaCrosse
2018 Buick Regal
2016–2018 Chevrolet Malibu
Release Date: August 2019
Revision: 02
Revision Description: The Parts Table was updated. Please discard all previous copies of bulletin N182188250.
Attention:
This Special Coverage can be seen in the Applicable Warranties section in Investigate Vehicle History (IVH).
Make
Model
Model Year
From
To
RPO
Description
Buick
LaCrosse
2017
2018
Buick
Regal
2018
2018
Chevrolet
Malibu
2016
2018
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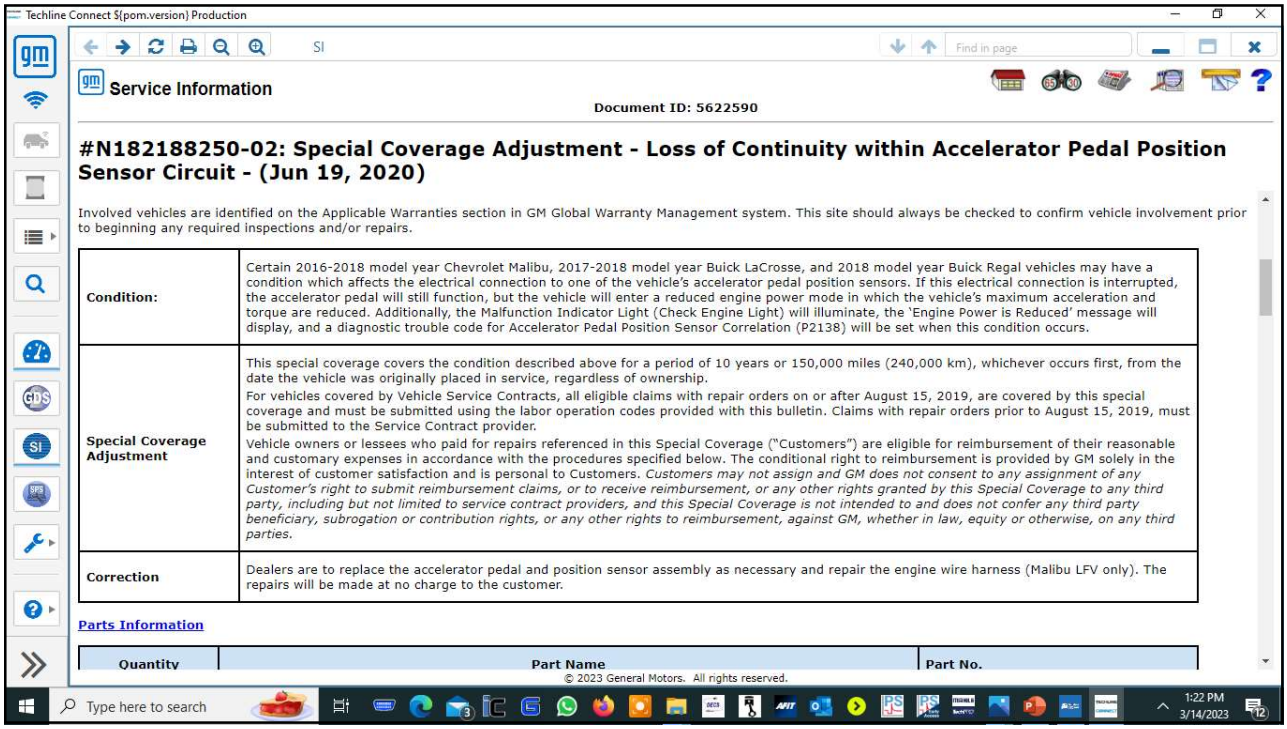
Type here to search
1:18 PM
3/14/2023


Techline Connect ${pom.version} Production
Service Information
Document ID: 5622590
#N182188250-02: Special Coverage Adjustment - Loss of Continuity within Accelerator Pedal Position Sensor Circuit - (Jun 19, 2020)
Involved vehicles are identified on the Applicable Warranties section in GM Global Warranty Management system. This site should always be checked to confirm vehicle involvement prior to beginning any required inspections and/or repairs.
Condition:
Certain 2016-2018 model year Chevrolet Malibu, 2017-2018 model year Buick LaCrosse, and 2018 model year Buick Regal vehicles may have a condition which affects the electrical connection to one of the vehicle's accelerator pedal position sensors. If this electrical connection is interrupted, the accelerator pedal will still function, but the vehicle will enter a reduced engine power mode in which the vehicle's maximum acceleration and torque are reduced. Additionally, the Malfunction Indicator Light (Check Engine Light) will illuminate, the 'Engine Power is Reduced' message will display, and a diagnostic trouble code for Accelerator Pedal Position Sensor Correlation (P2138) will be set when this condition occurs.
Special Coverage Adjustment
This special coverage covers the condition described above for a period of 10 years or 150,000 miles (240,000 km), whichever occurs first, from the date the vehicle was originally placed in service, regardless of ownership.
For vehicles covered by Vehicle Service Contracts, all eligible claims with repair orders on or after August 15, 2019, are covered by this special coverage and must be submitted using the labor operation codes provided with this bulletin. Claims with repair orders prior to August 15, 2019, must be submitted to the Service Contract provider.
Vehicle owners or lessees who paid for repairs referenced in this Special Coverage ("Customers") are eligible for reimbursement of their reasonable and customary expenses in accordance with the procedures specified below. The conditional right to reimbursement is provided by GM solely in the interest of customer satisfaction and is personal to Customers. Customers may not assign and GM does not consent to any assignment of any Customer's right to submit reimbursement claims, or to receive reimbursement, or any other rights granted by this Special Coverage to any third party, including but not limited to service contract providers, and this Special Coverage is not intended to and does not confer any third party beneficiary, subrogation or contribution rights, or any other rights to reimbursement, against GM, whether in law, equity or otherwise, on any third parties.
Correction
Dealers are to replace the accelerator pedal and position sensor assembly as necessary and repair the engine wire harness (Malibu LFV only). The repairs will be made at no charge to the customer.
Parts Information
Quantity
Part Name
Part No.
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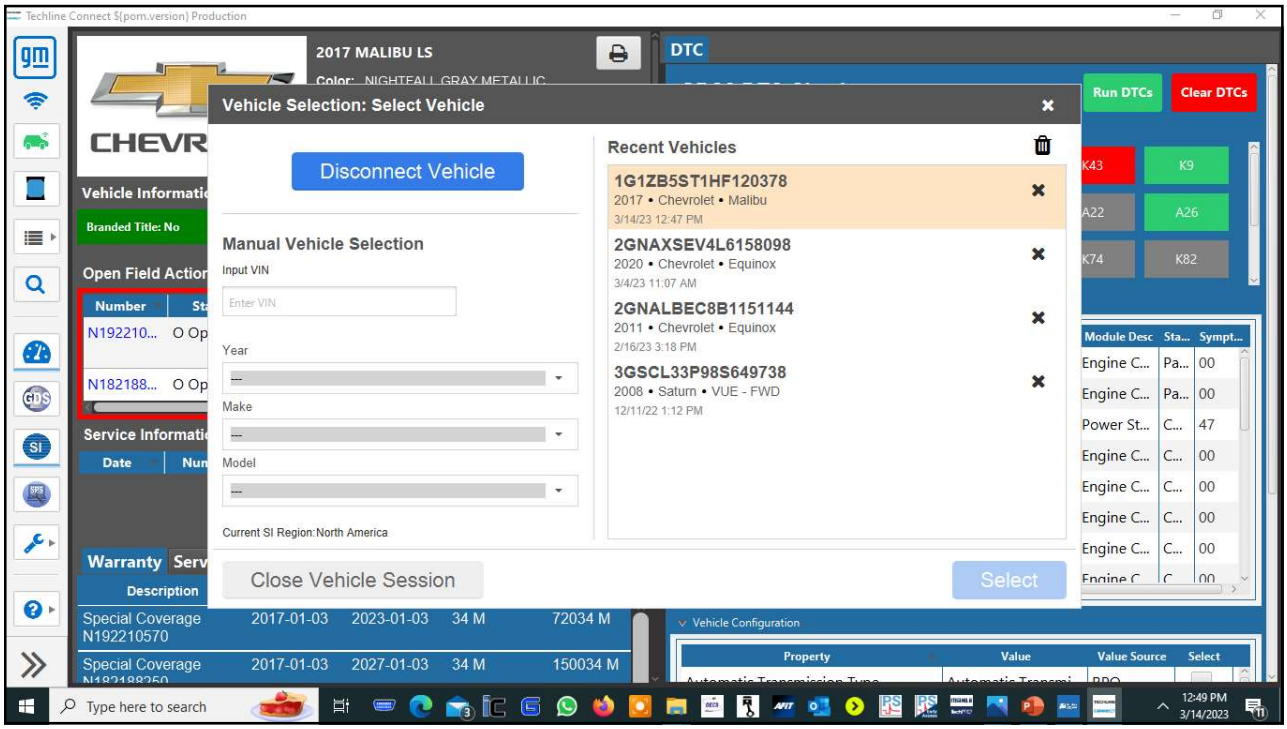
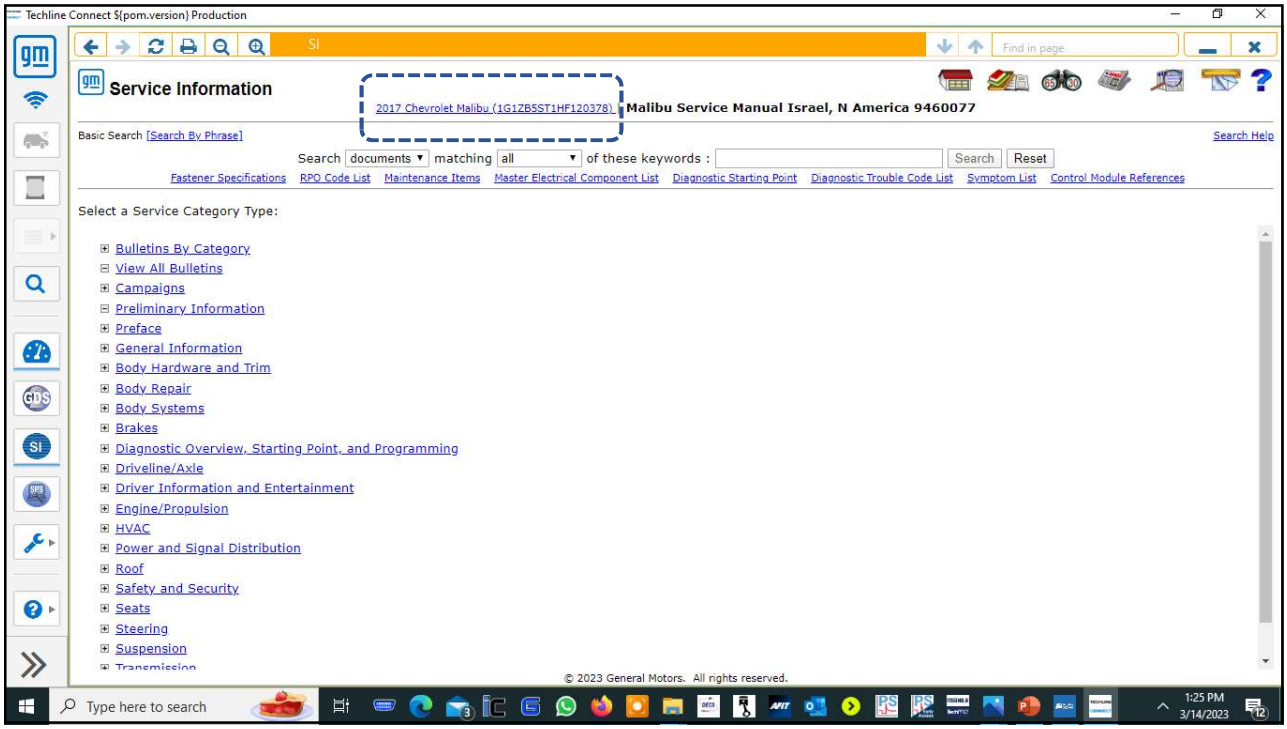
Type here to search
1:22 PM
3/14/2023


Techline Connect ${pom.version} Production
2017 MALIBU LS
Color: NIGHTFALL GRAY METALLIC
DTC
Run DTCs
Clear DTCs
Vehicle Selection: Select Vehicle
Disconnect Vehicle
Manual Vehicle Selection
Input VIN
Enter VIN
Year
Make
Model
Current SI Region:North America
Close Vehicle Session
Select
Recent Vehicles
1G1ZB5ST1HF120378
2017 • Chevrolet • Malibu
3/14/23 12:47 PM
2GNAXSEV4L6158098
2020 • Chevrolet • Equinox
3/4/23 11:07 AM
2GNALBEC8B1151144
2011 • Chevrolet • Equinox
2/16/23 3:18 PM
3GSCL33P98S649738
2008 • Saturn • VUE - FWD
12/11/22 1:12 PM
Vehicle Configuration
Property
Value
Value Source
Select
Warranty
Description
Special Coverage N192210570 2017-01-03 2023-01-03 34 M 72034 M
Special Coverage 2017-01-03 2027-01-03 34 M 150034 M
Type here to search
12:49 PM
3/14/2023


Techline Connect ${pom.version} Production
SI
Service Information
2017 Chevrolet Malibu (1G1ZB5ST1HF120378)
Malibu Service Manual Israel, N America 9460077
Basic Search [Search By Phrase]
Search Help
Search documents matching all of these keywords :
Search
Reset
Fastener Specifications
RPO Code List
Maintenance Items
Master Electrical Component List
Diagnostic Starting Point
Diagnostic Trouble Code List
Symptom List
Control Module References
Select a Service Category Type:
Bulletins By Category
View All Bulletins
Campaigns
Preliminary Information
Preface
General Information
Body Hardware and Trim
Body Repair
Body Systems
Brakes
Diagnostic Overview, Starting Point, and Programming
Driveline/Axle
Driver Information and Entertainment
Engine/Propulsion
HVAC
Power and Signal Distribution
Roof
Safety and Security
Seats
Steering
Suspension
Transmission
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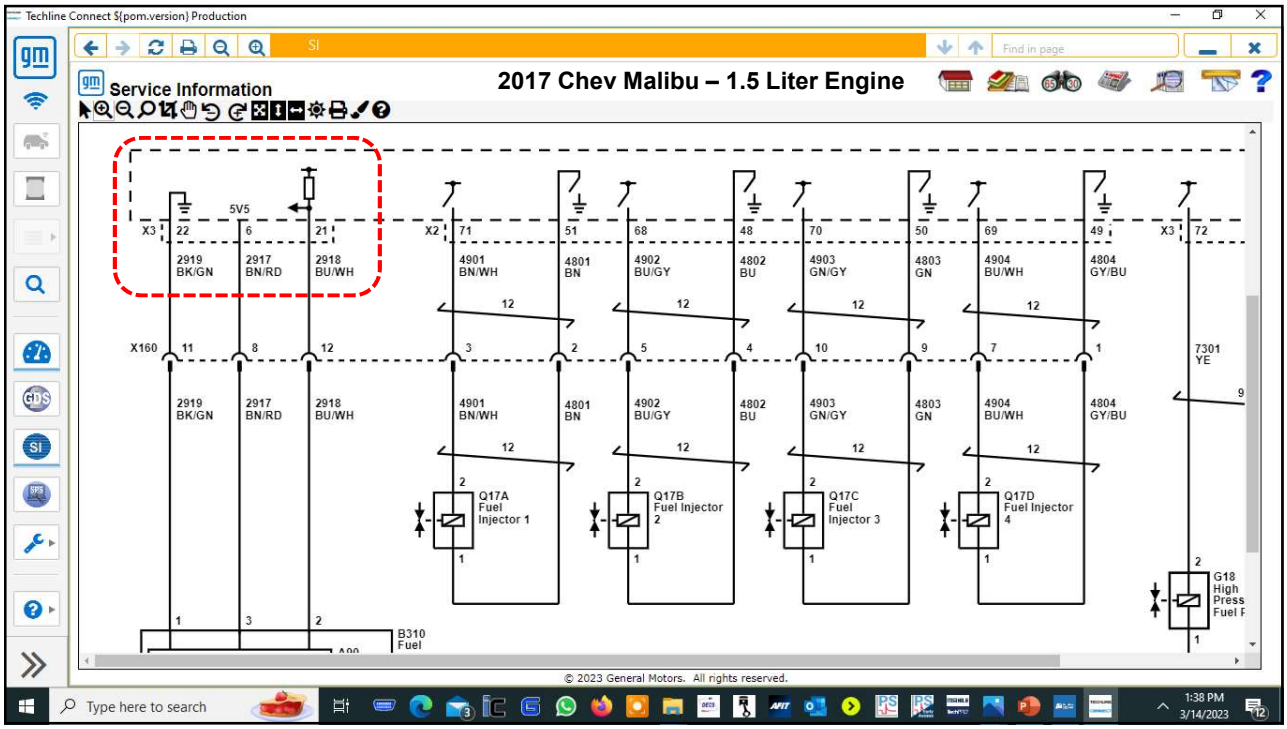
Type here to search
1:25 PM
3/14/2023


Techline Connect ${pom.version} Production
Service Information
2017 Chev Malibu – 1.5 Liter Engine
5V5
X3
22
6
21
2919 BK/GN
2917 BN/RD
2918 BU/WH
X2
71
51
68
48
70
50
69
49
X3
72
4901 BN/WH
4801 BN
4902 BU/GY
4802 BU
4903 GN/GY
4803 GN
4904 BU/WH
4804 GY/BU
X160
11
8
12
3
2
5
4
10
9
7
1
7301 YE
Q17A Fuel Injector 1
Q17B Fuel Injector 2
Q17C Fuel Injector 3
Q17D Fuel Injector 4
G18 High Press Fuel
B310 Fuel
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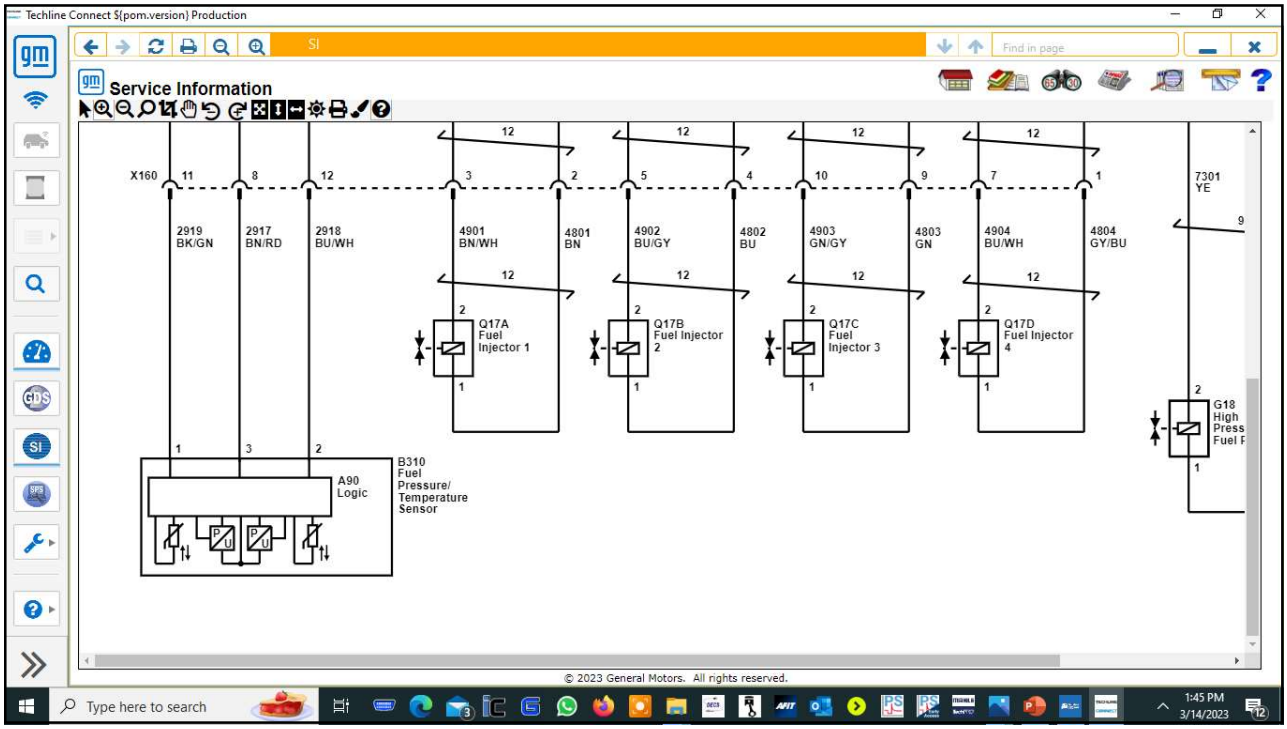
Type here to search
1:38 PM
3/14/2023


Techline Connect ${pom.version} Production
Service Information
X160
2919 BK/GN
2917 BN/RD
2918 BU/WH
4901 BN/WH
4801 BN
4902 BU/GY
4802 BU
4903 GN/GY
4803 GN
4904 BU/WH
4804 GY/BU
7301 YE
Q17A Fuel Injector 1
Q17B Fuel Injector 2
Q17C Fuel Injector 3
Q17D Fuel Injector 4
G18 High Press Fuel
B310 Fuel Pressure/ Temperature Sensor
A90 Logic
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Type here to search
1:45 PM
3/14/2023

Conclusion

- The VIN mismatch is a serious flaw. There were 11 different variants of this engine family introduced by 2017.
- There was a considerate amount of work completed by the repairing shop.
- The quick fix is not the way to go on modern day automotive products.

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Check for Codes/TSB's Search

A Case Study

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Observations Noted

- This vehicle was received from another repairing shop, the shop has replaced the following items: Fuel Injector and MAF sensor.
- The shop owner is requesting a diagnosis be performed.
- Once code information was obtained, a code review and TSB search was performed.

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2017 Pathfinder

Code P219F stored in memory –Air Fuel Ratio Imbalance (Cylinder No 4)

Possible Causes

- Fuel injector
- Exhaust gas leaks
- Incorrect fuel pressure
- Mass air flow sensor
- Intake air leaks
- Lack of fuel

Possible Causes

- Incorrect PCV hose connection
- Improper spark plug
- Insufficient compression
- The fuel injector circuit is open or shorted
- ignition coil
- The ignition signal circuit is open or shorted

TST Seminars
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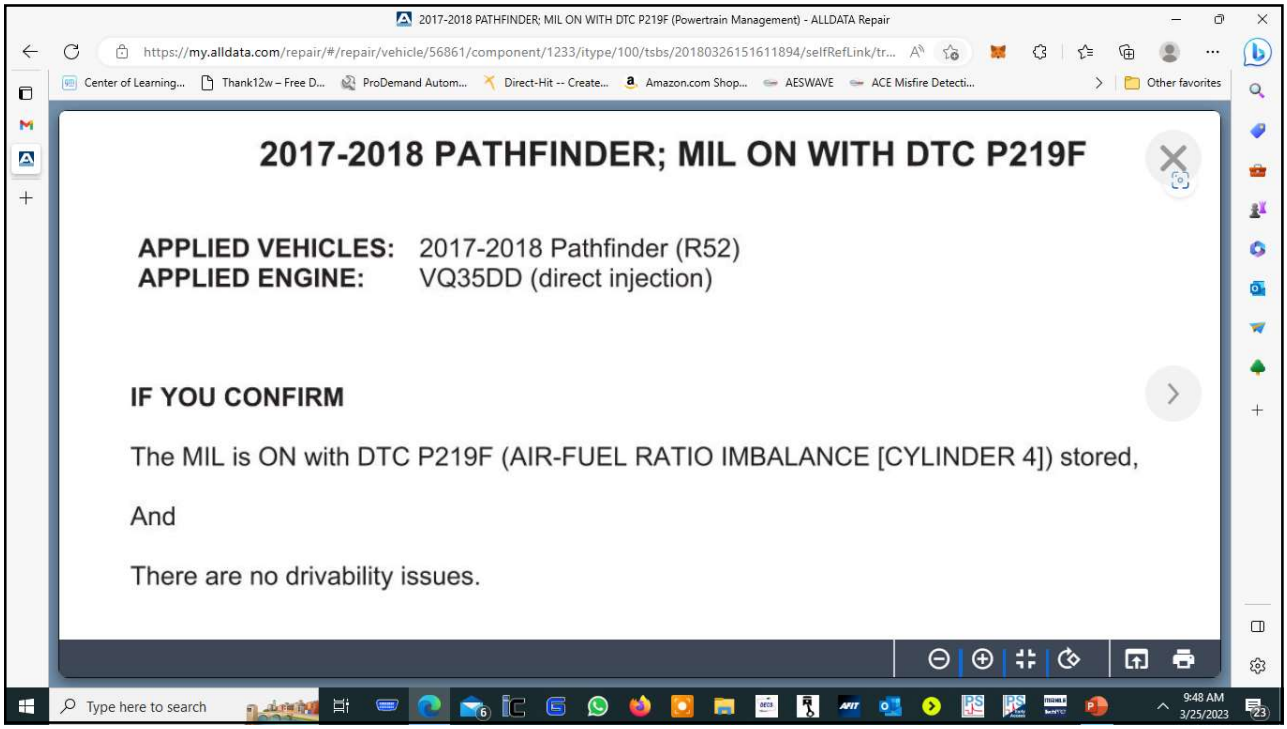

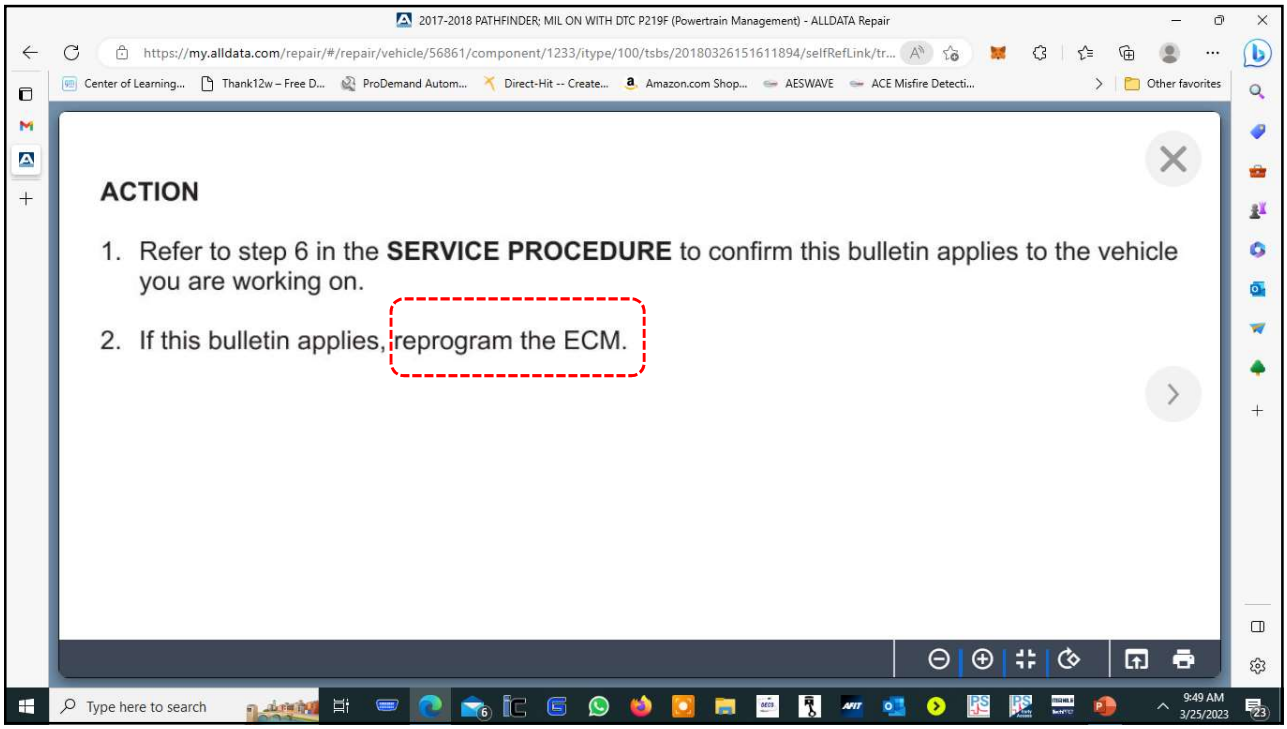

Perform Visual Checks

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2017 Hyundai Santa Fe – 3.3 Liter Engine

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Customer Concern

- Customer was driving his vehicle and the engine stalled
- The vehicle was towed in and it was determined that the Intake Cam Phaser on Bank 2 came apart
- The engine was reassembled and a code P0019 was stored in memory. (Crank-Cam Correlation)
- The first plan of attack was to locate the PCM

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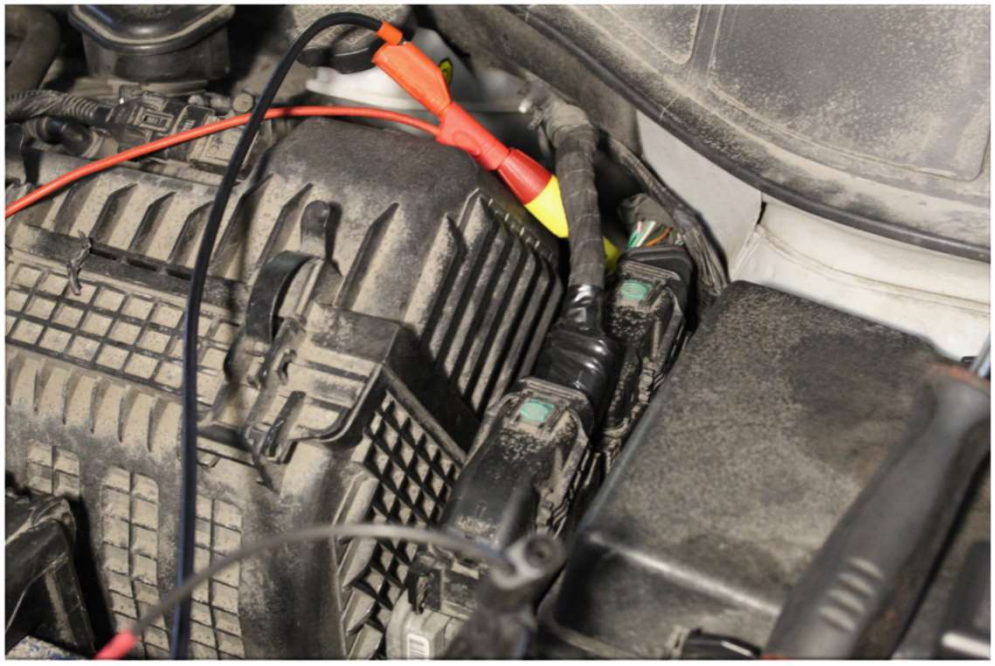
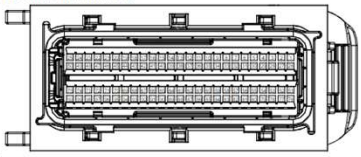
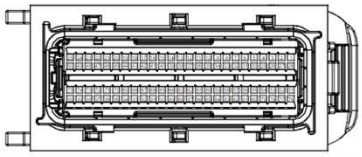


Engine Control System (G6DH : LAMBDA II 3.3L GDI) (1) SD313-1

PCM Terminal Information





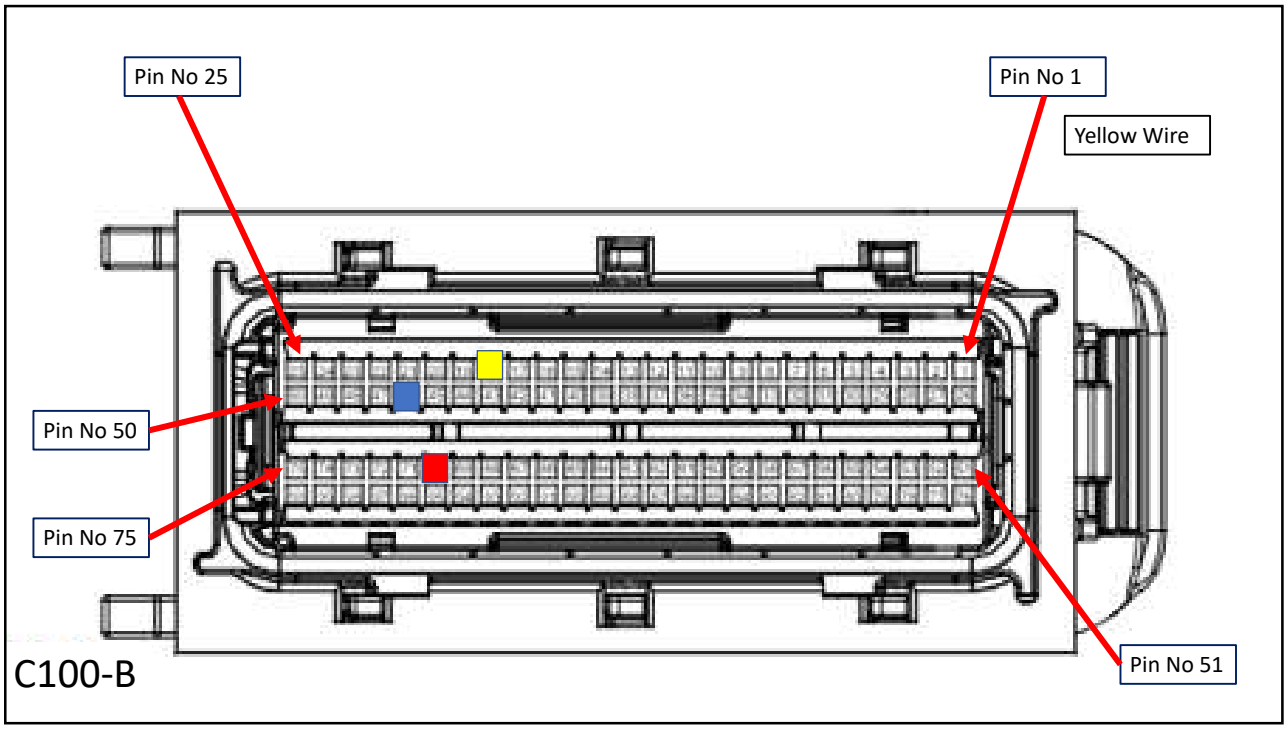
E100-A

PIN	COLOR	DESCRIPTION	PIN	COLOR	DESCRIPTION	PIN	COLOR	DESCRIPTION
1	-	-	35	O	C-CAN (Low)	69	-	-
2	-	-	36	-	-	70	B	RPM Signal
3	-	-	37	P	Rail Pressure Sensor (Ground)	71	Gr	C/Fan Relay Control
4	-	-	38	Gr	APS. 1 Signal	72	O	Alternator (COM)
5	B	Ground	39	-	-	73	-	-
6	B	Ground	40	-	-	74	R	IMMO. Data Line
7	-	-	41	-	-	75	P	Engine Control Relay 'ON' Input
8	-	-	42	-	-	76	-	-
9	W	CCP-CAN (High)	43	G/B	Brake Light Switch	77	L	Memory Power
10	G	C-CAN (High)	44	G/B	[A/T]PositionSwitch (S1)	78	-	-
11	G	FTPS Signal	45	Br	[A/T]PositionSwitch (S2)	79	W	[A/T] Select Switch
12	-	-	46	G	[A/T]PositionSwitch (S3)	80	B	Ground
13	-	-	47	Gr	[A/T]PositionSwitch (S4)	81	-	-
14	Br	APS. 1 Power	48	-	-	82	-	-
15	P	APT/RPS Power	49	-	-	83	-	-
16	O	Fuel Level Sensor	50	-	-	84	-	-
17	-	-	51	-	-	85	-	-
18	-	-	52	R	Memory Power	86	-	-
19	-	-	53	-	-	87	W	LIN-Diagnostic Data Line
20	-	-	54	P	[A/T] Down Shift	88	-	-
21	Br	Brake TEST Switch	55	B	Ground	89	-	-
22	-	-	56	-	-	90	R	APS.2 Power
23	-	-	57	G/B	F/Pump Relay Control [W/O IMMO]	91	-	-
24	W	Alternator (FR)	58	-	-	92	-	-
25	-	-	59	B/O	APS. 2 Ground	93	B	Start Relay
26	-	-	60	B	APS. 1 Ground	94	Gr	Engine Control Relay Control
27	P	ON/START Input	61	Br	FTPS Ground	95	G/B	F/Pump Relay Control [With IMMO]
28	W	Rail Pressure Sensor (Signal)	62	-	-	96	Gr	CCV
29	Gr	[A/T] Up Shift	63	B	APT Ground	97	-	-
30	B	Ground	64	-	-	98	-	-
31	-	-	65	L	FTPS Power	99	O	Engine Control Relay 'ON' Input
32	-	-	66	-	-	100	P	Engine Control Relay 'ON' Input
33	-	-	67	G	APT Signal			
34	Br	CCP-CAN (Low)	68	P	APS. 2 Signal			

C100-B

PIN	COLOR	DESCRIPTION	PIN	COLOR	DESCRIPTION	PIN	COLOR	DESCRIPTION
1	Y	[A/T]OD_VFS	35	Gr	ECTS Signal	69	O	VIV. 2 Control
2	-	-	36	-	-	70	R	CMPS Bank #1(EX) Signal
3	Gr	[A/T]Input Speed Signal	37	-	-	71	G	CMPS Bank #1(IN) Signal
4	G	[A/T]Output Speed Signal	38	Gr	Oxygen Sensor #1 (HI)	72	-	-
5	P	CMPS Bank #1(IN/EX) Power	39	G	Oxygen Sensor #1 (LO)	73	P	CMPS Bank #1(IN/EX) Power
6	Gr	TPS Power	40	B	Shield Ground	74	Y	Ignition Coil #5 Control
7	-	-	41	Y	Knock Sensor #2 (LO)	75	-	-
8	P	Start Switch	42	P	Knock Sensor #1 (LO)	76	G	[A/T]Solenoid Power 1
9	O	BPS Signal	43	G	CKPS LO	77	O	[A/T]Solenoid Power 2
10	W	Oil Temp. Sensor Signal	44	Br	CMPS Bank #2(1IN/EX) Ground	78	Gr	[A/T]26B_VFS
11	-	-	45	-	-	79	-	-
12	G	TPS.1 Signal	46	G	CMPS Bank #2(EX) Signal	80	W/B	ETC Motor (HI)
13	Y	MAP Sensor Signal	47	-	-	81	L	ETC Motor (LO)
14	W	Intake Air Temp. Sensor	48	P	MAP/BPS Power	82	P	Oxygen Sensor #3 Heater
15	W/B	Vehicle Speed Input	49	B	Ignition Coil #3 Control	83	P/B	Oxygen Sensor #4 Heater
16	Gr	Knock Sensor #2 (HI)	50	-	-	84	Gr	FPRV Control
17	O	Knock Sensor #1 (HI)	51	Y/B	[A/T]LINE_VFS	85	Gr/B	Injector #2 Control
18	W	CKPS HI	52	P	[A/T]UD_VFS	86	O	Injector #5 Control
19	B	Oil Temp. Sensor Ground	53	R	[A/T]SS_B	87	Y	Injector #3 Control
20	-	-	54	W/B	[A/T]Output Speed Power	88	G	Injector #6 Control
21	Gr	CMPS Bank #2(IN) Signal	55	W	[A/T]Oil Temp. Sensor (+)	89	R	Injector #4 Control
22	L	Wiper Motor Input	56	B	MAP/ECTS/BPS Ground	90	B	Injector #1 Control
23	-	-	57	L/B	[A/T]Oil Temp. Sensor (-)	91	P	Oxygen Sensor #1 Heater
24	W	Ignition Coil #1 Control	58	Gr	Oxygen Sensor #4 (HI)	92	P/B	Oxygen Sensor #2 Heater
25	-	-	59	W	Oxygen Sensor #3 (HI)	93	G	CVVT (EX) - Bank 2
26	Br	[A/T]T/CON_VFS	60	Br	Oxygen Sensor #3 (LO)	94	L/B	CVVT (EX) - Bank 1
27	G	[A/T]35R_VFS	61	-	-	95	W	CVVT (IN) - Bank 2
28	O	[A/T]SS_A	62	-	-	96	L	CVVT (IN) - Bank 1
29	L	[A/T]Input Speed Power	63	G/B	Oxygen Sensor #2 (HI)	97	G	Ignition Coil #2 Control
30	-	-	64	W	Oxygen Sensor #2 (LO)	98	L	Ignition Coil #6 Control
31	Br	TPS Ground	65	O	VIV. 1 Control	99	R	Ignition Coil #4 Control
32	B	CMPS Bank #1(IN/EX) Ground	66	G	PCSV Control	100	-	-
33	Br	Oxygen Sensor #4 (LO)	67	-	-			
34	W	TPS. 2 Signal	68	-	-			

※ [A/T] : See Automatic Transaxle Control System (SD450)



C100-B

PIN	COLOR	DESCRIPTION	PIN	COLOR	DESCRIPTION	PIN	COLOR	DESCRIPTION
1	Y	[A/T]OD_VFS	35	Gr	ECTS Signal	69	O	VIV. 2 Control
2	-	-	36	-	-	70	R	CMPS Bank #1(EX) Signal
3	Gr	[A/T]Input Speed Signal	37	-	-	71	G	CMPS Bank #1(IN) Signal
4	G	[A/T]Output Speed Signal	38	Gr	Oxygen Sensor #1 (HI)	72	-	-
5	P	CMPS Bank #1/2(IN/EX) Power	39	G	Oxygen Sensor #1 (LO)	73	P	CMPS Bank #2/1(IN/EX) Power
6	Gr	TPS Power	40	B	Shield Ground	74	Y	Ignition Coil #5 Control
7	-	-	41	Y	Knock Sensor #2 (LO)	75	-	-
8	P	Start Switch	42	P	Knock Sensor #1 (LO)	76	G	[A/T]Solenoid Power 1
9	O	BPS Signal	43	G	CKPS LO	77	O	[A/T]Solenoid Power 2
10	W	Oil Temp. Sensor Signal	44	Br	CMPS Bank #2/1(IN/EX) Ground	78	Gr	[A/T]26B_VFS
11	-	-	45	-	-	79	-	-
12	G	TPS.1 Signal	46	G	CMPS Bank #2(EX) Signal	80	W/B	ETC Motor (HI)
13	Y	MAP Sensor Signal	47	-	-	81	L	ETC Motor (LO)
14	W	Intake Air Temp. Sensor	48	P	MAP/BPS Power	82	P	Oxygen Sensor #3 Heater
15	W/B	Vehicle Speed Input	49	B	Ignition Coil #3 Control	83	P/B	Oxygen Sensor #4 Heater
16	Gr	Knock Sensor #2 (Hi)	50	-	-	84	Gr	FPRV Control
17	O	Knock Sensor #1 (Hi)	51	Y/B	[A/T]LINE_VFS	85	Gr/B	Injector #2 Control
18	W	CKPS Hi	52	P	[A/T]UD_VFS	86	O	Injector #5 Control
19	B	Oil Temp. Sensor Ground	53	R	[A/T]SS_B	87	Y	Injector #3 Control
20	-	-	54	W/B	[A/T]Output Speed Power	88	G	Injector #6 Control
21	Gr	CMPS Bank #2(IN) Signal	55	W	[A/T]Oil Temp. Sensor (+)	89	R	Injector #4 Control
22	L	Wiper Motor Input	56	B	MAP/ECTS/BPS Ground	90	B	Injector #1 Control
23	-	-	57	L/B	[A/T]Oil Temp. Sensor (-)	91	P	Oxygen Sensor #1 Heater
24	W	Ignition Coil #1 Control	58	Gr	Oxygen Sensor #4 (HI)	92	P/B	Oxygen Sensor #2 Heater
25	-	-	59	W	Oxygen Sensor #3 (HI)	93	G	CVVT (EX) - Bank 2
26	Br	[A/T]T/CON_VFS	60	Br	Oxygen Sensor #3 (LO)	94	L/B	CVVT (EX) - Bank 1
27	G	[A/T]3SR_VFS	61	-	-	95	W	CVVT (IN) - Bank 2
28	O	[A/T]SS_A	62	-	-	96	L	CVVT (IN) - Bank 1
29	L	[A/T]Input Speed Power	63	G/B	Oxygen Sensor #2 (HI)	97	G	Ignition Coil #2 Control
30	-	-	64	W	Oxygen Sensor #2 (LO)	98	L	Ignition Coil #6 Control
31	Br	TPS Ground	65	O	VIV. 1 Control	99	R	Ignition Coil #4 Control
32	B	CMPS Bank #1/2(IN/EX) Ground	66	G	PCSV Control	100	-	-
33	Br	Oxygen Sensor #4 (LO)	67	-	-			
34	W	TPS. 2 Signal	68	-	-			

Oil Control Valves

VVT Testing

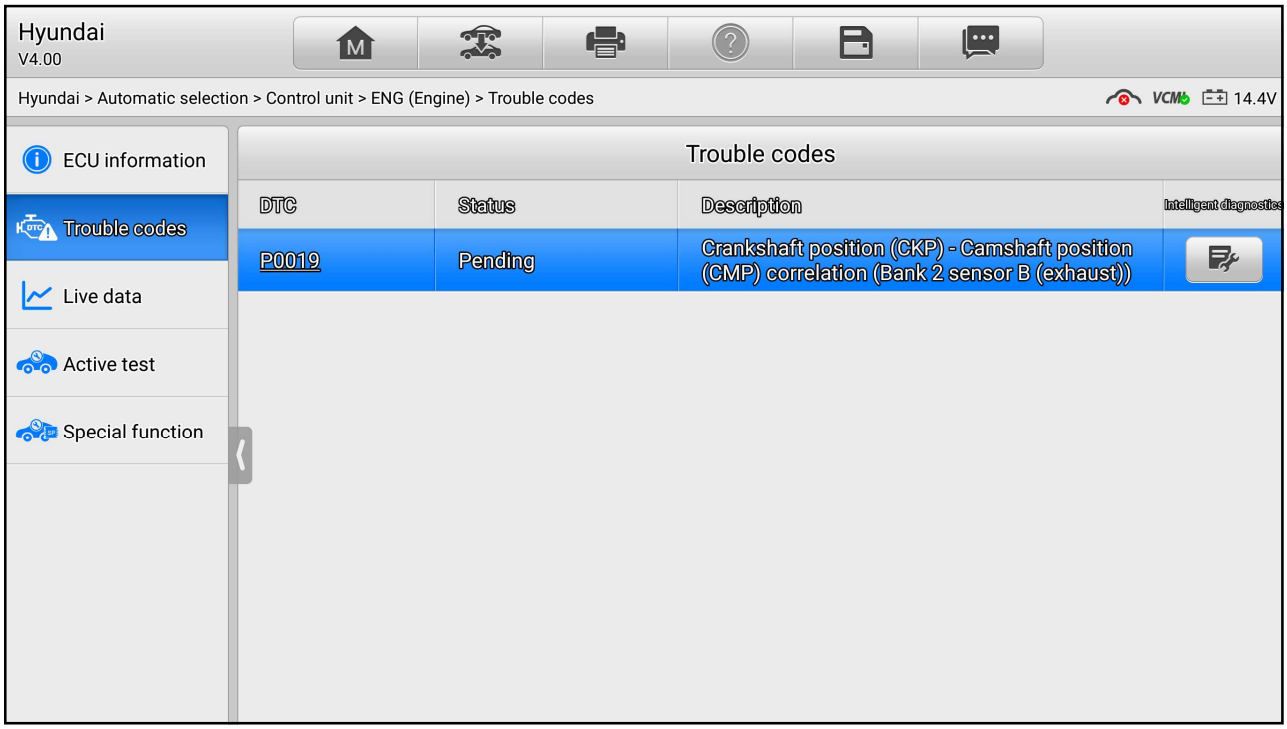
1. Scan Tool:

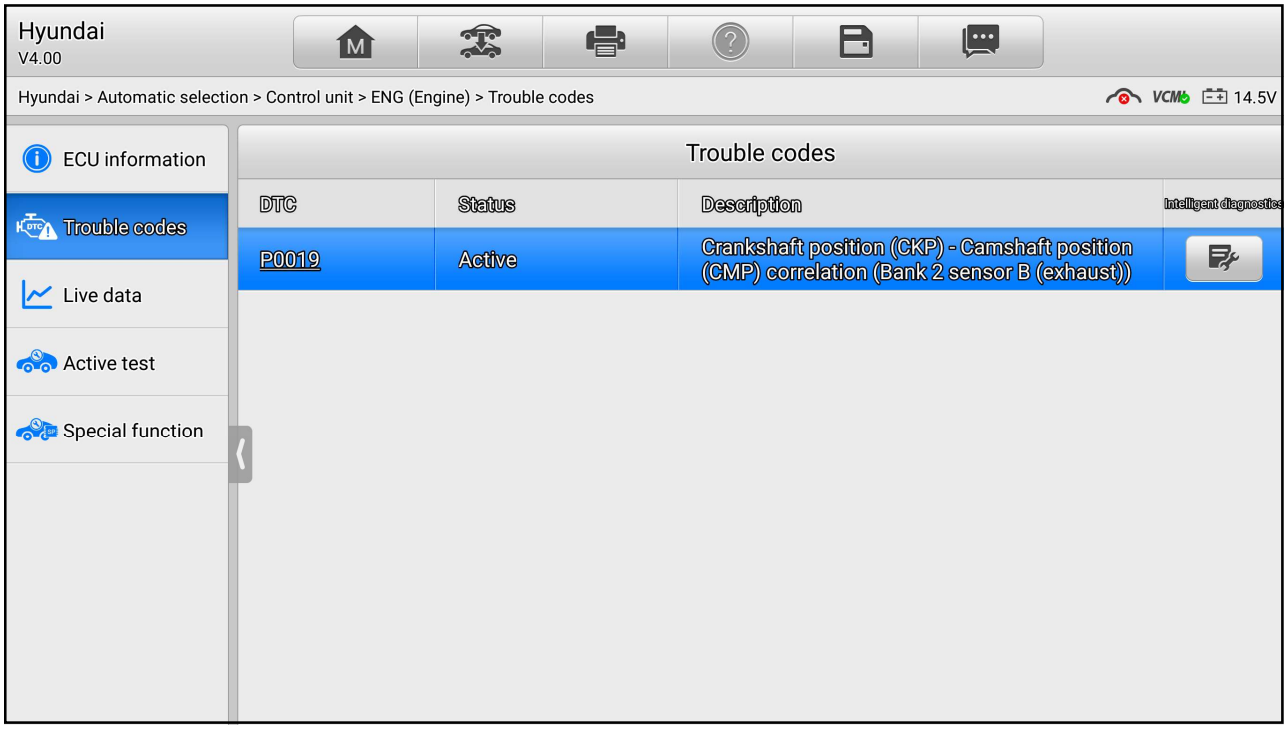
- Read codes
  - P0019 stored in memory
- Determine how cam position is displayed
  - Cam Position cannot be determined based on scantool information
- Solenoid/actuator duty cycle commands
  - Brake torque performed; duty cycle was noted to always be at zero degrees

VVT Testing

1. Scan Tool:

- Error pids
  - No error pid information is shown
- Desired position pids
  - Desired position pids always show zero degrees (maybe due to the P0019 code that has set)
- Check for bi-directional capability
  - There appears to be no bi-directional capability due to the P0019 code that has set


Hyundai
V4.00
Hyundai > Automatic selection > Control unit > ENG (Engine) > Trouble codes
VCM
14.4V
ECU information
Trouble codes
Live data
Active test
Special function
Trouble codes
DTC
Status
Description
Intelligent diagnostics
P0019
Pending
Crankshaft position (CKP) - Camshaft position (CMP) correlation (Bank 2 sensor B (exhaust))

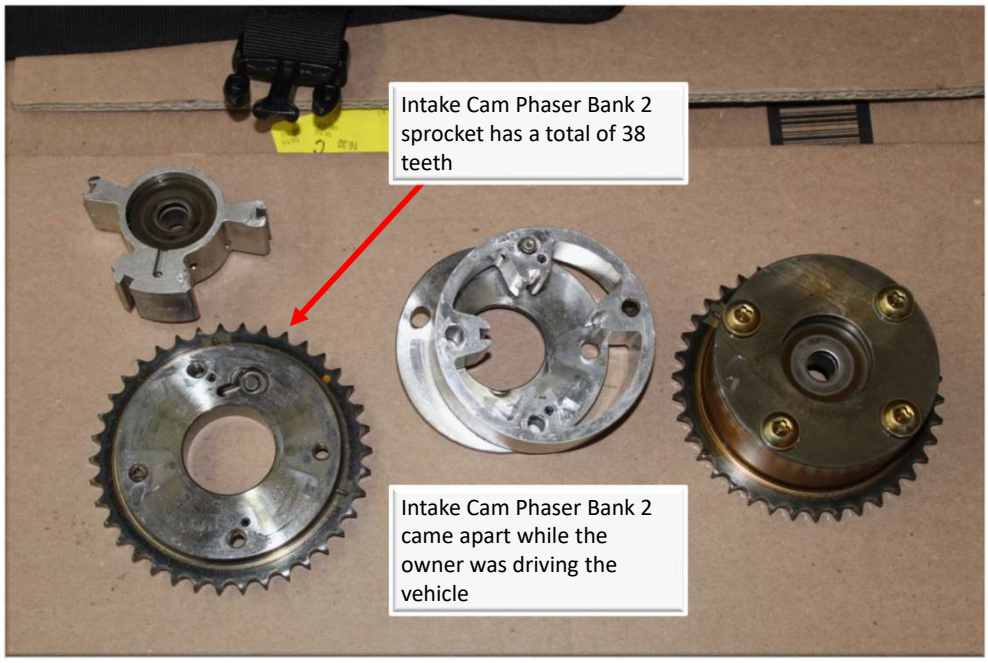

Hyundai
V4.00
Hyundai > Automatic selection > Control unit > ENG (Engine) > Trouble codes
VCM
14.5V
ECU information
Trouble codes
Live data
Active test
Special function
Trouble codes
DTC
Status
Description
Intelligent diagnostics
P0019
Active
Crankshaft position (CKP) - Camshaft position (CMP) correlation (Bank 2 sensor B (exhaust))

DTC Description

PCM monitors timing misalignment while no active faults are present with fully warmed up engine oil at idle. If the timing is misaligned PCM determines that a fault exists and a P0019 DTC is stored.

DTC Detecting Condition

Item		Detecting Condition	Possible Cause
DTC Strategy		• Determines if CAM target is aligned correctly to crankshaft	1. loosened CKPS 2. Timing Misalignment
Enable Conditions		• No active faults • Fully warmed up at idle	
Threshold value	Case 1	• 1 tooth misalignment at greater than 80 °C(176 °F) and less than 90 °C(194°F) of engine oil temperature.	
	Case 2	• 2 tooth misalignment at lower than 80 °C(176 °F) or higher than 90 °C(194°F) of engine oil temperature.	
Diagnosis Time		• Continuous (Within 1min.)	
MIL On Condition		• 2 Drive Cycles	



https://my.alldata.com/repair/#/repair/vehicle/56389/component/1/itype/100/tsbs/20191008115736250/selfRefLink/true

HYUNDAI

Technical Service Bulletin

GROUP	NUMBER
ENGINE	**19-EM-001H**
DATE	MODEL(S)
October, 2019	**MULTIPLE MODELS**

SUBJECT: LAMBDA ENGINE TIMING CHAIN AND CRANKSHAFT SPROCKET PARTS INFORMATION

Description: This bulletin provides information regarding the changes in the timing chain and the crankshaft sprockets on certain Azera (HG), Santa Fe/Santa Fe XL (NC), Genesis (BH/DH), Genesis Coupe (BK), and G90 (HI) vehicles equipped with Lambda 3.3L / 3.8L GDI engines.

Applicable Vehicles:
- **2012-17 MY Azera (HG)**
- **2013-18 MY Santa Fe and 2019MY Santa Fe XL (NC)**
- **2012-14 MY Genesis (BH) with 3.8L GDI engine**
- **2015-16 MY Genesis (DH) with 3.8L GDI engine**
- **2013-16 MY Genesis Coupe (BK) with 3.8L GDI engine**

Parts Information:

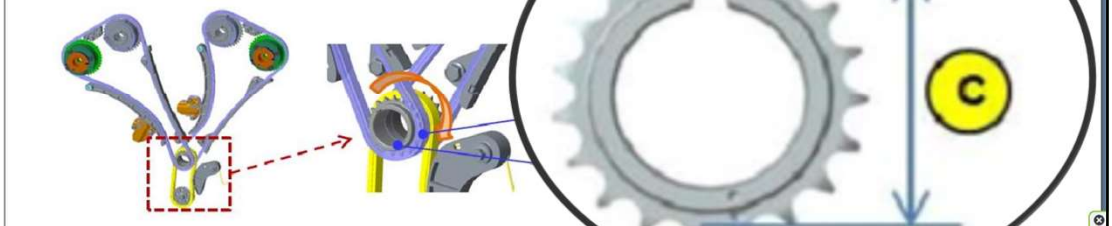
Type here to search 48°F 5:49 AM 10/28/2021

https://my.alldata.com/repair/#/repair/vehicle/56389/component/1/itype/100/tsbs/20191008115736250/selfRefLink/true

Applicable Vehicles:
- **2012-17 MY Azera (HG)**
- **2013-18 MY Santa Fe and 2019MY Santa Fe XL (NC)**
- **2012-14 MY Genesis (BH) with 3.8L GDI engine**
- **2015-16 MY Genesis (DH) with 3.8L GDI engine**
- **2013-16 MY Genesis Coupe (BK) with 3.8L GDI engine**

Parts Information:

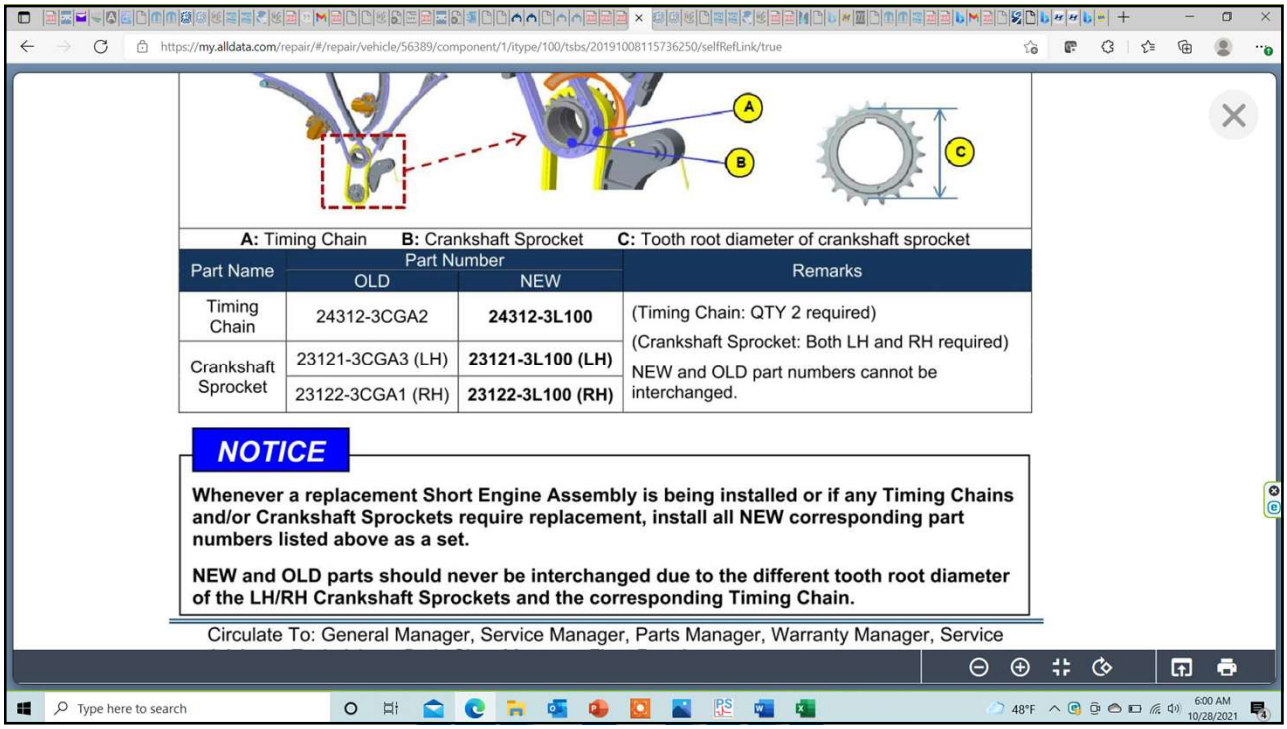
Crankshaft sprocket has a total of 19 teeth

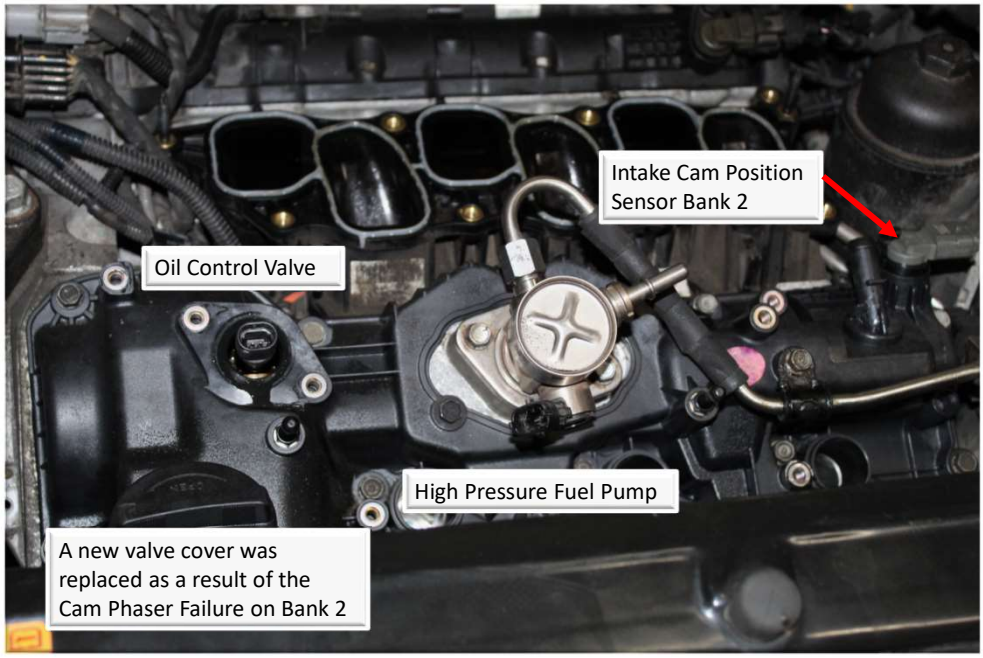


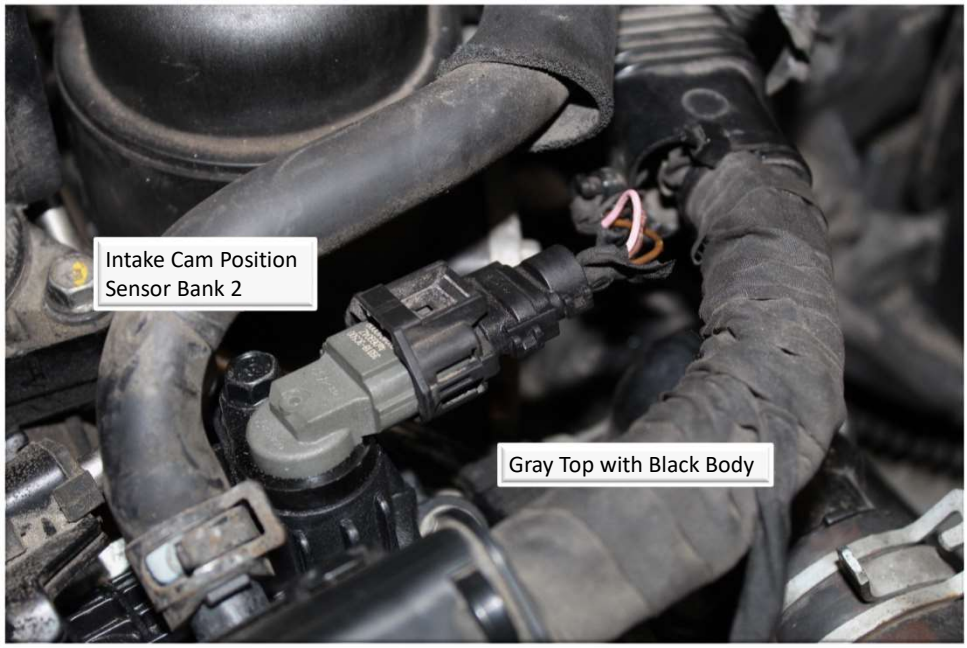
A: Timing Chain **B:** Crankshaft Sprocket **C:** Tooth root diameter

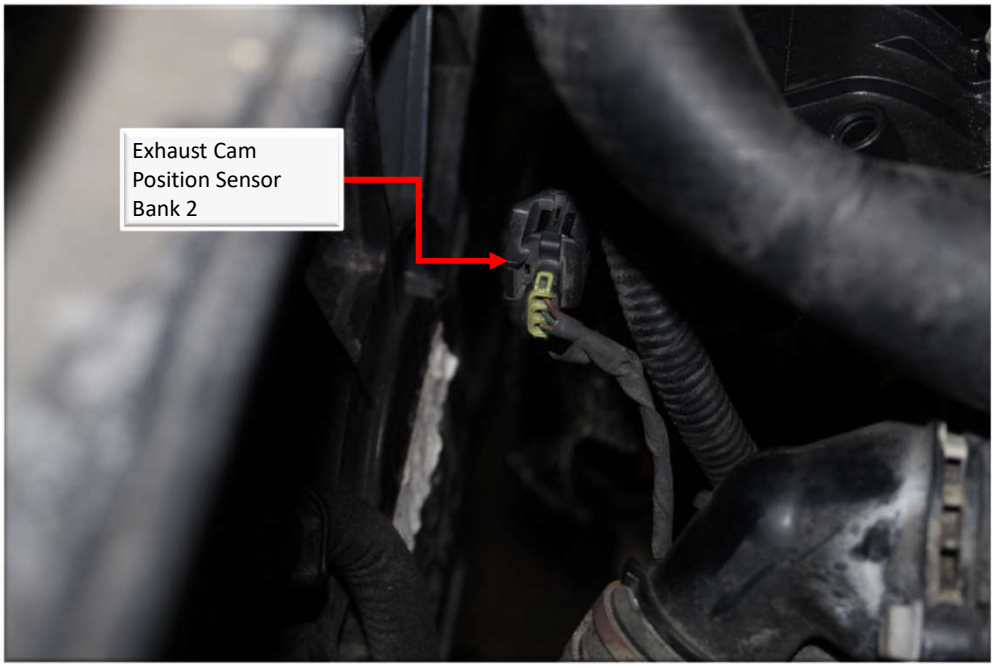
Part Name	Part Number		Remarks
	OLD	NEW	
Timing Chain	24312-3CGA2	**24312-3L100**	(Timing Chain: QTY 2 required)
Crankshaft	23121-3CGA3 (LH)	**23121-3L100 (LH)**	(Crankshaft Sprocket: Both LH and RH required) NEW and OLD part numbers cannot be

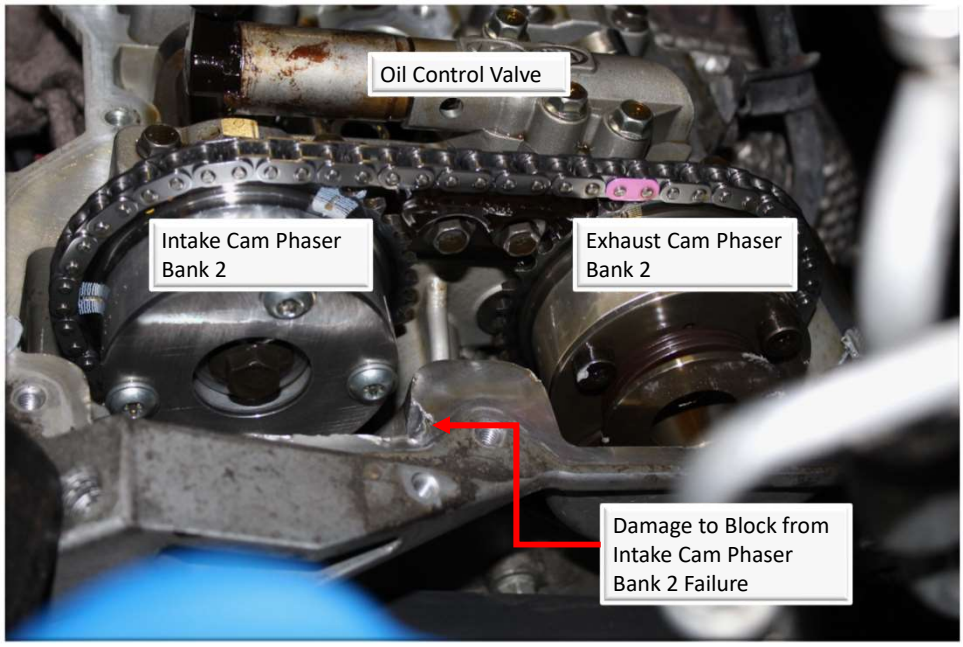
Type here to search 48°F 5:49 AM 10/28/2021

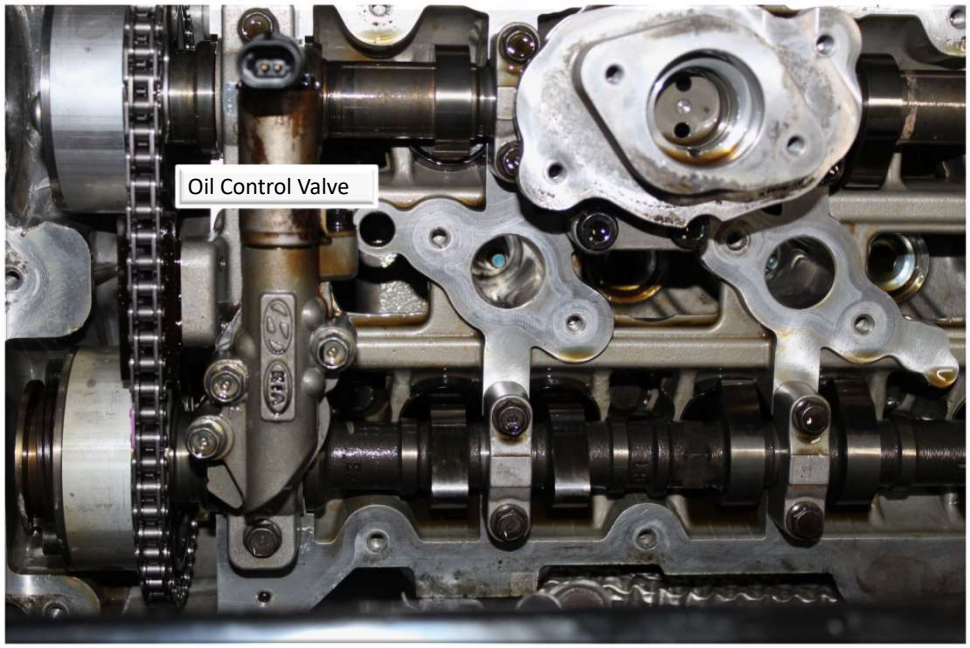

https://my.alldata.com/repair/#/repair/vehicle/56389/component/1/itype/100/tsbs/20191008115736250/selfRefLink/true
A
B
C
A: Timing Chain B: Crankshaft Sprocket C: Tooth root diameter of crankshaft sprocket
Part Name
Part Number
OLD
NEW
Remarks
Timing Chain
24312-3CGA2
24312-3L100
(Timing Chain: QTY 2 required)
(Crankshaft Sprocket: Both LH and RH required)
NEW and OLD part numbers cannot be interchanged.
Crankshaft Sprocket
23121-3CGA3 (LH)
23121-3L100 (LH)
23122-3CGA1 (RH)
23122-3L100 (RH)
NOTICE
Whenever a replacement Short Engine Assembly is being installed or if any Timing Chains and/or Crankshaft Sprockets require replacement, install all NEW corresponding part numbers listed above as a set.
NEW and OLD parts should never be interchanged due to the different tooth root diameter of the LH/RH Crankshaft Sprockets and the corresponding Timing Chain.
Circulate To: General Manager, Service Manager, Parts Manager, Warranty Manager, Service
Type here to search
48°F
6:00 AM
10/28/2021

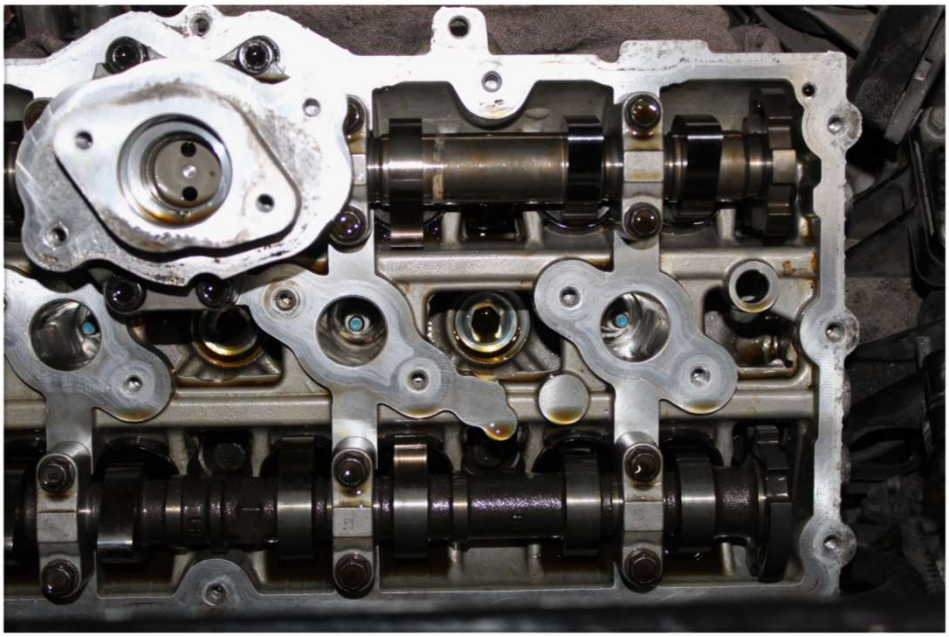

Intake Cam Position Sensor Bank 2
Oil Control Valve
High Pressure Fuel Pump
A new valve cover was replaced as a result of the Cam Phaser Failure on Bank 2


Intake Cam Position Sensor Bank 2
Gray Top with Black Body


Exhaust Cam Position Sensor Bank 2

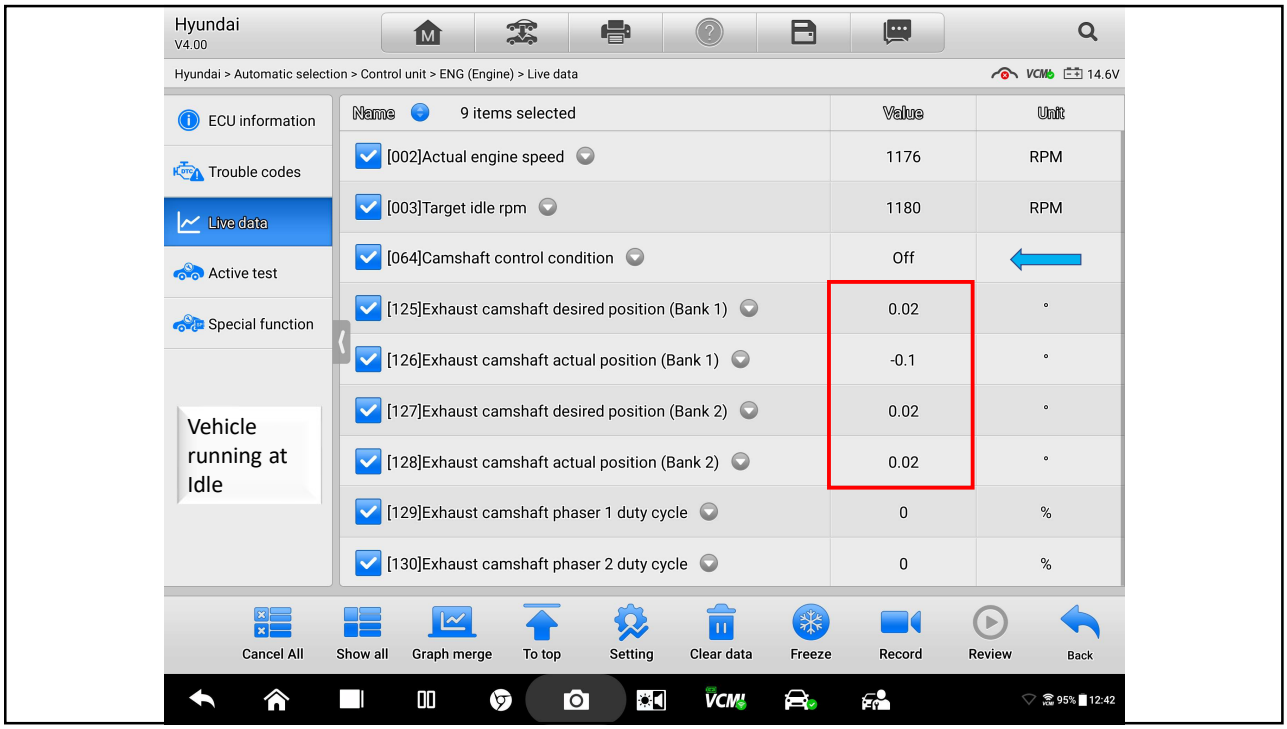

Oil Control Valve
Intake Cam Phaser Bank 2
Exhaust Cam Phaser Bank 2
Damage to Block from Intake Cam Phaser Bank 2 Failure

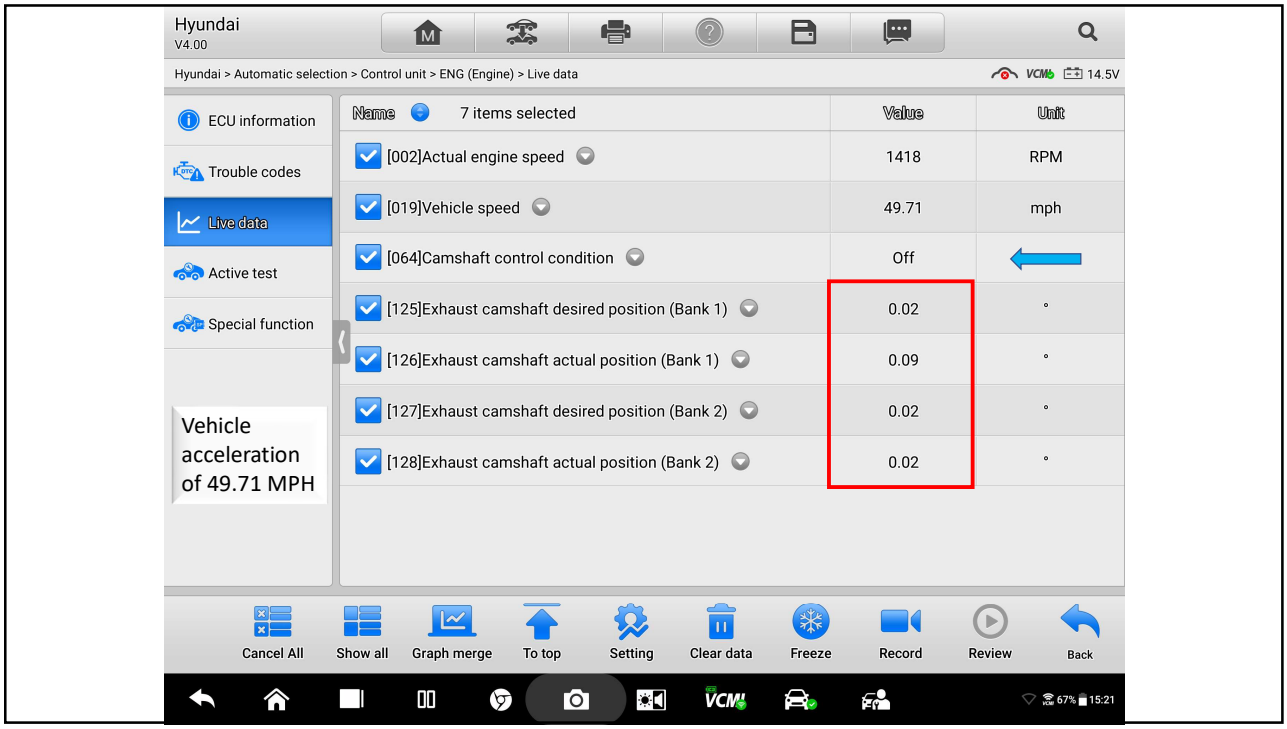

Oil Control Valve

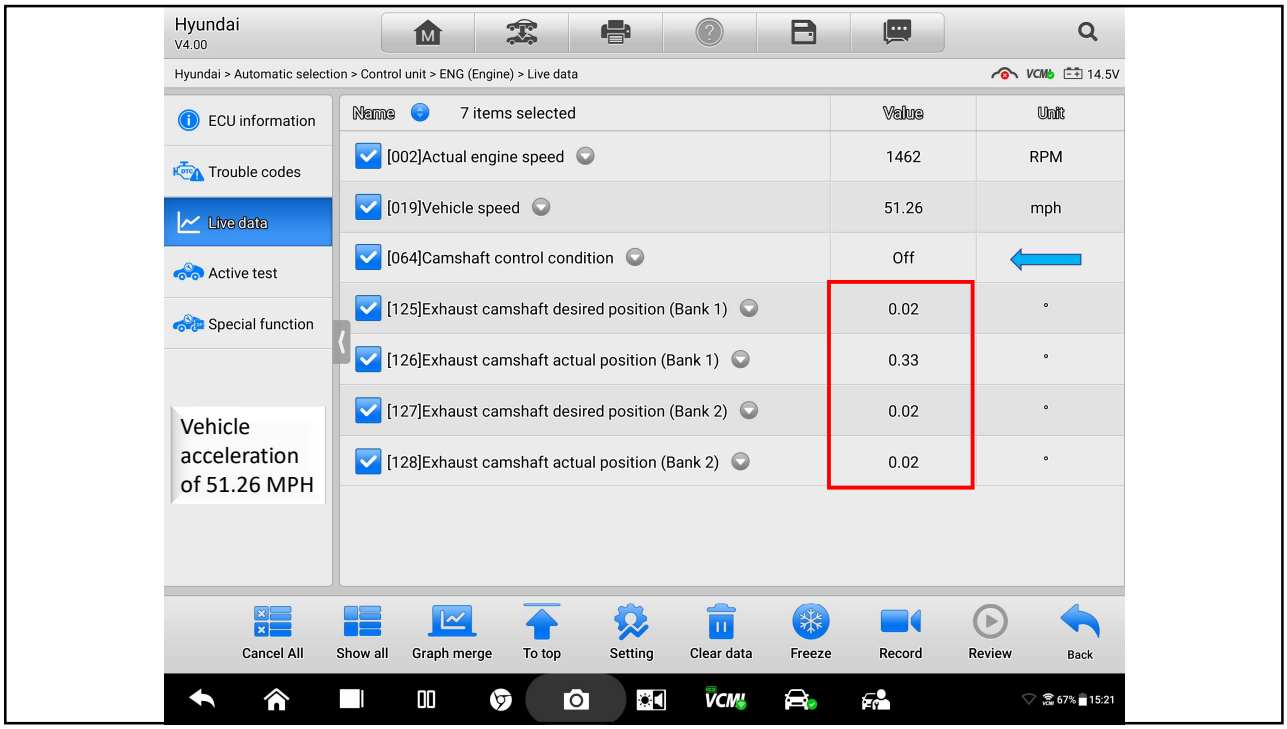


Scan Data

TST Seminars
Professional Training for Automotive Experts


Hyundai
V4.00
Hyundai > Automatic selection > Control unit > ENG (Engine) > Live data
VCMI 14.6V
ECU information
Trouble codes
Live data
Active test
Special function
Name
9 items selected
Value
Unit
[002]Actual engine speed
1176
RPM
[003]Target idle rpm
1180
RPM
[064]Camshaft control condition
Off
[125]Exhaust camshaft desired position (Bank 1)
0.02
°
[126]Exhaust camshaft actual position (Bank 1)
-0.1
°
[127]Exhaust camshaft desired position (Bank 2)
0.02
°
[128]Exhaust camshaft actual position (Bank 2)
0.02
°
[129]Exhaust camshaft phaser 1 duty cycle
0
%
[130]Exhaust camshaft phaser 2 duty cycle
0
%
Vehicle running at Idle
Cancel All
Show all
Graph merge
To top
Setting
Clear data
Freeze
Record
Review
Back
95%
12:42


Hyundai
V4.00
Hyundai > Automatic selection > Control unit > ENG (Engine) > Live data
VCMI 14.5V
ECU information
Trouble codes
Live data
Active test
Special function
Name
7 items selected
Value
Unit
[002]Actual engine speed
1418
RPM
[019]Vehicle speed
49.71
mph
[064]Camshaft control condition
Off
[125]Exhaust camshaft desired position (Bank 1)
0.02
°
[126]Exhaust camshaft actual position (Bank 1)
0.09
°
[127]Exhaust camshaft desired position (Bank 2)
0.02
°
[128]Exhaust camshaft actual position (Bank 2)
0.02
°
Vehicle acceleration of 49.71 MPH
Cancel All
Show all
Graph merge
To top
Setting
Clear data
Freeze
Record
Review
Back
67%
15:21


Hyundai
V4.00
Hyundai > Automatic selection > Control unit > ENG (Engine) > Live data
VCMi 14.5V
ECU information
Trouble codes
Live data
Active test
Special function
Name
7 items selected
Value
Unit
[002]Actual engine speed
1462
RPM
[019]Vehicle speed
51.26
mph
[064]Camshaft control condition
Off
[125]Exhaust camshaft desired position (Bank 1)
0.02
[126]Exhaust camshaft actual position (Bank 1)
0.33
[127]Exhaust camshaft desired position (Bank 2)
0.02
[128]Exhaust camshaft actual position (Bank 2)
0.02
Vehicle acceleration of 51.26 MPH
Cancel All
Show all
Graph merge
To top
Setting
Clear data
Freeze
Record
Review
Back

Labscope

VVT Testing

1. LabScope:

- Perform a Relative Compression Test
  - Test Results: Good
- Perform a Cranking Vacuum Test
  - Test Results: Slight deviation noted in pattern
- Perform an In Cylinder Test
  - Test Results: Slight deviation noted in pattern

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Relative Compression Test and Vacuum Waveform Analysis

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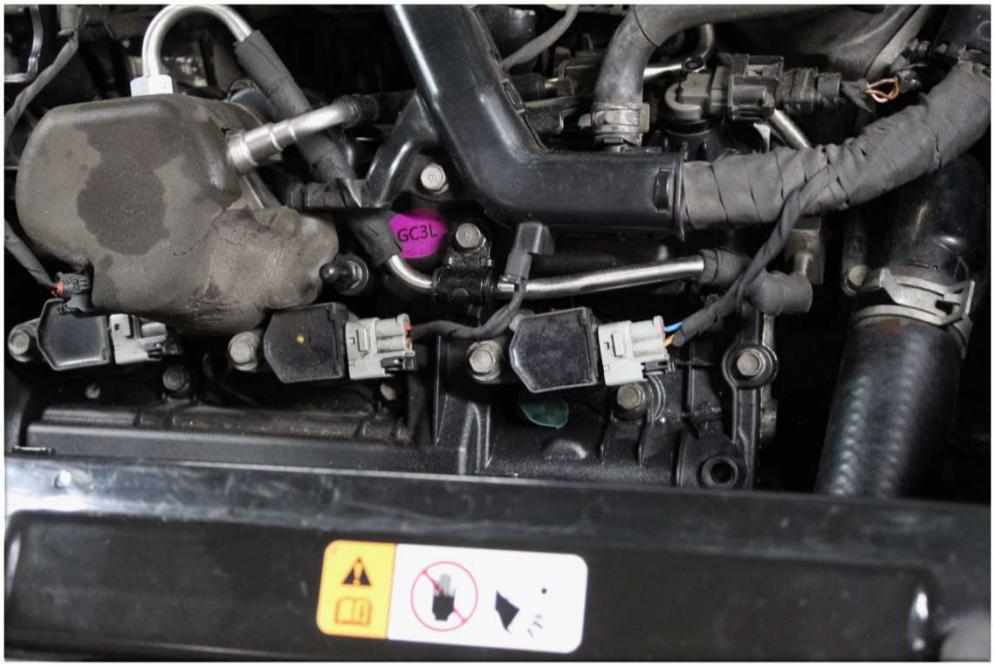
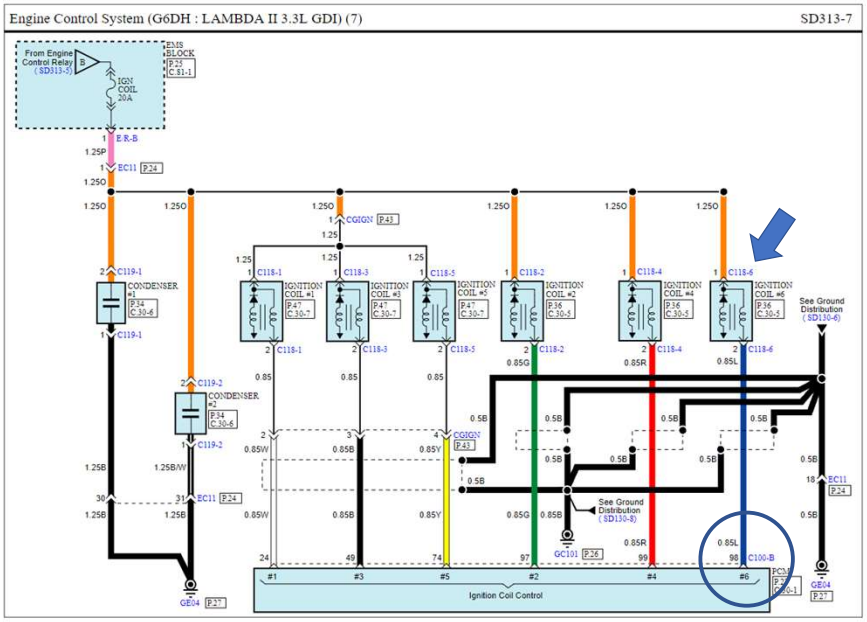
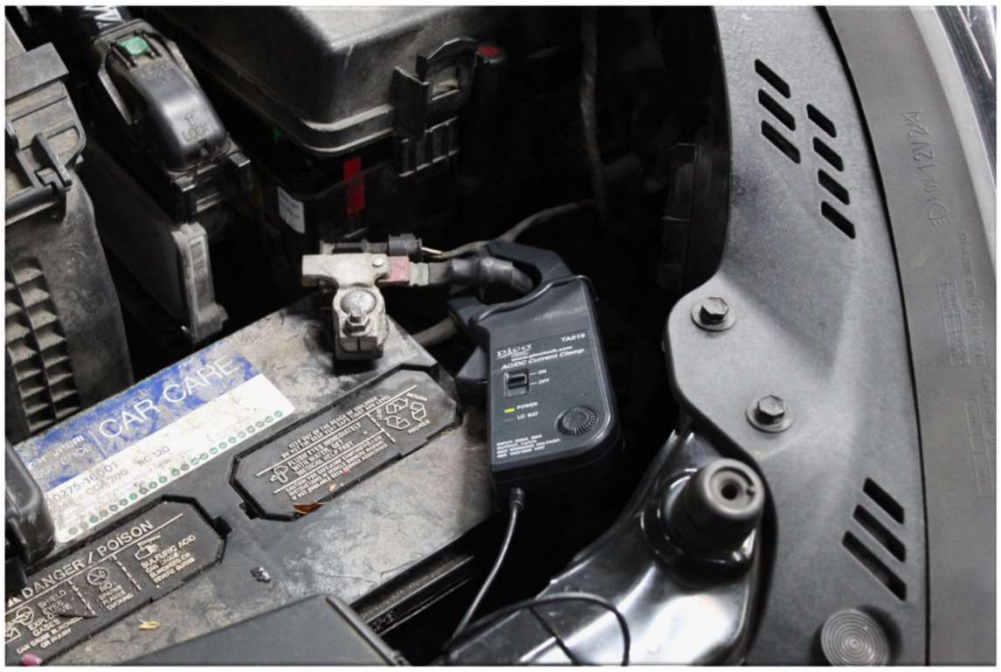
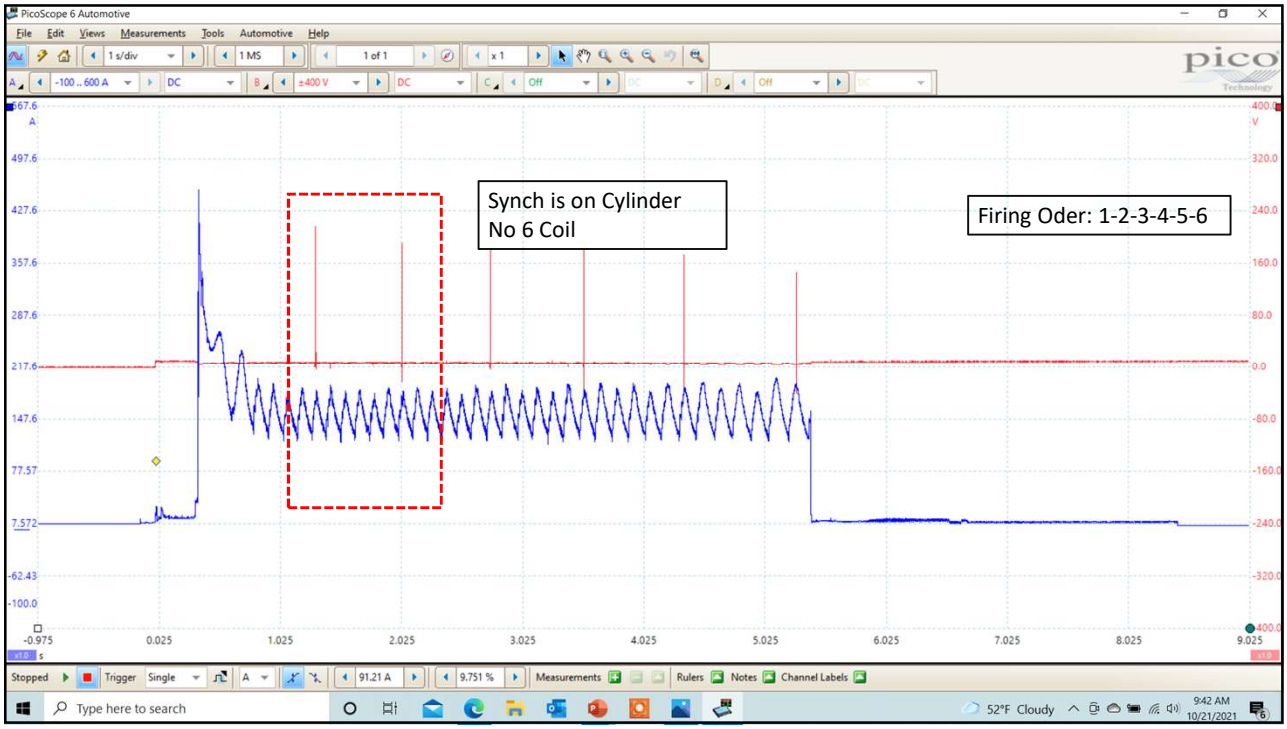
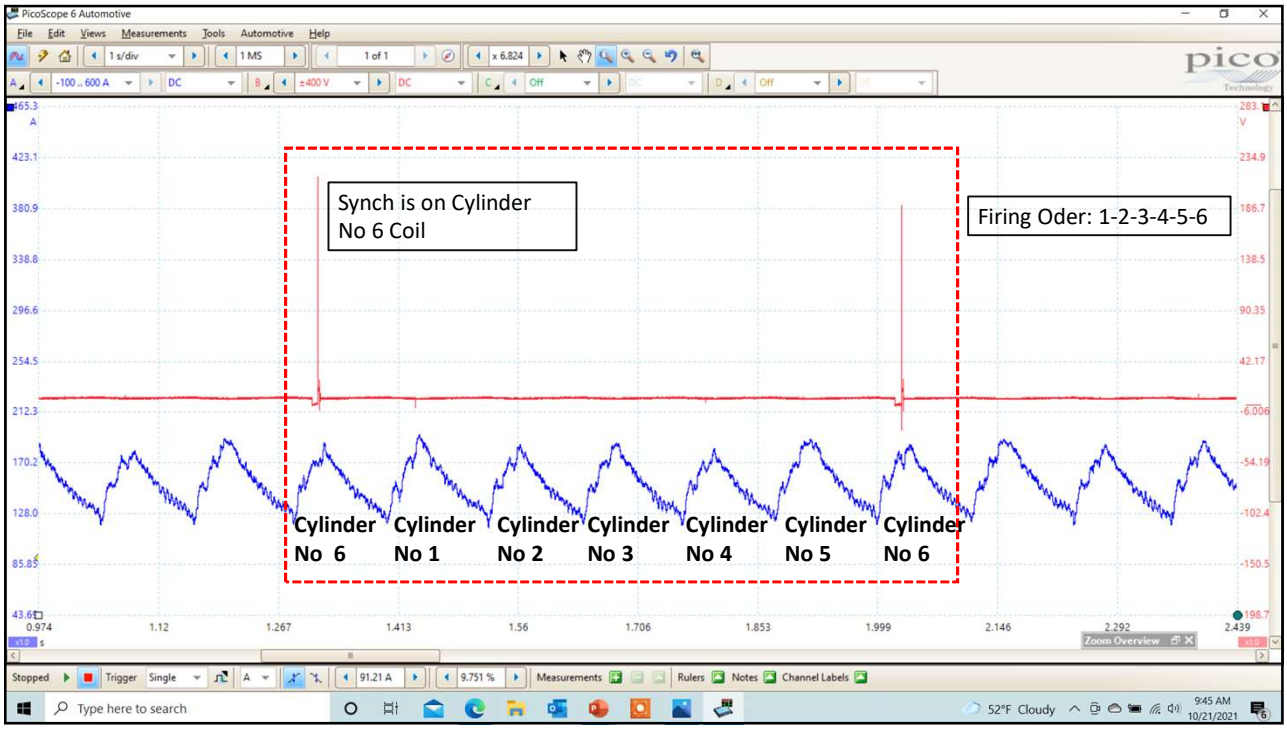


Ignition Coil No. 6 was used as a Synch Pin No 98 at PCM

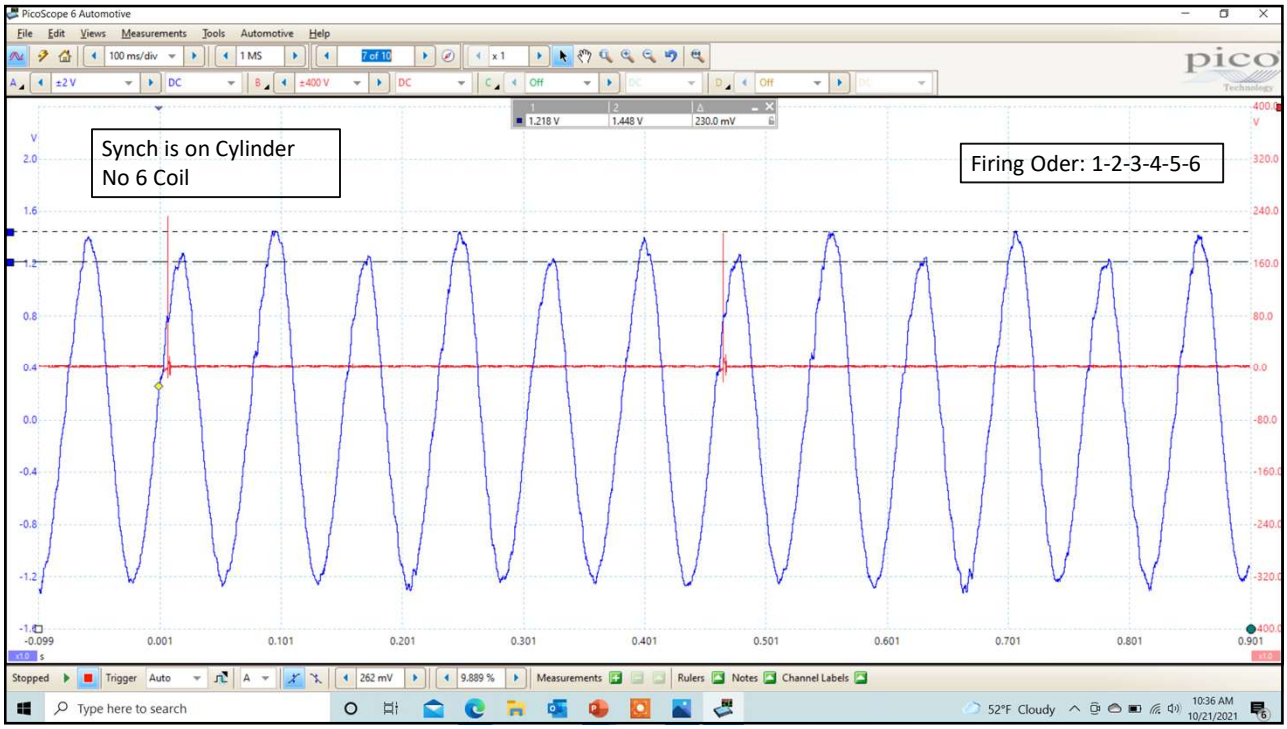


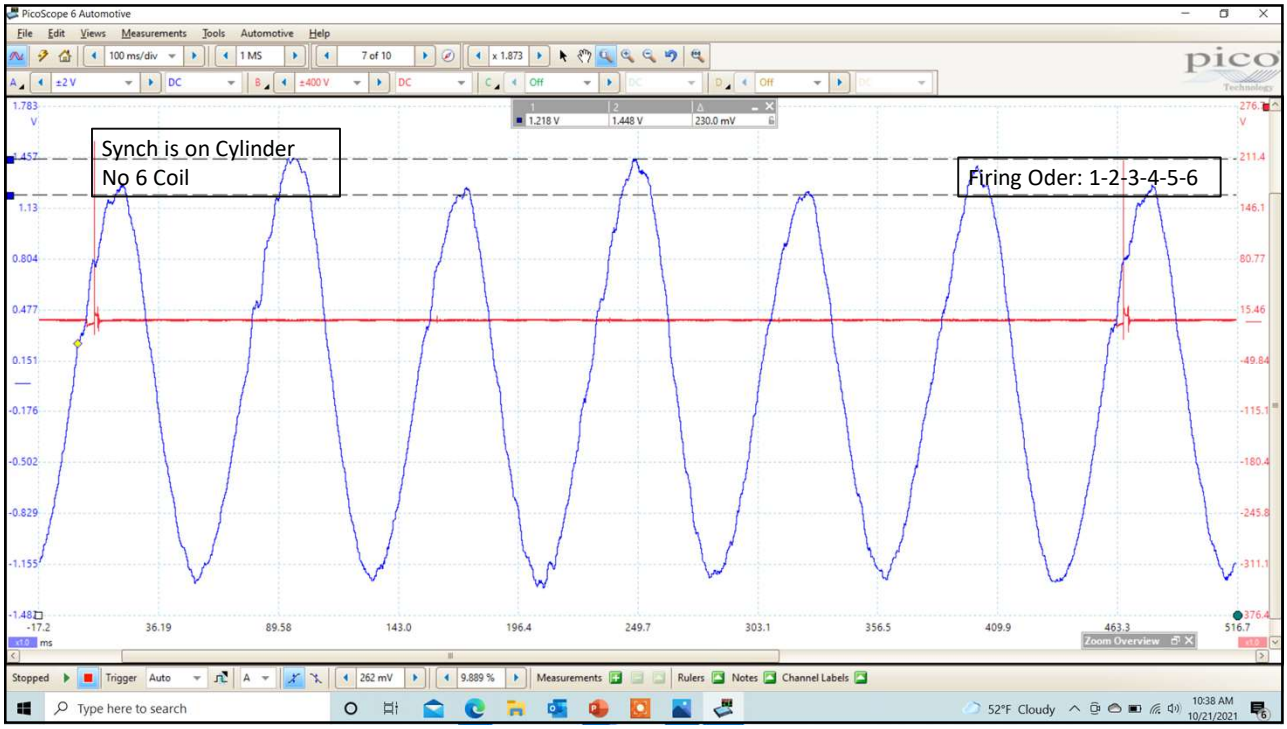

CAR CARE
DANGER / POISON

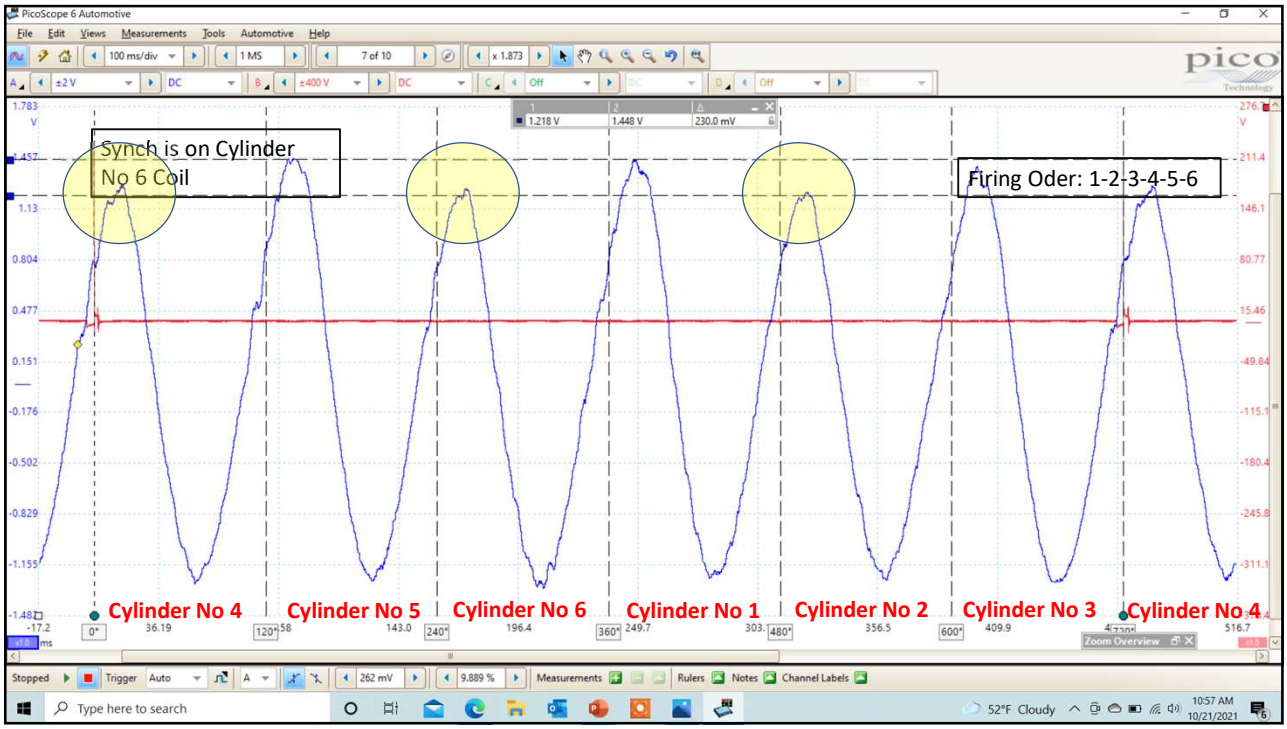

PicoScope 6 Automotive
File Edit Views Measurements Tools Automotive Help
Synch is on Cylinder No 6 Coil
Firing Oder: 1-2-3-4-5-6
667.6
497.6
427.6
357.6
287.6
217.6
147.6
77.57
7.572
-62.43
-100.0
-0.975
0.025
1.025
2.025
3.025
4.025
5.025
6.025
7.025
8.025
9.025
Stopped Trigger Single
Measurements Rulers Notes Channel Labels
Type here to search
52°F Cloudy
9:42 AM
10/21/2021


PicoScope 6 Automotive
File Edit Views Measurements Tools Automotive Help
pico
Synch is on Cylinder No 6 Coil
Firing Oder: 1-2-3-4-5-6
Cylinder No 6
Cylinder No 1
Cylinder No 2
Cylinder No 3
Cylinder No 4
Cylinder No 5
Cylinder No 6
Stopped Trigger Single
Type here to search
52°F Cloudy
9:45 AM 10/21/2021


FC1


PicoScope 6 Automotive
Synch is on Cylinder
No 6 Coil
Firing Oder: 1-2-3-4-5-6


PicoScope 6 Automotive
Synch is on Cylinder
No 6 Coil
Firing Oder: 1-2-3-4-5-6



VVT Testing

2. Scope In Cylinder:

- Perform cranking and running compression checks
  - Cam Timing appears to be Off
- Determine true TDC of crank sensor signal (Shown Later)
- Determine crank sensor reluctor "degrees per tooth" (Shown Later)

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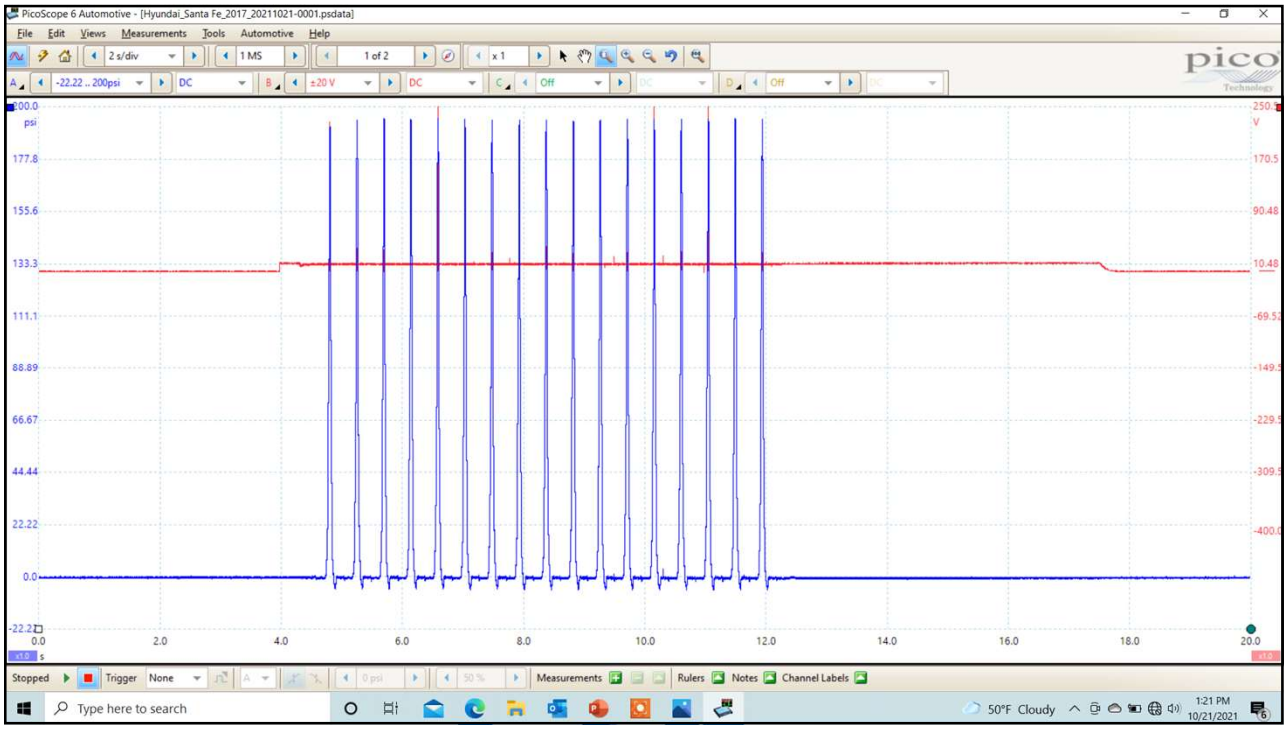
PicoScope 6 Automotive - [Hyundai_Santa Fe_2017_20211021-0001.psdata]
File Edit Views Measurements Tools Automotive Help
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200.0
psi
177.8
155.6
133.3
111.1
88.89
66.67
44.44
22.22
0.0
-22.2
250.0
V
170.5
90.48
10.48
-69.52
-149.5
-229.5
-309.5
-400.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
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Stopped
Trigger
None
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Rulers
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Type here to search
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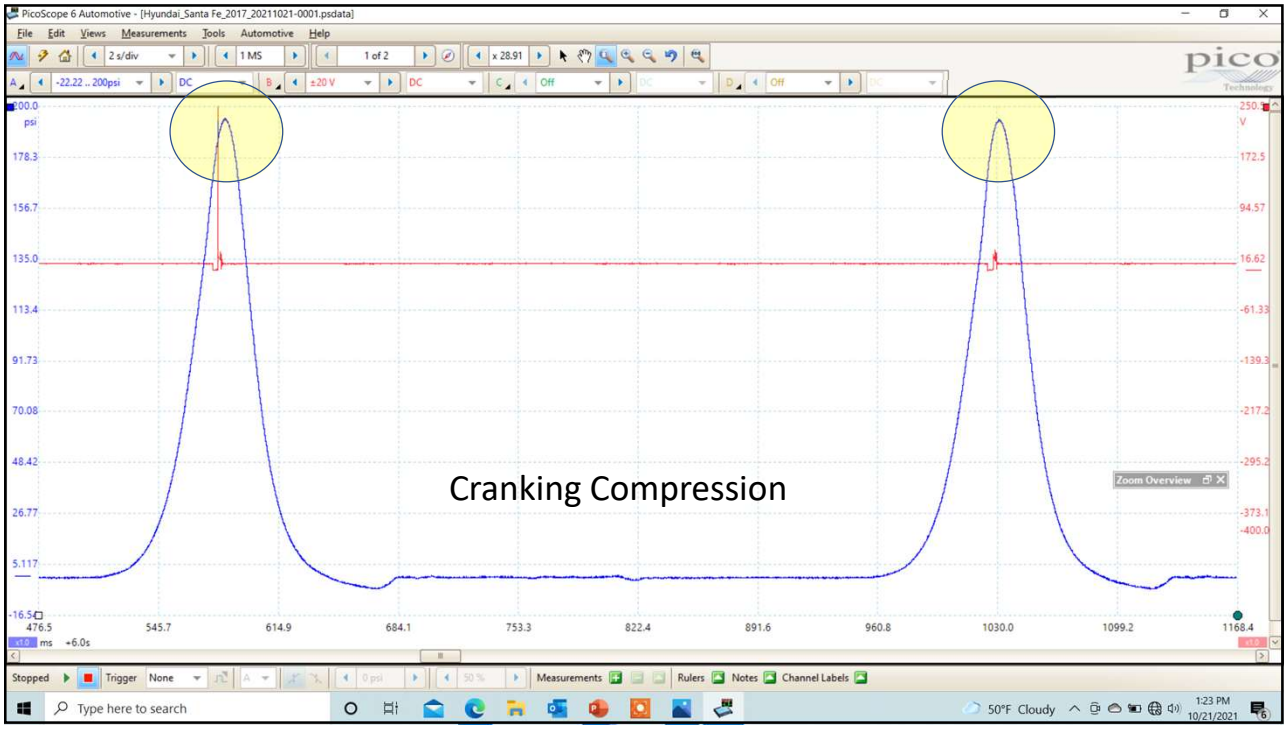
1:21 PM
10/21/2021


PicoScope 6 Automotive - [Hyundai_Santa Fe_2017_20211021-0001.psdata]
File Edit Views Measurements Tools Automotive Help
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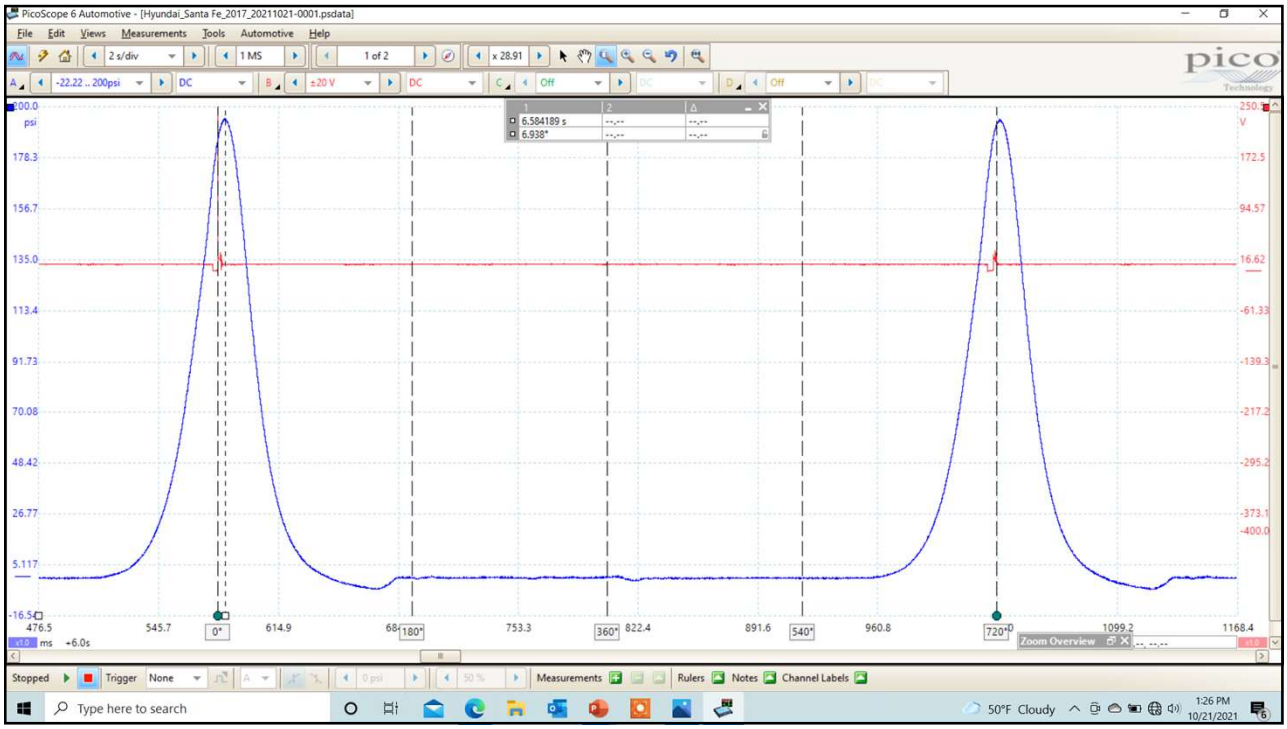
200.0
psi
178.3
156.7
135.0
113.4
91.73
70.08
48.42
26.77
5.117
-16.5
250.0
V
172.5
94.57
16.62
-61.33
-139.3
-217.2
-295.2
-373.1
-400.0
476.5
545.7
614.9
684.1
753.3
822.4
891.6
960.8
1030.0
1099.2
1168.4
ms
+6.0s
Cranking Compression
Zoom Overview
Stopped
Trigger
None
Measurements
Rulers
Notes
Channel Labels
Type here to search
50°F Cloudy
1:23 PM
10/21/2021


PicoScope 6 Automotive - [Hyundai_Santa Fe_2017_20211021-0001.psdata]
File Edit Views Measurements Tools Automotive Help
pico
200.0 psi
178.3
156.7
135.0
113.4
91.73
70.08
48.42
26.77
5.117
-16.54
250.0 V
172.5
94.57
16.62
-61.33
-139.3
-217.2
-295.2
-373.1
-400.0
476.5
545.7
0°
614.9
180°
753.3
360°
822.4
891.6
540°
960.8
720°
1099.2
1168.4
Zoom Overview
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Trigger
None
Measurements
Rulers
Notes
Channel Labels
Type here to search
50°F Cloudy
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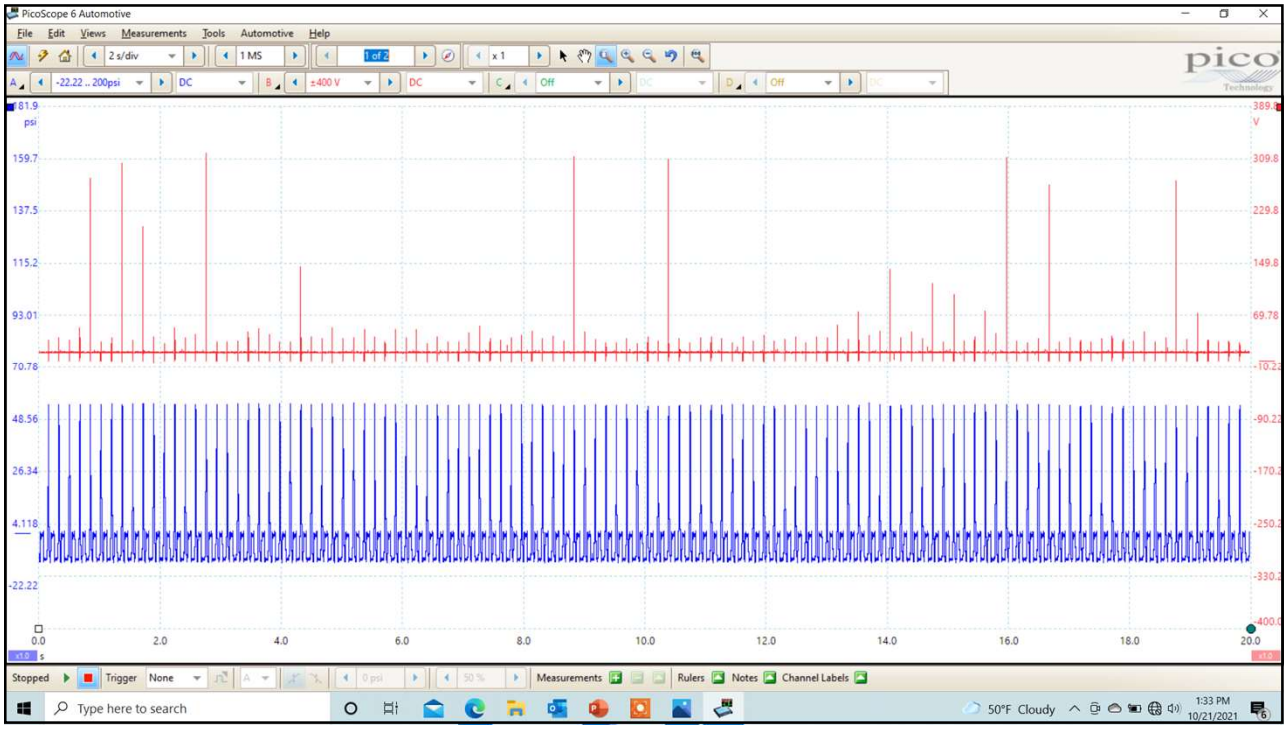
10/21/2021


PicoScope 6 Automotive
File Edit Views Measurements Tools Automotive Help
pico
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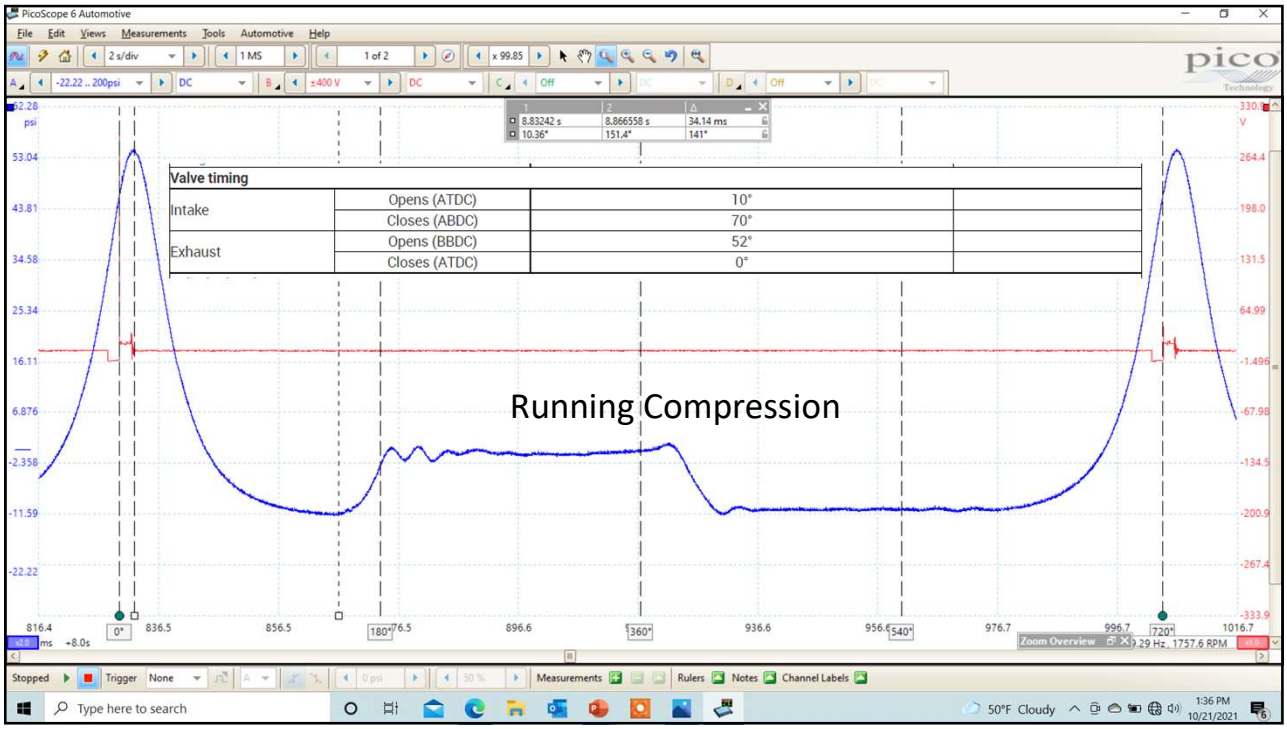
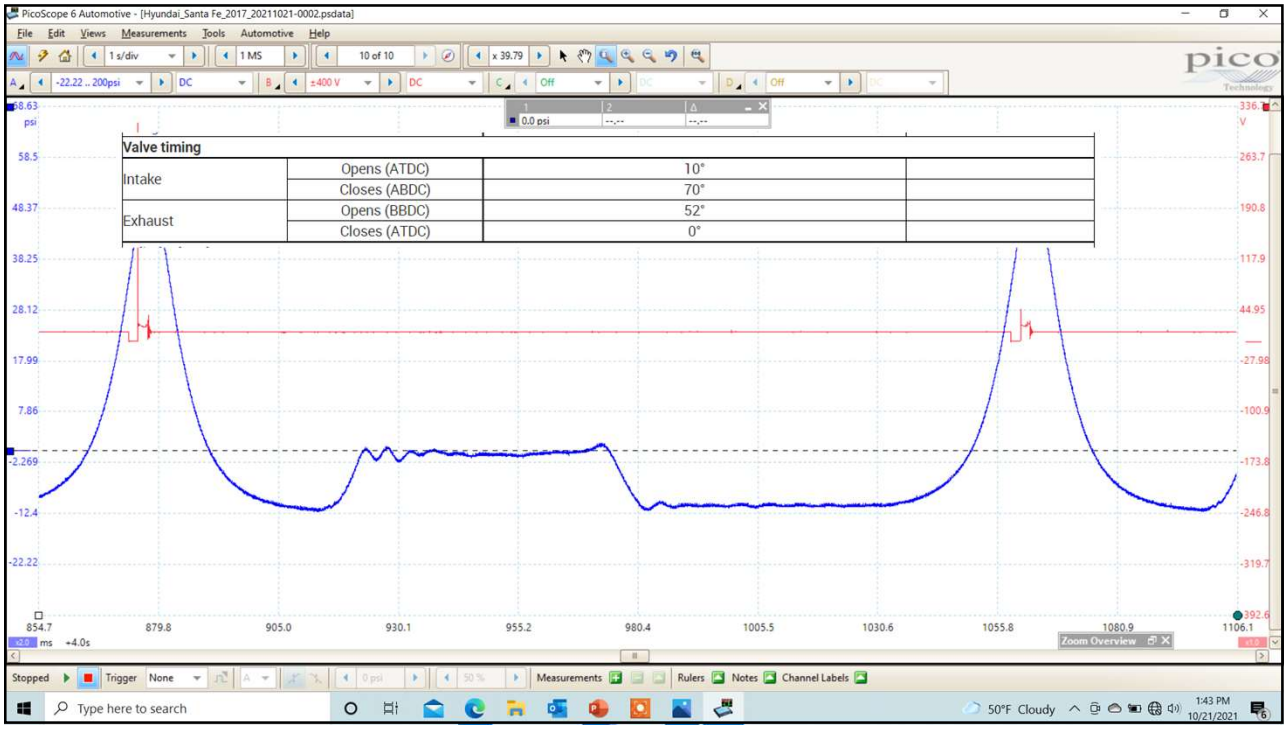
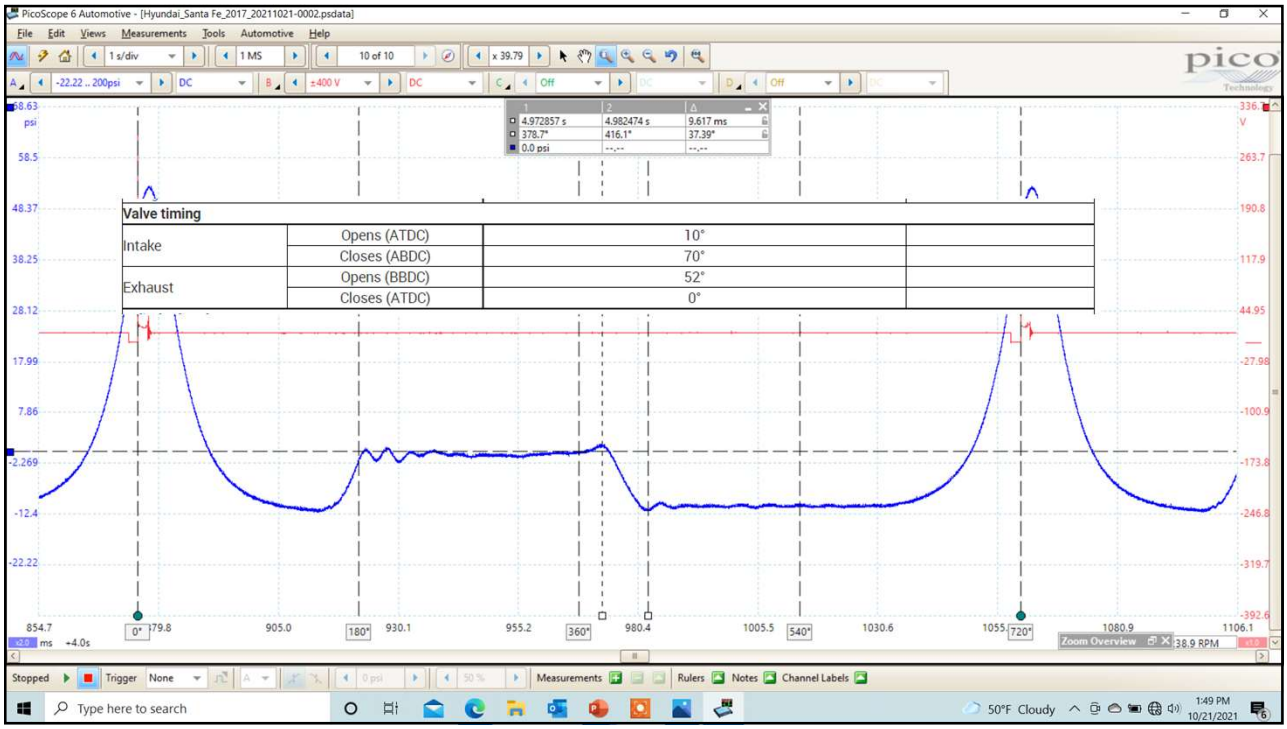
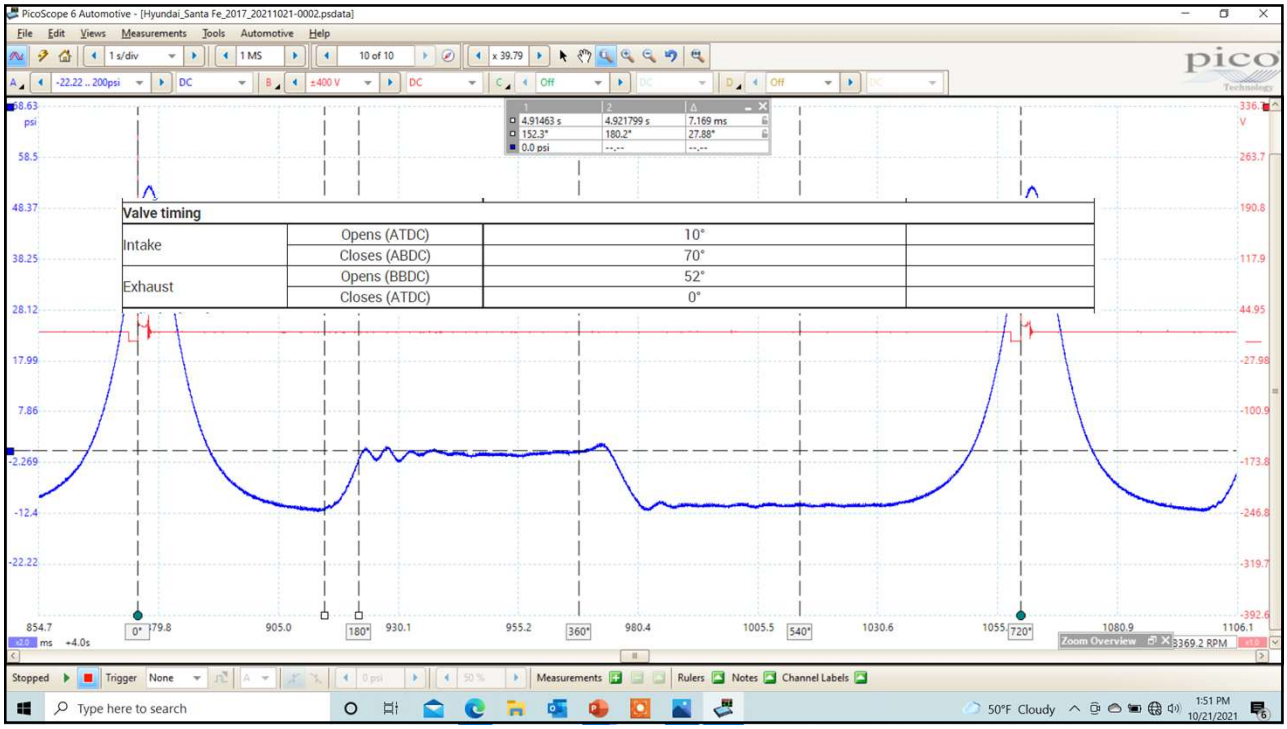
159.7
137.5
115.2
93.01
70.78
48.56
26.34
4.118
-22.22
389.0 V
309.8
229.8
149.8
69.78
-10.22
-90.22
-170.2
-250.2
-330.2
-400.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
Stopped
Trigger
None
Measurements
Rulers
Notes
Channel Labels
Type here to search
50°F Cloudy
1:33 PM
10/21/2021


PicoScope 6 Automotive
Valve timing
Intake
Opens (ATDC) 10°
Closes (ABDC) 70°
Exhaust
Opens (BBDC) 52°
Closes (ATDC) 0°
Running Compression


PicoScope 6 Automotive - [Hyundai_Santa Fe_2017_20211021-0002.psdata]
Valve timing
Intake
Opens (ATDC) 10°
Closes (ABDC) 70°
Exhaust
Opens (BBDC) 52°
Closes (ATDC) 0°


PicoScope 6 Automotive - [Hyundai_Santa Fe_2017_20211021-0002.psdata]
Valve timing
Intake
Opens (ATDC) 10°
Closes (ABDC) 70°
Exhaust
Opens (BBDC) 52°
Closes (ATDC) 0°
Stopped
Trigger
Measurements
Rulers
Notes
Channel Labels
Type here to search
50°F Cloudy
1:49 PM
10/21/2021


PicoScope 6 Automotive - [Hyundai_Santa Fe_2017_20211021-0002.psdata]
Valve timing
Intake
Opens (ATDC) 10°
Closes (ABDC) 70°
Exhaust
Opens (BBDC) 52°
Closes (ATDC) 0°
Stopped
Trigger
Measurements
Rulers
Notes
Channel Labels
Type here to search
50°F Cloudy
1:51 PM
10/21/2021

VVT Testing

3. Scope Crank Cam Synch:

- #1 coil vs crank sensor vs cam sensor (s)
  - Cam and Crank sensor were evaluated
- check crank to cam for proper relationship, to determine belt or chain alignment and stretch
  - There appears to be a Cam Sensor Issue

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VVT Testing

3. Scope Crank Cam Synch:

- Determine crank sensor reluctor “degrees per tooth”
  - The crankshaft sensor signal has a 60-2 design. You would divide 360 degrees/60 teeth = 6 crank degrees per pulse.

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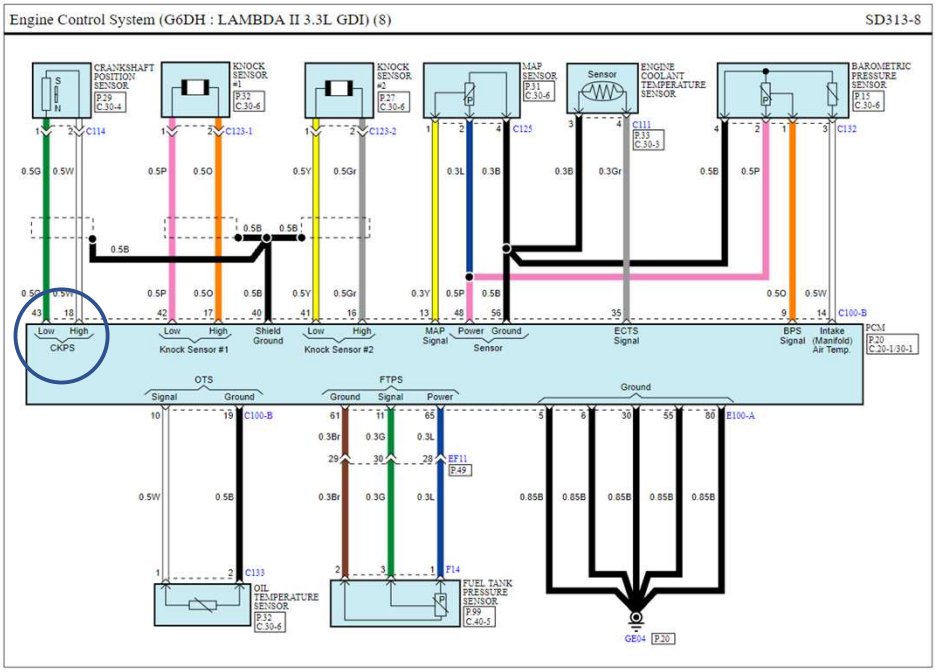
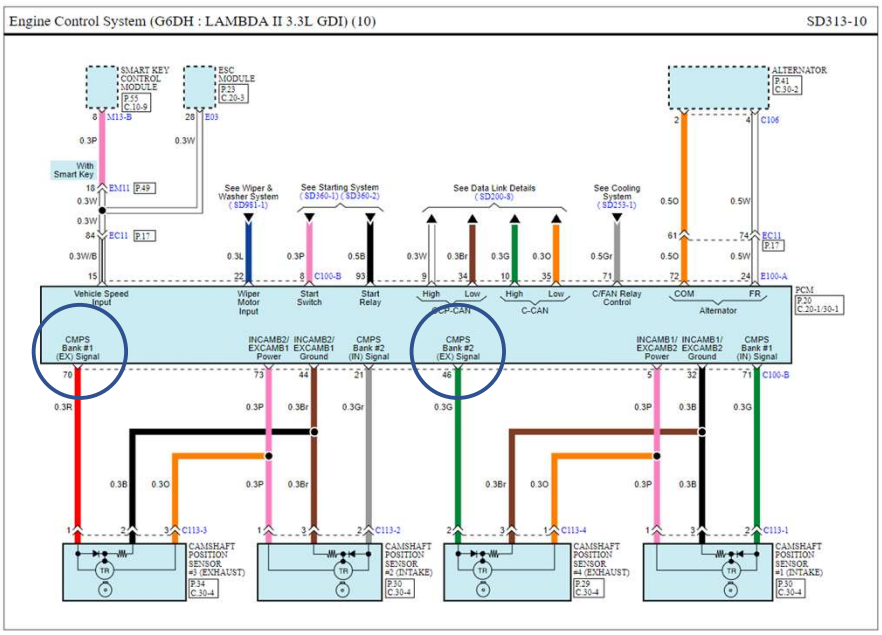
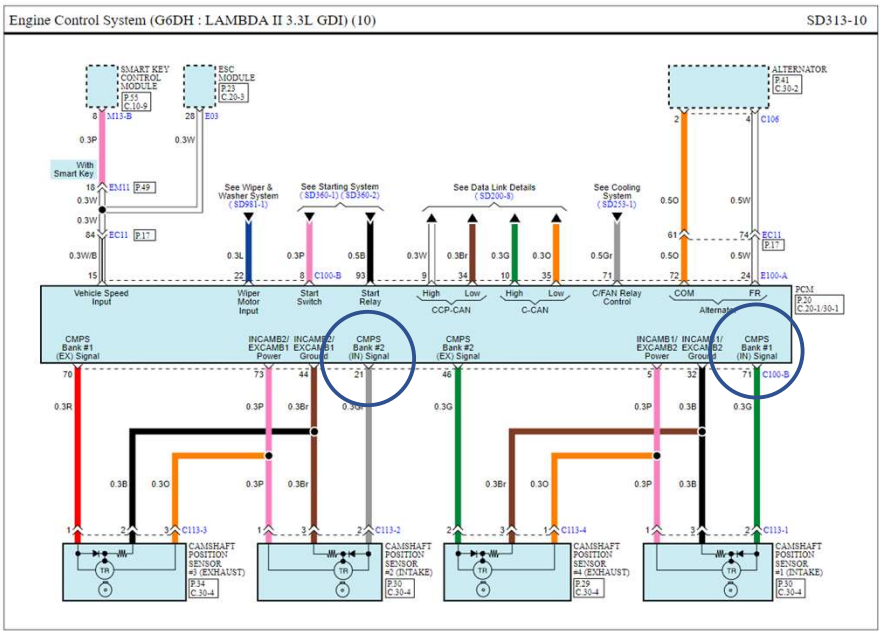
Crankshaft Position Sensor Low Pin 43



Camshaft Position Sensor Exhaust 1 and 2 Pins 70 and 46



Camshaft Position Sensor Intake 1 and 2 Pins 21 and 71



Notes from Hydundai

- Normal waveform of CKPS & CMPS at idle.
- Our example shows a typical Crankshaft Position Sensor (CKPS) and Camshaft Position Sensor (CMPS) waveform at idle. If the 17th signal of the CKPS after missing tooth of the target wheel is aligned with the high signal of the CMPS at idle, PCM recognizes that Synchronization between CKPS and CMPS is completed.

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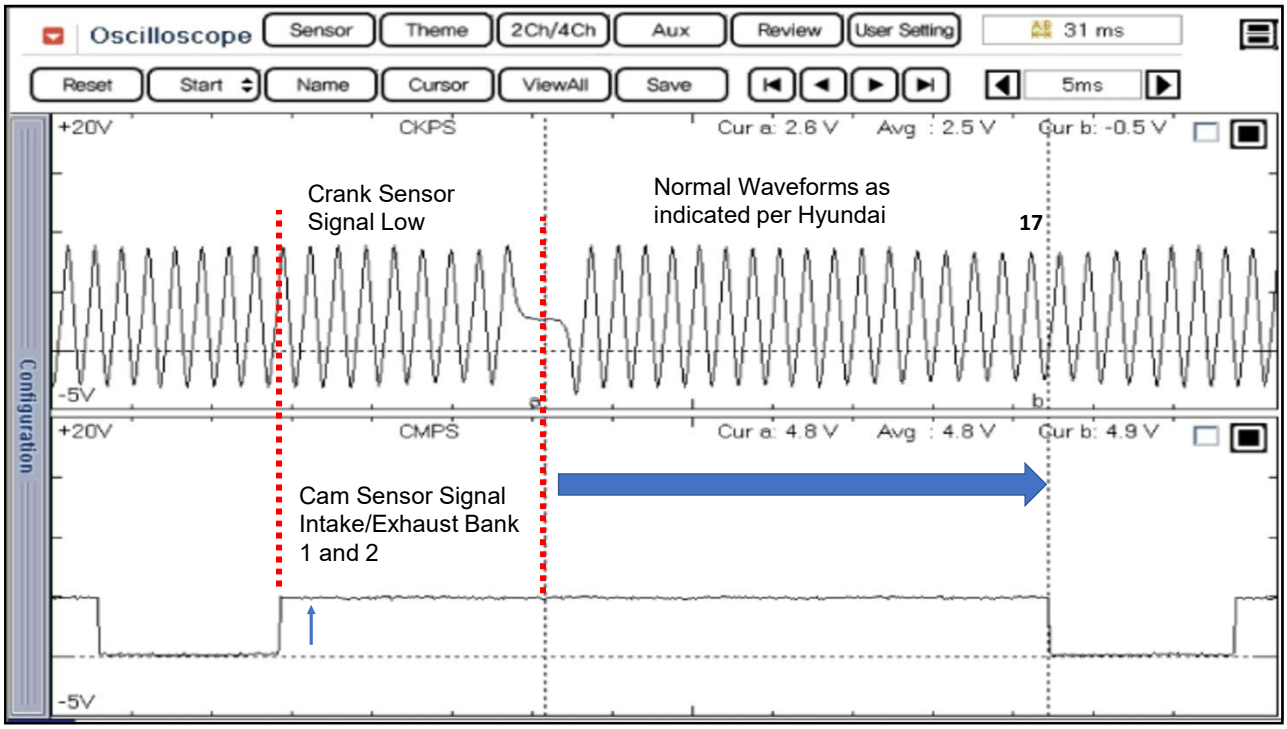
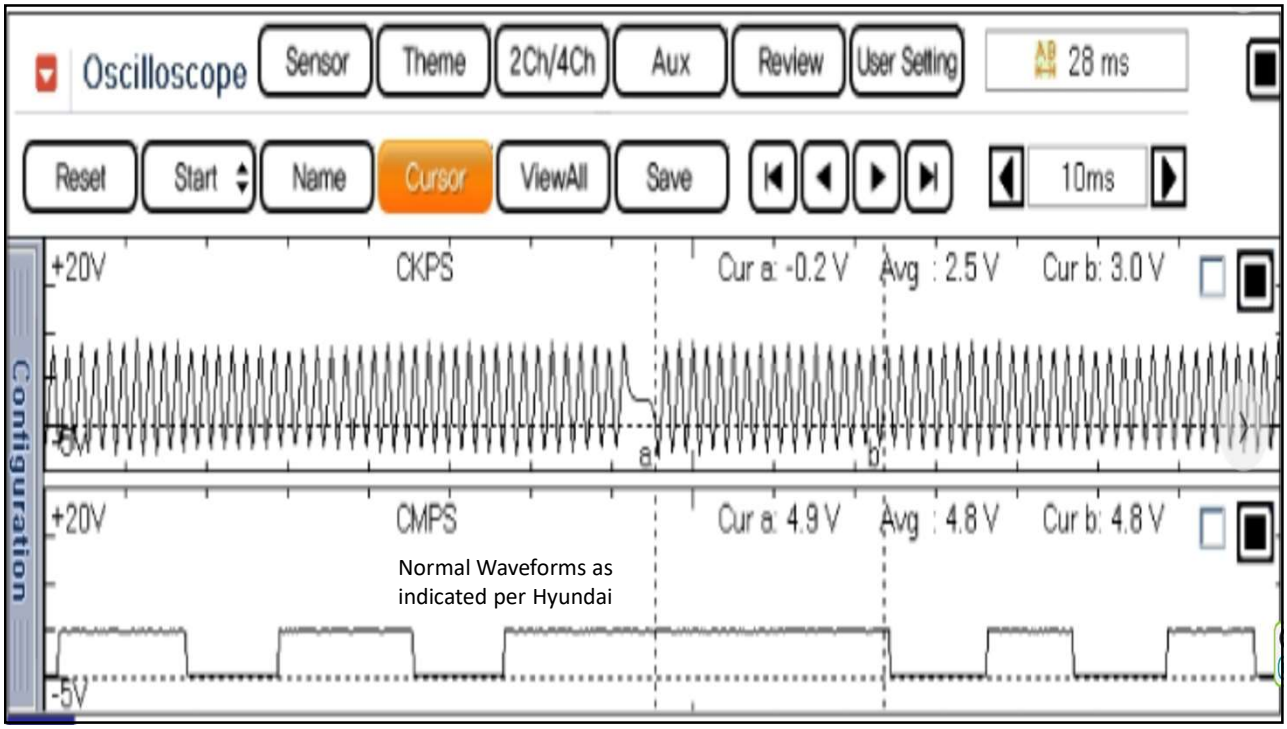
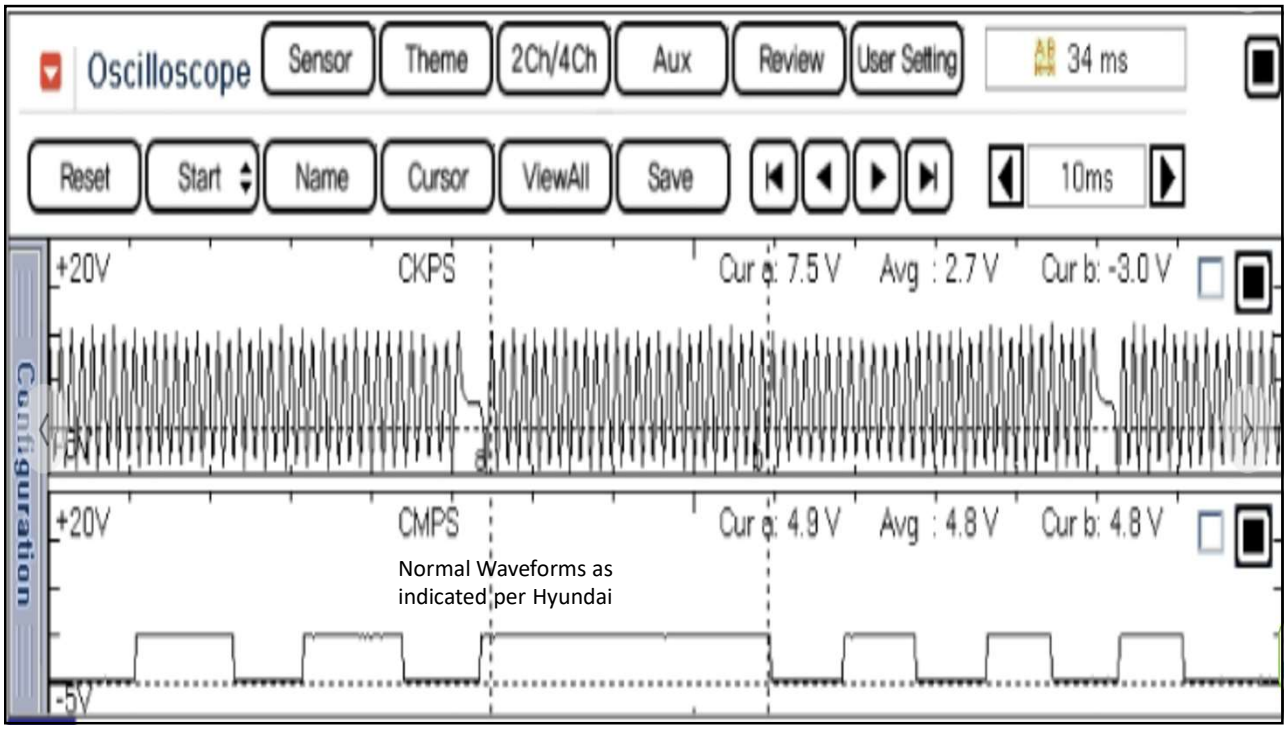

Oscilloscope
Sensor
Theme
2Ch/4Ch
Aux
Review
User Setting
31 ms
Reset
Start
Name
Cursor
ViewAll
Save
5ms
+20V
CKPS
Cur a: 2.6 V
Avg : 2.5 V
Cur b: -0.5 V
Crank Sensor Signal Low
Normal Waveforms as indicated per Hyundai
17
-5V
+20V
CMPS
Cur a: 4.8 V
Avg : 4.8 V
Cur b: 4.9 V
Cam Sensor Signal Intake/Exhaust Bank 1 and 2
-5V
Configuration


Oscilloscope
Sensor
Theme
2Ch/4Ch
Aux
Review
User Setting
28 ms
Reset
Start
Name
Cursor
ViewAll
Save
10ms
+20V
CKPS
Cur a: -0.2 V
Avg : 2.5 V
Cur b: 3.0 V
-5V
+20V
CMPS
Cur a: 4.9 V
Avg : 4.8 V
Cur b: 4.8 V
Normal Waveforms as indicated per Hyundai
-5V
Configuration



Camshaft Position Sensor - Intake

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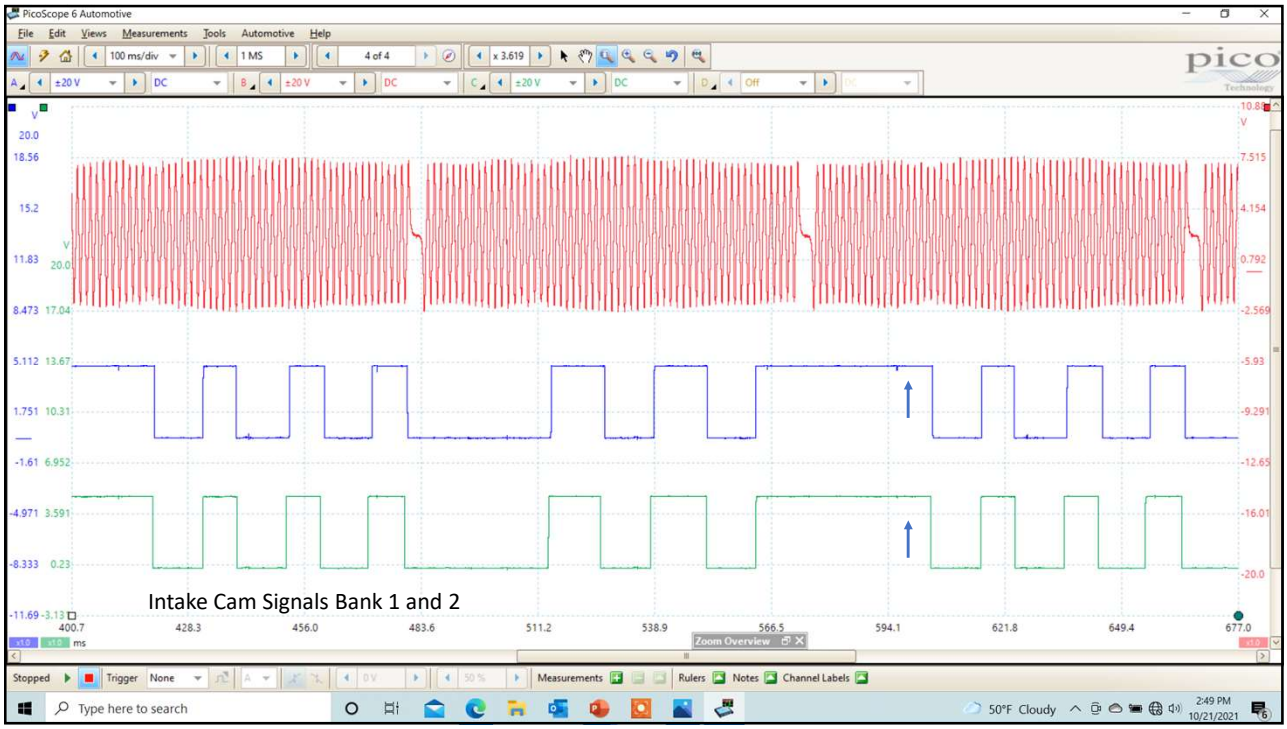
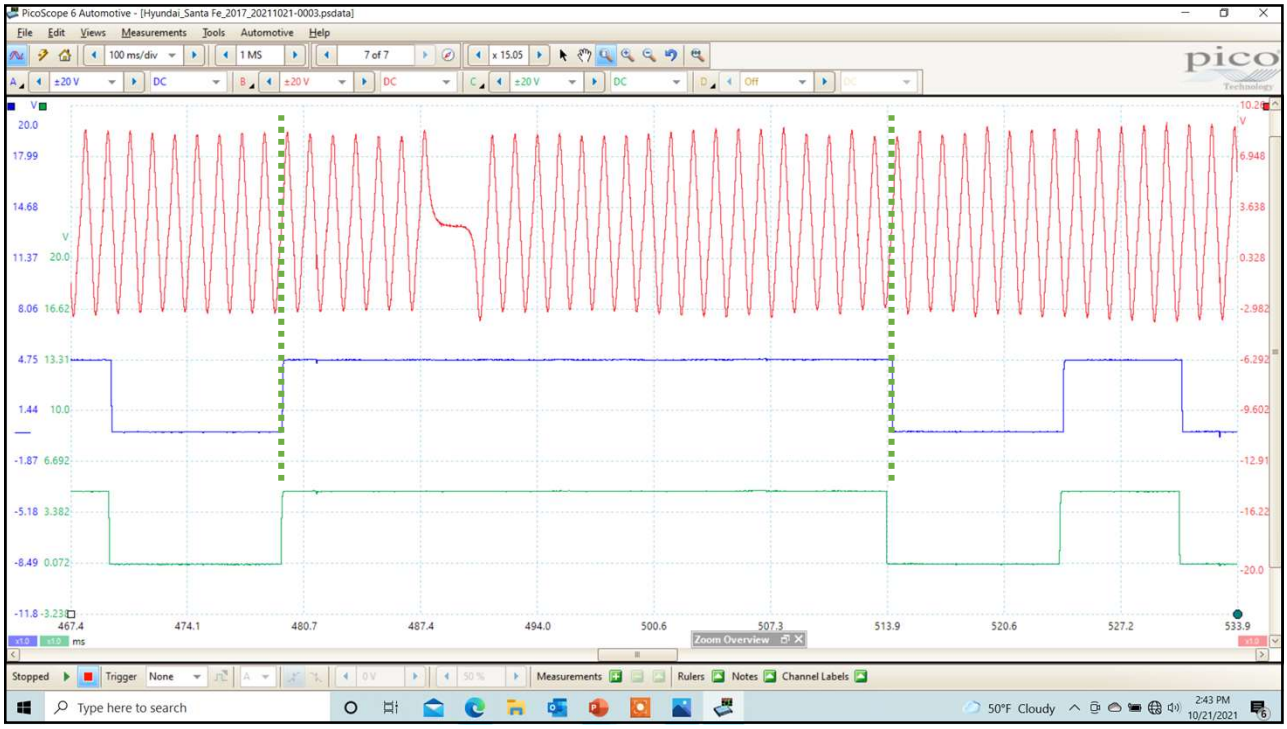
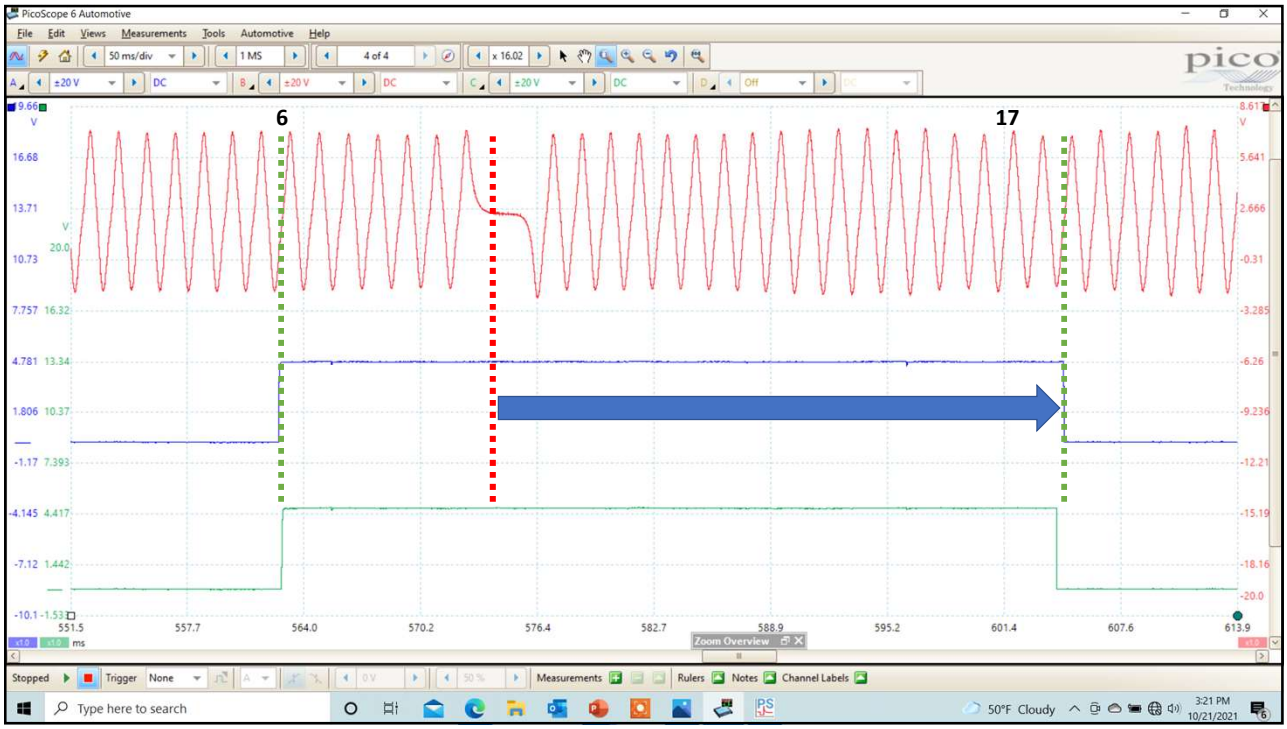

PicoScope 6 Automotive
File Edit Views Measurements Tools Automotive Help
Intake Cam Signals Bank 1 and 2
Stopped Trigger None Measurements Rulers Notes Channel Labels
Type here to search
50°F Cloudy
2:49 PM
10/21/2021


PicoScope 6 Automotive - [Hyundai_Santa Fe_2017_20211021-0003.psdata]
File Edit Views Measurements Tools Automotive Help
Stopped Trigger None Measurements Rulers Notes Channel Labels
Type here to search
50°F Cloudy
2:43 PM
10/21/2021



Camshaft Position Sensor - Exhaust

Notes: The valve cover was damaged as a result of the Intake cam phasor coming apart. The valve cover included a new exhaust cam sensor

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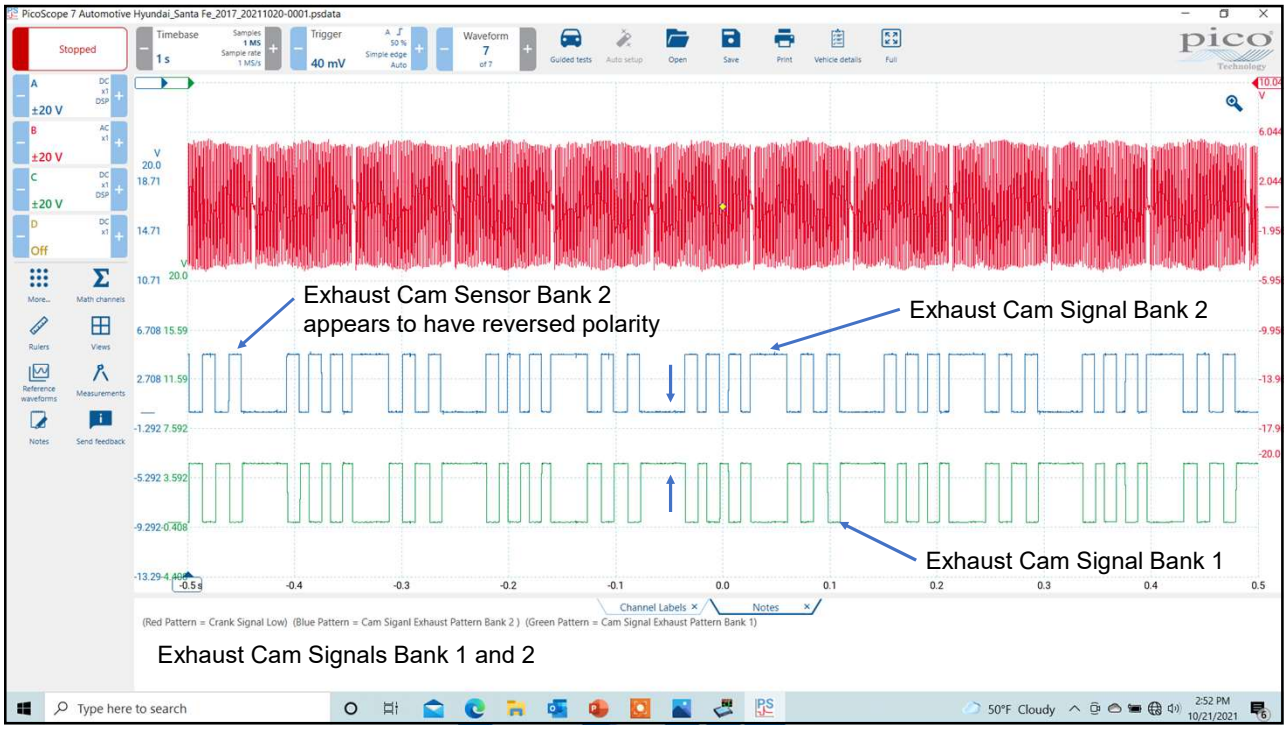
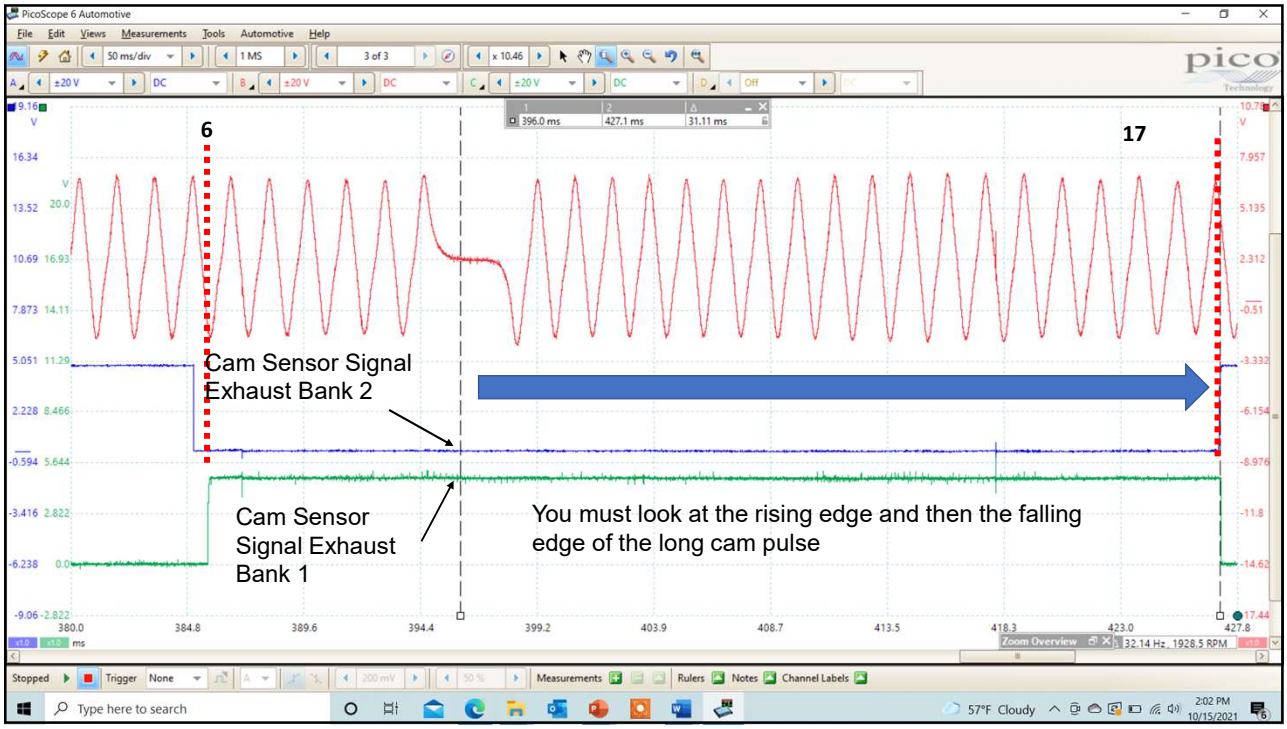
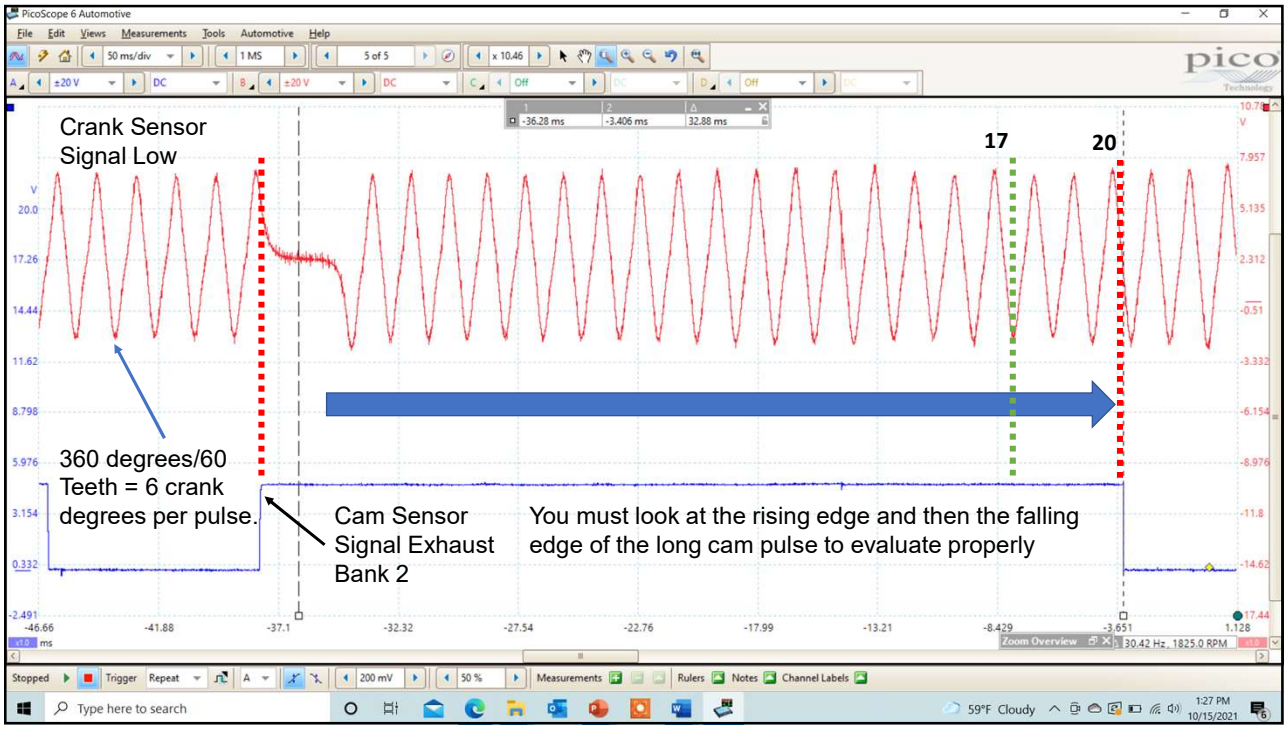


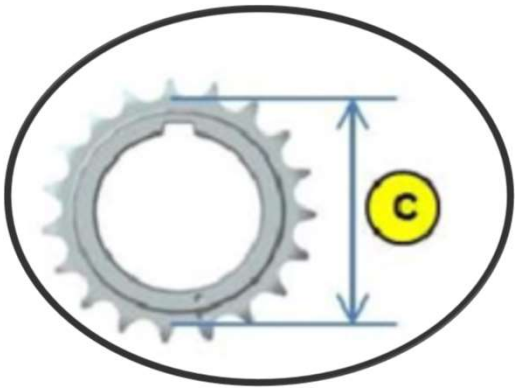
Exhaust Cam Signals Bank 1 and 2





Calculations

➢ The crankshaft pulley has 19 teeth in total. You would divide 360 degrees/19 teeth = 19 degrees of crankshaft rotation per tooth.



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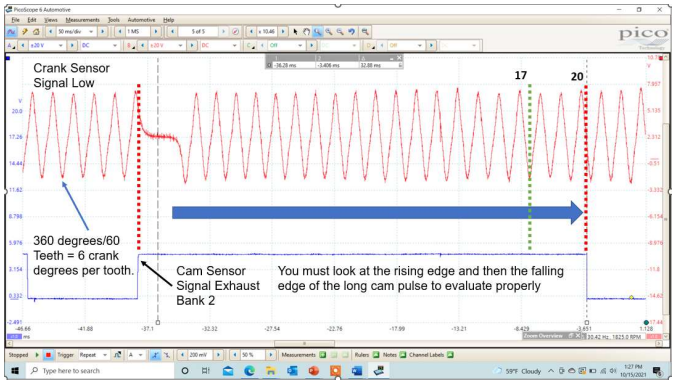
Calculations

➢ The crankshaft sensor signal has a 60-2 design. You would divide 360 degrees/60 teeth = 6 crank degrees per pulse.



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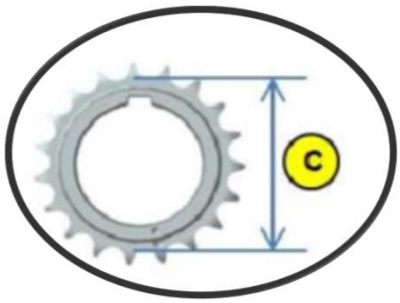
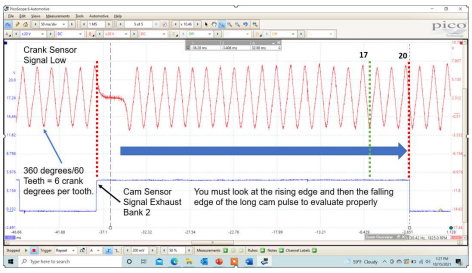
Calculations

➢ If the processor (PCM) thinks the we are 3 pulses off, this would equate to 18 crank degrees. The PCM will set a Code P0019

1 crank tooth = 19 crank degrees





3 pulses = 18 crank degrees

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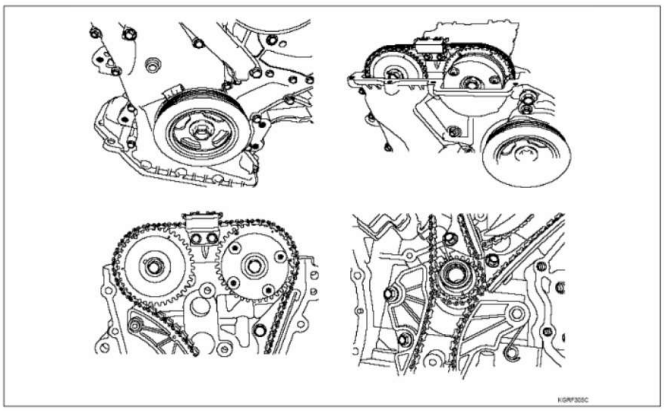
■ Timing Mark Inspection

1. IG "OFF". Check the timing mark is correctly aligned.

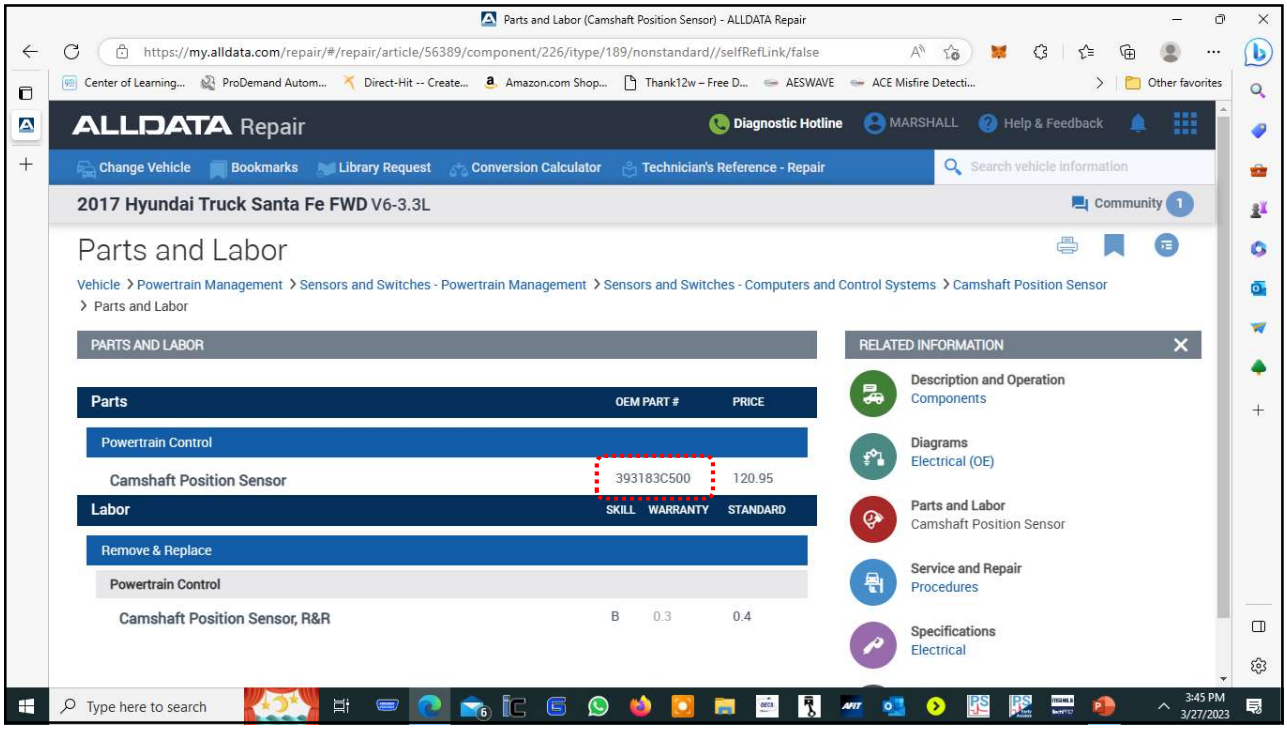
Reference :



2. Is the timing mark correctly aligned?

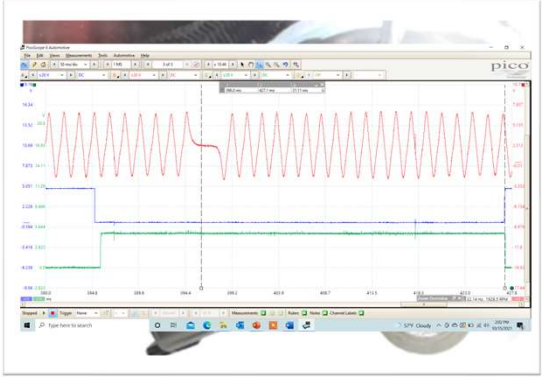
YES ▶ Fault is intermittent. Drive the vehicle to meet the enable condition for the DTC. and go to "Verification of Vehicle Repair" procedure.

NO ▶ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.



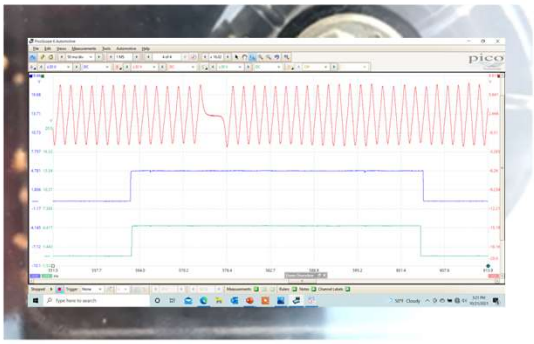
Camshaft Position Sensors

Black Top with Grey Body



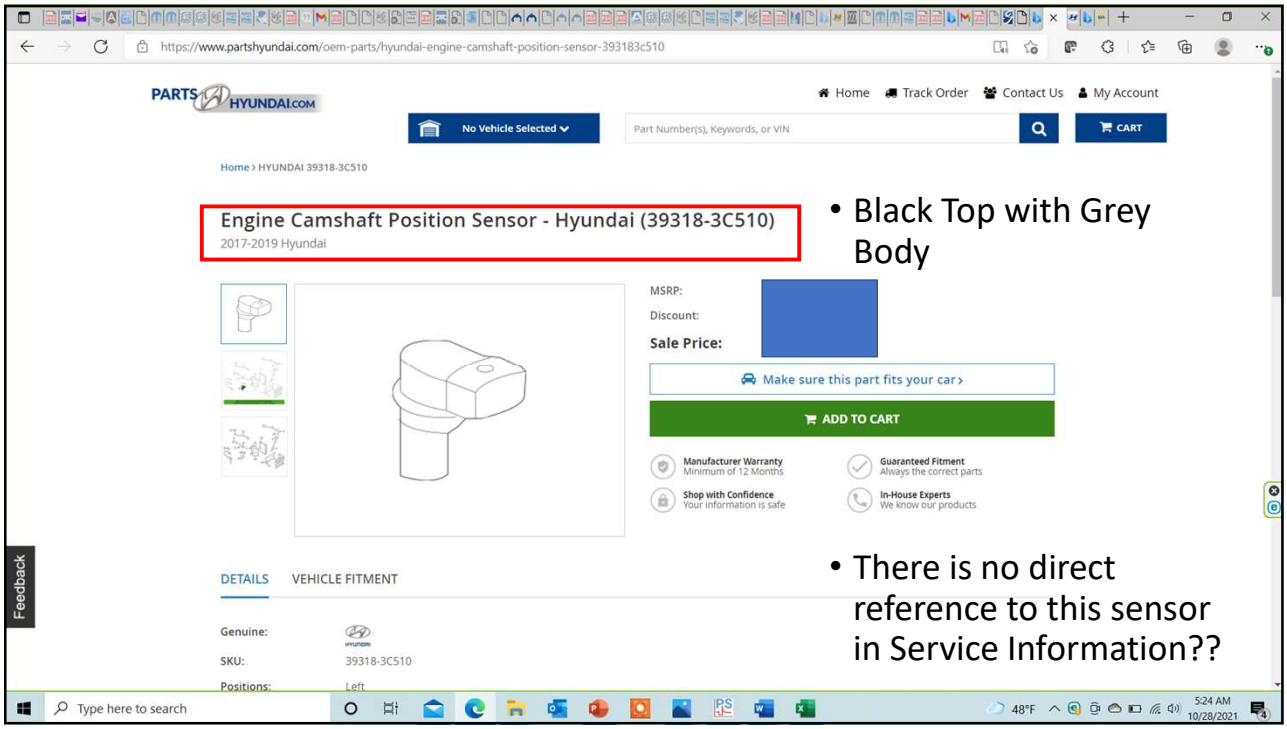
This was the sensor that was sent per the dealer with the new valve cover assembly

Grey Top with Black Body

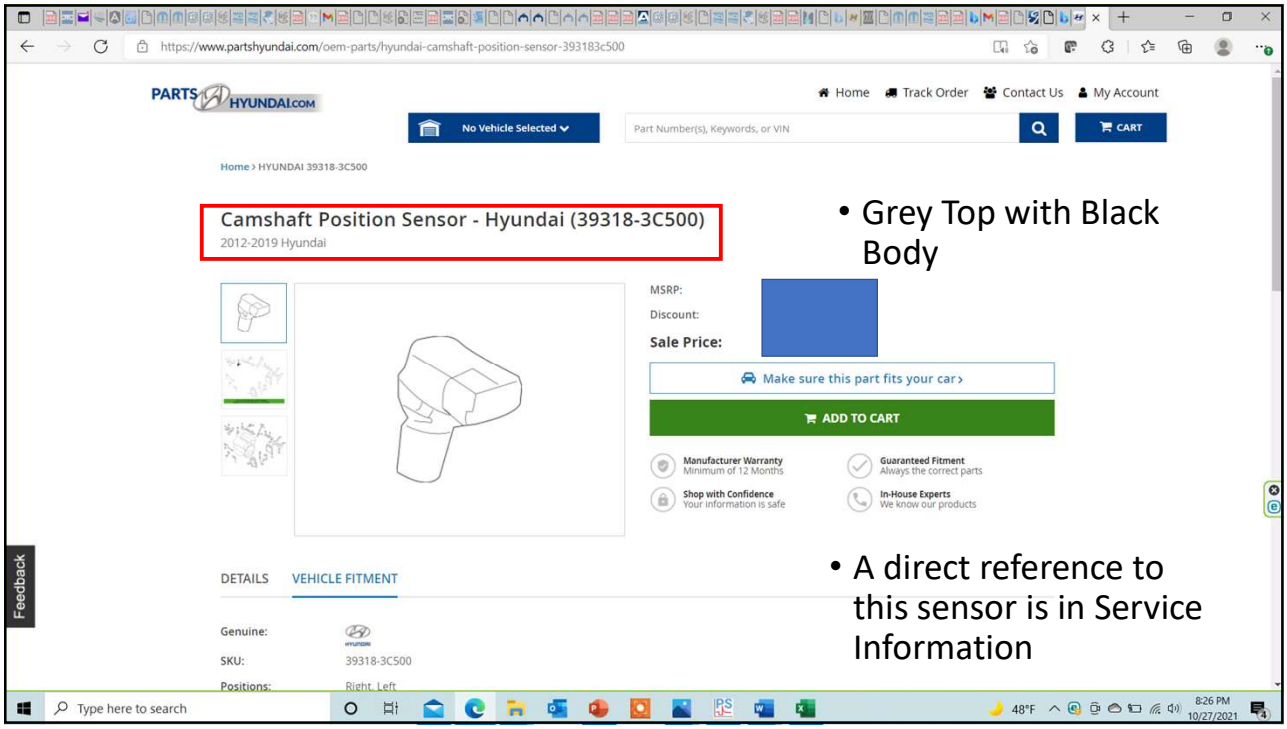


This is the sensor that should have been sent

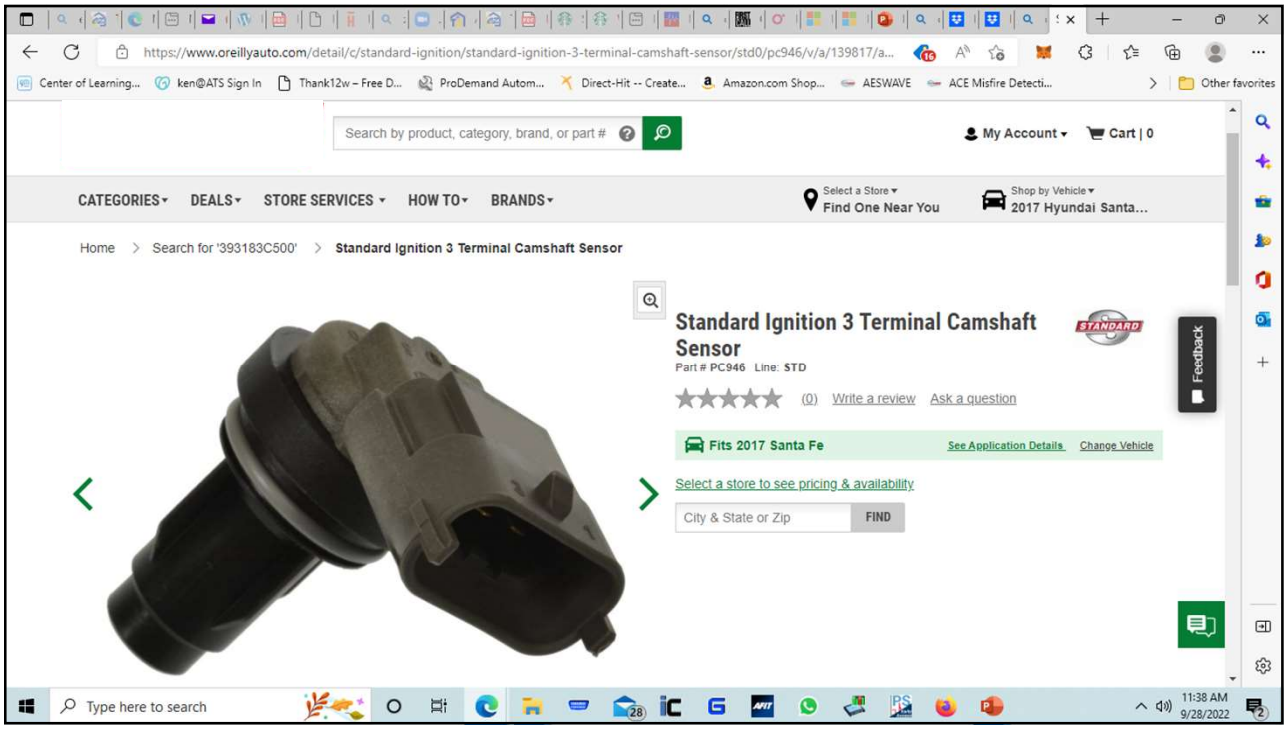
Part No. 393183C510 vs 393183C500



- Black Top with Grey Body
- There is no direct reference to this sensor in Service Information??

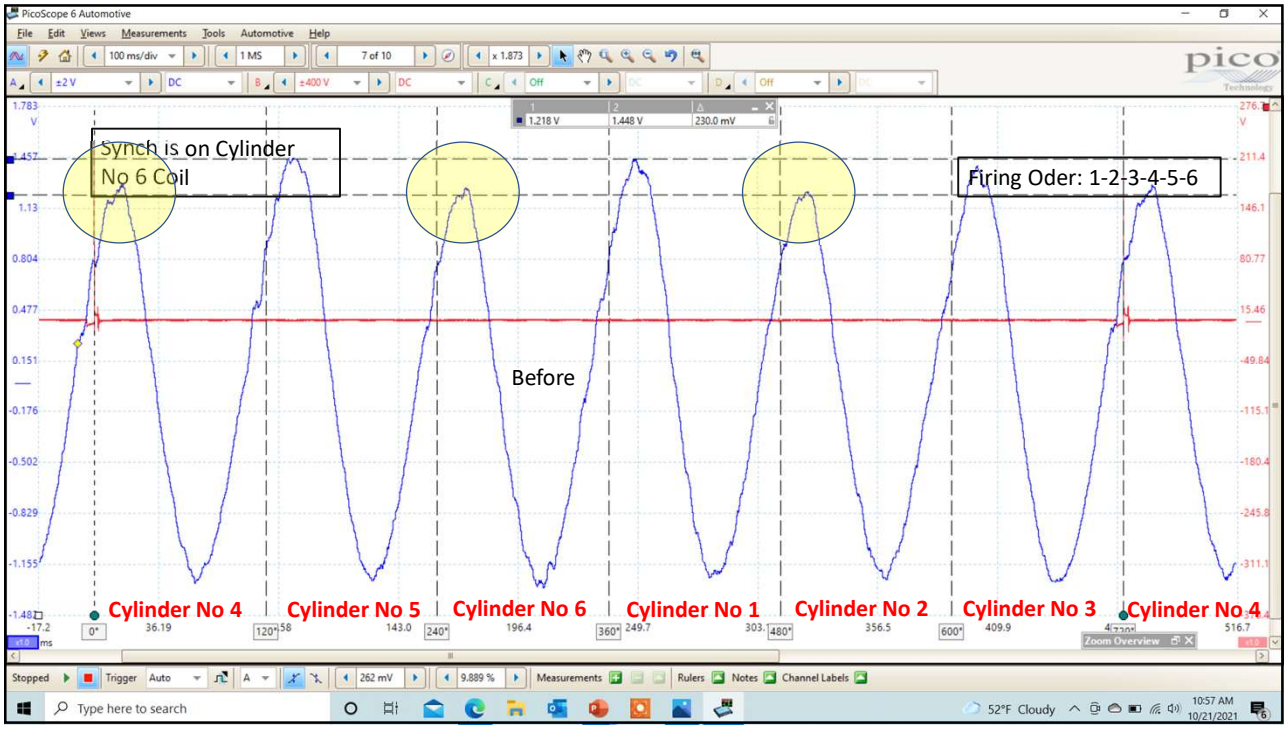


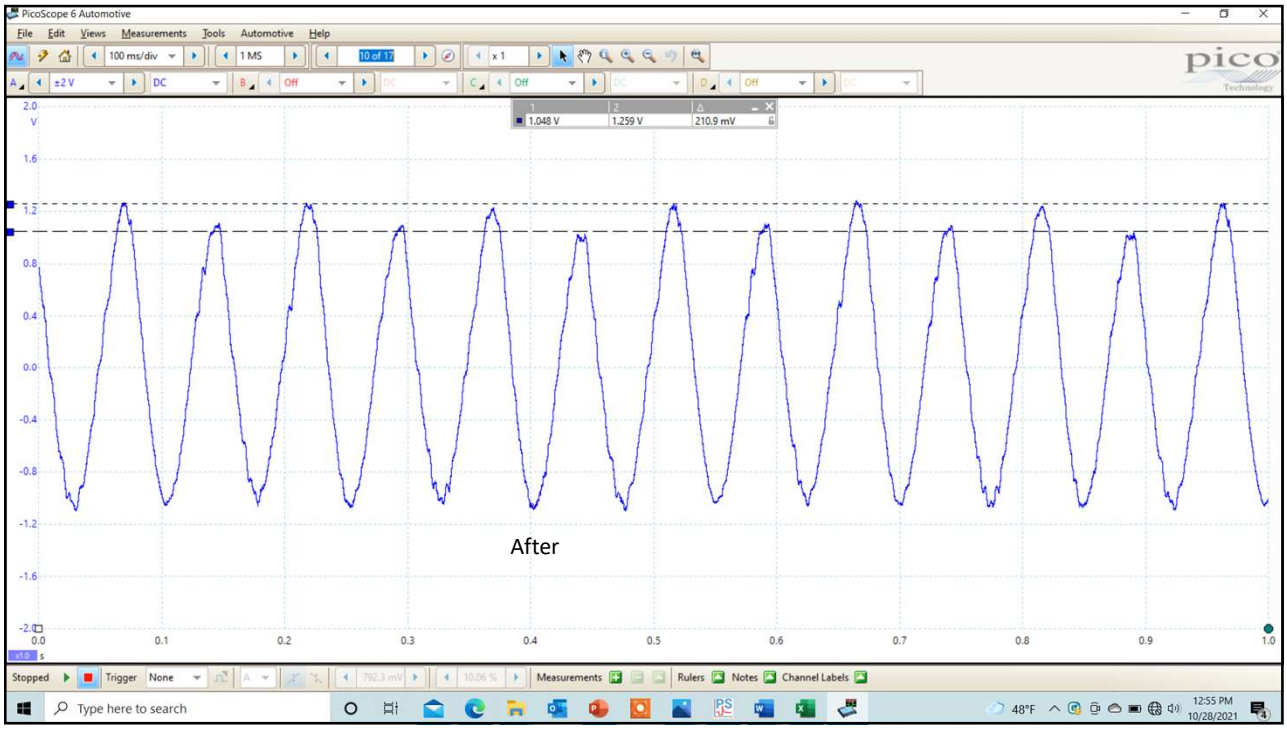
- Grey Top with Black Body
- A direct reference to this sensor is in Service Information

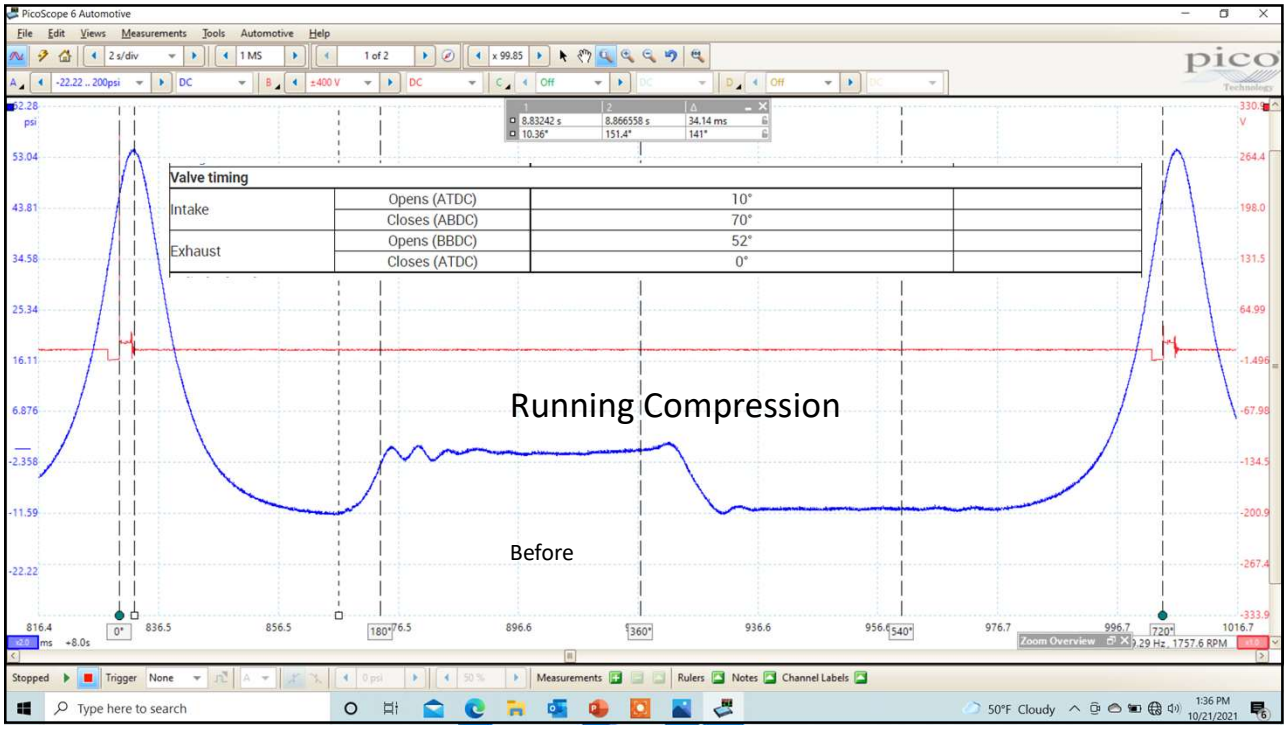


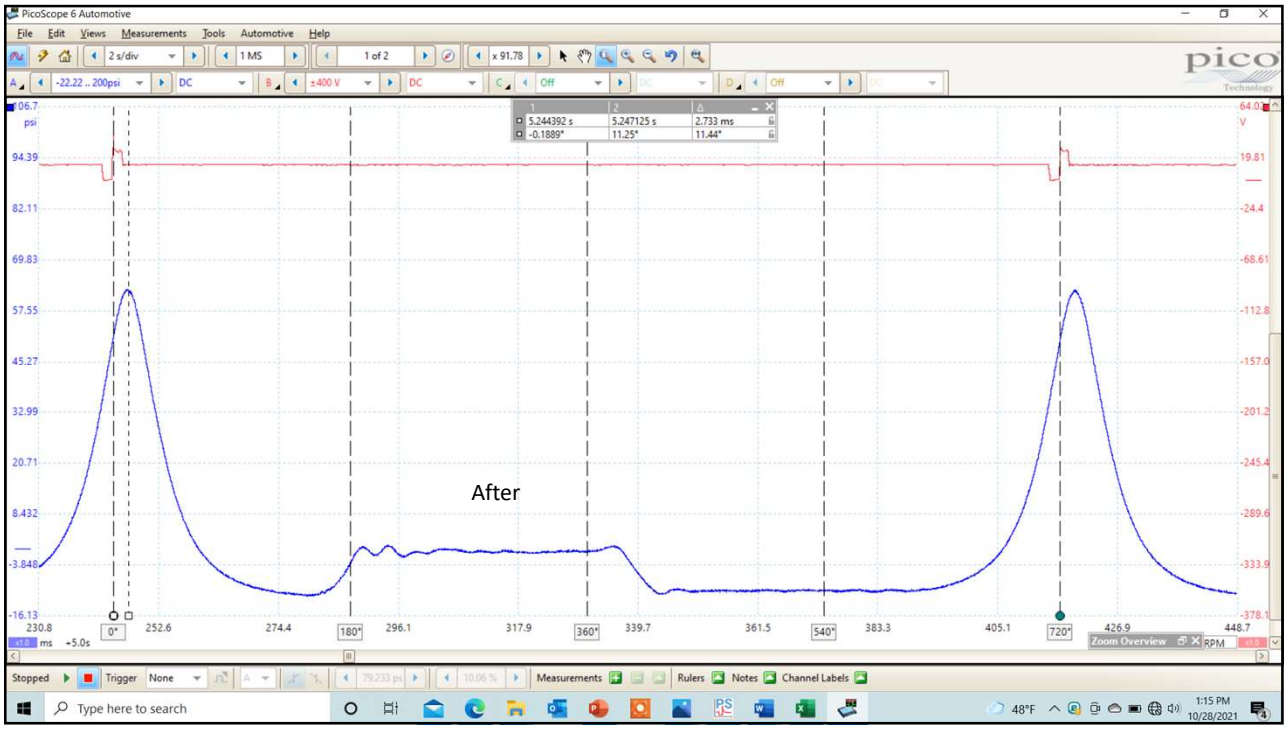
Final Analysis

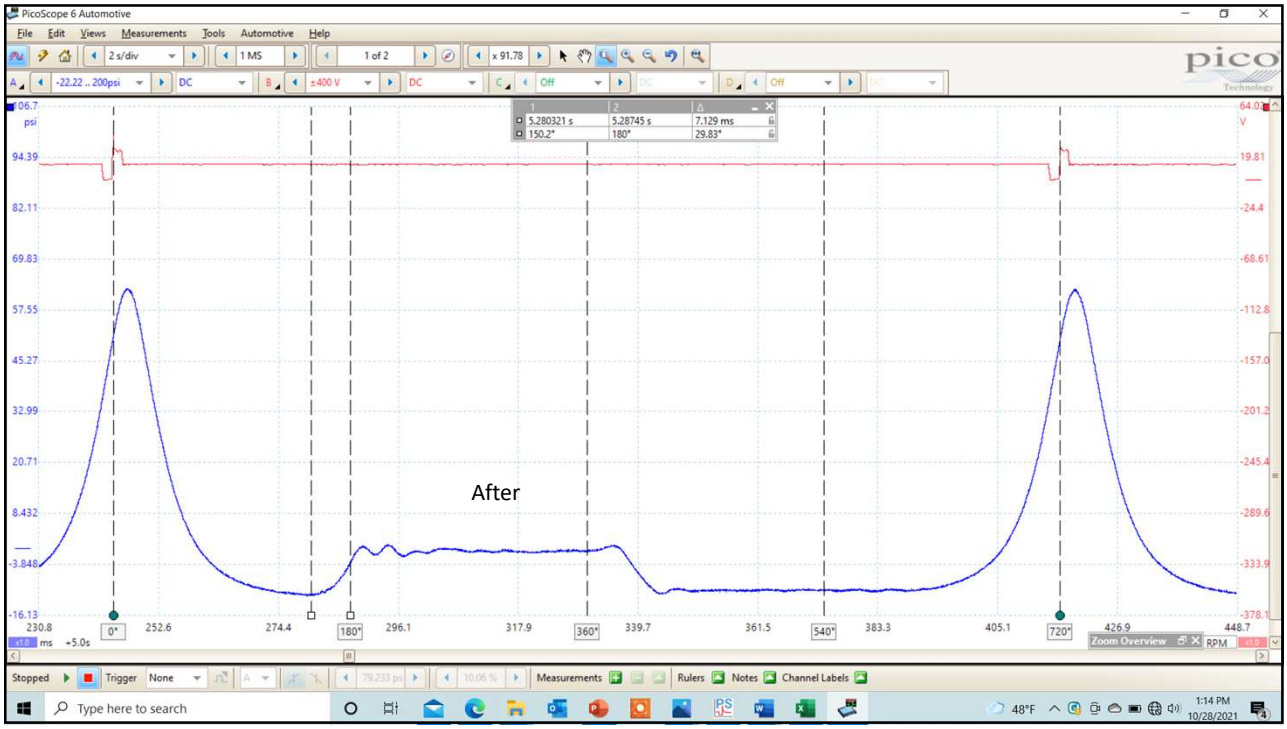
Relative Compression Test and Vacuum Waveform Analysis



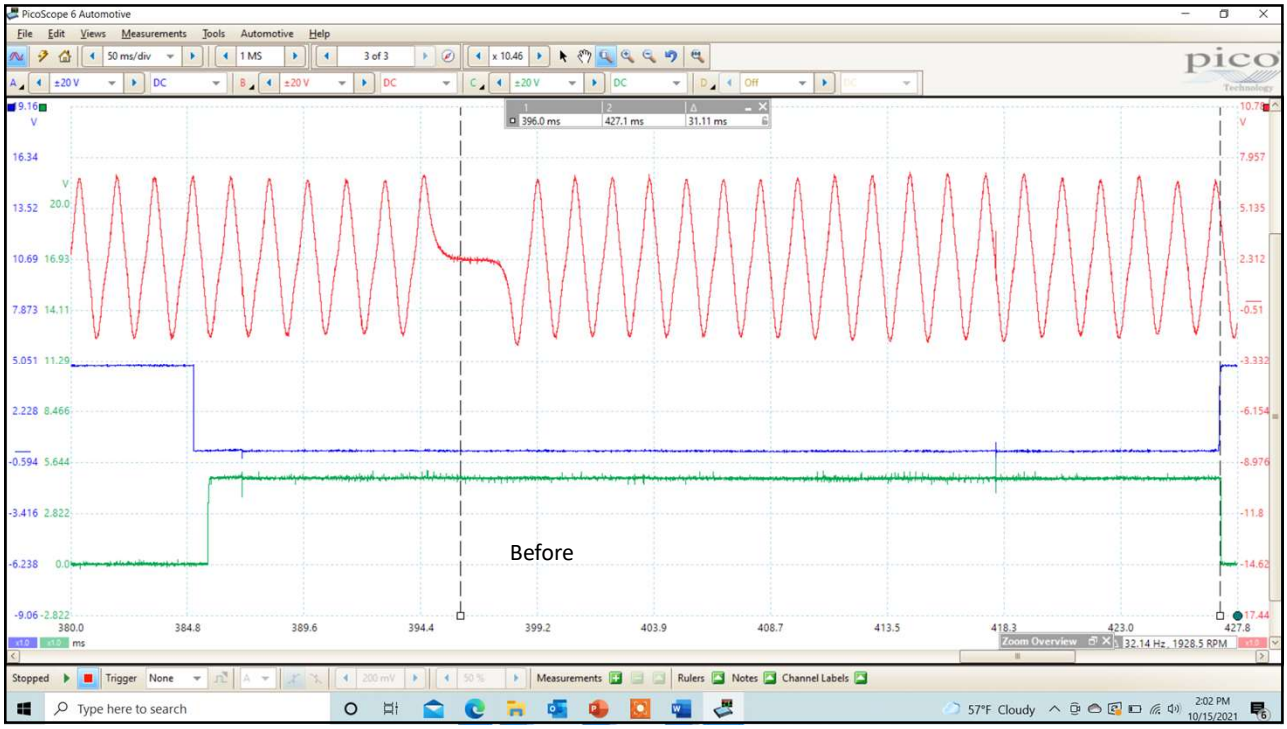

PicoScope 6 Automotive
File Edit Views Measurements Tools Automotive Help
pico
1.048 V
1.259 V
210.9 mV
After
Stopped
Trigger
None
Measurements
Rulers
Notes
Channel Labels
Type here to search
48°F
12:55 PM
10/28/2021

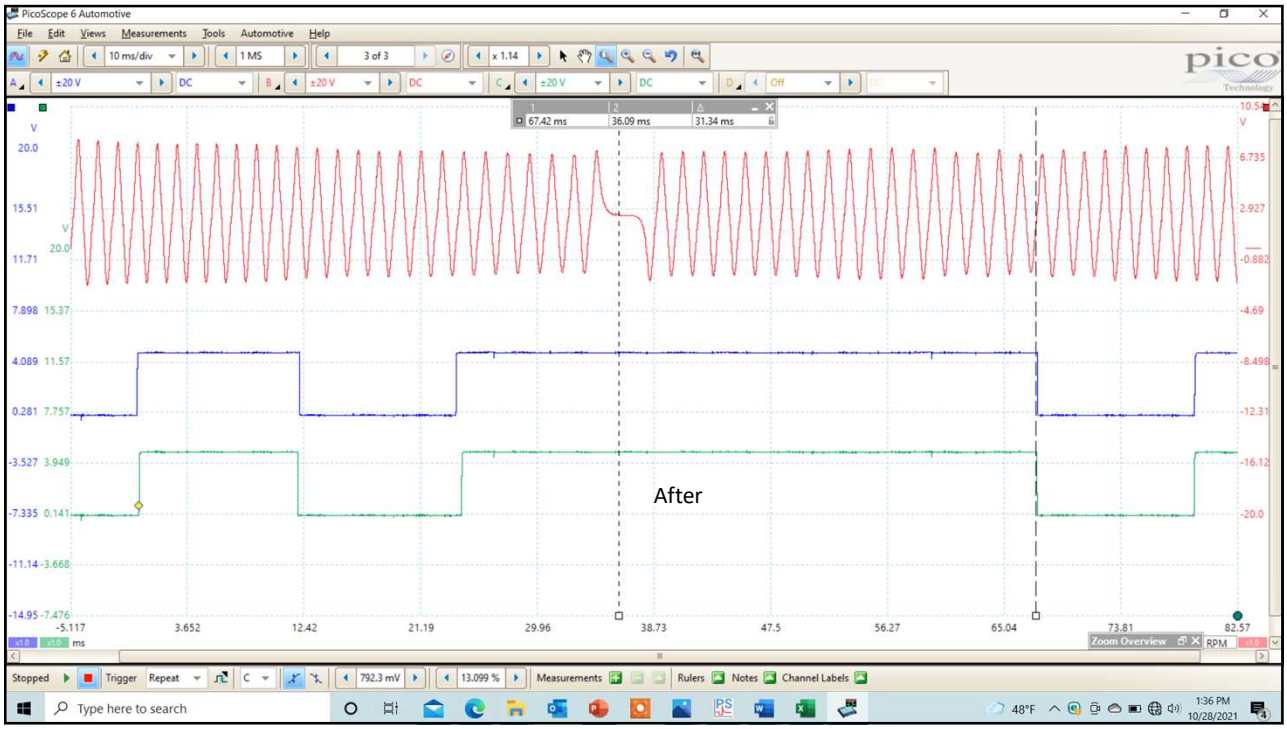

PicoScope 6 Automotive
File Edit Views Measurements Tools Automotive Help
pico
8.83242 s
8.866558 s
34.14 ms
10.36°
151.4°
141°
Valve timing
Intake
Opens (ATDC) 10°
Closes (ABDC) 70°
Exhaust
Opens (BBDC) 52°
Closes (ATDC) 0°
Running Compression
Before
Zoom Overview
Stopped
Trigger
None
Measurements
Rulers
Notes
Channel Labels
Type here to search
50°F Cloudy
1:36 PM
10/21/2021

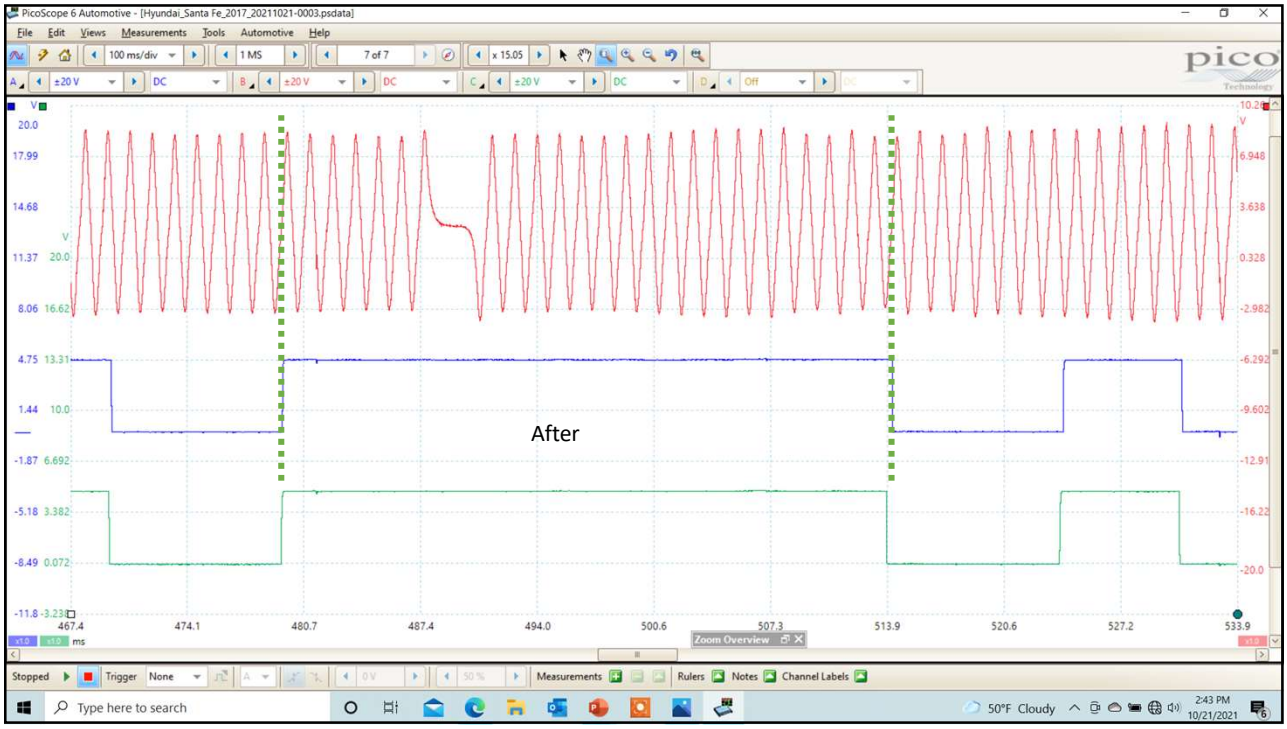

PicoScope 6 Automotive
File Edit Views Measurements Tools Automotive Help
After
Stopped Trigger None Measurements Rulers Notes Channel Labels
Type here to search
1:15 PM
10/28/2021

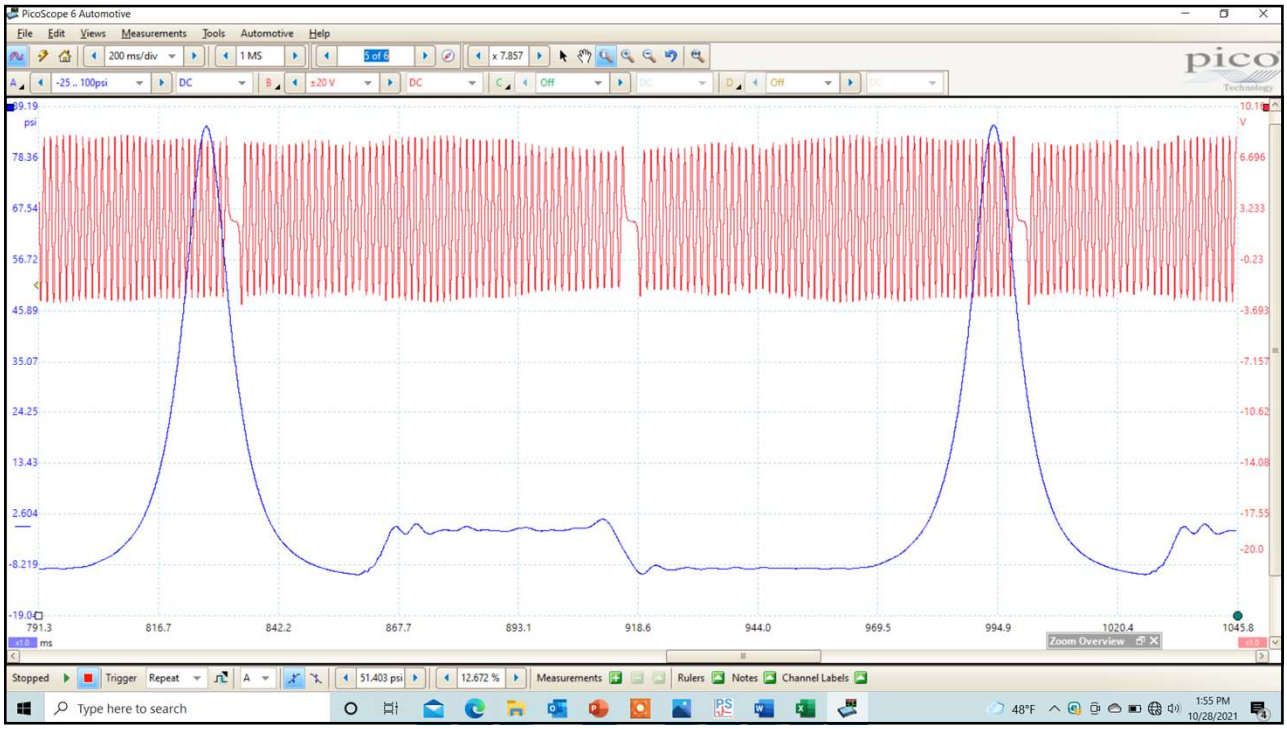

PicoScope 6 Automotive
File Edit Views Measurements Tools Automotive Help
After
Stopped Trigger None Measurements Rulers Notes Channel Labels
Type here to search
1:14 PM
10/28/2021

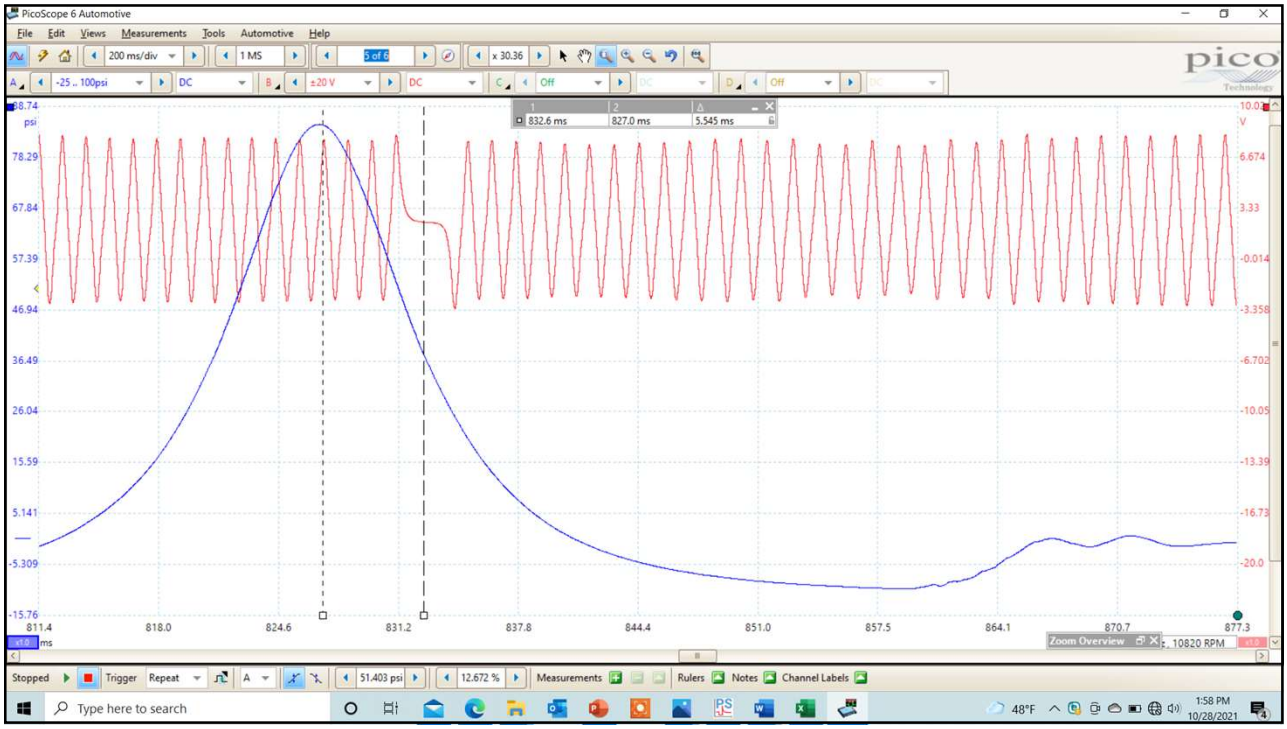
Crank and Cam Signals



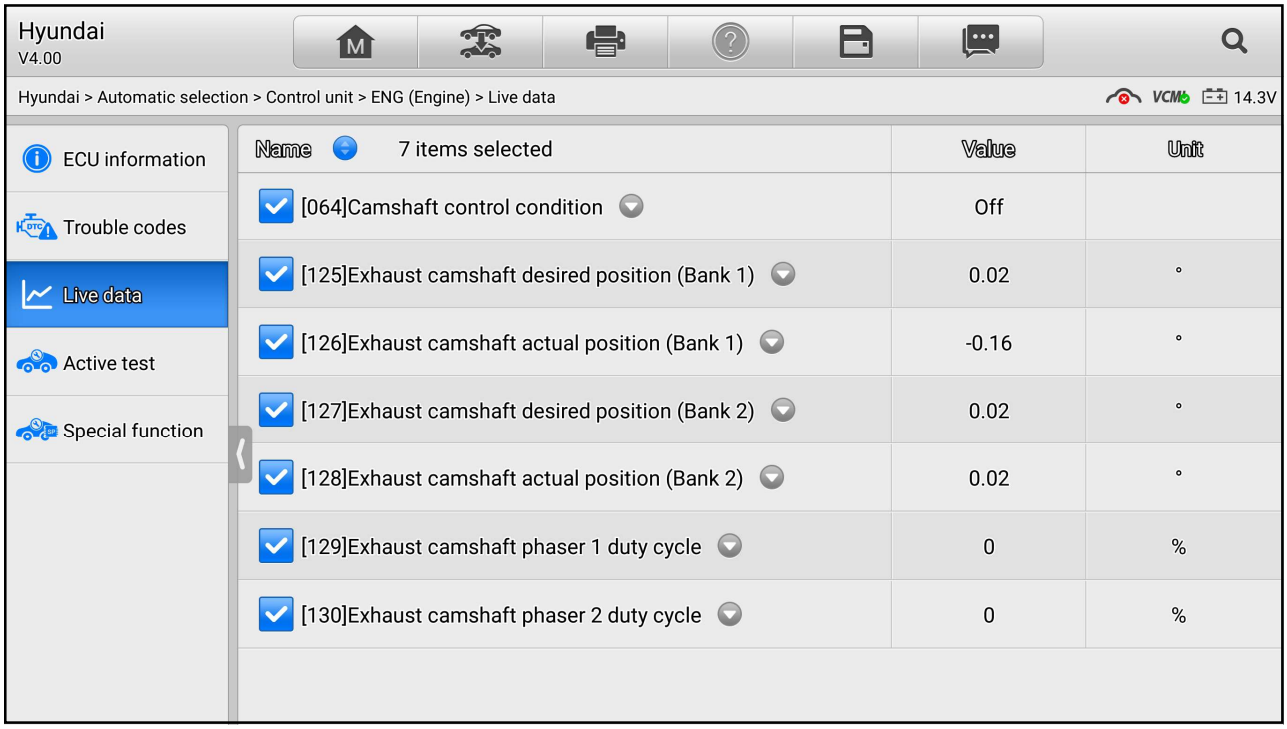

PicoScope 6 Automotive
File Edit Views Measurements Tools Automotive Help
After
Stopped Trigger Repeat Measurements Rulers Notes Channel Labels
Type here to search
48°F
1:36 PM
10/28/2021

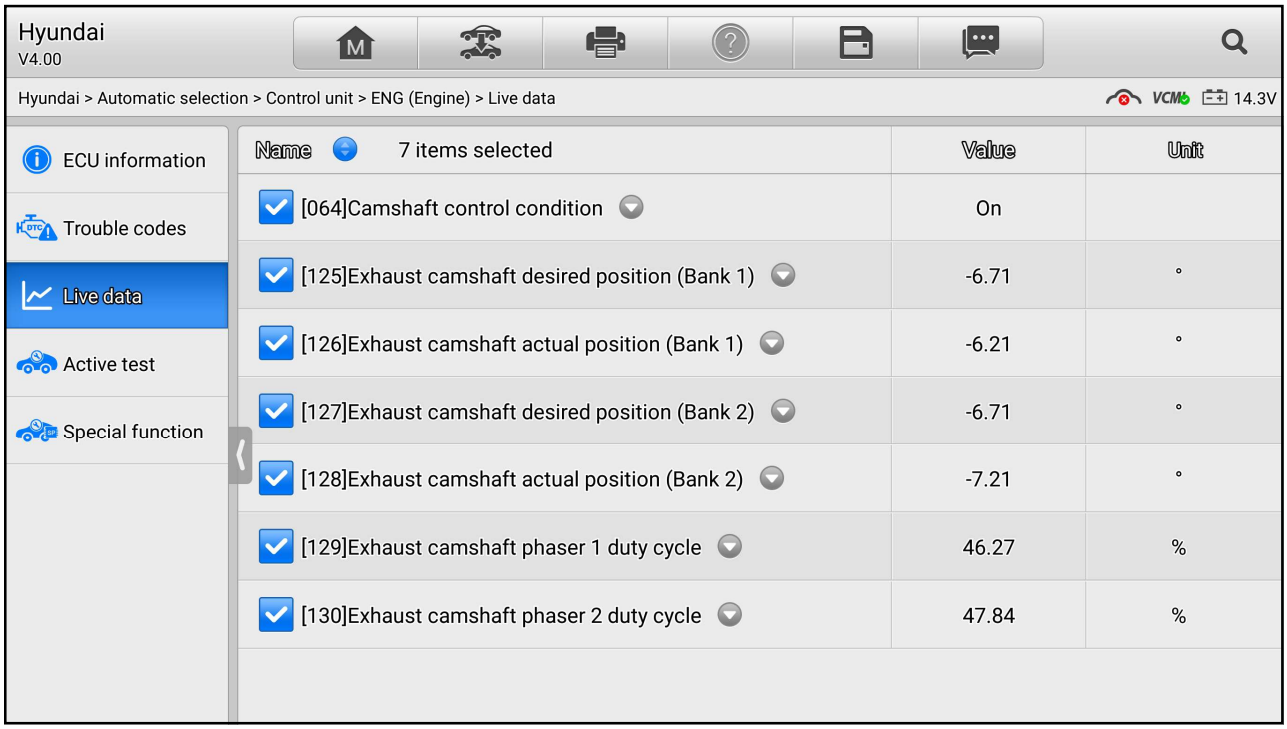

PicoScope 6 Automotive - [Hyundai_Santa Fe_2017_20211021-0003.psdata]
File Edit Views Measurements Tools Automotive Help
After
Stopped Trigger None Measurements Rulers Notes Channel Labels
Type here to search
50°F Cloudy
2:43 PM
10/21/2021

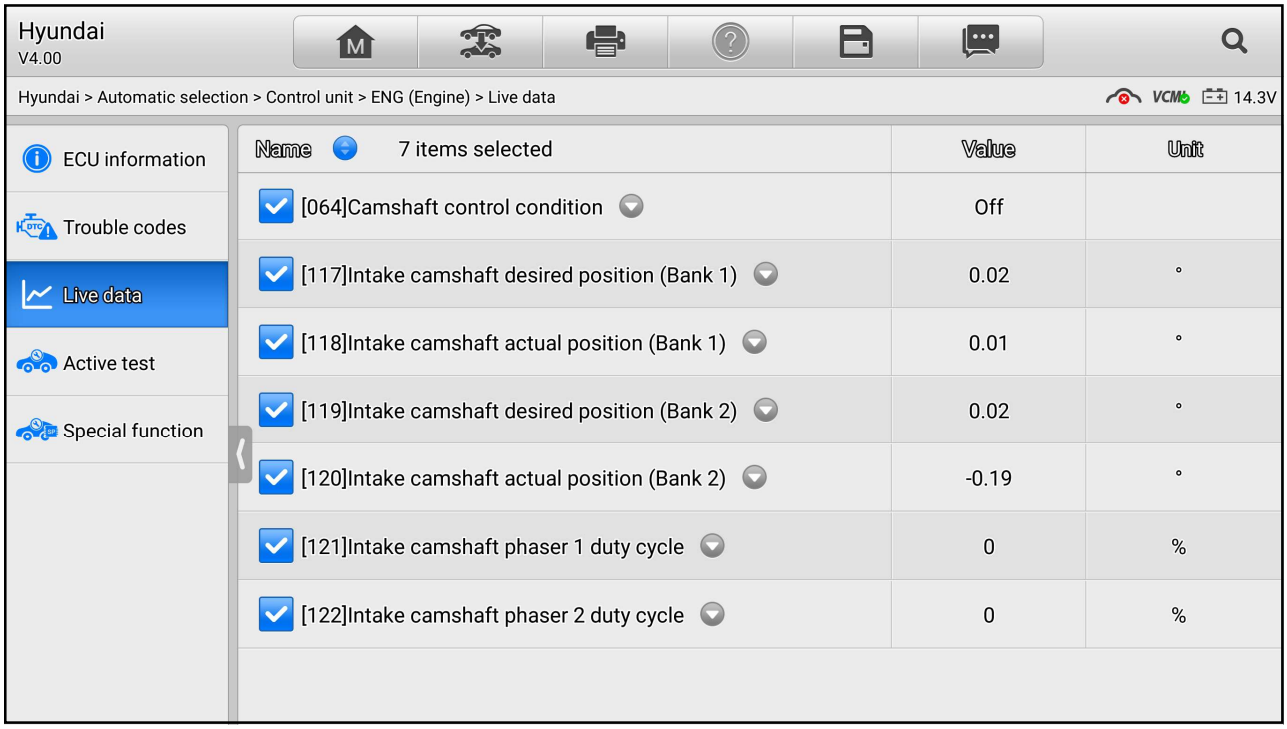

PicoScope 6 Automotive
File Edit Views Measurements Tools Automotive Help
pico
89.19
psi
78.36
67.54
56.72
45.89
35.07
24.25
13.43
2.604
-8.219
-19.0
10.1
V
6.696
3.233
-0.23
-3.693
-7.157
-10.62
-14.08
-17.55
-20.0
791.3
816.7
842.2
867.7
893.1
918.6
944.0
969.5
994.9
1020.4
1045.8
ms
Zoom Overview
Stopped
Trigger
Repeat
51.403 psi
12.672 %
Measurements
Rulers
Notes
Channel Labels
Type here to search
48°F
1:55 PM
10/28/2021

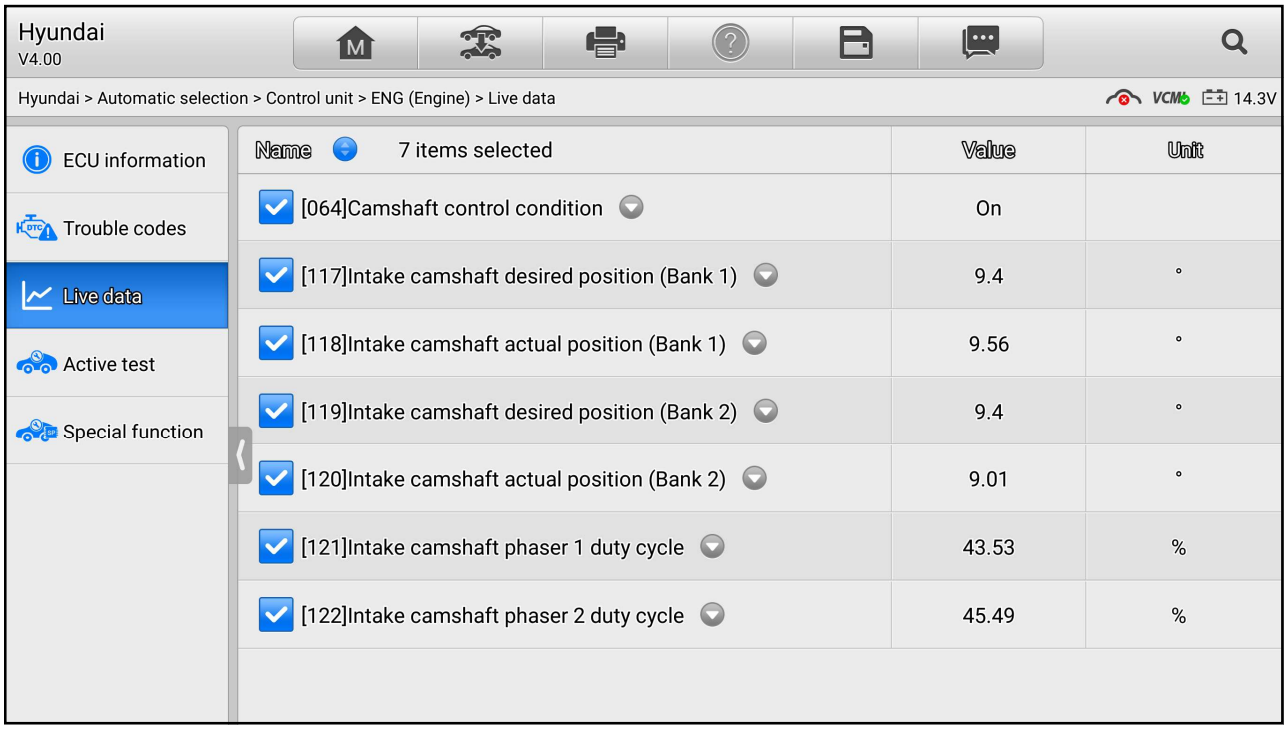

PicoScope 6 Automotive
File Edit Views Measurements Tools Automotive Help
pico
88.74
psi
78.29
67.84
57.39
46.94
36.49
26.04
15.59
5.141
-5.309
-15.76
832.6 ms
827.0 ms
5.545 ms
10.0
V
6.674
3.33
-0.014
-3.358
-6.702
-10.05
-13.39
-16.73
-20.0
811.4
818.0
824.6
831.2
837.8
844.4
851.0
857.5
864.1
870.7
877.3
ms
Zoom Overview
10820 RPM
Stopped
Trigger
Repeat
51.403 psi
12.672 %
Measurements
Rulers
Notes
Channel Labels
Type here to search
48°F
1:58 PM
10/28/2021

Scan Data


Hyundai
V4.00
Hyundai > Automatic selection > Control unit > ENG (Engine) > Live data
VCMI
14.3V
ECU information
Trouble codes
Live data
Active test
Special function
Name
7 items selected
Value
Unit
[064]Camshaft control condition
Off
[125]Exhaust camshaft desired position (Bank 1)
0.02
°
[126]Exhaust camshaft actual position (Bank 1)
-0.16
°
[127]Exhaust camshaft desired position (Bank 2)
0.02
°
[128]Exhaust camshaft actual position (Bank 2)
0.02
°
[129]Exhaust camshaft phaser 1 duty cycle
0
%
[130]Exhaust camshaft phaser 2 duty cycle
0
%


Hyundai
V4.00
Hyundai > Automatic selection > Control unit > ENG (Engine) > Live data
VCM
14.3V
ECU information
Trouble codes
Live data
Active test
Special function
Name
7 items selected
Value
Unit
[064]Camshaft control condition
On
[125]Exhaust camshaft desired position (Bank 1)
-6.71
°
[126]Exhaust camshaft actual position (Bank 1)
-6.21
°
[127]Exhaust camshaft desired position (Bank 2)
-6.71
°
[128]Exhaust camshaft actual position (Bank 2)
-7.21
°
[129]Exhaust camshaft phaser 1 duty cycle
46.27
%
[130]Exhaust camshaft phaser 2 duty cycle
47.84
%


Hyundai
V4.00
Hyundai > Automatic selection > Control unit > ENG (Engine) > Live data
VCM
14.3V
ECU information
Trouble codes
Live data
Active test
Special function
Name
7 items selected
Value
Unit
[064]Camshaft control condition
Off
[117]Intake camshaft desired position (Bank 1)
0.02
°
[118]Intake camshaft actual position (Bank 1)
0.01
°
[119]Intake camshaft desired position (Bank 2)
0.02
°
[120]Intake camshaft actual position (Bank 2)
-0.19
°
[121]Intake camshaft phaser 1 duty cycle
0
%
[122]Intake camshaft phaser 2 duty cycle
0
%



Test Procedures

Case Study No 1

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Engine Mechanical Analysis

using the 4 stroke cycle

2016 Dodge Durango

Loud Tapping Noise
(Obvious)

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Observations Noted

- The misfire monitor on the vehicle has been suspended.
- There are no misfire codes stored in the controllers memory (PCM).
- There is an audible tapping noise coming from the engine. It is not clear which side of the engine it is coming from.

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Description and Operation

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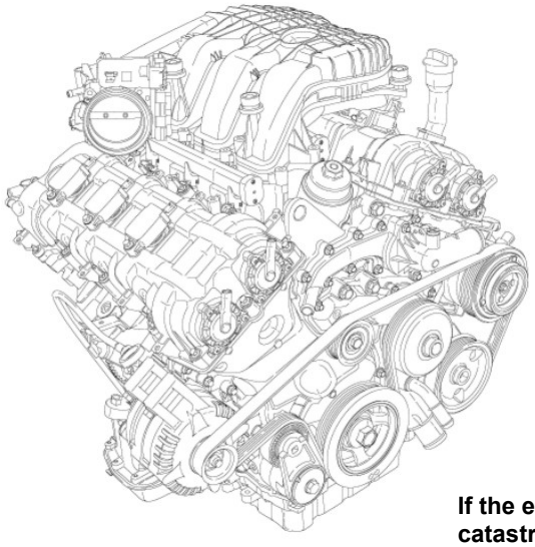
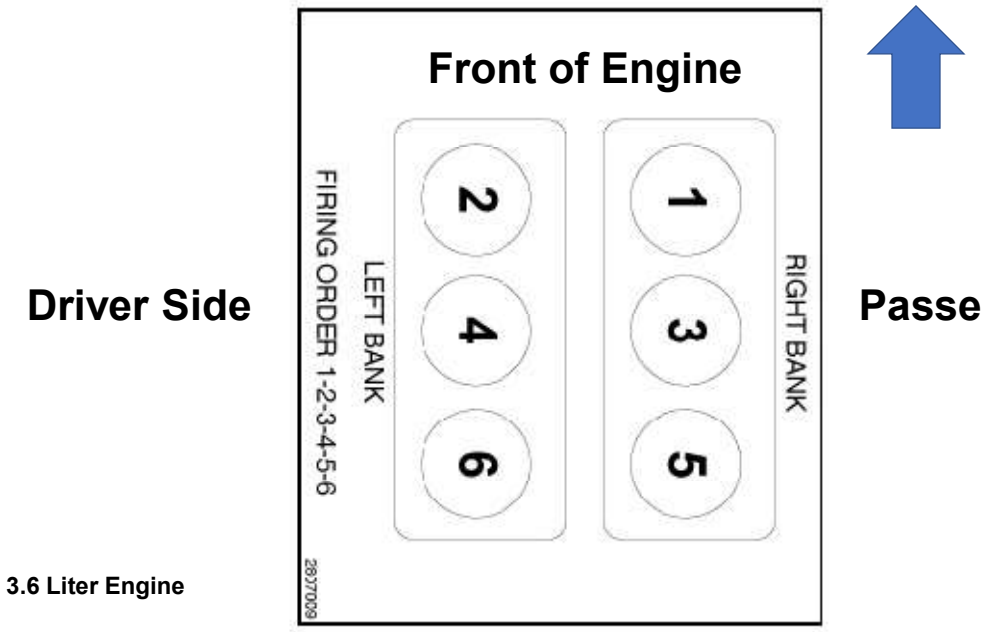
Description and Operation

- The 3.6 liter (219.7 CID) flexible fuel V-6 engine features Variable Valve Timing (VVT), Dual Overhead Camshafts (DOHC) and a high-pressure die-cast aluminum cylinder block with steel liners in a 60° configuration.



If the engine has experienced a catastrophic failure, THE INTAKE MANIFOLD MUST BE REPLACED!



3.6 Liter Engine

Description and Operation

- The 3.6 liter engine has a chain driven variable discharge oil pump with a two-stage pressure regulator for improved fuel economy. The exhaust manifolds are integrated into the cylinder heads for reduced weight.

Description and Operation

- The cylinders are numbered from front to rear. The right bank is numbered 1, 3, 5 and the left bank is numbered 2, 4, 6. The firing order is 1–2–3–4–5–6. The engine serial number is located on the left side of the cylinder block at the transmission flange.

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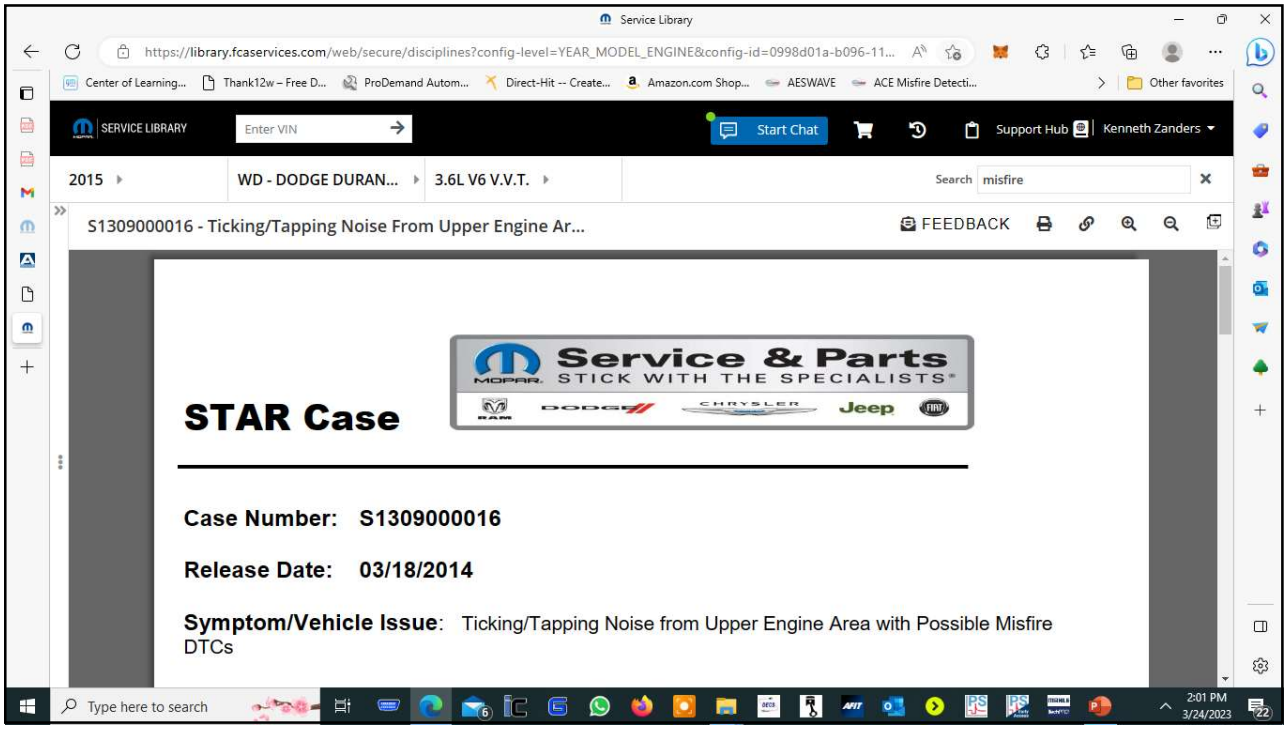
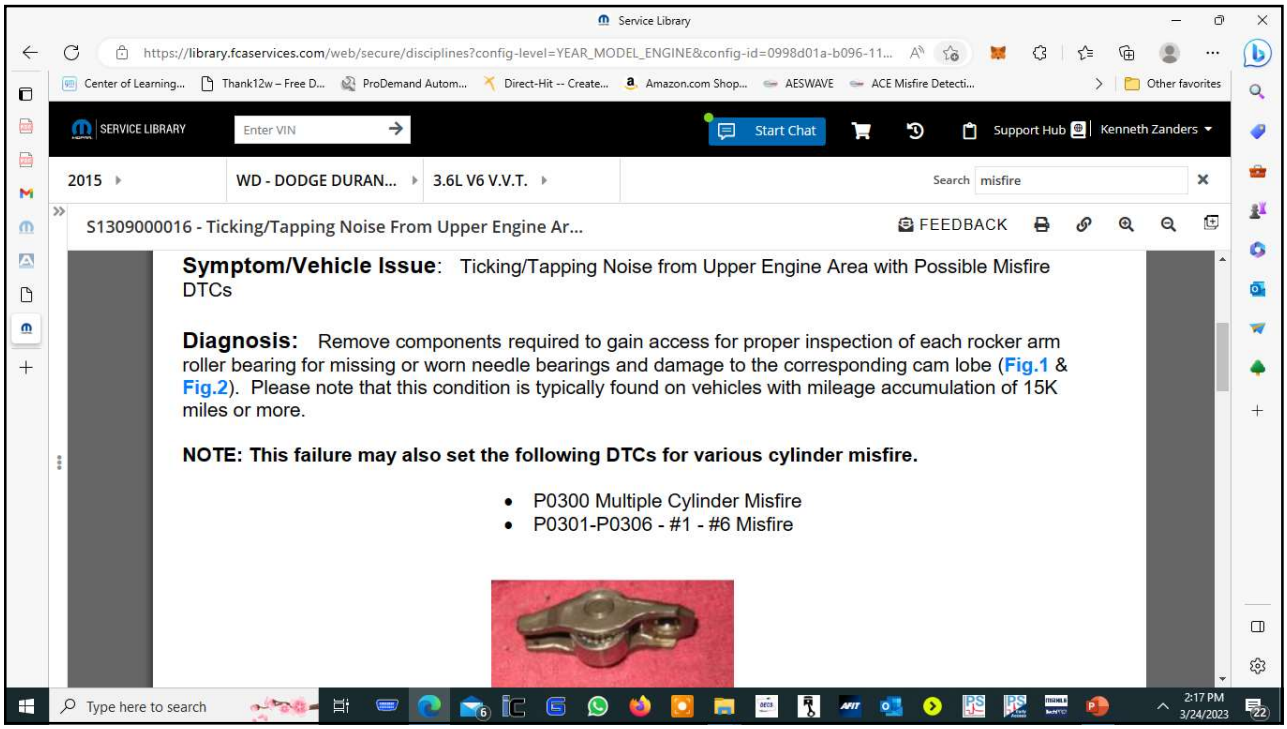
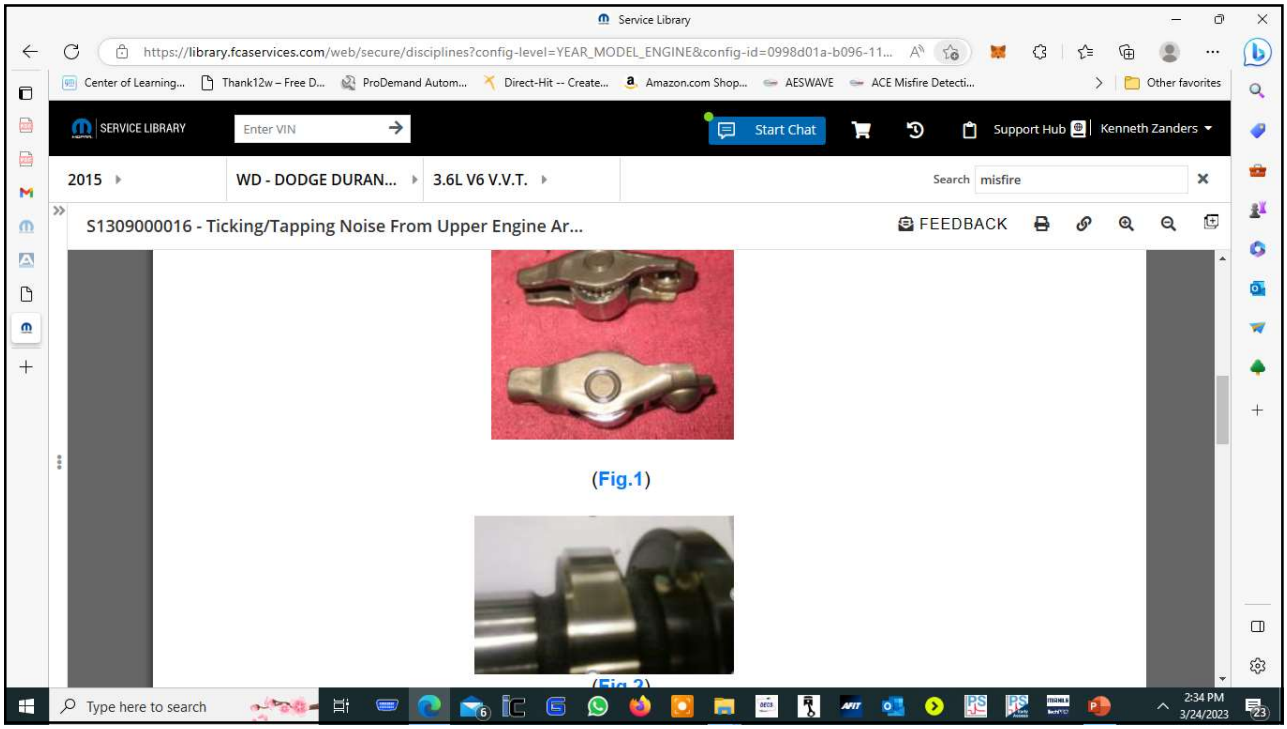
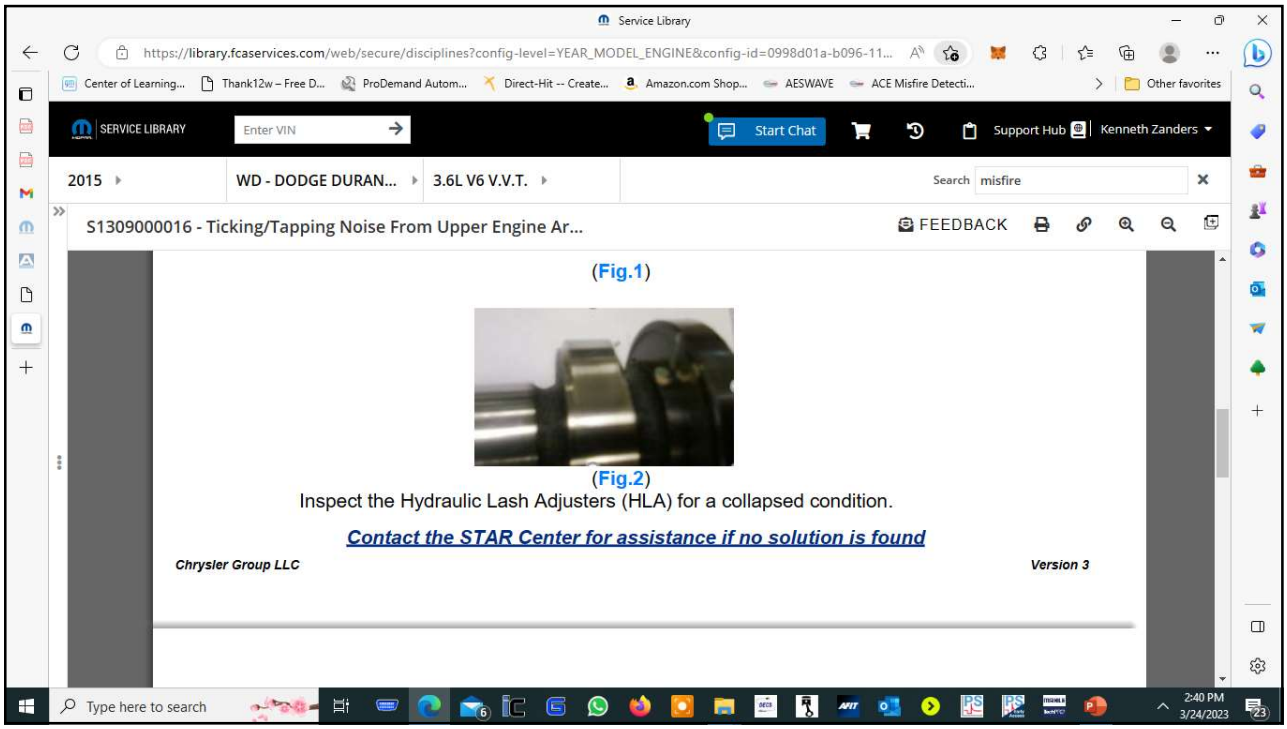
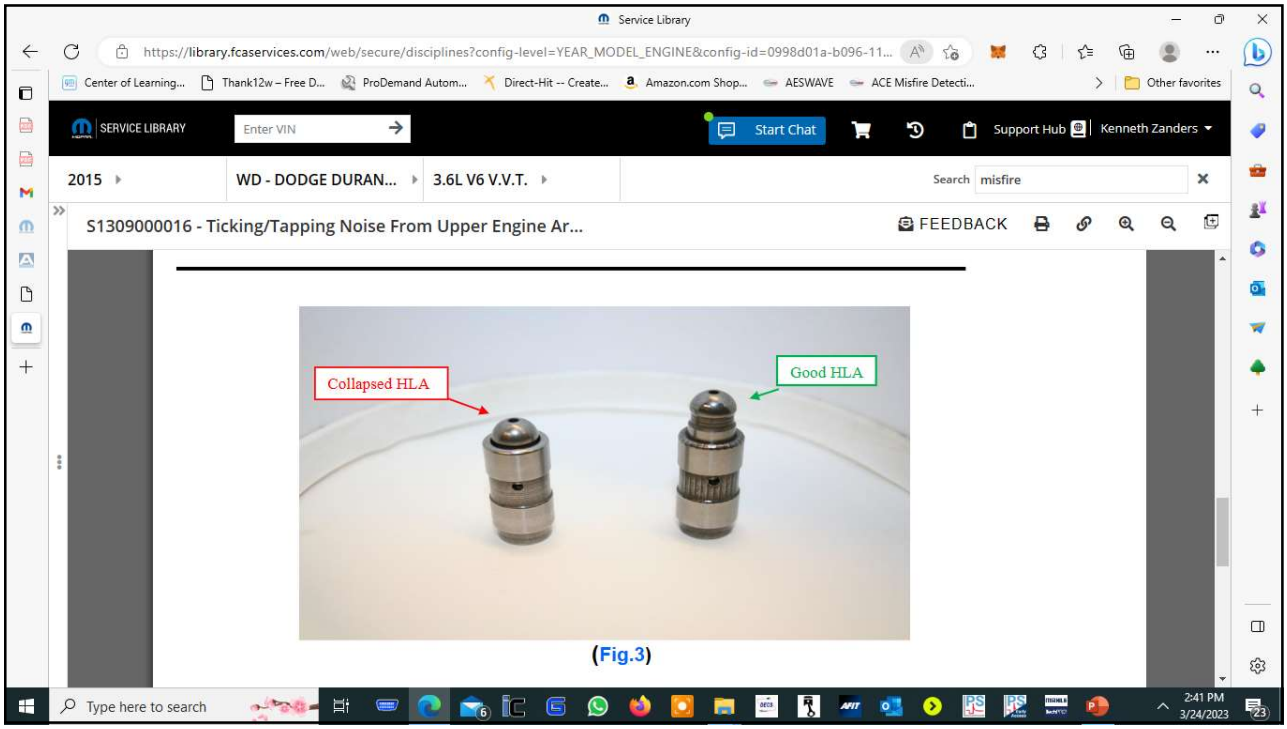
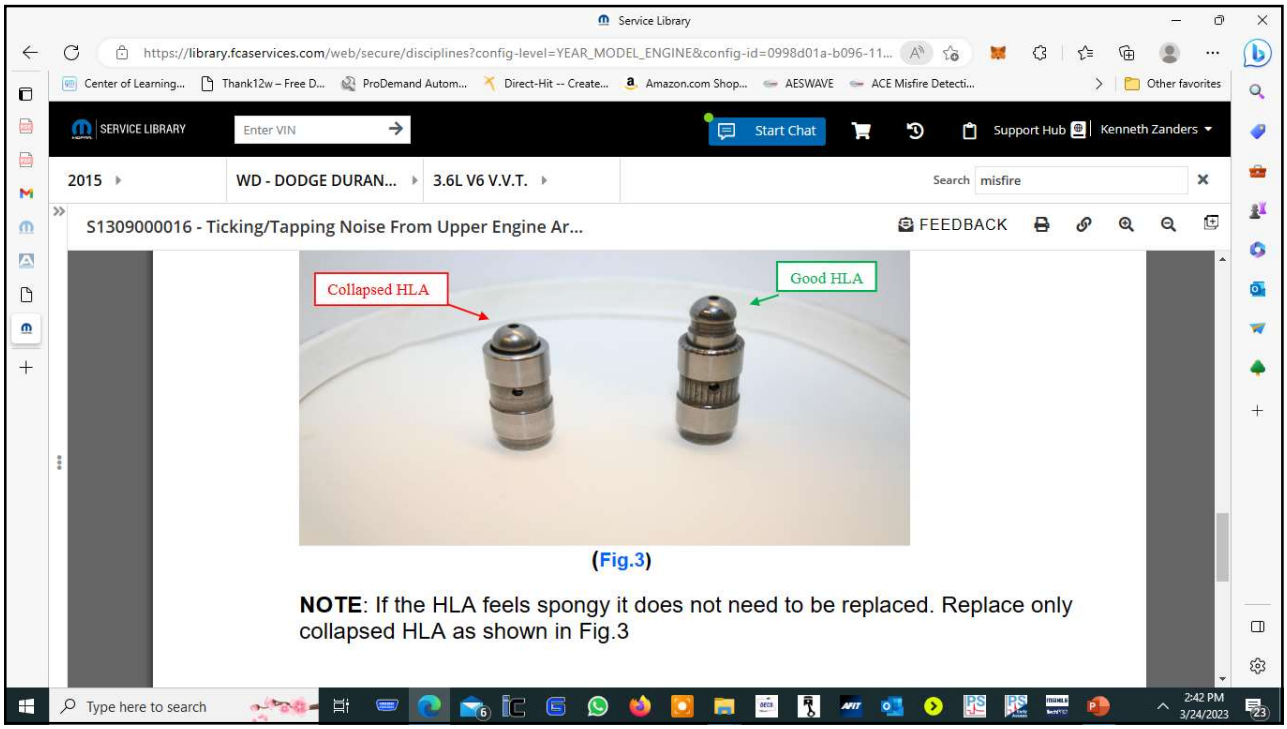


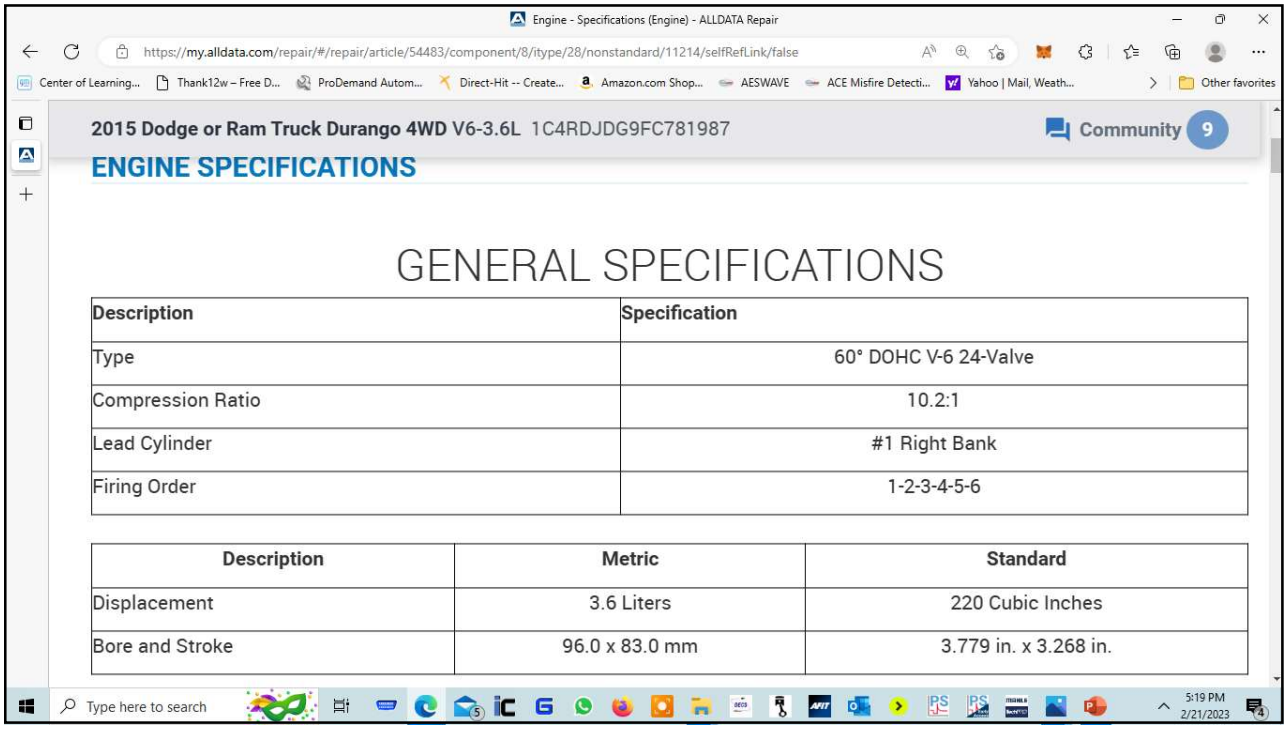

Service Library
https://library.fcaservices.com/web/secure/disciplines?config-level=YEAR_MODEL_ENGINE&config-id=0998d01a-b096-11...
SERVICE LIBRARY
Enter VIN
Start Chat
Support Hub
Kenneth Zanders
2015
WD - DODGE DURAN...
3.6L V6 V.V.T.
Search misfire
S1309000016 - Ticking/Tapping Noise From Upper Engine Ar...
FEEDBACK
Symptom/Vehicle Issue: Ticking/Tapping Noise from Upper Engine Area with Possible Misfire DTCs
Diagnosis: Remove components required to gain access for proper inspection of each rocker arm roller bearing for missing or worn needle bearings and damage to the corresponding cam lobe (Fig.1 & Fig.2). Please note that this condition is typically found on vehicles with mileage accumulation of 15K miles or more.
NOTE: This failure may also set the following DTCs for various cylinder misfire.
P0300 Multiple Cylinder Misfire
P0301-P0306 - #1 - #6 Misfire
Type here to search
2:17 PM
3/24/2023

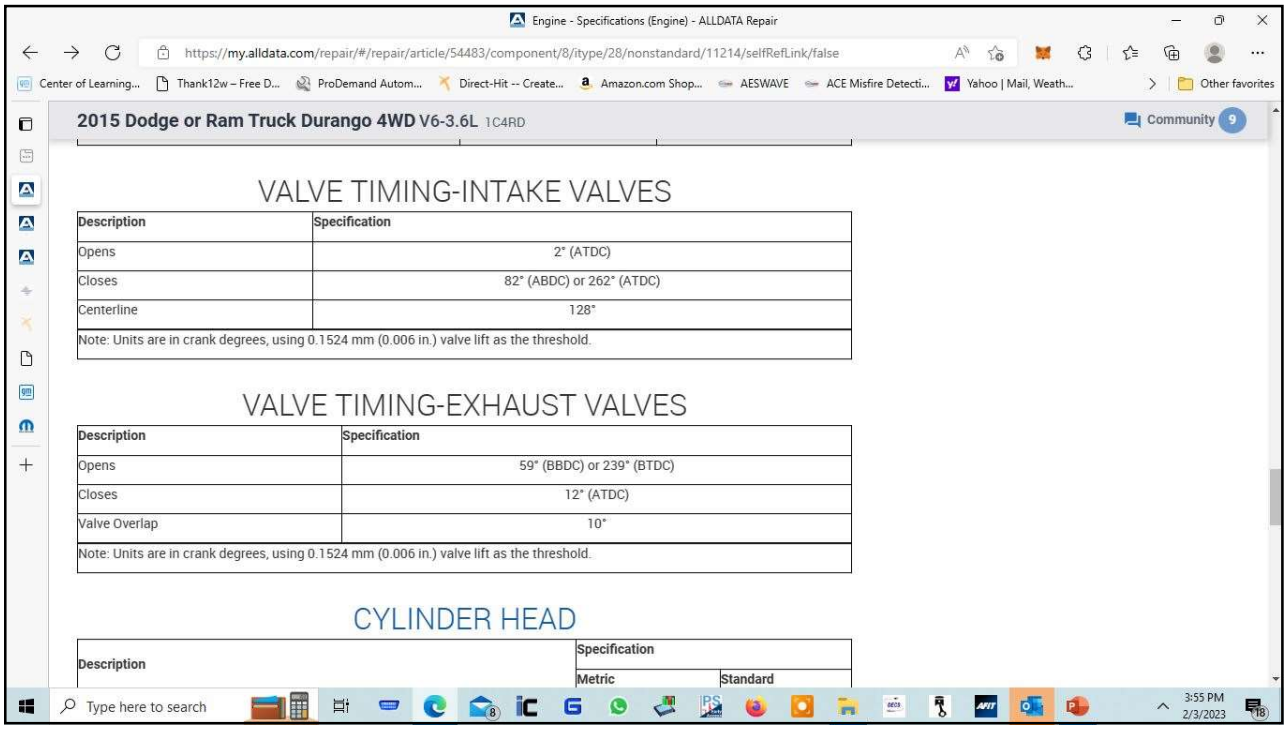

Service Library
https://library.fcaservices.com/web/secure/disciplines?config-level=YEAR_MODEL_ENGINE&config-id=0998d01a-b096-11...
SERVICE LIBRARY
Enter VIN
Start Chat
Support Hub
Kenneth Zanders
2015
WD - DODGE DURAN...
3.6L V6 V.V.T.
Search misfire
S1309000016 - Ticking/Tapping Noise From Upper Engine Ar...
FEEDBACK
(Fig.1)
Type here to search
2:34 PM
3/24/2023


Service Library
https://library.fcaservices.com/web/secure/disciplines?config-level=YEAR_MODEL_ENGINE&config-id=0998d01a-b096-11...
SERVICE LIBRARY
Enter VIN
Start Chat
Support Hub
Kenneth Zanders
2015
WD - DODGE DURAN...
3.6L V6 V.V.T.
Search misfire
S1309000016 - Ticking/Tapping Noise From Upper Engine Ar...
FEEDBACK
(Fig.1)
(Fig.2)
Inspect the Hydraulic Lash Adjusters (HLA) for a collapsed condition.
Contact the STAR Center for assistance if no solution is found
Chrysler Group LLC
Version 3
Type here to search
2:40 PM
3/24/2023


Service Library
https://library.fcaservices.com/web/secure/disciplines?config-level=YEAR_MODEL_ENGINE&config-id=0998d01a-b096-11...
SERVICE LIBRARY
Enter VIN
Start Chat
Support Hub
Kenneth Zanders
2015
WD - DODGE DURAN...
3.6L V6 V.V.T.
Search misfire
S1309000016 - Ticking/Tapping Noise From Upper Engine Ar...
FEEDBACK
Collapsed HLA
Good HLA
(Fig.3)
Type here to search
2:41 PM
3/24/2023


Service Library
https://library.fcaservices.com/web/secure/disciplines?config-level=YEAR_MODEL_ENGINE&config-id=0998d01a-b096-11...
SERVICE LIBRARY
Enter VIN
Start Chat
Support Hub
Kenneth Zanders
2015
WD - DODGE DURAN...
3.6L V6 V.V.T.
Search misfire
S1309000016 - Ticking/Tapping Noise From Upper Engine Ar...
FEEDBACK
Collapsed HLA
Good HLA
(Fig.3)
NOTE: If the HLA feels spongy it does not need to be replaced. Replace only collapsed HLA as shown in Fig.3
Type here to search
2:42 PM
3/24/2023


Engine - Specifications (Engine) - ALLDATA Repair
https://my.alldata.com/repair/#/repair/article/54483/component/8/itype/28/nonstandard/11214/selfRefLink/false
2015 Dodge or Ram Truck Durango 4WD V6-3.6L 1C4RDJDG9FC781987
Community 9
ENGINE SPECIFICATIONS
GENERAL SPECIFICATIONS
Description
Specification
Type
60° DOHC V-6 24-Valve
Compression Ratio
10.2:1
Lead Cylinder
#1 Right Bank
Firing Order
1-2-3-4-5-6
Description
Metric
Standard
Displacement
3.6 Liters
220 Cubic Inches
Bore and Stroke
96.0 x 83.0 mm
3.779 in. x 3.268 in.
Type here to search
5:19 PM
2/21/2023



Cranking Vacuum Waveforms

Intake Stroke

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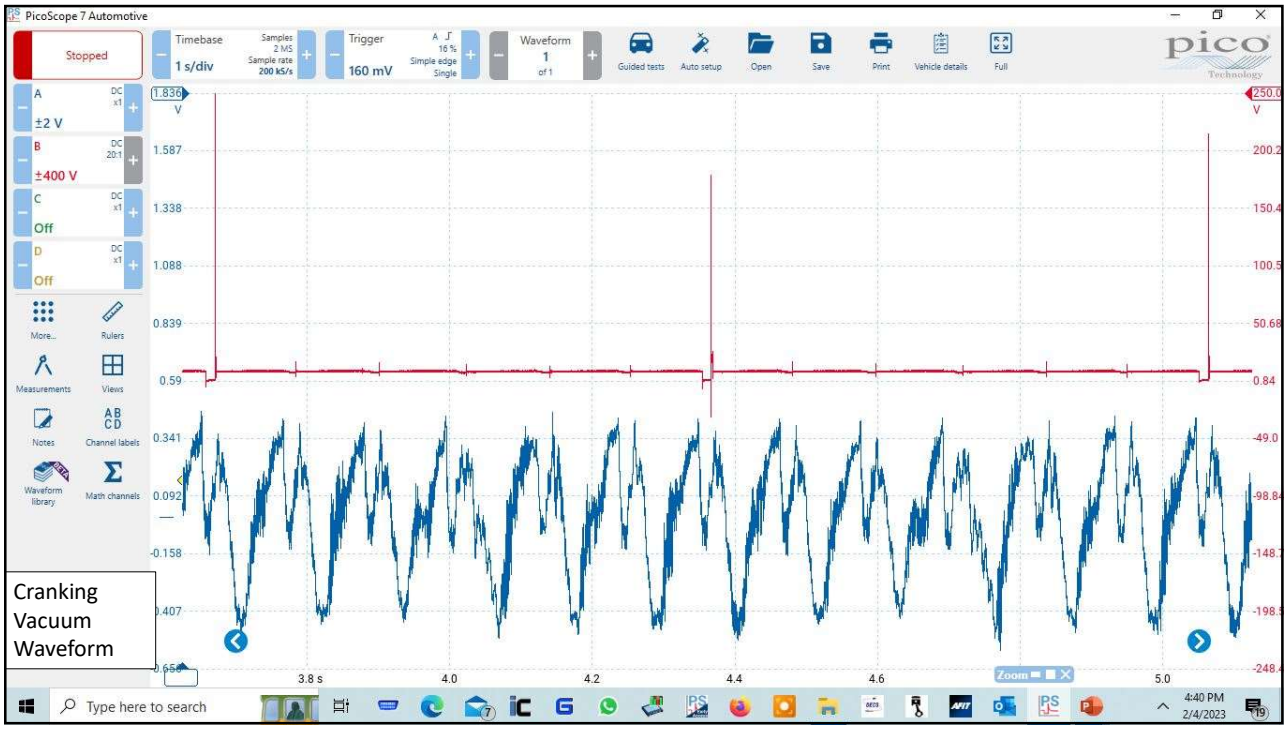
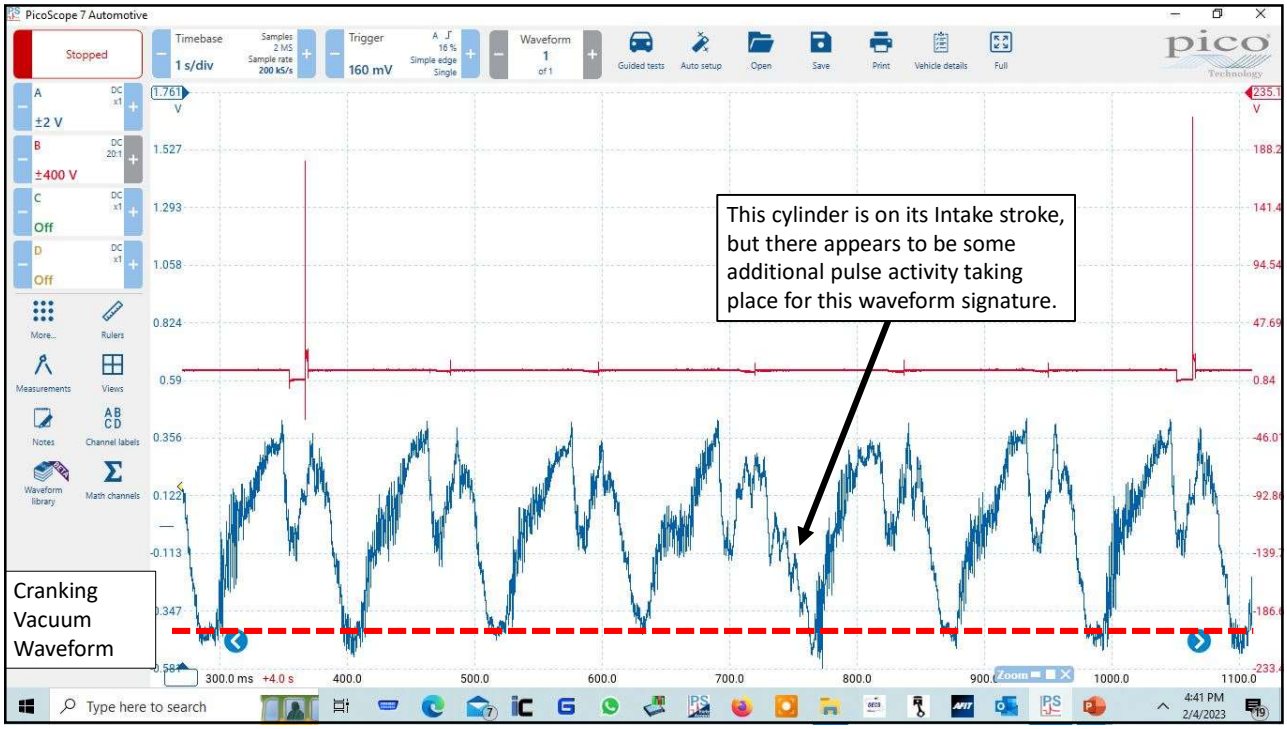
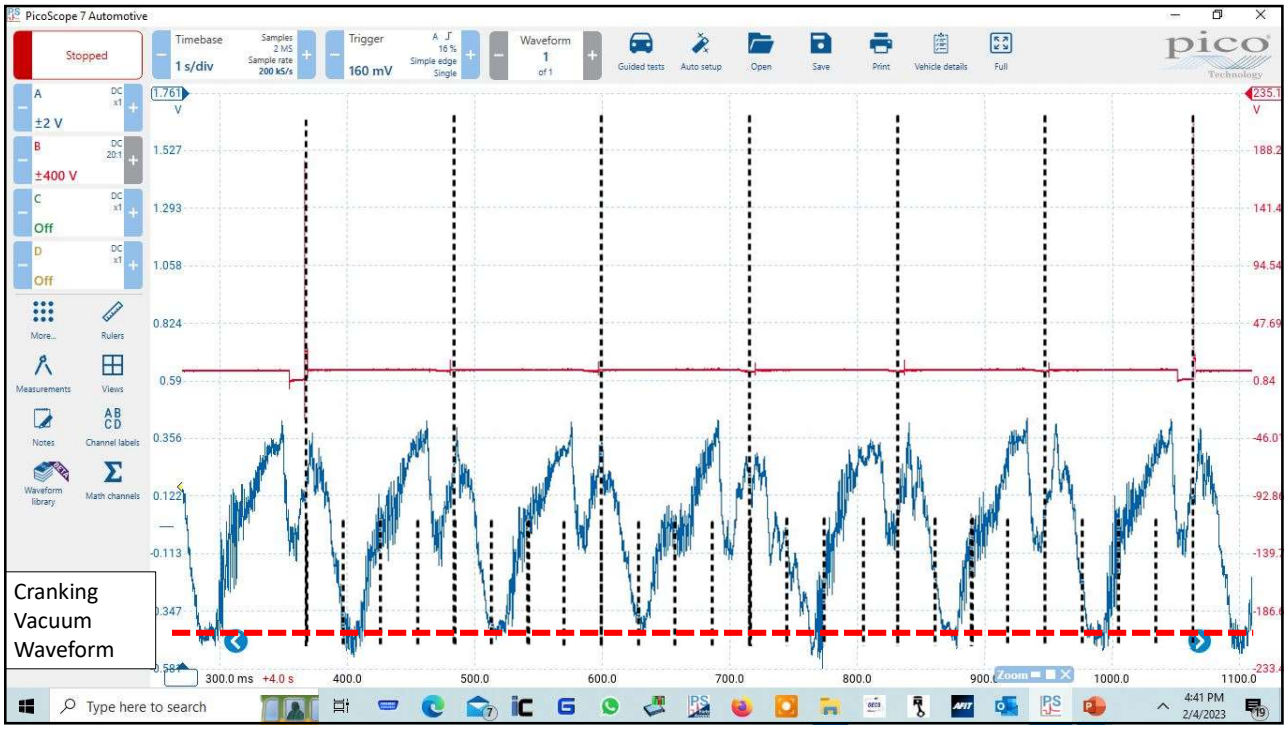
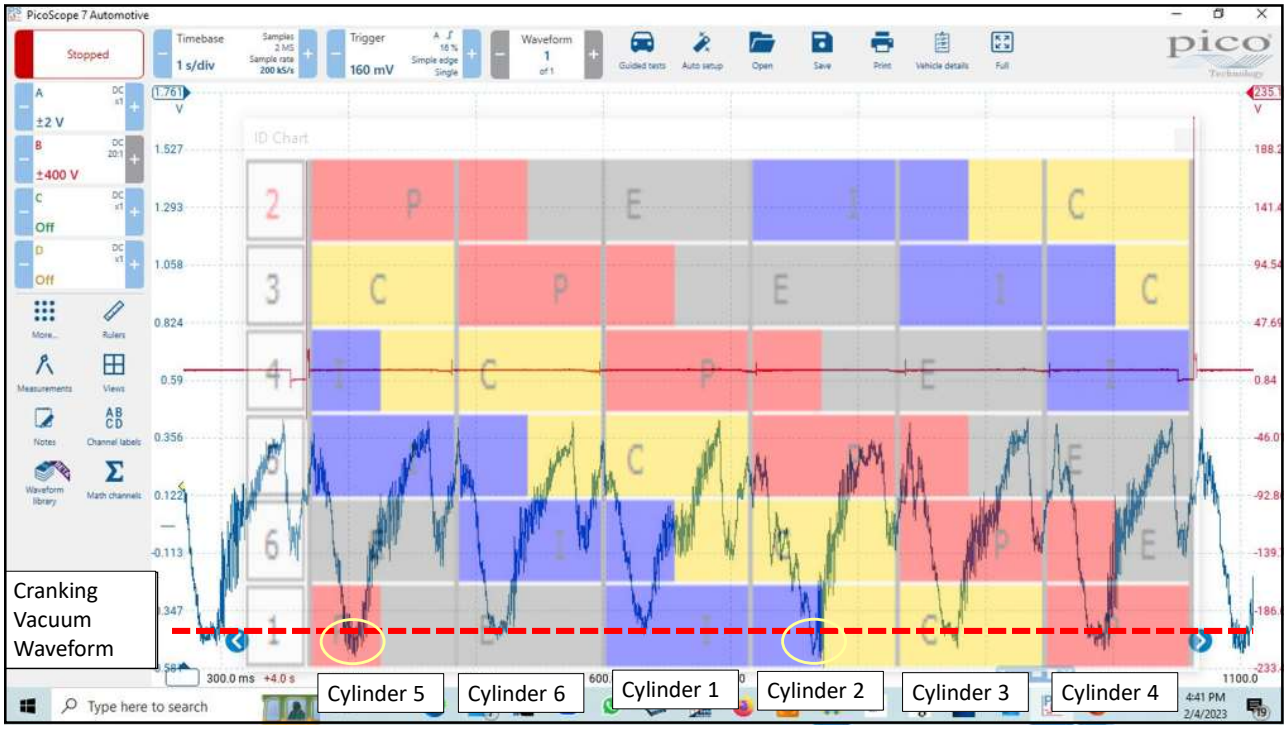

PicoScope 7 Automotive
Stopped
Timebase
1 s/div
Trigger
160 mV
Waveform
Guided tests
Auto setup
Open
Save
Print
Vehicle details
Full
pico
A
±2 V
B
±400 V
C
Off
D
Off
More...
Rulers
Measurements
Views
Notes
Channel labels
Waveform library
Math channels
Cranking Vacuum Waveform
Type here to search
4:40 PM
2/4/2023


PicoScope 7 Automotive
Stopped
Timebase
1 s/div
Trigger
160 mV
Waveform
Guided tests
Auto setup
Open
Save
Print
Vehicle details
Full
pico
A
±2 V
B
±400 V
C
Off
D
Off
More...
Rulers
Measurements
Views
Notes
Channel labels
Waveform library
Math channels
This cylinder is on its Intake stroke, but there appears to be some additional pulse activity taking place for this waveform signature.
Cranking Vacuum Waveform
Type here to search
4:41 PM
2/4/2023


PicoScope 7 Automotive
Stopped
Timebase
1 s/div
Trigger
160 mV
Waveform
pico
Cranking
Vacuum
Waveform


PicoScope 7 Automotive
Stopped
Timebase
1 s/div
Trigger
160 mV
Waveform
pico
ID Chart
Cranking
Vacuum
Waveform
Cylinder 5
Cylinder 6
Cylinder 1
Cylinder 2
Cylinder 3
Cylinder 4

Questions: Intake Stroke

- What cylinder(s) appears to be affected?
- _____
- Do we appear to have a mechanical issue?
- _____

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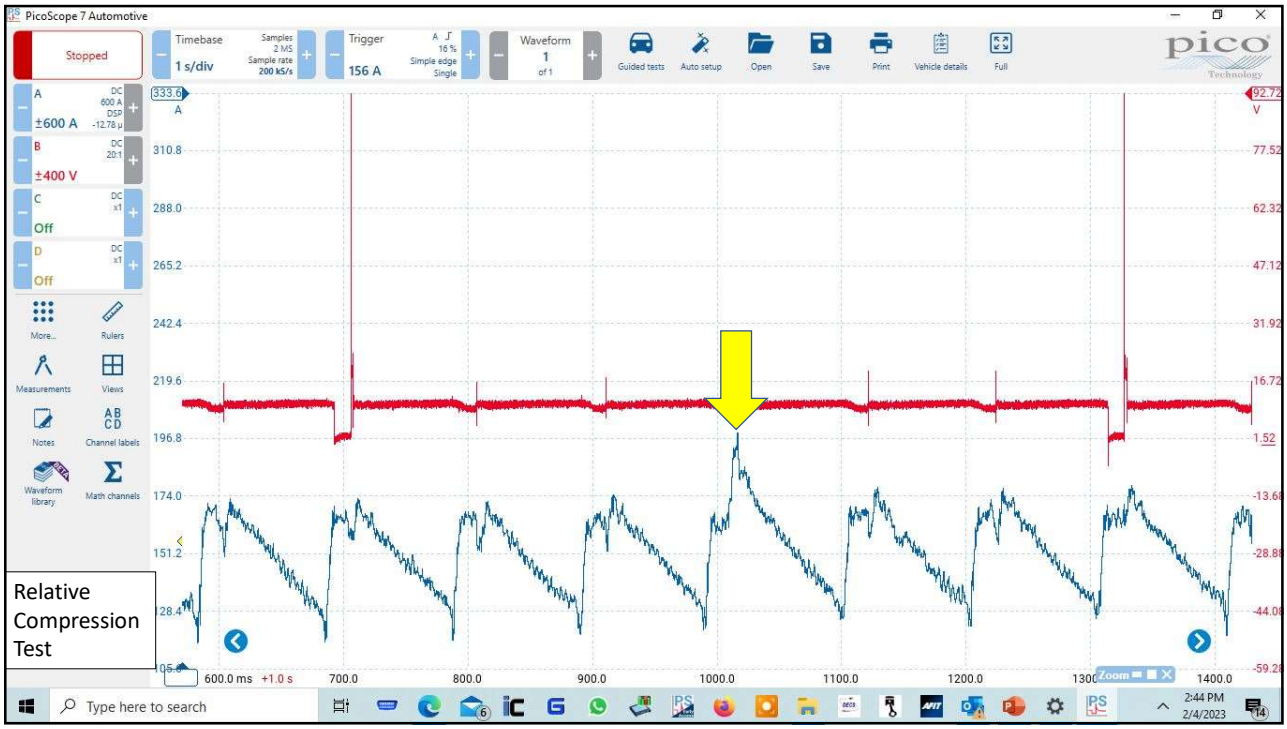
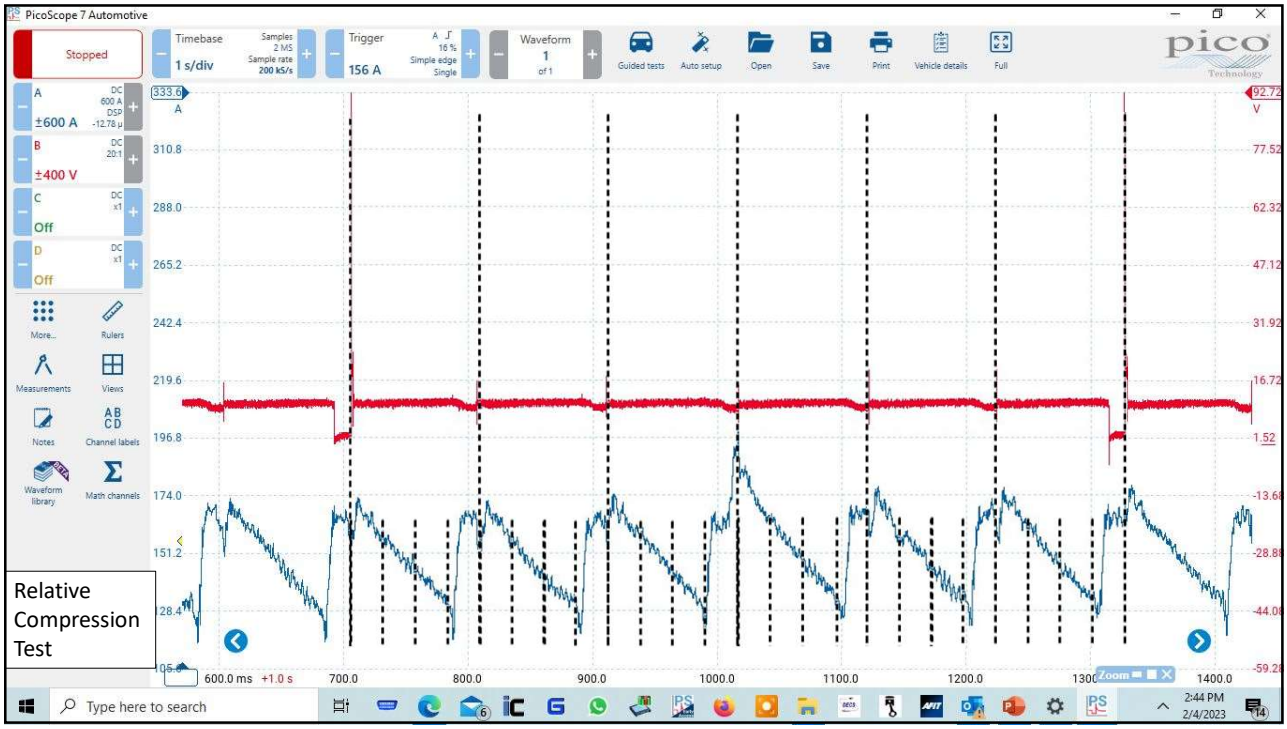
Relative Compression Test

Compression Stroke

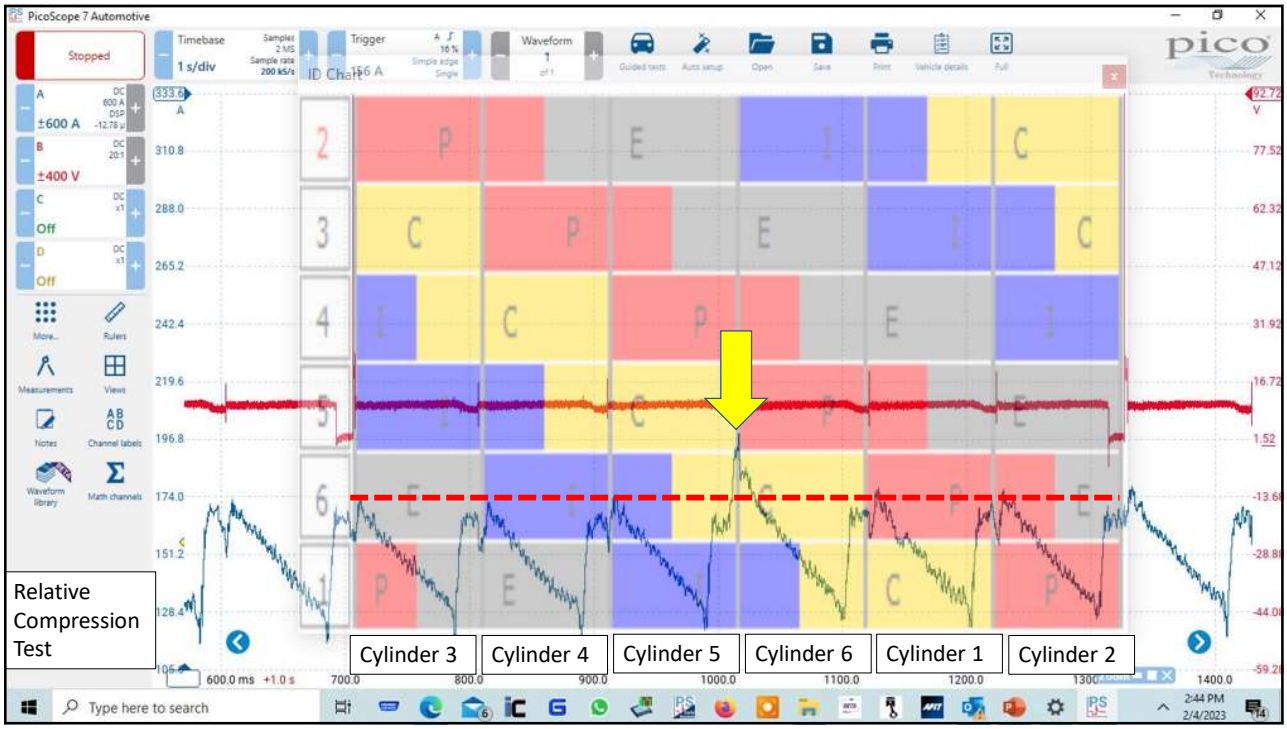
TST Seminars
Professional Training for Automotive Experts



Relative Compression Test



Relative Compression Test



Questions: Compression Stroke

- What cylinder(s) appears to be affected?
- _____
- Do we appear to have a mechanical issue?
- _____
- What cylinder was affected on the Intake Stroke?
- _____

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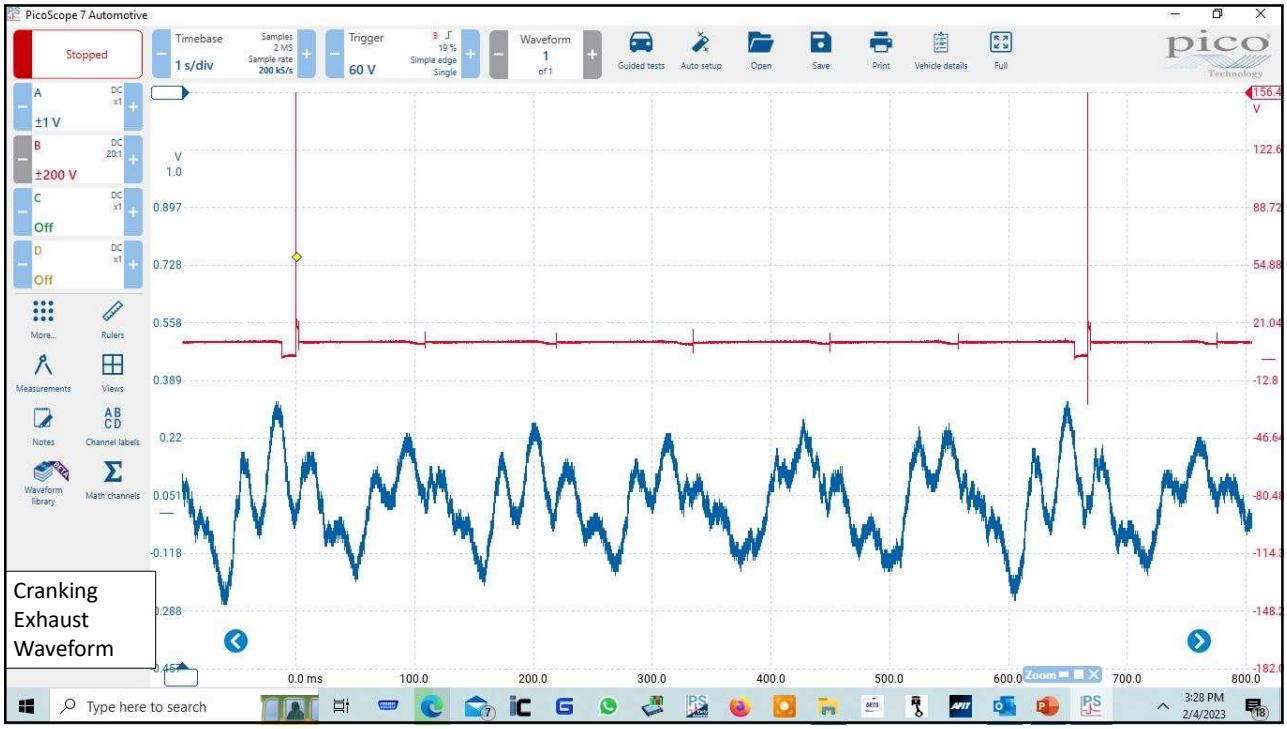
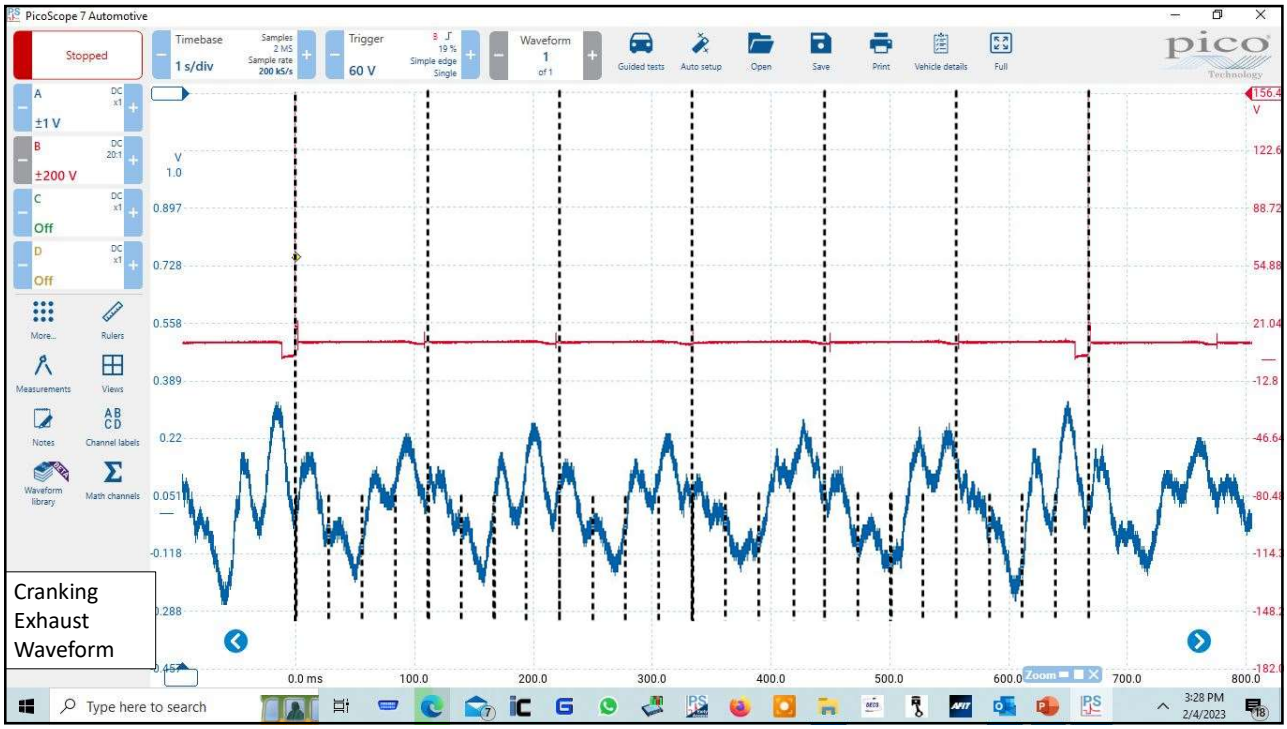
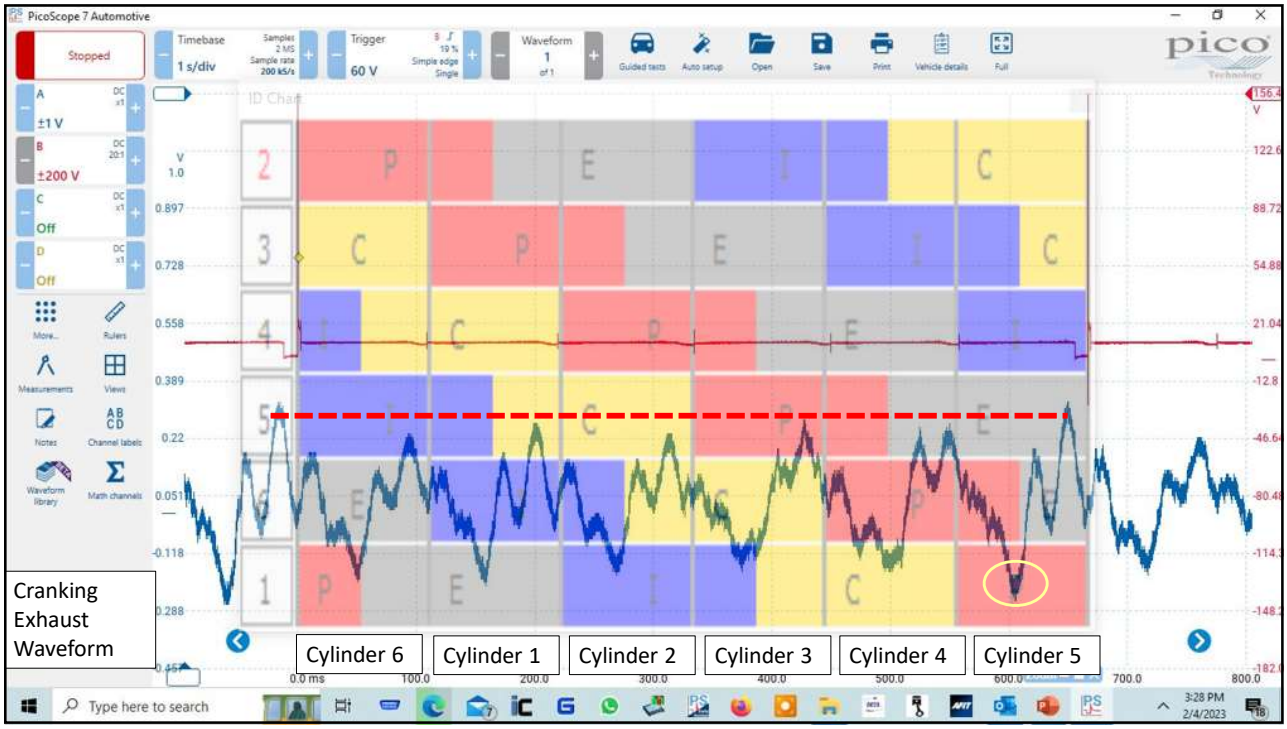
Cranking Exhaust Waveforms

Exhaust Stroke



Cranking Exhaust Waveform


PicoScope 7 Automotive
Stopped
Timebase
1 s/div
Trigger
60 V
Waveform
pico
Cranking
Exhaust
Waveform


PicoScope 7 Automotive
Stopped
Timebase
1 s/div
Trigger
60 V
Waveform
pico
Cranking
Exhaust
Waveform
Cylinder 6
Cylinder 1
Cylinder 2
Cylinder 3
Cylinder 4
Cylinder 5

Questions: Exhaust Stroke

- What cylinder(s) appears to be affected?
- _____
- Do we appear to have a mechanical issue?
- _____
- What cylinder was affected on the Compression Stroke?
- _____

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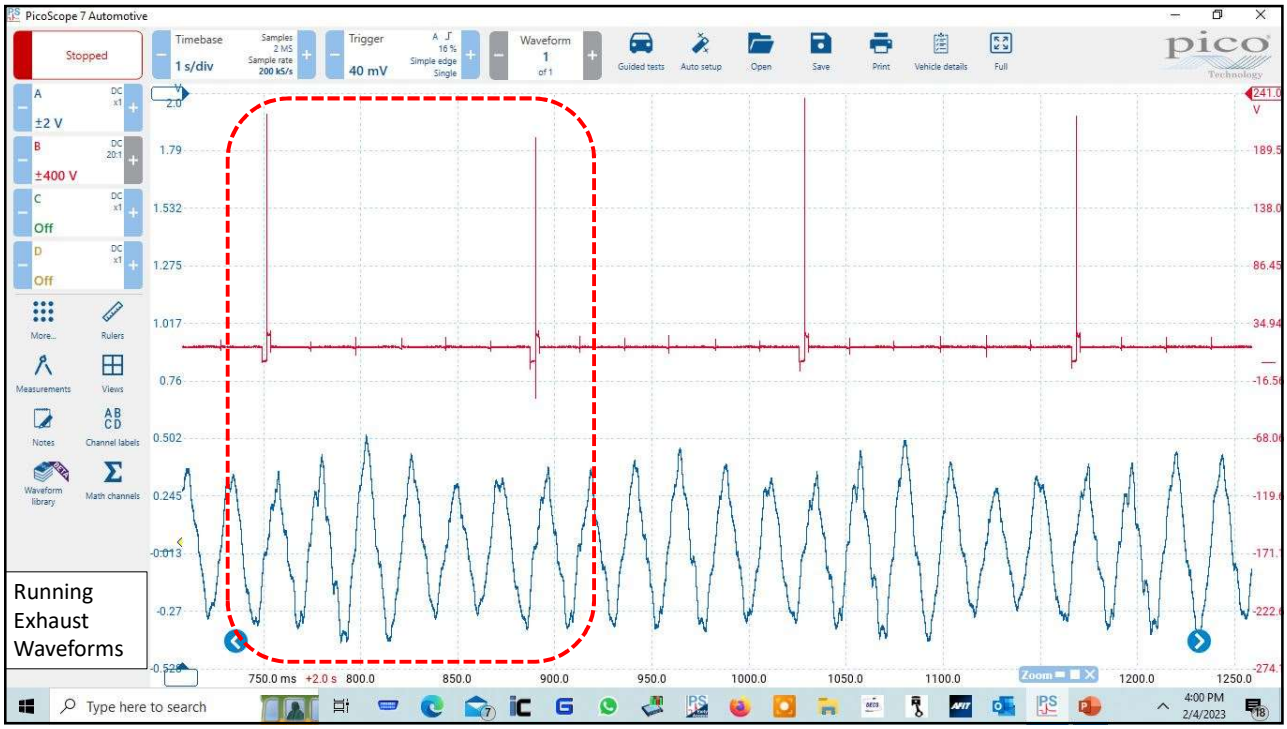
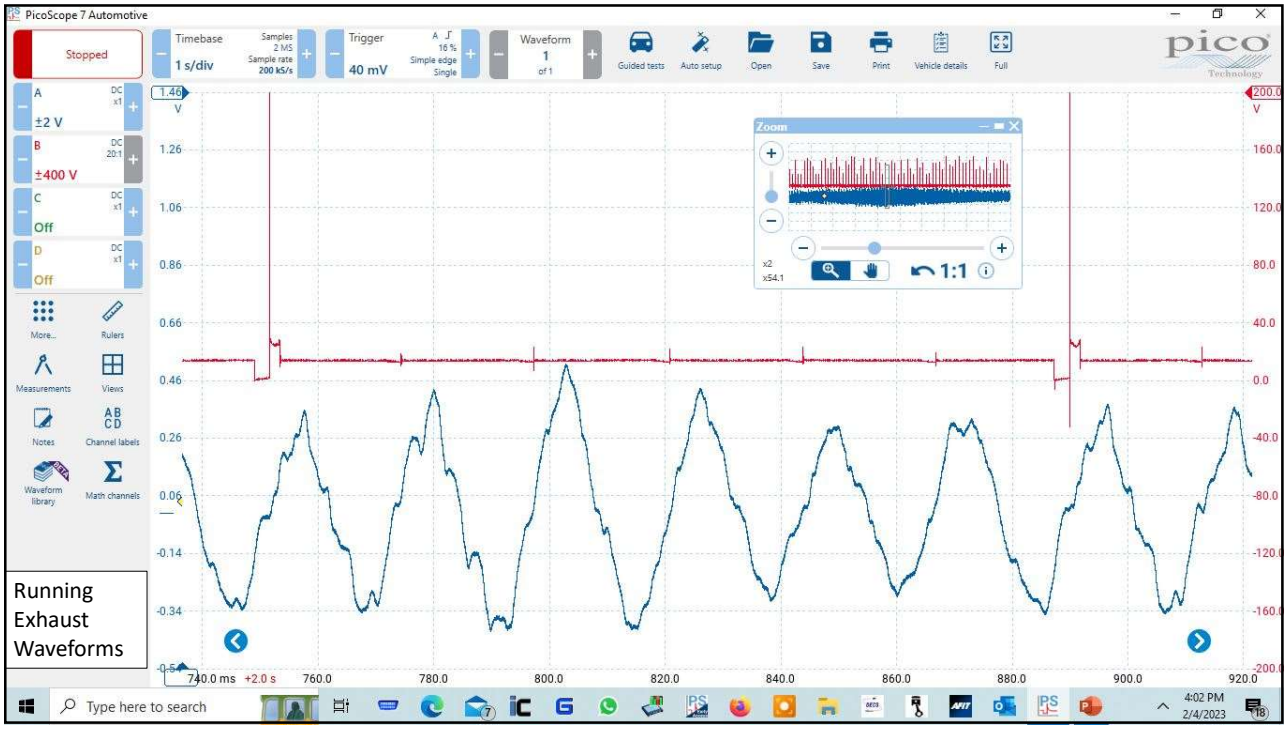
Running Exhaust Waveforms

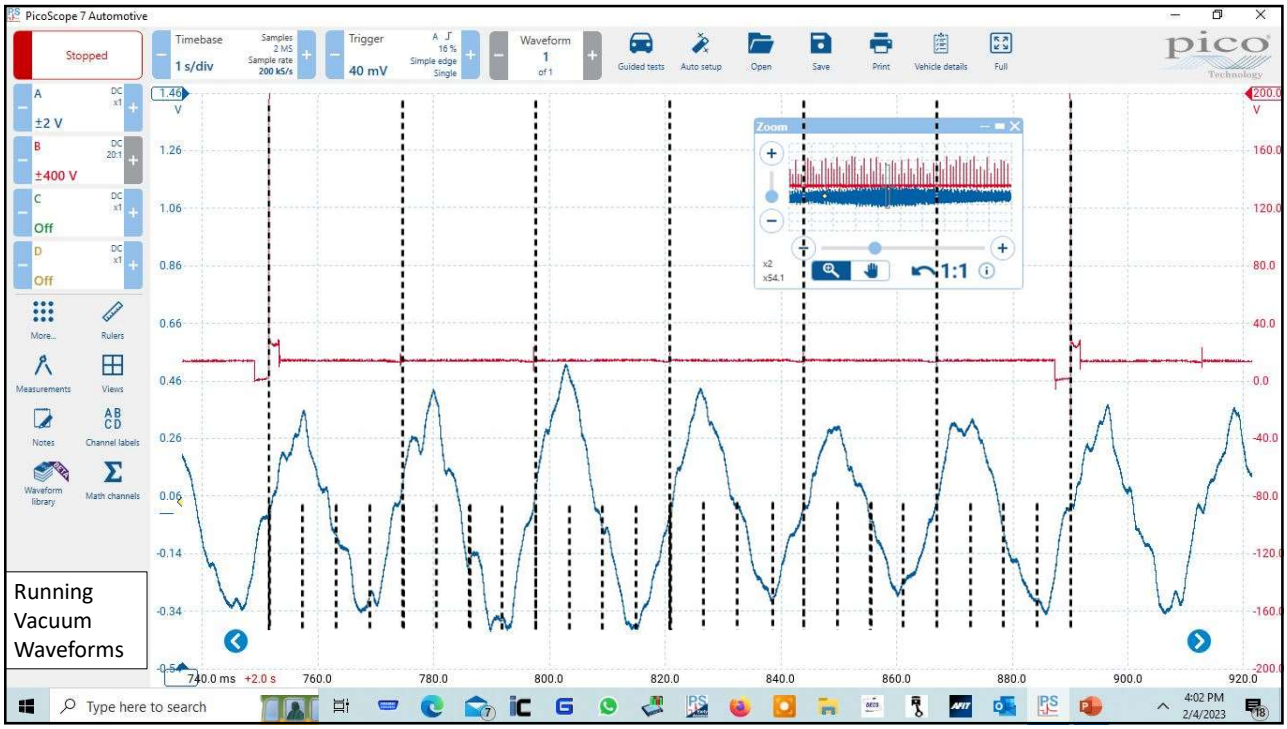
Exhaust Stroke



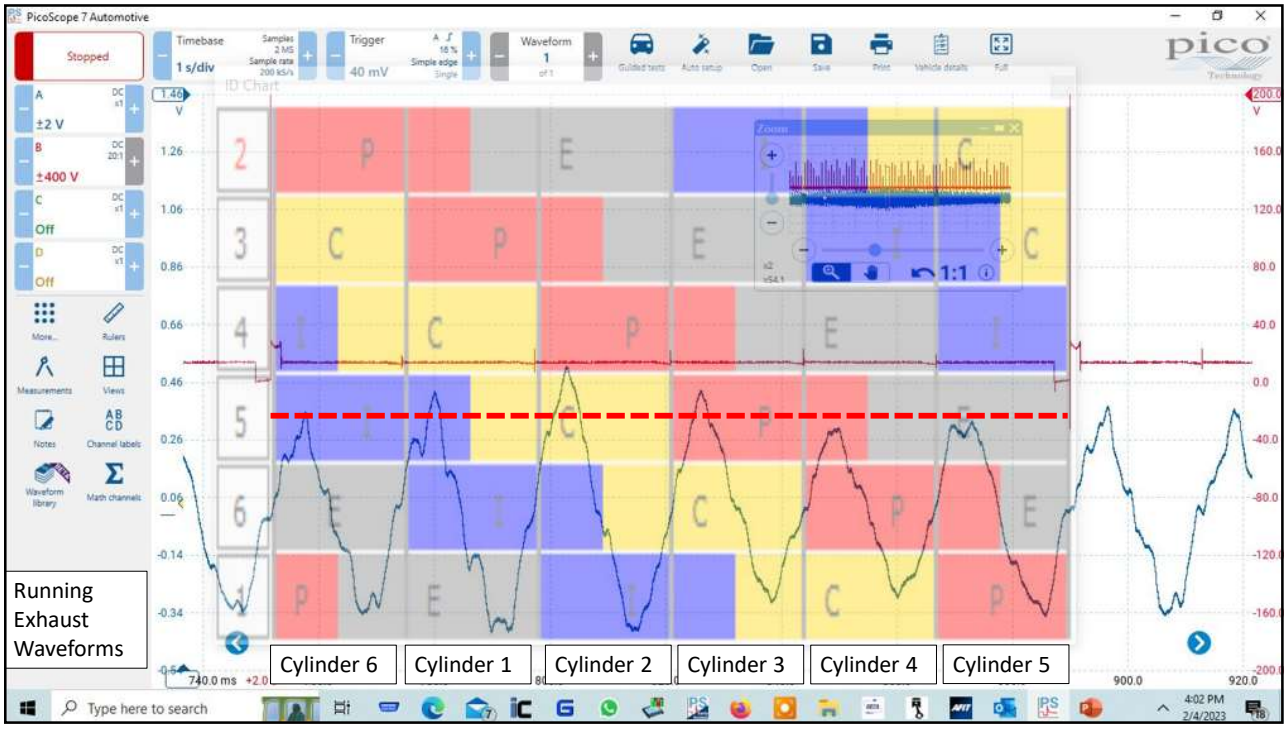
Running Exhaust Waveforms



Running Exhaust Waveforms



Running Vacuum Waveforms



Running Exhaust Waveforms

Questions: Exhaust Stroke

- What cylinder(s) appears to be affected?
- _____
- Do we appear to have a mechanical issue?
- _____
- What cylinder was affected on the cranking Exhaust Stroke?
- _____

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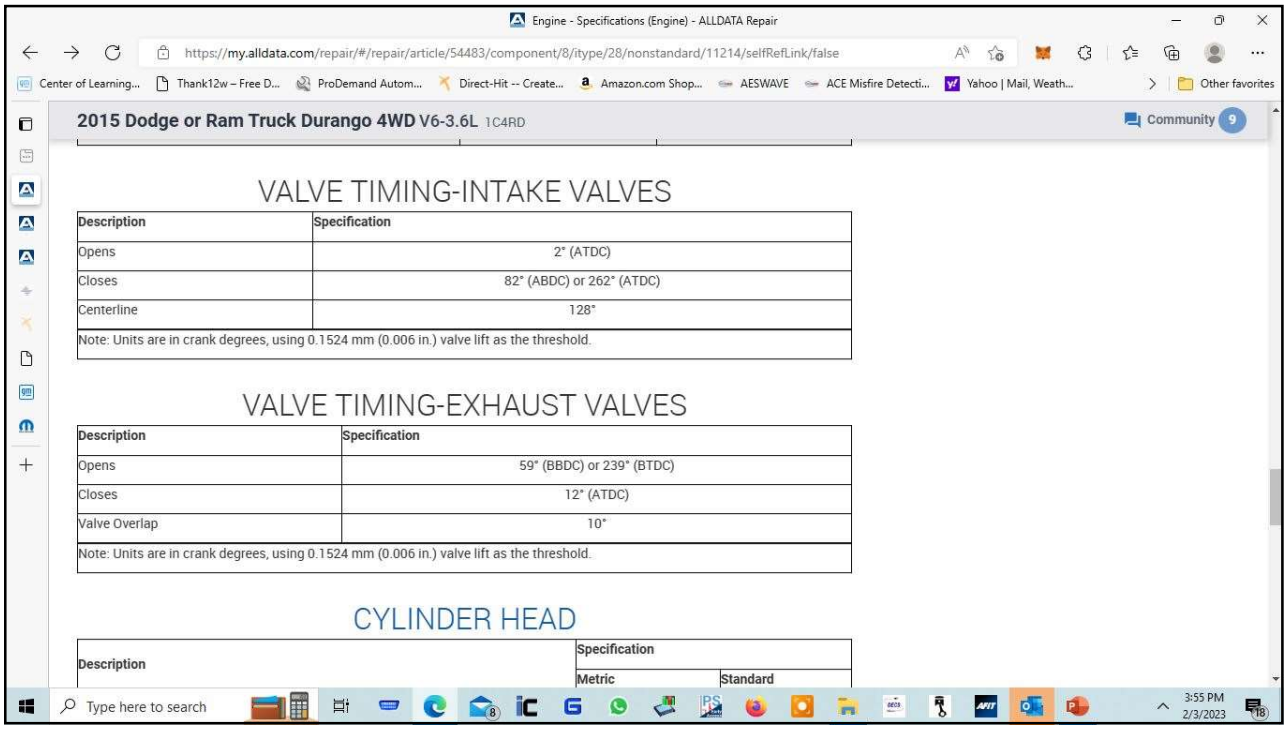
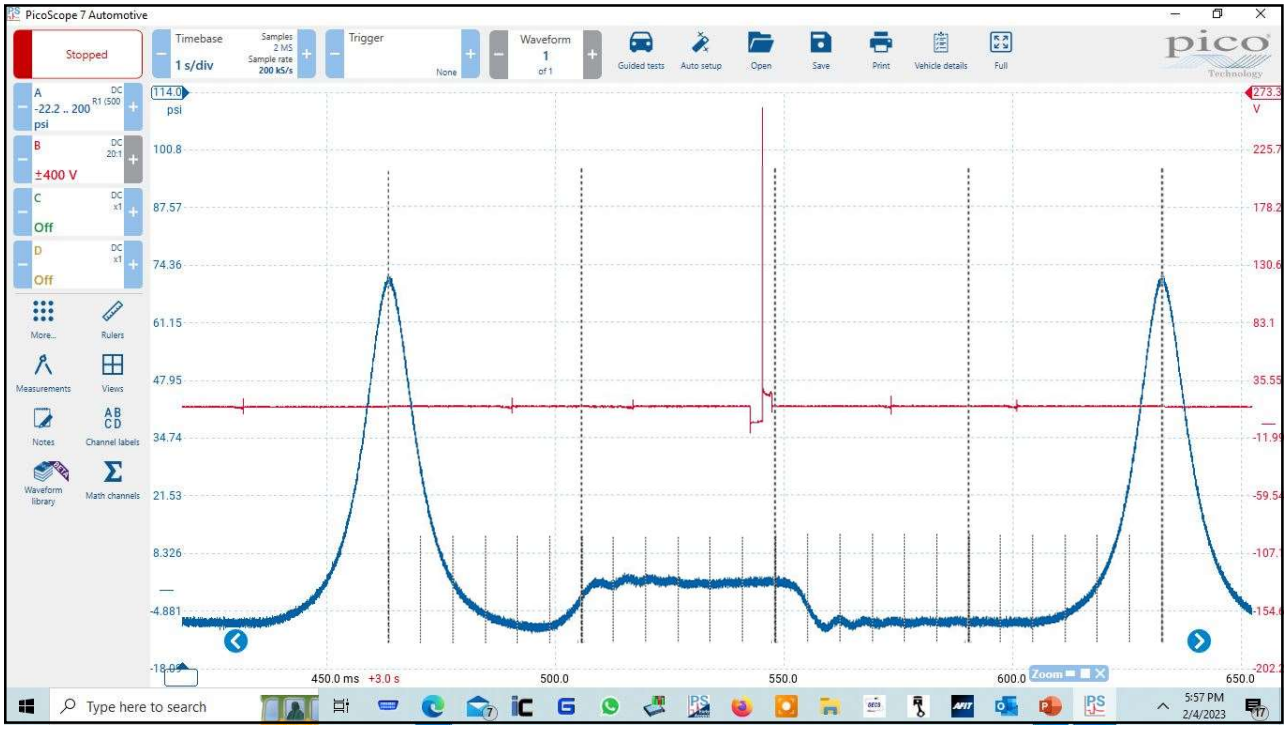
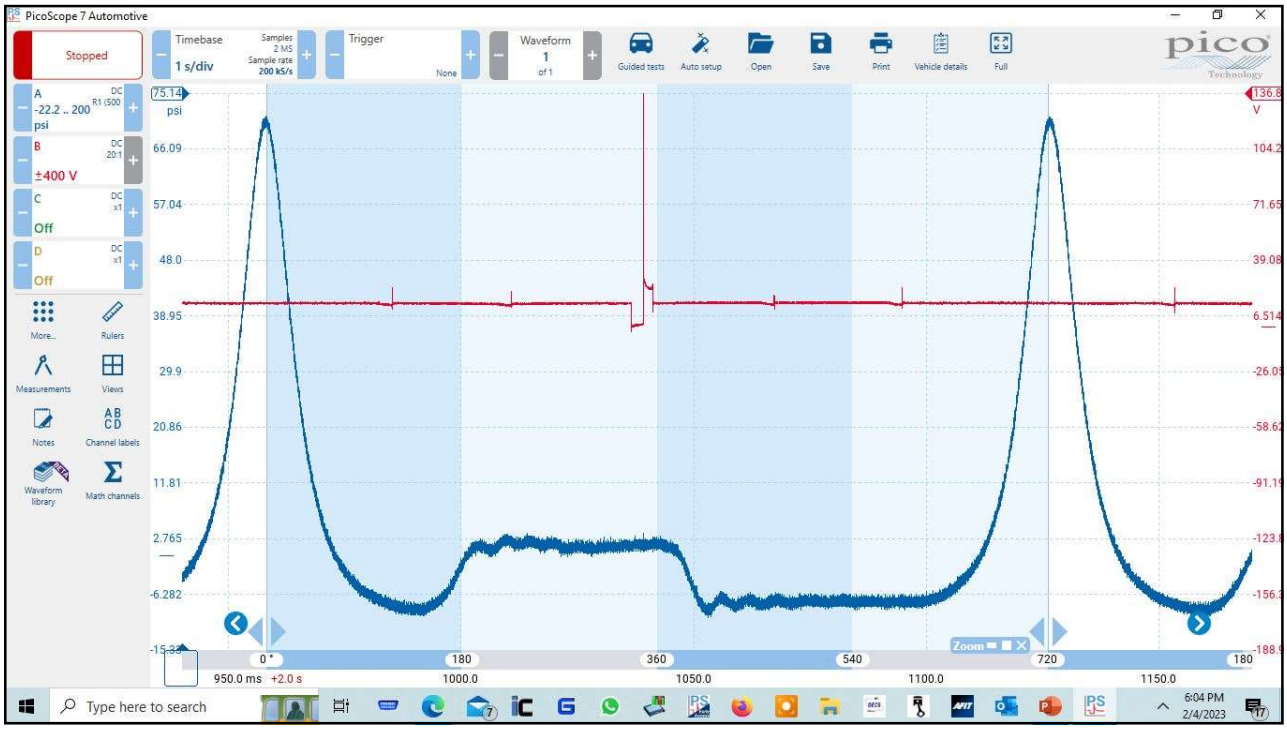
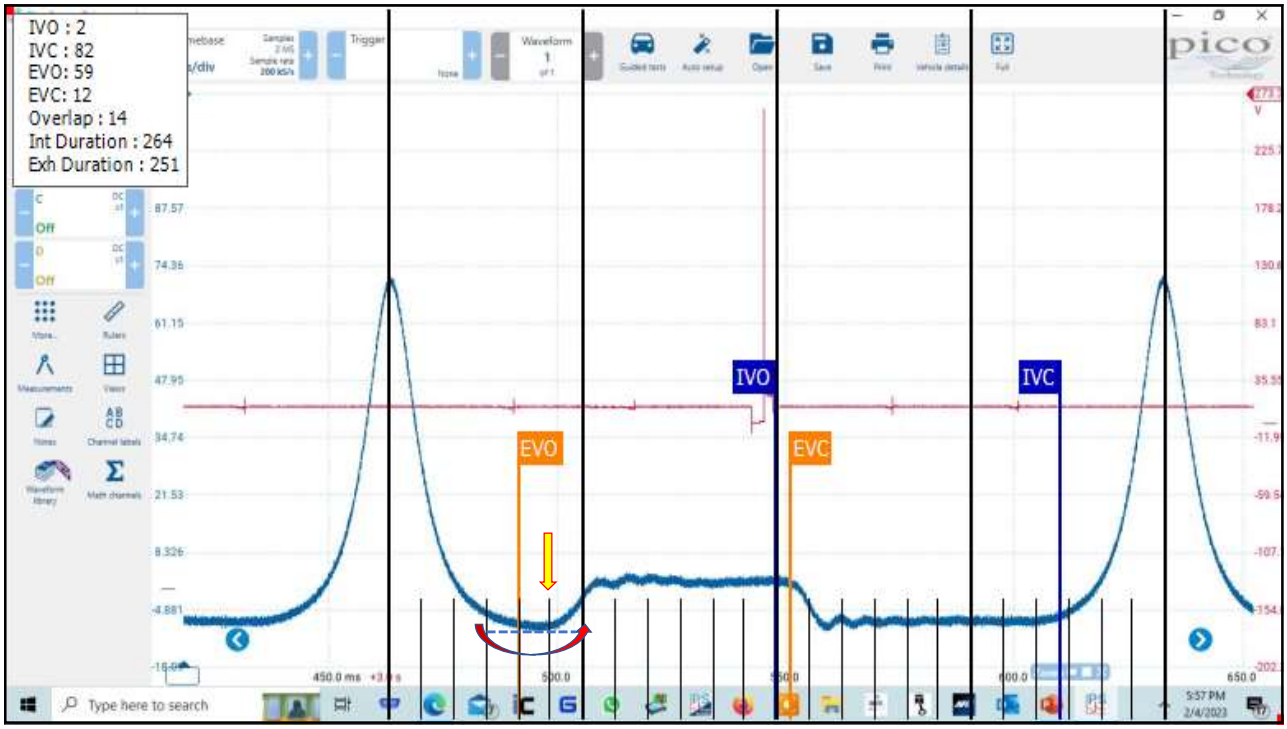
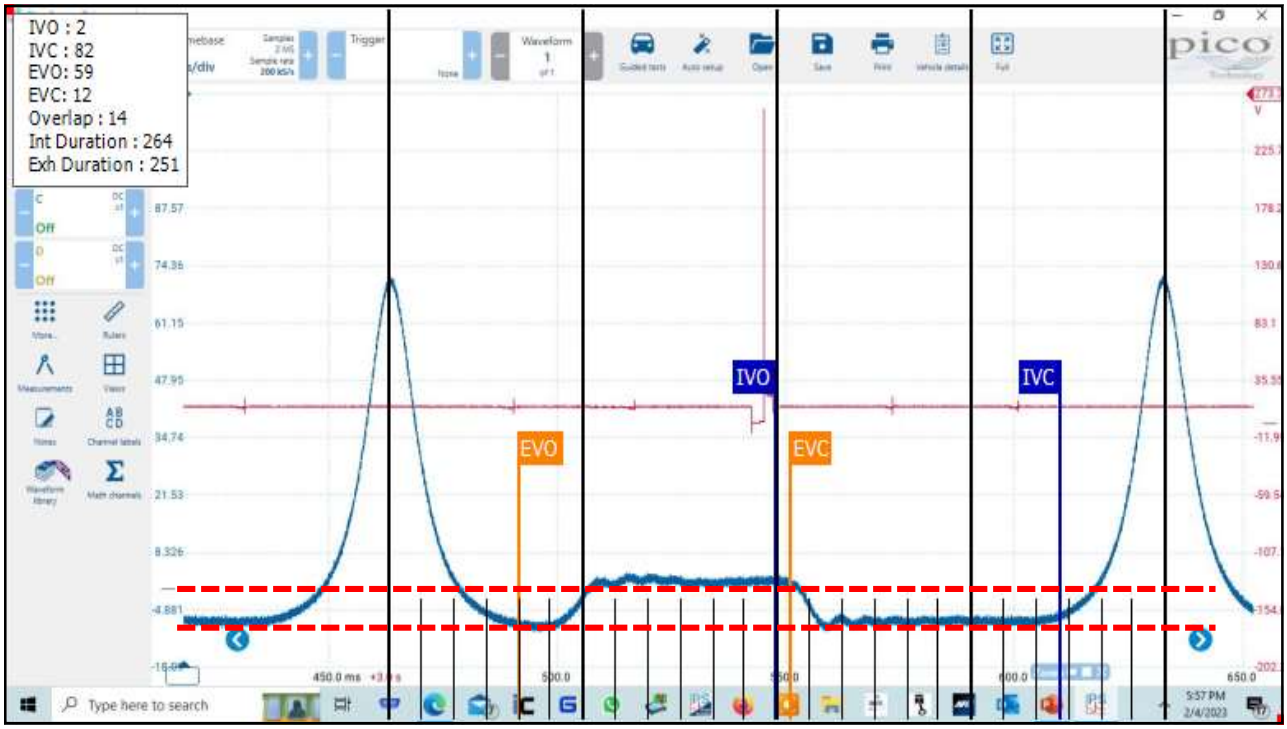
In Cylinder Analysis
Cylinder No 2

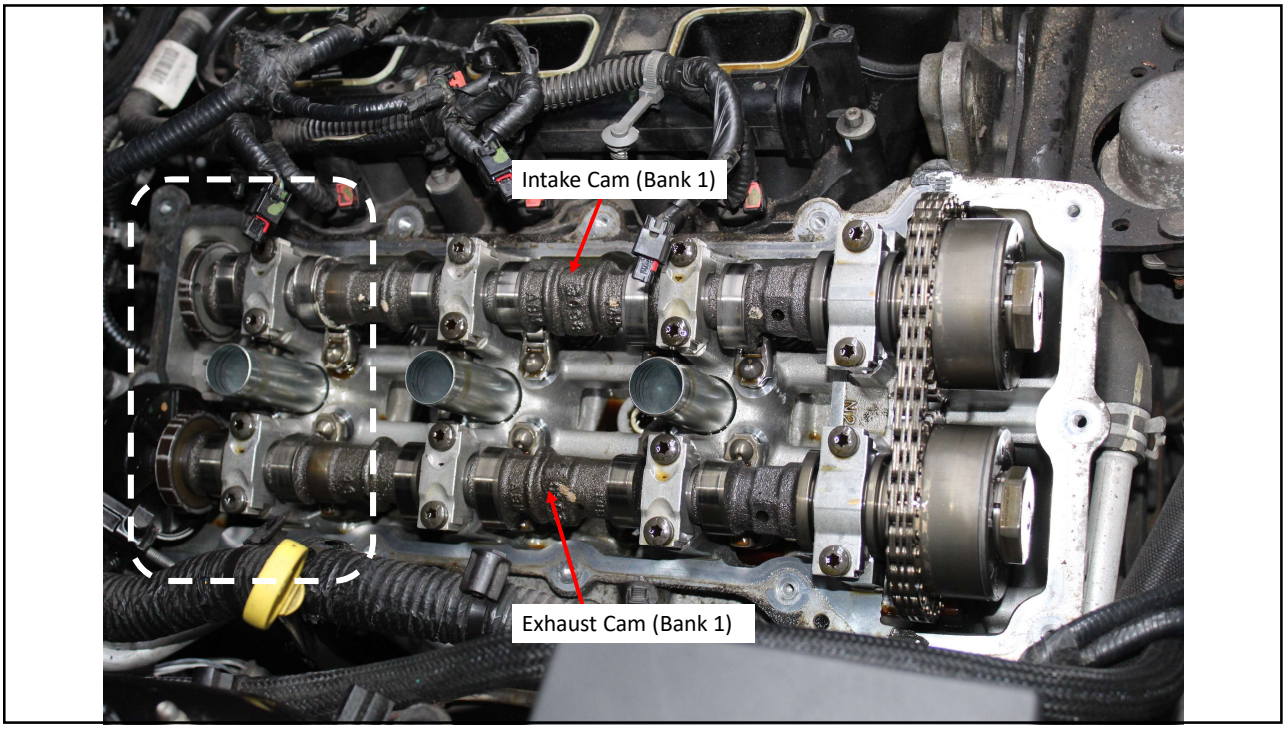

Engine - Specifications (Engine) - ALLDATA Repair
https://my.alldata.com/repair/#/repair/article/54483/component/8/itype/28/nonstandard/11214/selfRefLink/false
2015 Dodge or Ram Truck Durango 4WD V6-3.6L 1C4RD
Community 9
VALVE TIMING-INTAKE VALVES
Description | Specification
Opens | 2° (ATDC)
Closes | 82° (ABDC) or 262° (ATDC)
Centerline | 128°
Note: Units are in crank degrees, using 0.1524 mm (0.006 in.) valve lift as the threshold.
VALVE TIMING-EXHAUST VALVES
Description | Specification
Opens | 59° (BBDC) or 239° (BTDC)
Closes | 12° (ATDC)
Valve Overlap | 10°
Note: Units are in crank degrees, using 0.1524 mm (0.006 in.) valve lift as the threshold.
CYLINDER HEAD
Description | Specification
Metric | Standard
Type here to search
3:55 PM
2/3/2023

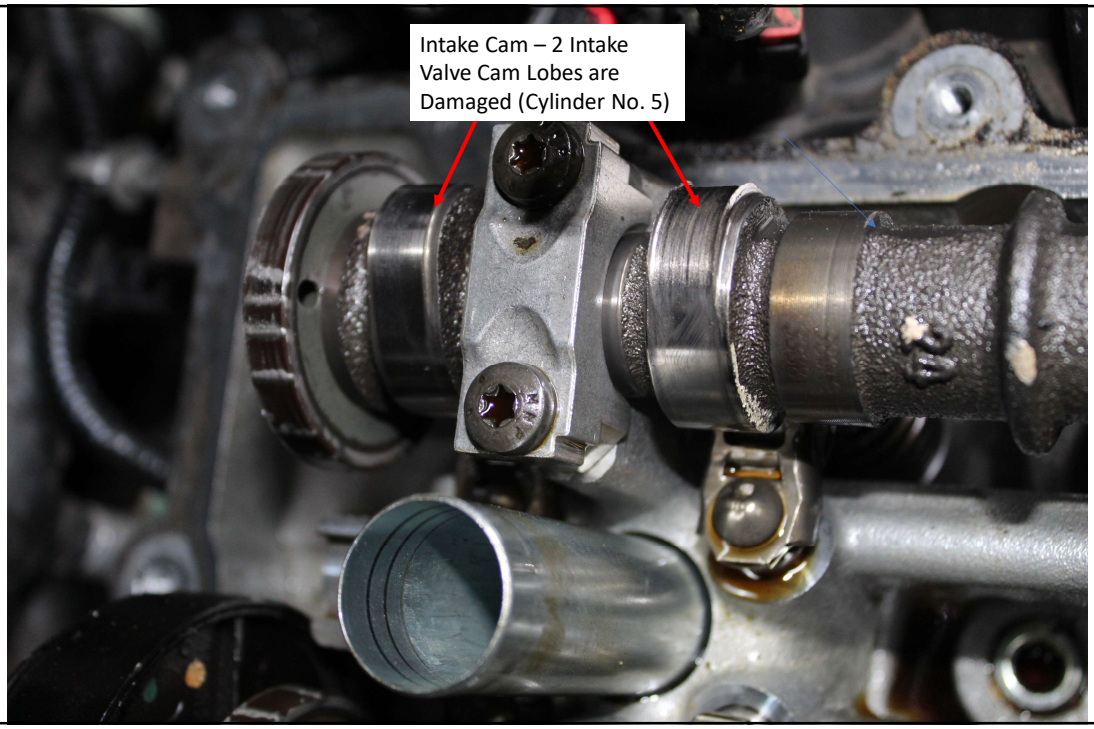

PicoScope 7 Automotive
Stopped
Timebase
1 s/div
Trigger
Waveform
Guided tests
Auto setup
Open
Save
Print
Vehicle details
Full
pico
A
-22.2 .. 200 psi
B
±400 V
C
Off
D
Off
More...
Rulers
Measurements
Views
Notes
Channel labels
Waveform library
Math channels
114.0 psi
100.8
87.57
74.36
61.15
47.95
34.74
21.53
8.326
-4.881
-18.07
273.3 V
225.7
178.2
130.6
83.1
35.55
-11.99
-59.54
-107.1
-154.6
-202.2
450.0 ms +3.0 s
500.0
550.0
600.0
650.0
Zoom
Type here to search
5:57 PM
2/4/2023

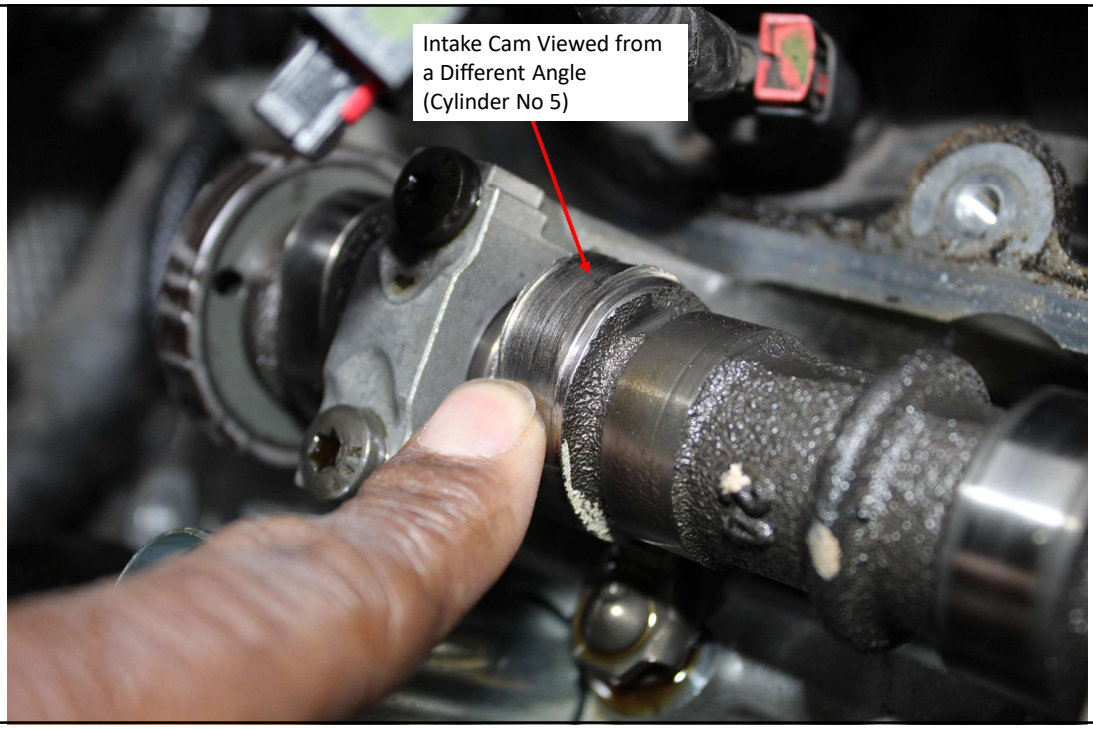

PicoScope 7 Automotive
Stopped
Timebase
1 s/div
Trigger
Waveform
Guided tests
Auto setup
Open
Save
Print
Vehicle details
Full
pico
A
-22.2 .. 200
psi
B
±400 V
C
Off
D
Off
More...
Rulers
Measurements
Views
Notes
Channel labels
Waveform library
Math channels
75.14
psi
66.09
57.04
48.0
38.95
29.9
20.86
11.81
2.765
-6.282
136.8
V
104.2
71.65
39.08
6.514
-26.05
-58.62
-91.19
-123.8
-156.3
-188.9
0 °
180
360
540
720
180
Zoom
950.0 ms +2.0 s
1000.0
1050.0
1100.0
1150.0
Type here to search
6:04 PM
2/4/2023

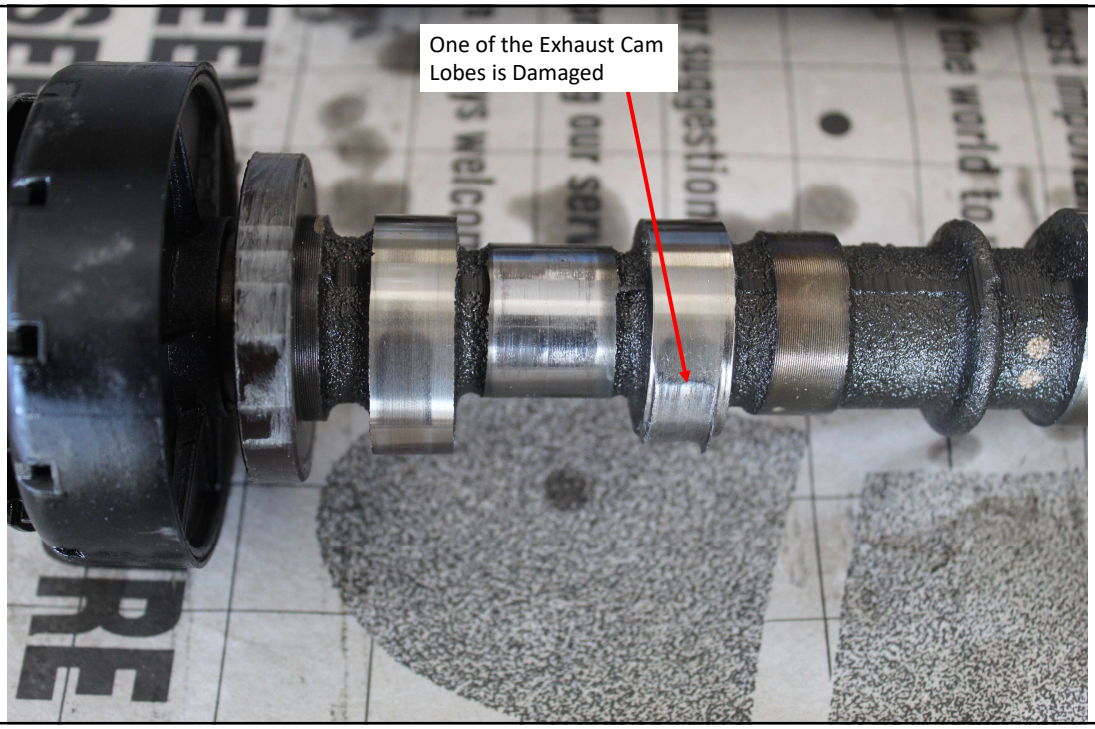

IVO : 2
IVC : 82
EVO: 59
EVC: 12
Overlap : 14
Int Duration : 264
Exh Duration : 251
pico
Off
Off
87.57
74.36
61.15
47.95
34.74
21.53
8.326
-4.881
IVO
IVC
EVO
EVC
450.0 ms
500.0
550.0
600.0
650.0
Type here to search
5:57 PM
2/4/2023

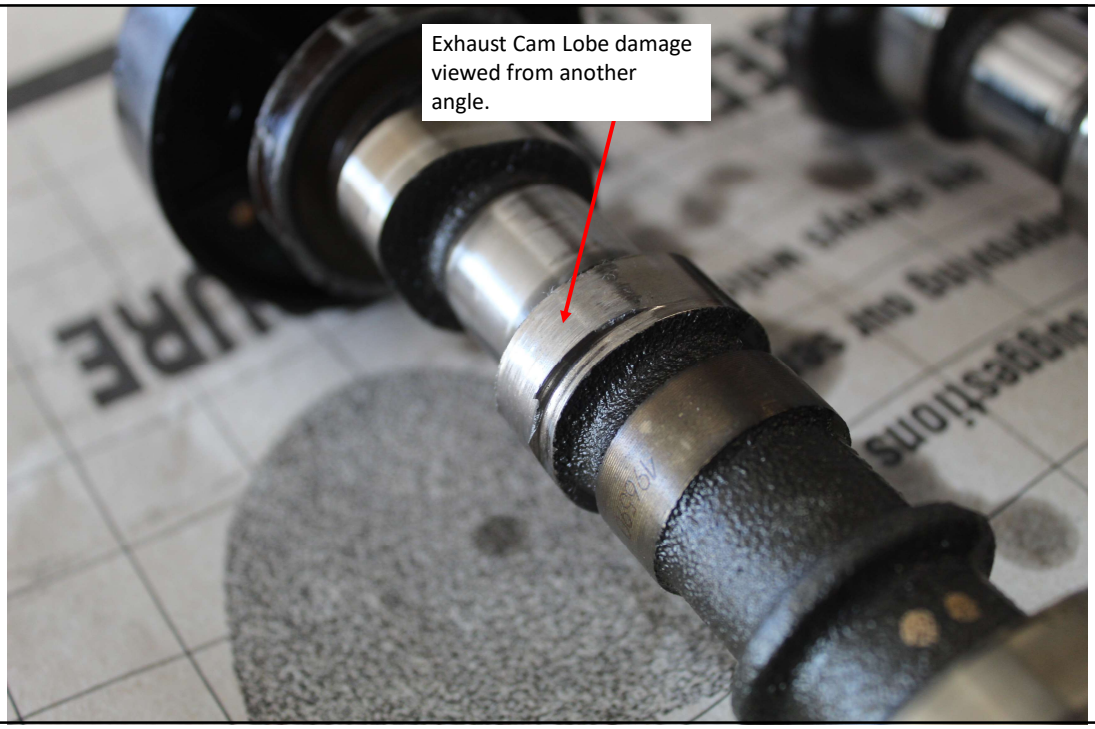

IVO : 2
IVC : 82
EVO: 59
EVC: 12
Overlap : 14
Int Duration : 264
Exh Duration : 251
IVO
IVC
EVO
EVC
pico

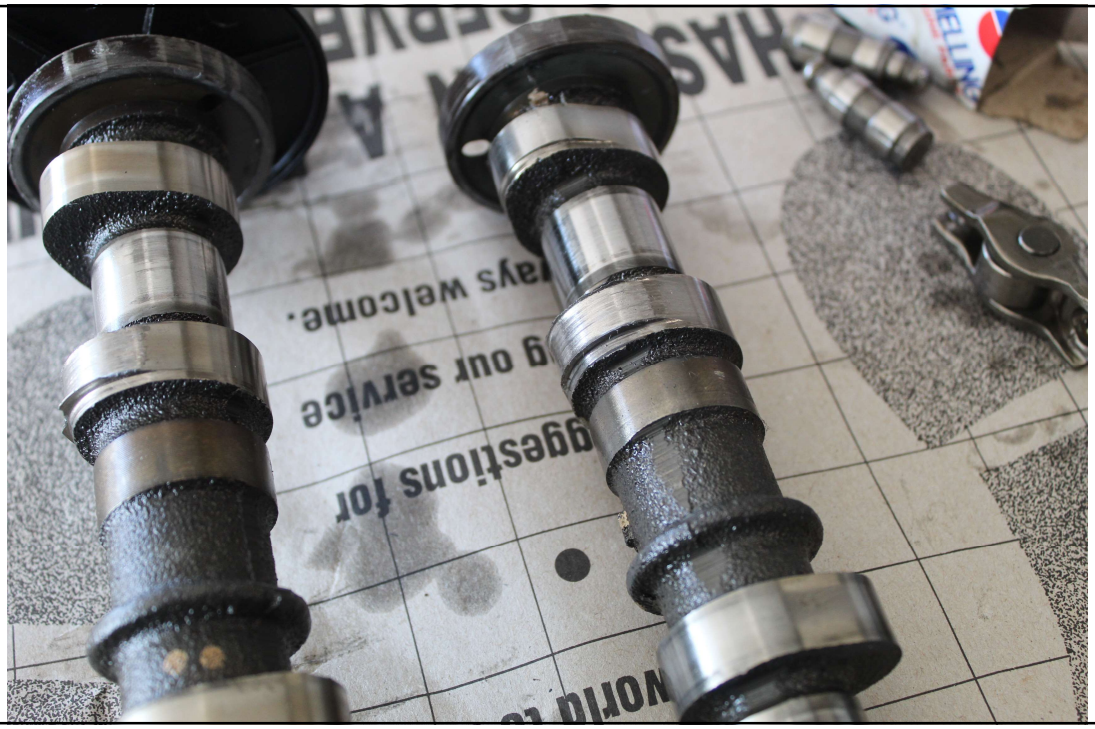

Intake Cam (Bank 1)
Exhaust Cam (Bank 1)


Intake Cam – 2 Intake Valve Cam Lobes are Damaged (Cylinder No. 5)


Intake Cam Viewed from a Different Angle (Cylinder No 5)


One of the Exhaust Cam Lobes is Damaged


Exhaust Cam Lobe damage viewed from another angle.



Conclusion

- The vehicle was repaired successfully and the misfire monitor has been reinstated.
- There are no misfire codes stored in the controllers memory (PCM) per a test drive.
- The vehicle appears to be working as designed.

Test Procedures

Case Study No 2

TST Seminars
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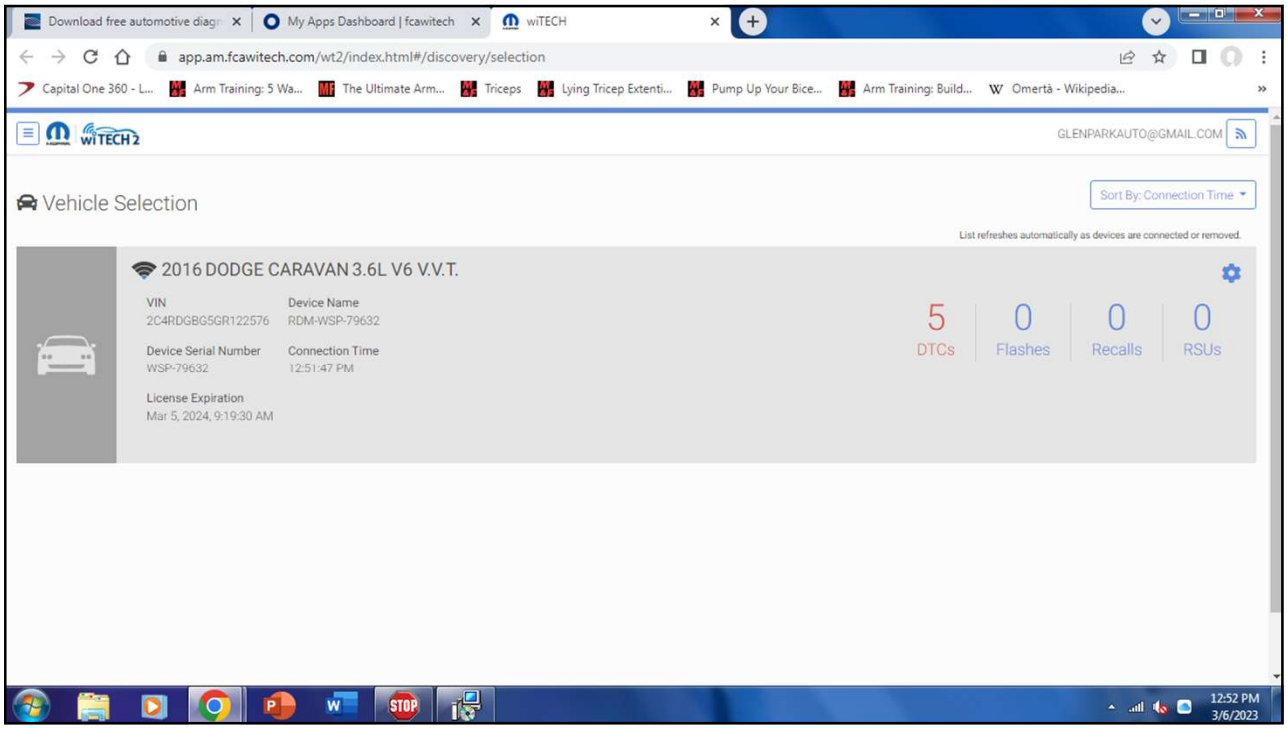
2016 Dodge Caravan

Appears to Run Extremely Quiet
(Not So Obvious)

Observations Noted

- The misfire monitor on this vehicle has recorded a 1 trip Failure
- There is a P0306 stored in the controllers memory(PCM).
- The vehicle appears to run quiet and it has been recorded that minor cylinder misfire activity has been noted.

Check VIN Information

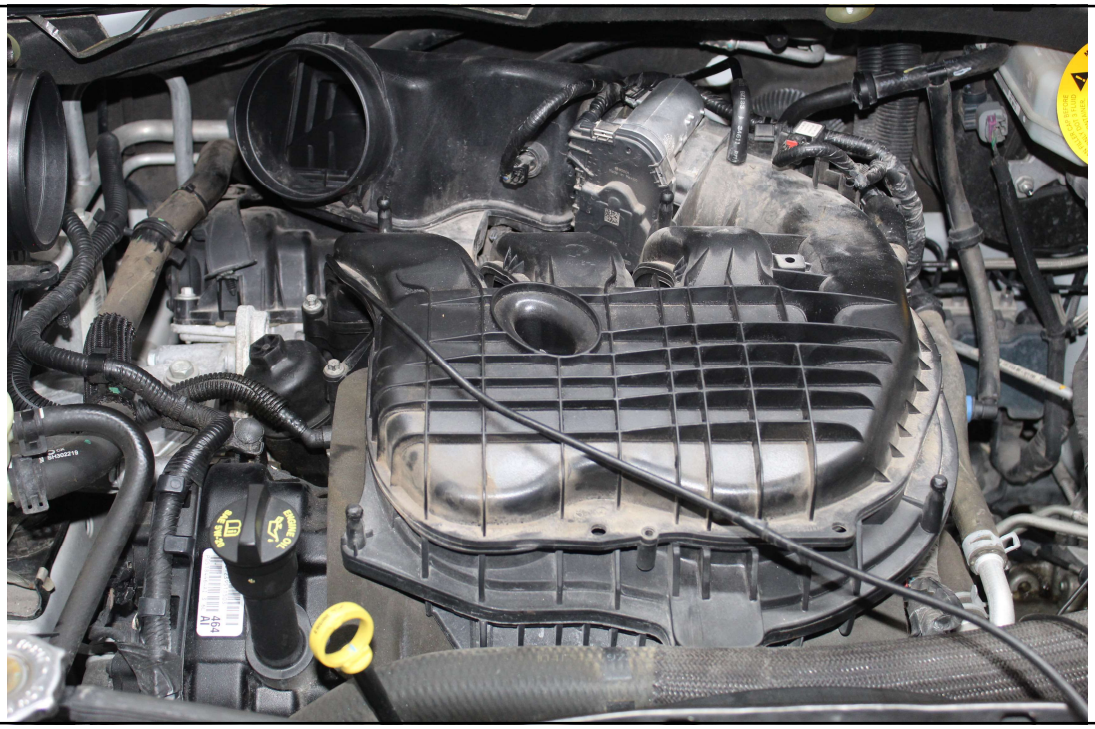


Verify Customers Concern

Perform Visual Checks

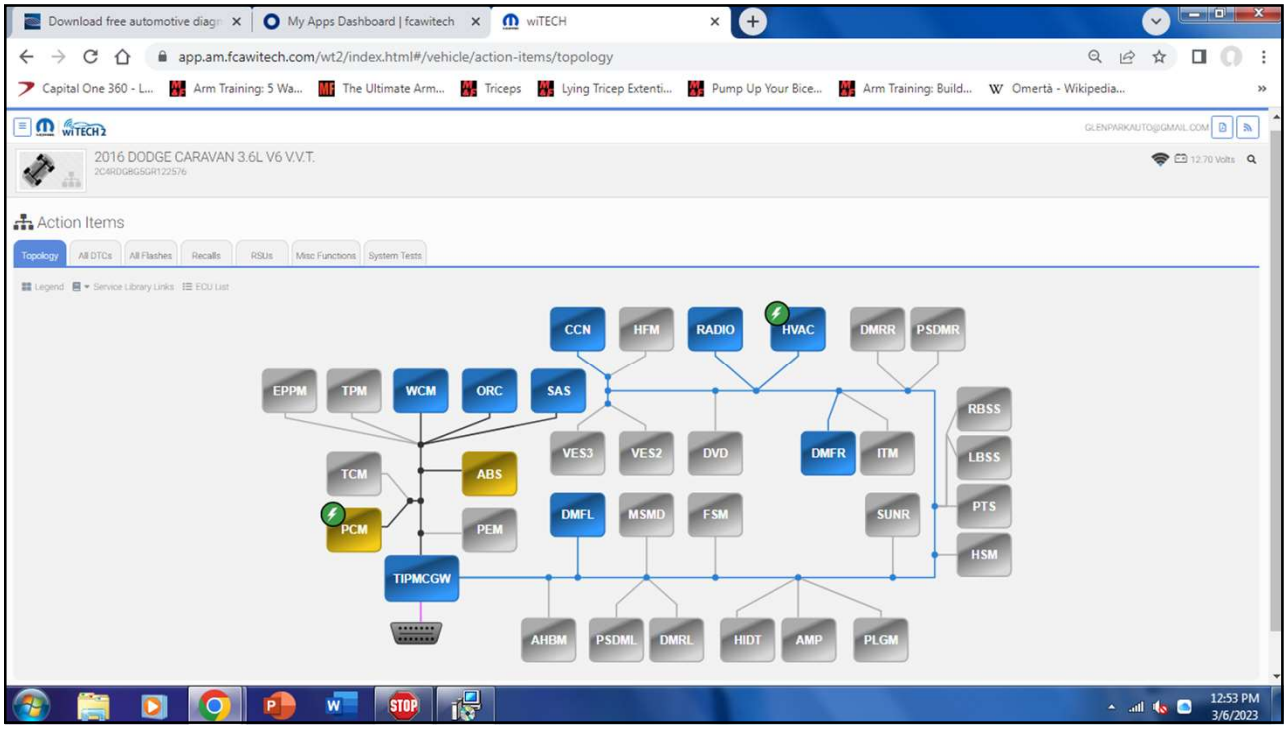

Die Hard

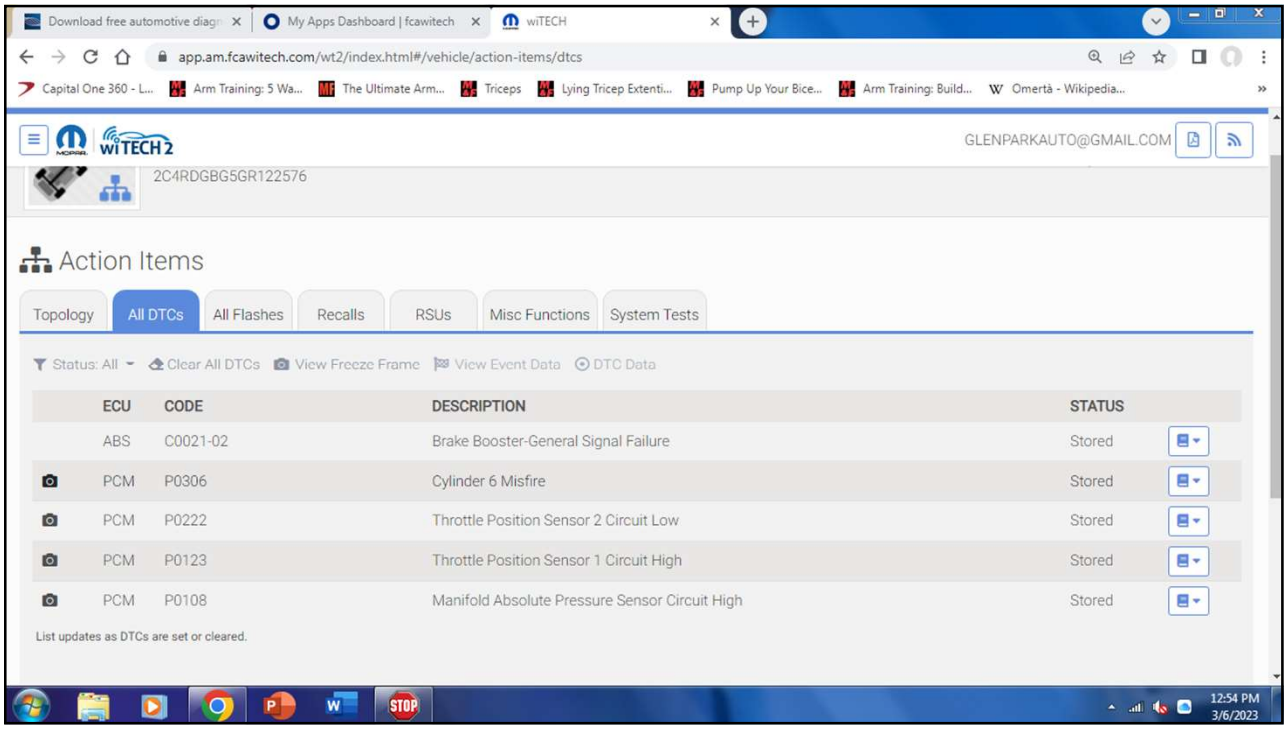

GRAND
CARAVAN

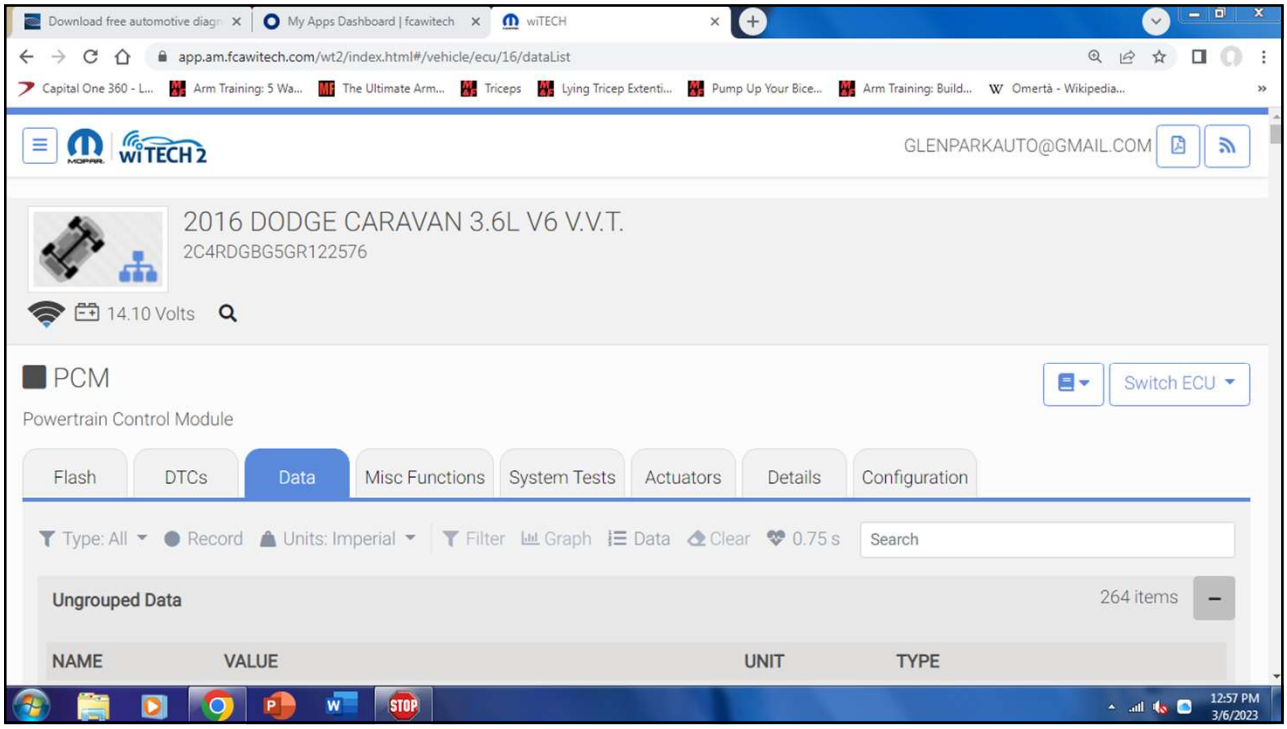



DieHard
POWER AHEAD
AGM
PLATINUM

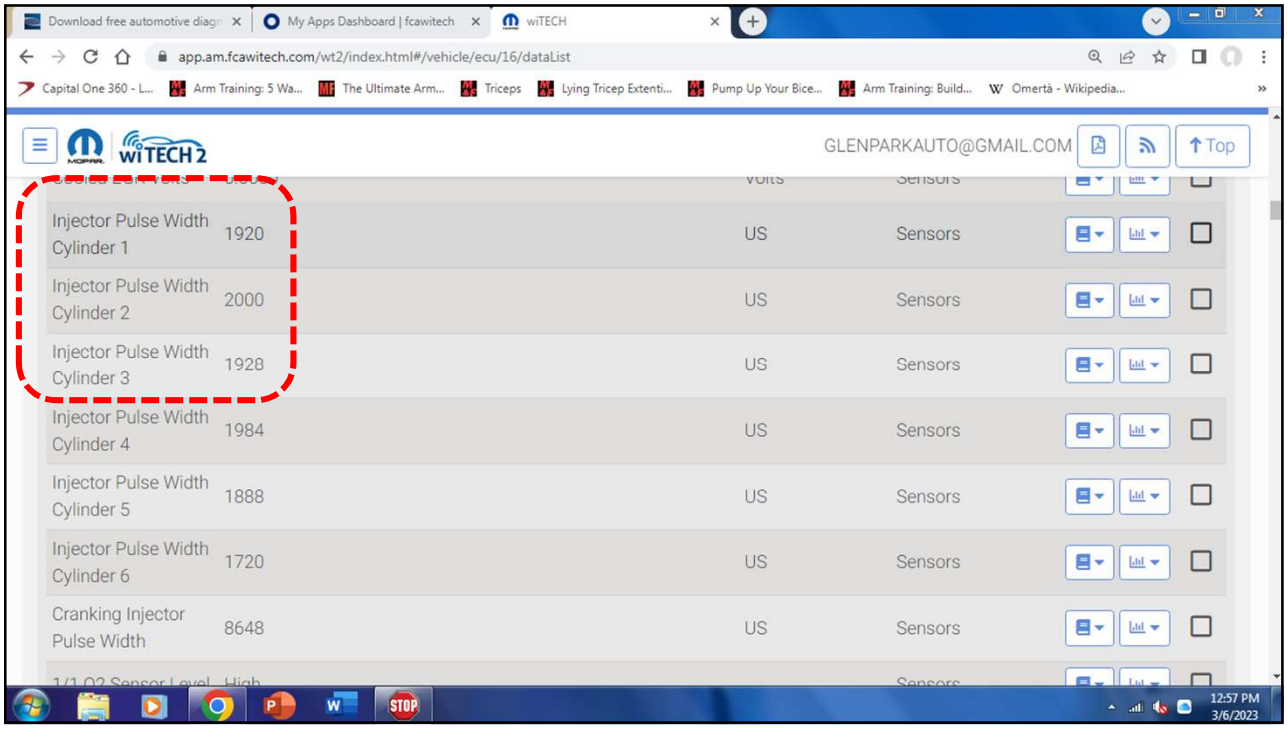
Check for Codes/TSB's

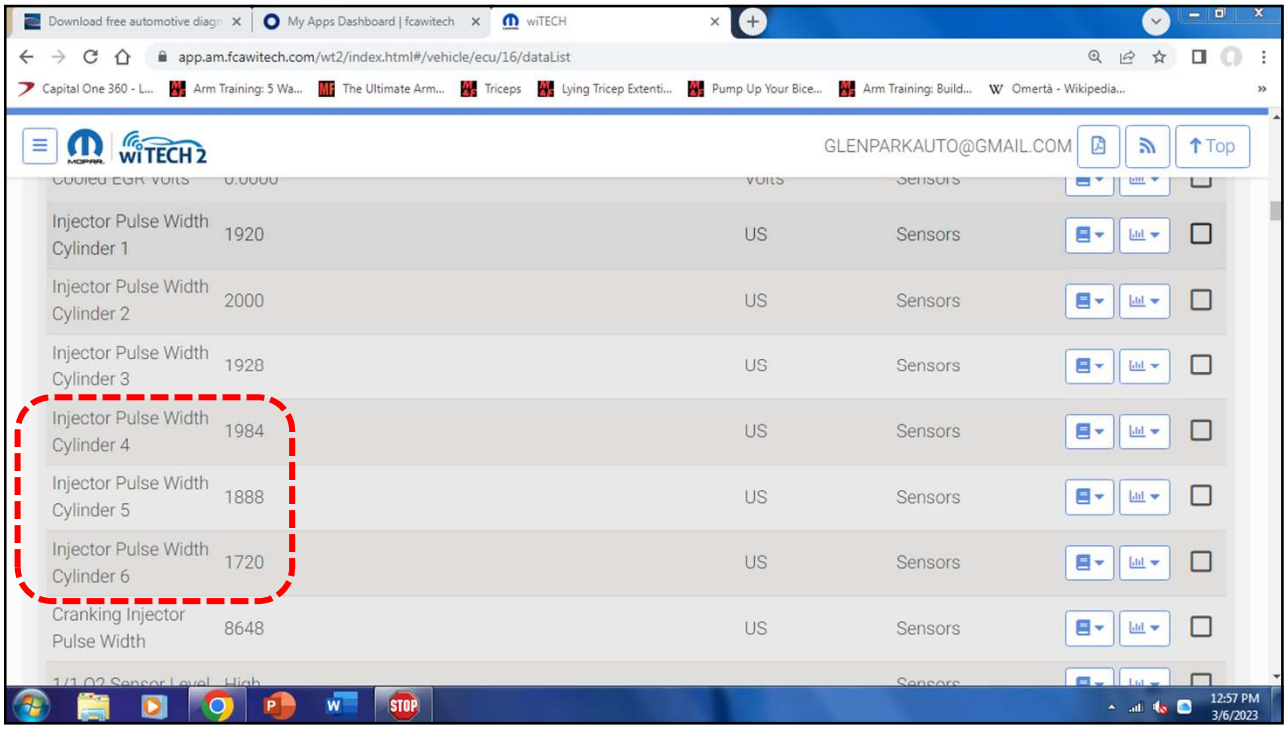


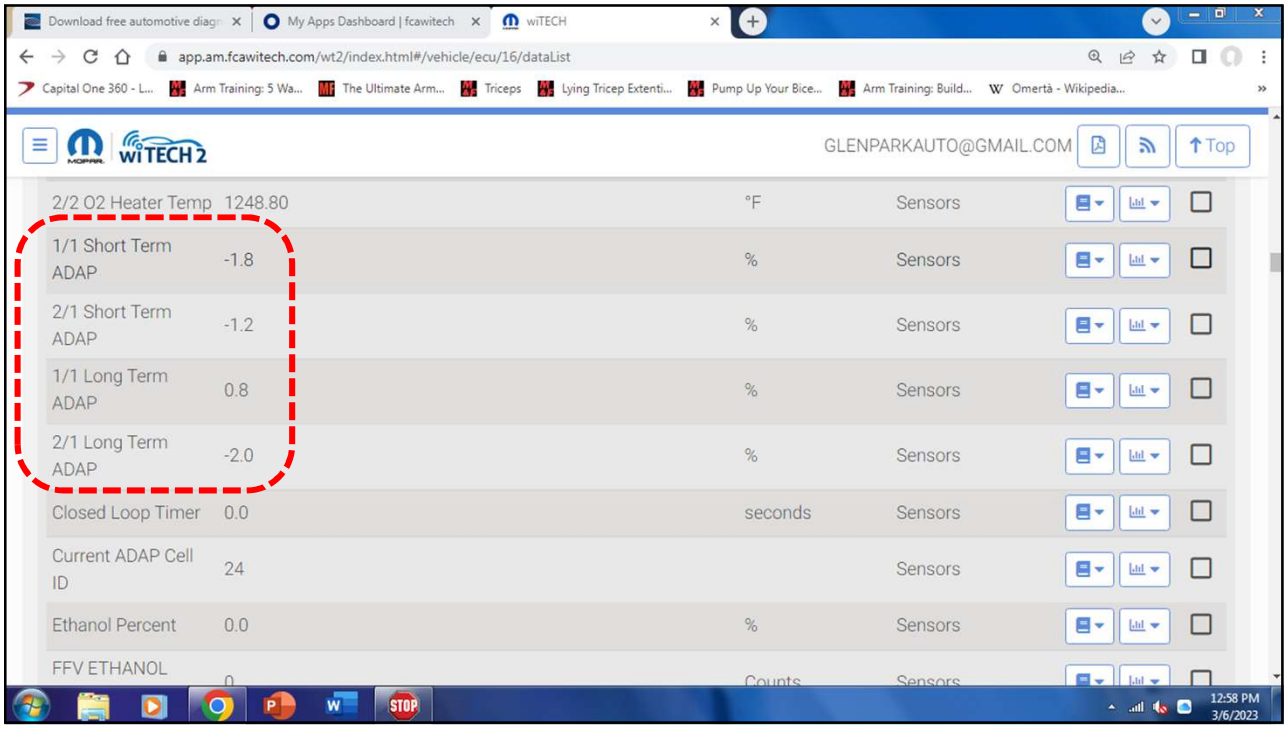

app.am.fcawitech.com/wt2/index.html#/vehicle/action-items/dtcs
GLENPARKAUTO@GMAIL.COM
2C4RDGBG5GR122576
Action Items
Topology
All DTCs
All Flashes
Recalls
RSUs
Misc Functions
System Tests
Status: All
Clear All DTCs
View Freeze Frame
View Event Data
DTC Data
ECU
CODE
DESCRIPTION
STATUS
ABS
C0021-02
Brake Booster-General Signal Failure
Stored
PCM
P0306
Cylinder 6 Misfire
Stored
PCM
P0222
Throttle Position Sensor 2 Circuit Low
Stored
PCM
P0123
Throttle Position Sensor 1 Circuit High
Stored
PCM
P0108
Manifold Absolute Pressure Sensor Circuit High
Stored
List updates as DTCs are set or cleared.
12:54 PM
3/6/2023

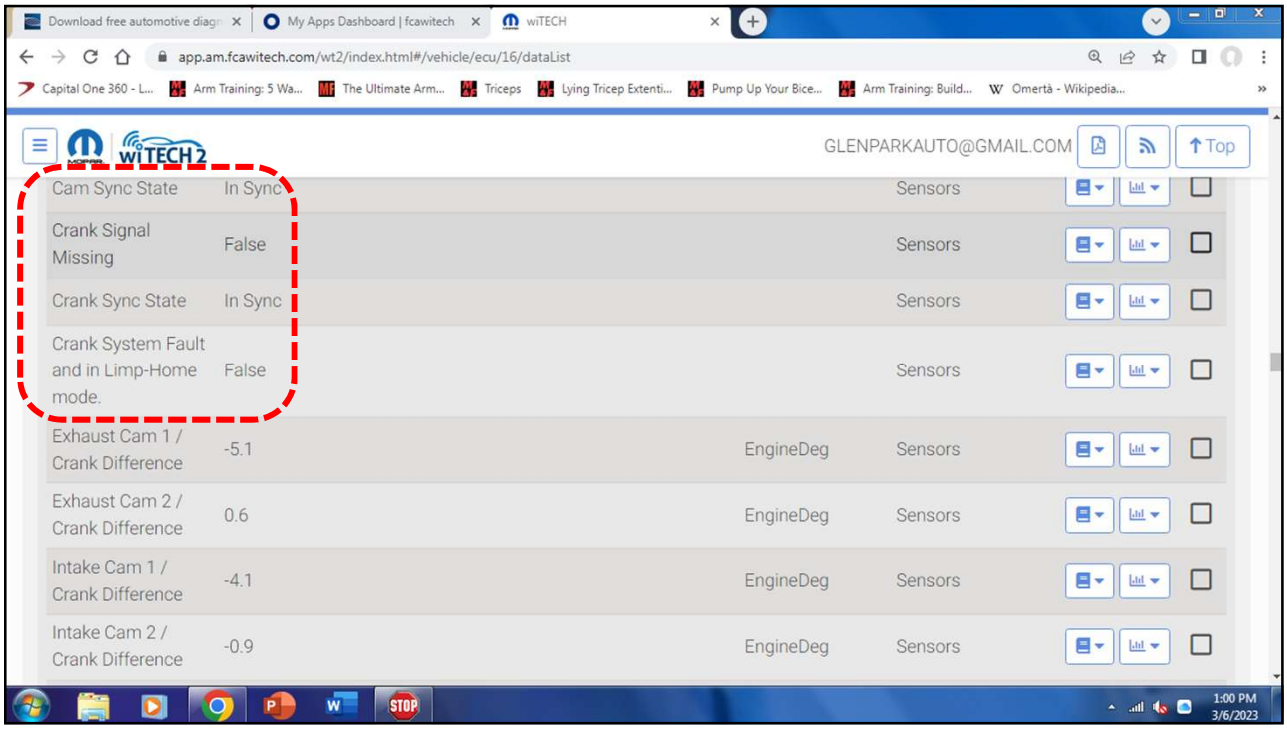

app.am.fcawitech.com/wt2/index.html#/vehicle/ecu/16/dataList
GLENPARKAUTO@GMAIL.COM
2016 DODGE CARAVAN 3.6L V6 V.V.T.
2C4RDGBG5GR122576
14.10 Volts
PCM
Powertrain Control Module
Switch ECU
Flash
DTCs
Data
Misc Functions
System Tests
Actuators
Details
Configuration
Type: All
Record
Units: Imperial
Filter
Graph
Data
Clear
0.75 s
Search
Ungrouped Data
264 items
NAME
VALUE
UNIT
TYPE
12:57 PM
3/6/2023

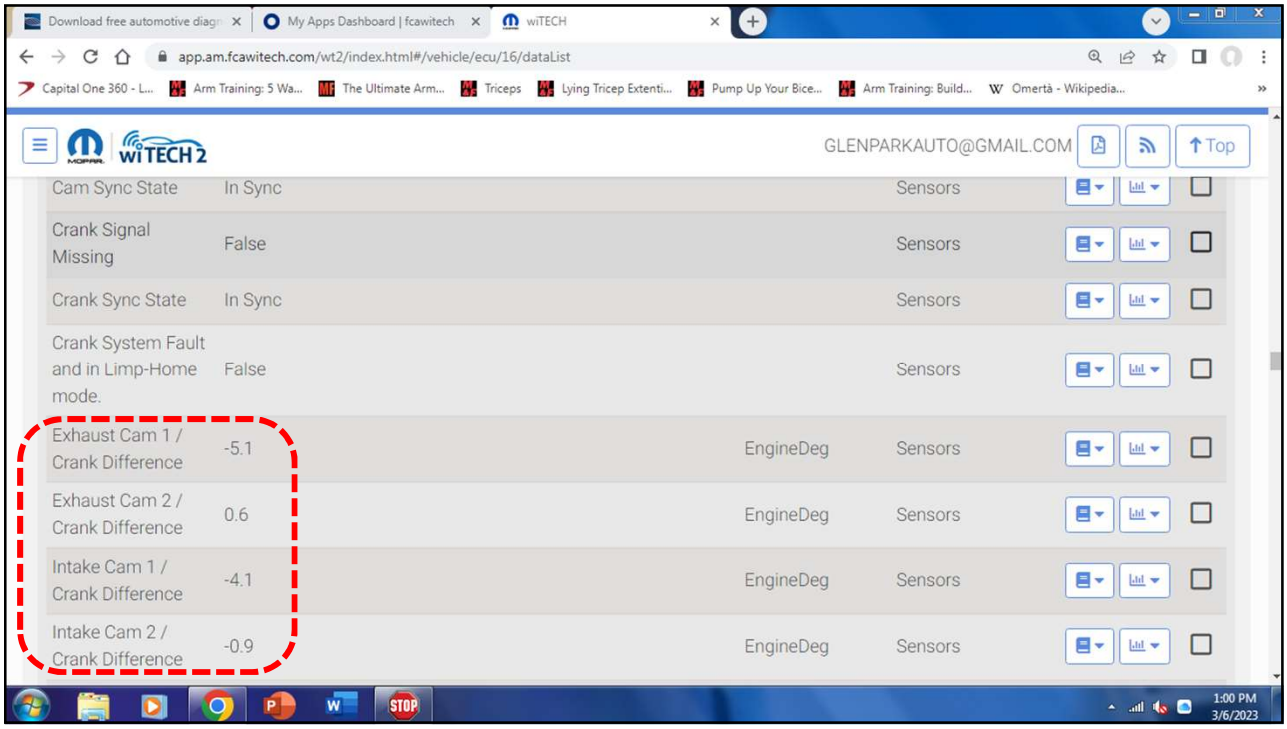
Review Scan Data

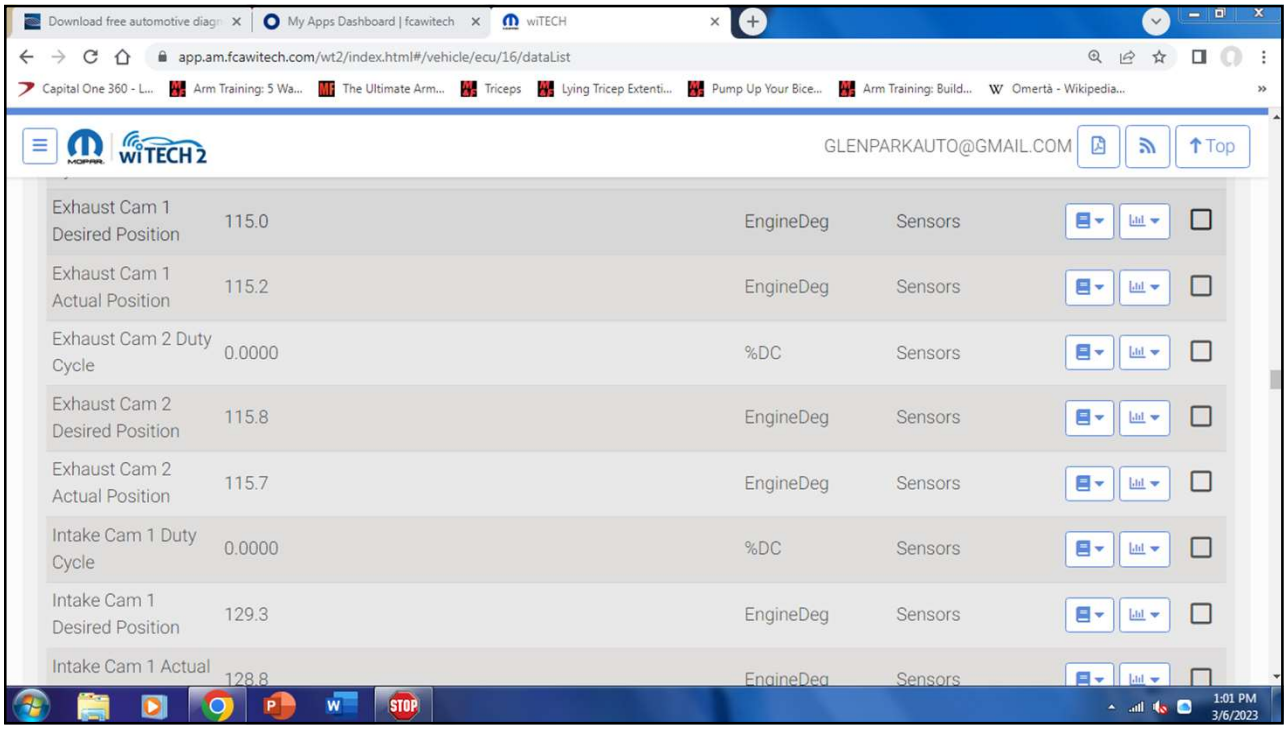


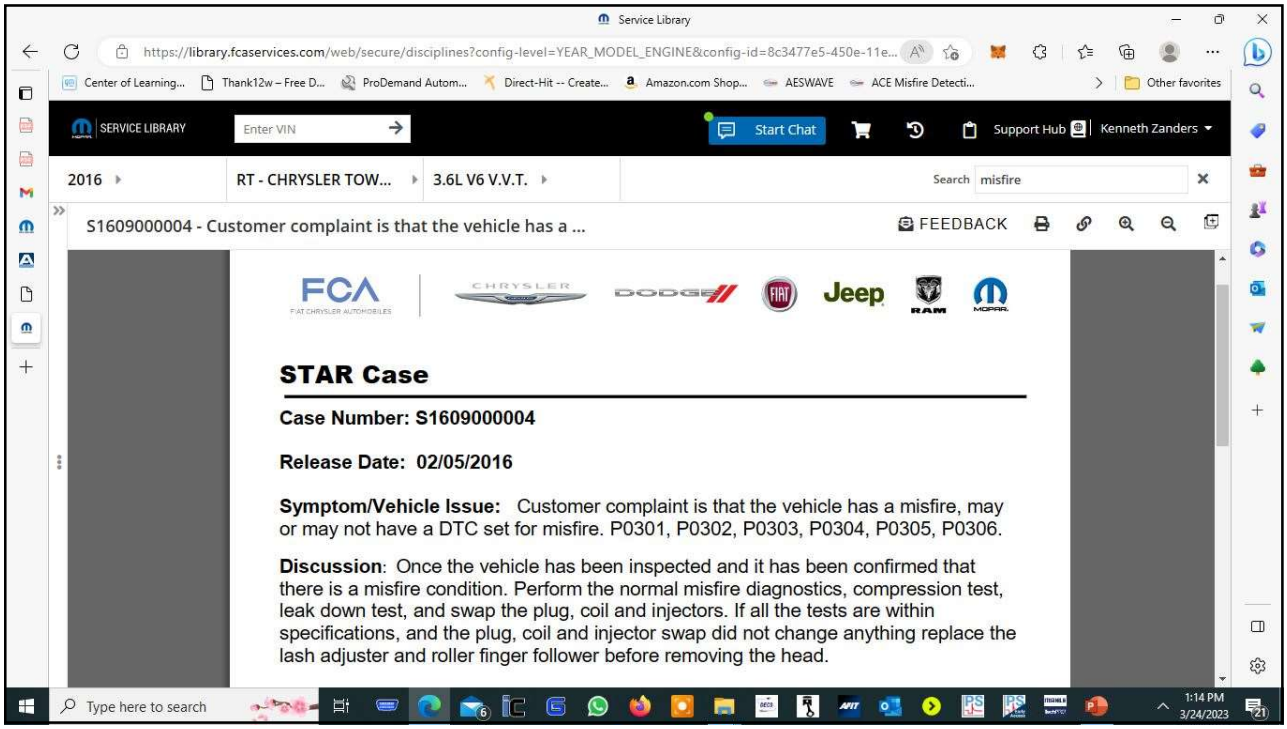

app.am.fcawitech.com/wt2/index.html#/vehicle/ecu/16/dataList
GLENPARKAUTO@GMAIL.COM
Top
Injector Pulse Width Cylinder 1 1920 US Sensors
Injector Pulse Width Cylinder 2 2000 US Sensors
Injector Pulse Width Cylinder 3 1928 US Sensors
Injector Pulse Width Cylinder 4 1984 US Sensors
Injector Pulse Width Cylinder 5 1888 US Sensors
Injector Pulse Width Cylinder 6 1720 US Sensors
Cranking Injector Pulse Width 8648 US Sensors
12:57 PM
3/6/2023


app.am.fcawitech.com/wt2/index.html#/vehicle/ecu/16/dataList
GLENPARKAUTO@GMAIL.COM
Top
2/2 O2 Heater Temp 1248.80 °F Sensors
1/1 Short Term ADAP -1.8 % Sensors
2/1 Short Term ADAP -1.2 % Sensors
1/1 Long Term ADAP 0.8 % Sensors
2/1 Long Term ADAP -2.0 % Sensors
Closed Loop Timer 0.0 seconds Sensors
Current ADAP Cell ID 24 Sensors
Ethanol Percent 0.0 % Sensors
12:58 PM
3/6/2023


app.am.fcawitech.com/wt2/index.html#/vehicle/ecu/16/dataList
GLENPARKAUTO@GMAIL.COM
Top
Cam Sync State In Sync Sensors
Crank Signal Missing False Sensors
Crank Sync State In Sync Sensors
Crank System Fault and in Limp-Home mode. False Sensors
Exhaust Cam 1 / Crank Difference -5.1 EngineDeg Sensors
Exhaust Cam 2 / Crank Difference 0.6 EngineDeg Sensors
Intake Cam 1 / Crank Difference -4.1 EngineDeg Sensors
Intake Cam 2 / Crank Difference -0.9 EngineDeg Sensors
1:00 PM
3/6/2023


app.am.fcawitech.com/wt2/index.html#/vehicle/ecu/16/dataList
GLENPARKAUTO@GMAIL.COM
Top
Cam Sync State In Sync Sensors
Crank Signal Missing False Sensors
Crank Sync State In Sync Sensors
Crank System Fault and in Limp-Home mode. False Sensors
Exhaust Cam 1 / Crank Difference -5.1 EngineDeg Sensors
Exhaust Cam 2 / Crank Difference 0.6 EngineDeg Sensors
Intake Cam 1 / Crank Difference -4.1 EngineDeg Sensors
Intake Cam 2 / Crank Difference -0.9 EngineDeg Sensors
1:00 PM
3/6/2023


app.am.fcawitech.com/wt2/index.html#/vehicle/ecu/16/dataList
GLENPARKAUTO@GMAIL.COM
Top
Exhaust Cam 1 Desired Position 115.0 EngineDeg Sensors
Exhaust Cam 1 Actual Position 115.2 EngineDeg Sensors
Exhaust Cam 2 Duty Cycle 0.0000 %DC Sensors
Exhaust Cam 2 Desired Position 115.8 EngineDeg Sensors
Exhaust Cam 2 Actual Position 115.7 EngineDeg Sensors
Intake Cam 1 Duty Cycle 0.0000 %DC Sensors
Intake Cam 1 Desired Position 129.3 EngineDeg Sensors
Intake Cam 1 Actual 128.8 EngineDeg Sensors
1:01 PM
3/6/2023


Service Library
https://library.fcaservices.com/web/secure/disciplines?config-level=YEAR_MODEL_ENGINE&config-id=8c3477e5-450e-11e...
SERVICE LIBRARY
Enter VIN
Start Chat
Support Hub
Kenneth Zanders
2016
RT - CHRYSLER TOW...
3.6L V6 V.V.T.
Search misfire
S1609000004 - Customer complaint is that the vehicle has a ...
FEEDBACK
STAR Case
Case Number: S1609000004
Release Date: 02/05/2016
Symptom/Vehicle Issue: Customer complaint is that the vehicle has a misfire, may or may not have a DTC set for misfire. P0301, P0302, P0303, P0304, P0305, P0306.
Discussion: Once the vehicle has been inspected and it has been confirmed that there is a misfire condition. Perform the normal misfire diagnostics, compression test, leak down test, and swap the plug, coil and injectors. If all the tests are within specifications, and the plug, coil and injector swap did not change anything replace the lash adjuster and roller finger follower before removing the head.
Type here to search
1:14 PM
3/24/2023

Diagnostic Process

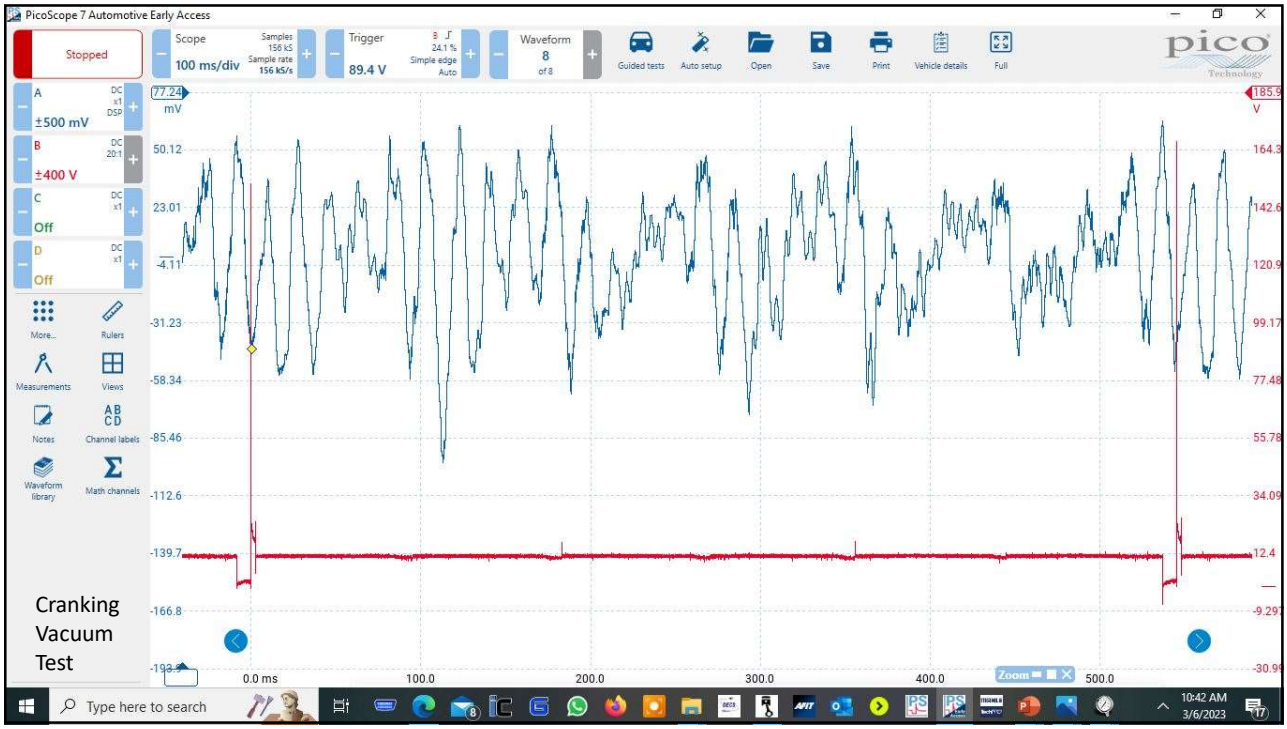
- The STAR Case supports the replacement of the lash adjuster and roller finger follower.
- This vehicle is under a used car warranty, the shop has suggested an Engine Replacement.
- I have advised the shop that a mechanical analysis should be performed.

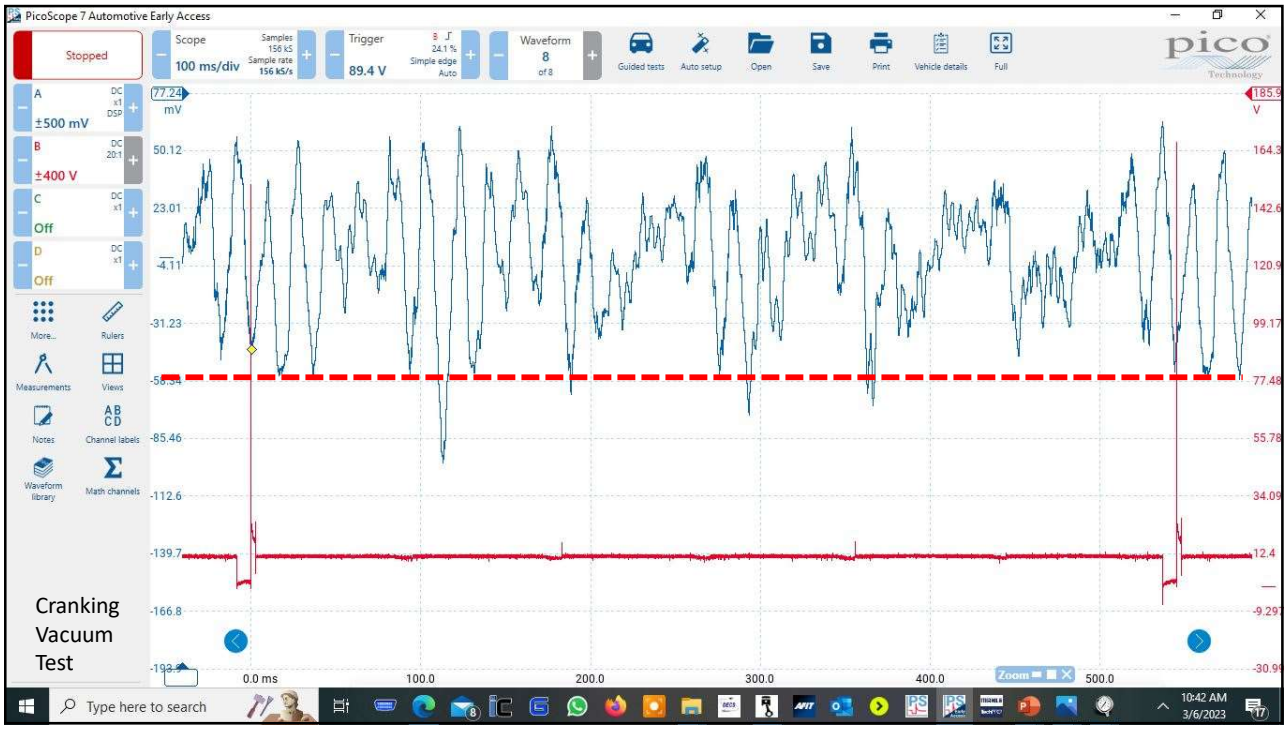
Tests Performed

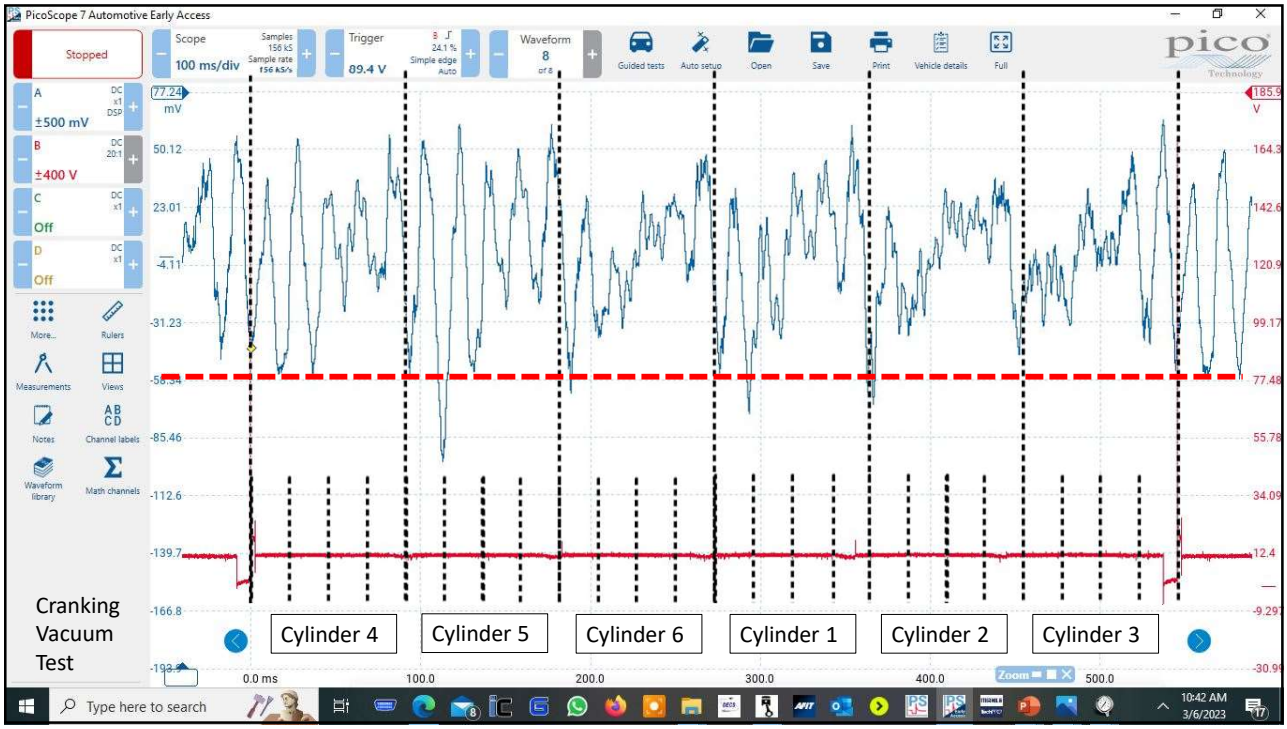
- **Cranking Vacuum Test**
- **Running Vacuum Test**
- **Relative Compression Test**
- **Running Exhaust Waveform Test**

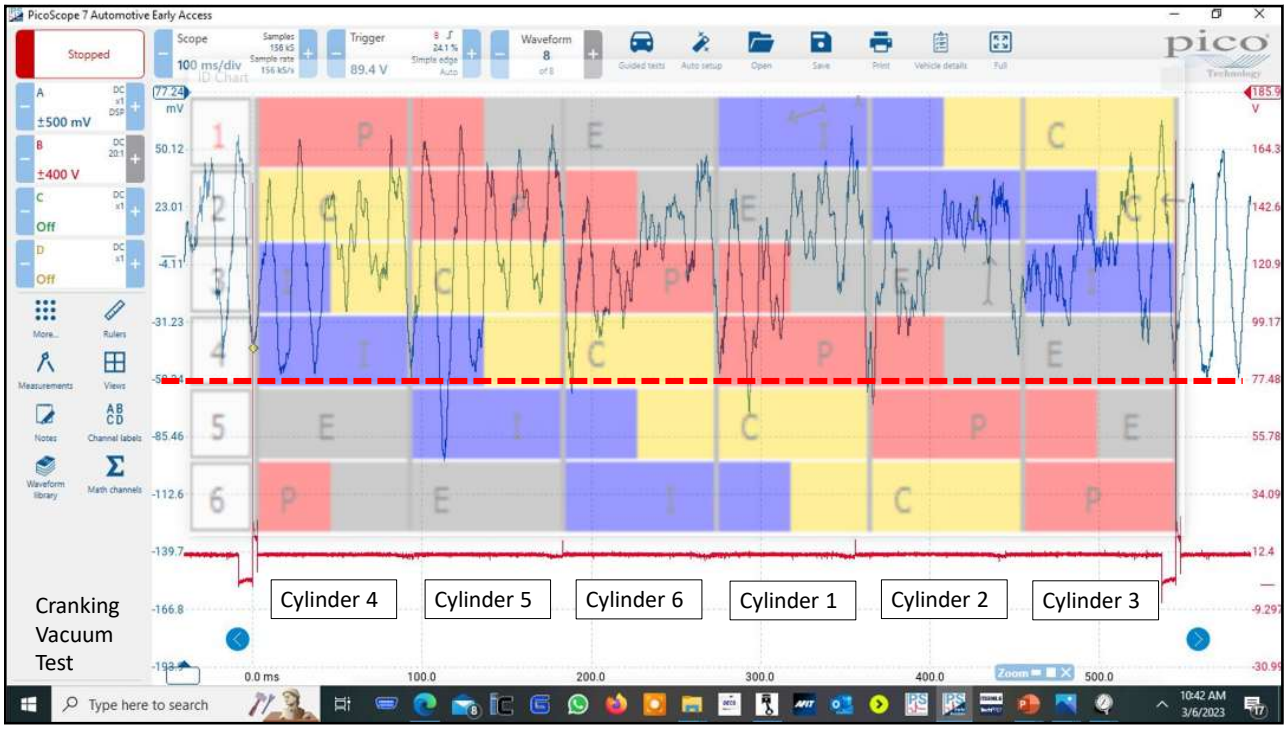
Cranking Vacuum Waveforms

Intake Stroke




PicoScope 7 Automotive Early Access
Stopped
Scope
100 ms/div
Trigger
89.4 V
Waveform
8
pico
A
±500 mV
B
±400 V
C
Off
D
Off
77.24
mV
50.12
23.01
-4.11
-31.23
-58.34
-85.46
-112.6
-139.7
-166.8
185.9
V
164.3
142.6
120.9
99.17
77.48
55.78
34.09
12.4
-9.297
-30.99
0.0 ms
100.0
200.0
300.0
400.0
500.0
Cranking
Vacuum
Test
Type here to search
10:42 AM
3/6/2023


PicoScope 7 Automotive Early Access
Stopped
Scope
100 ms/div
Trigger
89.4 V
Waveform
8
pico
A
±500 mV
B
±400 V
C
Off
D
Off
77.24
mV
50.12
23.01
-4.11
-31.23
-58.34
-85.46
-112.6
-139.7
-166.8
185.9
V
164.3
142.6
120.9
99.17
77.48
55.78
34.09
12.4
-9.297
-30.99
0.0 ms
100.0
200.0
300.0
400.0
500.0
Cranking
Vacuum
Test
Cylinder 4
Cylinder 5
Cylinder 6
Cylinder 1
Cylinder 2
Cylinder 3
Type here to search
10:42 AM
3/6/2023



Running Vacuum Waveforms

Intake Stroke

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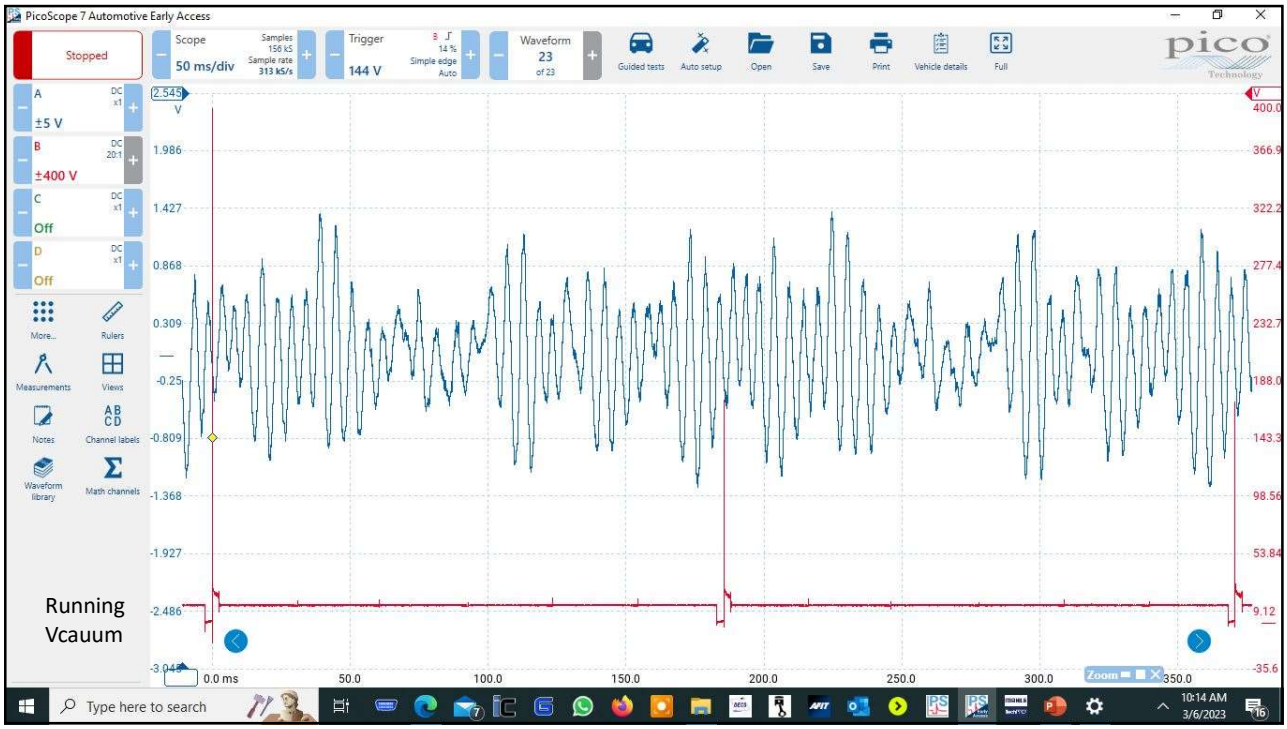
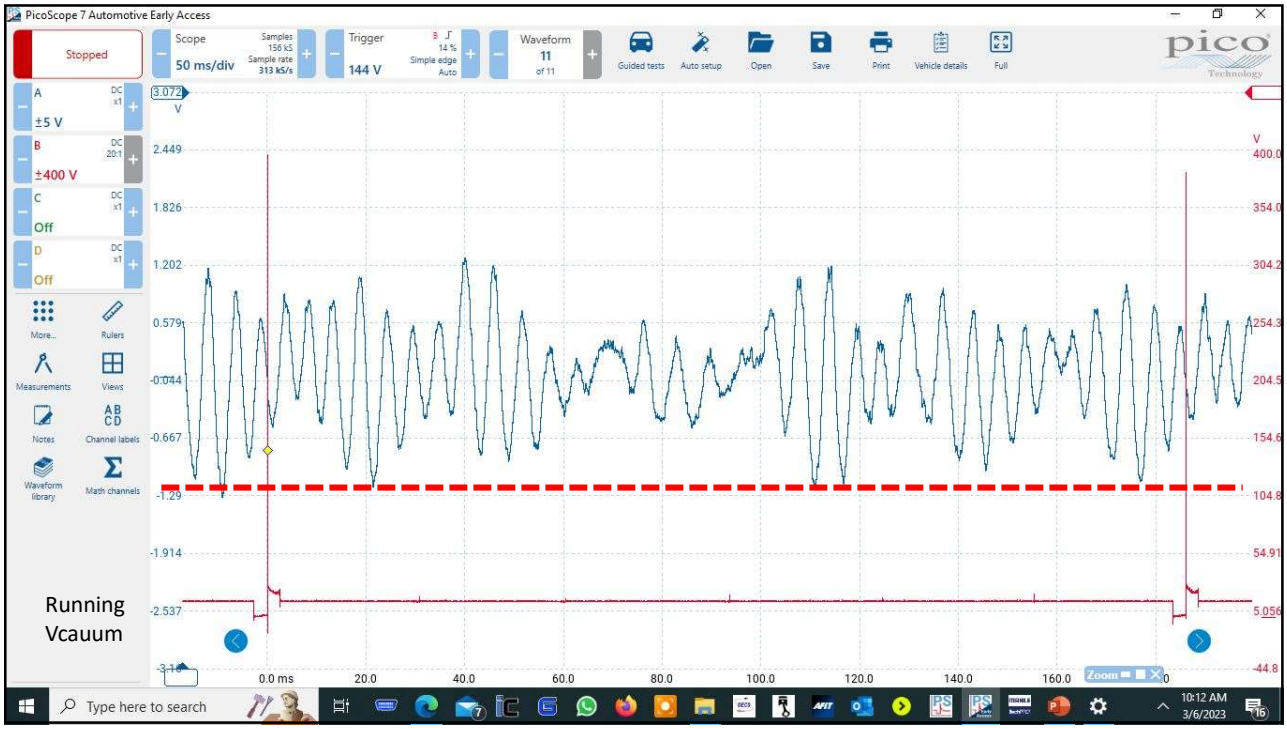
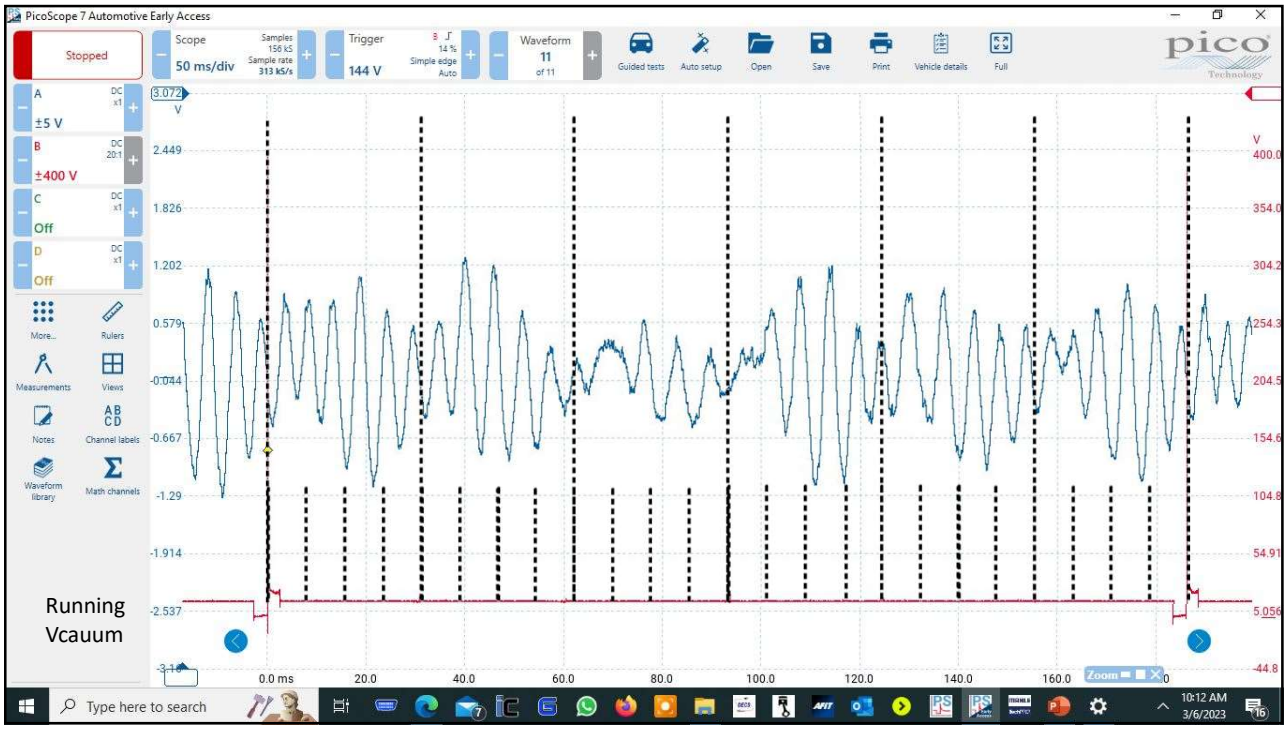
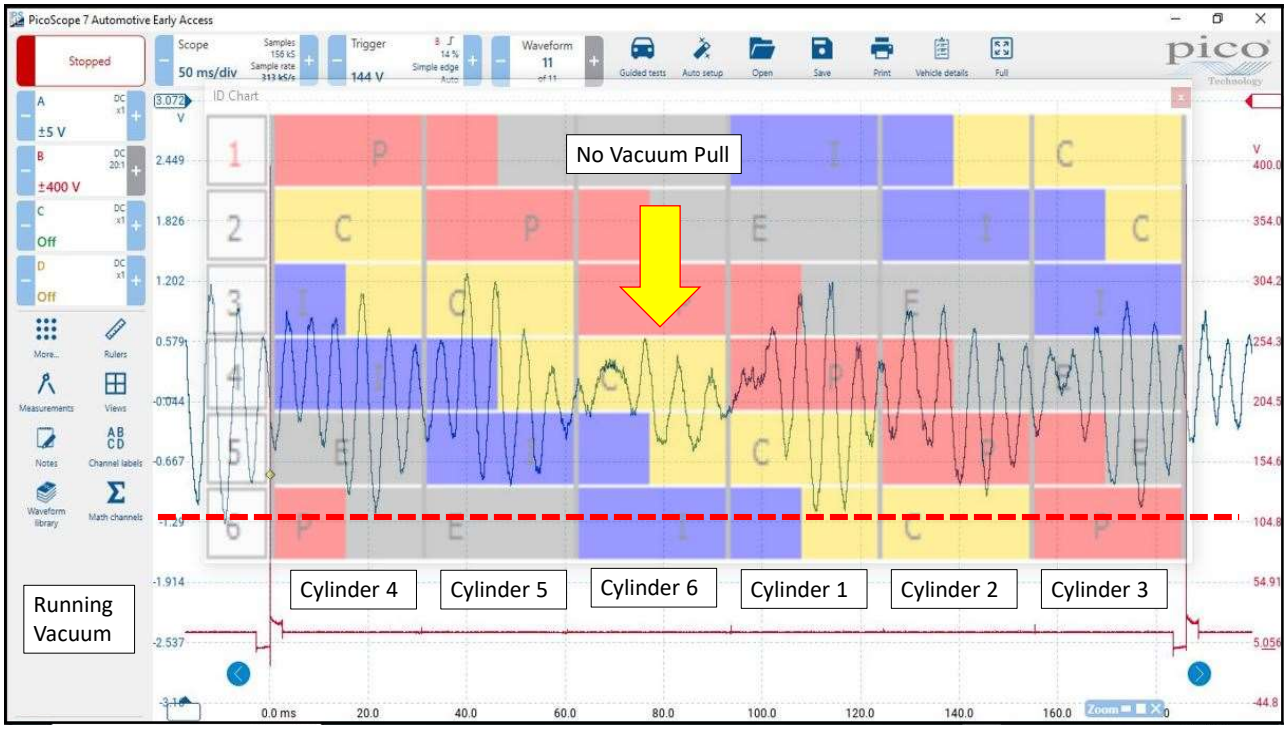

PicoScope 7 Automotive Early Access
Stopped
Scope
50 ms/div
Trigger
144 V
Waveform
23
of 23
A
±5 V
B
±400 V
C
Off
D
Off
2.545
1.986
1.427
0.868
0.309
-0.25
-0.809
-1.368
-1.927
-2.486
-3.045
0.0 ms
50.0
100.0
150.0
200.0
250.0
300.0
350.0
Running
Vcauum
Type here to search
10:14 AM
3/6/2023


PicoScope 7 Automotive Early Access
Stopped
Scope
50 ms/div
Trigger
144 V
Waveform
11
of 11
A
±5 V
B
±400 V
C
Off
D
Off
3.072
2.449
1.826
1.202
0.579
-0.044
-0.667
-1.29
-1.914
-2.537
-3.16
0.0 ms
20.0
40.0
60.0
80.0
100.0
120.0
140.0
160.0
Running
Vcauum
Type here to search
10:12 AM
3/6/2023


PicoScope 7 Automotive Early Access
Stopped
Scope
50 ms/div
Trigger
144 V
Waveform
11
of 11
pico
Running
Vcauum


PicoScope 7 Automotive Early Access
Stopped
Scope
50 ms/div
Trigger
144 V
Waveform
11
of 11
pico
ID Chart
No Vacuum Pull
Cylinder 4
Cylinder 5
Cylinder 6
Cylinder 1
Cylinder 2
Cylinder 3
Running
Vacuum

Relative Compression Test

Compression Stroke

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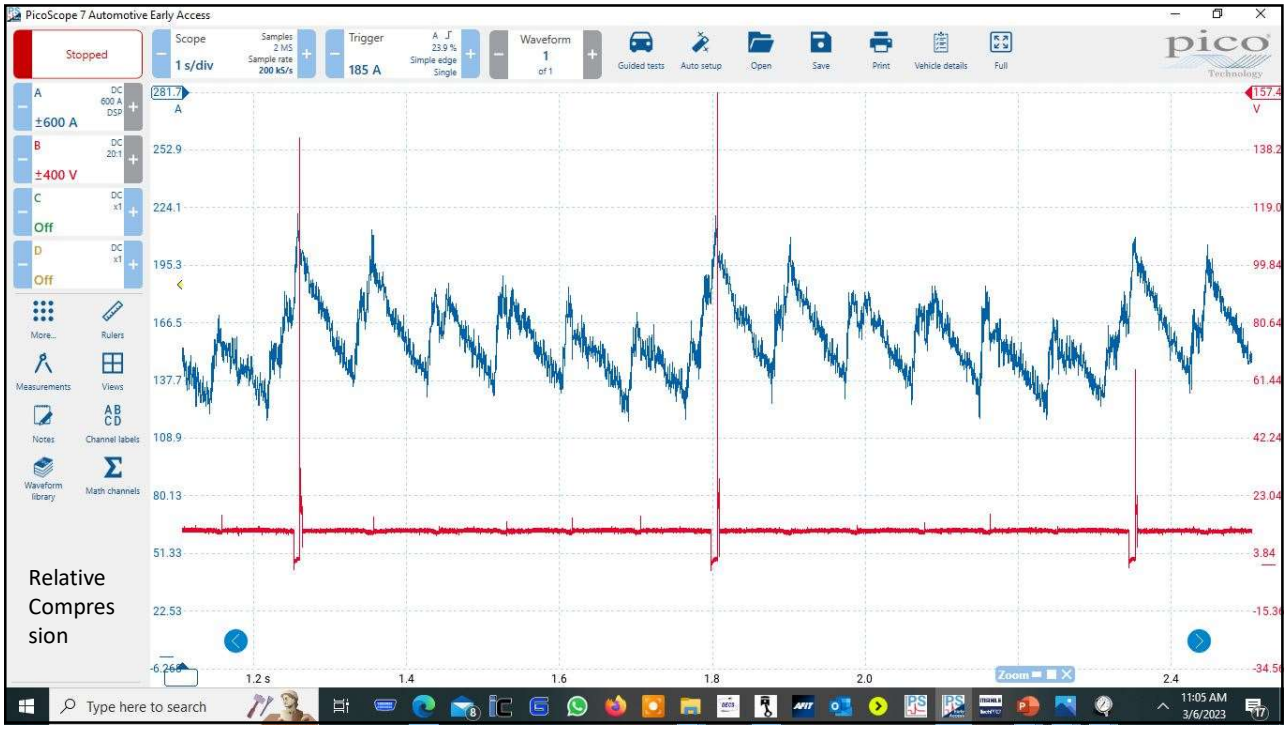
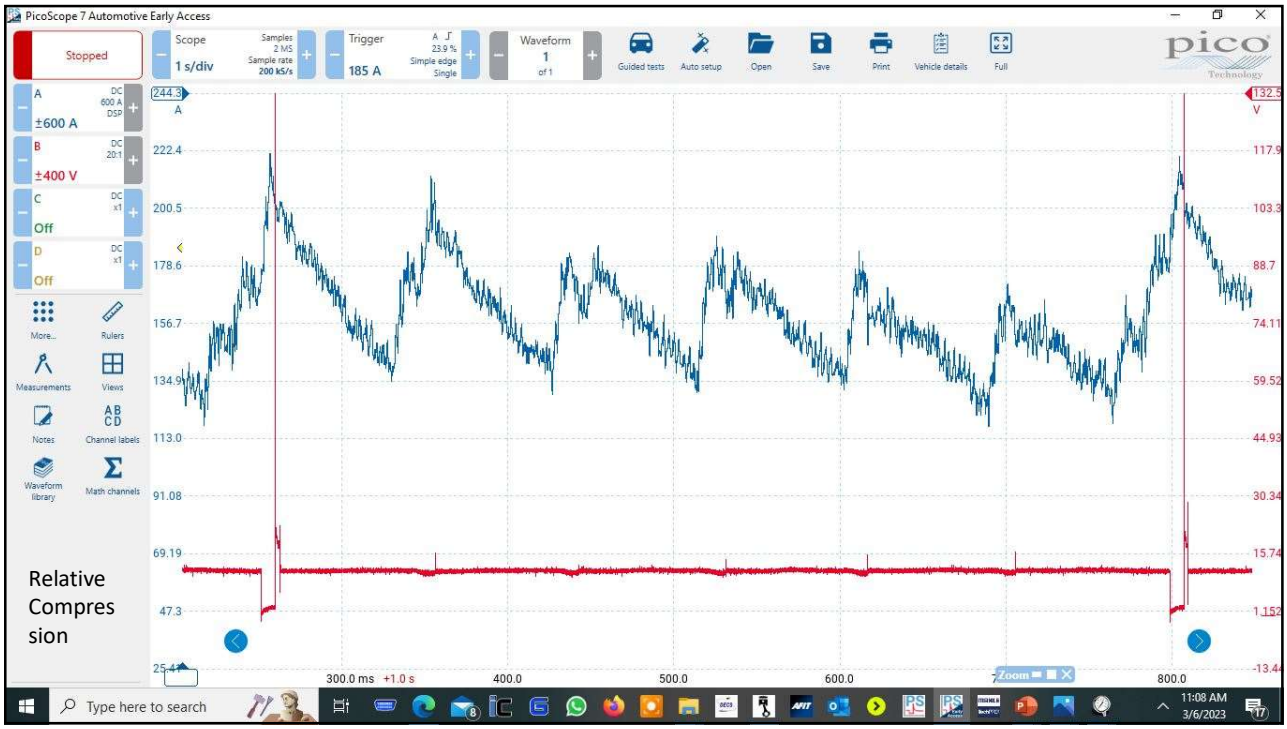
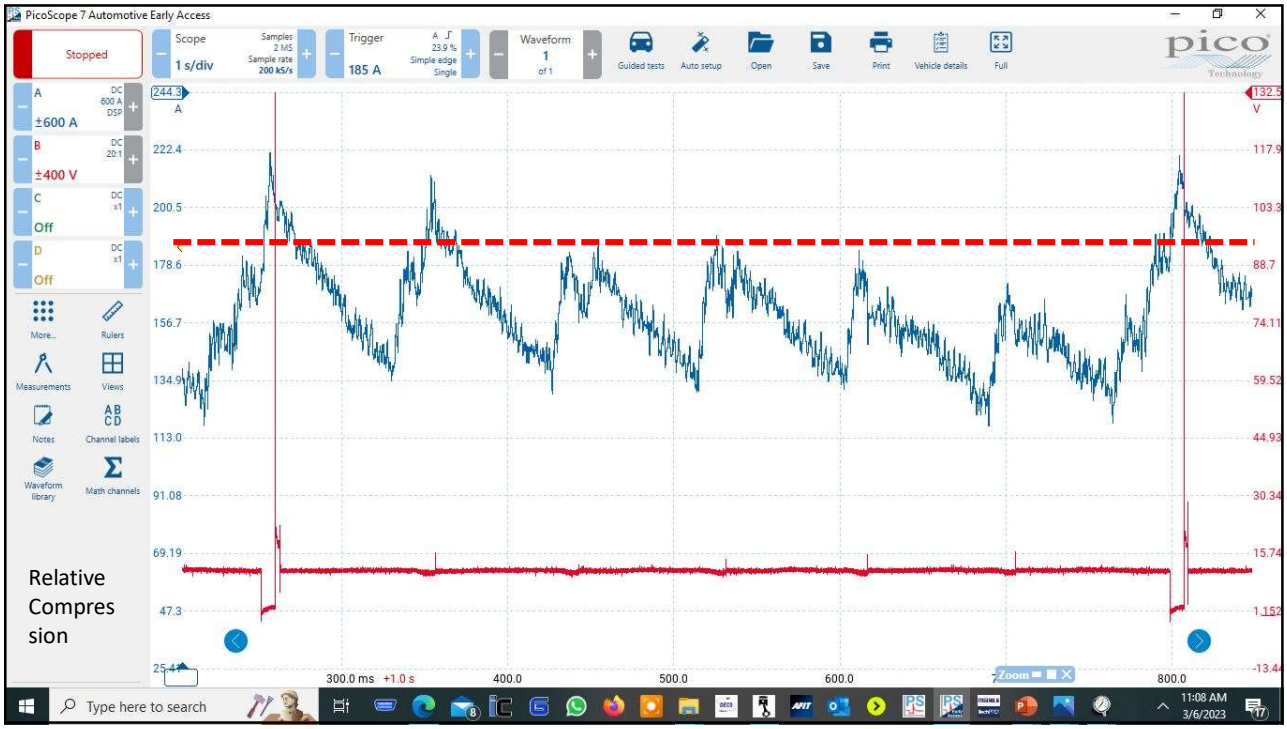
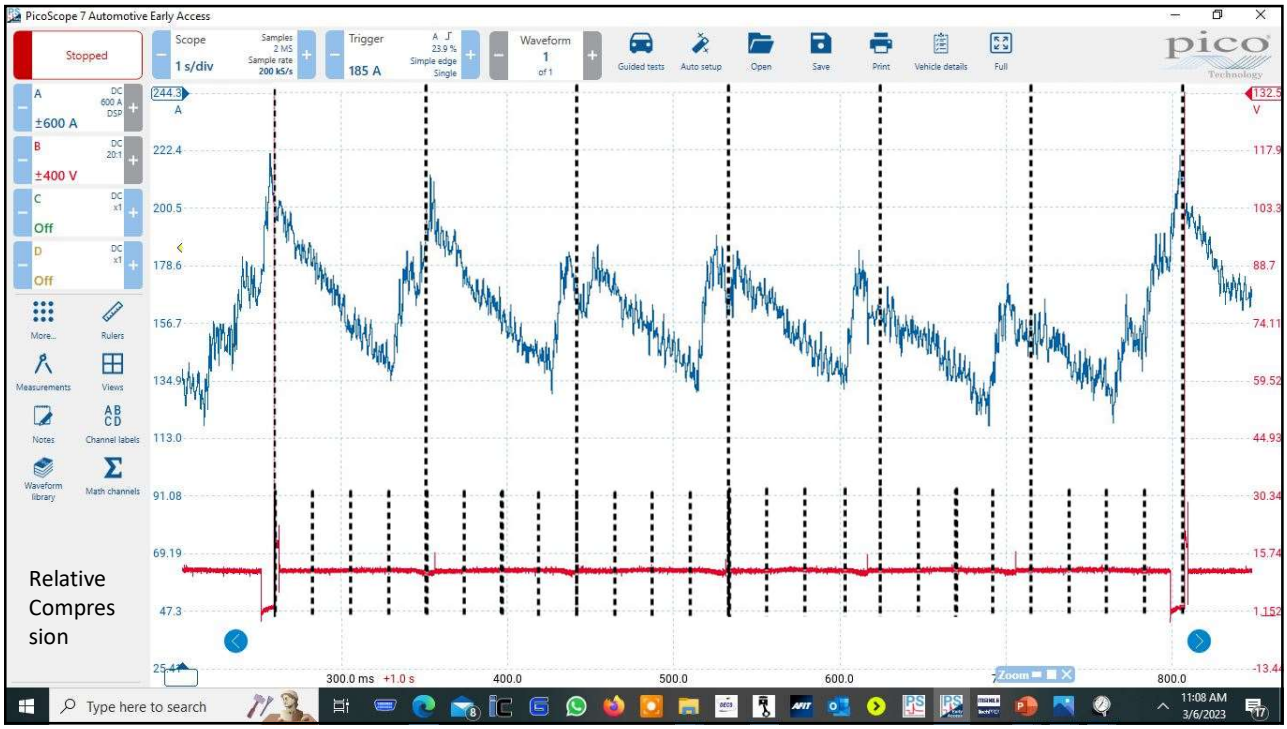
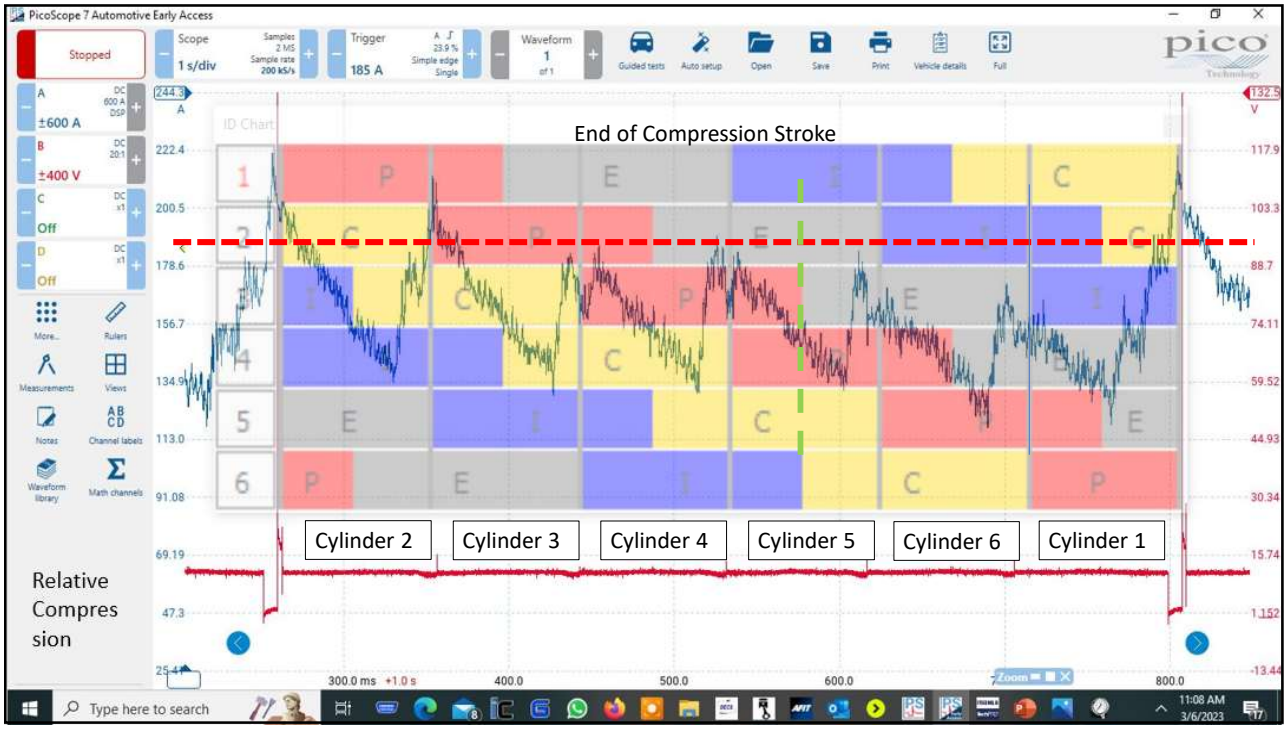



PicoScope 7 Automotive Early Access
Stopped
Scope
1 s/div
Trigger
185 A
Waveform
Guided tests
Auto setup
Open
Save
Print
Vehicle details
Full
pico
A
±600 A
B
±400 V
C
Off
D
Off
More...
Rulers
Measurements
Views
Notes
Channel labels
Waveform library
Math channels
Relative Compression
244.3
222.4
200.5
178.6
156.7
134.9
113.0
91.08
69.19
47.3
132.5
117.9
103.3
88.7
74.11
59.52
44.93
30.34
15.74
1.152
-13.44
300.0 ms +1.0 s
400.0
500.0
600.0
800.0
Zoom
Type here to search
11:08 AM
3/6/2023


PicoScope 7 Automotive Early Access
Stopped
Scope
1 s/div
Trigger
185 A
Waveform
Guided tests
Auto setup
Open
Save
Print
Vehicle details
Full
pico
A
±600 A
B
±400 V
C
Off
D
Off
More...
Rulers
Measurements
Views
Notes
Channel labels
Waveform library
Math channels
Relative Compression
244.3
222.4
200.5
178.6
156.7
134.9
113.0
91.08
69.19
47.3
132.5
117.9
103.3
88.7
74.11
59.52
44.93
30.34
15.74
1.152
-13.44
300.0 ms +1.0 s
400.0
500.0
600.0
800.0
Zoom
Type here to search
11:08 AM
3/6/2023


PicoScope 7 Automotive Early Access
Stopped
Scope
1 s/div
Trigger
185 A
Waveform
pico
Relative Compression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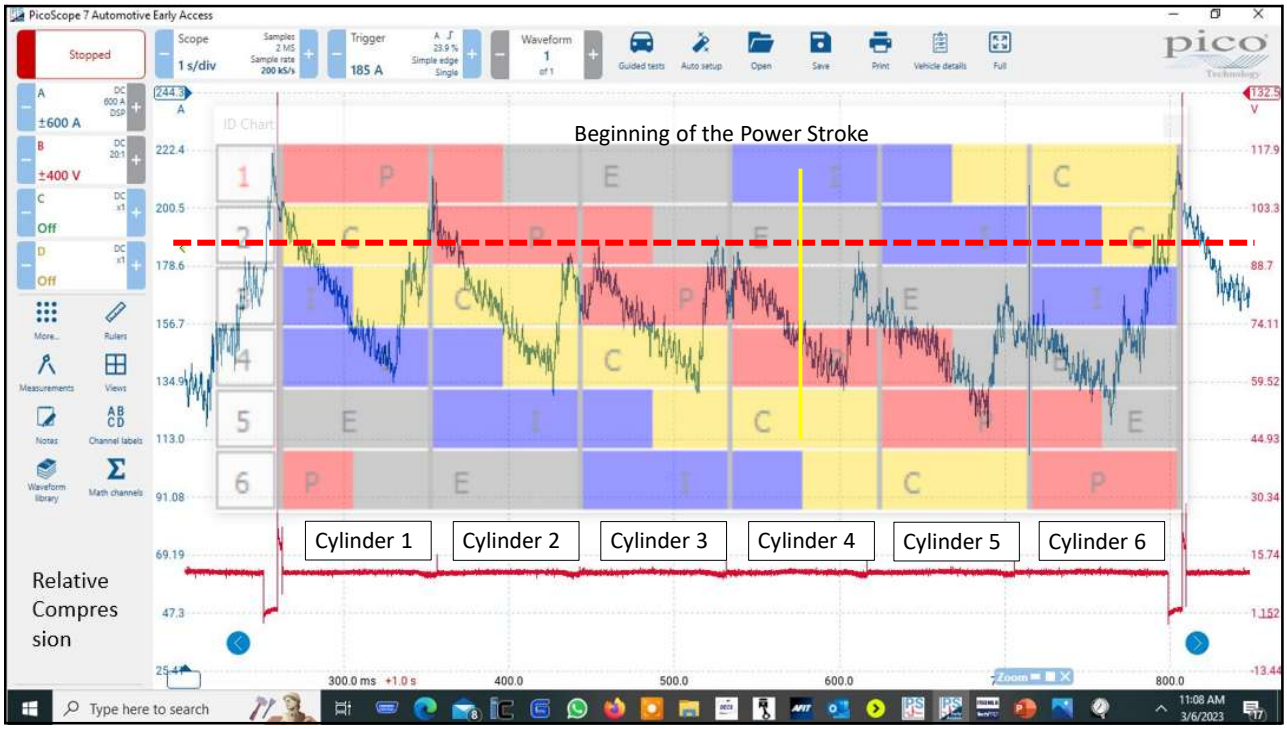
Stopped
End of Compression Stroke
Cylinder 2
Cylinder 3
Cylinder 4
Cylinder 5
Cylinder 6
Cylinder 1
Relative Compression



Running Exhaust Waveforms

Exhaust Stroke

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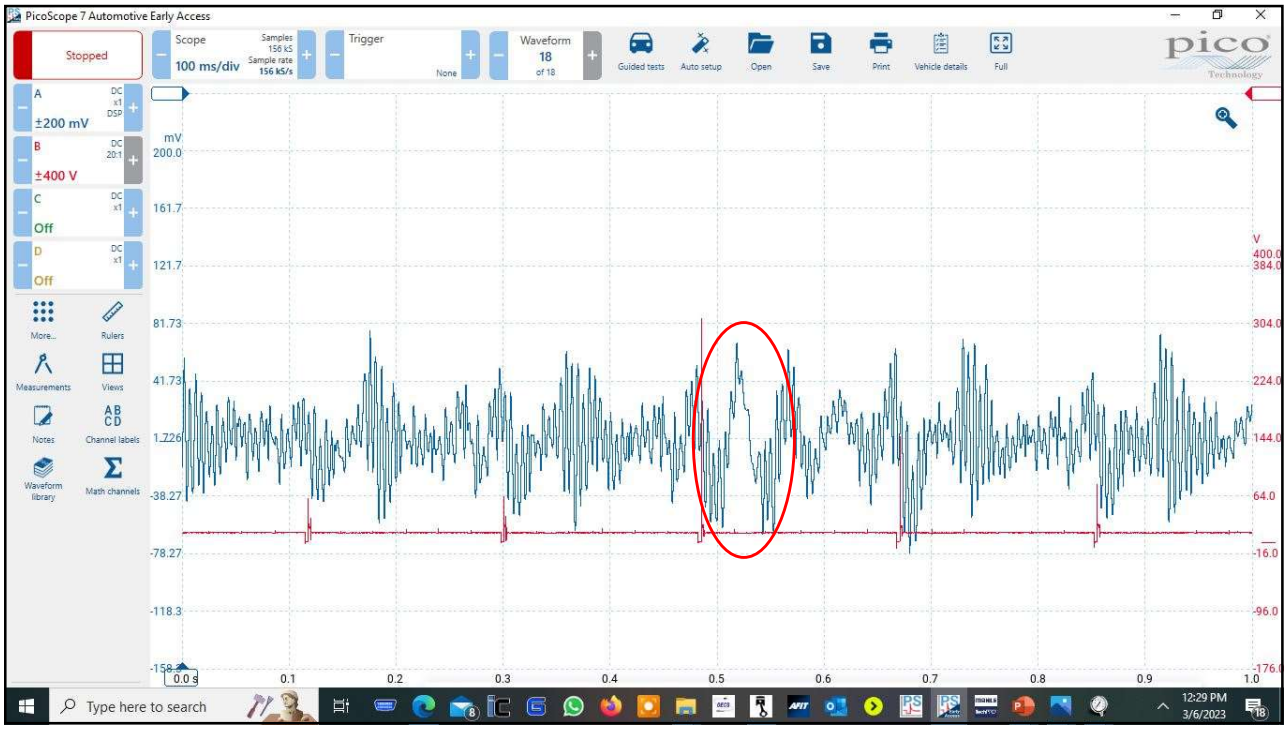
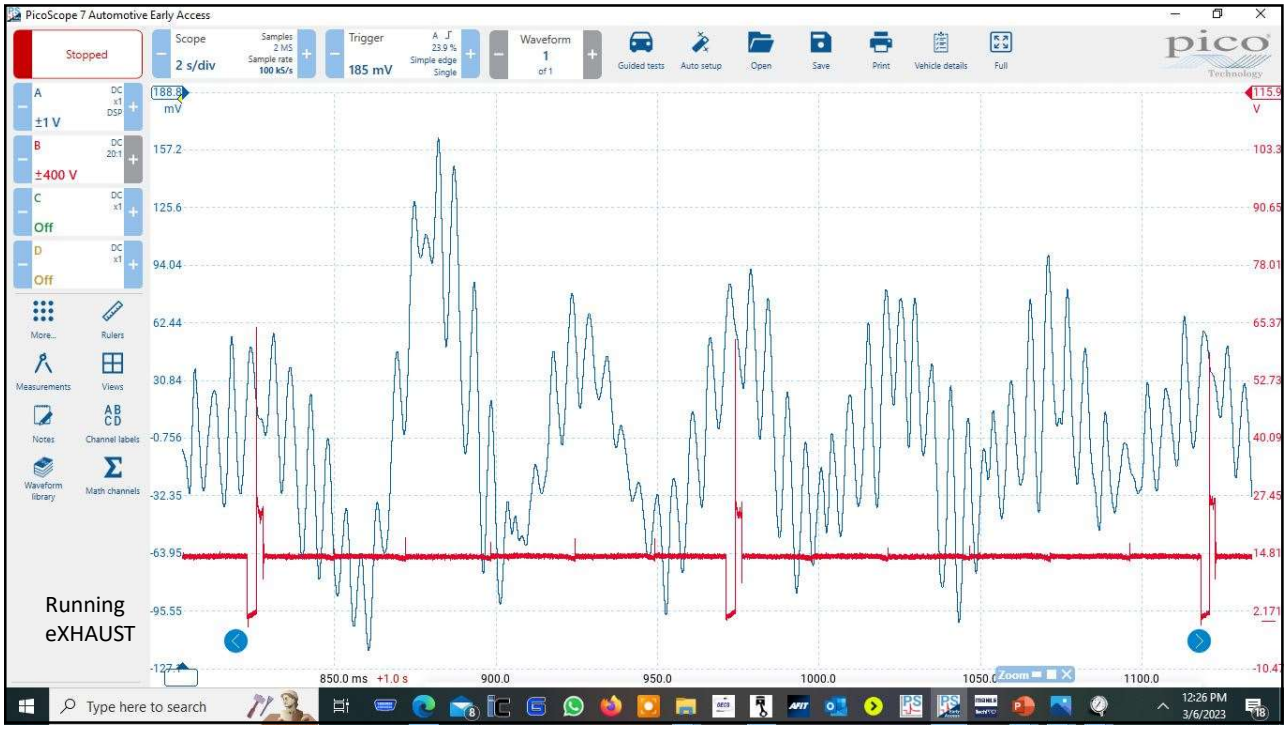
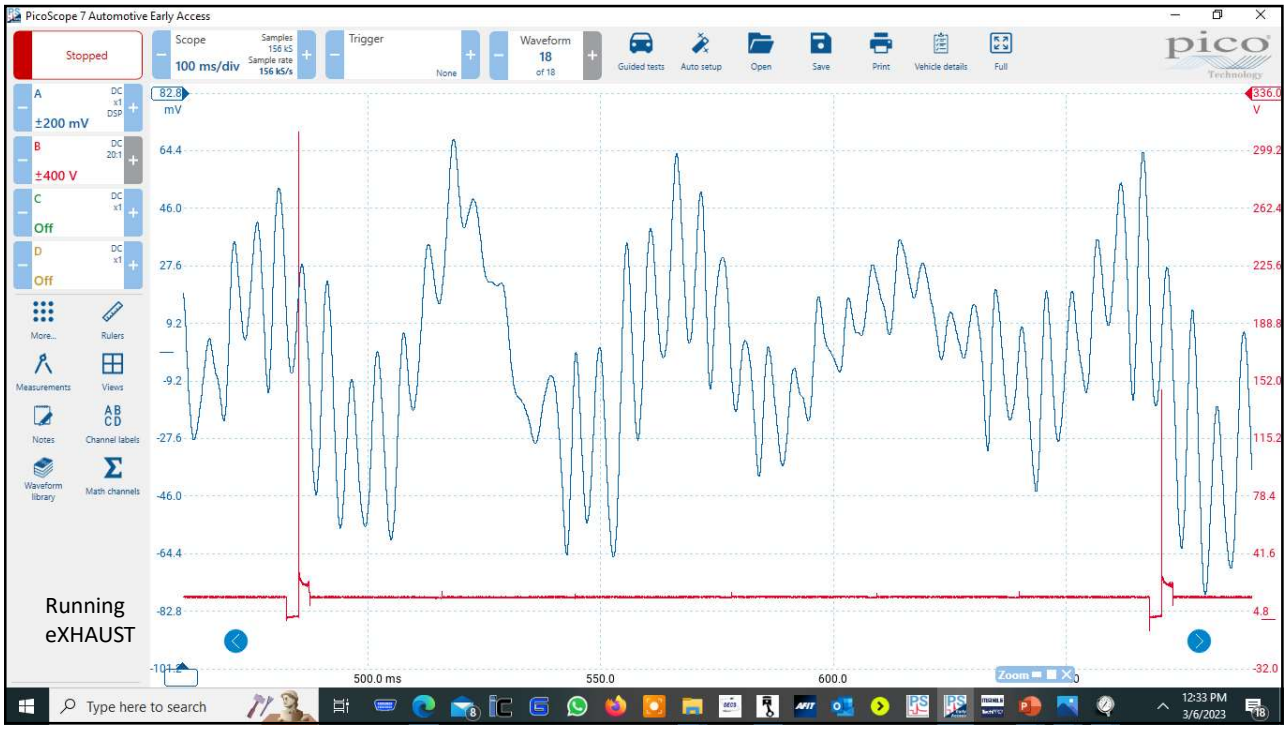
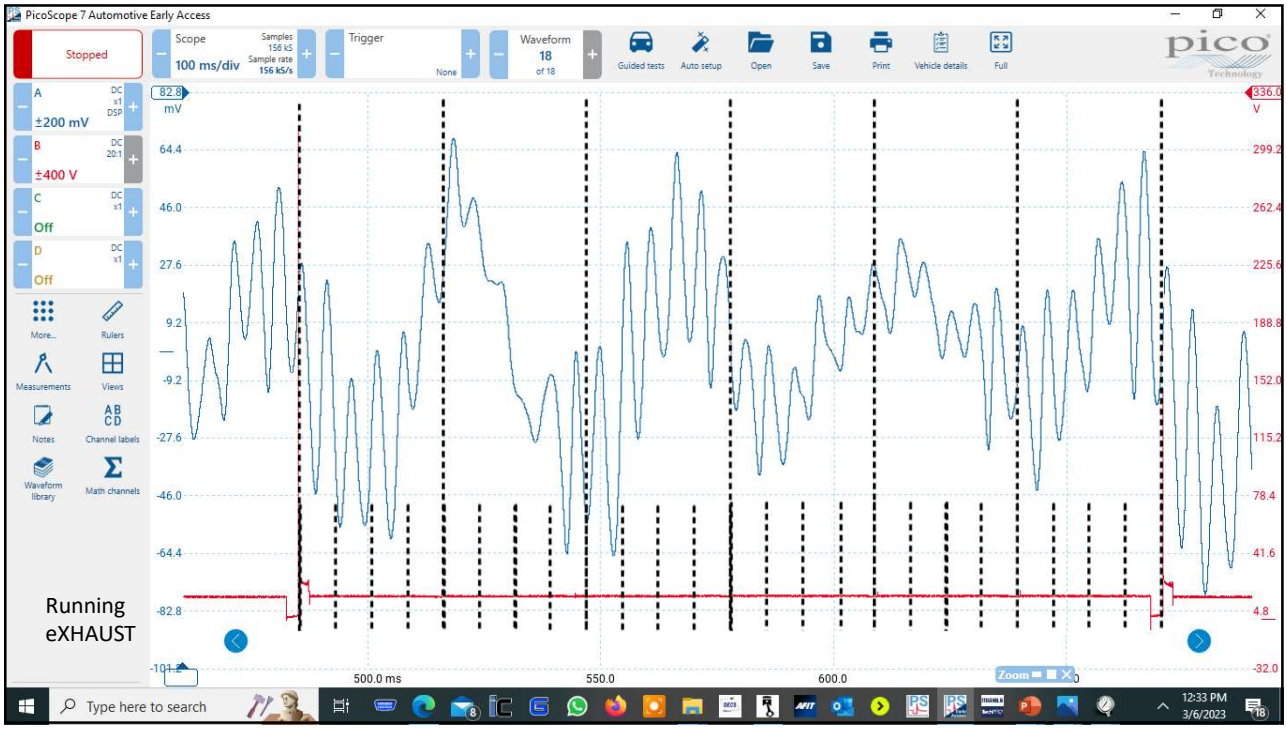
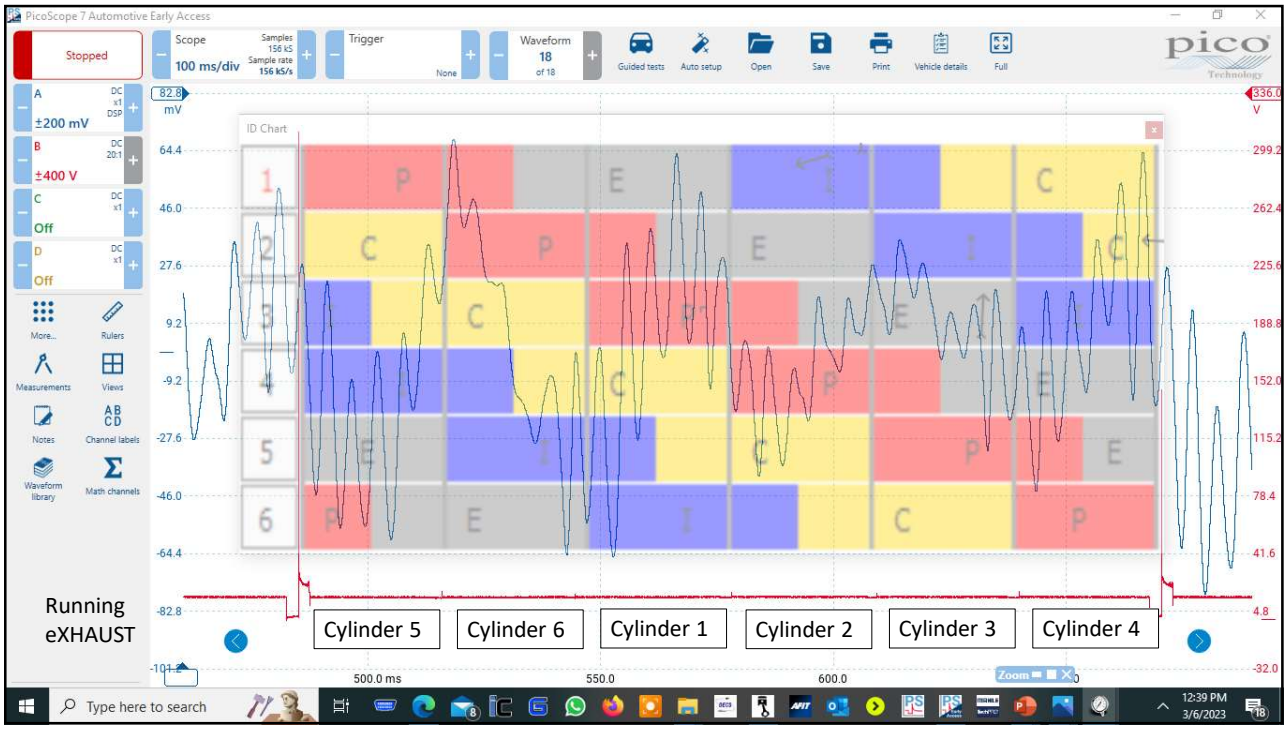

PicoScope 7 Automotive Early Access
Stopped
Scope
100 ms/div
Trigger
Waveform
18
of 18
Guided tests
Auto setup
Open
Save
Print
Vehicle details
Full
pico
Technology
A
±200 mV
B
±400 V
C
Off
D
Off
More...
Rulers
Measurements
Views
Notes
Channel labels
Waveform library
Math channels
mV
200.0
161.7
121.7
81.73
41.73
1.726
-38.27
-78.27
-118.3
-158.2
V
400.0
384.0
304.0
224.0
144.0
64.0
-16.0
-96.0
-176.0
0.0 s
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Type here to search
12:29 PM
3/6/2023


PicoScope 7 Automotive Early Access
Stopped
Scope
2 s/div
Trigger
185 mV
Waveform
1
of 1
Guided tests
Auto setup
Open
Save
Print
Vehicle details
Full
pico
Technology
A
±1 V
B
±400 V
C
Off
D
Off
More...
Rulers
Measurements
Views
Notes
Channel labels
Waveform library
Math channels
188.8
mV
157.2
125.6
94.04
62.44
30.84
-0.756
-32.35
-63.95
-95.55
-127.4
115.9
V
103.3
90.65
78.01
65.37
52.73
40.09
27.45
14.81
2.171
-10.47
Running
eXHAUST
850.0 ms
+1.0 s
900.0
950.0
1000.0
1050.0
1100.0
Zoom
Type here to search
12:26 PM
3/6/2023


PicoScope 7 Automotive Early Access
Stopped
Scope
100 ms/div
Trigger
Waveform
18
of 18
Guided tests
Auto setup
Open
Save
Print
Vehicle details
Full
pico
A
±200 mV
B
±400 V
C
Off
D
Off
More...
Rulers
Measurements
Views
Notes
Channel labels
Waveform library
Math channels
82.8
mV
64.4
46.0
27.6
9.2
-9.2
-27.6
-46.0
-64.4
-82.8
-101.2
836.0
V
299.2
262.4
225.6
188.8
152.0
115.2
78.4
41.6
4.8
-32.0
500.0 ms
550.0
600.0
Zoom
Running eXHAUST
Type here to search
12:33 PM
3/6/2023


PicoScope 7 Automotive Early Access
Stopped
Scope
100 ms/div
Trigger
Waveform
18
of 18
Guided tests
Auto setup
Open
Save
Print
Vehicle details
Full
pico
A
±200 mV
B
±400 V
C
Off
D
Off
More...
Rulers
Measurements
Views
Notes
Channel labels
Waveform library
Math channels
82.8
mV
64.4
46.0
27.6
9.2
-9.2
-27.6
-46.0
-64.4
-82.8
-101.2
836.0
V
299.2
262.4
225.6
188.8
152.0
115.2
78.4
41.6
4.8
-32.0
500.0 ms
550.0
600.0
Zoom
Running eXHAUST
Type here to search
12:33 PM
3/6/2023



Cylinder No 4
(Known Good)

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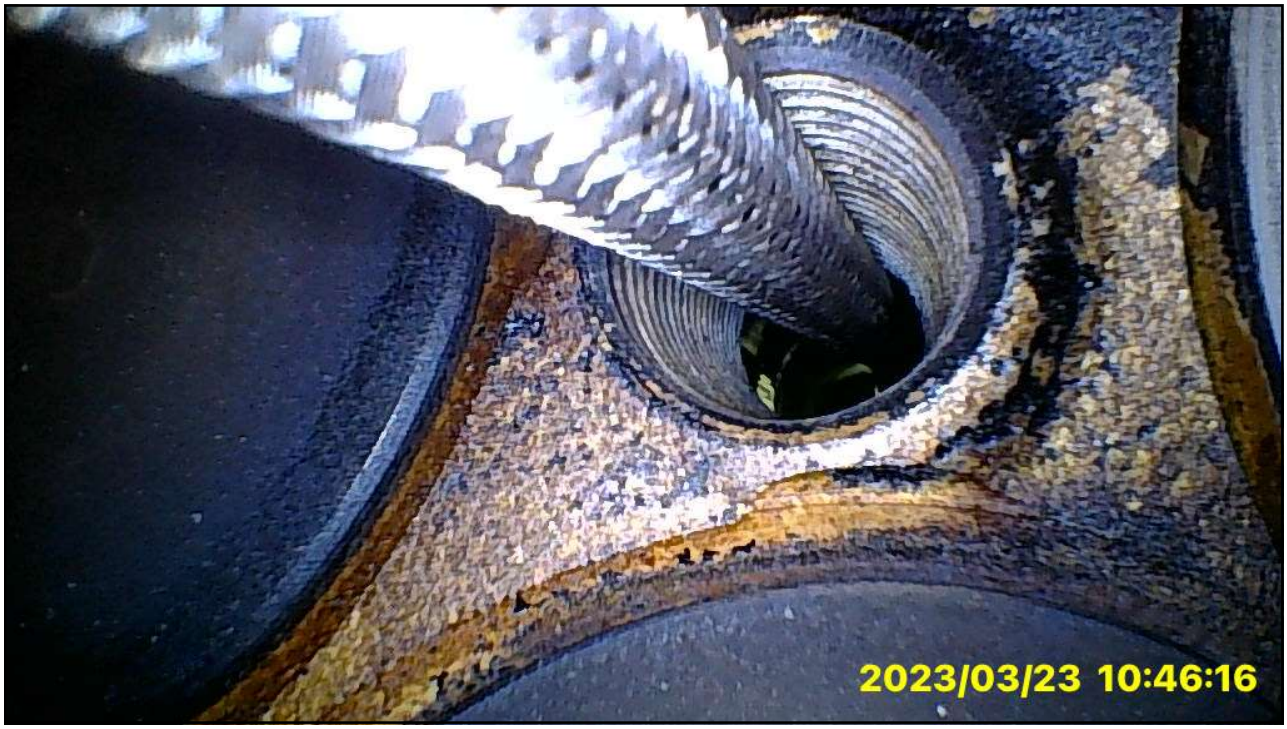
2023/03/23 10:58:05


2023/03/23 10:46:16


2023/03/23 10:58:40


2023/03/23 10:47:56

Cylinder No 6
(Suspect Cylinder)

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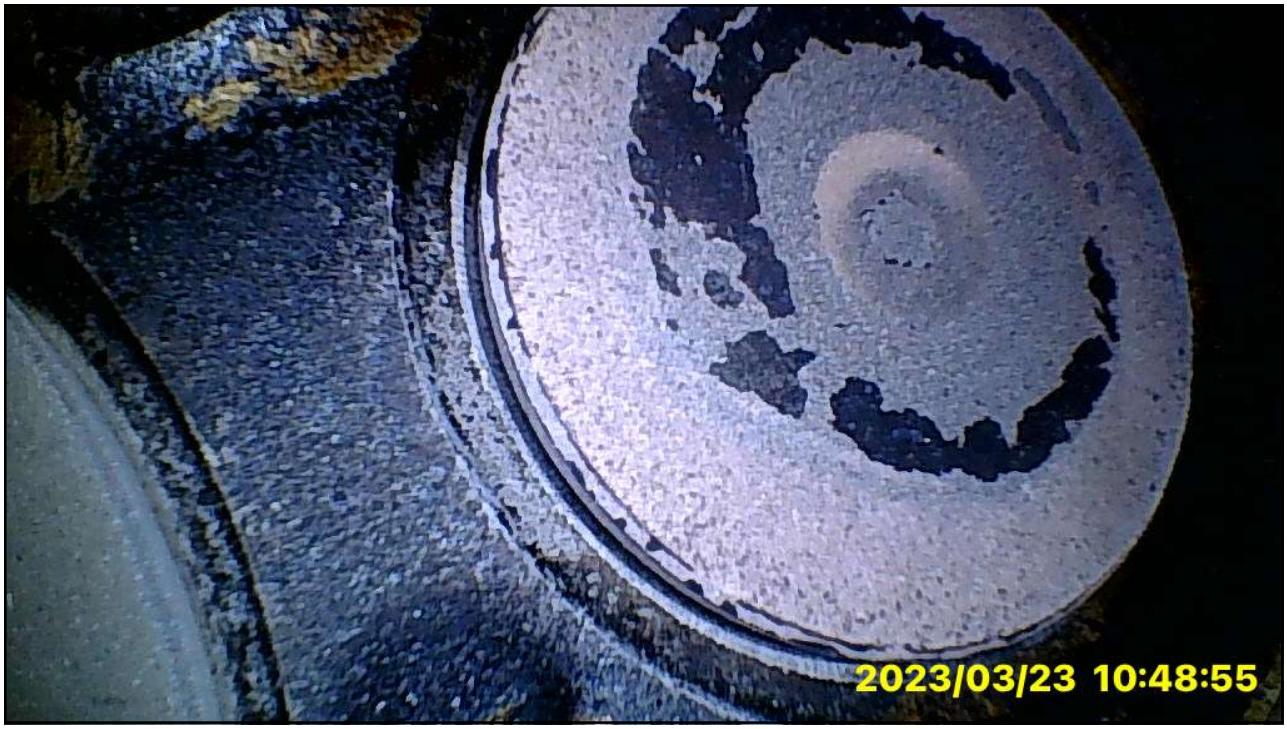

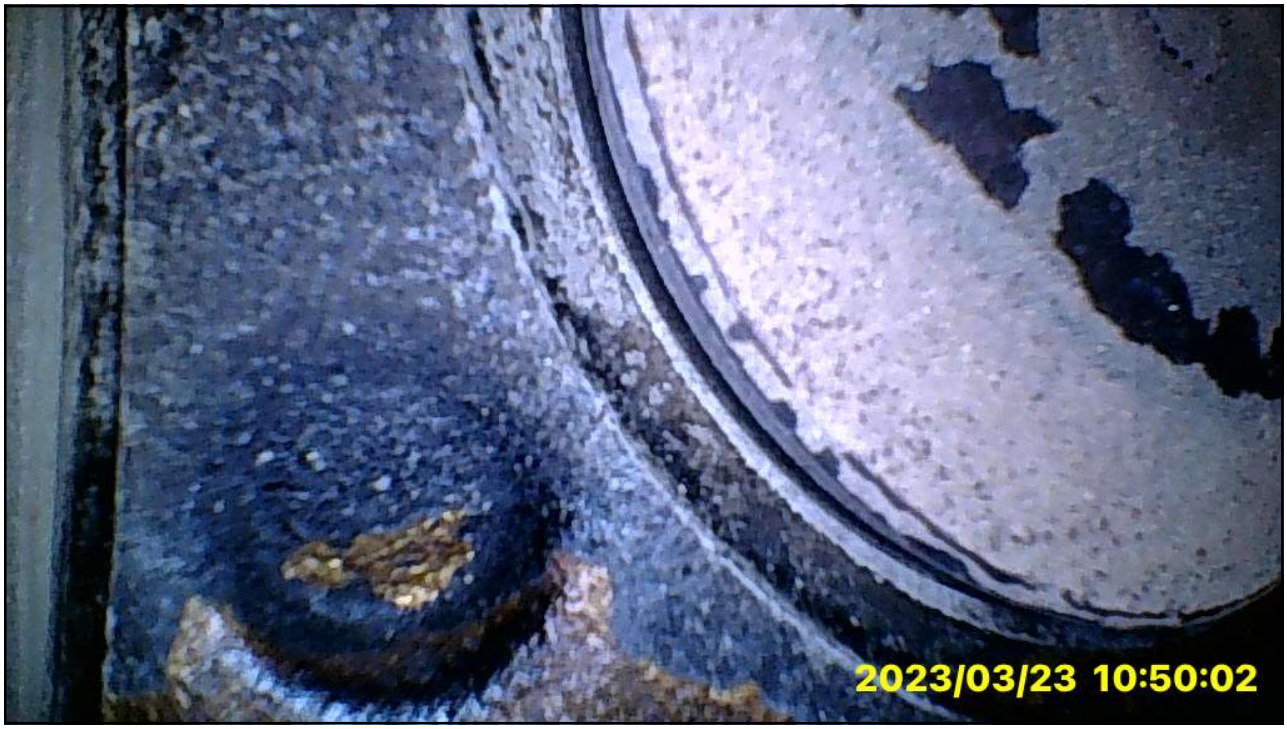
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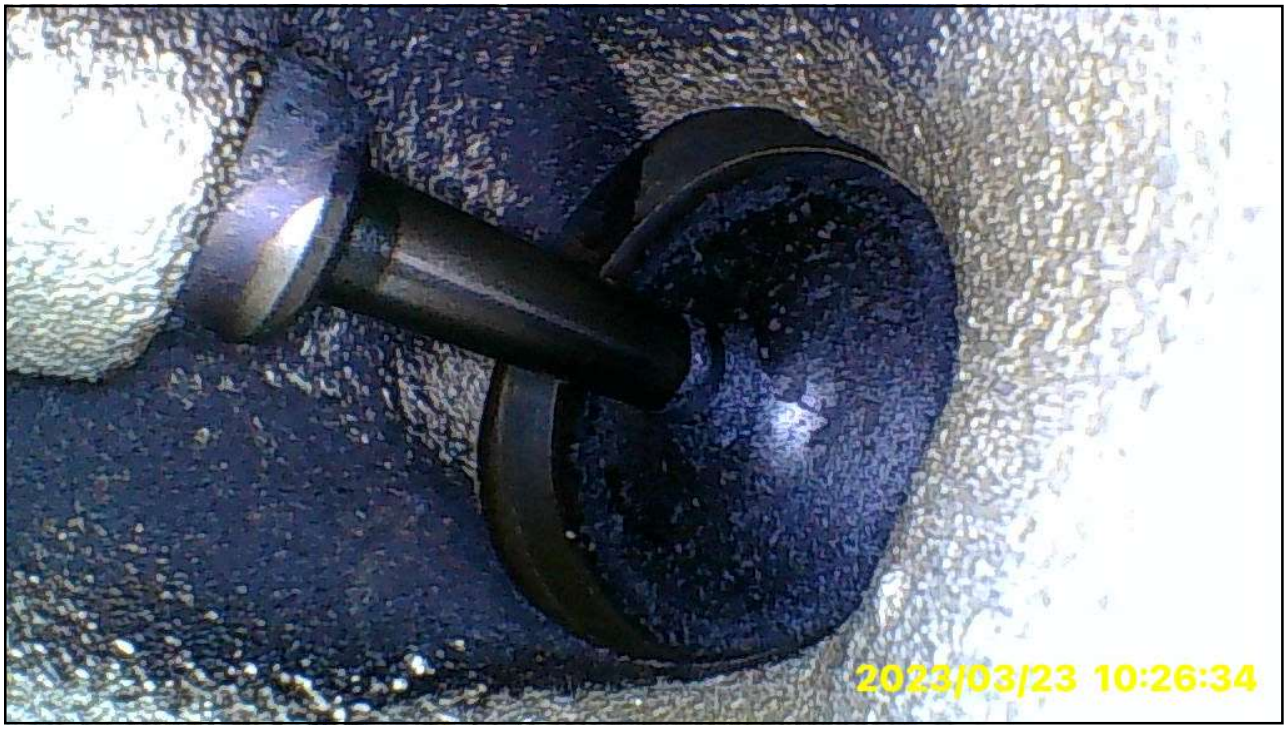
2023/03/23 10:32:56



Test Procedures

Case Study No 3

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A Tale of Two Batteries

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Thank You for Attending

But Wait, There is More!

Customer Concern

- The Check Engine Light is on.
- The technician does a code clear and takes the vehicle for a test drive. It is then noted that during a Start/Stop event that the check engine light illuminates again
- A code P305F is stored in the controllers (PCM) memory.

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Code P305F

Dual Battery Control Module Performance

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Diagnostic Process

- Step 1: Obtain Trouble Code Information
- Step 2: Determine the RPO code for the start/stop system you are working on (GM)
- Step 3: Review Description and Operation
- Step 4: Review any and all TSB's that may apply
- Step 5: Review Wiring Diagrams and Trouble Code Chart

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Obtain Trouble Code Information

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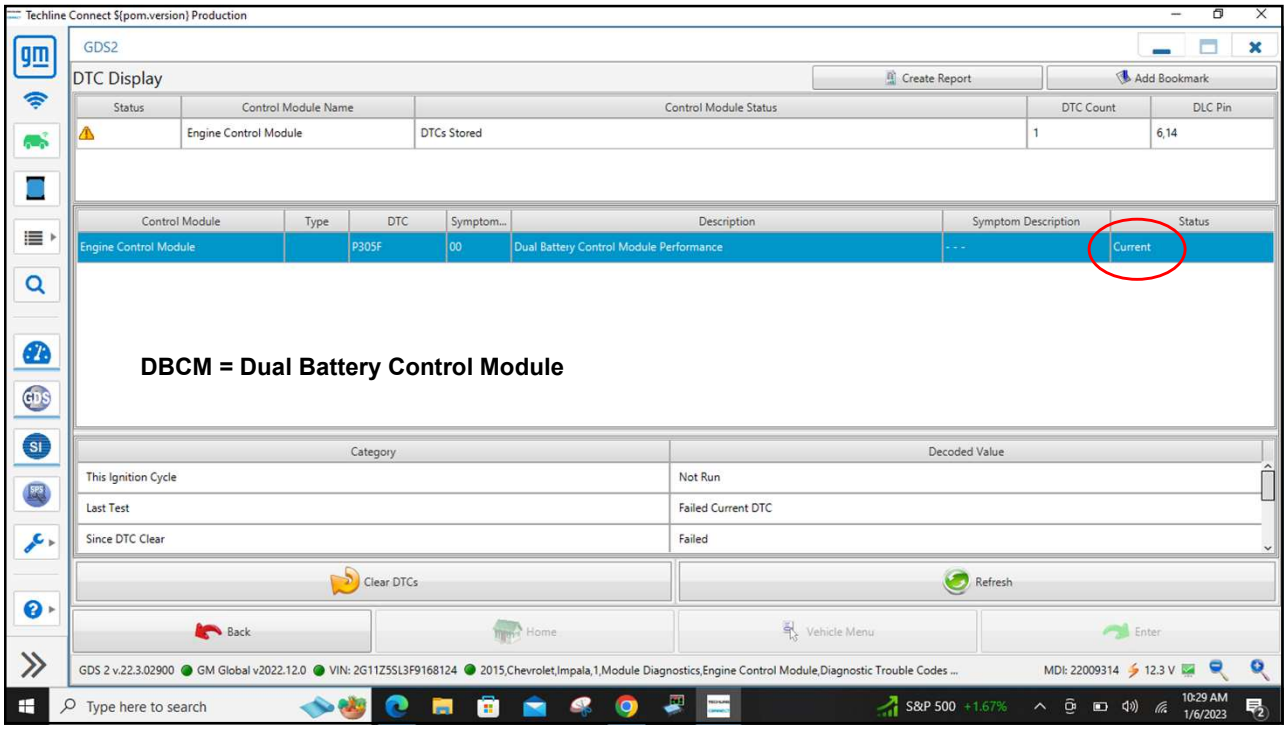
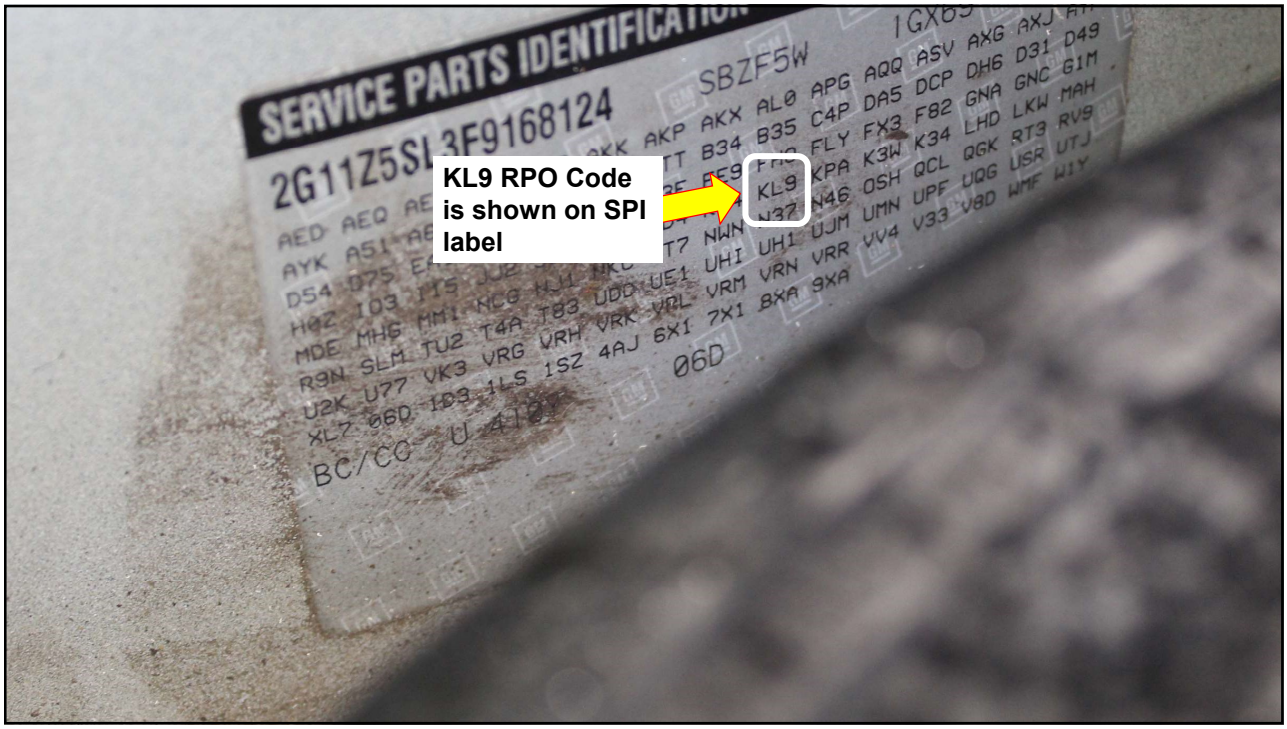
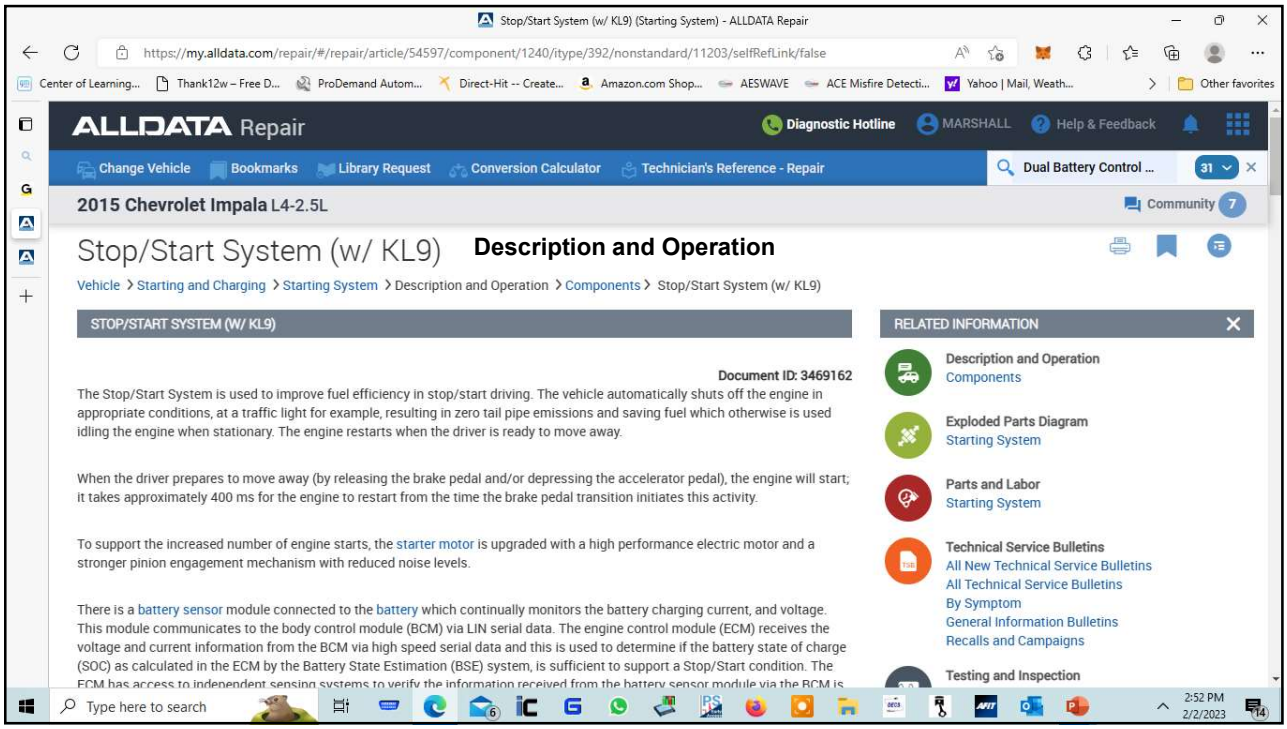


Determine the RPO Code(s)



Description and Operartion



Dual Battery Control Module

Dual Battery Control Module (DBCM)

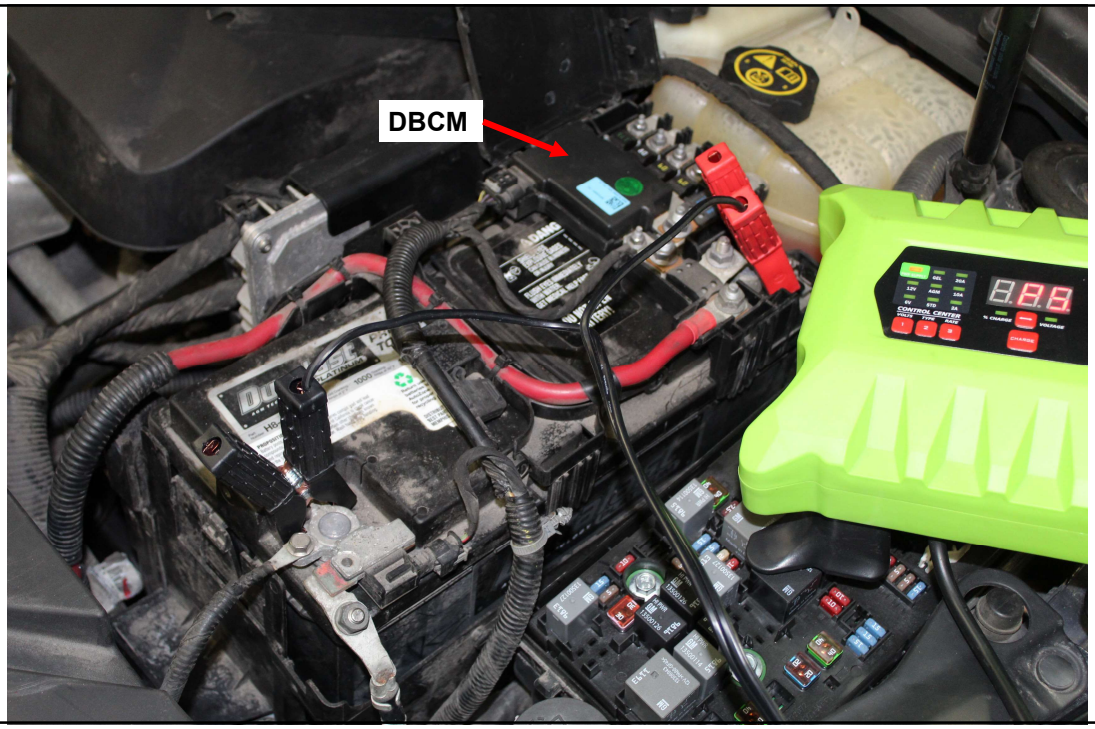
The DBCM is used to isolate 12V primary battery from vehicle loads during cranking events. It switches primary and auxiliary batteries in and out at appropriate times to support vehicle loads and battery charging. It does not utilize vehicle bus communication. The following table defines the utilization of the primary and auxiliary batteries based on specified events.

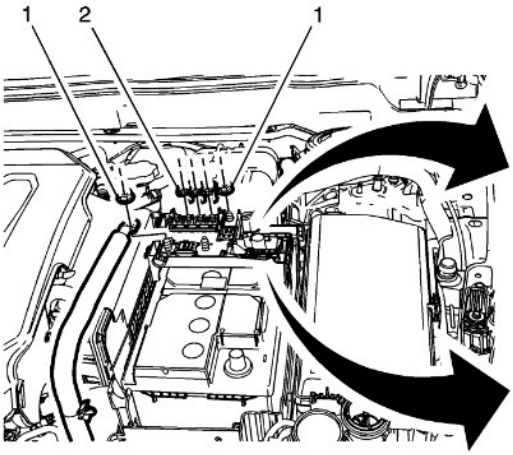
Dual Battery Control Module

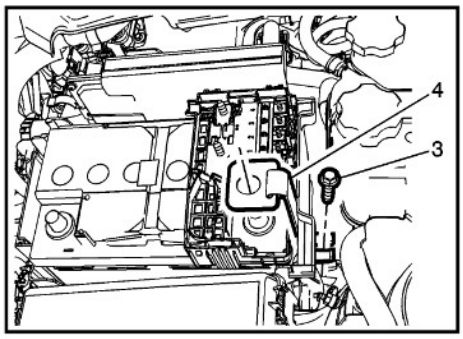
Vehicle Load Supported by

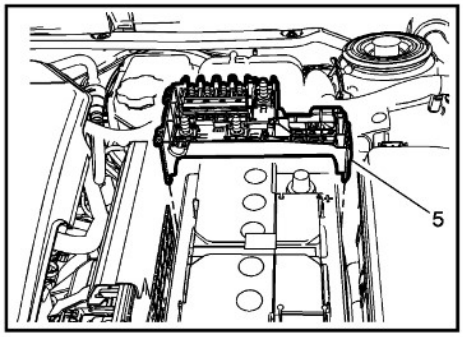
Event	Primary Battery	Auxiliary Battery
Key off	Yes	No
Key on	Yes	Yes
*Key Crank	No	Yes
Run	Yes	Yes
Auto-stop	Yes	No
*Auto-start	No	Yes
*During a Key Crank or Auto-start event, the primary battery supplies power to the Starter Motor.		

Battery voltages should be monitored under actual driving conditions by using graphical analysis

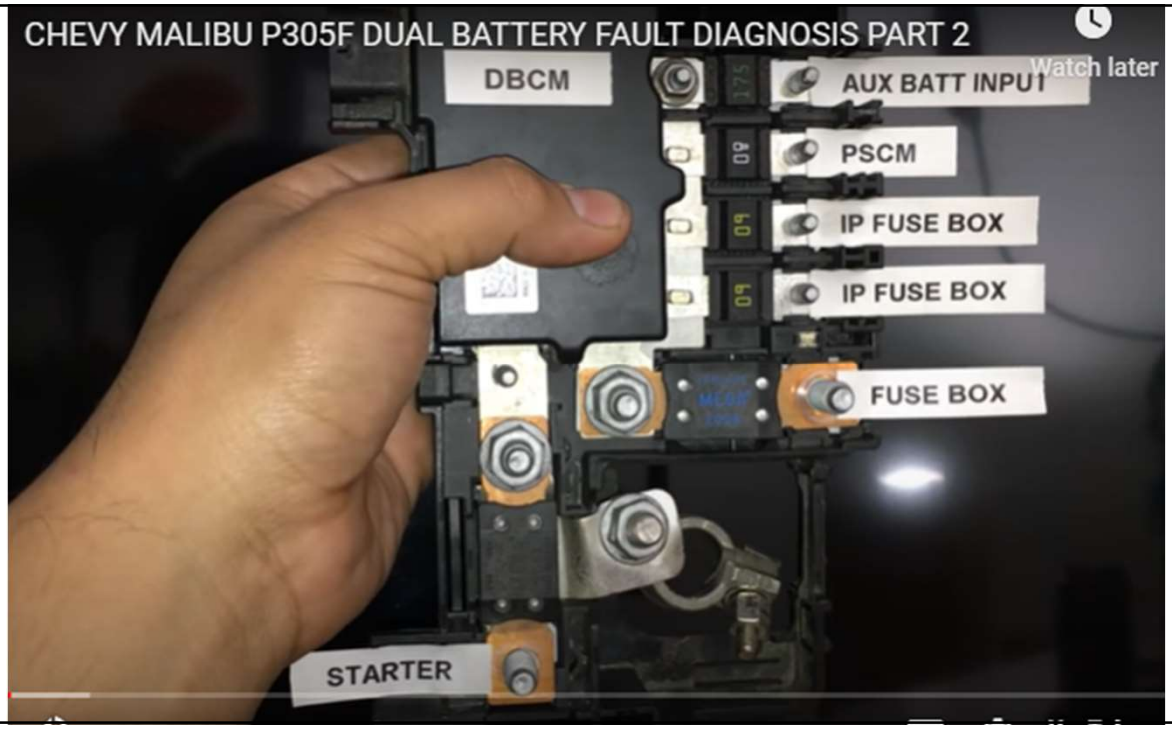


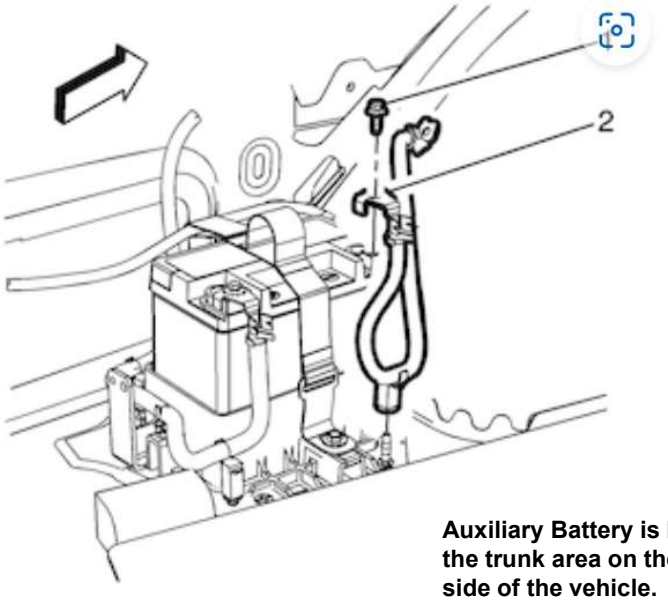






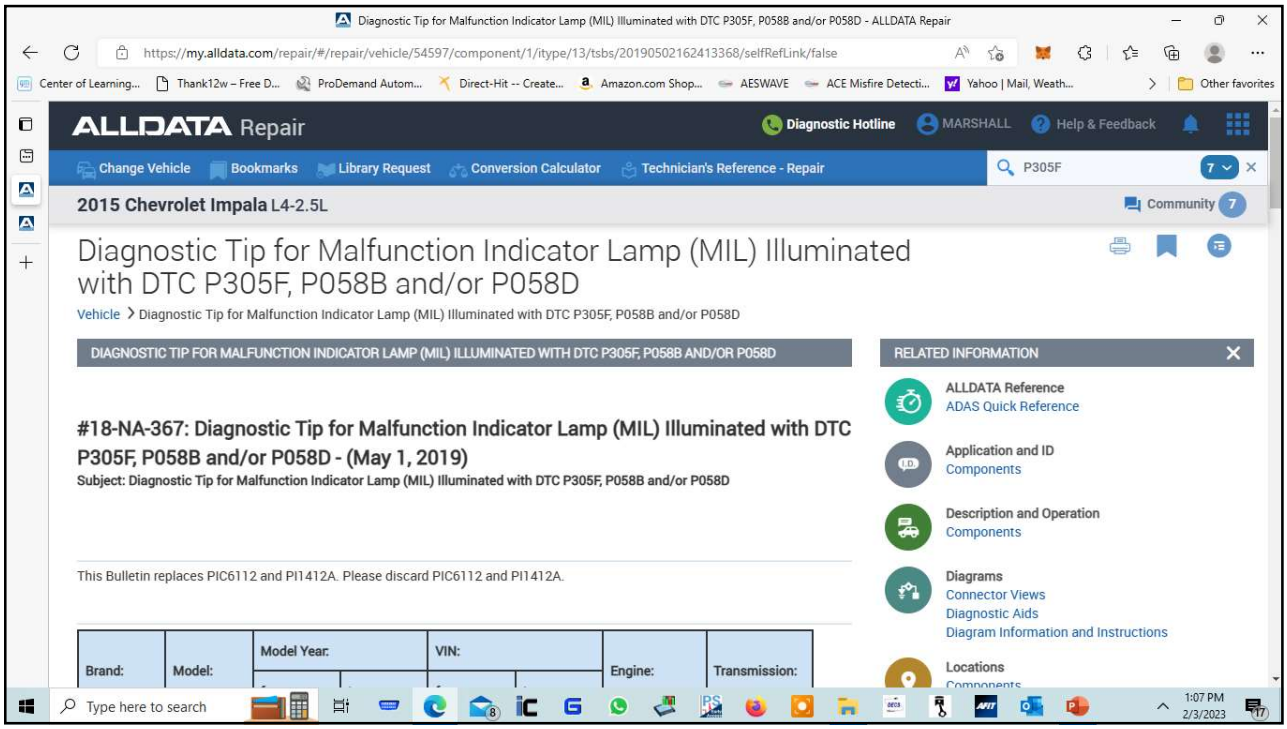
AGM (Primary) Battery is located under the hood on the drivers side of the vehicle





Auxiliary Battery is located in the trunk area on the drivers side of the vehicle.

Review Technical Service Bulletins


Diagnostic Tip for Malfunction Indicator Lamp (MIL) Illuminated with DTC P305F, P058B and/or P058D - ALLDATA Repair
https://my.alldata.com/repair/#/repair/vehicle/54597/component/1/itype/13/tsbs/20190502162413368/selfRefLink/false
ALLDATA Repair
Diagnostic Hotline
MARSHALL
Help & Feedback
Change Vehicle
Bookmarks
Library Request
Conversion Calculator
Technician's Reference - Repair
P305F
2015 Chevrolet Impala L4-2.5L
Community 7
Diagnostic Tip for Malfunction Indicator Lamp (MIL) Illuminated with DTC P305F, P058B and/or P058D
Vehicle > Diagnostic Tip for Malfunction Indicator Lamp (MIL) Illuminated with DTC P305F, P058B and/or P058D
DIAGNOSTIC TIP FOR MALFUNCTION INDICATOR LAMP (MIL) ILLUMINATED WITH DTC P305F, P058B AND/OR P058D
#18-NA-367: Diagnostic Tip for Malfunction Indicator Lamp (MIL) Illuminated with DTC P305F, P058B and/or P058D - (May 1, 2019)
Subject: Diagnostic Tip for Malfunction Indicator Lamp (MIL) Illuminated with DTC P305F, P058B and/or P058D
This Bulletin replaces PIC6112 and PI1412A. Please discard PIC6112 and PI1412A.
Brand:
Model:
Model Year:
VIN:
Engine:
Transmission:
RELATED INFORMATION
ALLDATA Reference
ADAS Quick Reference
Application and ID
Components
Description and Operation
Components
Diagrams
Connector Views
Diagnostic Aids
Diagram Information and Instructions
Locations
Type here to search
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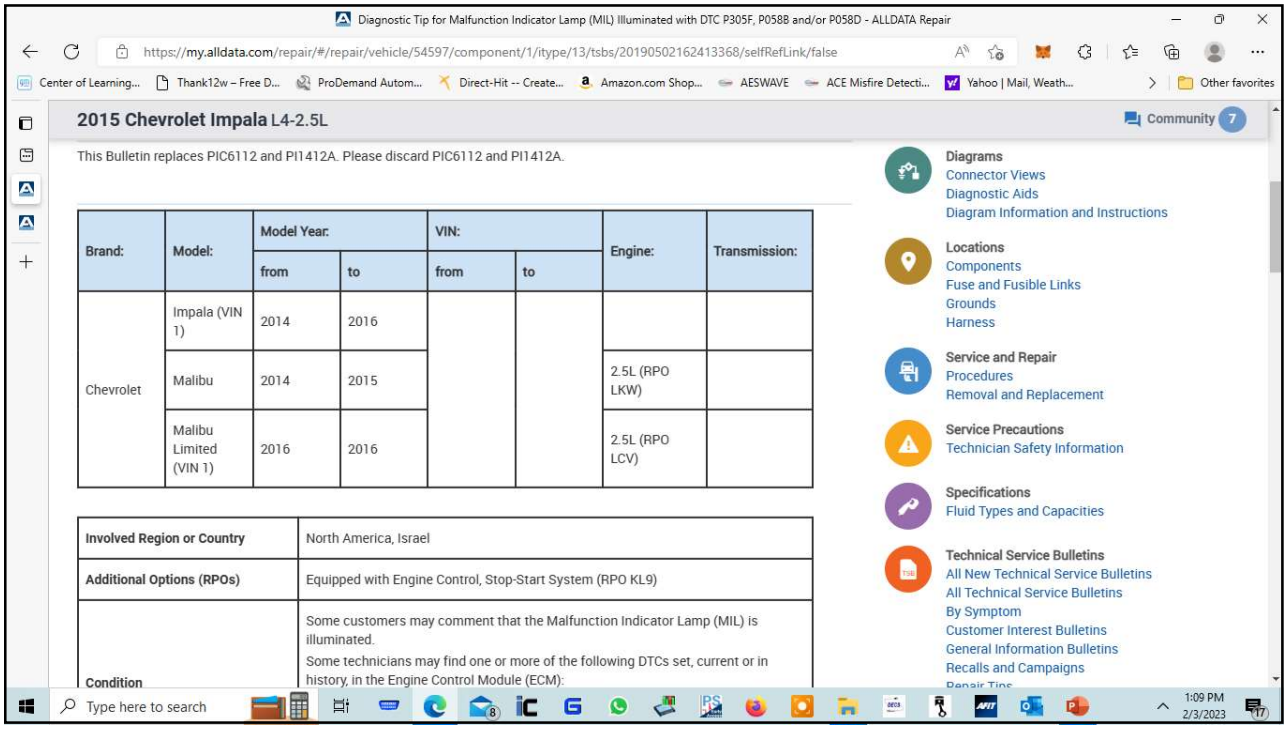
2/3/2023


Diagnostic Tip for Malfunction Indicator Lamp (MIL) Illuminated with DTC P305F, P058B and/or P058D - ALLDATA Repair
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2015 Chevrolet Impala L4-2.5L
Community 7
This Bulletin replaces PIC6112 and PI1412A. Please discard PIC6112 and PI1412A.
Brand: | Model: | Model Year: from | Model Year: to | VIN: from | VIN: to | Engine: | Transmission:
Chevrolet | Impala (VIN 1) | 2014 | 2016 | | | |
Chevrolet | Malibu | 2014 | 2015 | | | 2.5L (RPO LKW) |
Chevrolet | Malibu Limited (VIN 1) | 2016 | 2016 | | | 2.5L (RPO LCV) |
Involved Region or Country: North America, Israel
Additional Options (RPOs): Equipped with Engine Control, Stop-Start System (RPO KL9)
Condition: Some customers may comment that the Malfunction Indicator Lamp (MIL) is illuminated.
Some technicians may find one or more of the following DTCs set, current or in history, in the Engine Control Module (ECM):
Diagrams
Connector Views
Diagnostic Aids
Diagram Information and Instructions
Locations
Components
Fuse and Fusible Links
Grounds
Harness
Service and Repair
Procedures
Removal and Replacement
Service Precautions
Technician Safety Information
Specifications
Fluid Types and Capacities
Technical Service Bulletins
All New Technical Service Bulletins
All Technical Service Bulletins
By Symptom
Customer Interest Bulletins
General Information Bulletins
Recalls and Campaigns
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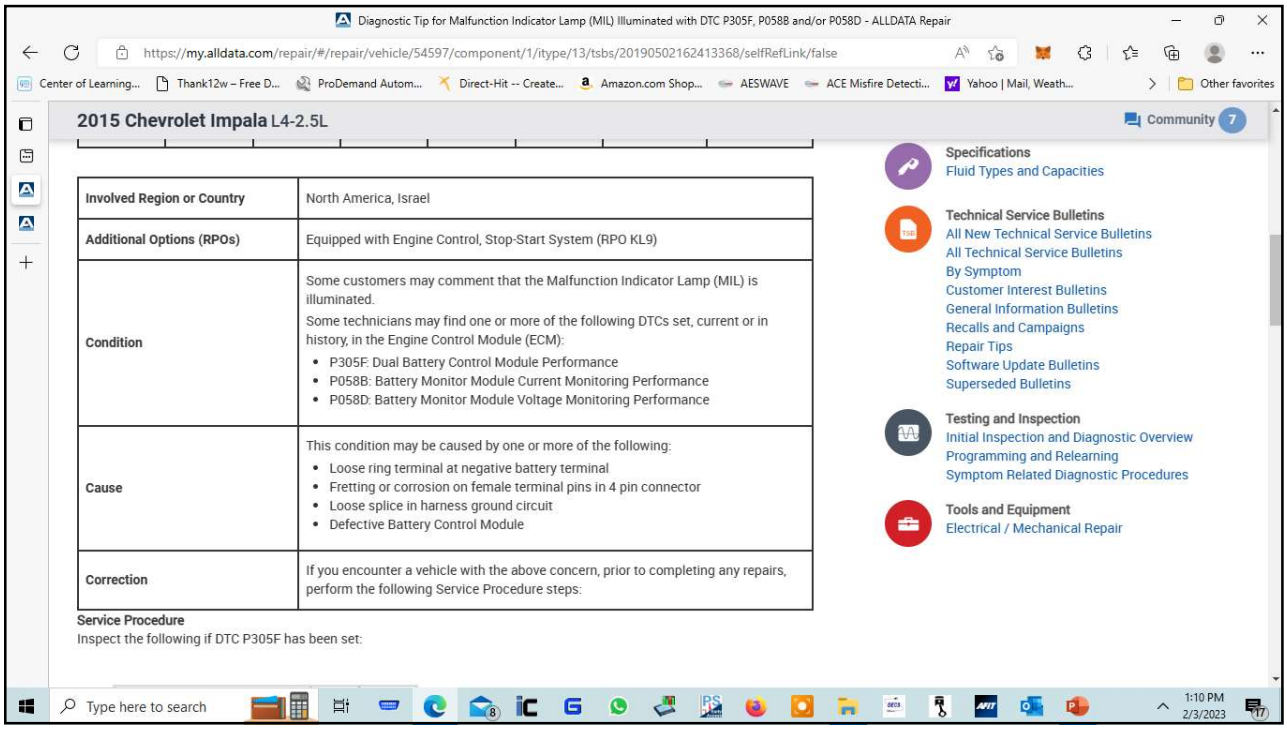
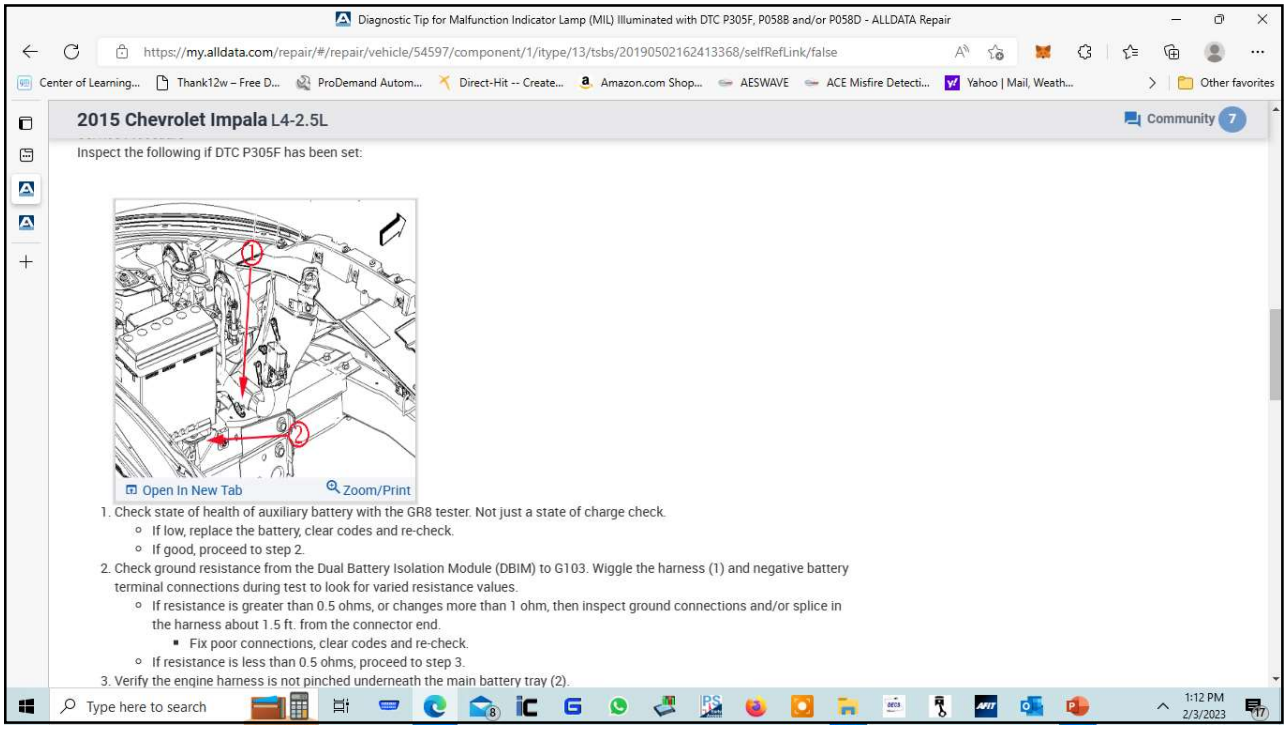
2/3/2023


Diagnostic Tip for Malfunction Indicator Lamp (MIL) Illuminated with DTC P305F, P058B and/or P058D - ALLDATA Repair
https://my.alldata.com/repair/#/repair/vehicle/54597/component/1/itype/13/tsbs/20190502162413368/selfRefLink/false
2015 Chevrolet Impala L4-2.5L
Community 7
Specifications
Fluid Types and Capacities
Technical Service Bulletins
All New Technical Service Bulletins
All Technical Service Bulletins
By Symptom
Customer Interest Bulletins
General Information Bulletins
Recalls and Campaigns
Repair Tips
Software Update Bulletins
Superseded Bulletins
Testing and Inspection
Initial Inspection and Diagnostic Overview
Programming and Relearning
Symptom Related Diagnostic Procedures
Tools and Equipment
Electrical / Mechanical Repair
Involved Region or Country
North America, Israel
Additional Options (RPOs)
Equipped with Engine Control, Stop-Start System (RPO KL9)
Condition
Some customers may comment that the Malfunction Indicator Lamp (MIL) is illuminated.
Some technicians may find one or more of the following DTCs set, current or in history, in the Engine Control Module (ECM):
P305F: Dual Battery Control Module Performance
P058B: Battery Monitor Module Current Monitoring Performance
P058D: Battery Monitor Module Voltage Monitoring Performance
Cause
This condition may be caused by one or more of the following:
Loose ring terminal at negative battery terminal
Fretting or corrosion on female terminal pins in 4 pin connector
Loose splice in harness ground circuit
Defective Battery Control Module
Correction
If you encounter a vehicle with the above concern, prior to completing any repairs, perform the following Service Procedure steps:
Service Procedure
Inspect the following if DTC P305F has been set:
Type here to search
1:10 PM
2/3/2023


Diagnostic Tip for Malfunction Indicator Lamp (MIL) Illuminated with DTC P305F, P058B and/or P058D - ALLDATA Repair
https://my.alldata.com/repair/#/repair/vehicle/54597/component/1/itype/13/tsbs/20190502162413368/selfRefLink/false
2015 Chevrolet Impala L4-2.5L
Community 7
Inspect the following if DTC P305F has been set:
Open In New Tab
Zoom/Print
1. Check state of health of auxiliary battery with the GR8 tester. Not just a state of charge check.
If low, replace the battery, clear codes and re-check.
If good, proceed to step 2.
2. Check ground resistance from the Dual Battery Isolation Module (DBIM) to G103. Wiggle the harness (1) and negative battery terminal connections during test to look for varied resistance values.
If resistance is greater than 0.5 ohms, or changes more than 1 ohm, then inspect ground connections and/or splice in the harness about 1.5 ft. from the connector end.
Fix poor connections, clear codes and re-check.
If resistance is less than 0.5 ohms, proceed to step 3.
3. Verify the engine harness is not pinched underneath the main battery tray (2).
Type here to search
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2/3/2023

Diagnostic Tip for Malfunction Indicator Lamp (MIL) Illuminated with DTC P305F, P058B and/or P058D - ALLDATA Repair

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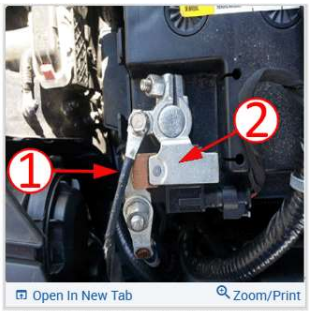
2015 Chevrolet Impala L4-2.5L

Community 7

3. Verify the engine harness is not pinched underneath the main battery tray (2).
   Note: The DBIM is located on the fuse block assembly. If found the cause of the concern, the Battery Distribution Fuse Block must be replaced.
4. Replace the battery distribution fuse block and wiring harness connector, clear codes and re-check.

Inspect the following if DTC P058B and/or P058D is set current or in history:



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1. Inspect the orientation of the grounding ring for circuit 150 (1) to the B110 Battery Sensor Module (2).

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Diagnostic Tip for Malfunction Indicator Lamp (MIL) Illuminated with DTC P305F, P058B and/or P058D - ALLDATA Repair

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2015 Chevrolet Impala L4-2.5L

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1. Inspect the orientation of the grounding ring for circuit 150 (1) to the B110 Battery Sensor Module (2).

Open In New Tab | Zoom/Print

   - If found contacting the sensor, reposition the terminal away from the sensor as shown above, and tighten the bolt to 5 Nm (44 lb in).
2. Check ground resistance of Dual Battery Isolation Module (DBIM) to G103. Wiggle the harness and negative battery terminal connections during the test to look for varied resistance values.
   - If resistance is greater than 0.5 ohms or changes more than 1 ohm:
     1. Inspect ground connections and/or splice in the harness about 1.5 ft. from the connector end.
     2. Fix poor connection and replace the module.
     3. Clear codes and re-check.
   - If resistance is less than 0.5 ohms, proceed to step 3.

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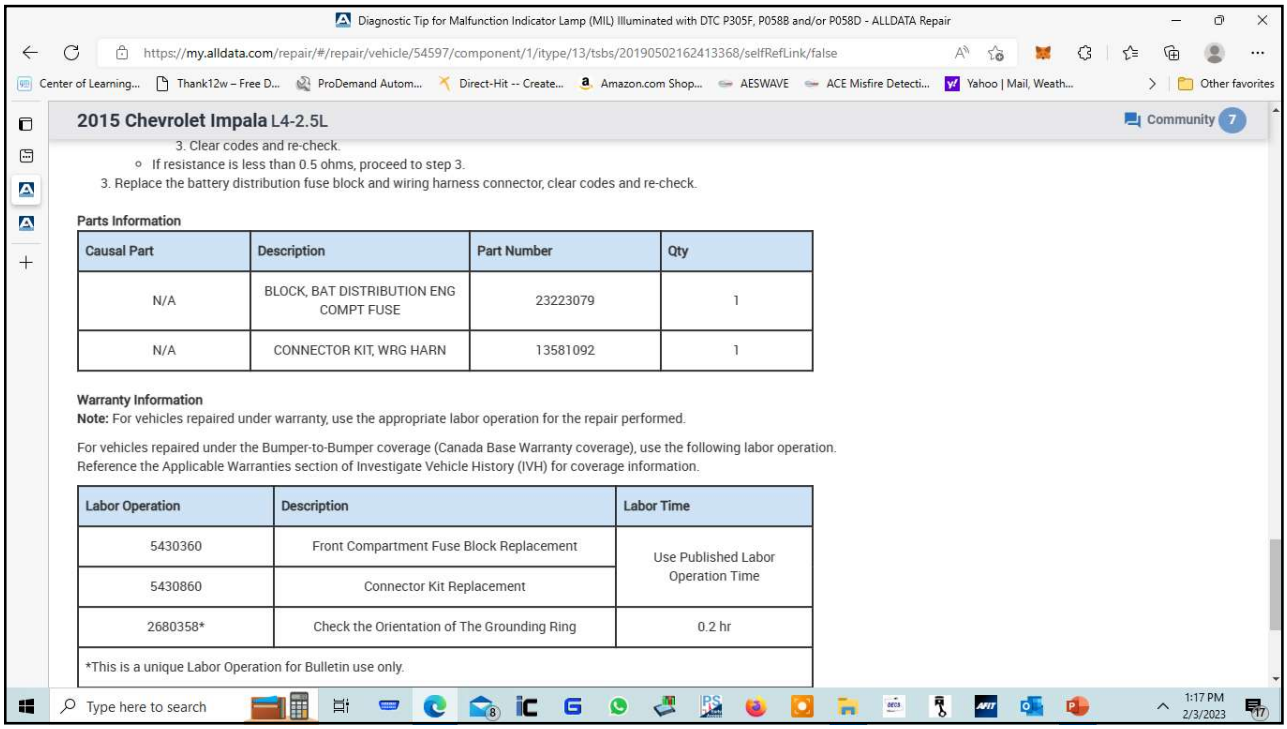
Diagnostic Tip for Malfunction Indicator Lamp (MIL) Illuminated with DTC P305F, P058B and/or P058D - ALLDATA Repair
https://my.alldata.com/repair/#/repair/vehicle/54597/component/1/itype/13/tsbs/20190502162413368/selfRefLink/false
2015 Chevrolet Impala L4-2.5L
Community 7
3. Clear codes and re-check.
If resistance is less than 0.5 ohms, proceed to step 3.
3. Replace the battery distribution fuse block and wiring harness connector, clear codes and re-check.
Parts Information
Causal Part | Description | Part Number | Qty
N/A | BLOCK, BAT DISTRIBUTION ENG COMPT FUSE | 23223079 | 1
N/A | CONNECTOR KIT, WRG HARN | 13581092 | 1
Warranty Information
Note: For vehicles repaired under warranty, use the appropriate labor operation for the repair performed.
For vehicles repaired under the Bumper-to-Bumper coverage (Canada Base Warranty coverage), use the following labor operation. Reference the Applicable Warranties section of Investigate Vehicle History (IVH) for coverage information.
Labor Operation | Description | Labor Time
5430360 | Front Compartment Fuse Block Replacement | Use Published Labor Operation Time
5430860 | Connector Kit Replacement
2680358* | Check the Orientation of The Grounding Ring | 0.2 hr
*This is a unique Labor Operation for Bulletin use only.
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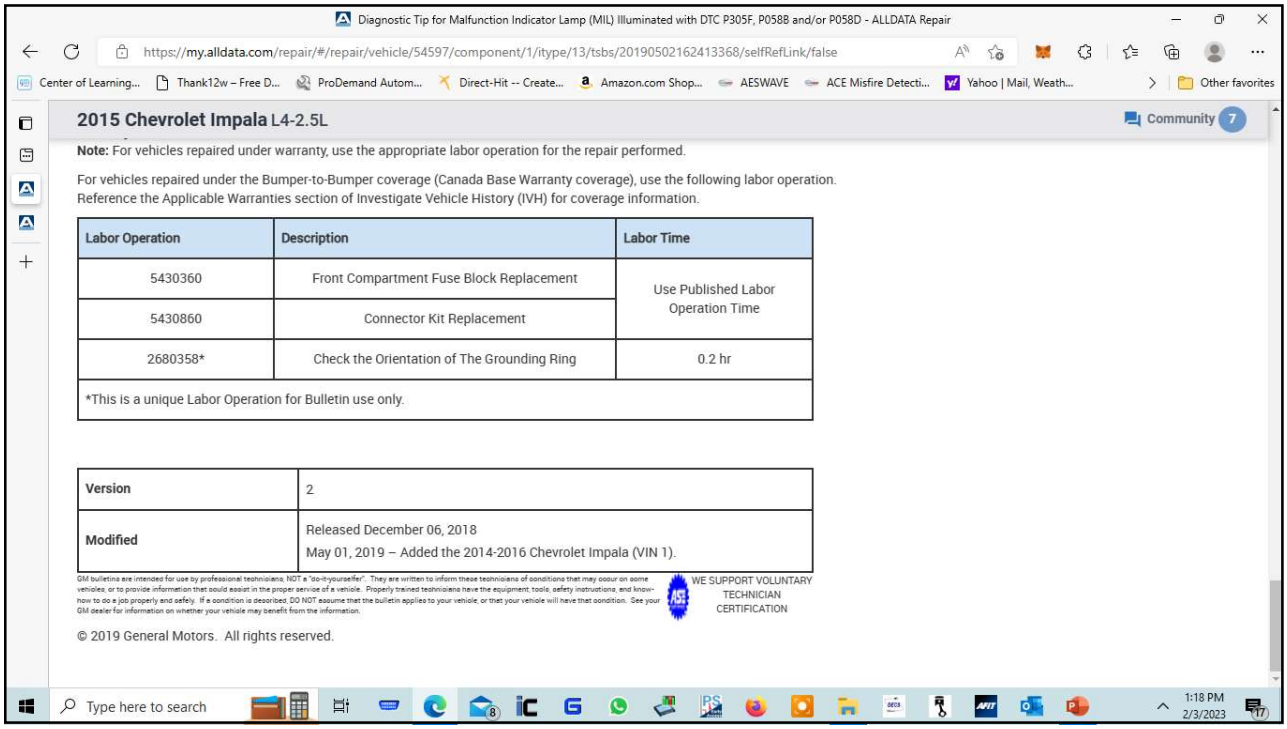
Diagnostic Tip for Malfunction Indicator Lamp (MIL) Illuminated with DTC P305F, P058B and/or P058D - ALLDATA Repair
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2015 Chevrolet Impala L4-2.5L
Community 7
Note: For vehicles repaired under warranty, use the appropriate labor operation for the repair performed.
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Labor Operation | Description | Labor Time
5430360 | Front Compartment Fuse Block Replacement | Use Published Labor Operation Time
5430860 | Connector Kit Replacement
2680358* | Check the Orientation of The Grounding Ring | 0.2 hr
*This is a unique Labor Operation for Bulletin use only.
Version | 2
Modified | Released December 06, 2018
May 01, 2019 – Added the 2014-2016 Chevrolet Impala (VIN 1).
GM bulletins are intended for use by professional technicians, NOT a "do-it-yourselfer". They are written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the bulletin applies to your vehicle, or that your vehicle will have that condition. See your GM dealer for information on whether your vehicle may benefit from the information.
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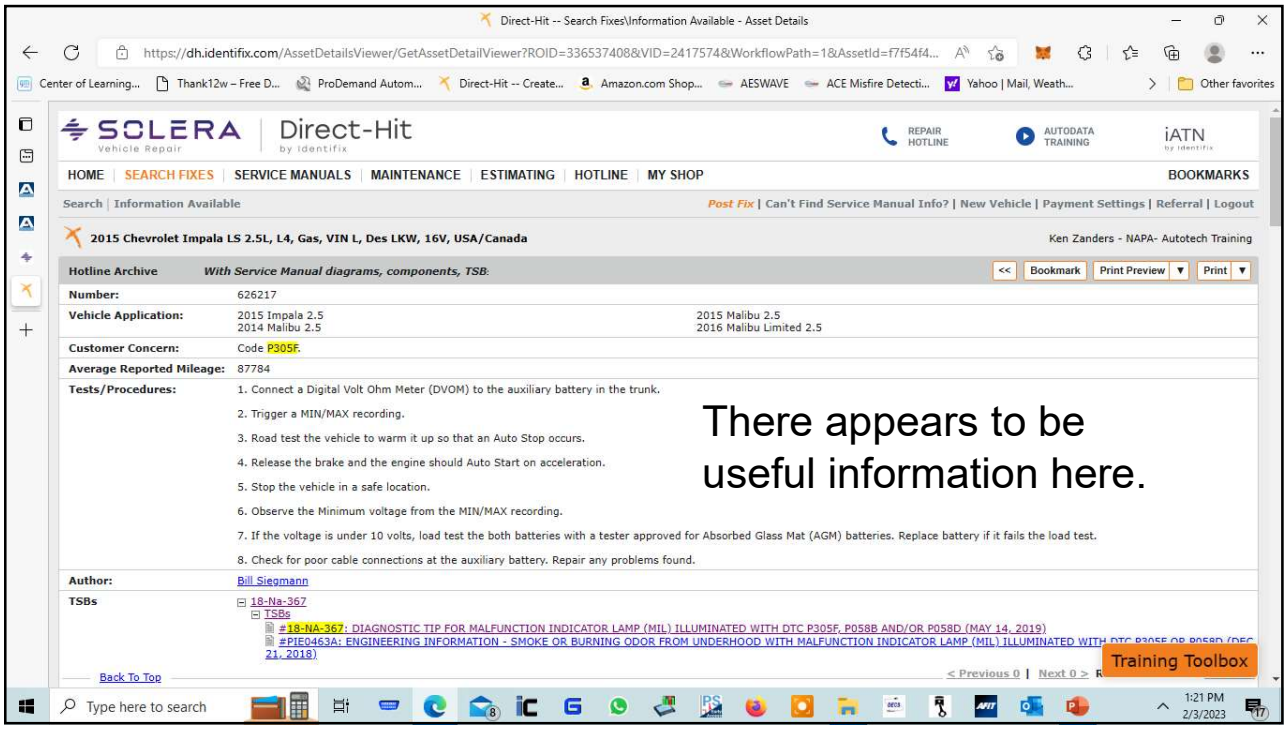
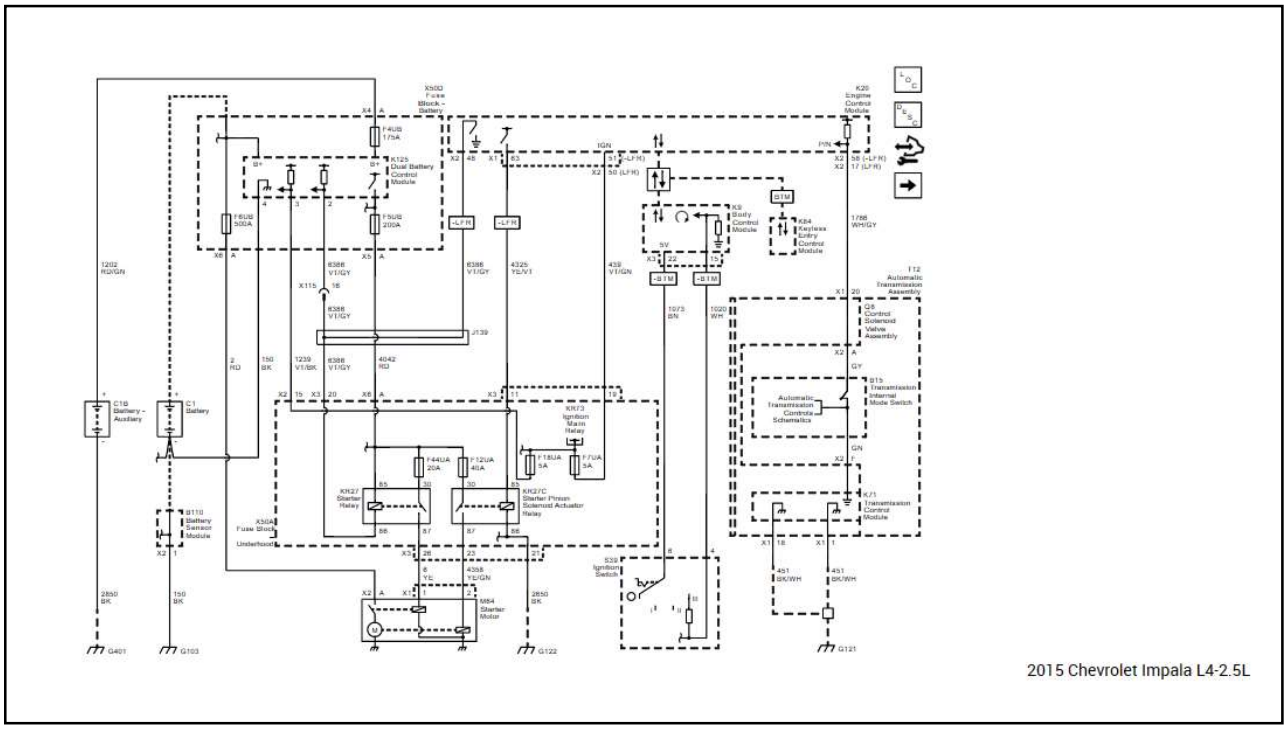
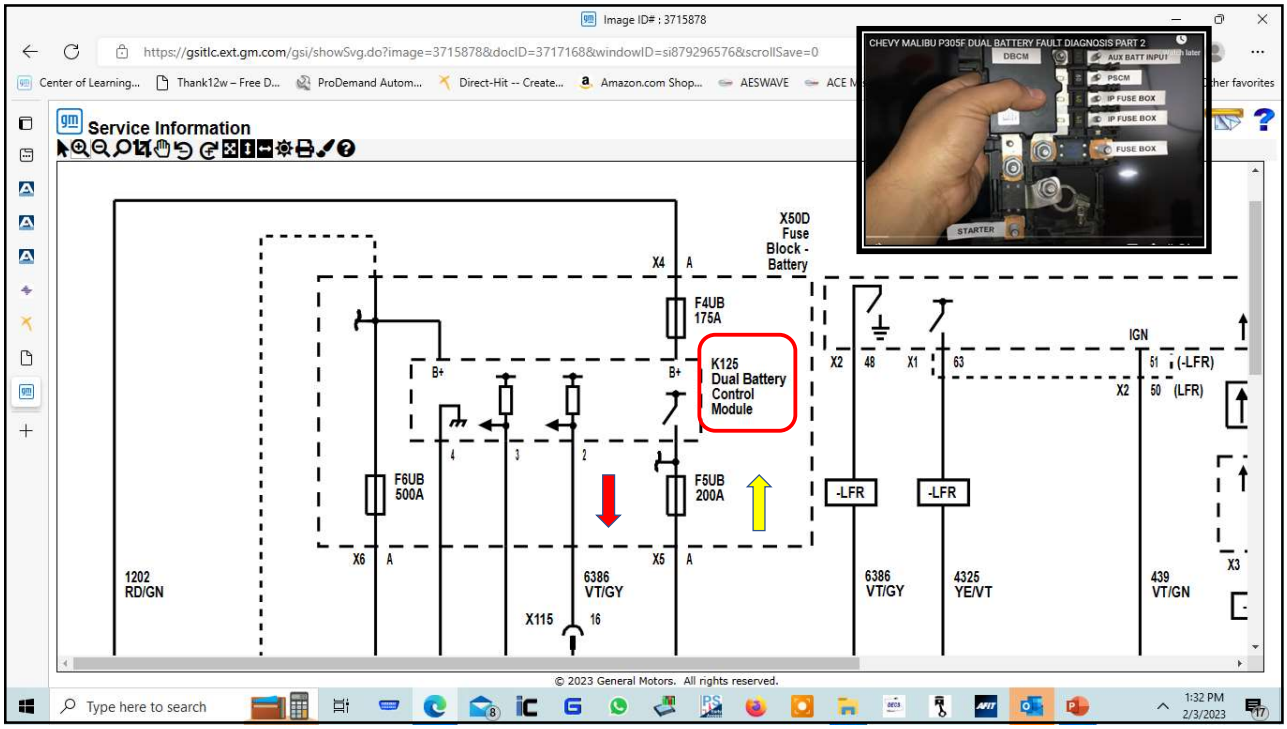


Review Wiring Diagrams and Trouble Code Charts


2015 Chevrolet Impala L4-2.5L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Service Information
CHEVY MALIBU P305F DUAL BATTERY FAULT DIAGNOSIS PART 2
X50D Fuse Block - Battery
F4UB 175A
K125 Dual Battery Control Module
F6UB 500A
F5UB 200A
IGN
-LFR
1202 RD/GN
6386 VT/GY
4325 YE/VT
439 VT/GN
X115
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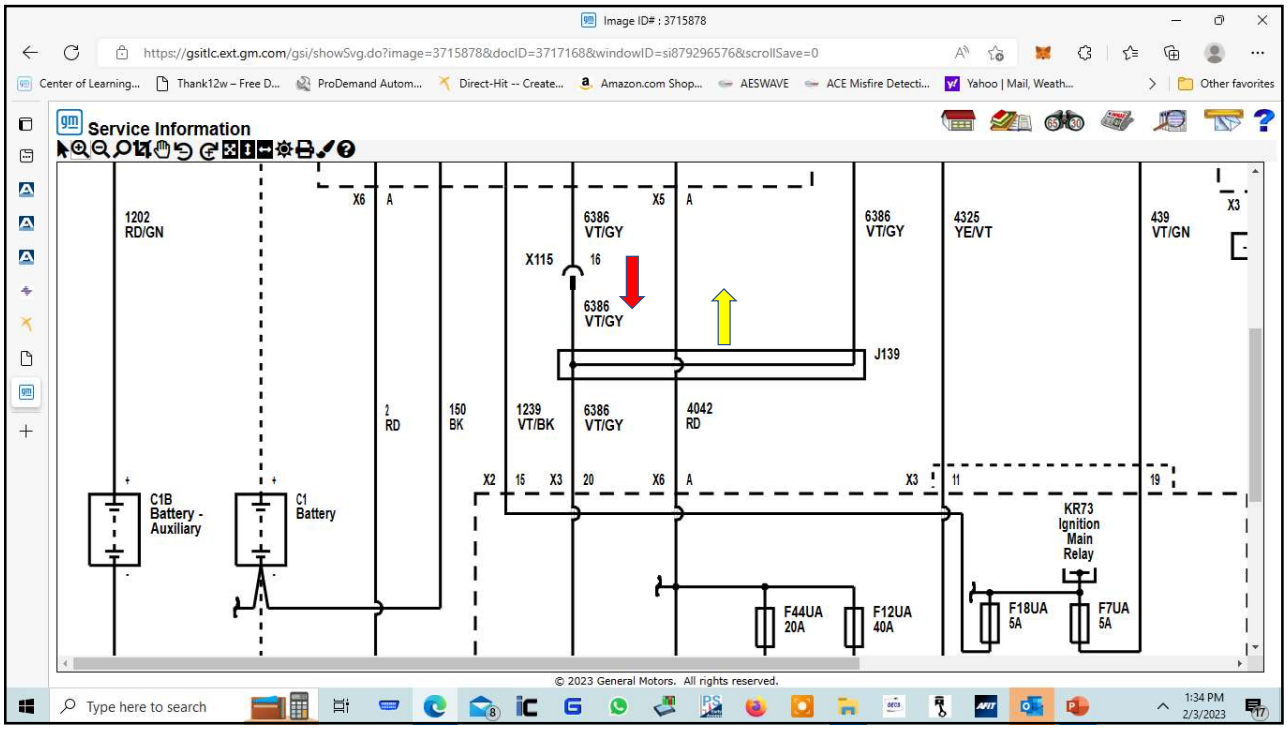
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Service Information
1202 RD/GN
X6
A
X5
6386 VT/GY
X115
16
J139
4325 YE/VT
439 VT/GN
X3
2 RD
150 BK
1239 VT/BK
4042 RD
X2
15
20
11
19
C1B Battery - Auxiliary
C1 Battery
KR73 Ignition Main Relay
F44UA 20A
F12UA 40A
F18UA 5A
F7UA 5A
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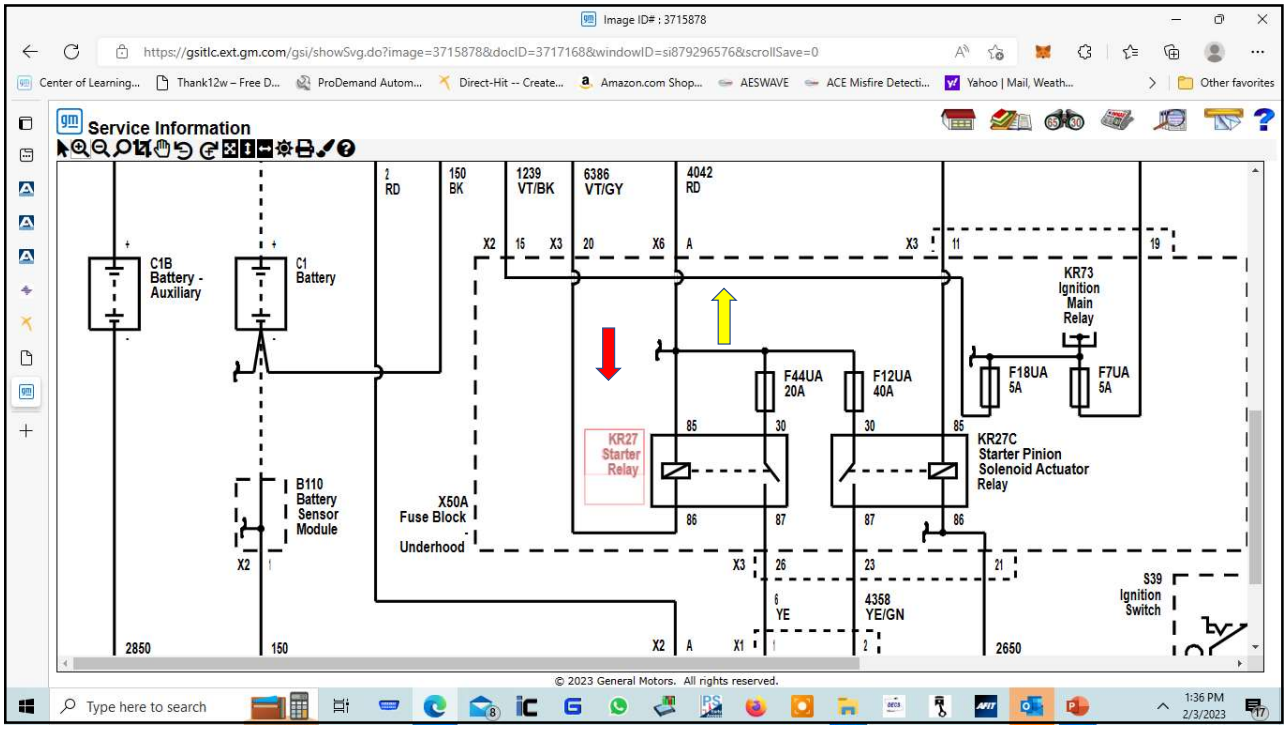
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Service Information
2 RD
150 BK
1239 VT/BK
6386 VT/GY
4042 RD
X2
15
X3
20
X6
A
11
19
C1B Battery - Auxiliary
C1 Battery
KR73 Ignition Main Relay
F44UA 20A
F12UA 40A
F18UA 5A
F7UA 5A
KR27 Starter Relay
85
30
86
87
KR27C Starter Pinion Solenoid Actuator Relay
B110 Battery Sensor Module
X50A Fuse Block Underhood
X2
1
X3
26
23
21
6 YE
4358 YE/GN
S39 Ignition Switch
2850
150
X2
A
X1
2650
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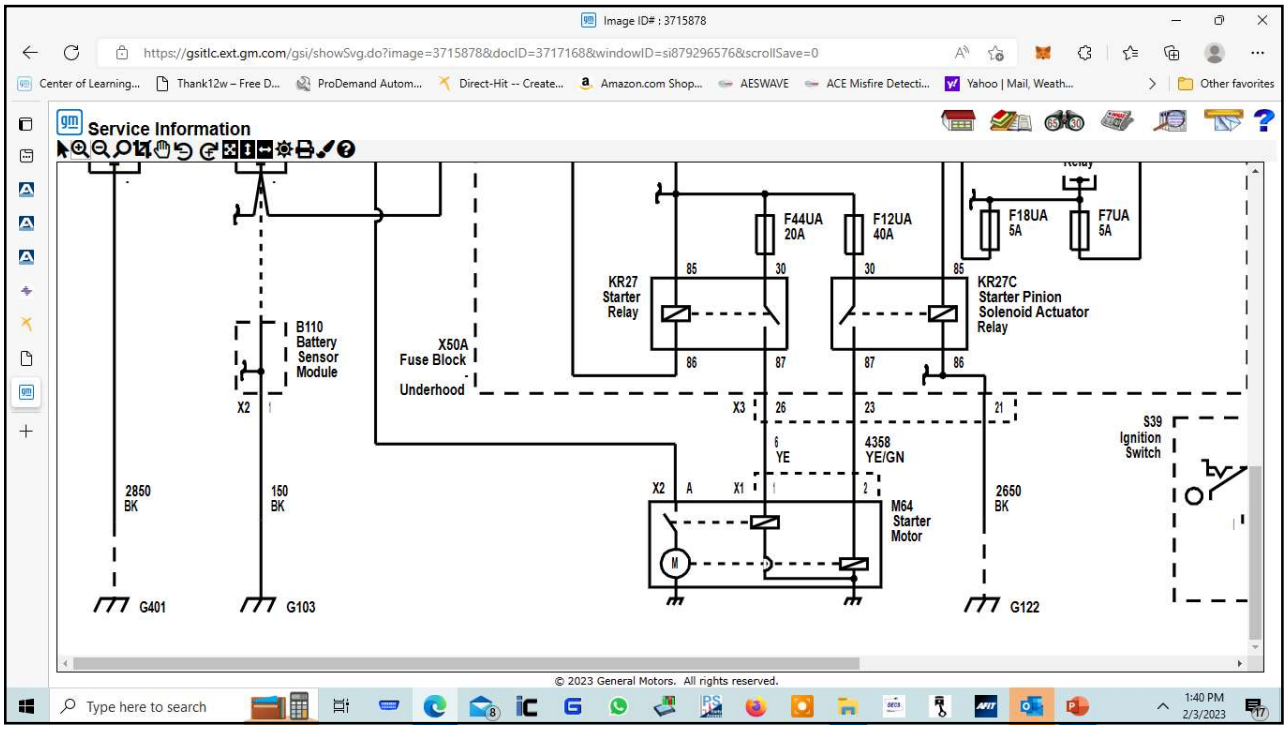
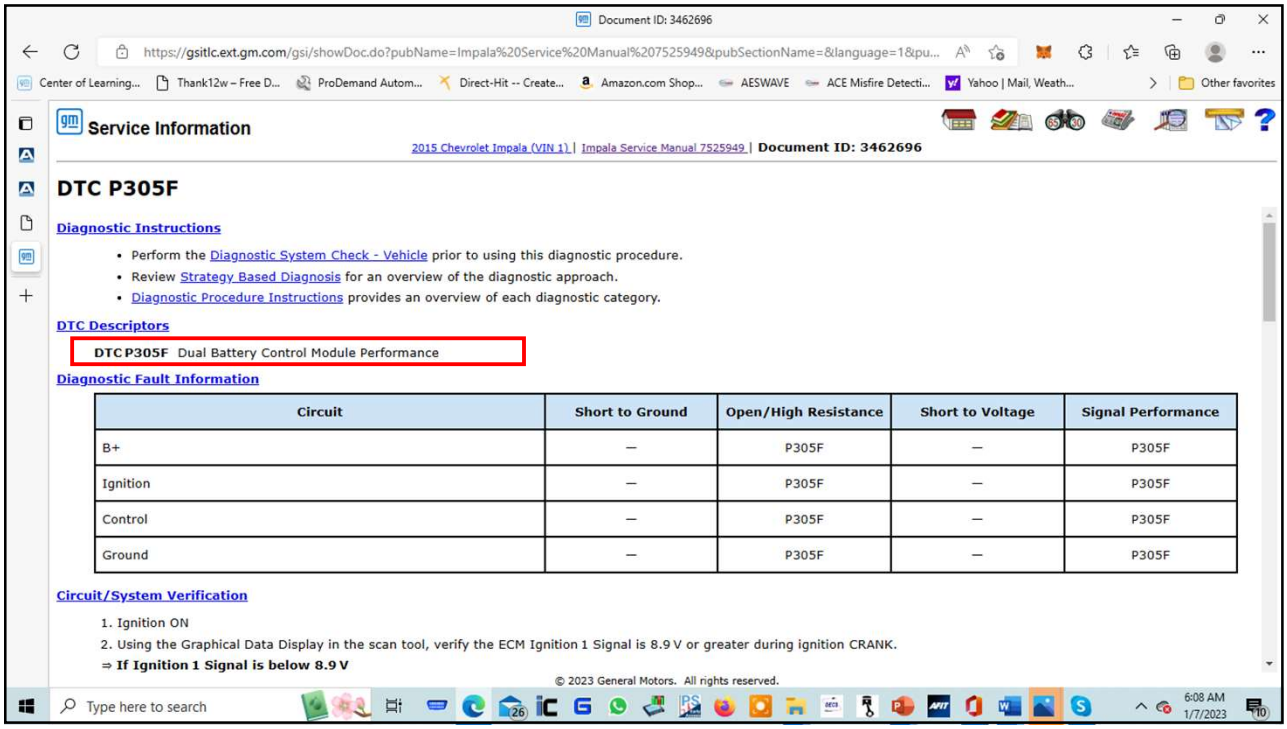
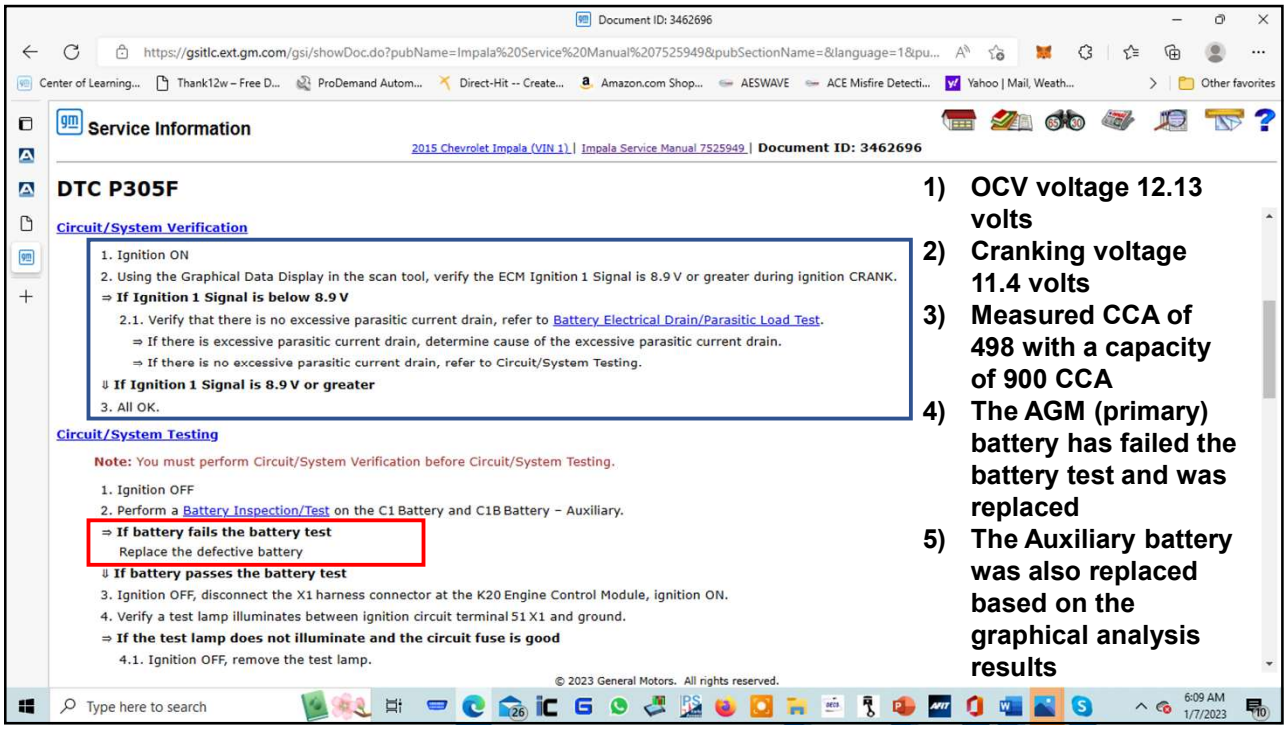
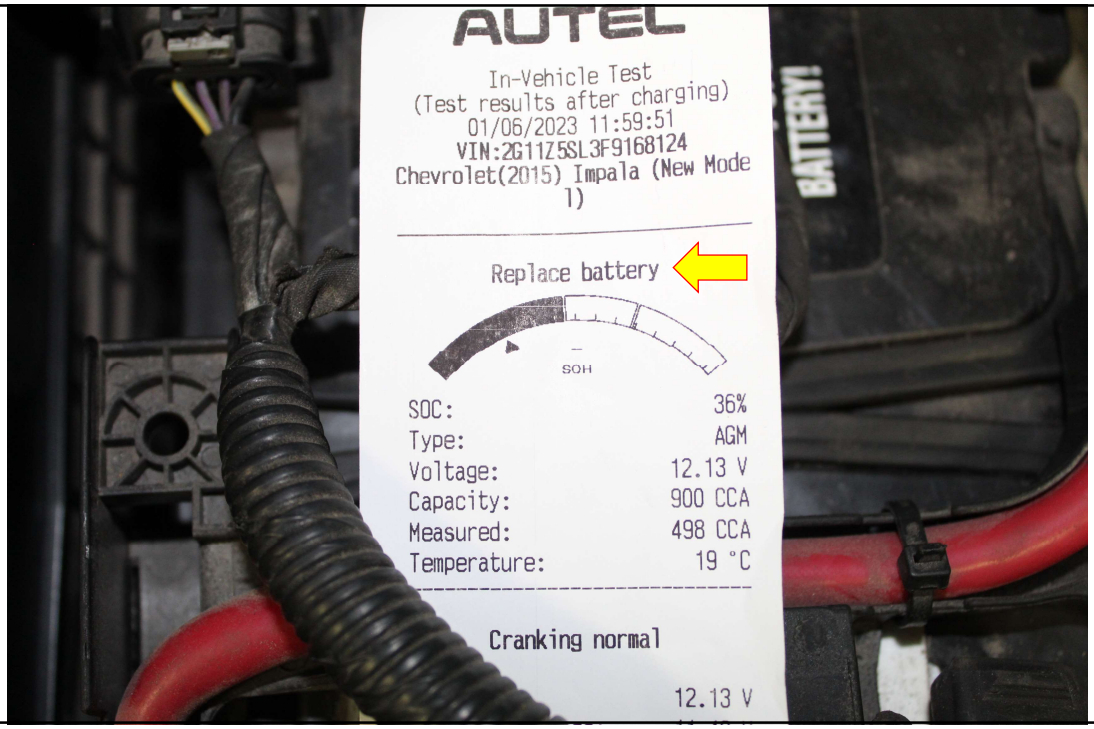




Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	–	P305F	–	P305F
Ignition	–	P305F	–	P305F
Control	–	P305F	–	P305F
Ground	–	P305F	–	P305F



1) OCV voltage 12.13 volts
2) Cranking voltage 11.4 volts
3) Measured CCA of 498 with a capacity of 900 CCA
4) The AGM (primary) battery has failed the battery test and was replaced
5) The Auxiliary battery was also replaced based on the graphical analysis results



Conclusion

- The subject vehicle is now working as designed in this particular area and the trouble code P305F is no longer stored in the controllers (PCM) memory
- Never assume that the Auxiliary Battery is OK. You should always Test.
- The customer is now asking that the GM infotainment system be evaluated and repaired

Test Procedures

Case Study No 4

TST Seminars
Professional Training for Automotive Experts

Can You Live Without Your Radio?

Code U0028

MOST Bus

Customer Concern

- The Information Display Module for the Infotainment System is Blank
- The CD Player does not appear to work as designed
- The owner would like to sell the vehicle, but the radio being inoperative is a barrier to obtaining a interested buyer

Diagnostic Process

- Step 1: Obtain Trouble Code Information
- Step 2: Determine the RPO code for the infotainment system you are working on
- Step 3: Review Description and Operation
- Step 4: Review any and all TSB's that may apply
- Step 5: Review Trouble Code Chart and Wiring Diagrams

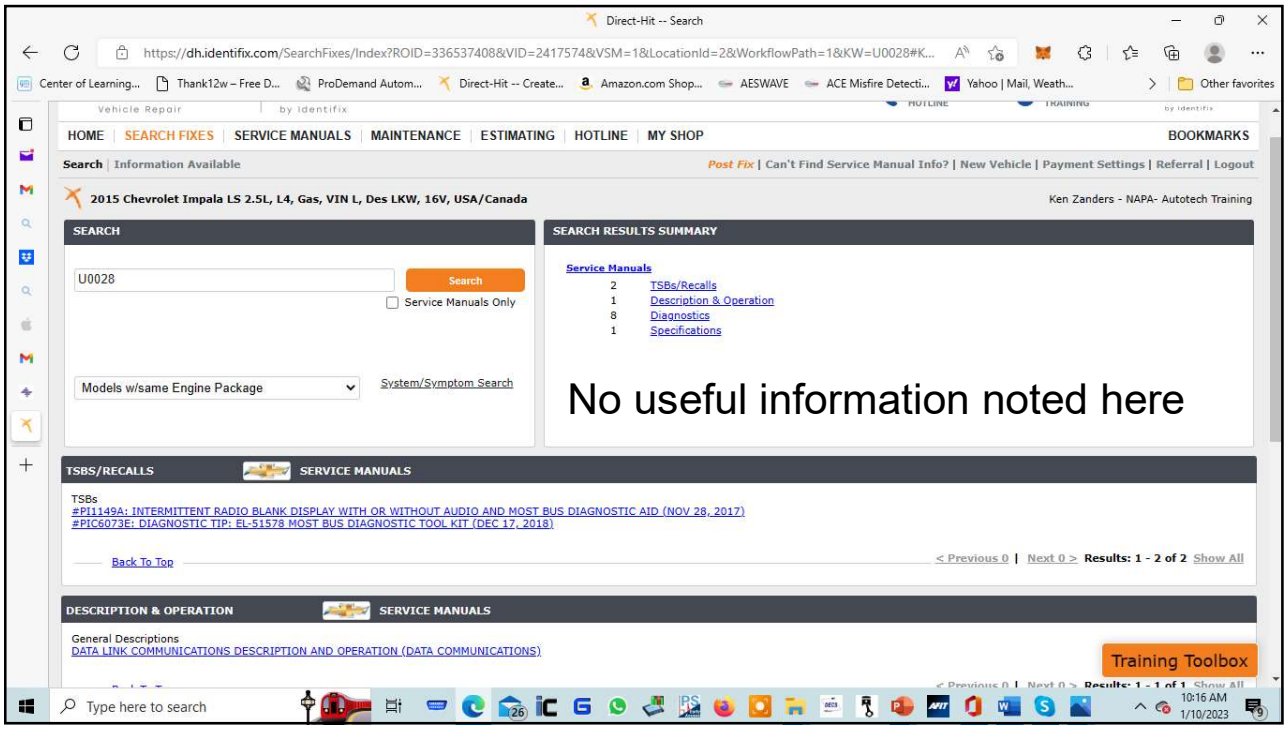
Diagnostic Process

- Step 6: Review MOST Diagnostic Starting Point
  - Is there any information available that indicates a failure status exist?
- Step 7: Verify MOST Control Circuit (MOST communication enable circuit) is good

Obtain Trouble Code Information

Review Wiring Diagrams and Trouble Code Charts

Review Technical Service Bulletins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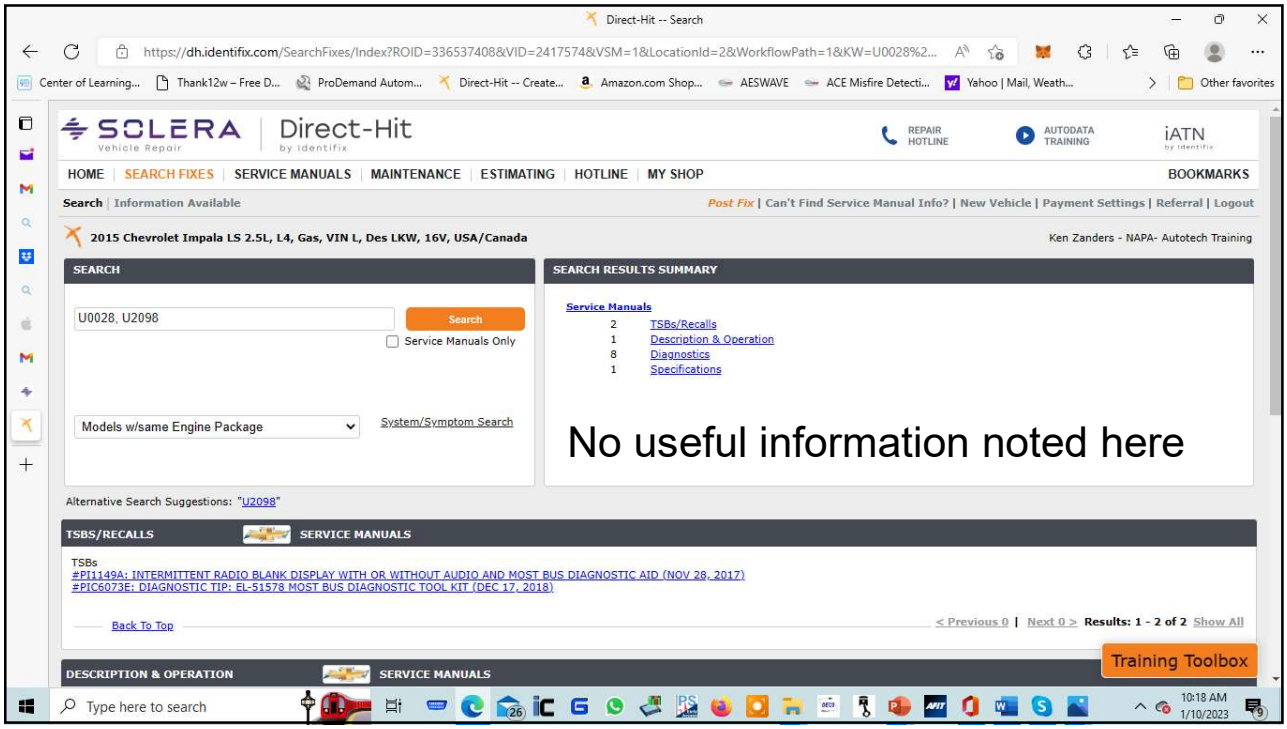
HOME | SEARCH FIXES | SERVICE MANUALS | MAINTENANCE | ESTIMATING | HOTLINE | MY SHOP
BOOKMARKS
2015 Chevrolet Impala LS 2.5L, L4, Gas, VIN L, Des LKW, 16V, USA/Canada
Ken Zanders - NAPA- Autotech Training
SEARCH
U0028
Search
Service Manuals Only
Models w/same Engine Package
System/Symptom Search
SEARCH RESULTS SUMMARY
Service Manuals
2 TSBs/Recalls
1 Description & Operation
8 Diagnostics
1 Specifications
No useful information noted here
TSBS/RECALLS
SERVICE MANUALS
TSBs
#PI1149A: INTERMITTENT RADIO BLANK DISPLAY WITH OR WITHOUT AUDIO AND MOST BUS DIAGNOSTIC AID (NOV 28, 2017)
#PIC6073E: DIAGNOSTIC TIP: EL-51578 MOST BUS DIAGNOSTIC TOOL KIT (DEC 17, 2018)
Back To Top
Results: 1 - 2 of 2
DESCRIPTION & OPERATION
SERVICE MANUALS
General Descriptions
DATA LINK COMMUNICATIONS DESCRIPTION AND OPERATION (DATA COMMUNICATIONS)
Training Toolbox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BOOKMARKS
2015 Chevrolet Impala LS 2.5L, L4, Gas, VIN L, Des LKW, 16V, USA/Canada
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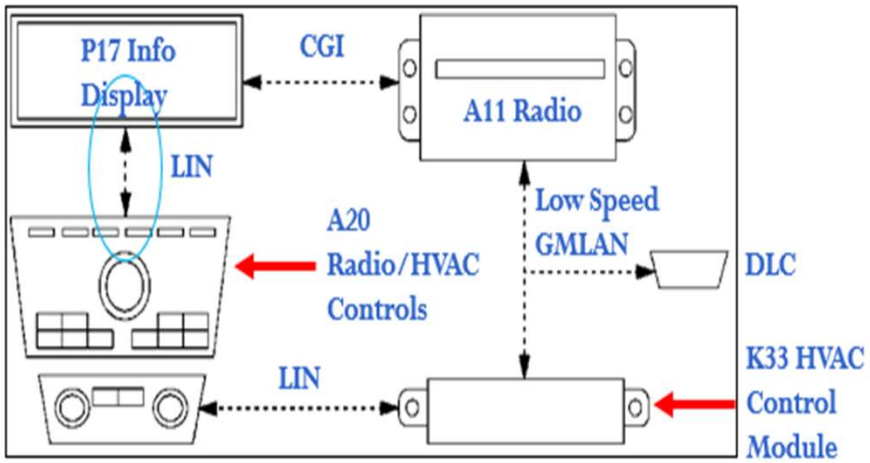
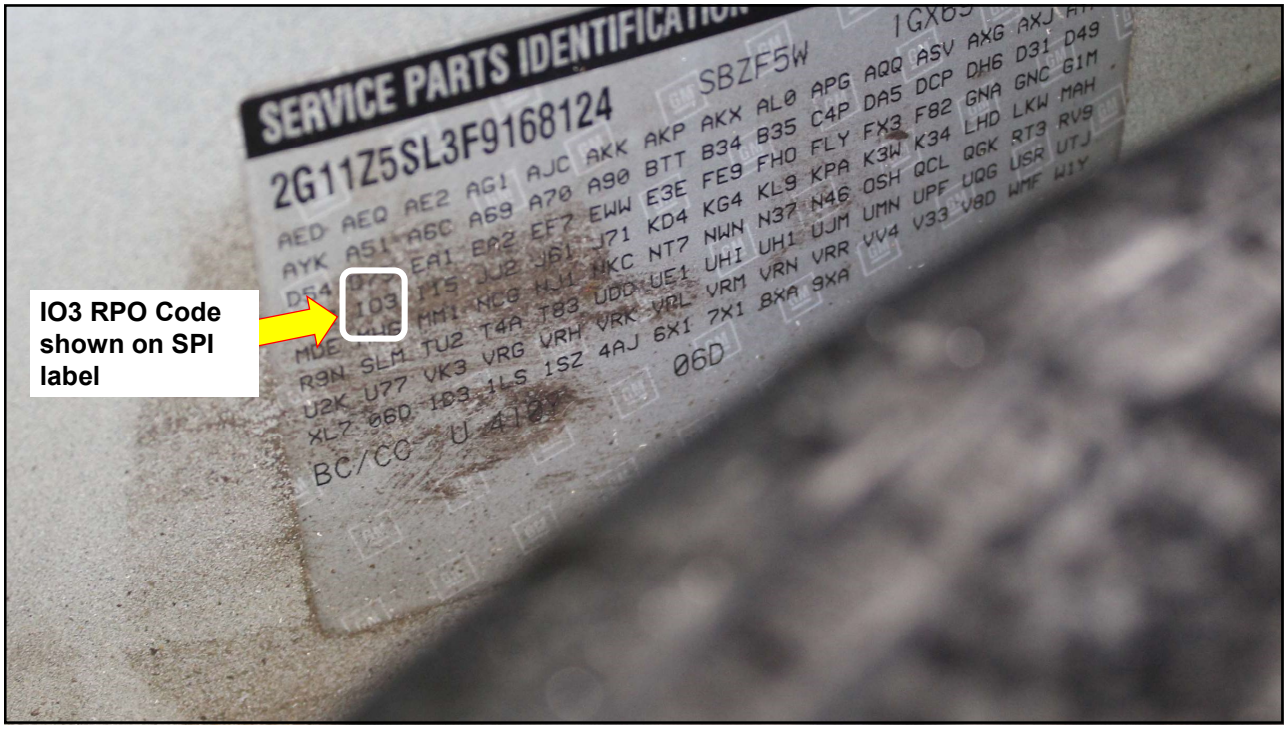
U0028, U2098
Search
Service Manuals Only
Models w/same Engine Package
System/Symptom Search
SEARCH RESULTS SUMMARY
Service Manuals
2 TSBs/Recalls
1 Description & Operation
8 Diagnostics
1 Specifications
No useful information noted here
Alternative Search Suggestions: "U2098"
TSBS/RECALLS
SERVICE MANUALS
TSBs
#PI1149A: INTERMITTENT RADIO BLANK DISPLAY WITH OR WITHOUT AUDIO AND MOST BUS DIAGNOSTIC AID (NOV 28, 2017)
#PIC6073E: DIAGNOSTIC TIP: EL-51578 MOST BUS DIAGNOSTIC TOOL KIT (DEC 17, 2018)
Back To Top
Results: 1 - 2 of 2
DESCRIPTION & OPERATION
SERVICE MANUALS
Training Toolbox

Basic View of Components



Determine the RPO Code(s)

GM Infotainment System


SERVICE PARTS IDENTIFICATION
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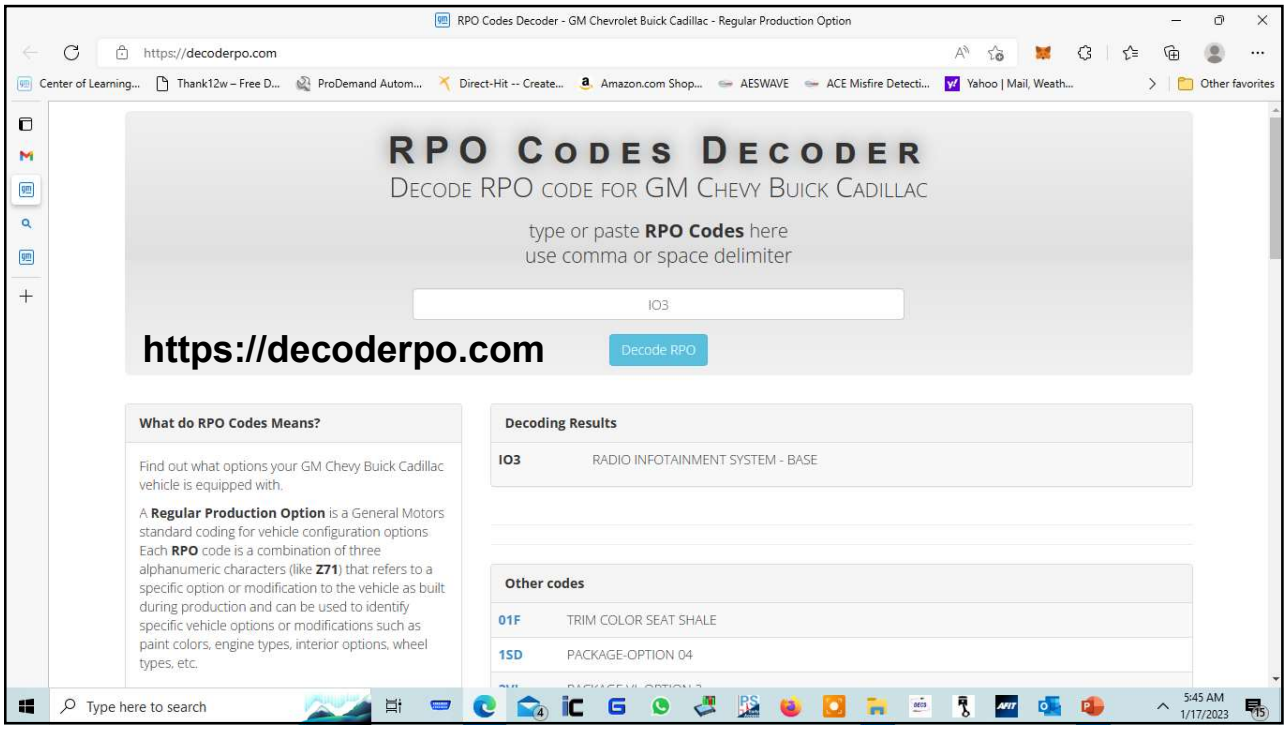
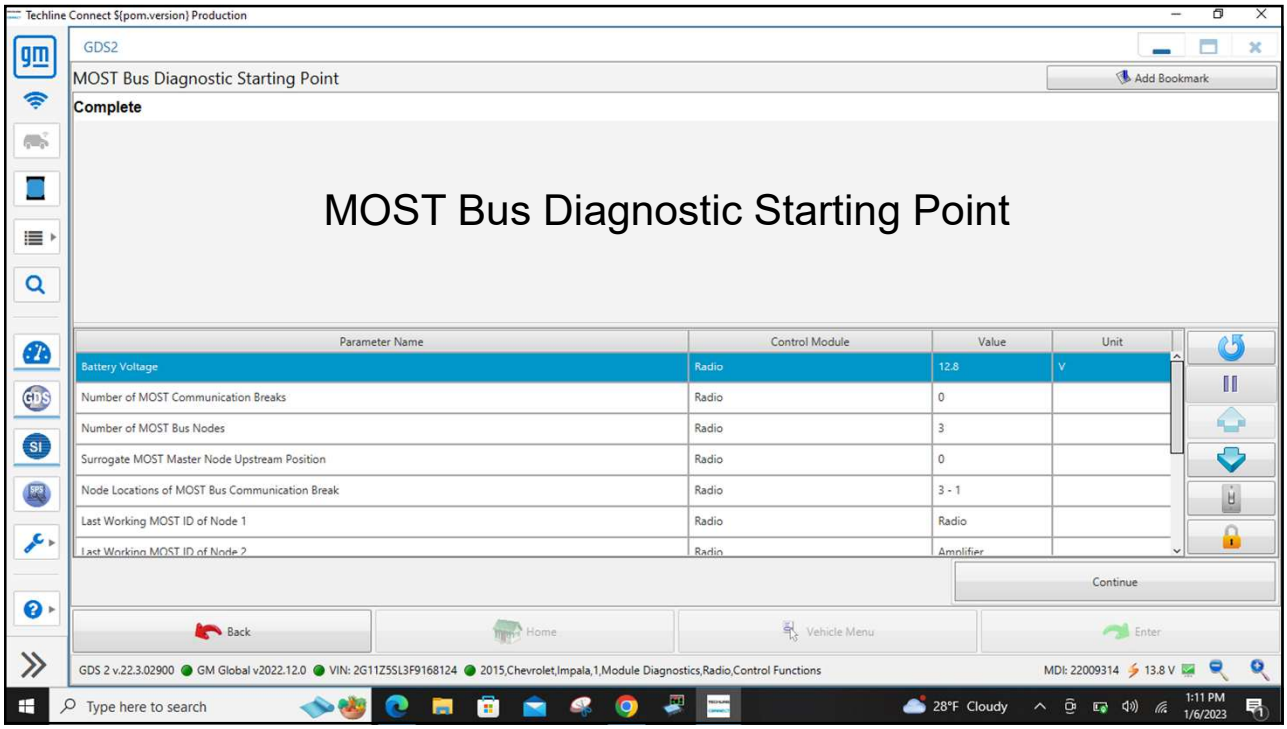
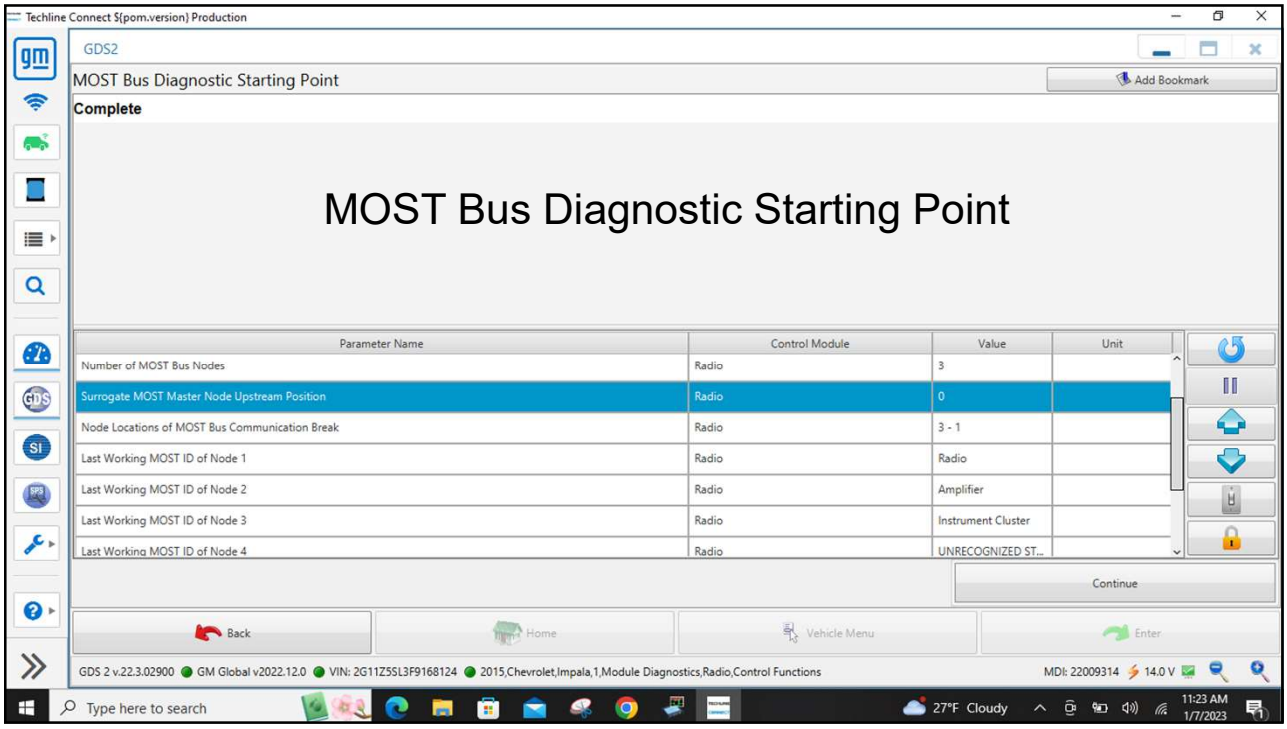
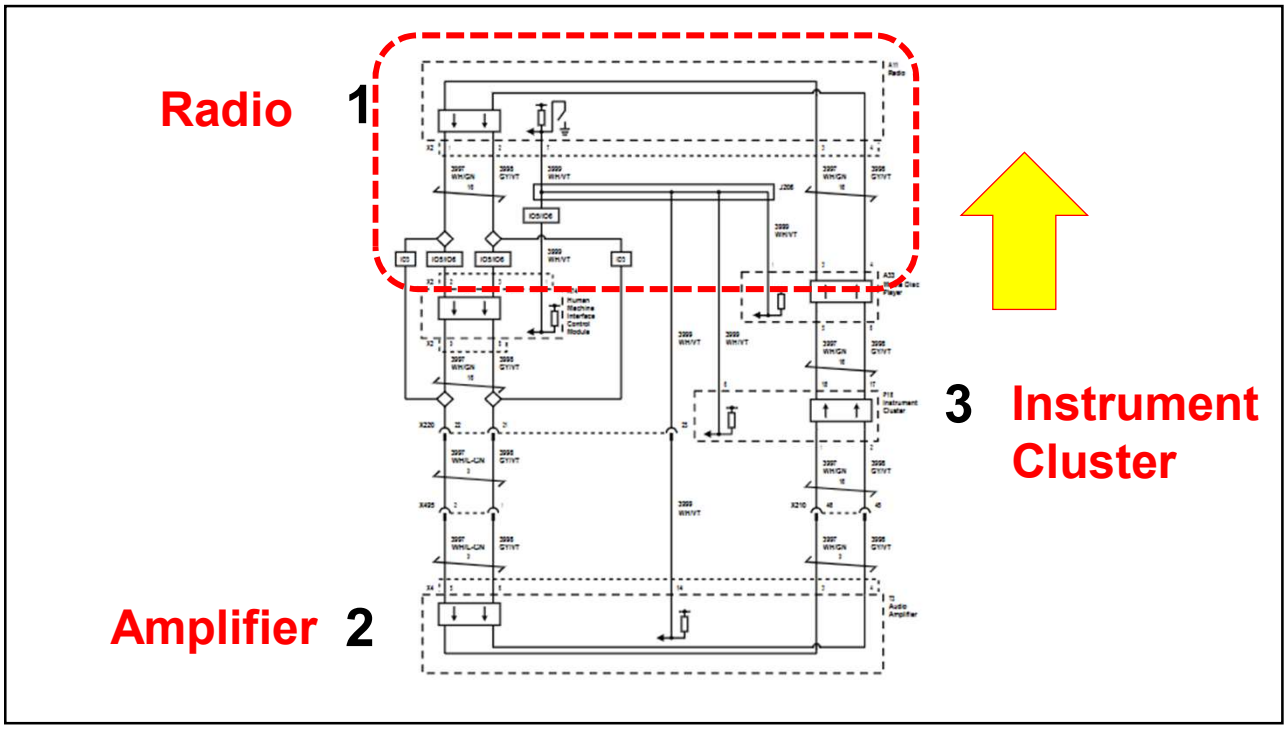
SBZF5W
1GX65
AED AEQ AE2 AG1 AJC AKK AKP AKX AL0 APG AQQ ASV AXG AXJ
AYK A51 A6C A69 A70 A90 BTT B34 B35 C4P DA5 DCP DH6 D31 D49
EA1 BA2 EF7 EWW E3E FE9 FH0 FLY FX3 F82 GNA GNC G1M
J2 J61 J71 KD4 KG4 KL9 KPA K3W K34 LHD LKW MAH
MM1 NC0 NJ1 NKC NT7 NWN N37 N46 OSH QCL QGK RT3 RV9
R9N SLM TU2 T4A T83 UDD UE1 UHI UH1 UJM UMN UPF UQG USR UTJ
U2K U77 VK3 VRG VRH VRK VRL VRM VRN VRR VV4 V33 V8D WMF WIY
XL7 06D 1D3 1LS 1SZ 4AJ 6X1 7X1 8XA 9XA
BC/CC U 4T2
06D
IO3 RPO Code shown on SPI label

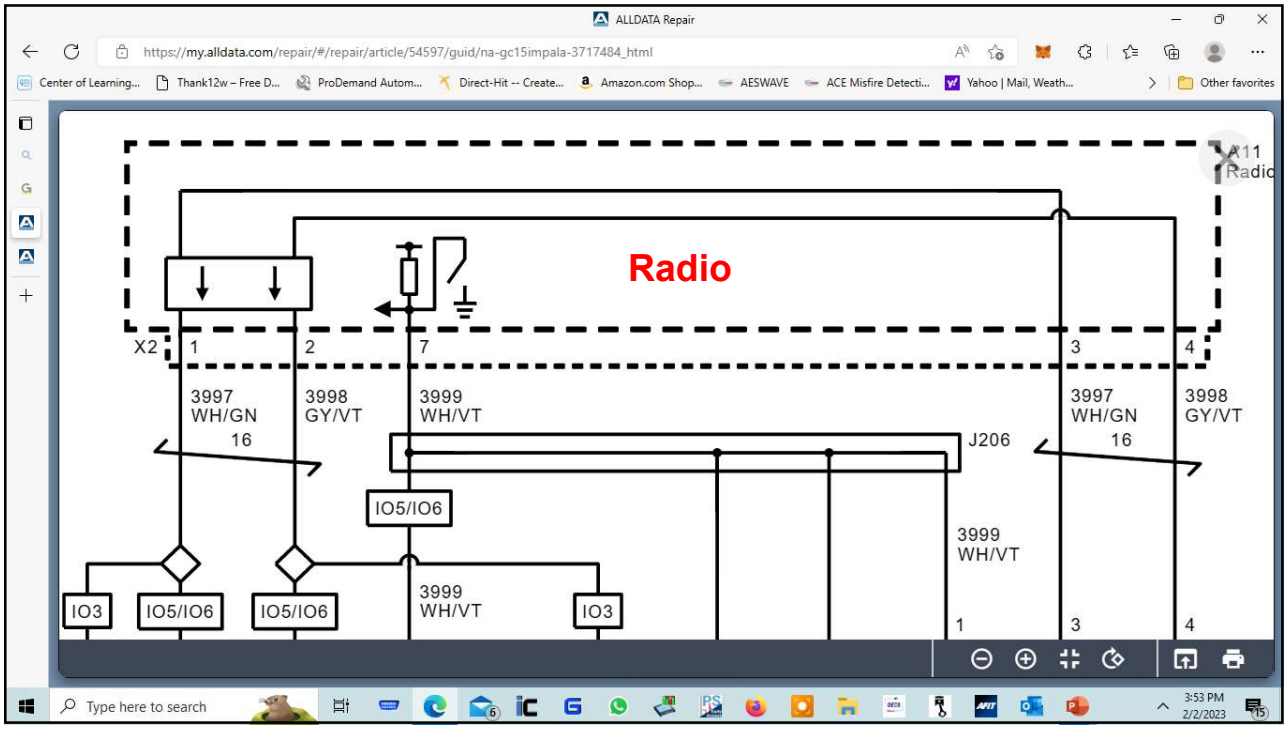


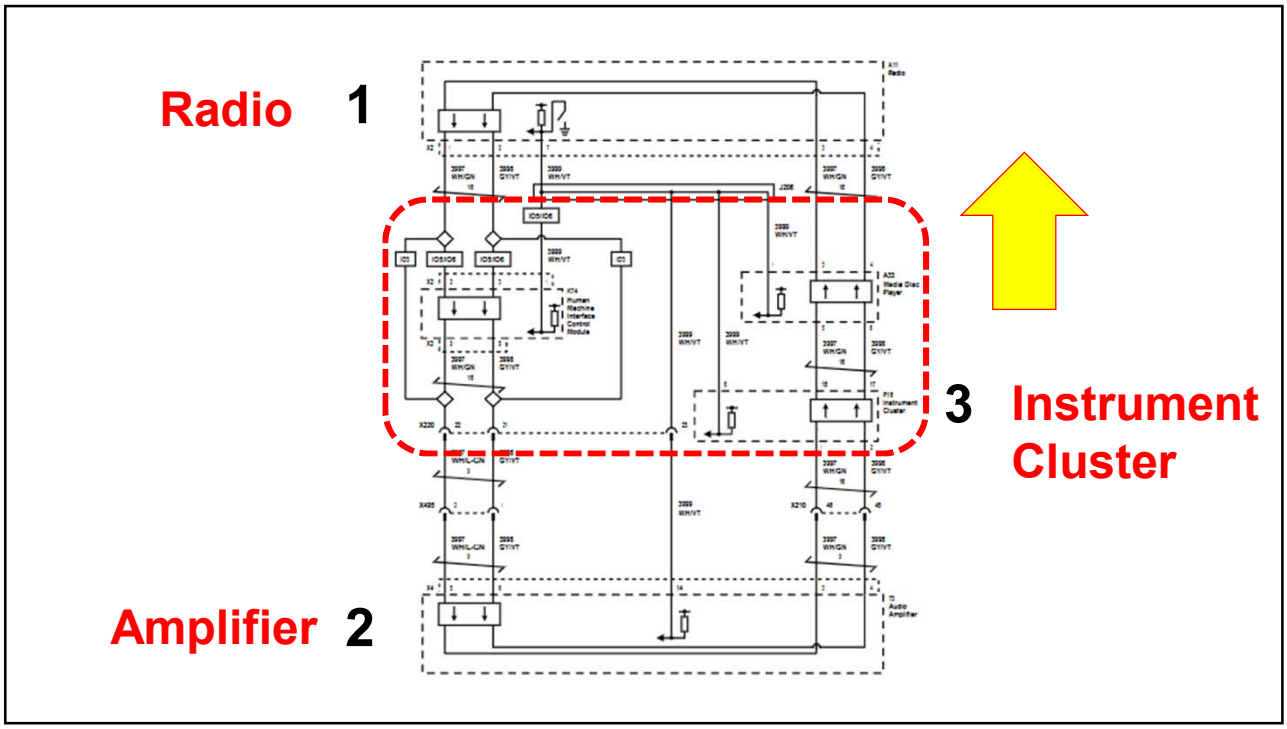
MOST Diagnostic Starting Point

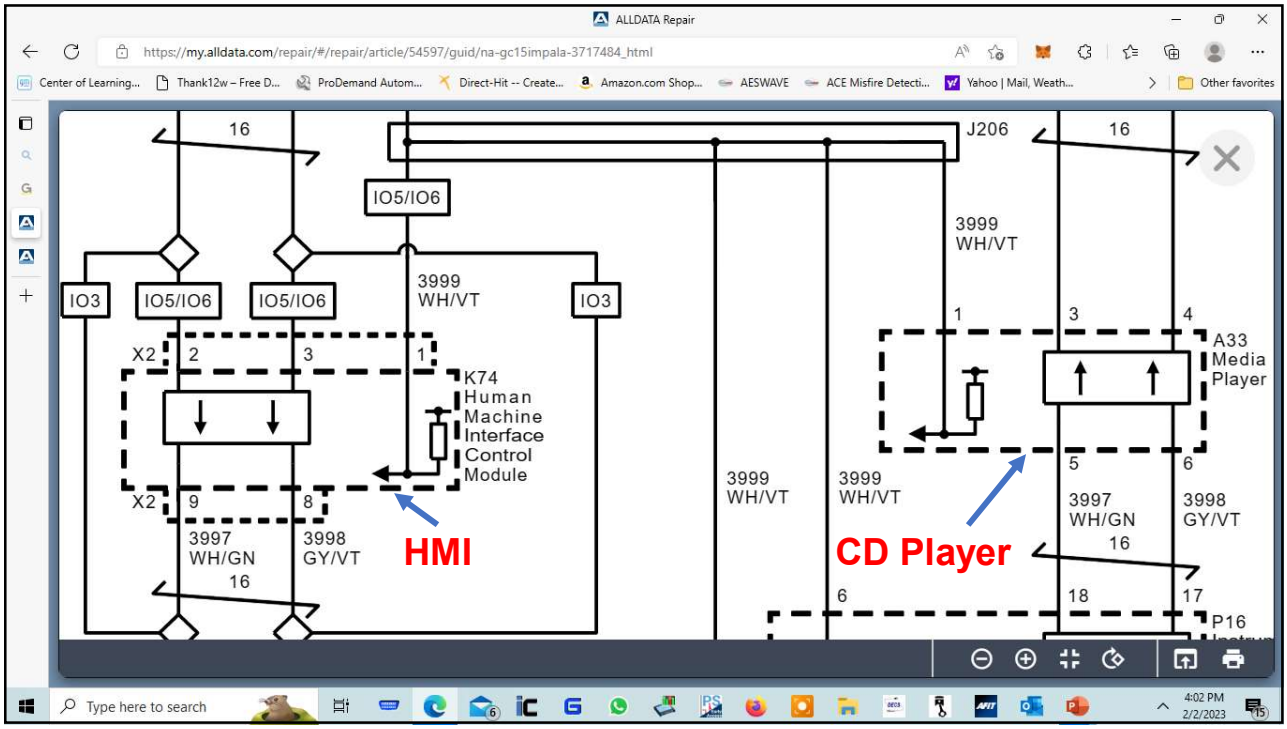

Techline Connect ${pom.version} Production
GDS2
MOST Bus Diagnostic Starting Point
Add Bookmark
Complete
MOST Bus Diagnostic Starting Point
Parameter Name
Control Module
Value
Unit
Battery Voltage
Radio
12.8
V
Number of MOST Communication Breaks
Radio
0
Number of MOST Bus Nodes
Radio
3
Surrogate MOST Master Node Upstream Position
Radio
0
Node Locations of MOST Bus Communication Break
Radio
3 - 1
Last Working MOST ID of Node 1
Radio
Radio
Last Working MOST ID of Node 2
Radio
Amplifier
Continue
Back
Home
Vehicle Menu
Enter
GDS 2 v.22.3.02900
GM Global v2022.12.0
VIN: 2G11Z5SL3F9168124
2015,Chevrolet,Impala,1,Module Diagnostics,Radio,Control Functions
MDI: 22009314
13.8 V
Type here to search
28°F Cloudy
1:11 PM
1/6/2023

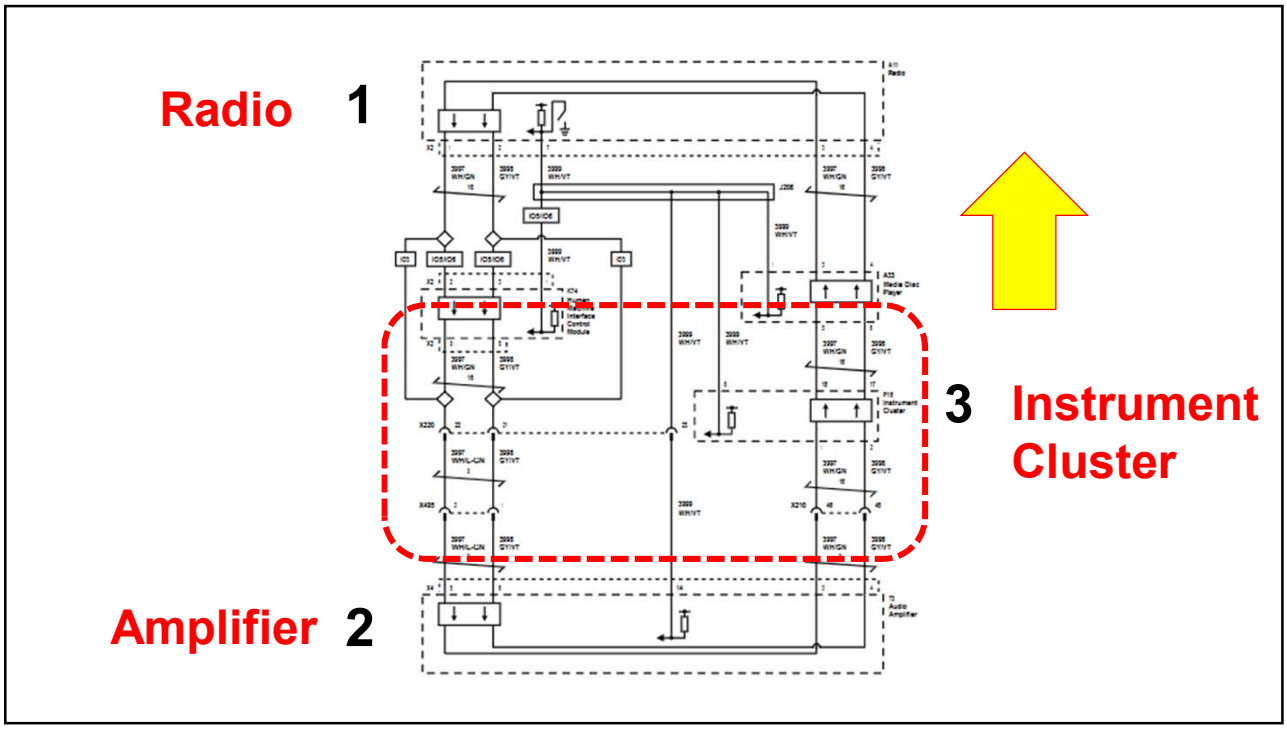

Techline Connect ${pom.version} Production
GDS2
MOST Bus Diagnostic Starting Point
Add Bookmark
Complete
MOST Bus Diagnostic Starting Point
Parameter Name
Control Module
Value
Unit
Number of MOST Bus Nodes
Radio
3
Surrogate MOST Master Node Upstream Position
Radio
0
Node Locations of MOST Bus Communication Break
Radio
3 - 1
Last Working MOST ID of Node 1
Radio
Radio
Last Working MOST ID of Node 2
Radio
Amplifier
Last Working MOST ID of Node 3
Radio
Instrument Cluster
Last Working MOST ID of Node 4
Radio
UNRECOGNIZED ST...
Continue
Back
Home
Vehicle Menu
Enter
GDS 2 v.22.3.02900
GM Global v2022.12.0
VIN: 2G11Z5SL3F9168124
2015,Chevrolet,Impala,1,Module Diagnostics,Radio,Control Functions
MDI: 22009314
14.0 V
Type here to search
27°F Cloudy
11:23 AM
1/7/2023

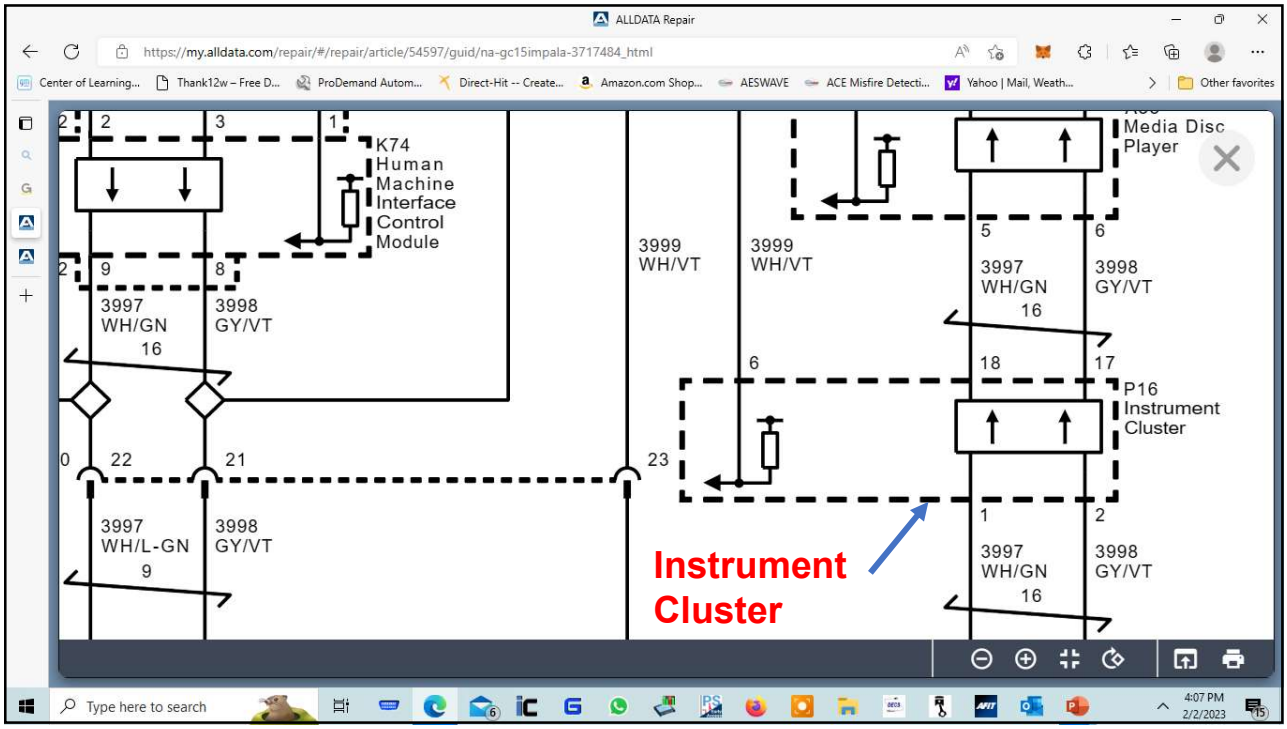

Radio
1
Amplifier
2
3
Instrument
Cluster

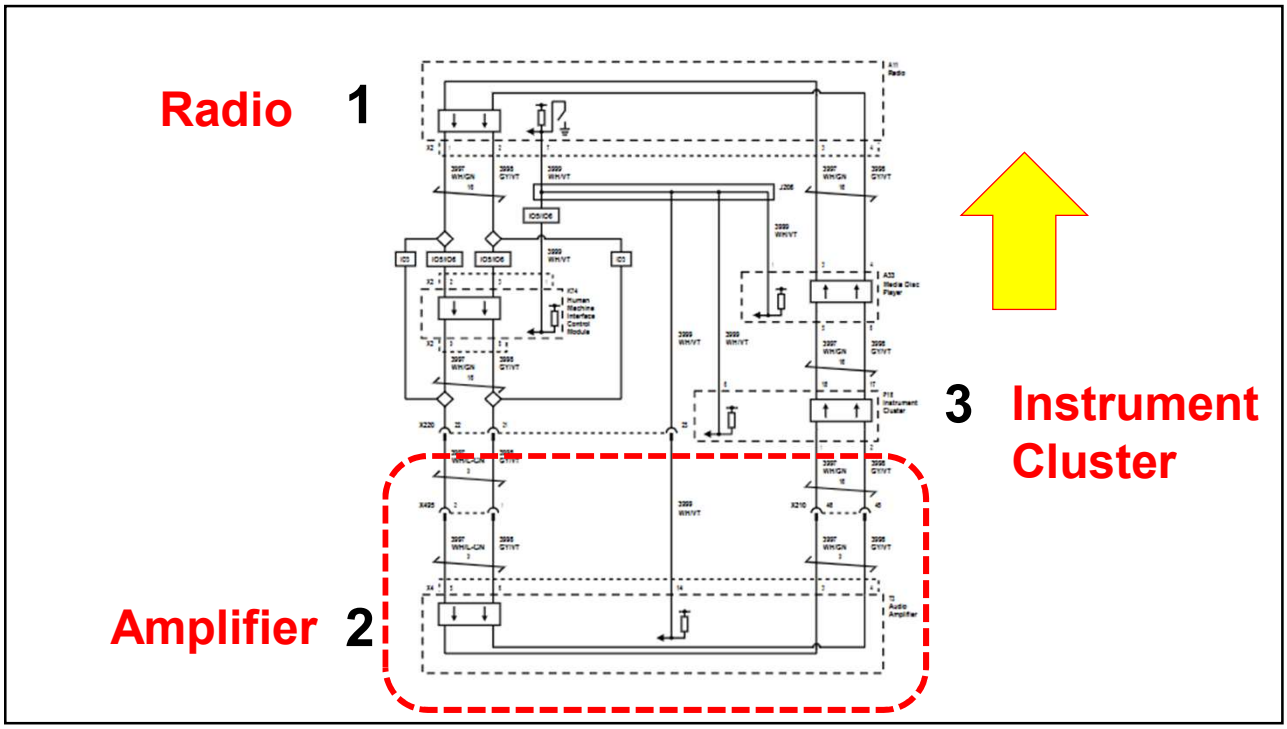

ALLDATA Repair
https://my.alldata.com/repair/#/repair/article/54597/guid/na-gc15impala-3717484_html
Radio
X2
1
2
7
3
4
3997
WH/GN
16
3998
GY/VT
3999
WH/VT
J206
IO5/IO6
IO3
IO5/IO6
IO5/IO6
3999
WH/VT
IO3
Type here to search

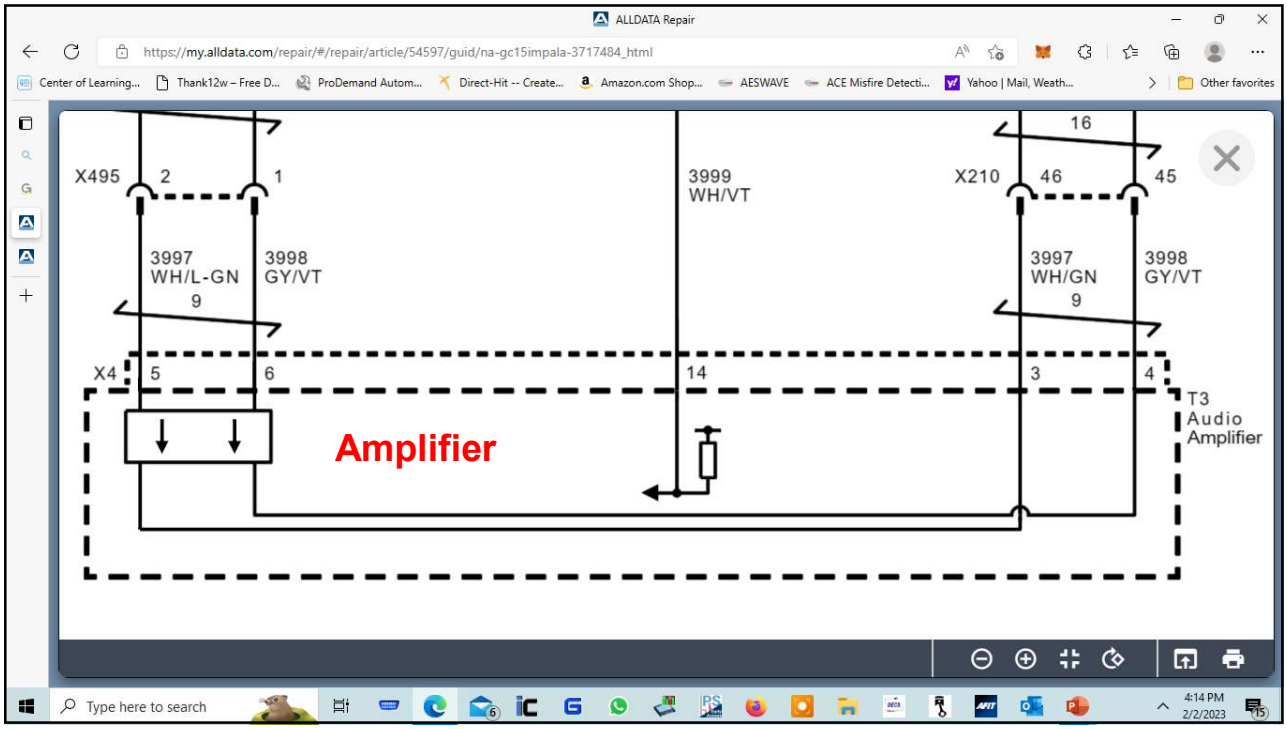

Radio 1
3 Instrument Cluster
Amplifier 2


ALLDATA Repair
https://my.alldata.com/repair/#/repair/article/54597/guid/na-gc15impala-3717484_html
16
IO5/IO6
IO3
IO5/IO6
IO5/IO6
3999 WH/VT
IO3
X2
2
3
1
K74 Human Machine Interface Control Module
X2
9
8
3997 WH/GN
16
3998 GY/VT
HMI
J206
16
3999 WH/VT
1
3
4
A33 Media Player
3999 WH/VT
3999 WH/VT
5
6
3997 WH/GN
16
3998 GY/VT
CD Player
6
18
17
P16

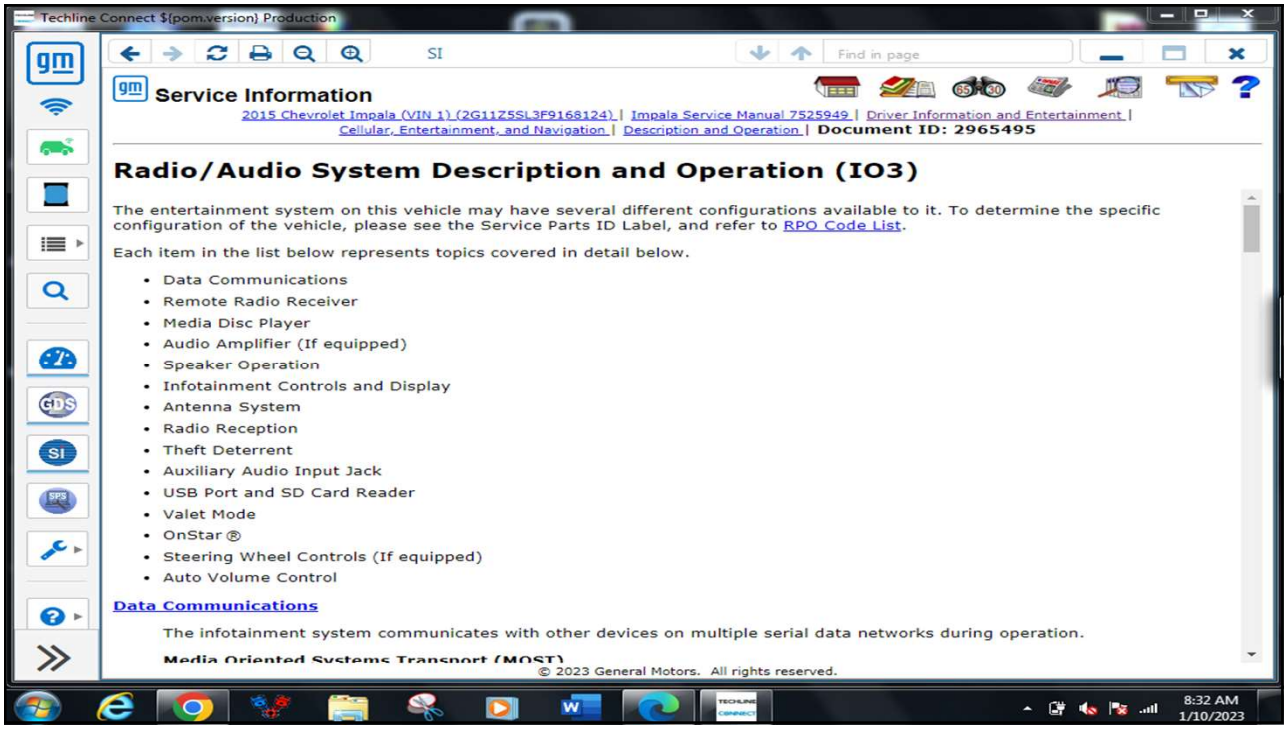

Radio 1
3 Instrument Cluster
Amplifier 2


ALLDATA Repair
https://my.alldata.com/repair/#/repair/article/54597/guid/na-gc15impala-3717484_html
K74 Human Machine Interface Control Module
Media Disc Player
P16 Instrument Cluster
3999 WH/VT
3999 WH/VT
3997 WH/GN 16
3998 GY/VT
3997 WH/L-GN 9
3998 GY/VT
3997 WH/GN 16
3998 GY/VT
Instrument Cluster
Type here to search
4:07 PM 2/2/2023

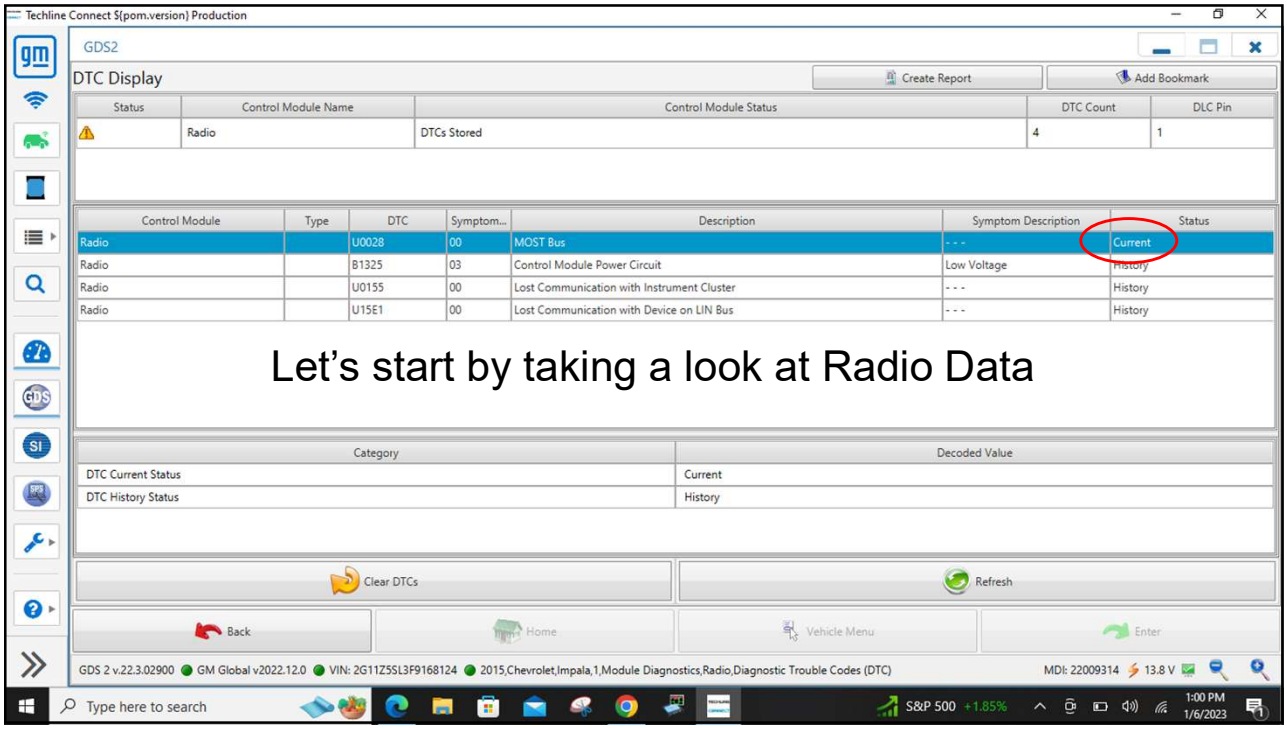

Radio 1
3 Instrument Cluster
Amplifier 2

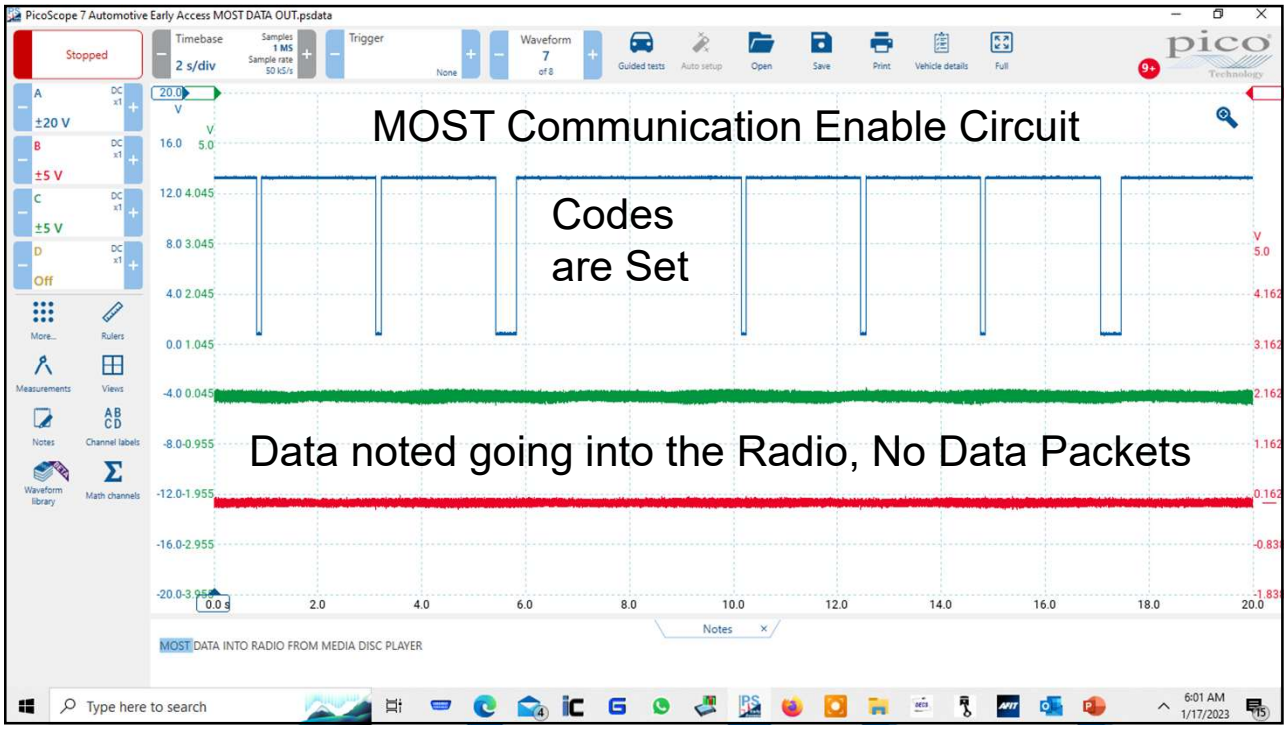

ALLDATA Repair
https://my.alldata.com/repair/#/repair/article/54597/guid/na-gc15impala-3717484_html
X495
2
1
3997
WH/L-GN
9
3998
GY/VT
3999
WH/VT
X210
16
46
45
3997
WH/GN
9
3998
GY/VT
X4
5
6
14
3
4
Amplifier
T3
Audio
Amplifier
Type here to search
4:14 PM
2/2/2023

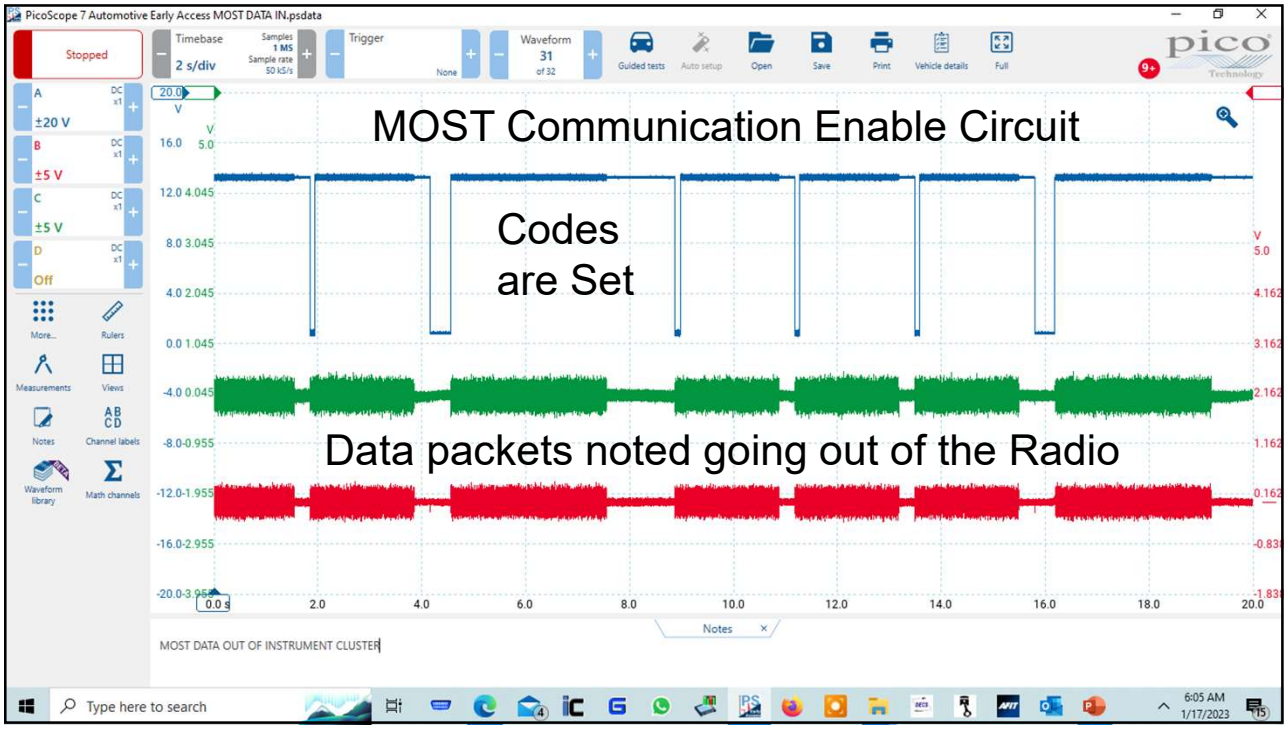
Description and Operation



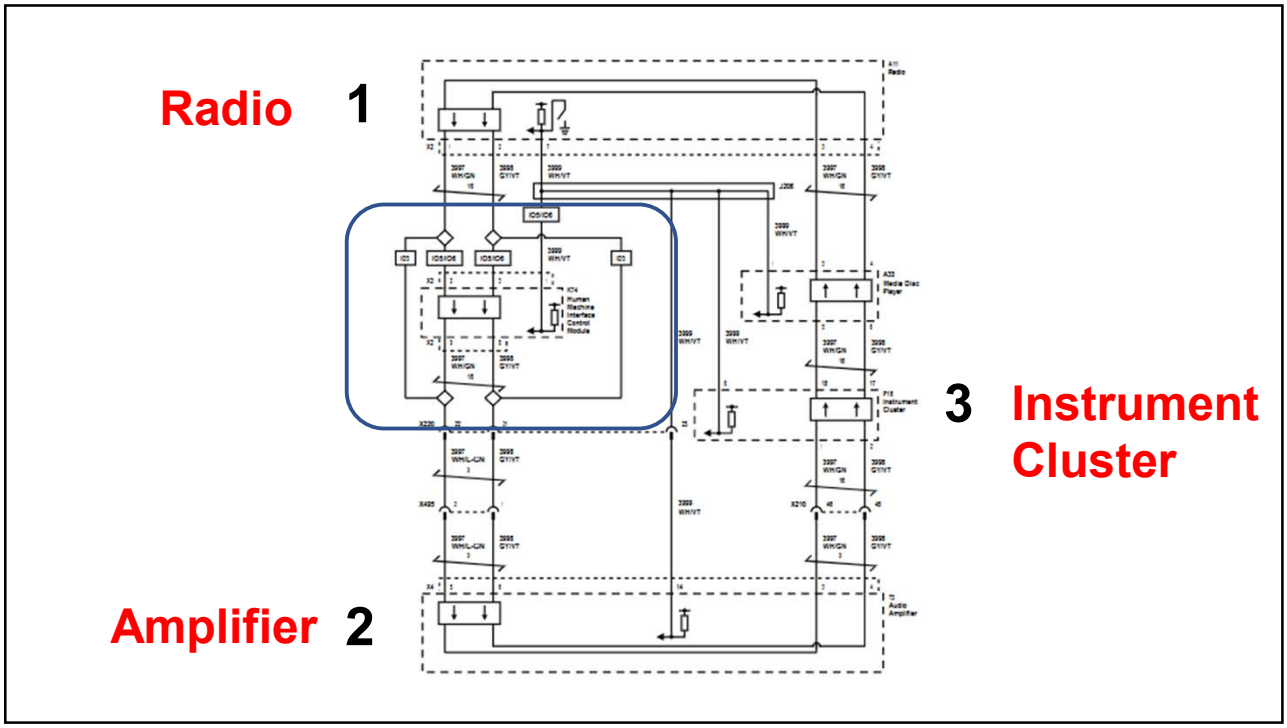
Obtain Trouble Code Information



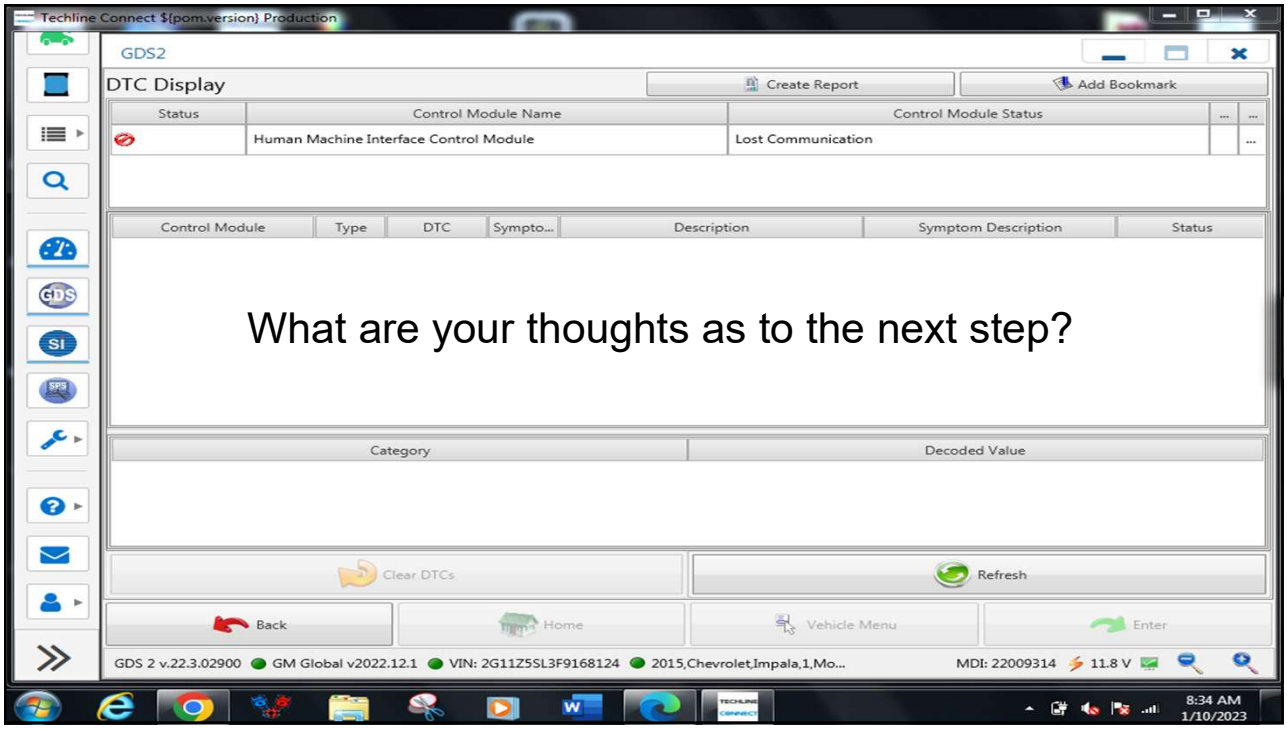

PicoScope 7 Automotive Early Access MOST DATA OUT.psdata
MOST Communication Enable Circuit
Codes
are Set
Data noted going into the Radio, No Data Packets
MOST DATA INTO RADIO FROM MEDIA DISC PLAYER

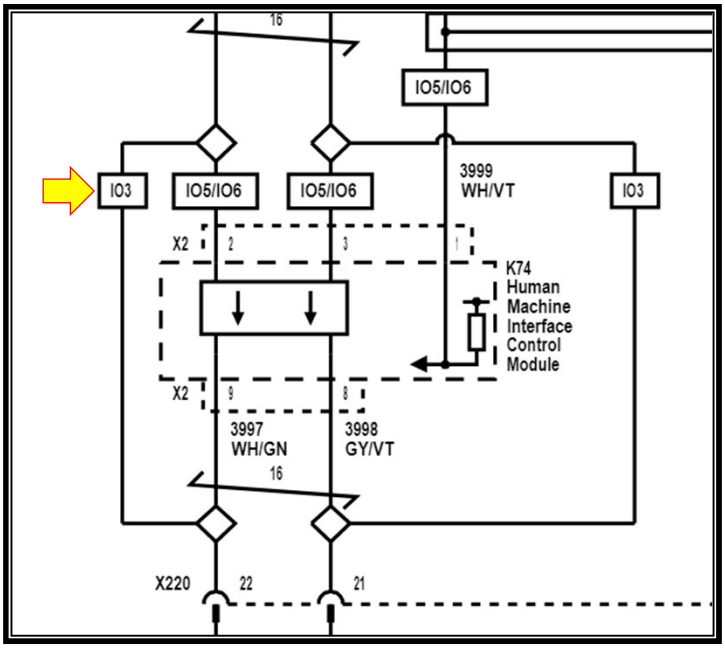

PicoScope 7 Automotive Early Access MOST DATA IN.psdata
MOST Communication Enable Circuit
Codes
are Set
Data packets noted going out of the Radio
MOST DATA OUT OF INSTRUMENT CLUSTER


Radio
SATELLITE RADIO
AINV730P
USB
2A

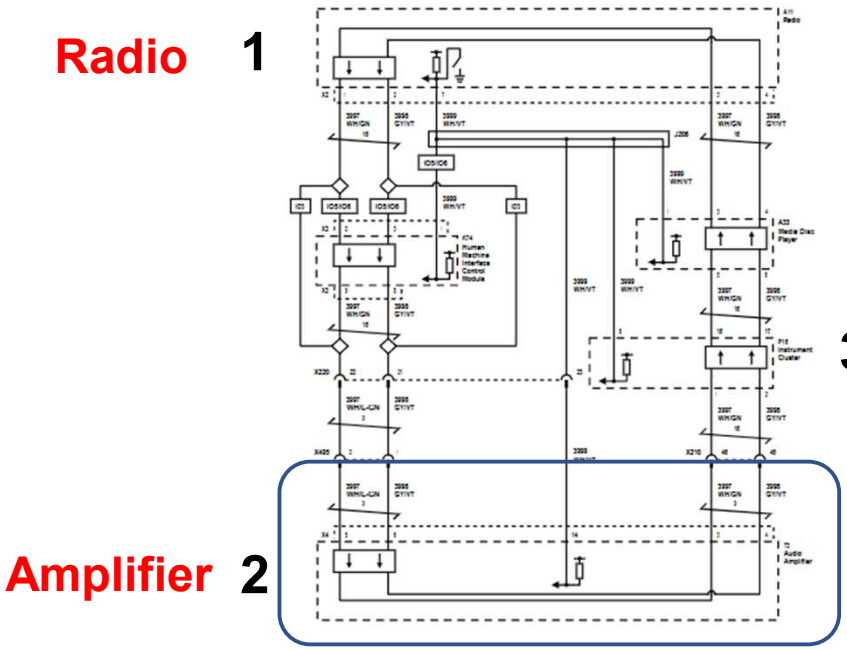

Radio 1
Amplifier 2
3 Instrument Cluster

Human Machine Interface Codes

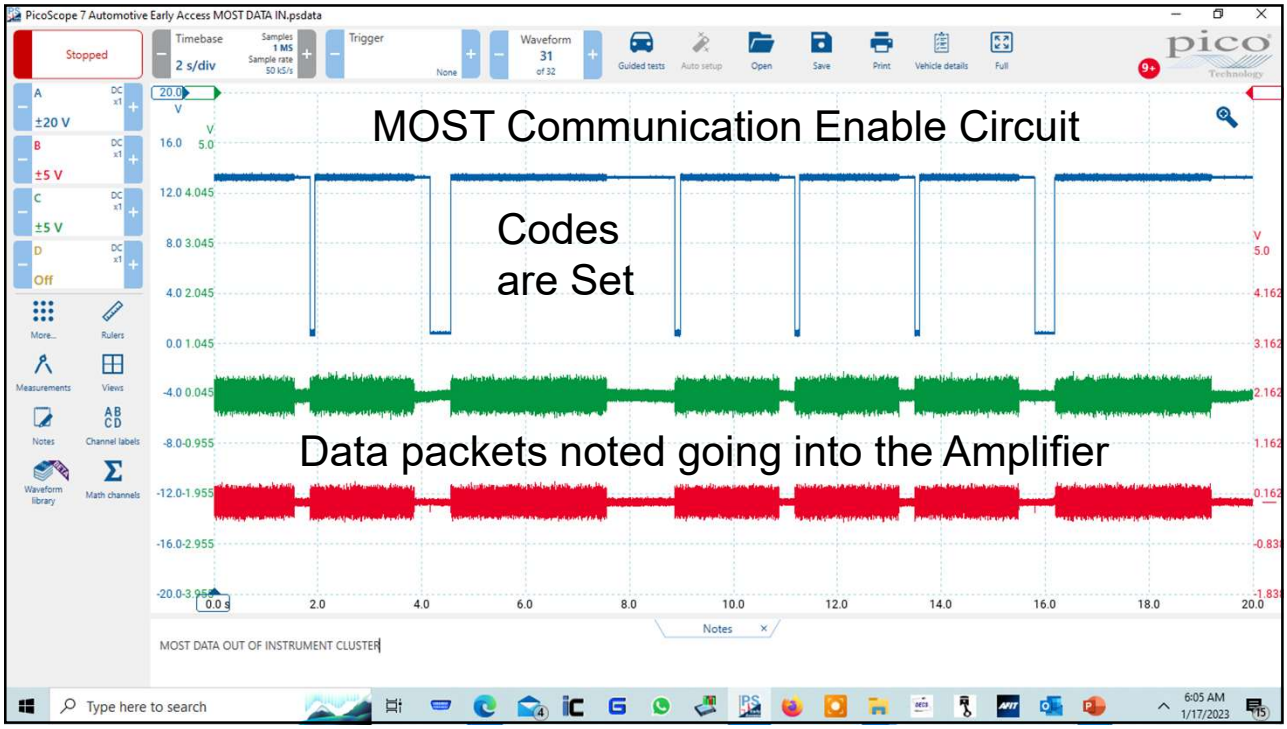


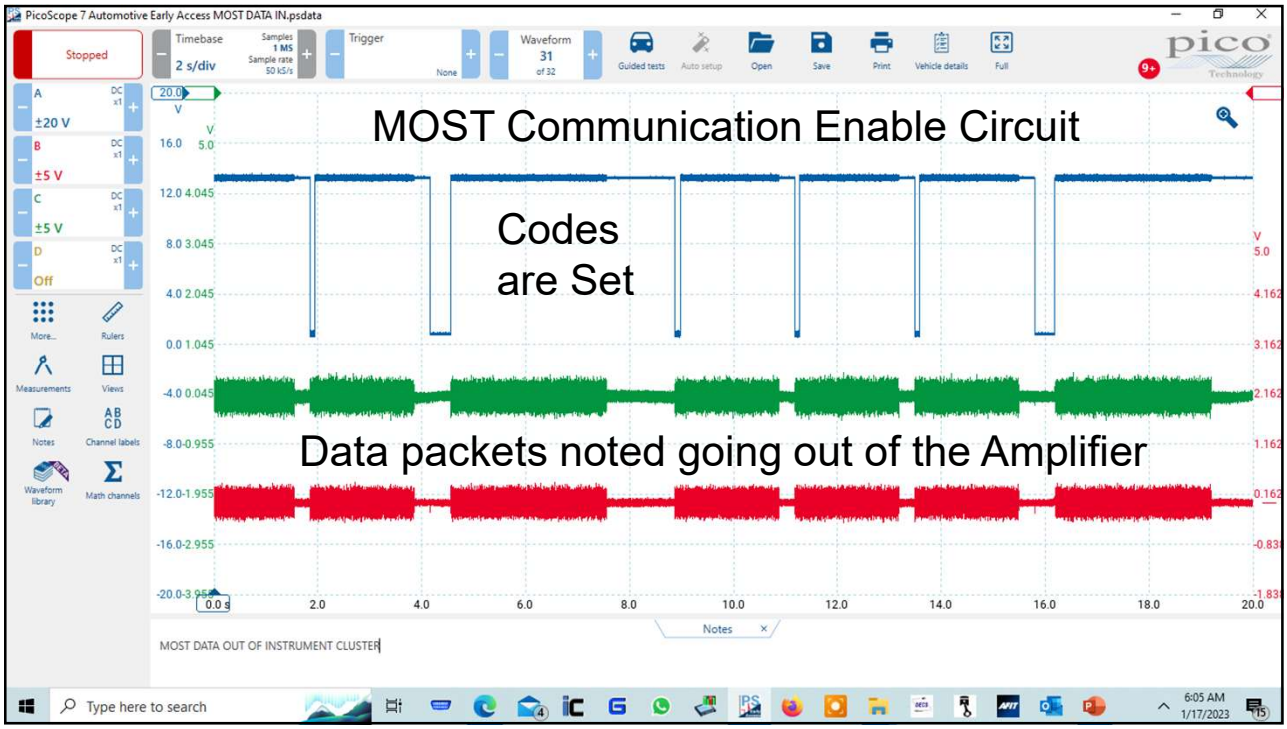


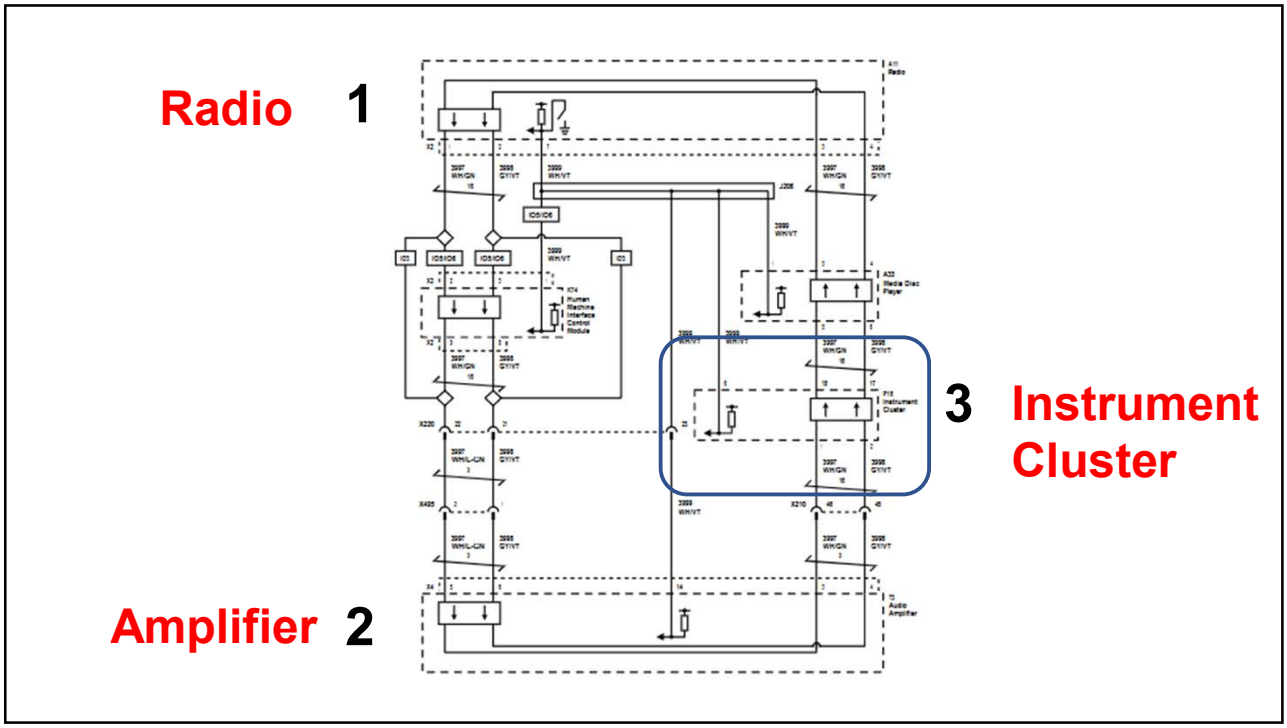
There is not an HMI Control Module on this vehicle



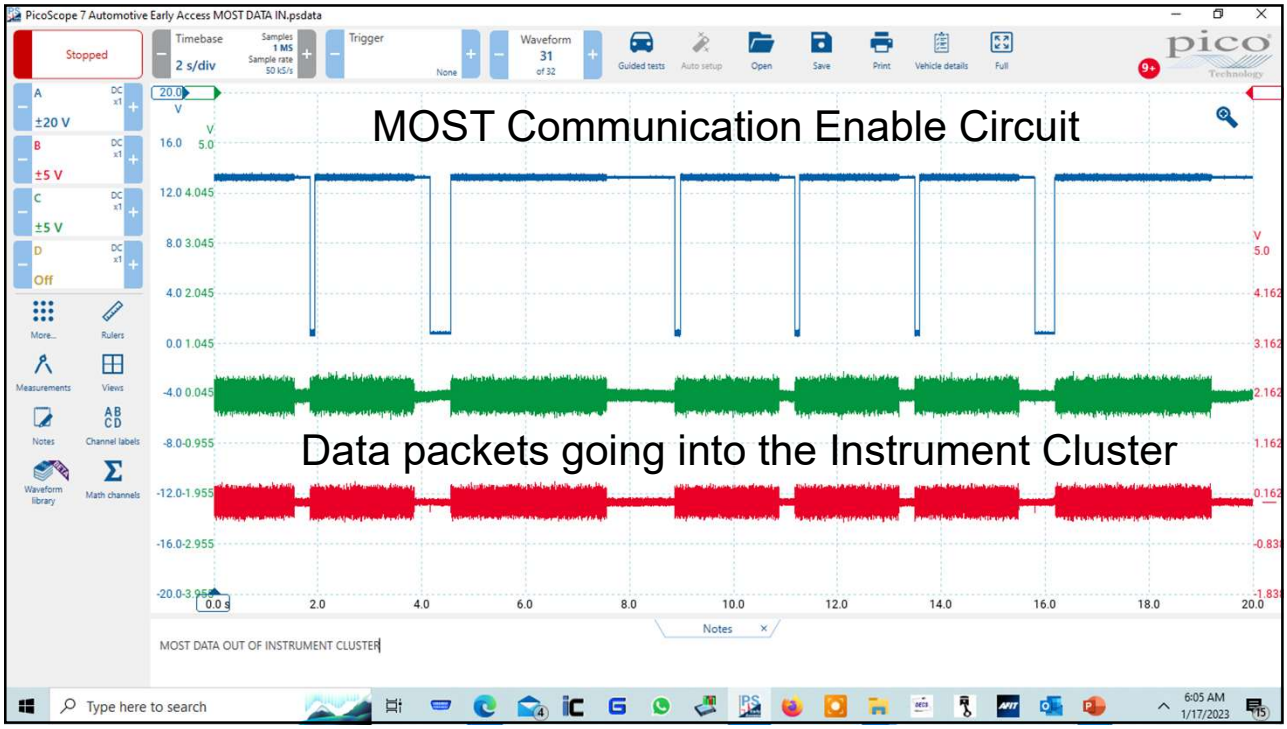
Amplifier Codes

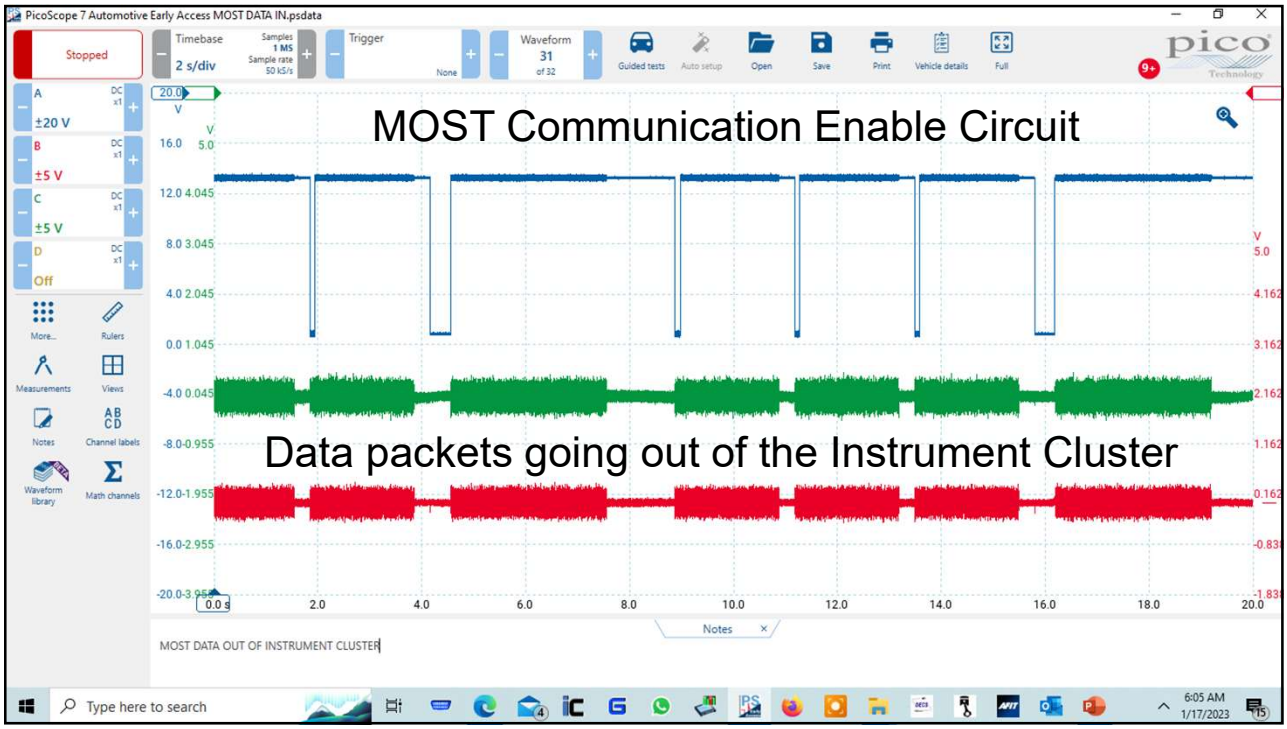



PicoScope 7 Automotive Early Access MOST DATA IN.psdata
MOST Communication Enable Circuit
Codes
are Set
Data packets noted going out of the Amplifier
MOST DATA OUT OF INSTRUMENT CLUSTER

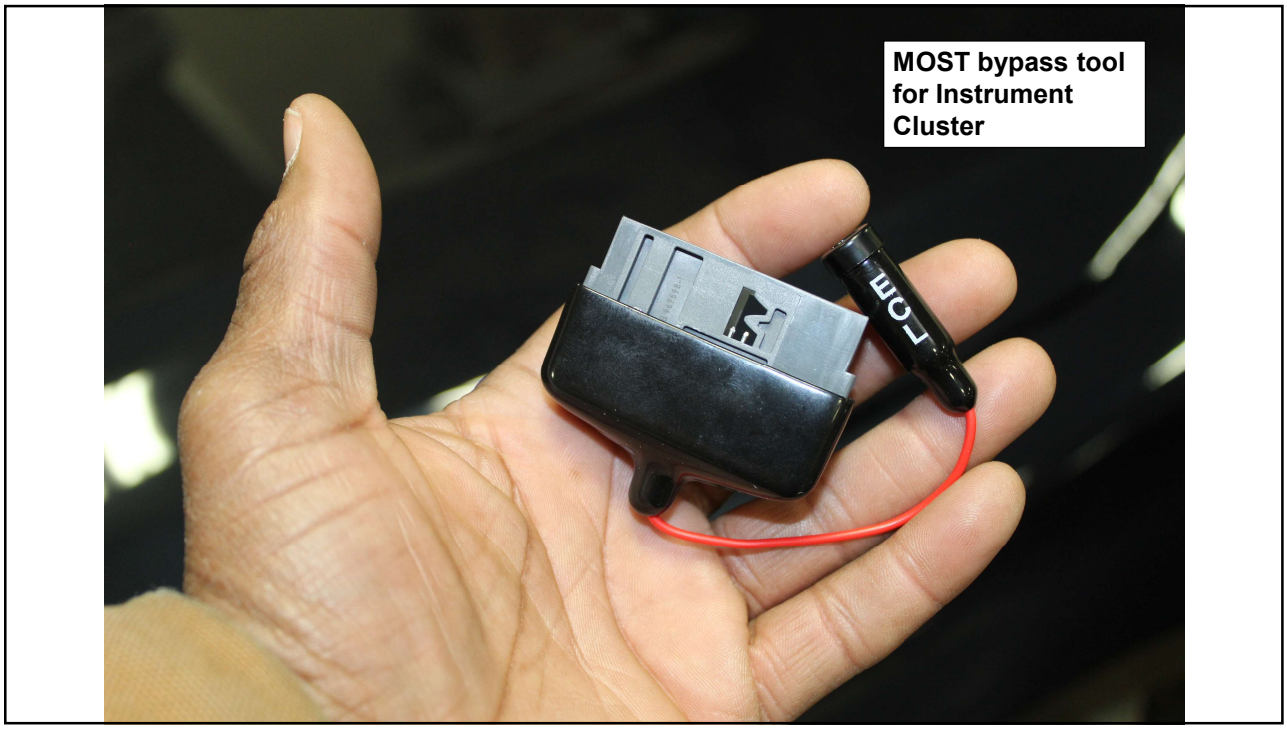

Radio 1
3 Instrument Cluster
Amplifier 2

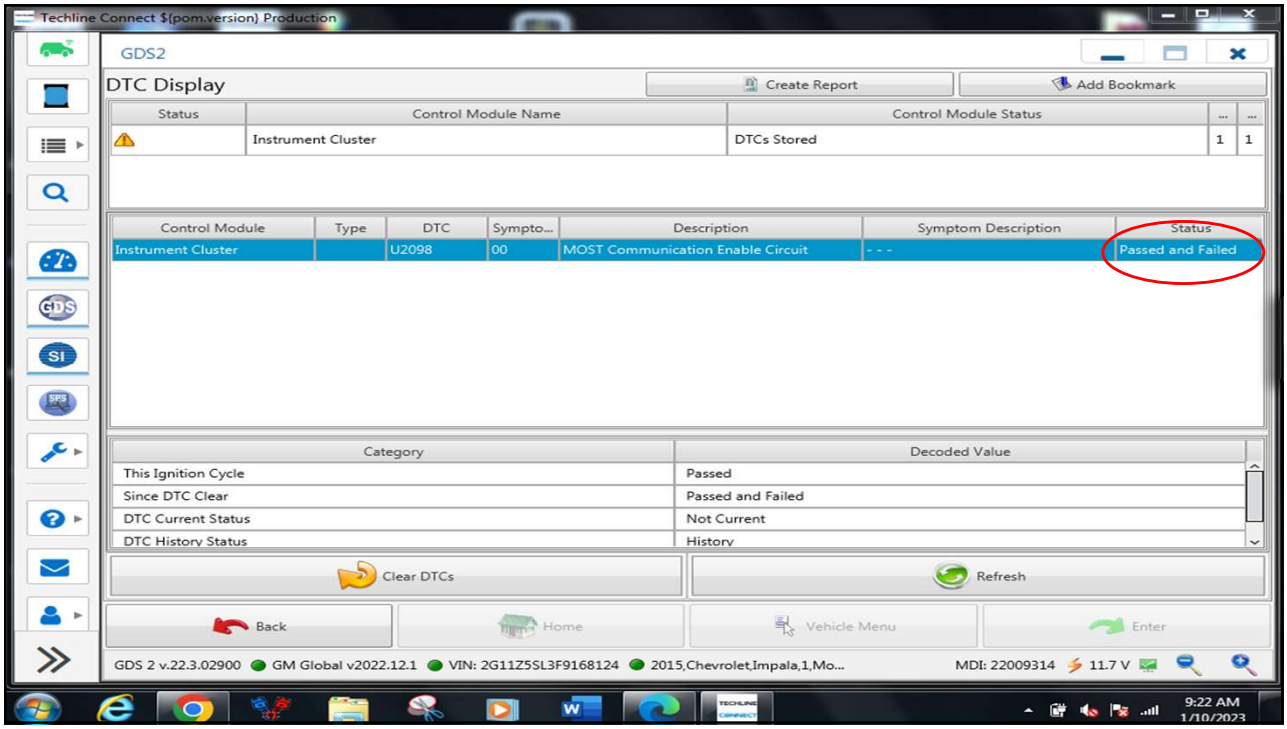
Instrument Cluster Codes



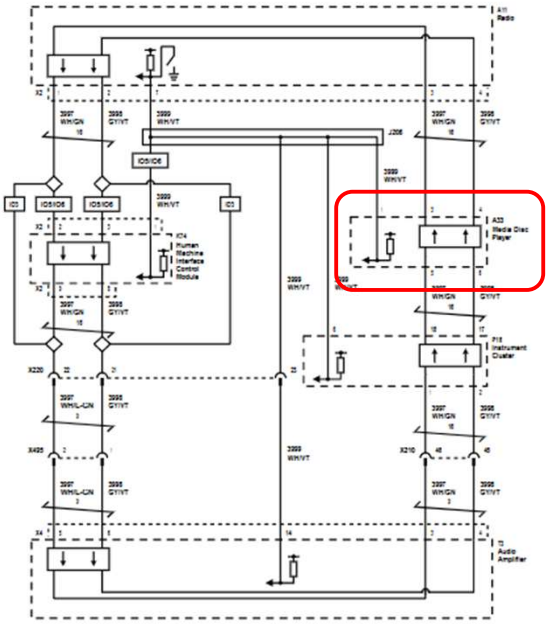

PicoScope 7 Automotive Early Access MOST DATA IN.psdata
MOST Communication Enable Circuit
Data packets going out of the Instrument Cluster
MOST DATA OUT OF INSTRUMENT CLUSTER


Instrument Cluster


MOST bypass tool for Instrument Cluster


Techline Connect ${pom.version} Production
GDS2
DTC Display
Create Report
Add Bookmark
Status
Control Module Name
Control Module Status
Instrument Cluster
DTCs Stored
Control Module
Type
DTC
Sympto...
Description
Symptom Description
Status
Instrument Cluster
U2098
00
MOST Communication Enable Circuit
- - -
Passed and Failed
Category
Decoded Value
This Ignition Cycle
Passed
Since DTC Clear
Passed and Failed
DTC Current Status
Not Current
DTC History Status
History
Clear DTCs
Refresh
Back
Home
Vehicle Menu
Enter
GDS 2 v.22.3.02900
GM Global v2022.12.1
VIN: 2G11Z5SL3F9168124
2015,Chevrolet,Impala,1,Mo...
MDI: 22009314
11.7 V
9:22 AM
1/10/2023

Radio 1



Amplifier 2

4 Media Disc Player

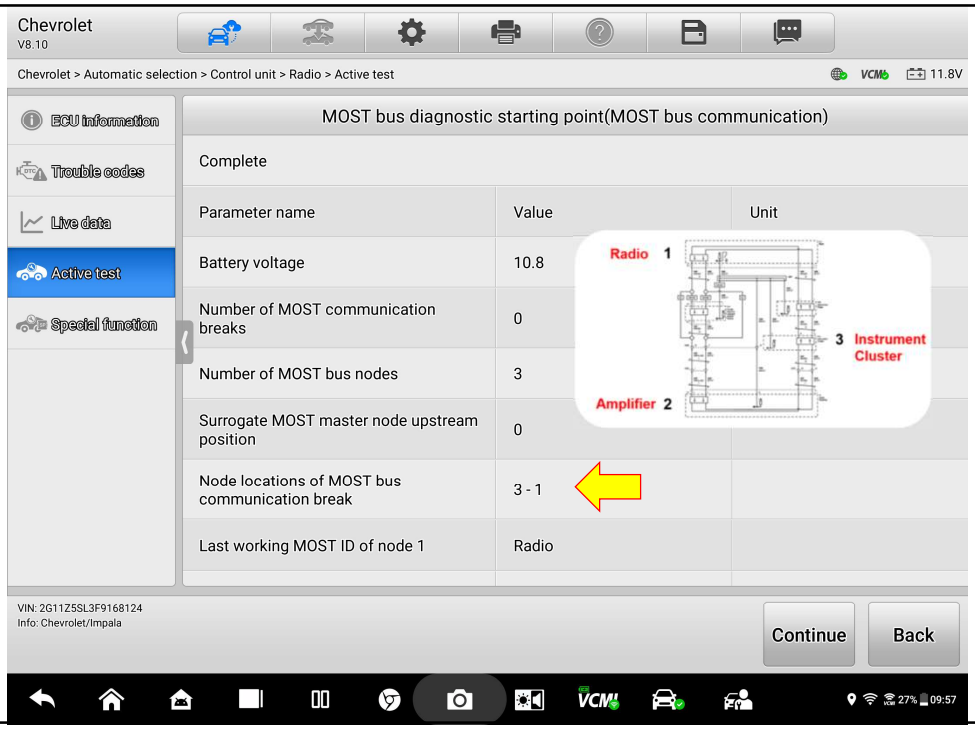
3 Instrument Cluster

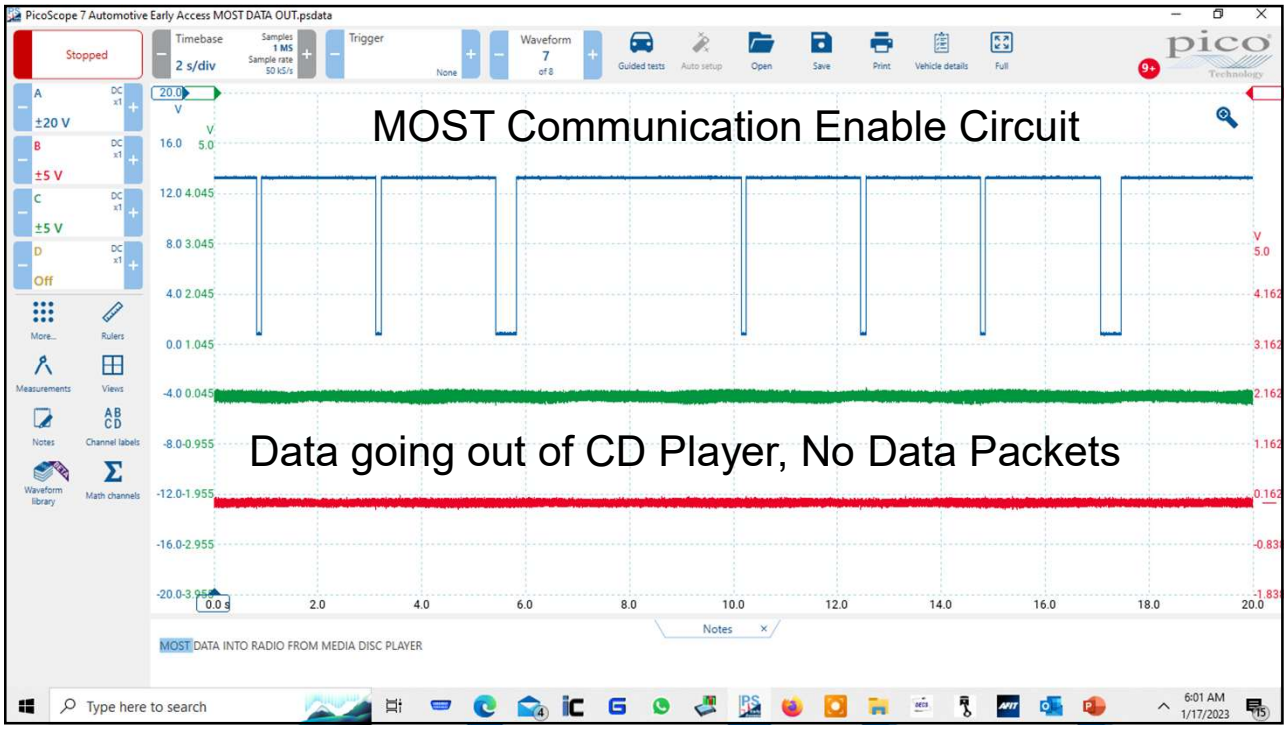
Media Disc Player Codes

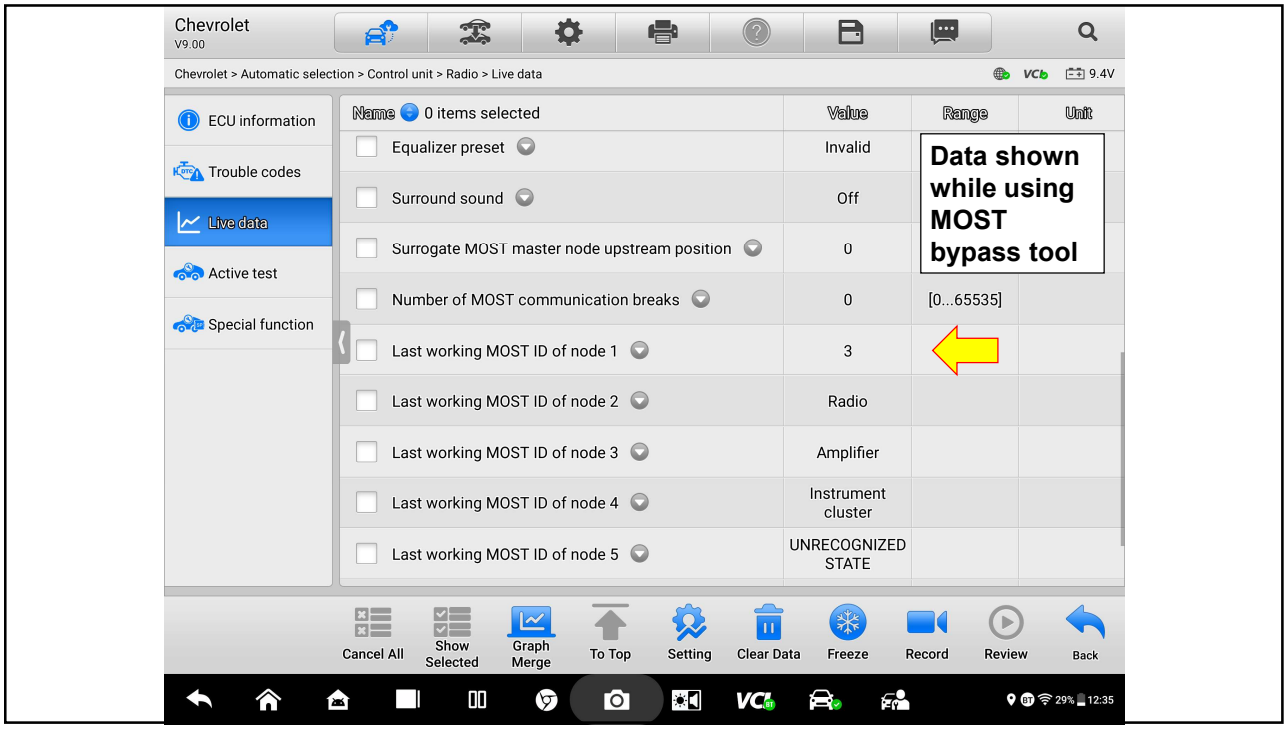
Case Study

Module Scan:

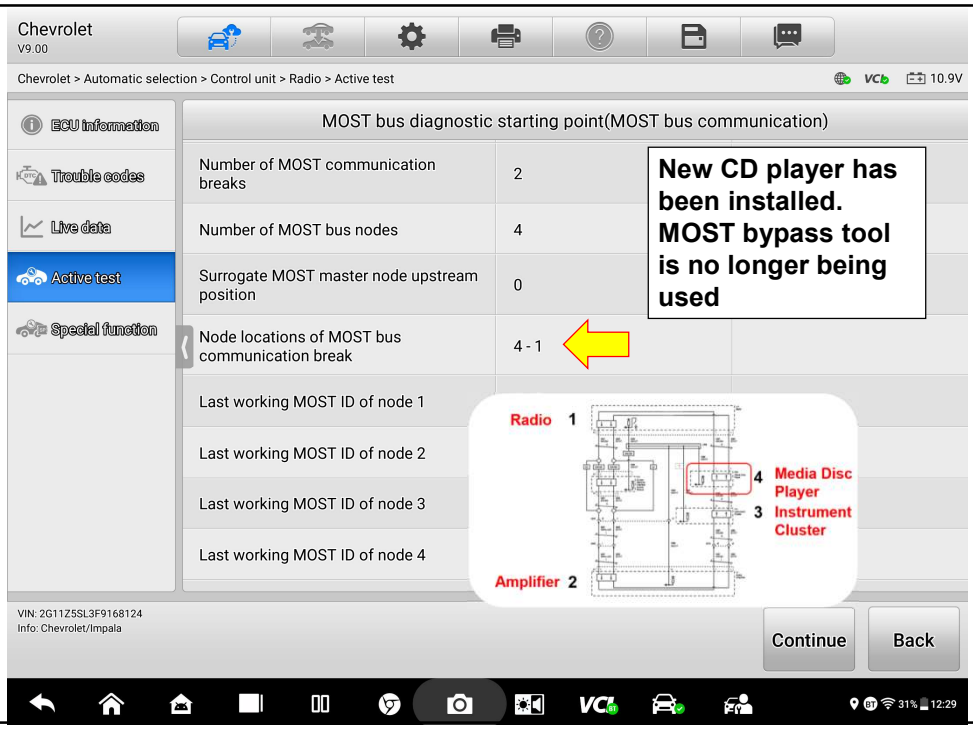
- The Media Disc Player (A33) shows no communication
- This is normal
- The Media Disc Player is only on the MOST Bus



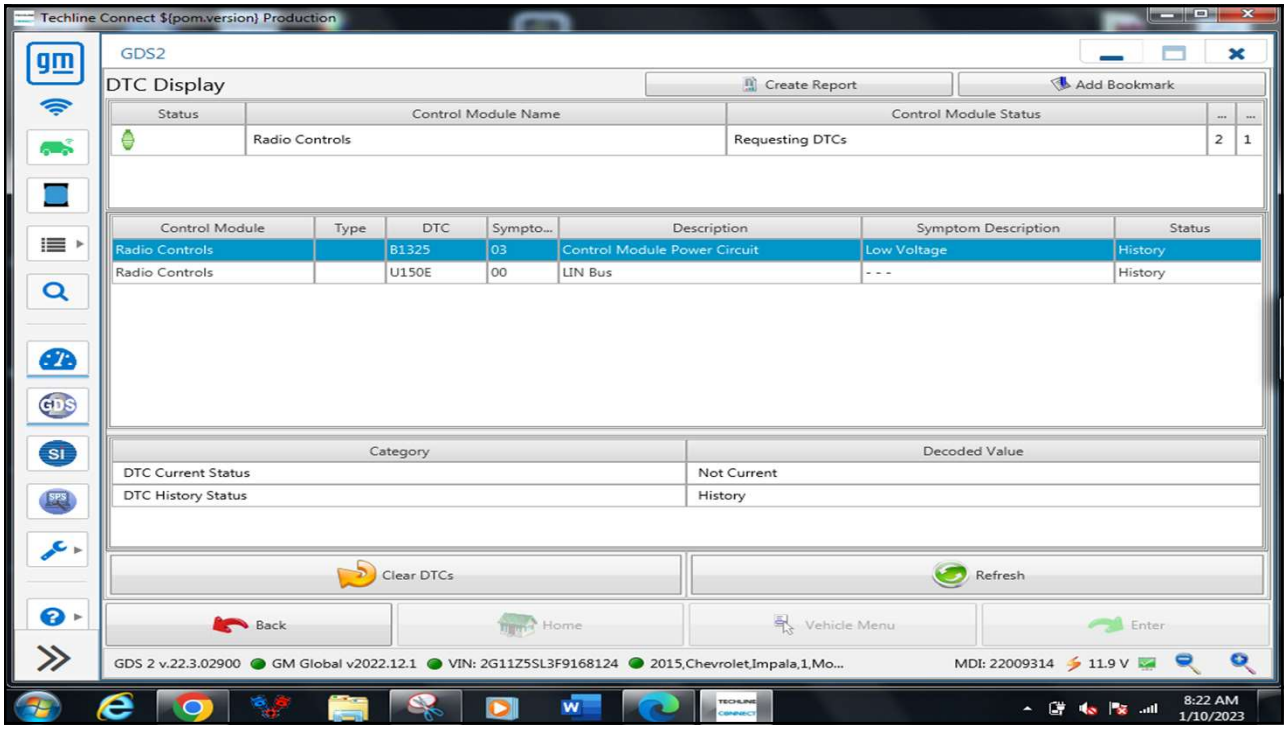

PicoScope 7 Automotive Early Access MOST DATA OUT.psdata
MOST Communication Enable Circuit
Data going out of CD Player, No Data Packets
MOST DATA INTO RADIO FROM MEDIA DISC PLAYER

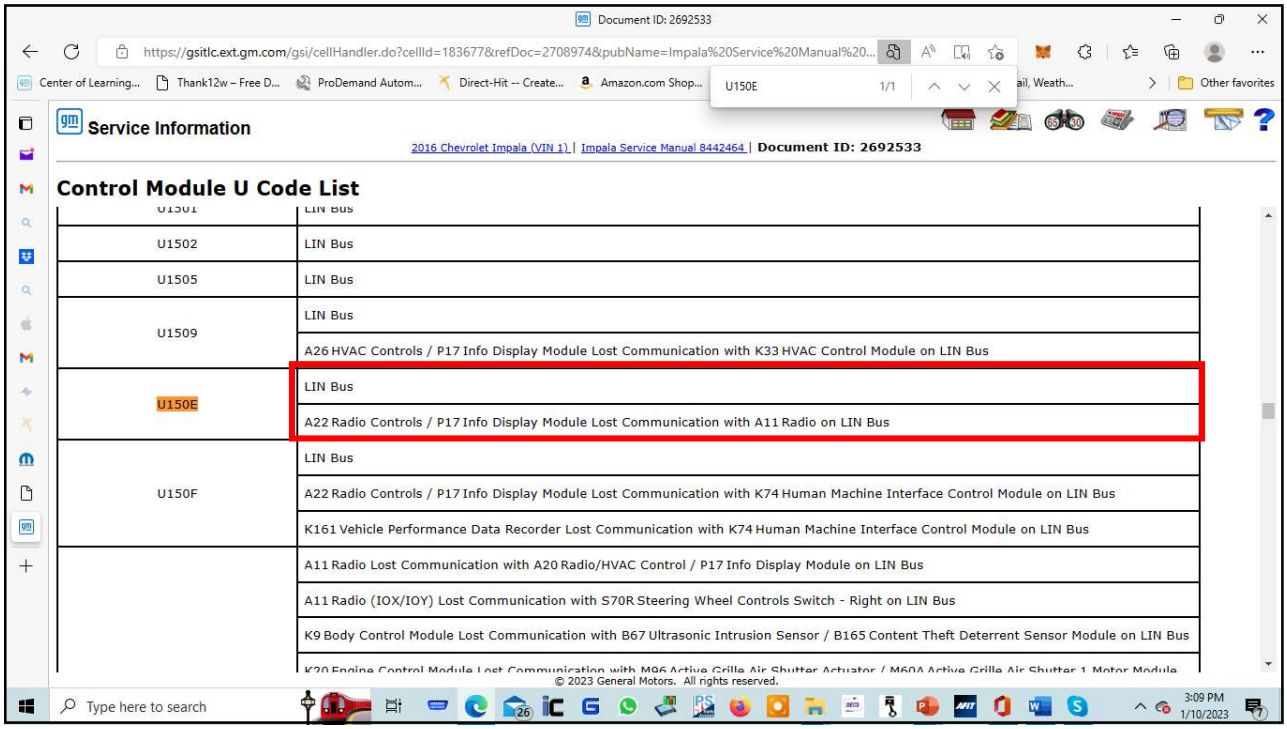

Chevrolet
V9.00
Chevrolet > Automatic selection > Control unit > Radio > Live data
ECU information
Trouble codes
Live data
Active test
Special function
Name 0 items selected
Value
Range
Unit
Equalizer preset
Invalid
Surround sound
Off
Surrogate MOST master node upstream position
0
Number of MOST communication breaks
0
[0...65535]
Last working MOST ID of node 1
3
Last working MOST ID of node 2
Radio
Last working MOST ID of node 3
Amplifier
Last working MOST ID of node 4
Instrument cluster
Last working MOST ID of node 5
UNRECOGNIZED STATE
Data shown while using MOST bypass tool
Cancel All
Show Selected
Graph Merge
To Top
Setting
Clear Data
Freeze
Record
Review
Back


CD Player (Media Disc Player)


Chevrolet
V9.00
Chevrolet > Automatic selection > Control unit > Radio > Active test
10.9V
ECU information
Trouble codes
Live data
Active test
Special function
MOST bus diagnostic starting point(MOST bus communication)
Number of MOST communication breaks
2
Number of MOST bus nodes
4
Surrogate MOST master node upstream position
0
Node locations of MOST bus communication break
4 - 1
Last working MOST ID of node 1
Last working MOST ID of node 2
Last working MOST ID of node 3
Last working MOST ID of node 4
New CD player has been installed. MOST bypass tool is no longer being used
Radio 1
Amplifier 2
4 Media Disc Player
3 Instrument Cluster
VIN: 2G11Z5SL3F9168124
Info: Chevrolet/Impala
Continue
Back

Radio Controls Codes


Techline Connect ${pom.version} Production
GDS2
DTC Display
Create Report
Add Bookmark
Status
Control Module Name
Control Module Status
Radio Controls
Requesting DTCs
Control Module
Type
DTC
Sympto...
Description
Symptom Description
Status
Radio Controls
B1325
03
Control Module Power Circuit
Low Voltage
History
Radio Controls
U150E
00
LIN Bus
- - -
History
Category
Decoded Value
DTC Current Status
Not Current
DTC History Status
History
Clear DTCs
Refresh
Back
Home
Vehicle Menu
Enter
GDS 2 v.22.3.02900
GM Global v2022.12.1
VIN: 2G11Z5SL3F9168124
2015,Chevrolet,Impala,1,Mo...
MDI: 22009314
11.9 V
8:22 AM
1/10/2023


Document ID: 2692533
https://gsitlc.ext.gm.com/gsi/cellHandler.do?cellId=183677&refDoc=2708974&pubName=Impala%20Service%20Manual%20...
U150E
1/1
Service Information
2016 Chevrolet Impala (VIN 1) | Impala Service Manual 8442464 | Document ID: 2692533
Control Module U Code List
U1502
LIN Bus
U1505
LIN Bus
U1509
LIN Bus
A26 HVAC Controls / P17 Info Display Module Lost Communication with K33 HVAC Control Module on LIN Bus
U150E
LIN Bus
A22 Radio Controls / P17 Info Display Module Lost Communication with A11 Radio on LIN Bus
U150F
LIN Bus
A22 Radio Controls / P17 Info Display Module Lost Communication with K74 Human Machine Interface Control Module on LIN Bus
K161 Vehicle Performance Data Recorder Lost Communication with K74 Human Machine Interface Control Module on LIN Bus
A11 Radio Lost Communication with A20 Radio/HVAC Control / P17 Info Display Module on LIN Bus
A11 Radio (IOX/IOY) Lost Communication with S70R Steering Wheel Controls Switch - Right on LIN Bus
K9 Body Control Module Lost Communication with B67 Ultrasonic Intrusion Sensor / B165 Content Theft Deterrent Sensor Module on LIN Bus
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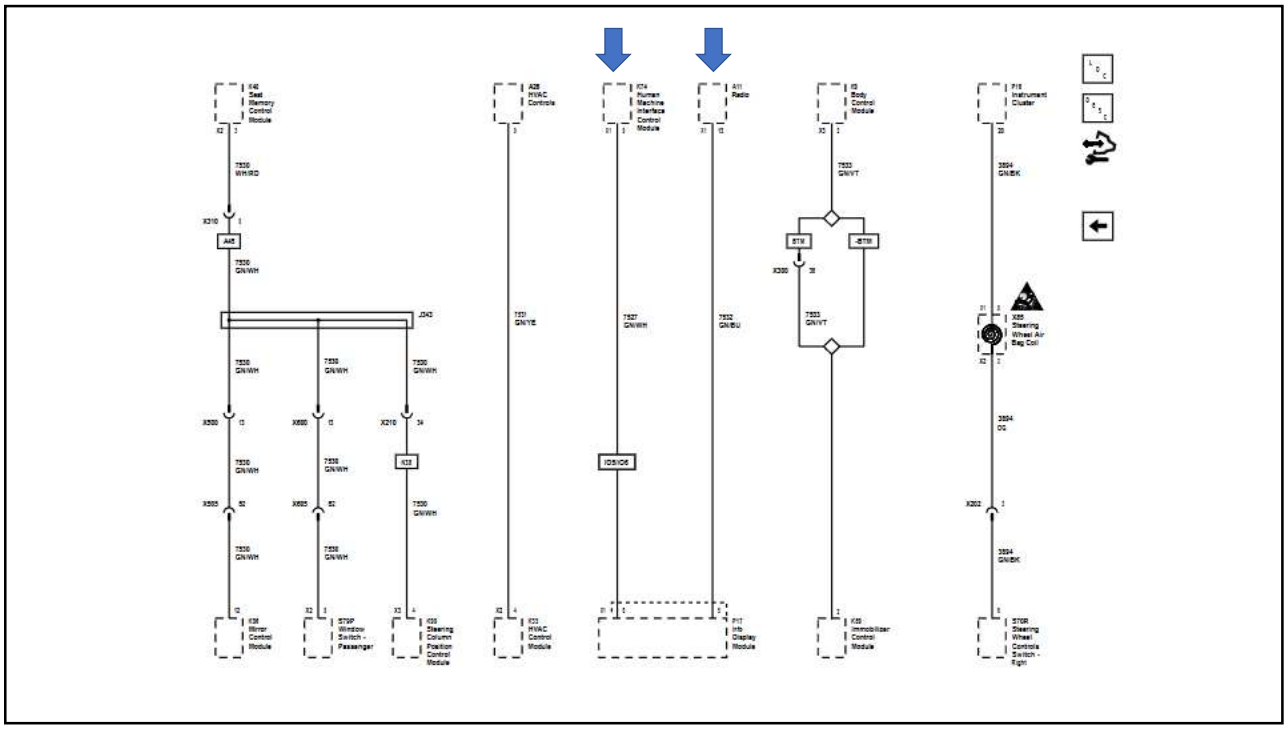
Type here to search
3:09 PM
1/10/2023



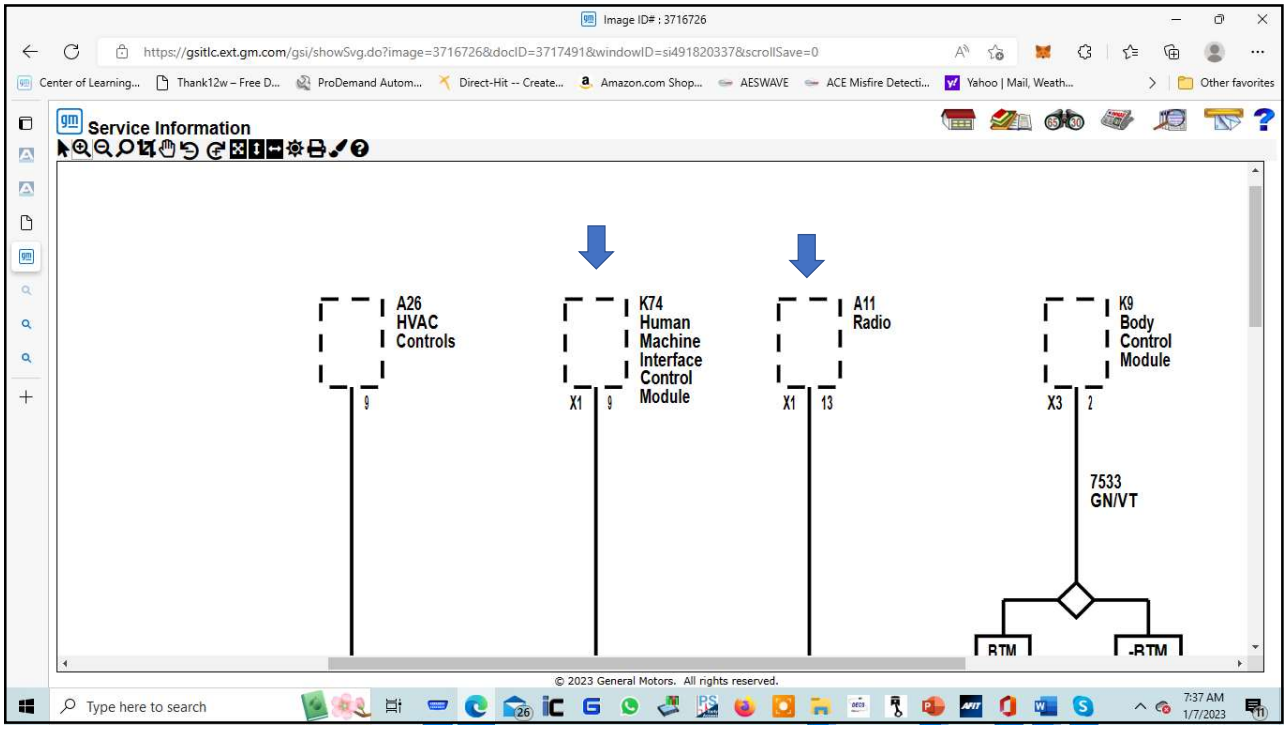


Image ID# : 3716726
https://gsitlc.ext.gm.com/gsi/showSvg.do?image=3716726&docID=3717491&windowID=si491820337&scrollSave=0
Service Information
A26
HVAC
Controls
9
K74
Human
Machine
Interface
Control
Module
X1
9
A11
Radio
X1
13
K9
Body
Control
Module
X3
2
7533
GN/VT
RTM
-RTM
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Type here to search
7:37 AM
1/7/2023

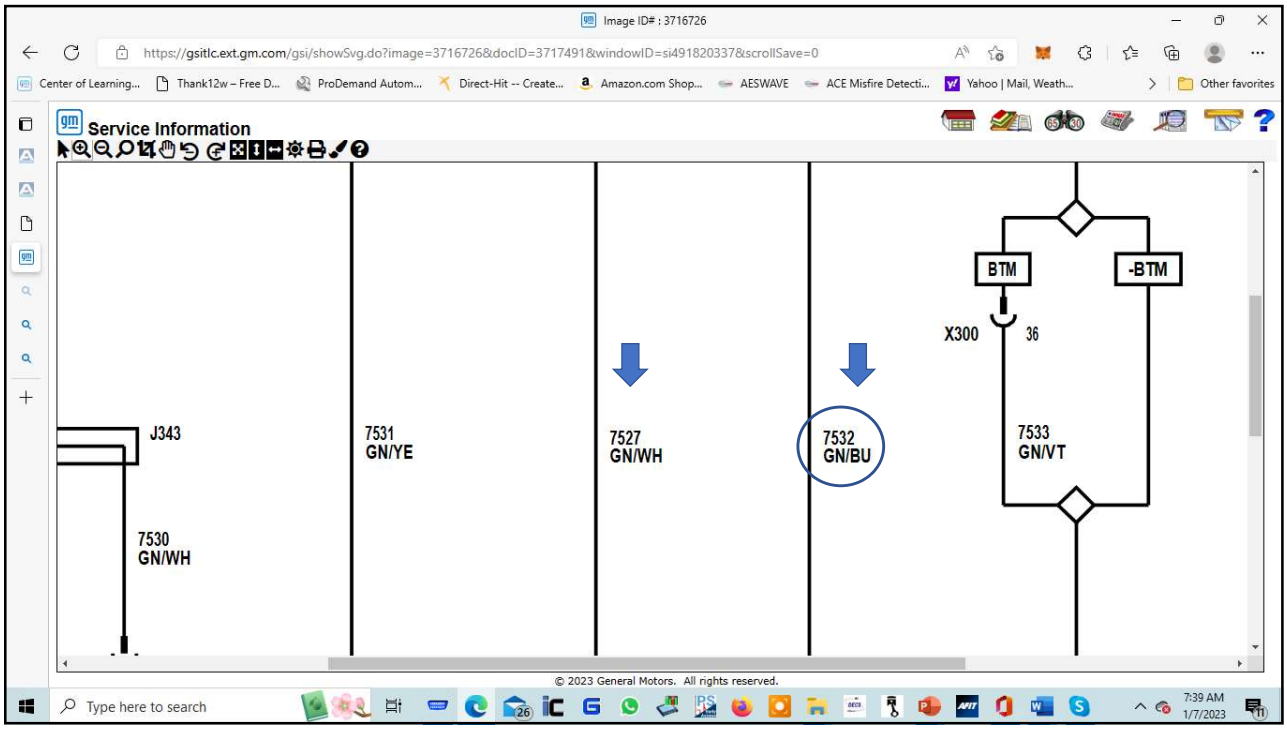
Image ID# : 3716726
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Service Information
BTM
-BTM
X300
36
J343
7530
GN/WH
7531
GN/YE
7527
GN/WH
7532
GN/BU
7533
GN/VT
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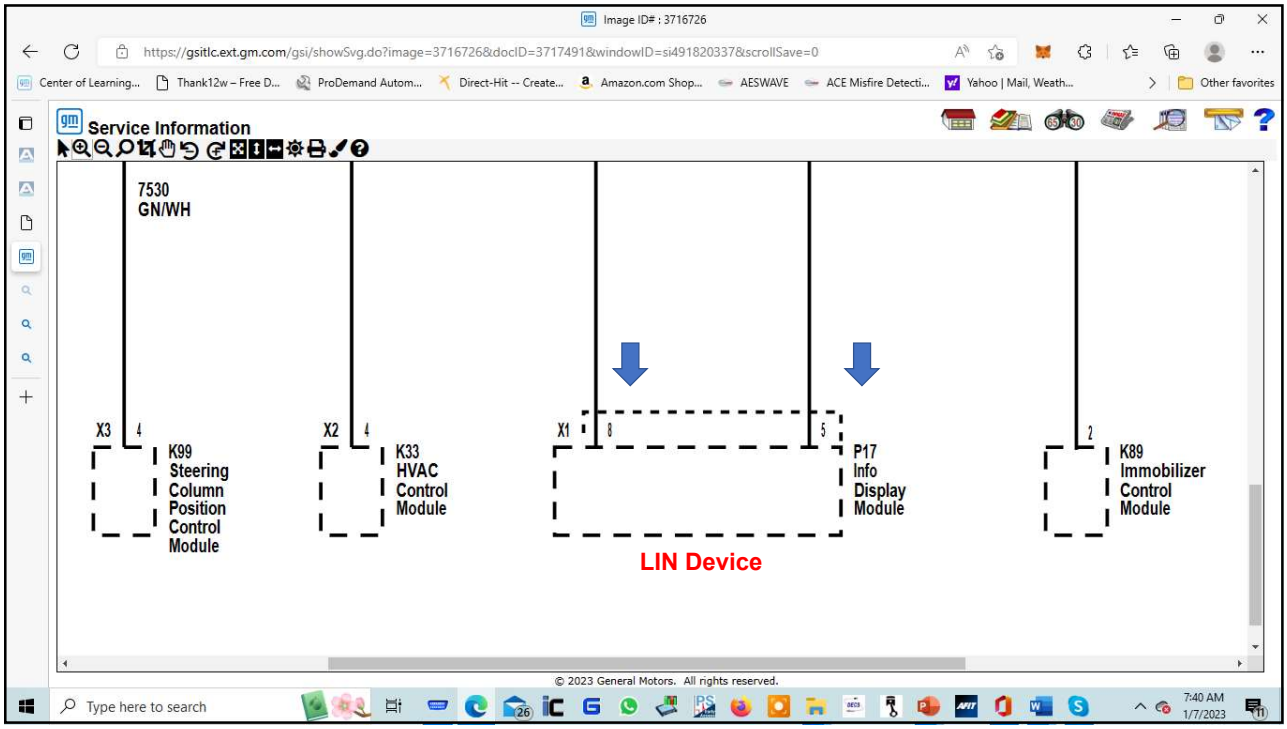
Type here to search
7:39 AM
1/7/2023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Service Information
7530
GN/WH
X3
4
K99
Steering
Column
Position
Control
Module
X2
4
K33
HVAC
Control
Module
X1
8
5
P17
Info
Display
Module
LIN Device
2
K89
Immobilizer
Control
Module
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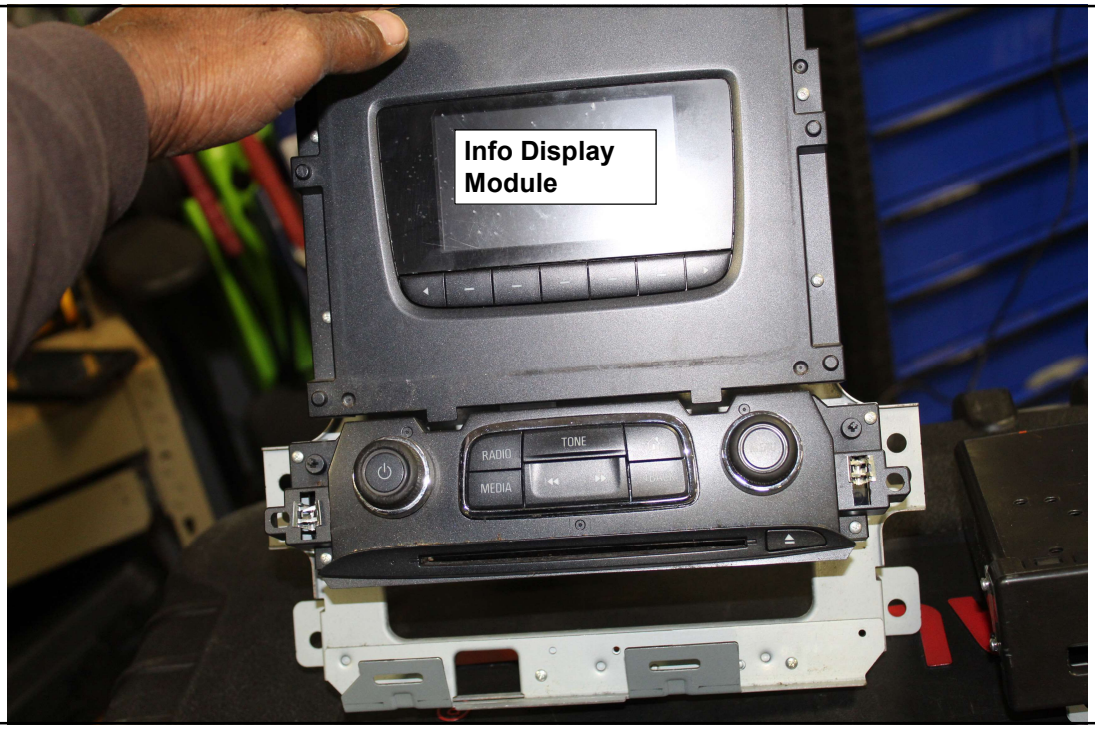
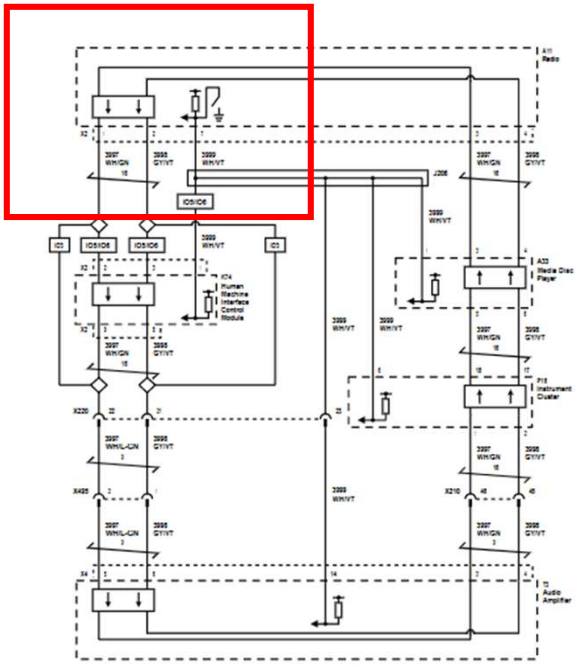
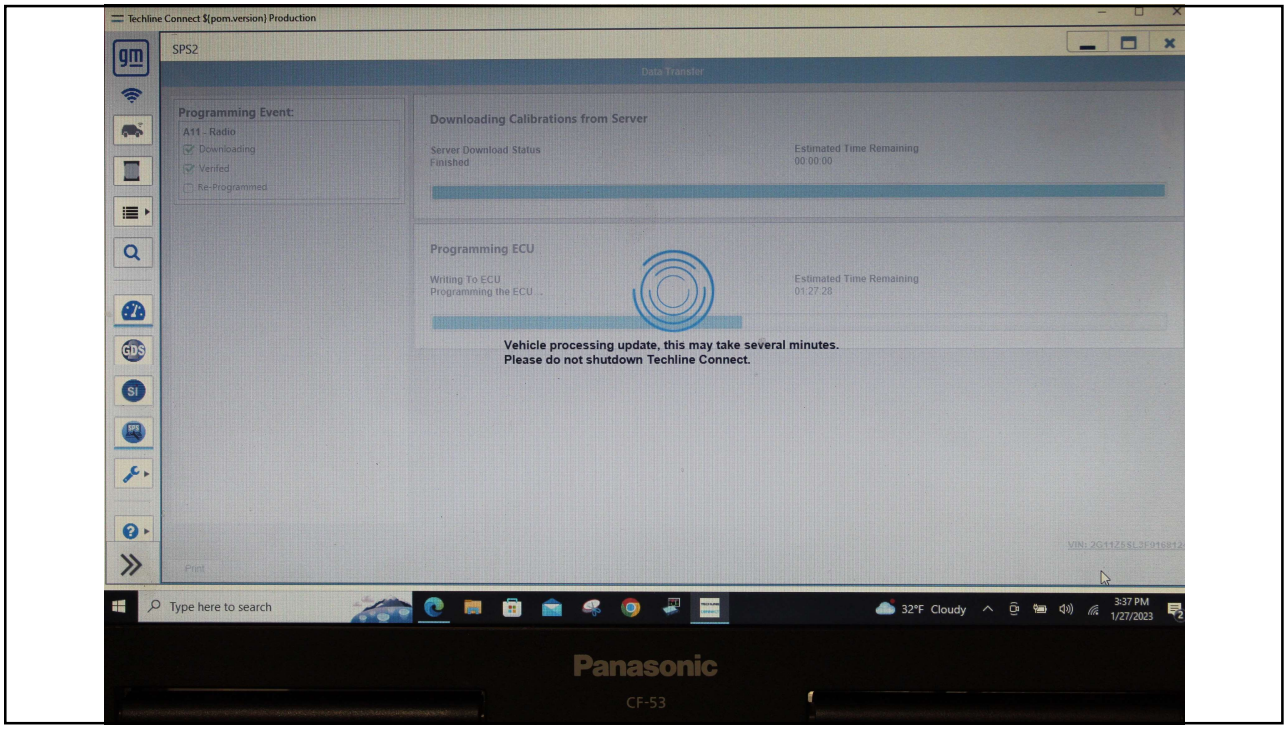


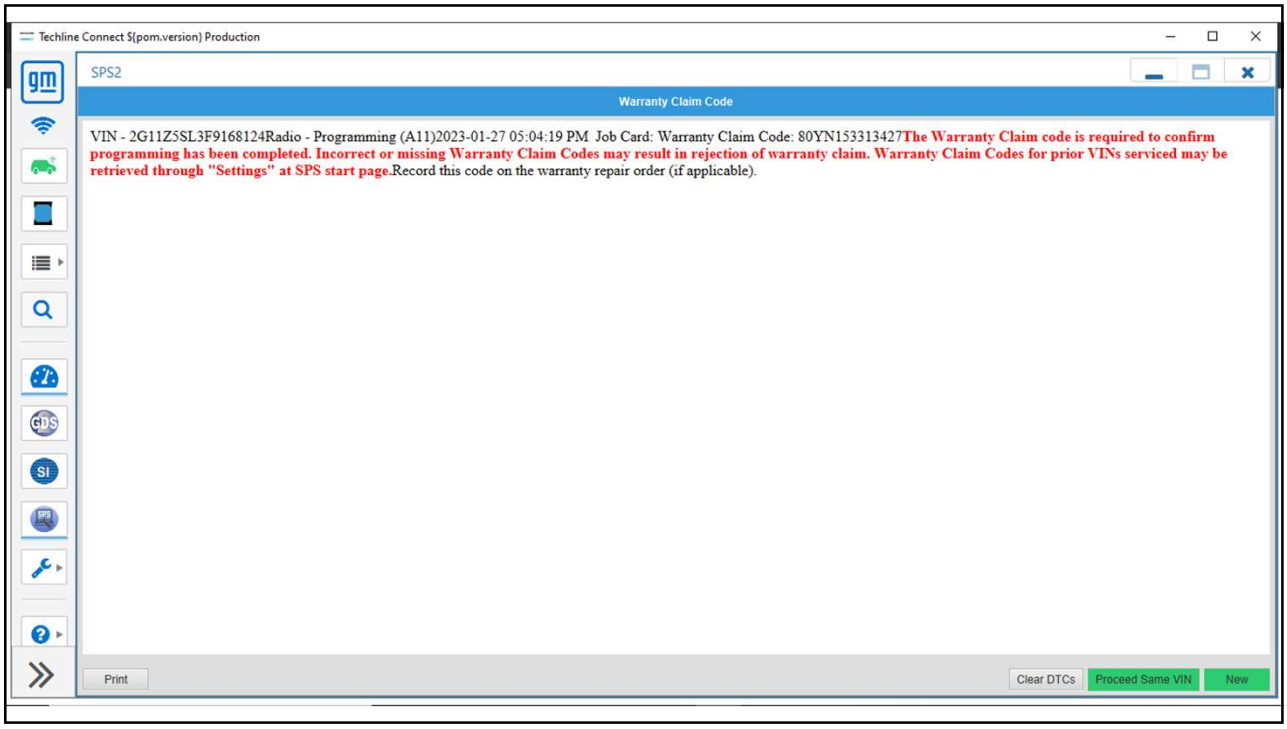
Suggested Gameplan

- Step 1: Review Trouble Code Information
- Step 2: Determine the RPO code for the infotainment system and record it
- Step 3: Review MOST Diagnostic Starting Point
  - Is there any data available for review?
- Step 4: Review Operation and Description carefully
- Step 5: Verify MOST Control Circuit (MOST communication enable circuit) is good

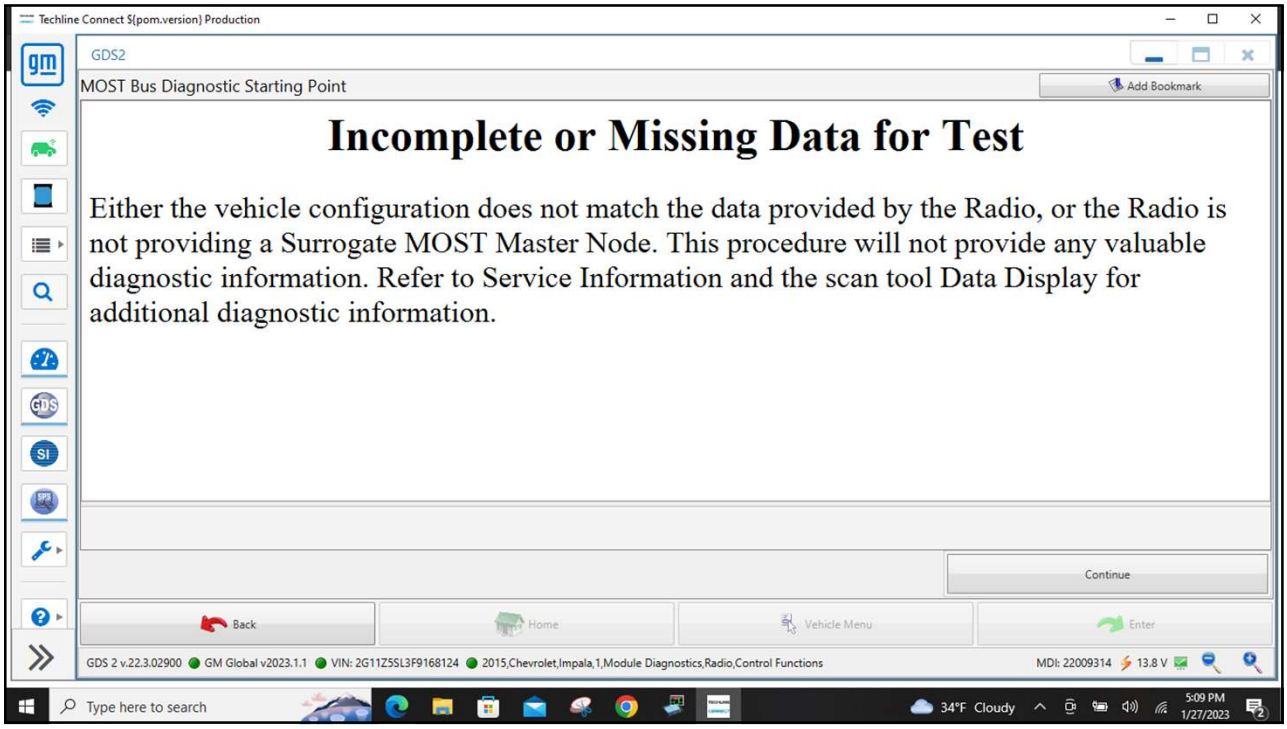
Lets take a look at the MOST communication enable circuit




Techline Connect ${pom.version} Production
SPS2
Data Transfer
Programming Event:
A11 - Radio
Downloading
Verified
Re-Programmed
Downloading Calibrations from Server
Server Download Status
Finished
Estimated Time Remaining
00:00:00
Programming ECU
Writing To ECU
Programming the ECU ...
Estimated Time Remaining
01:27:28
Vehicle processing update, this may take several minutes.
Please do not shutdown Techline Connect.
Print
Type here to search
32°F Cloudy
3:37 PM
1/27/2023
Panasonic
CF-53


Techline Connect ${pom.version} Production
SPS2
Warranty Claim Code
VIN - 2G11Z5SL3F9168124Radio - Programming (A11)2023-01-27 05:04:19 PM Job Card: Warranty Claim Code: 80YN153313427The Warranty Claim code is required to confirm programming has been completed. Incorrect or missing Warranty Claim Codes may result in rejection of warranty claim. Warranty Claim Codes for prior VINs serviced may be retrieved through "Settings" at SPS start page.Record this code on the warranty repair order (if applicable).
Print
Clear DTCs
Proceed Same VIN
New


12:10 59°
AUDIO
PHONE
OnStar NAV
SETTINGS


Techline Connect ${pom.version} Production
GDS2
MOST Bus Diagnostic Starting Point
Add Bookmark
Incomplete or Missing Data for Test
Either the vehicle configuration does not match the data provided by the Radio, or the Radio is not providing a Surrogate MOST Master Node. This procedure will not provide any valuable diagnostic information. Refer to Service Information and the scan tool Data Display for additional diagnostic information.
Continue
Back
Home
Vehicle Menu
Enter
GDS 2 v.22.3.02900
GM Global v2023.1.1
VIN: 2G11Z5SL3F9168124
2015,Chevrolet,Impala,1,Module Diagnostics,Radio,Control Functions
MDI: 22009314
13.8 V
Type here to search
34°F Cloudy
5:09 PM
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