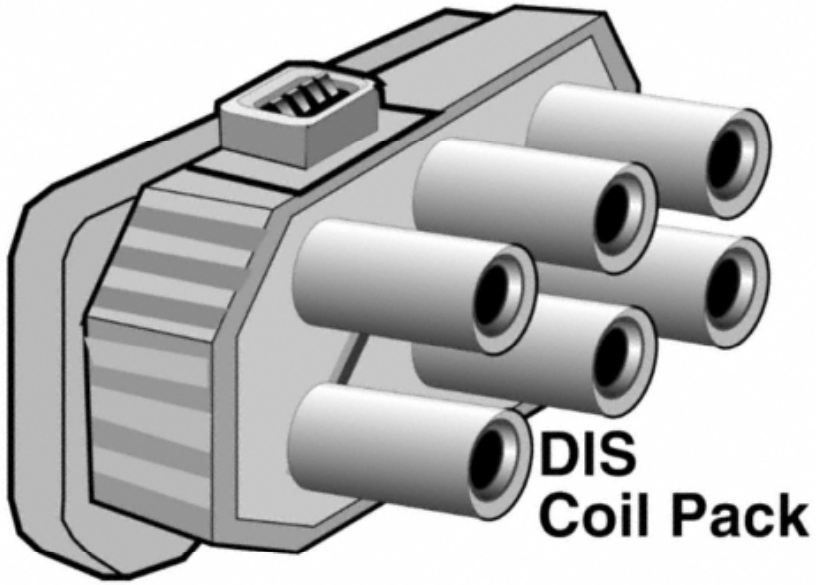
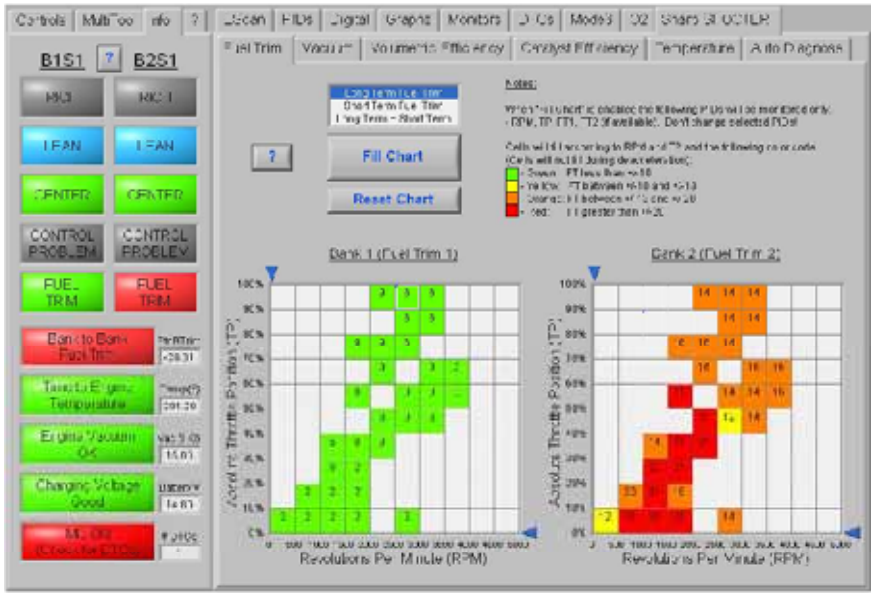
Fuel Trim and Misfire Analysis





A “No Excuse” Approach

Seminar Objectives

- Define “Loop Status” Definitions (Ford Motor Co.)
- Fuel Trim Interpretation
- Ignition Misfires
- Clogged Injector Misfire
- Engine Mechanical Misfire

Seminar Objectives

- EGR Misfires
- Case Studies

Important Terms to Know

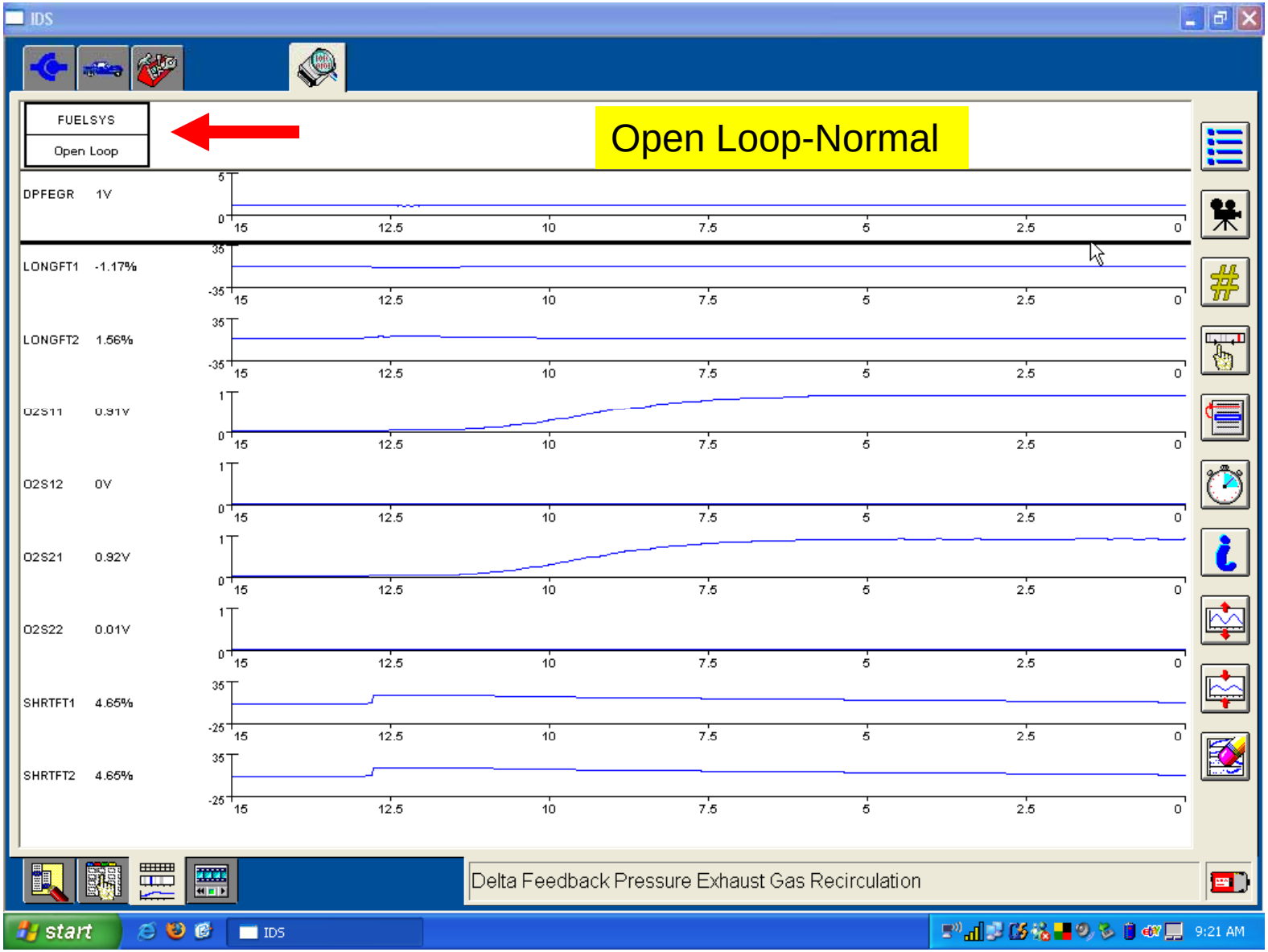
- Open Loop-Normal
- Open Loop-Fault
- Open Loop-Drive
- Closed Loop-Normal
- Closed Loop-Fault


Don't Let This Happen To You
923 8122
2007 Ford Tauras SE


TAURUS SE

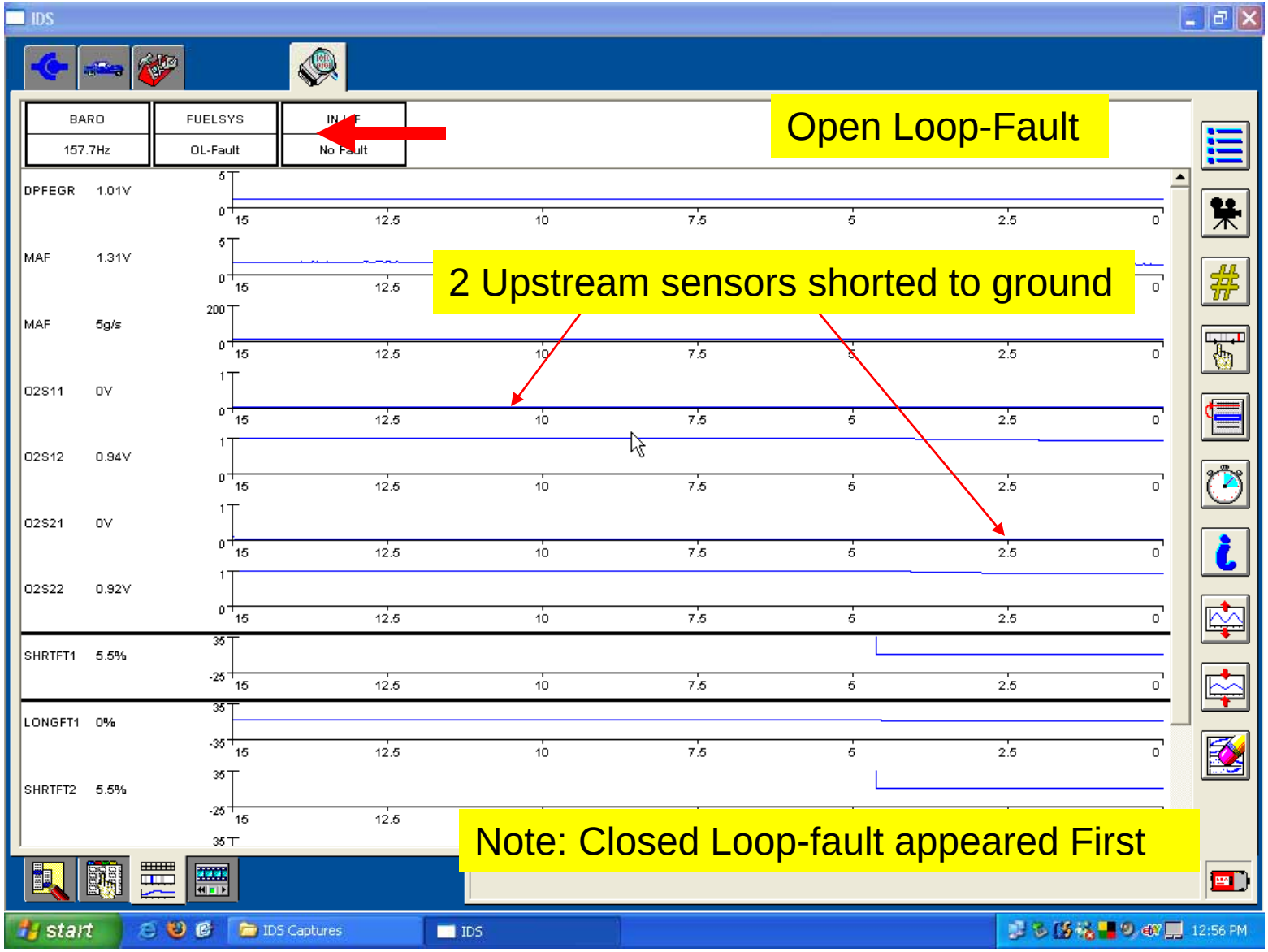
Open Loop-Normal

- Open loop fuel system status, oxygen sensor is not being used as feedback for fuel control
- Ford Motor Company has defined the various loop status that are listed here


IDS
FUELSYS
Open Loop
Open Loop-Normal
DPFEGR 1V
LONGFT1 -1.17%
LONGFT2 1.56%
O2S11 0.91V
O2S12 0V
O2S21 0.92V
O2S22 0.01V
SHRTFT1 4.65%
SHRTFT2 4.65%
15 12.5 10 7.5 5 2.5 0
Delta Feedback Pressure Exhaust Gas Recirculation
start
IDS
9:21 AM

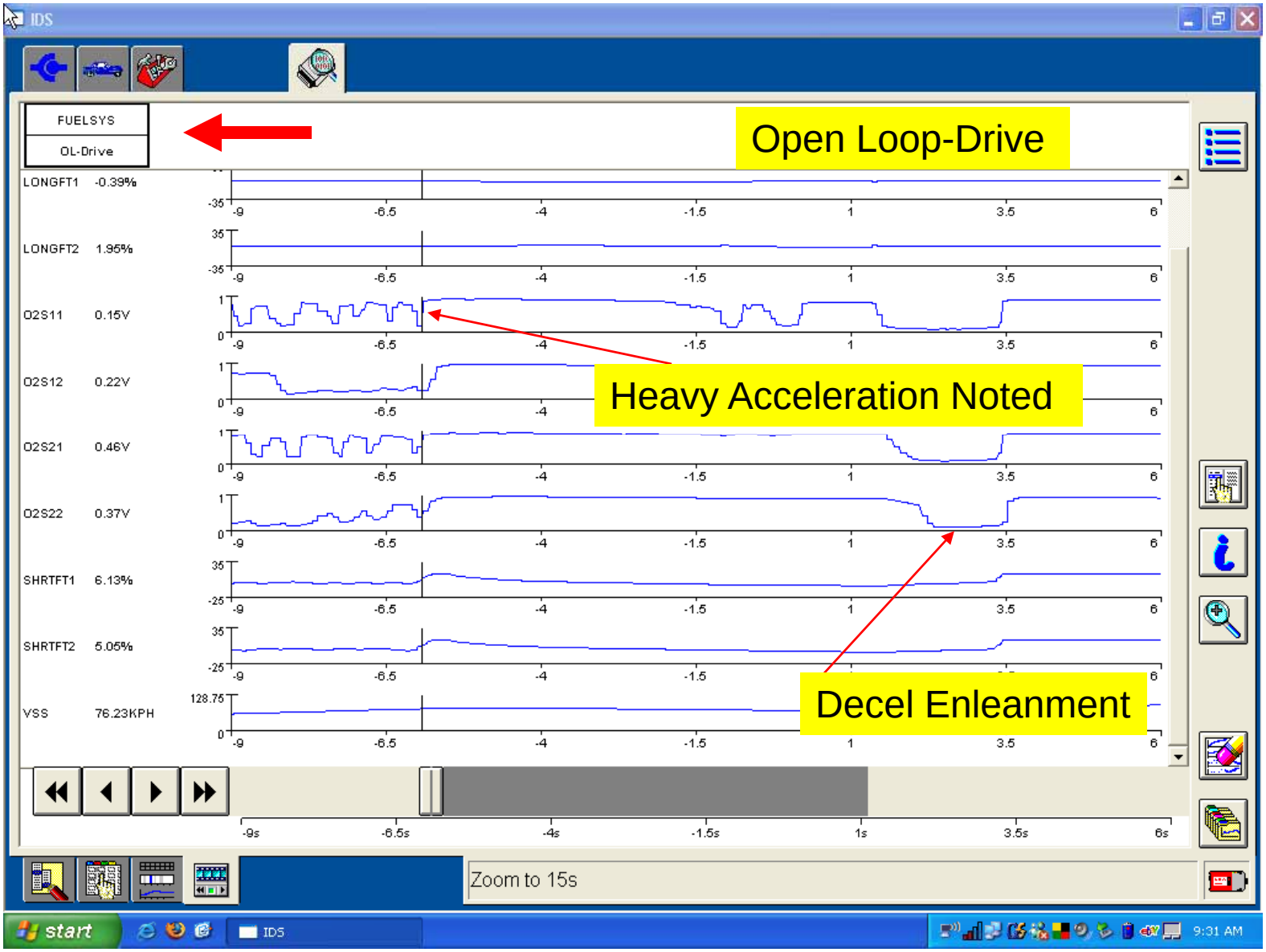
Open Loop-Fault

- Open loop fuel system status due to fault status with all the upstream oxygen sensors
- It appears that Closed loop-fault will occur first, then this status will appear second


IDS
BARO
157.7Hz
FUELSYS
OL-Fault
IN LF
No Fault
Open Loop-Fault
2 Upstream sensors shorted to ground
DPFEGR 1.01V
MAF 1.31V
MAF 5g/s
O2S11 0V
O2S12 0.94V
O2S21 0V
O2S22 0.92V
SHRTFT1 5.5%
LONGFT1 0%
SHRTFT2 5.5%
Note: Closed Loop-fault appeared First
start
IDS Captures
IDS
12:56 PM

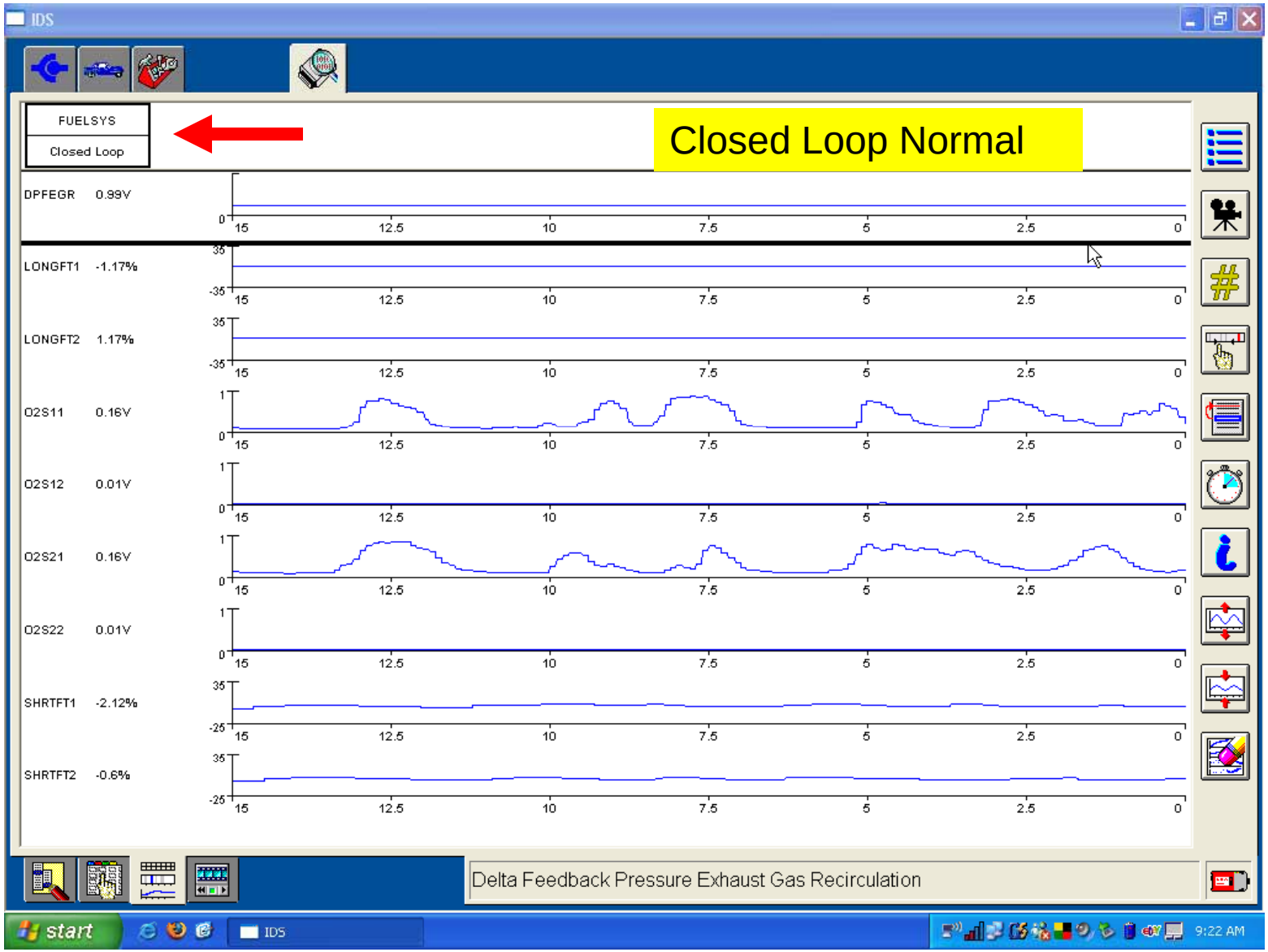
Open Loop-Drive

- Open loop status due to high oxygen sensor voltages as a result of heavy acceleration or extended idle conditions


IDS
FUELSYS
OL-Drive
Open Loop-Drive
LONGFT1 -0.39%
LONGFT2 1.95%
O2S11 0.15V
O2S12 0.22V
O2S21 0.46V
O2S22 0.37V
SHRTFT1 6.13%
SHRTFT2 5.05%
VSS 76.23KPH
Heavy Acceleration Noted
Decel Enleanment
-9 -6.5 -4 -1.5 1 3.5 6
-9s -6.5s -4s -1.5s 1s 3.5s 6s
Zoom to 15s
start
IDS
9:31 AM

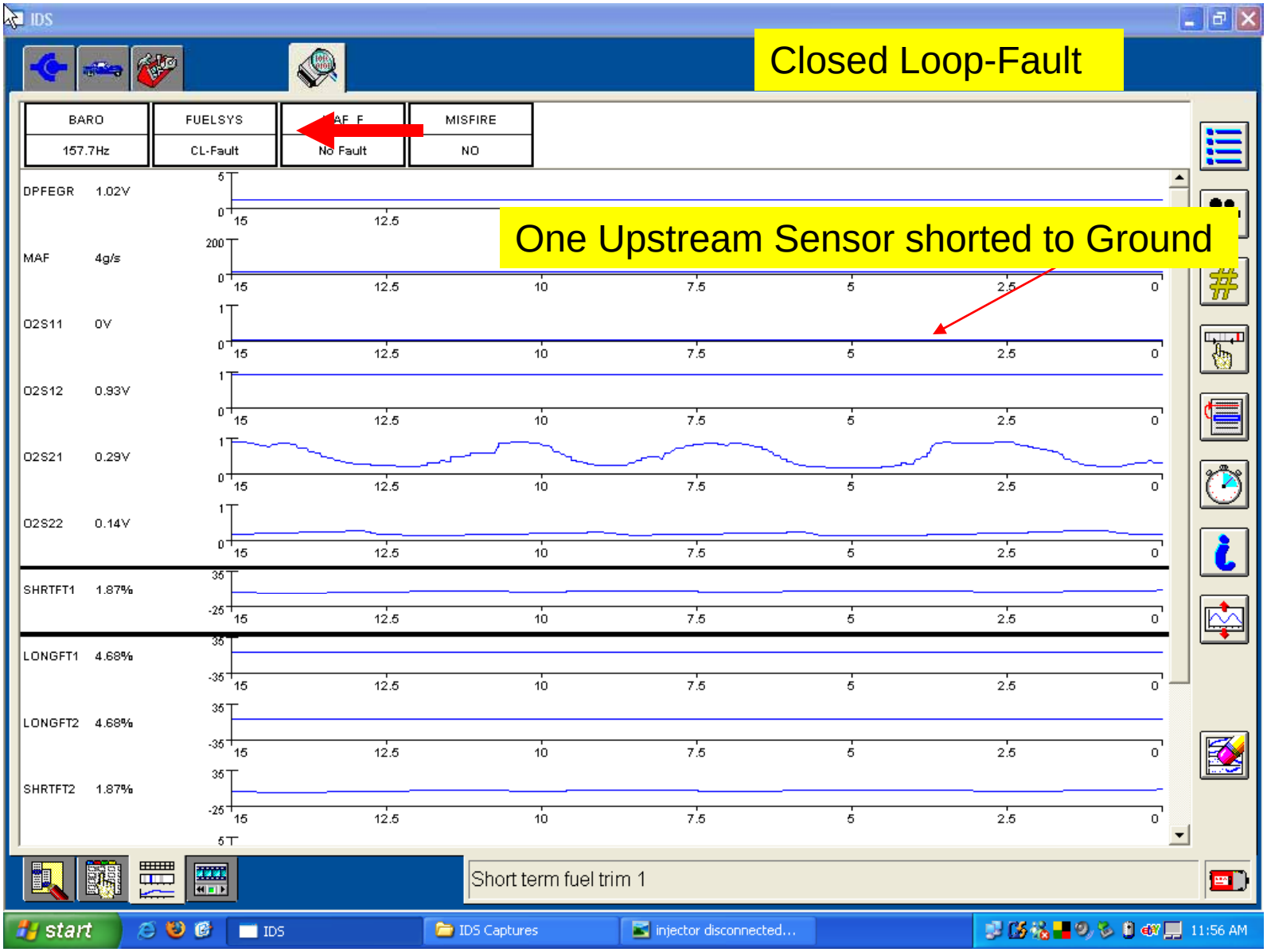
Closed Loop-Normal

- Closed loop fuel status, oxygen sensor is being used as feedback for fuel control


IDS
FUELSYS
Closed Loop
Closed Loop Normal
DPFEGR 0.99V
LONGFT1 -1.17%
LONGFT2 1.17%
O2S11 0.16V
O2S12 0.01V
O2S21 0.16V
O2S22 0.01V
SHRTFT1 -2.12%
SHRTFT2 -0.6%
15 12.5 10 7.5 5 2.5 0
Delta Feedback Pressure Exhaust Gas Recirculation
start
IDS
9:22 AM

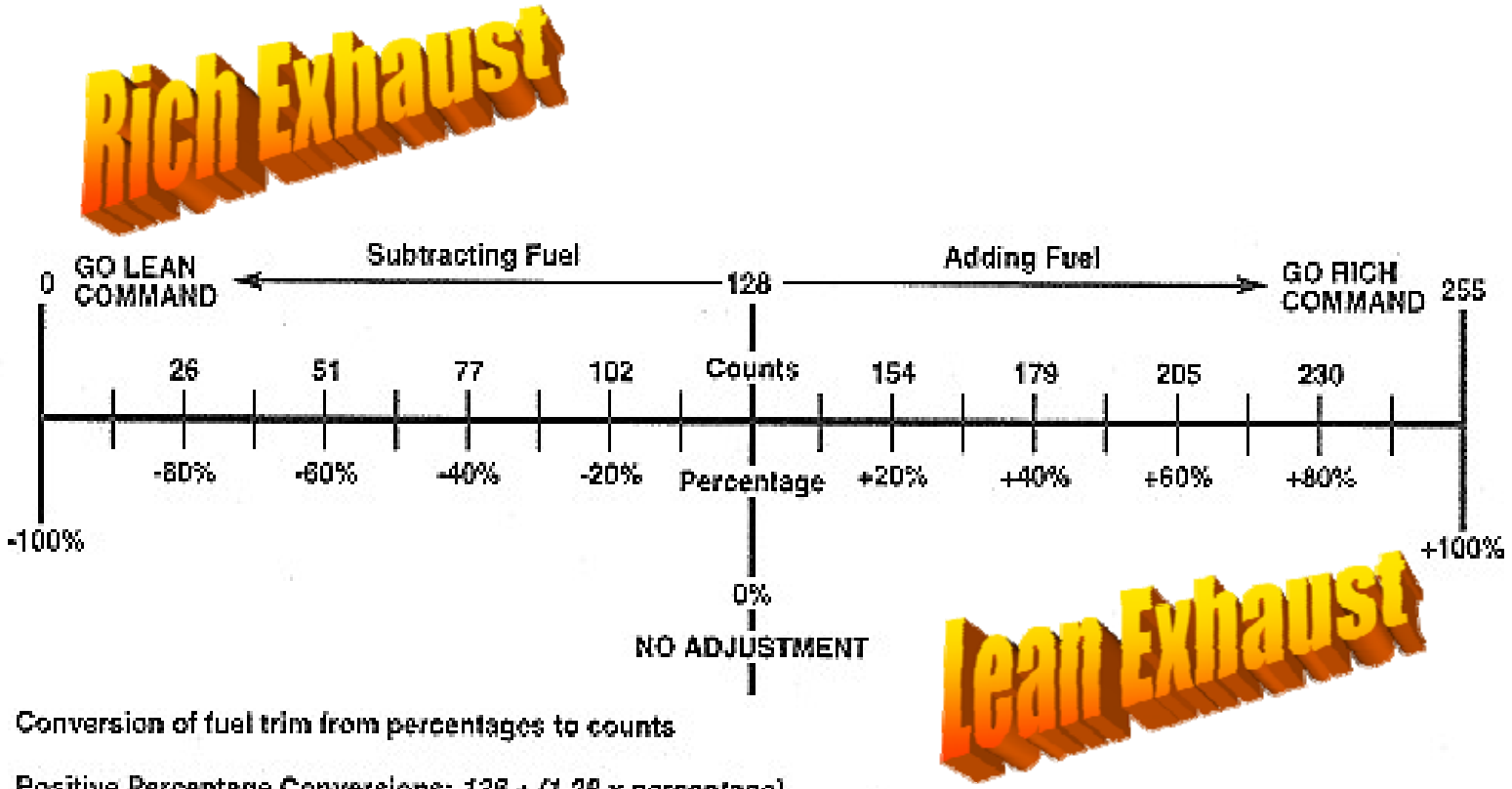
Closed Loop-Fault

- Closed loop fuel status, but a fault status has been established with one oxygen sensor on a dual bank design vehicle


IDS
Closed Loop-Fault
BARO
157.7Hz
FUELSYS
CL-Fault
MISFIRE
NO
No Fault
One Upstream Sensor shorted to Ground
DPFEGR 1.02V
MAF 4g/s
O2S11 0V
O2S12 0.93V
O2S21 0.29V
O2S22 0.14V
SHRTFT1 1.87%
LONGFT1 4.68%
LONGFT2 4.68%
SHRTFT2 1.87%
Short term fuel trim 1
start
IDS
IDS Captures
injector disconnected...
11:56 AM

Fuel Trim Interpretation

Fuel Trim Numbers



Conversion of fuel trim from percentages to counts

Positive Percentage Conversions: *128 + (1.28 x percentage)*
Example: To convert +20% to counts, the formula would be *128 + (1.28 x 20) = 154*

Negative Percentage Conversions: *128 - (1.28 x percentage)*
Example: To convert -20% to counts, the formula would be *128 - (1.28 x 20) = 102*

Fuel Trim download can be obtained at www.atechtraining.com

Short Term Fuel Trim

- This is an immediate correction to the fuel system
- An acceptable range is +/- 10%

Long Term Fuel Trim

- This is how the system has a tendency to run
- An acceptable range is +/- 10%

Positive Fuel Trims

- The system is adding fuel for a perceived lean running condition
- The summation of STFT and LTFT denote a total correction to the system

Negative Fuel Trims

- The system is subtracting fuel for a perceived rich running condition
- The summation of STFT and LTFT denote a total correction to the system

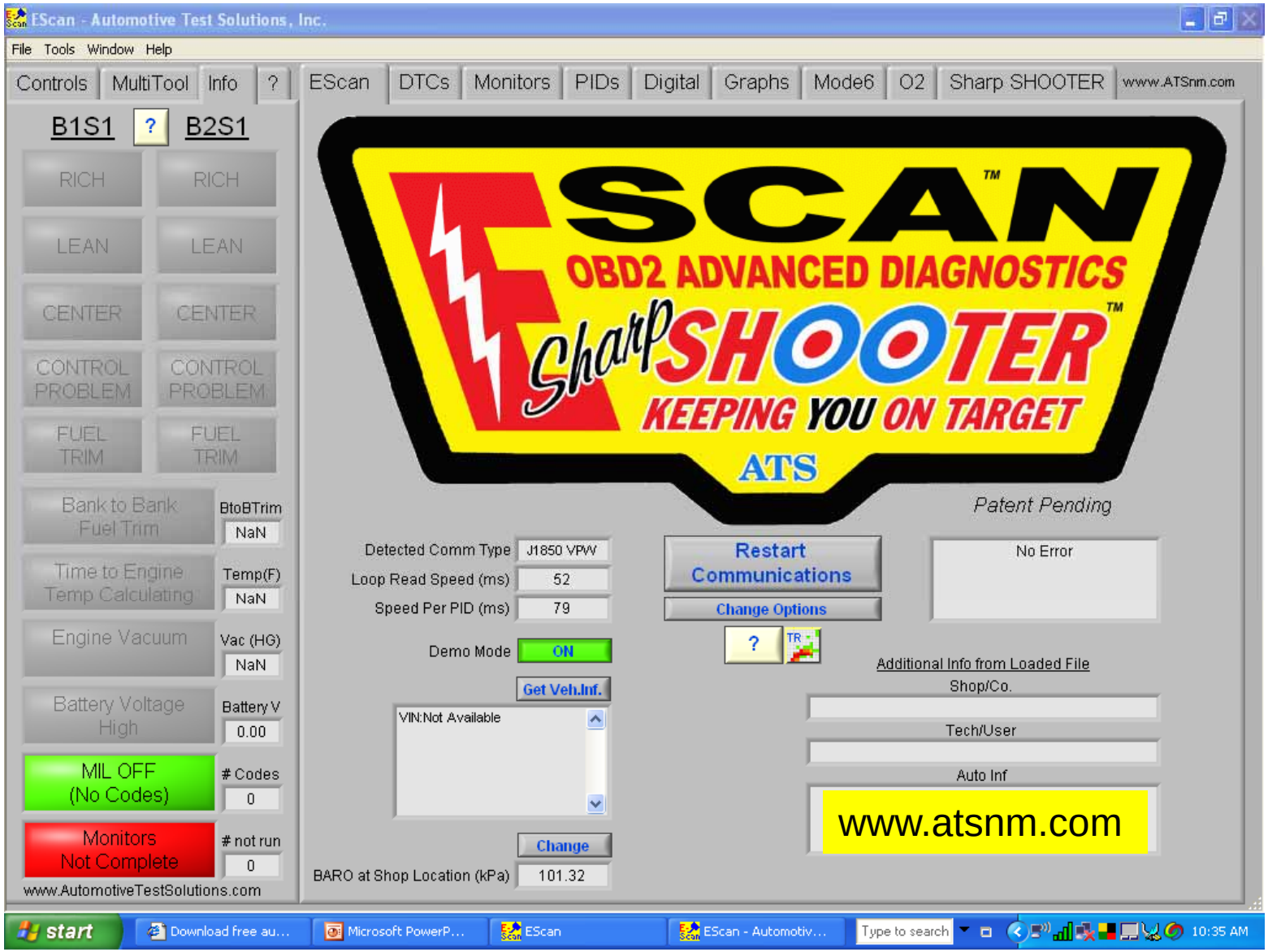
Fuel Trim Example

- LTFT = +12%
- STFT= +2%
- What is the total fuel trim correction on this vehicle?
- Is this vehicle running rich or lean?

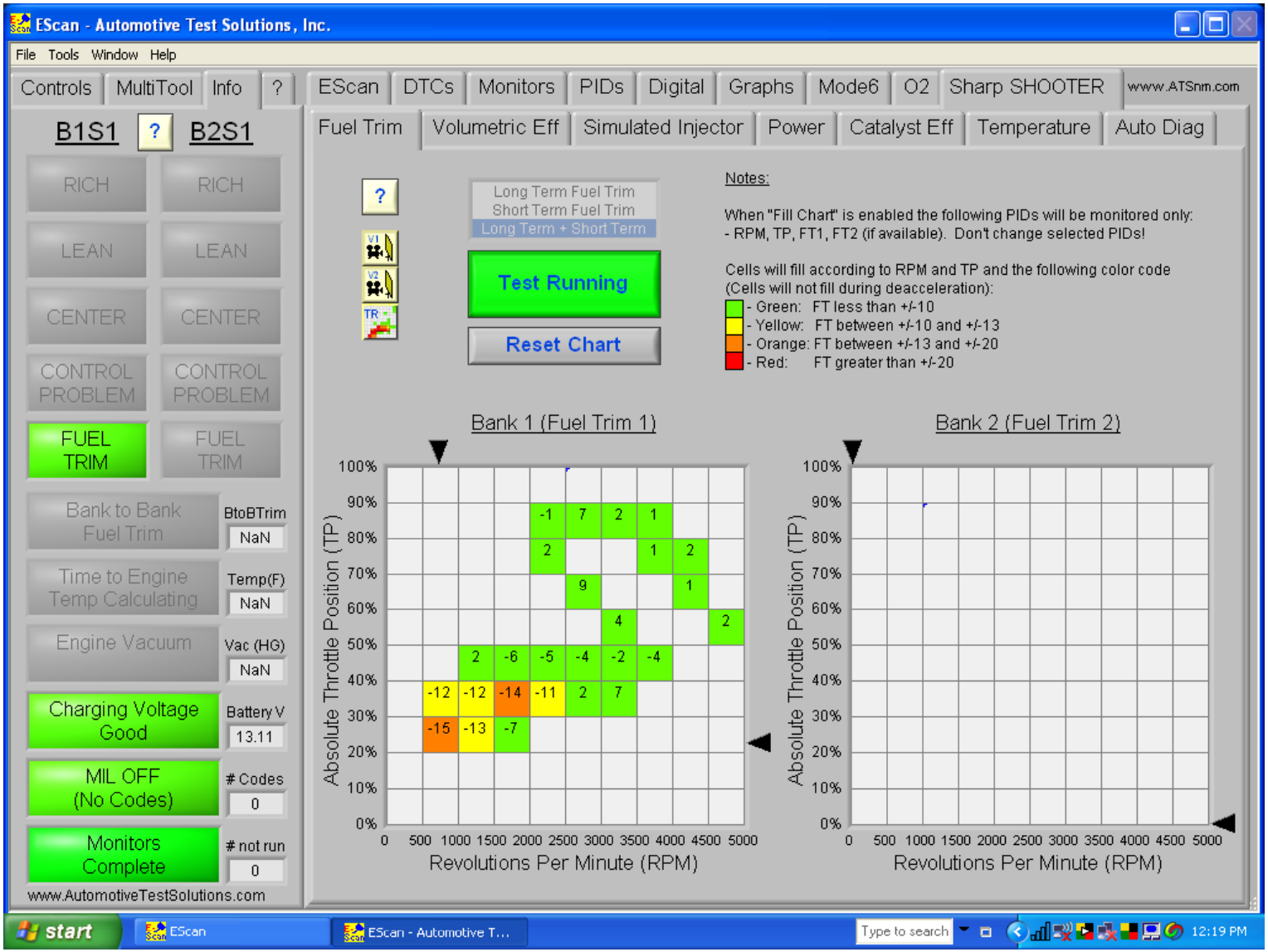
Fuel Trim Example

- Would the tailpipe readings on this vehicle be acceptable based on today's standard?
- What do you think the air fuel ratio or Lambda might be on the gas analyzer?

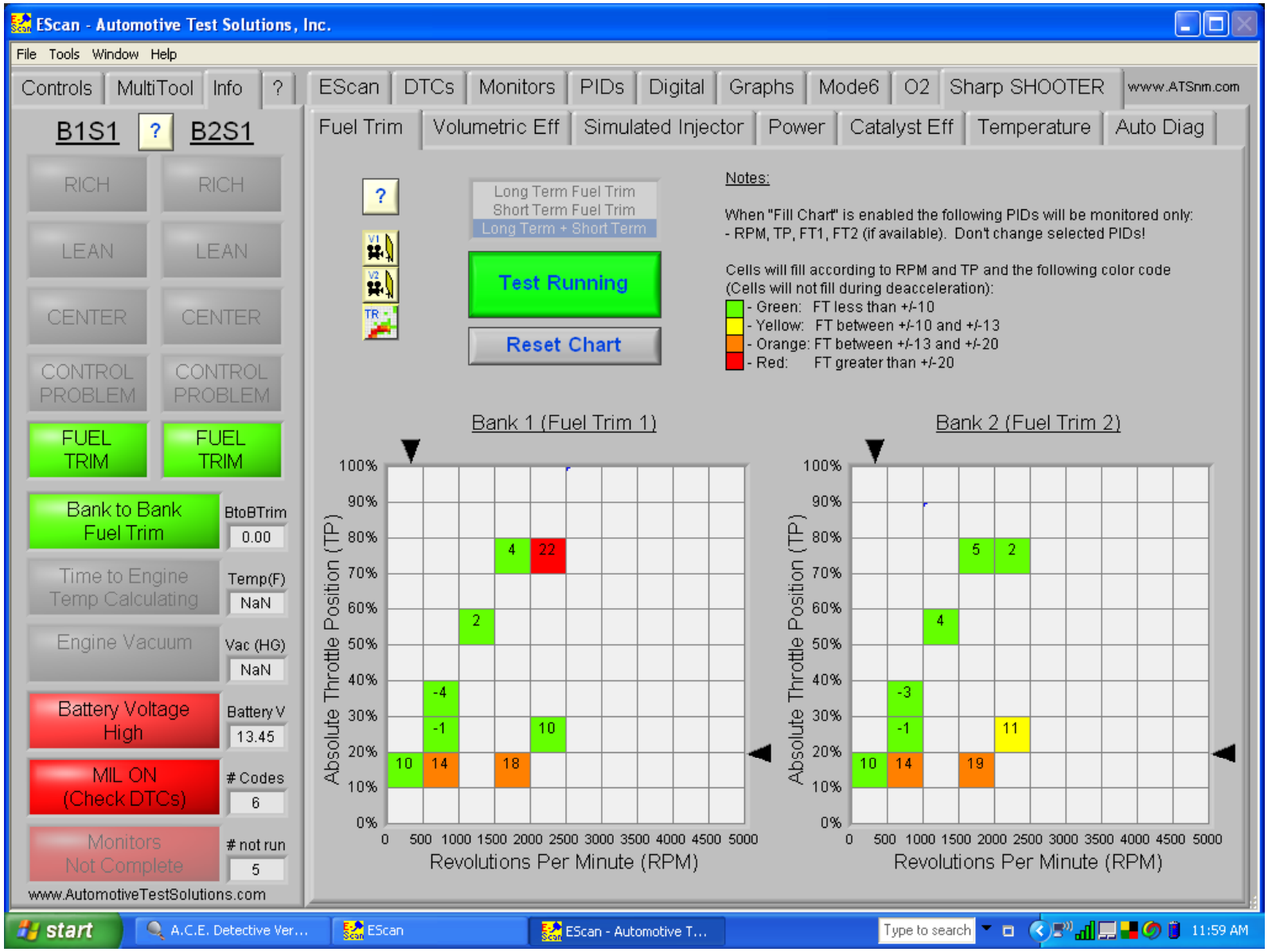
Fuel Trim Diagnostics


EScan - Automotive Test Solutions, Inc.
File Tools Window Help
Controls MultiTool Info ? EScan DTCs Monitors PIDs Digital Graphs Mode6 O2 Sharp SHOOTER www.ATSnm.com
B1S1 ? B2S1
RICH RICH
LEAN LEAN
CENTER CENTER
CONTROL PROBLEM CONTROL PROBLEM
FUEL TRIM FUEL TRIM
Bank to Bank Fuel Trim
BtoBTrim NaN
Time to Engine Temp Calculating
Temp(F) NaN
Engine Vacuum
Vac (HG) NaN
Battery Voltage High
Battery V 0.00
MIL OFF (No Codes)
Codes 0
Monitors Not Complete
not run 0
www.AutomotiveTestSolutions.com
SCAN
OBD2 ADVANCED DIAGNOSTICS
SharpSHOOTER
KEEPING YOU ON TARGET
ATS
Patent Pending
Detected Comm Type J1850 VPW
Loop Read Speed (ms) 52
Speed Per PID (ms) 79
Demo Mode ON
Get Veh.Inf.
VIN:Not Available
Change
BARO at Shop Location (kPa) 101.32
Restart Communications
Change Options
No Error
Additional Info from Loaded File
Shop/Co.
Tech/User
Auto Inf
www.atsnm.com
start
Download free au...
Microsoft PowerP...
EScan
EScan - Automotiv...
Type to search
10:35 AM


2007 Chevrolet Impala


EScan - Automotive Test Solutions, Inc.
File Tools Window Help
Controls MultiTool Info ? EScan DTCs Monitors PIDs Digital Graphs Mode6 O2 Sharp SHOOTER www.ATSnm.com
B1S1 ? B2S1
RICH RICH
LEAN LEAN
CENTER CENTER
CONTROL PROBLEM CONTROL PROBLEM
FUEL TRIM FUEL TRIM
Bank to Bank Fuel Trim
BtoBTrim NaN
Time to Engine Temp Calculating
Temp(F) NaN
Engine Vacuum
Vac (HG) NaN
Charging Voltage Good
Battery V 13.11
MIL OFF (No Codes)
Codes 0
Monitors Complete
not run 0
www.AutomotiveTestSolutions.com
Fuel Trim Volumetric Eff Simulated Injector Power Catalyst Eff Temperature Auto Diag
Long Term Fuel Trim
Short Term Fuel Trim
Long Term + Short Term
Test Running
Reset Chart
Notes:
When "Fill Chart" is enabled the following PIDs will be monitored only:
- RPM, TP, FT1, FT2 (if available). Don't change selected PIDs!
Cells will fill according to RPM and TP and the following color code
(Cells will not fill during deacceleration):
- Green: FT less than +/-10
- Yellow: FT between +/-10 and +/-13
- Orange: FT between +/-13 and +/-20
- Red: FT greater than +/-20
Bank 1 (Fuel Trim 1)
Bank 2 (Fuel Trim 2)
Absolute Throttle Position (TP)
Revolutions Per Minute (RPM)
start EScan EScan - Automotive T... Type to search 12:19 PM

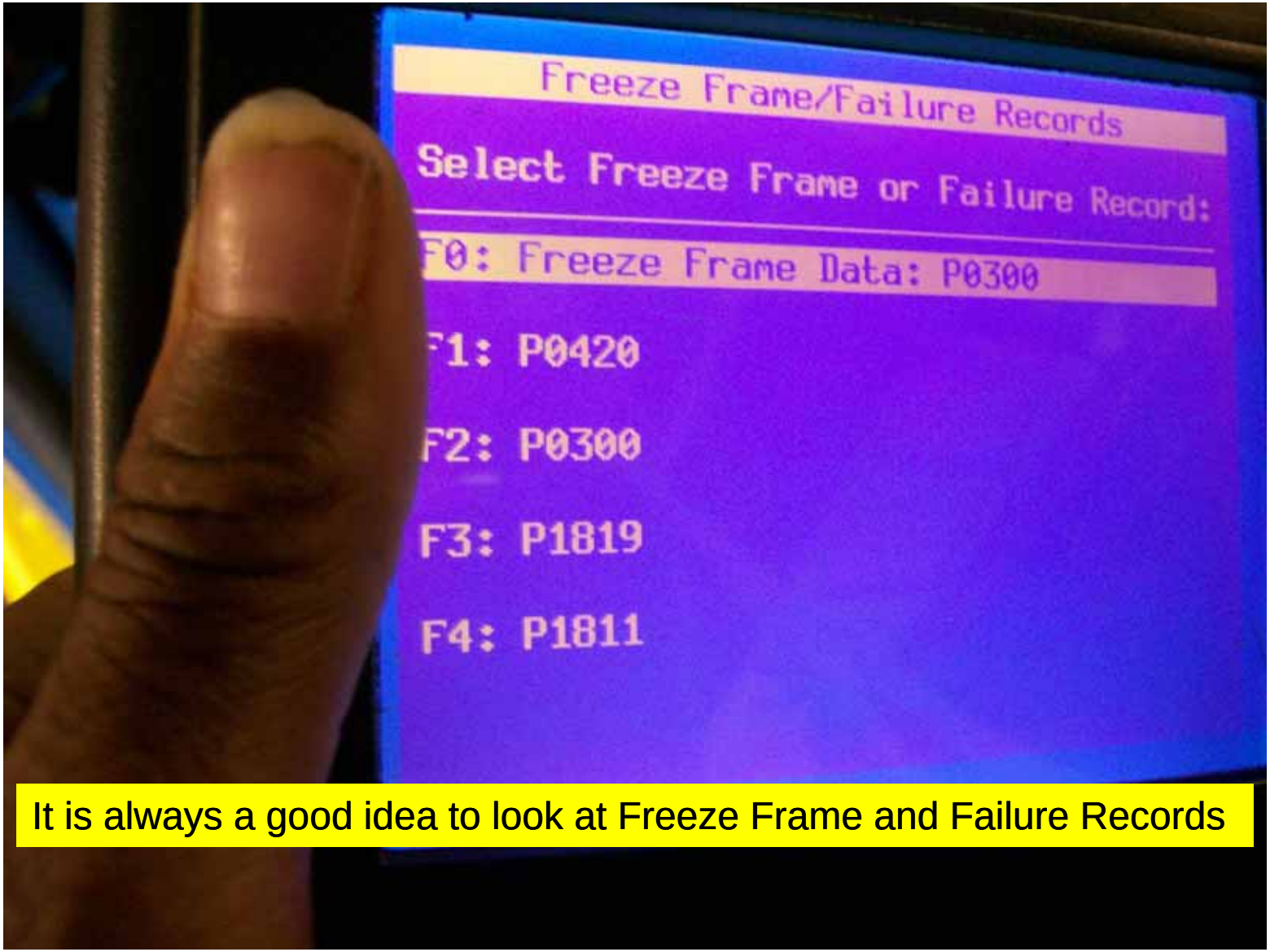
2002 Lincoln LS


EScan - Automotive Test Solutions, Inc.
File Tools Window Help
Controls MultiTool Info ?
EScan DTCs Monitors PIDs Digital Graphs Mode6 O2 Sharp SHOOTER
www.ATSnm.com
B1S1 ? B2S1
RICH RICH
LEAN LEAN
CENTER CENTER
CONTROL PROBLEM CONTROL PROBLEM
FUEL TRIM FUEL TRIM
Bank to Bank Fuel Trim
BtoBTrim 0.00
Time to Engine Temp Calculating
Temp(F) NaN
Engine Vacuum
Vac (HG) NaN
Battery Voltage High
Battery V 13.45
MIL ON (Check DTCs)
Codes 6
Monitors Not Complete
not run 5
www.AutomotiveTestSolutions.com
Fuel Trim Volumetric Eff Simulated Injector Power Catalyst Eff Temperature Auto Diag
Long Term Fuel Trim
Short Term Fuel Trim
Long Term + Short Term
Test Running
Reset Chart
Notes:
When "Fill Chart" is enabled the following PIDs will be monitored only:
- RPM, TP, FT1, FT2 (if available). Don't change selected PIDs!
Cells will fill according to RPM and TP and the following color code
(Cells will not fill during deacceleration):
- Green: FT less than +/-10
- Yellow: FT between +/-10 and +/-13
- Orange: FT between +/-13 and +/-20
- Red: FT greater than +/-20
Bank 1 (Fuel Trim 1)
Bank 2 (Fuel Trim 2)
Absolute Throttle Position (TP)
Revolutions Per Minute (RPM)
start
A.C.E. Detective Ver...
EScan
EScan - Automotive T...
Type to search
11:59 AM

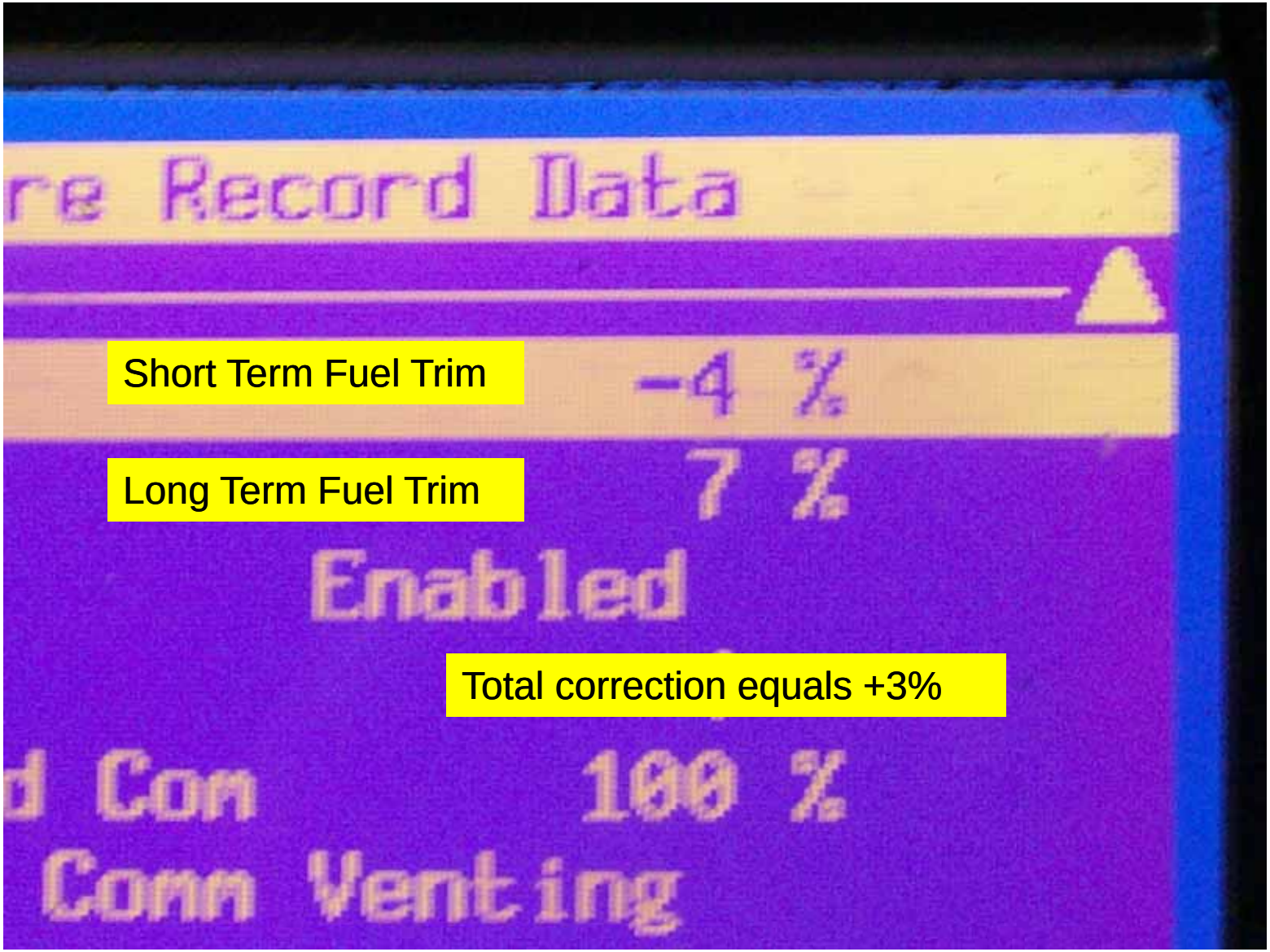
Fuel Trim Exercise

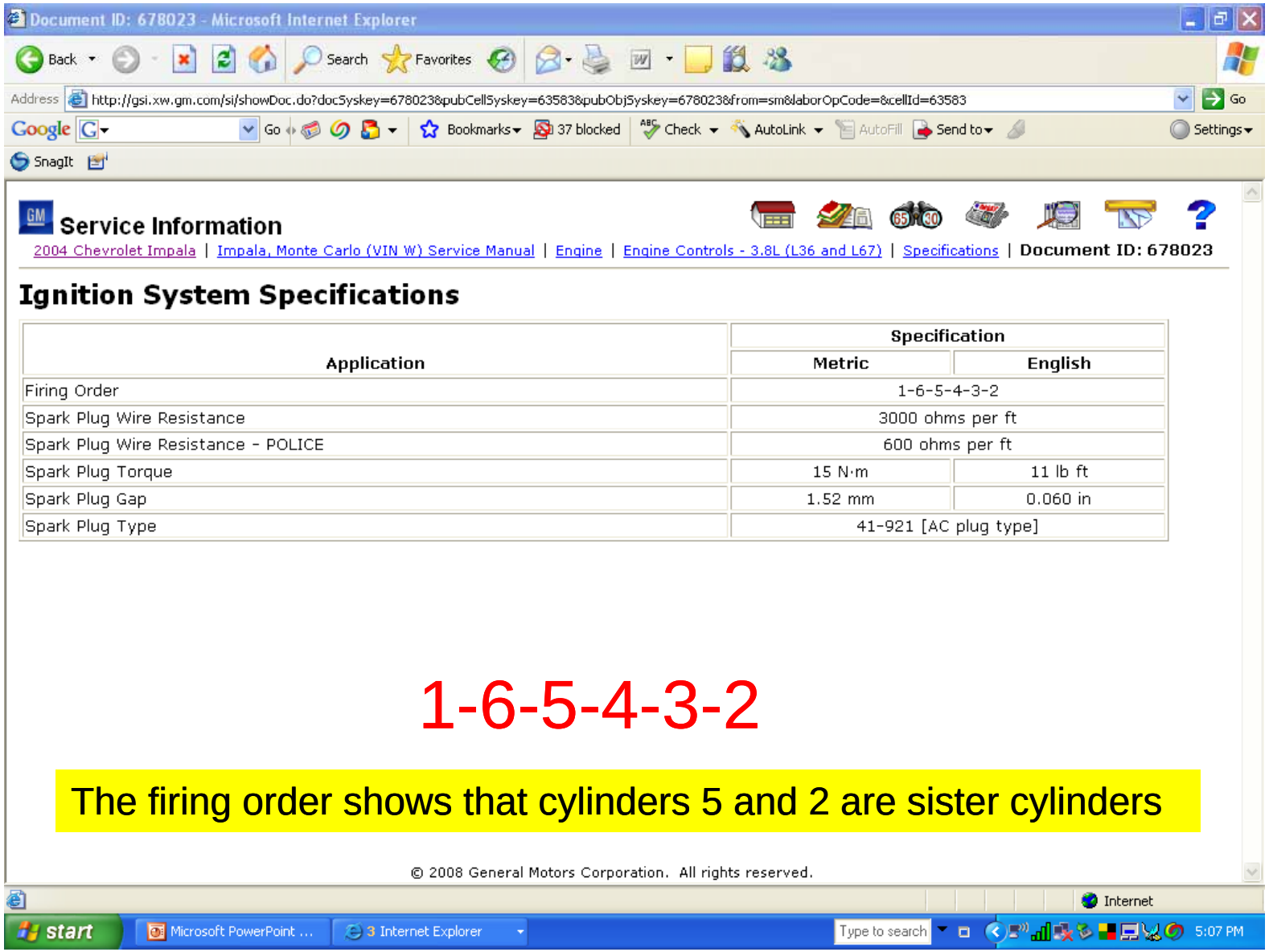

MIL is On
Tire pressure is low
2004 Chevrolet Impala


MESSAGE CENTER
LOW
TIRE
PRESSURE



It is always a good idea to look at Freeze Frame and Failure Records


re Record Data
Short Term Fuel Trim
-4 %
Long Term Fuel Trim
7 %
Enabled
Total correction equals +3%
d Con
100 %
Conn Venting


Document ID: 678023 - Microsoft Internet Explorer
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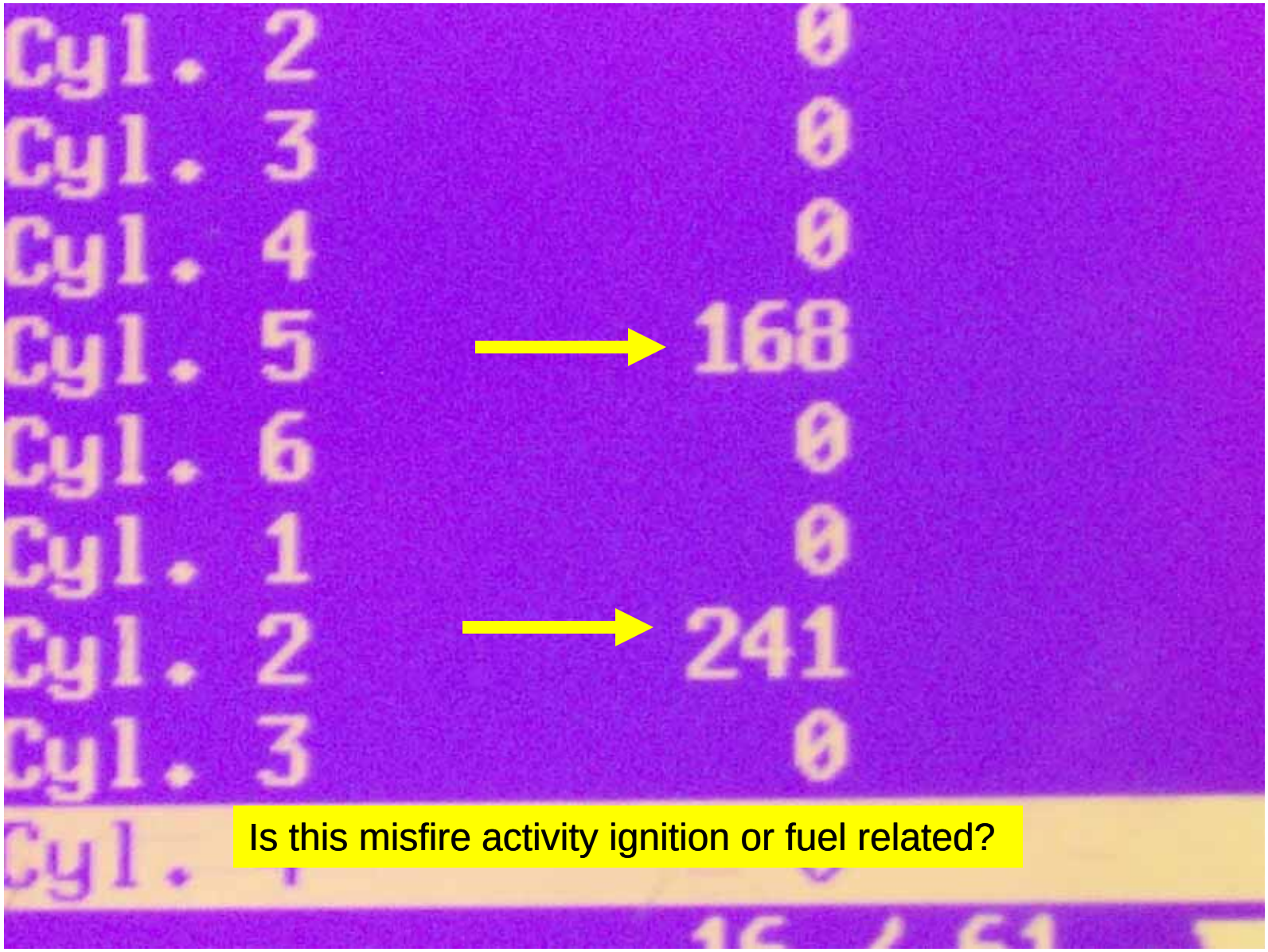
Search
Favorites
Address
http://gsi.xw.gm.com/si/showDoc.do?docSyskey=678023&pubCellSyskey=63583&pubObjSyskey=678023&from=sm&laborOpCode=&cellId=63583
Go
Google
Bookmarks
37 blocked
Check
AutoLink
AutoFill
Send to
Settings
SnagIt
Service Information
2004 Chevrolet Impala | Impala, Monte Carlo (VIN W) Service Manual | Engine | Engine Controls - 3.8L (L36 and L67) | Specifications | Document ID: 678023
Ignition System Specifications
Application
Specification
Metric
English
Firing Order
1-6-5-4-3-2
Spark Plug Wire Resistance
3000 ohms per ft
Spark Plug Wire Resistance - POLICE
600 ohms per ft
Spark Plug Torque
15 N·m
11 lb ft
Spark Plug Gap
1.52 mm
0.060 in
Spark Plug Type
41-921 [AC plug type]
1-6-5-4-3-2
The firing order shows that cylinders 5 and 2 are sister cylinders
© 2008 General Motors Corporation. All rights reserved.
Internet
start
Microsoft PowerPoint ...
3 Internet Explorer
Type to search
5:07 PM


Cyl. 2 0
Cyl. 3 0
Cyl. 4 0
Cyl. 5 168
Cyl. 6 0
Cyl. 1 0
Cyl. 2 241
Cyl. 3 0
Cyl.
Is this misfire activity ignition or fuel related?

Lean Running Engine Interpretations

Fuel Trims will increase in a positive going direction

Lean Running Engine Interpretation

- Single Cylinder Ignition misfire
- Clogged Injector Misfire
- Vacuum Leak Misfire
- Fuel Pump Low Volume Issue
- O2 signal shorted to ground

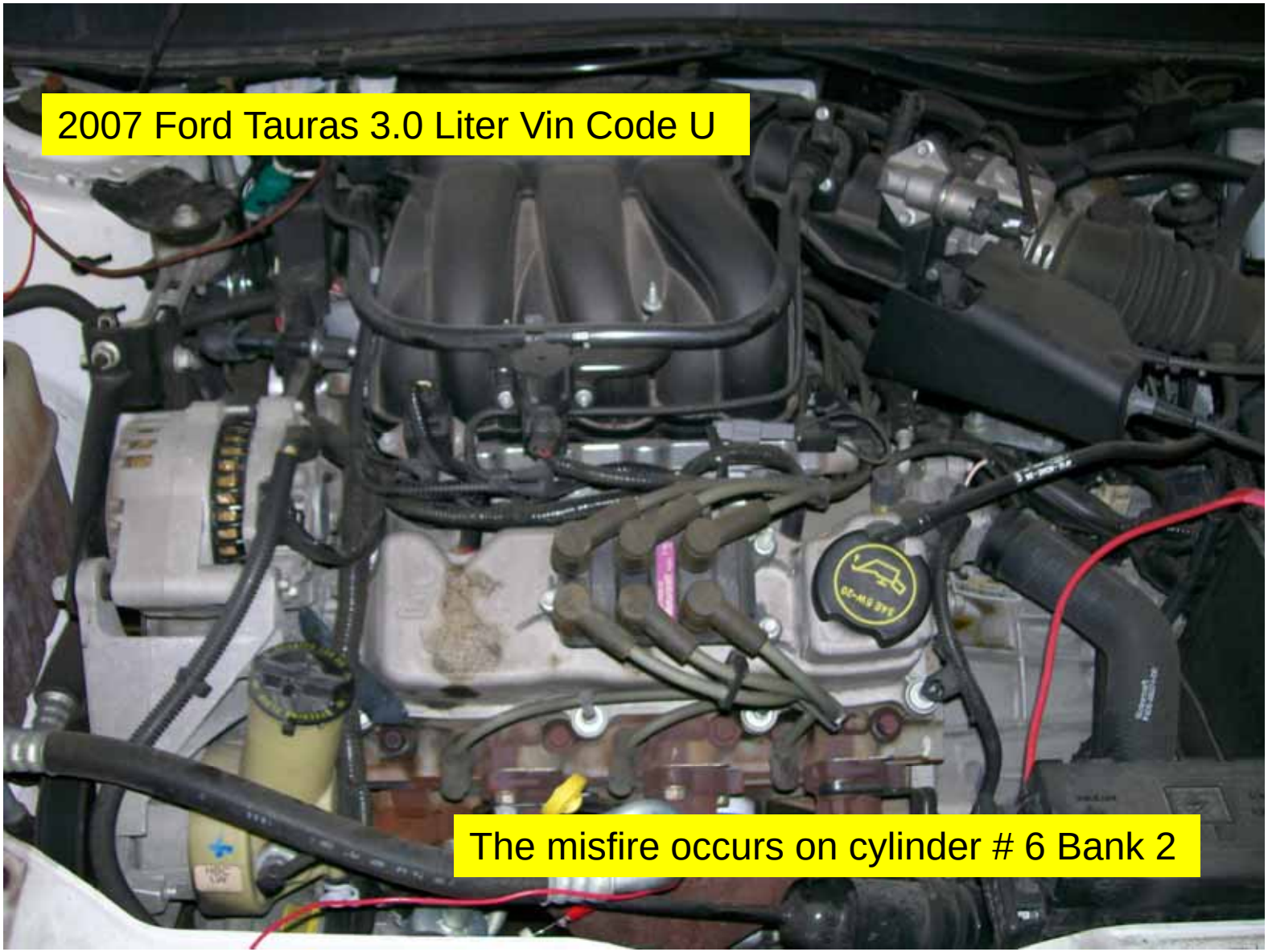
Fuel trim values will increase if the PCM thinks or knows the vehicle is running lean

Lean Running Engine Interpretation

- EGR Misfire-MAF Engine
  - Significant misfire occuring
- Shorted Injector
  - Pintle may not lift off its seat

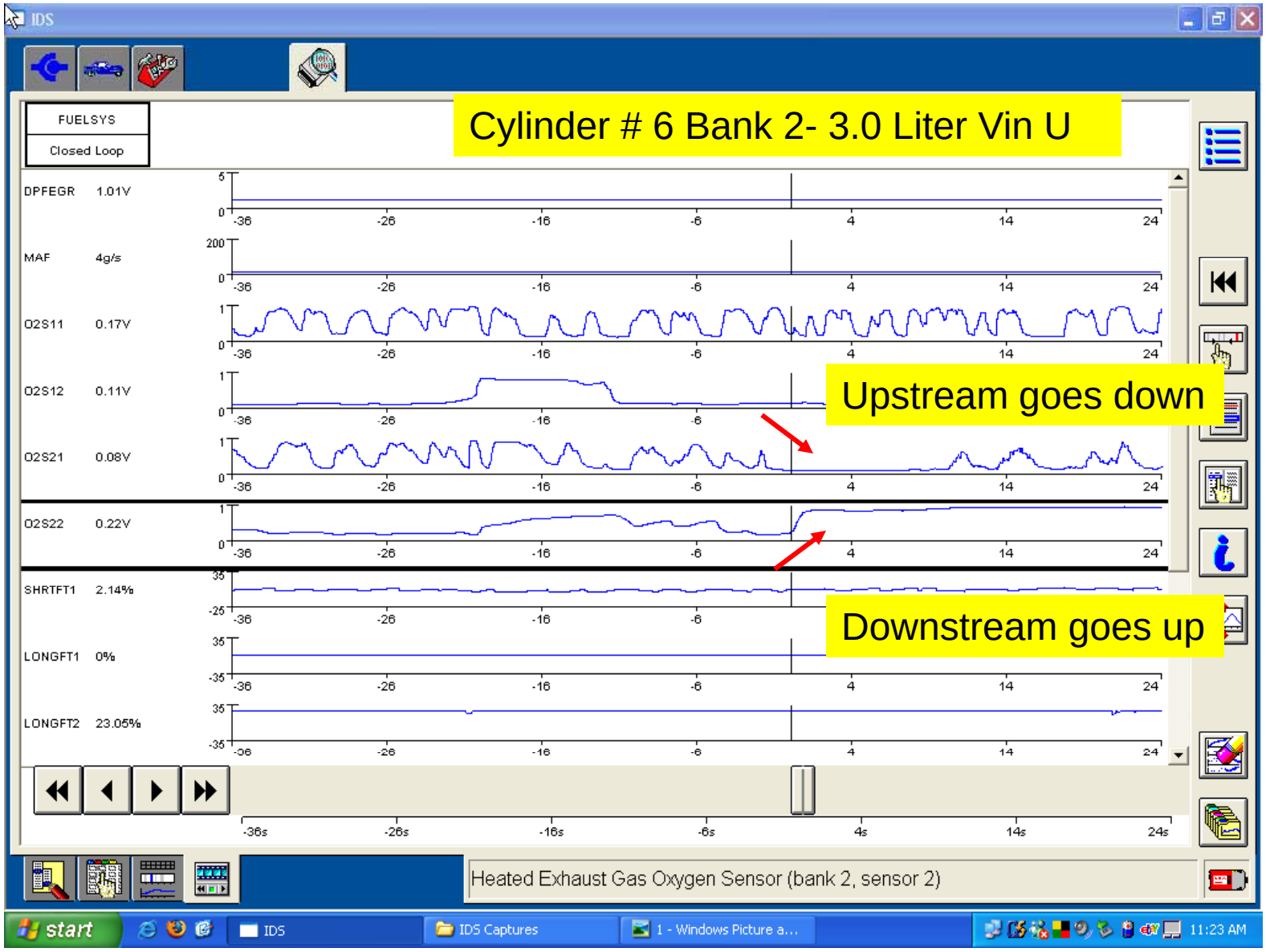
Fuel trim values will increase if the PCM thinks or knows the vehicle is running lean

Single Cylinder Ignition Misfire


2007 Ford Tauras 3.0 Liter Vin Code U
The misfire occurs on cylinder # 6 Bank 2

Single Cylinder Ignition Misfire Theory

- When the initial misfire occurs the pre-oxygen sensor voltage will go low due to the additional oxygen in the cylinder
- STFT will increase slightly to compensate for this initial effect

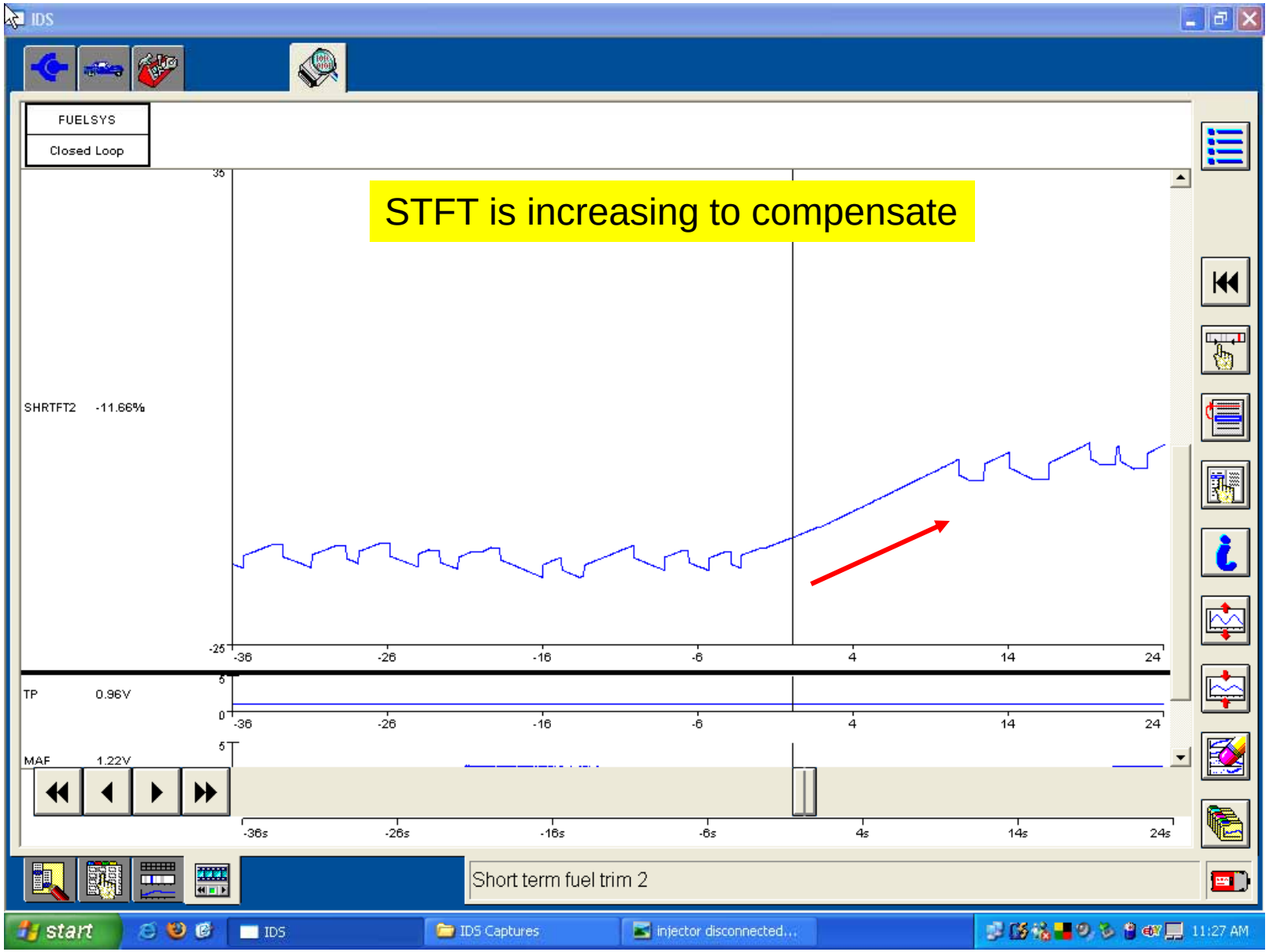

IDS
FUELSYS
Closed Loop
Cylinder # 6 Bank 2- 3.0 Liter Vin U
DPFEGR 1.01V
MAF 4g/s
O2S11 0.17V
O2S12 0.11V
O2S21 0.08V
O2S22 0.22V
Upstream goes down
SHRTFT1 2.14%
LONGFT1 0%
LONGFT2 23.05%
Downstream goes up
-36 -26 -16 -6 4 14 24
-36s -26s -16s -6s 4s 14s 24s
Heated Exhaust Gas Oxygen Sensor (bank 2, sensor 2)
start
IDS
IDS Captures
1 - Windows Picture a...
11:23 AM

Single Cylinder Ignition Misfire Theory

- The pre-oxygen sensor will eventually begin to switch again due to this compensation

Single Cylinder Ignition Misfire Theory

- LTFT will begin to increase in an effort to bring STFT as close to zero as possible
- Post oxygen sensor voltage will be high indicating that the vehicle is running rich


IDS
FUELSYS
Closed Loop
STFT is increasing to compensate
SHRTFT2 -11.66%
TP 0.96V
MAF 1.22V
-36 -26 -16 -6 4 14 24
-36s -26s -16s -6s 4s 14s 24s
Short term fuel trim 2
start
IDS
IDS Captures
injector disconnected...
11:27 AM

Single Cylinder Ignition Misfire Theory

- STFT may show a minimal impact as a result of the single cylinder ignition misfire.
- LTFT may show a noticeable impact as a result of the single cylinder ignition misfire ranging from single to dual digit positive values

Single Cylinder Ignition Misfire Theory

- A possible end result may show a pre oxygen sensor that is switching and in fuel control
- A post oxygen sensor that is slightly higher in sensor voltage
- This is what you may see in the service bay

PCM Rich Running Engine Interpretation

Fuel Trims will increase in a negative going direction

PCM Rich Running Engine Interpretation

- O2 sensor shorted to voltage
- EGR Misfire-Speed Density
  - –Significant misfire occuring
- Leaking Injector misfire

Fuel trim values will decrease if the PCM thinks or knows the vehicle is running rich

PCM Rich Running Engine Interpretation

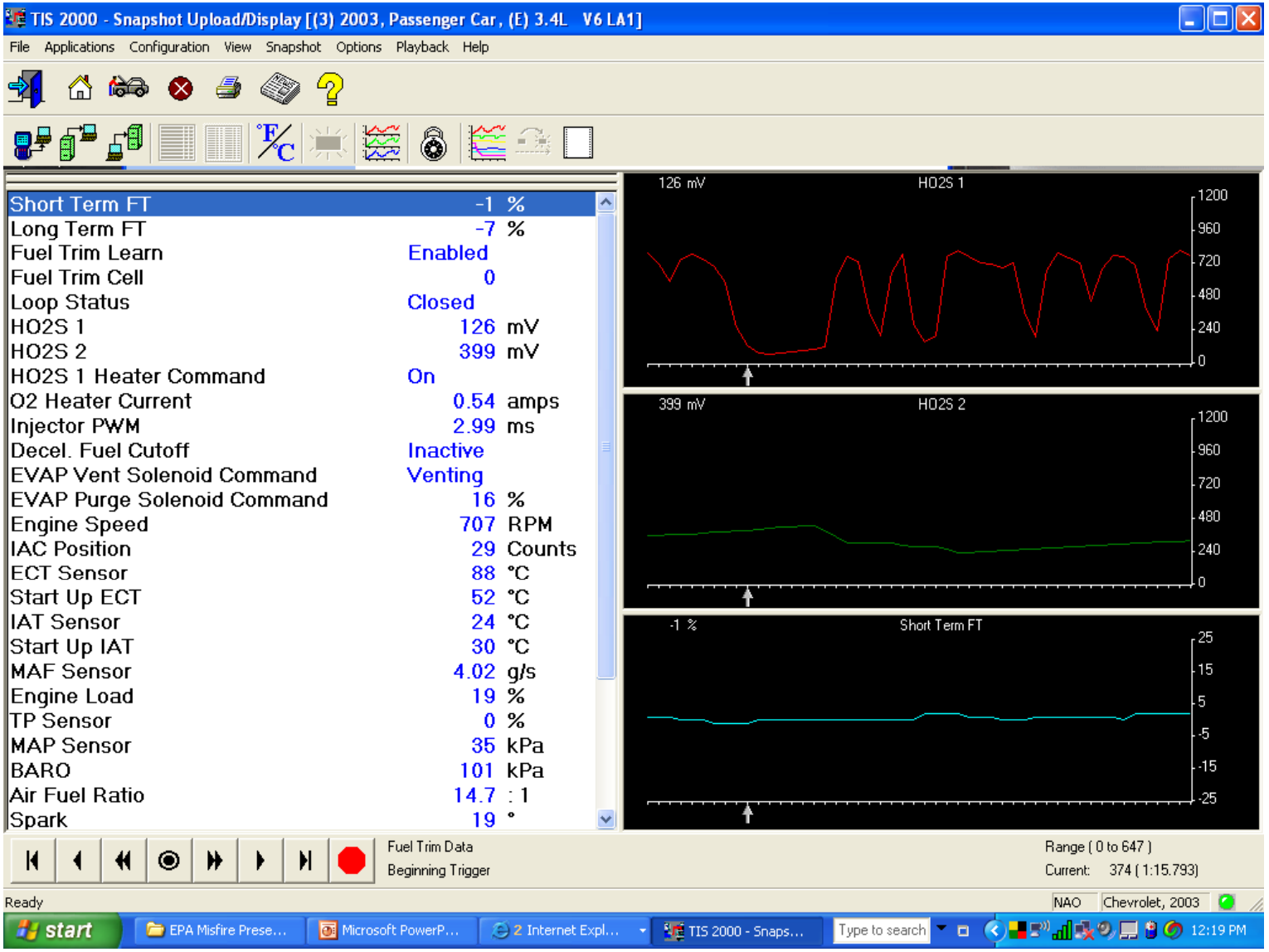
- Shorted Injector
  - Pintle maybe open longer
- Fuel Pressure Regulator
  - Leaking Diaphragm
  - No vacuum applied

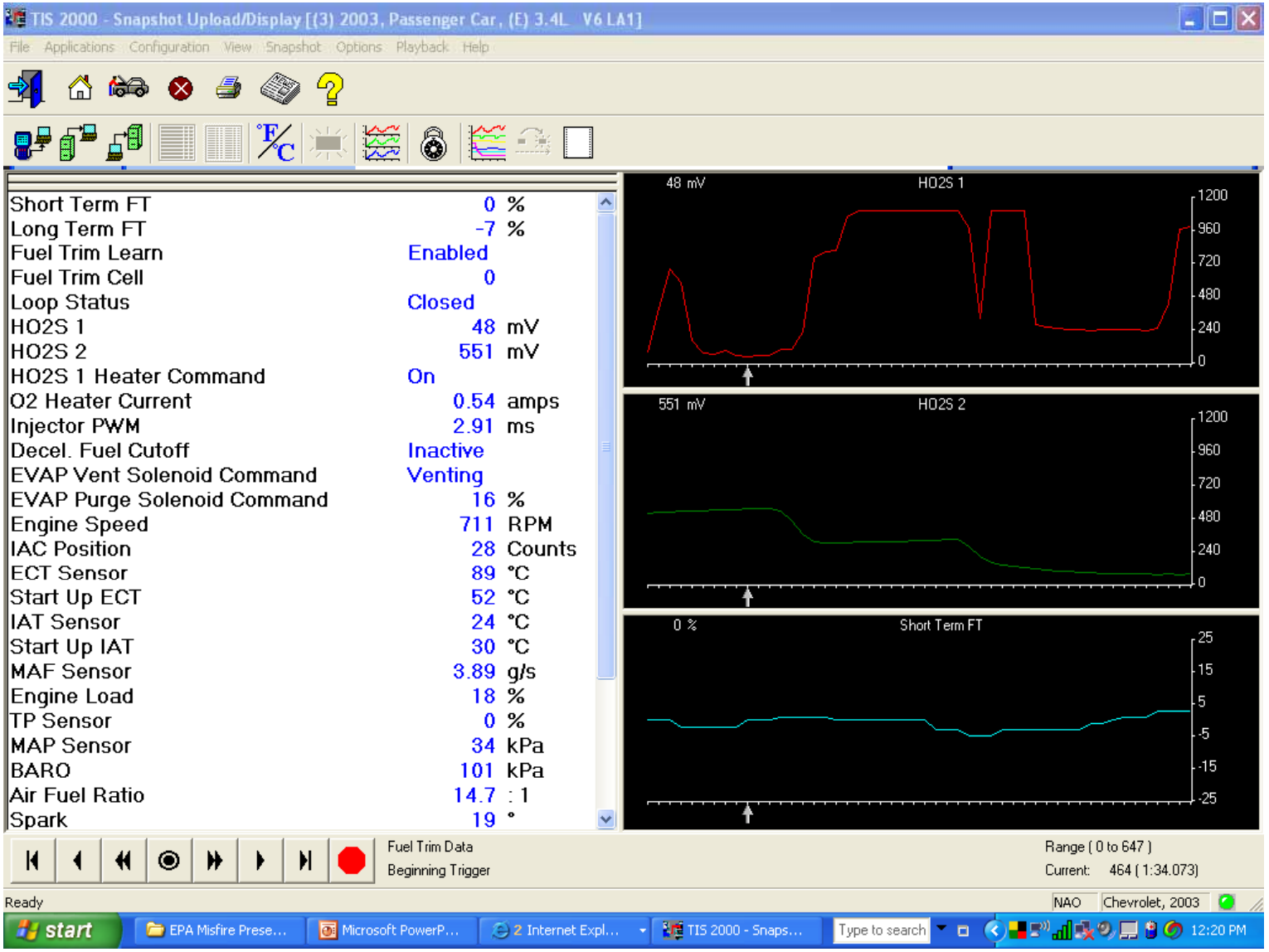
Fuel trim values will decrease if the PCM thinks or knows the vehicle is running rich

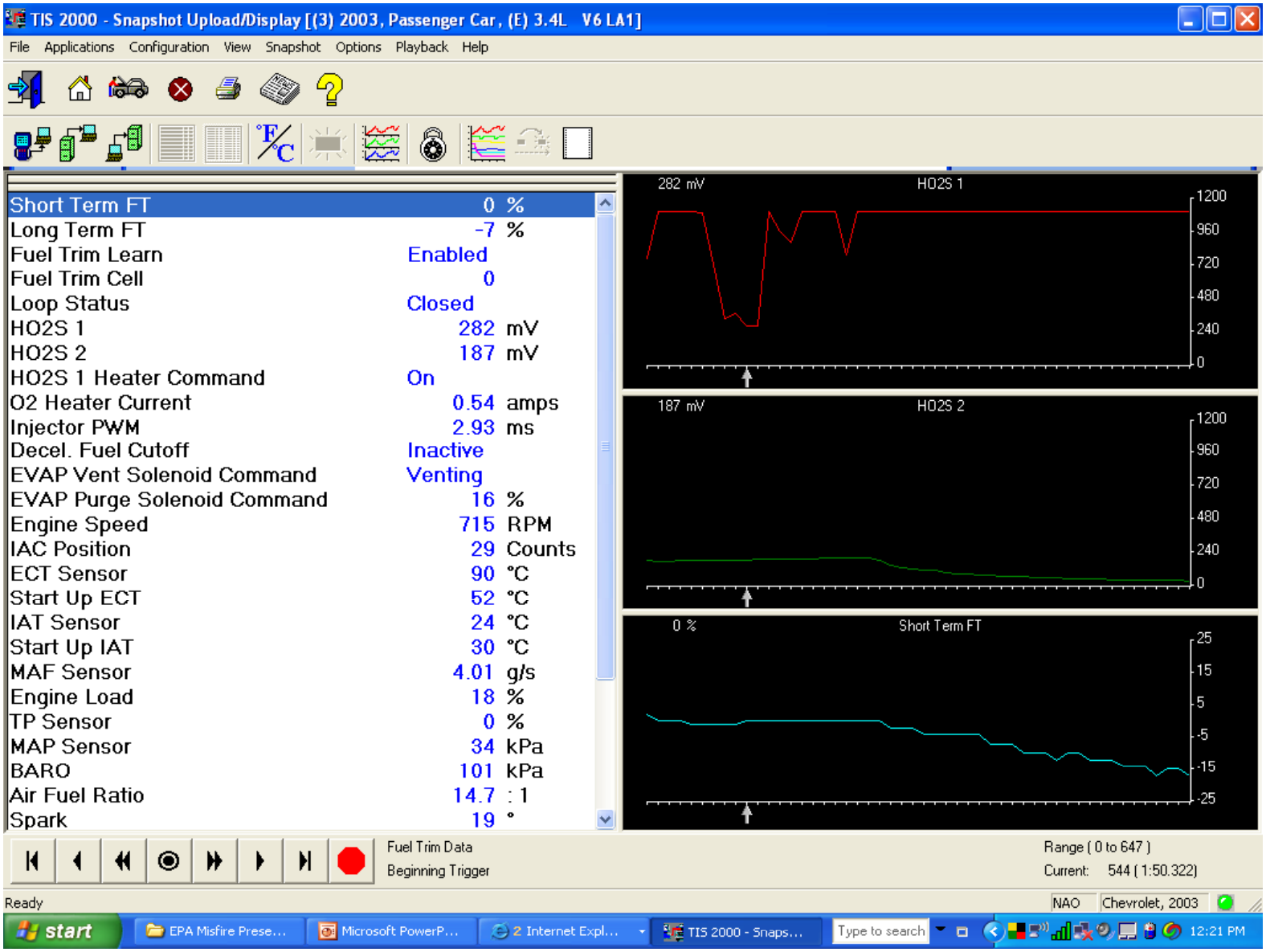
O2 Sensor Shorted to Voltage

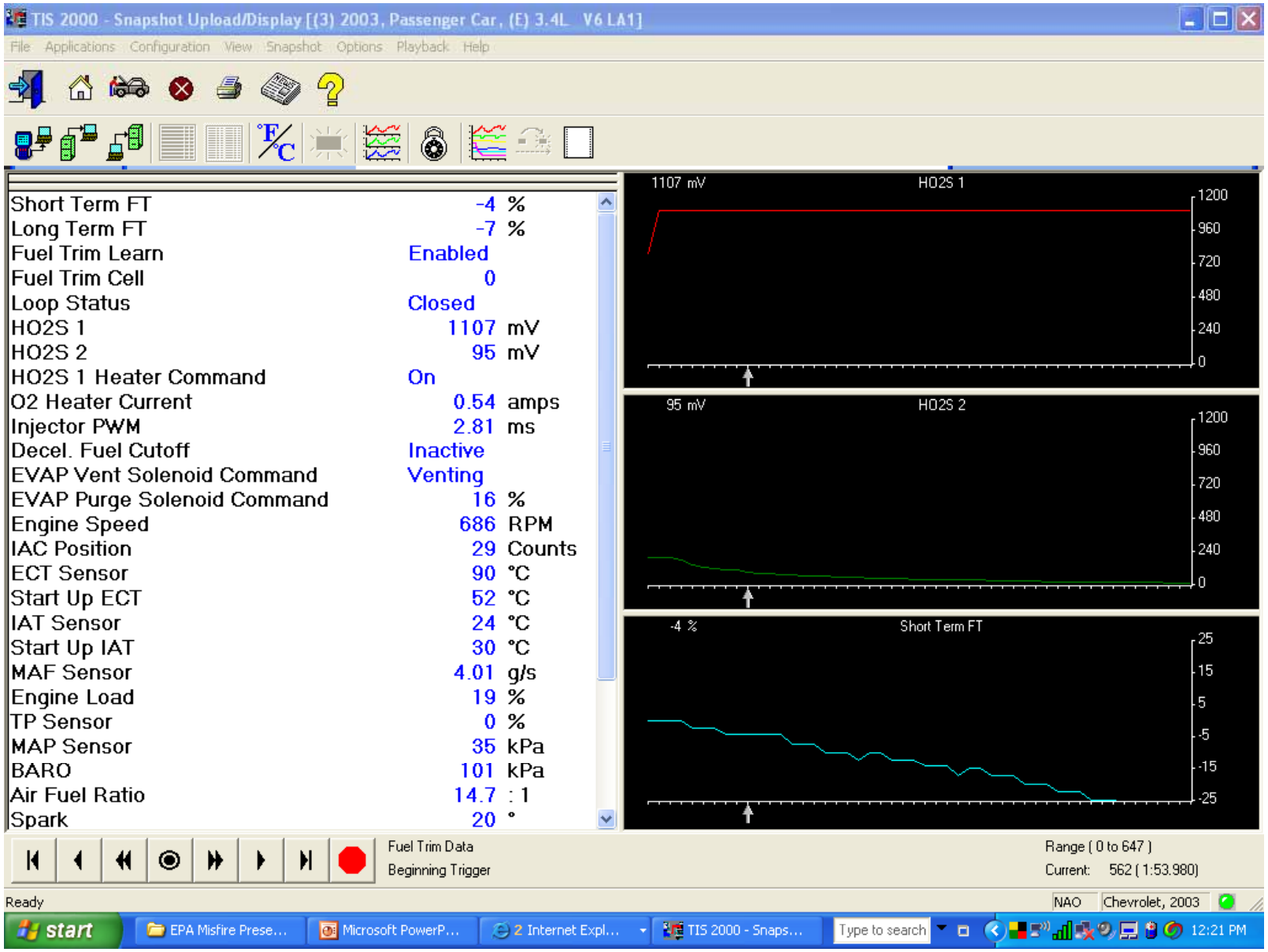
2003 Chevrolet Impala

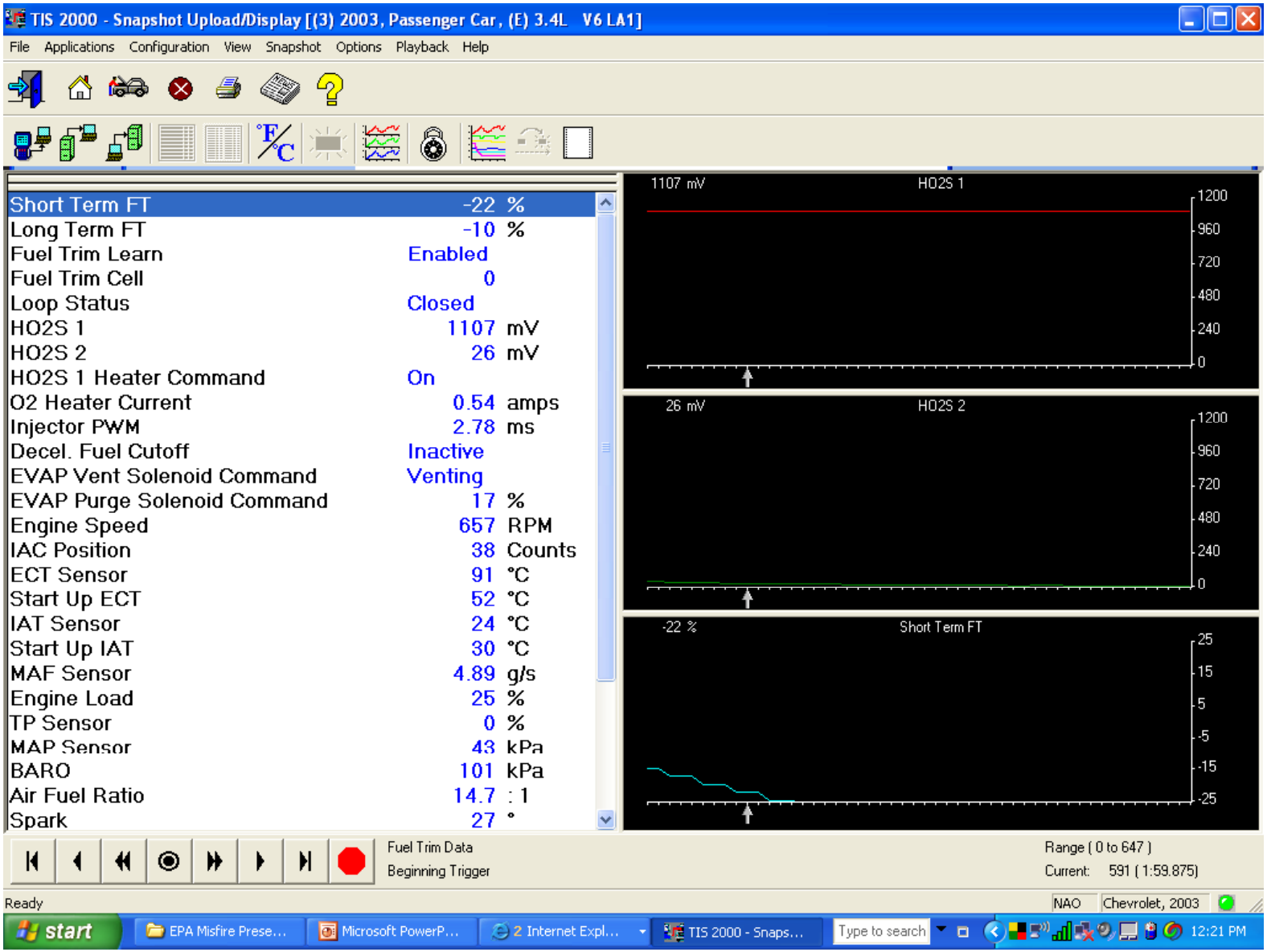
MAF System


TIS 2000 - Snapshot Upload/Display [(3) 2003, Passenger Car, (E) 3.4L V6 LA1]
File Applications Configuration View Snapshot Options Playback Help
Short Term FT -1 %
Long Term FT -7 %
Fuel Trim Learn Enabled
Fuel Trim Cell 0
Loop Status Closed
HO2S 1 126 mV
HO2S 2 399 mV
HO2S 1 Heater Command On
O2 Heater Current 0.54 amps
Injector PWM 2.99 ms
Decel. Fuel Cutoff Inactive
EVAP Vent Solenoid Command Venting
EVAP Purge Solenoid Command 16 %
Engine Speed 707 RPM
IAC Position 29 Counts
ECT Sensor 88 °C
Start Up ECT 52 °C
IAT Sensor 24 °C
Start Up IAT 30 °C
MAF Sensor 4.02 g/s
Engine Load 19 %
TP Sensor 0 %
MAP Sensor 35 kPa
BARO 101 kPa
Air Fuel Ratio 14.7 : 1
Spark 19 °
126 mV
HO2S 1
1200
960
720
480
240
0
399 mV
HO2S 2
-1 %
Short Term FT
25
15
5
-5
-15
-25
Fuel Trim Data
Beginning Trigger
Range (0 to 647)
Current: 374 (1:15.793)
Ready
NAO
Chevrolet, 2003
start
EPA Misfire Prese...
Microsoft PowerP...
2 Internet Expl...
TIS 2000 - Snaps...
Type to search
12:19 PM


TIS 2000 - Snapshot Upload/Display [(3) 2003, Passenger Car, (E) 3.4L V6 LA1]
File Applications Configuration View Snapshot Options Playback Help
Short Term FT 0 %
Long Term FT -7 %
Fuel Trim Learn Enabled
Fuel Trim Cell 0
Loop Status Closed
HO2S 1 48 mV
HO2S 2 551 mV
HO2S 1 Heater Command On
O2 Heater Current 0.54 amps
Injector PWM 2.91 ms
Decel. Fuel Cutoff Inactive
EVAP Vent Solenoid Command Venting
EVAP Purge Solenoid Command 16 %
Engine Speed 711 RPM
IAC Position 28 Counts
ECT Sensor 89 °C
Start Up ECT 52 °C
IAT Sensor 24 °C
Start Up IAT 30 °C
MAF Sensor 3.89 g/s
Engine Load 18 %
TP Sensor 0 %
MAP Sensor 34 kPa
BARO 101 kPa
Air Fuel Ratio 14.7 : 1
Spark 19 °
48 mV
HO2S 1
1200
960
720
480
240
0
551 mV
HO2S 2
0 %
Short Term FT
25
15
5
-5
-15
-25
Fuel Trim Data
Beginning Trigger
Range (0 to 647)
Current: 464 (1:34.073)
Ready
NAO
Chevrolet, 2003
start
EPA Misfire Prese...
Microsoft PowerP...
2 Internet Expl...
TIS 2000 - Snaps...
Type to search
12:20 PM


TIS 2000 - Snapshot Upload/Display [(3) 2003, Passenger Car, (E) 3.4L V6 LA1]
File Applications Configuration View Snapshot Options Playback Help
Short Term FT 0 %
Long Term FT -7 %
Fuel Trim Learn Enabled
Fuel Trim Cell 0
Loop Status Closed
HO2S 1 282 mV
HO2S 2 187 mV
HO2S 1 Heater Command On
O2 Heater Current 0.54 amps
Injector PWM 2.93 ms
Decel. Fuel Cutoff Inactive
EVAP Vent Solenoid Command Venting
EVAP Purge Solenoid Command 16 %
Engine Speed 715 RPM
IAC Position 29 Counts
ECT Sensor 90 °C
Start Up ECT 52 °C
IAT Sensor 24 °C
Start Up IAT 30 °C
MAF Sensor 4.01 g/s
Engine Load 18 %
TP Sensor 0 %
MAP Sensor 34 kPa
BARO 101 kPa
Air Fuel Ratio 14.7 : 1
Spark 19 °
282 mV
HO2S 1
1200
960
720
480
240
0
187 mV
HO2S 2
0 %
Short Term FT
25
15
5
-5
-15
-25
Fuel Trim Data
Beginning Trigger
Range (0 to 647)
Current: 544 (1:50.322)
Ready
NAO
Chevrolet, 2003
start
EPA Misfire Prese...
Microsoft PowerP...
2 Internet Expl...
TIS 2000 - Snaps...
Type to search
12:21 PM


TIS 2000 - Snapshot Upload/Display [(3) 2003, Passenger Car, (E) 3.4L V6 LA1]
File Applications Configuration View Snapshot Options Playback Help
Short Term FT -4 %
Long Term FT -7 %
Fuel Trim Learn Enabled
Fuel Trim Cell 0
Loop Status Closed
HO2S 1 1107 mV
HO2S 2 95 mV
HO2S 1 Heater Command On
O2 Heater Current 0.54 amps
Injector PWM 2.81 ms
Decel. Fuel Cutoff Inactive
EVAP Vent Solenoid Command Venting
EVAP Purge Solenoid Command 16 %
Engine Speed 686 RPM
IAC Position 29 Counts
ECT Sensor 90 °C
Start Up ECT 52 °C
IAT Sensor 24 °C
Start Up IAT 30 °C
MAF Sensor 4.01 g/s
Engine Load 19 %
TP Sensor 0 %
MAP Sensor 35 kPa
BARO 101 kPa
Air Fuel Ratio 14.7 : 1
Spark 20 °
1107 mV
HO2S 1
1200
960
720
480
240
0
95 mV
HO2S 2
-4 %
Short Term FT
25
15
5
-5
-15
-25
Fuel Trim Data
Beginning Trigger
Range (0 to 647)
Current: 562 (1:53.980)
Ready
NAO
Chevrolet, 2003
start
EPA Misfire Prese...
Microsoft PowerP...
2 Internet Expl...
TIS 2000 - Snaps...
Type to search
12:21 PM

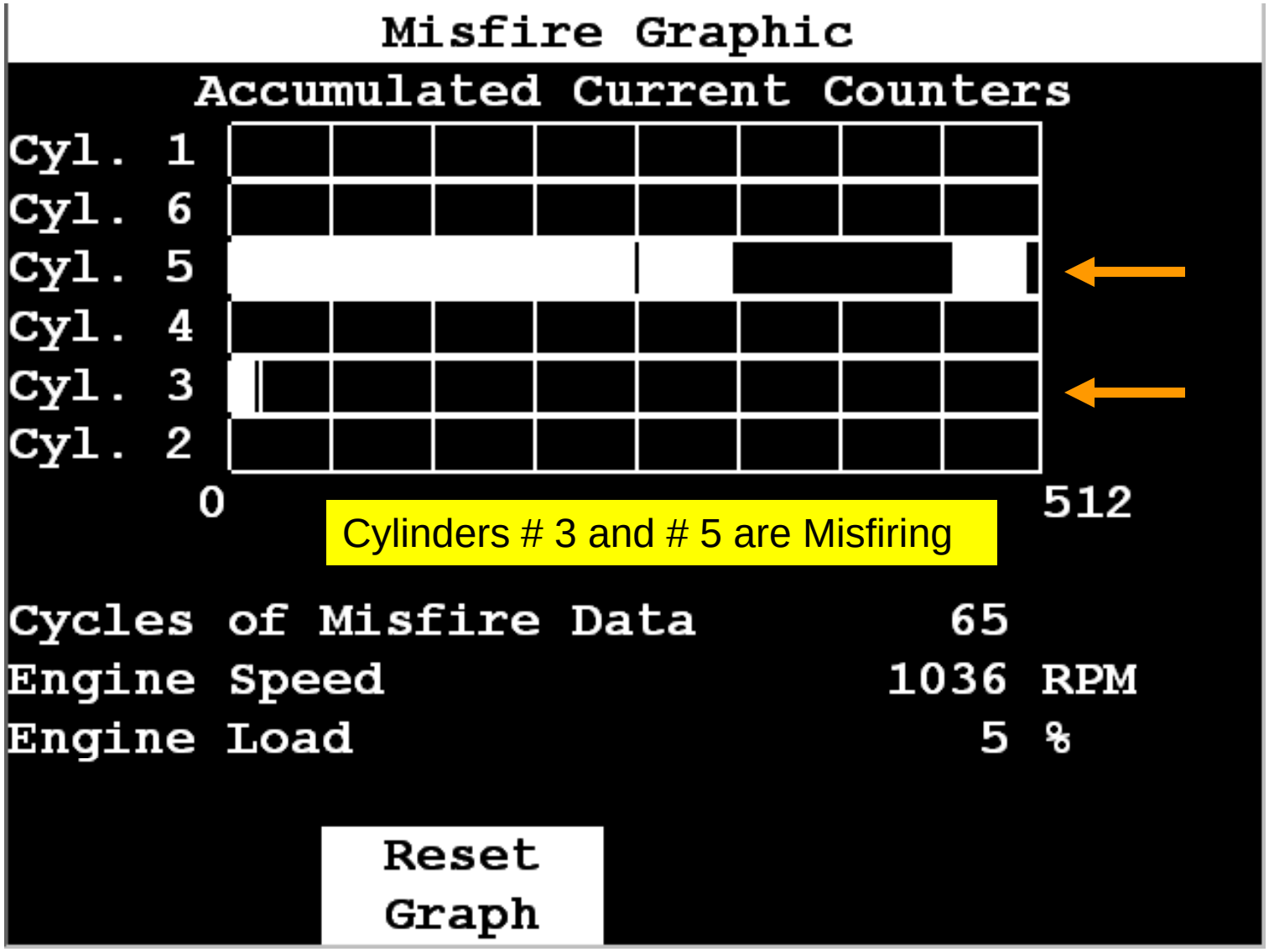

TIS 2000 - Snapshot Upload/Display [(3) 2003, Passenger Car, (E) 3.4L V6 LA1]
File Applications Configuration View Snapshot Options Playback Help
Short Term FT -22 %
Long Term FT -10 %
Fuel Trim Learn Enabled
Fuel Trim Cell 0
Loop Status Closed
HO2S 1 1107 mV
HO2S 2 26 mV
HO2S 1 Heater Command On
O2 Heater Current 0.54 amps
Injector PWM 2.78 ms
Decel. Fuel Cutoff Inactive
EVAP Vent Solenoid Command Venting
EVAP Purge Solenoid Command 17 %
Engine Speed 657 RPM
IAC Position 38 Counts
ECT Sensor 91 °C
Start Up ECT 52 °C
IAT Sensor 24 °C
Start Up IAT 30 °C
MAF Sensor 4.89 g/s
Engine Load 25 %
TP Sensor 0 %
MAP Sensor 43 kPa
BARO 101 kPa
Air Fuel Ratio 14.7 : 1
Spark 27 °
1107 mV
HO2S 1
1200
960
720
480
240
0
26 mV
HO2S 2
-22 %
Short Term FT
25
15
5
-5
-15
-25
Fuel Trim Data
Beginning Trigger
Range (0 to 647)
Current: 591 (1:59.875)
Ready
NAO
Chevrolet, 2003
start
EPA Misfire Prese...
Microsoft PowerP...
2 Internet Expl...
TIS 2000 - Snaps...
Type to search
12:21 PM

Case Study #1

1997 Buick Park Av

1997 Buick Park Av

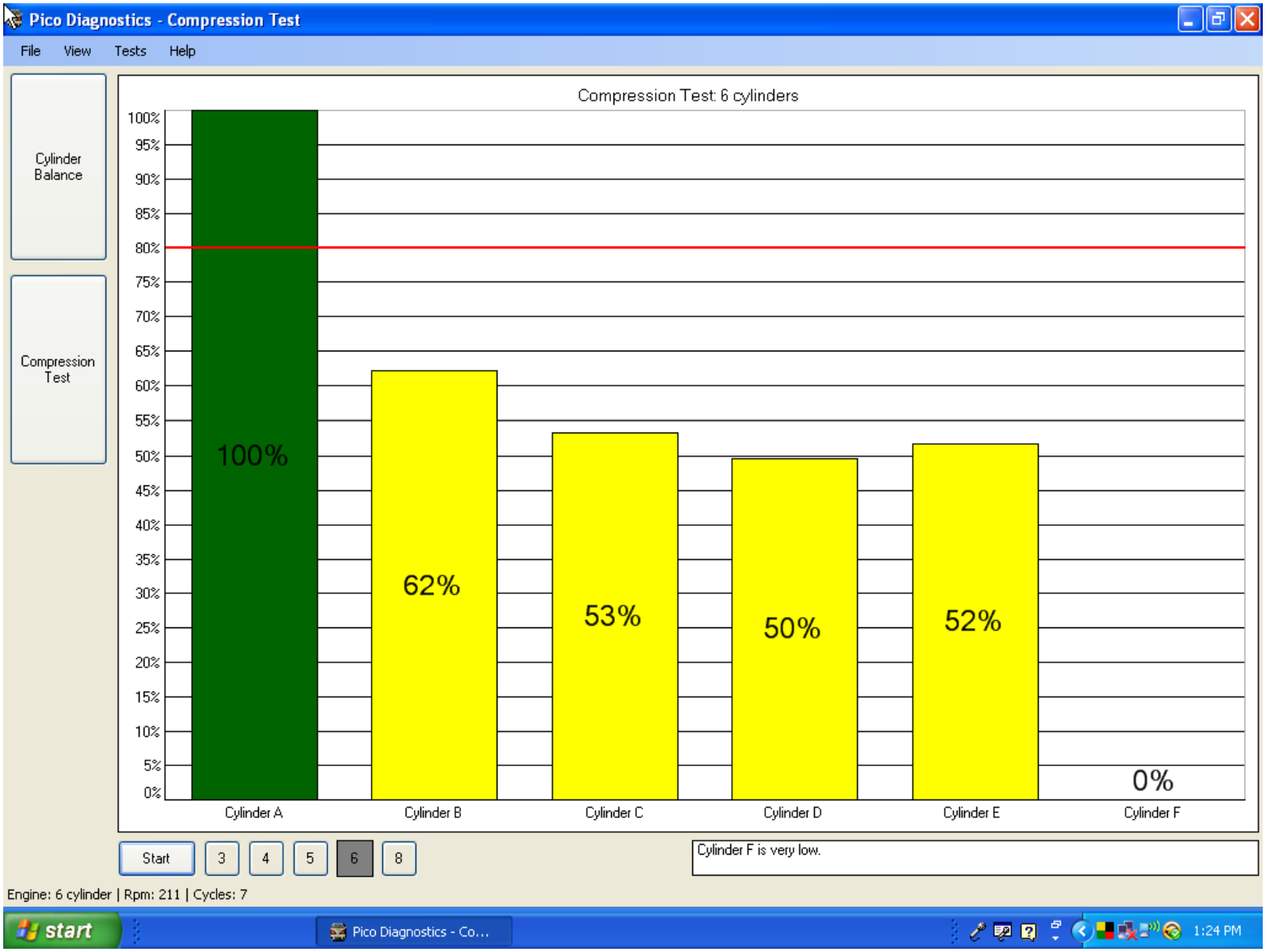
- This vehicle had multiple misfire activity
- Scan tool data was reviewed to get an idea of the cylinders involved
- A relative compression test was then preformed on the vehicle


Misfire Graphic
Accumulated Current Counters
Cyl. 1
Cyl. 6
Cyl. 5
Cyl. 4
Cyl. 3
Cyl. 2
0
512
Cylinders # 3 and # 5 are Misfiring
Cycles of Misfire Data 65
Engine Speed 1036 RPM
Engine Load 5 %
Reset Graph

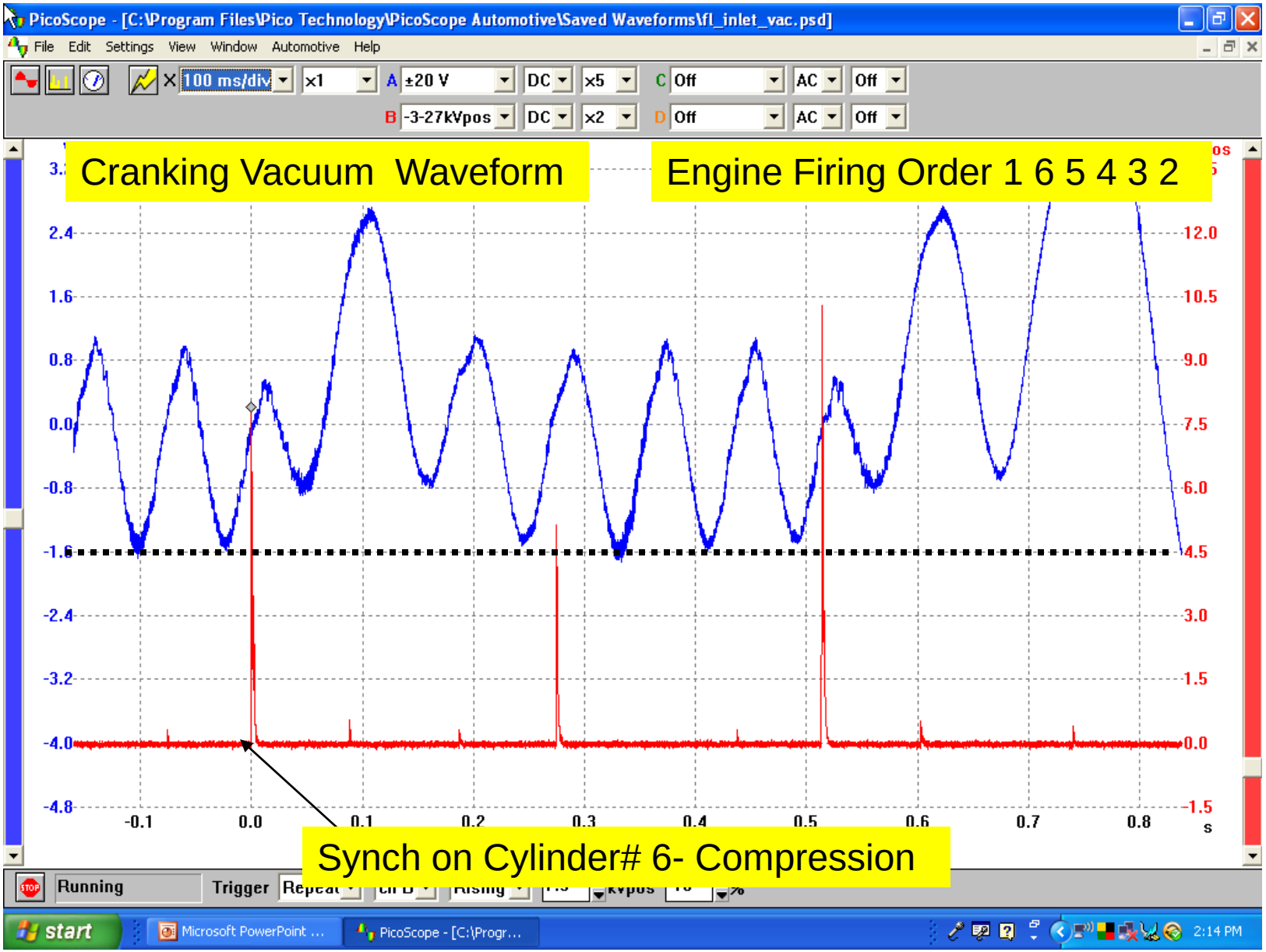
A Flashing MIL was Noted

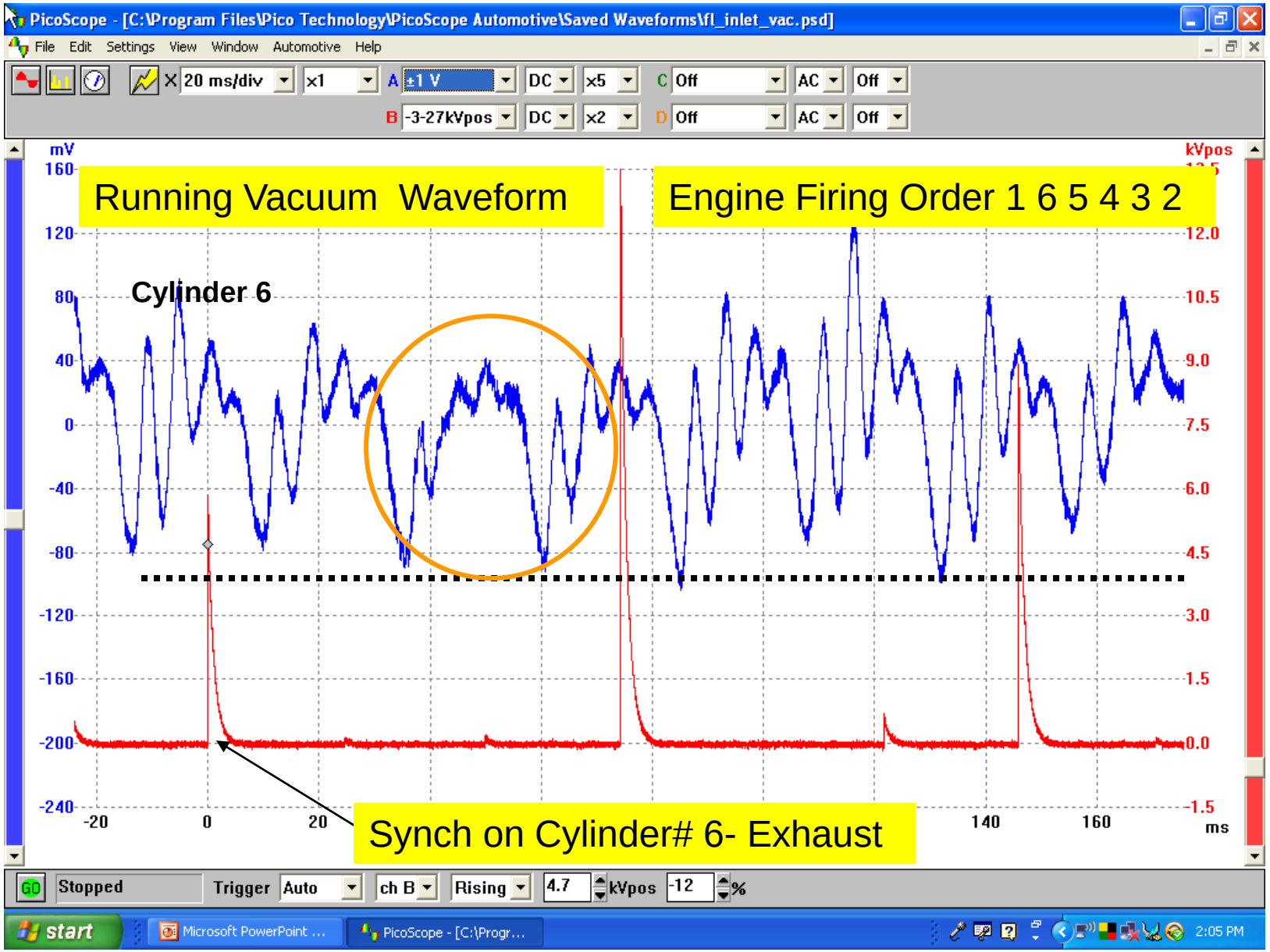
PICO Diagnostics

Relative Compression

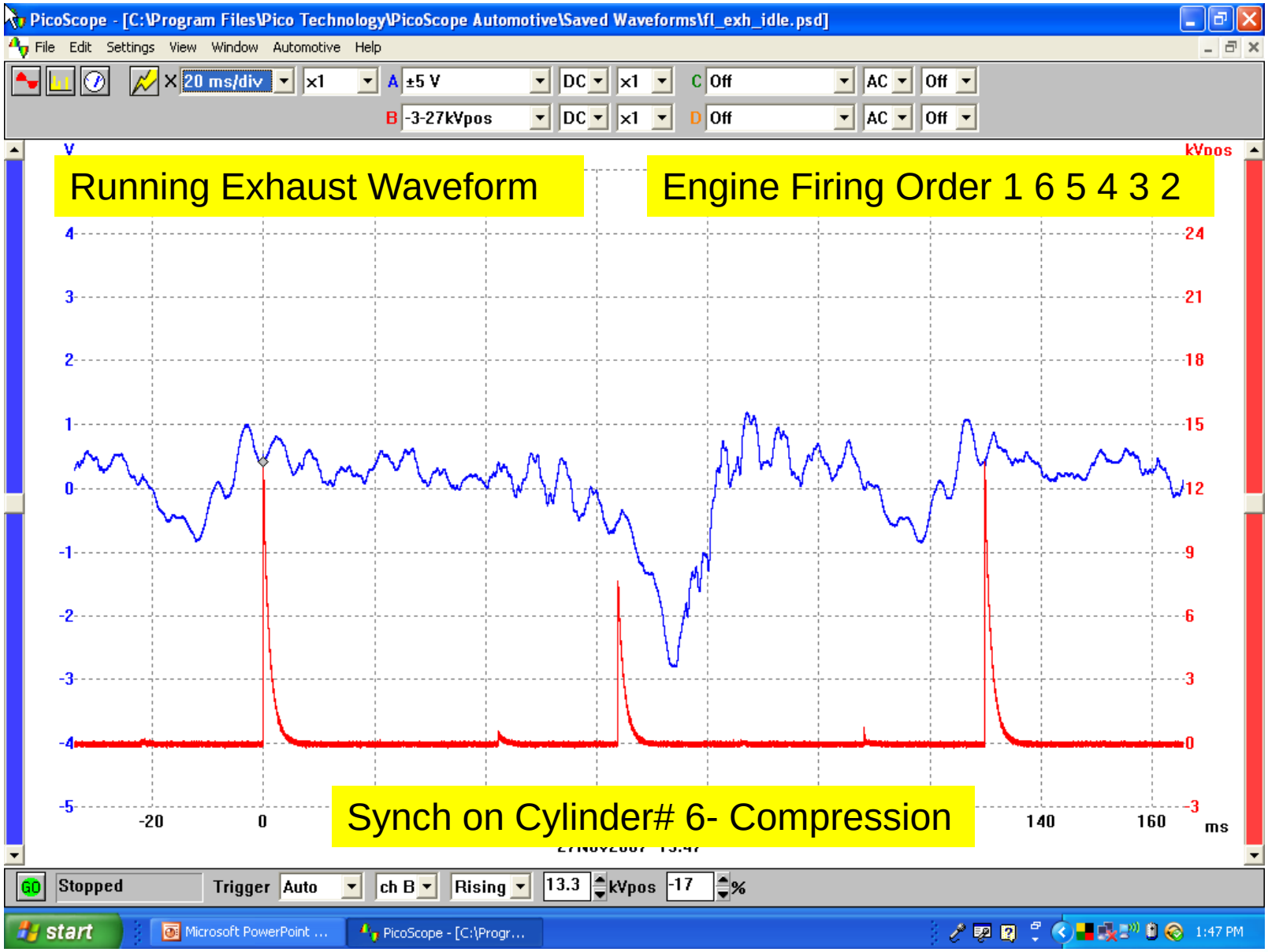

Pico Diagnostics - Compression Test
File
View
Tests
Help
Cylinder Balance
Compression Test
Compression Test: 6 cylinders
100%
95%
90%
85%
80%
75%
70%
65%
60%
55%
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
100%
62%
53%
50%
52%
0%
Cylinder A
Cylinder B
Cylinder C
Cylinder D
Cylinder E
Cylinder F
Start
3
4
5
6
8
Cylinder F is very low.
Engine: 6 cylinder | Rpm: 211 | Cycles: 7
start
Pico Diagnostics - Co...
1:24 PM

Vacuum Waveforms

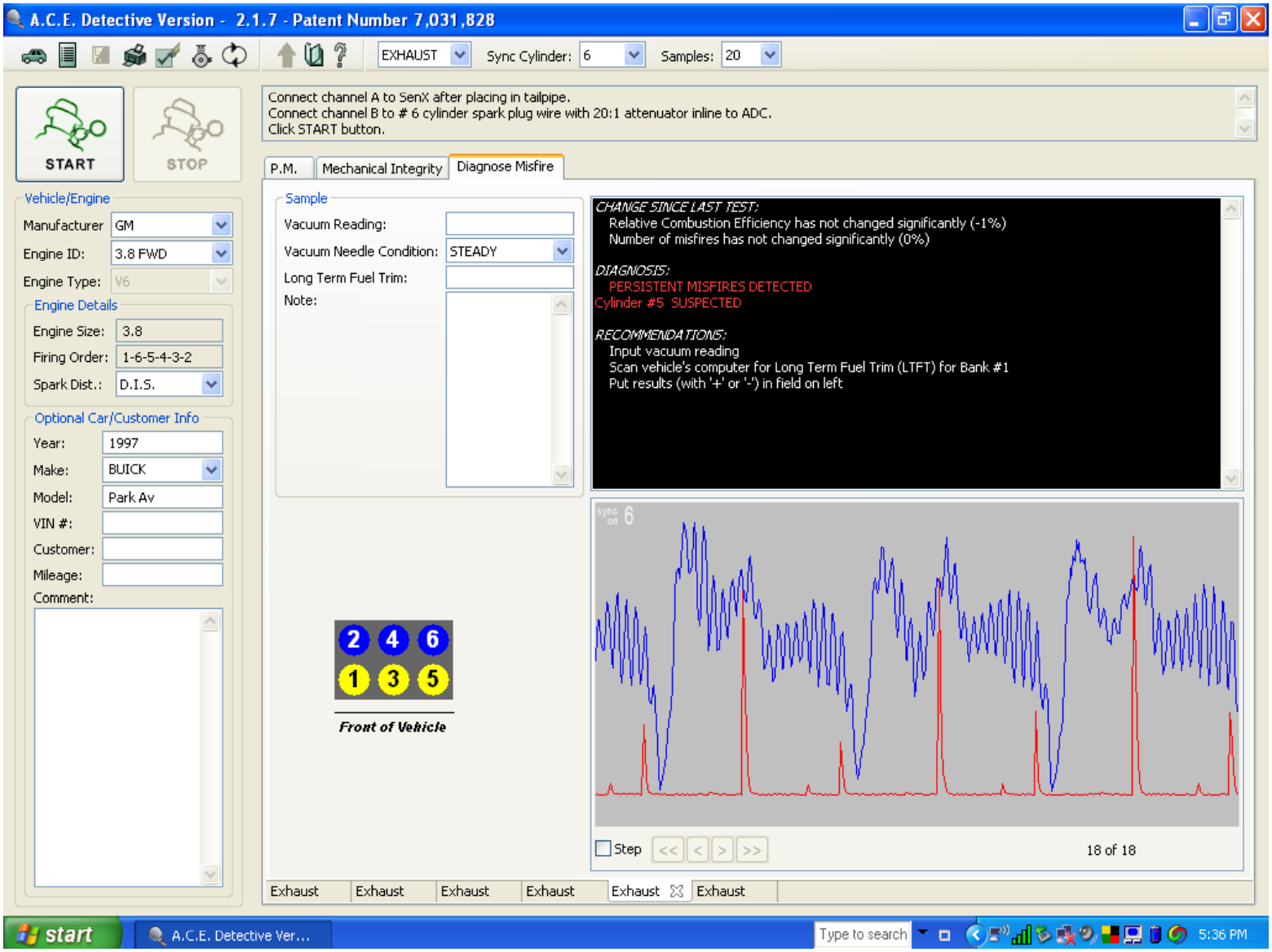

PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\fl_inlet_vac.psd]
File Edit Settings View Window Automotive Help
100 ms/div
A ±20 V
B -3-27kVpos
C Off
D Off
Cranking Vacuum Waveform
Engine Firing Order 1 6 5 4 3 2
Synch on Cylinder# 6- Compression
Running
Trigger
start
Microsoft PowerPoint ...
PicoScope - [C:\Progr...
2:14 PM

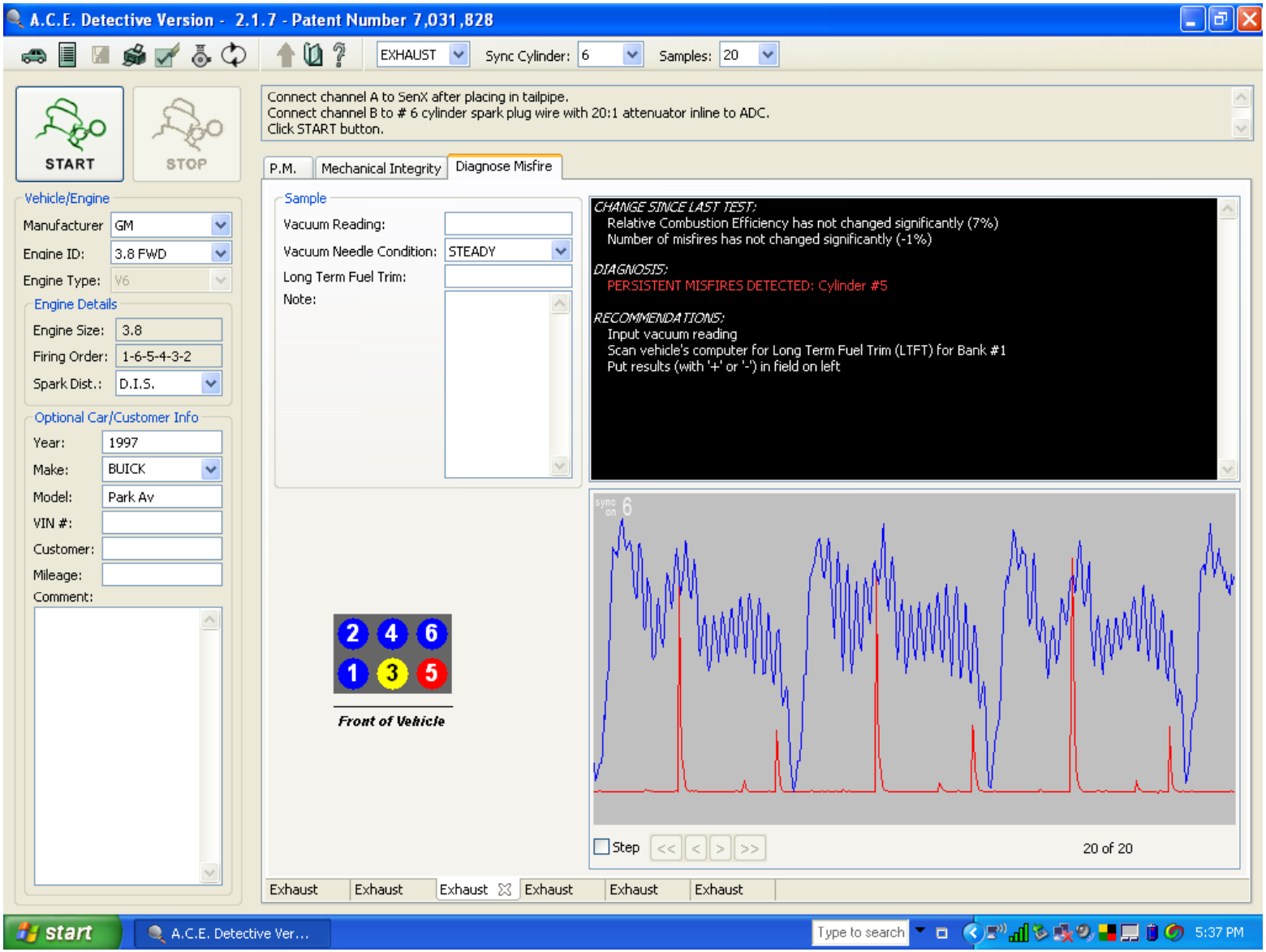

PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\fl_inlet_vac.psd]
File Edit Settings View Window Automotive Help
20 ms/div
A ±1 V
B -3-27kVpos
C Off
D Off
mV
kVpos
Running Vacuum Waveform
Engine Firing Order 1 6 5 4 3 2
Cylinder 6
Synch on Cylinder# 6- Exhaust
ms
Stopped
Trigger Auto
ch B Rising
4.7 kVpos
-12 %
start
Microsoft PowerPoint ...
PicoScope - [C:\Progr...
2:05 PM

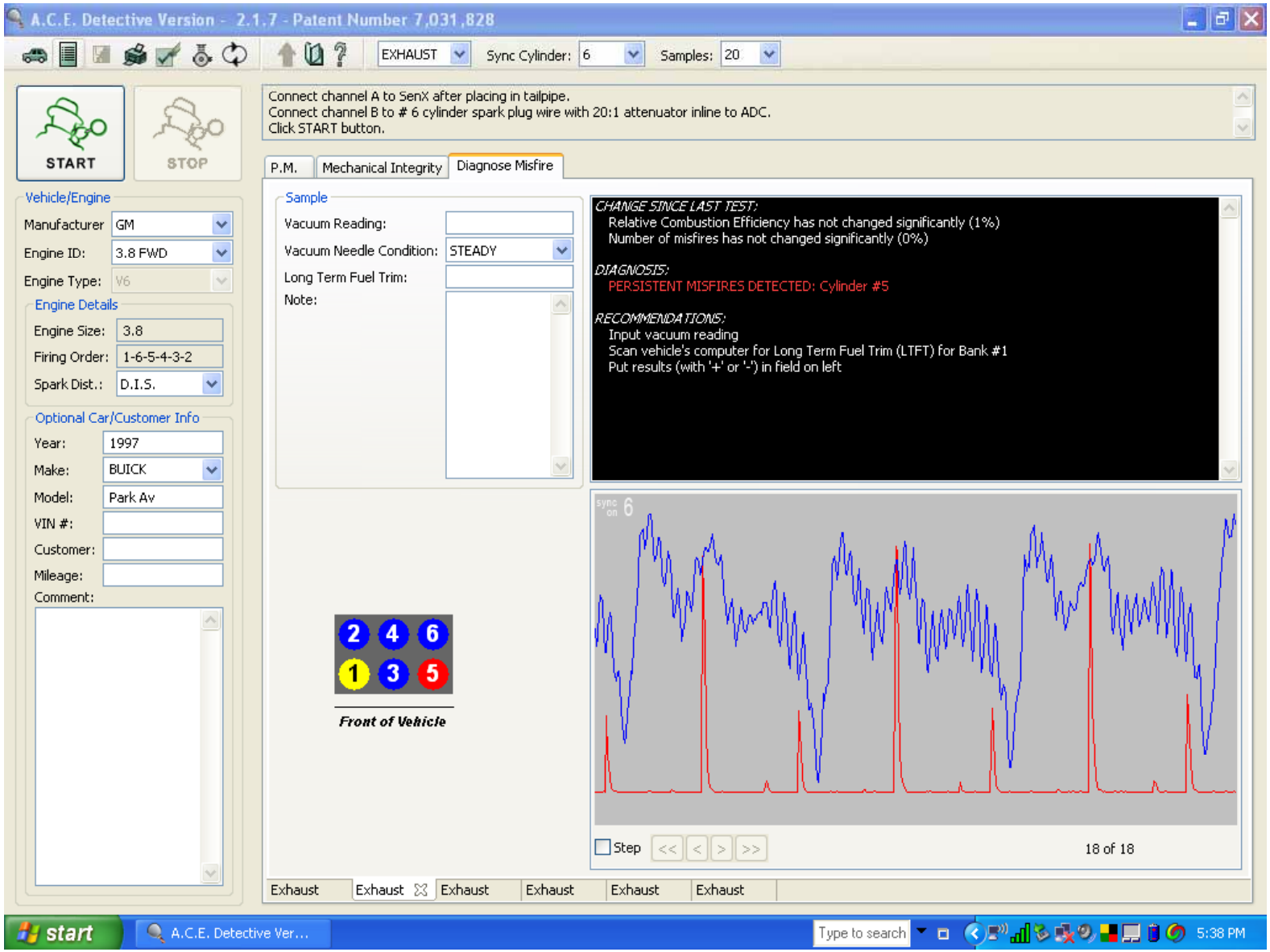
Exhaust Waveforms

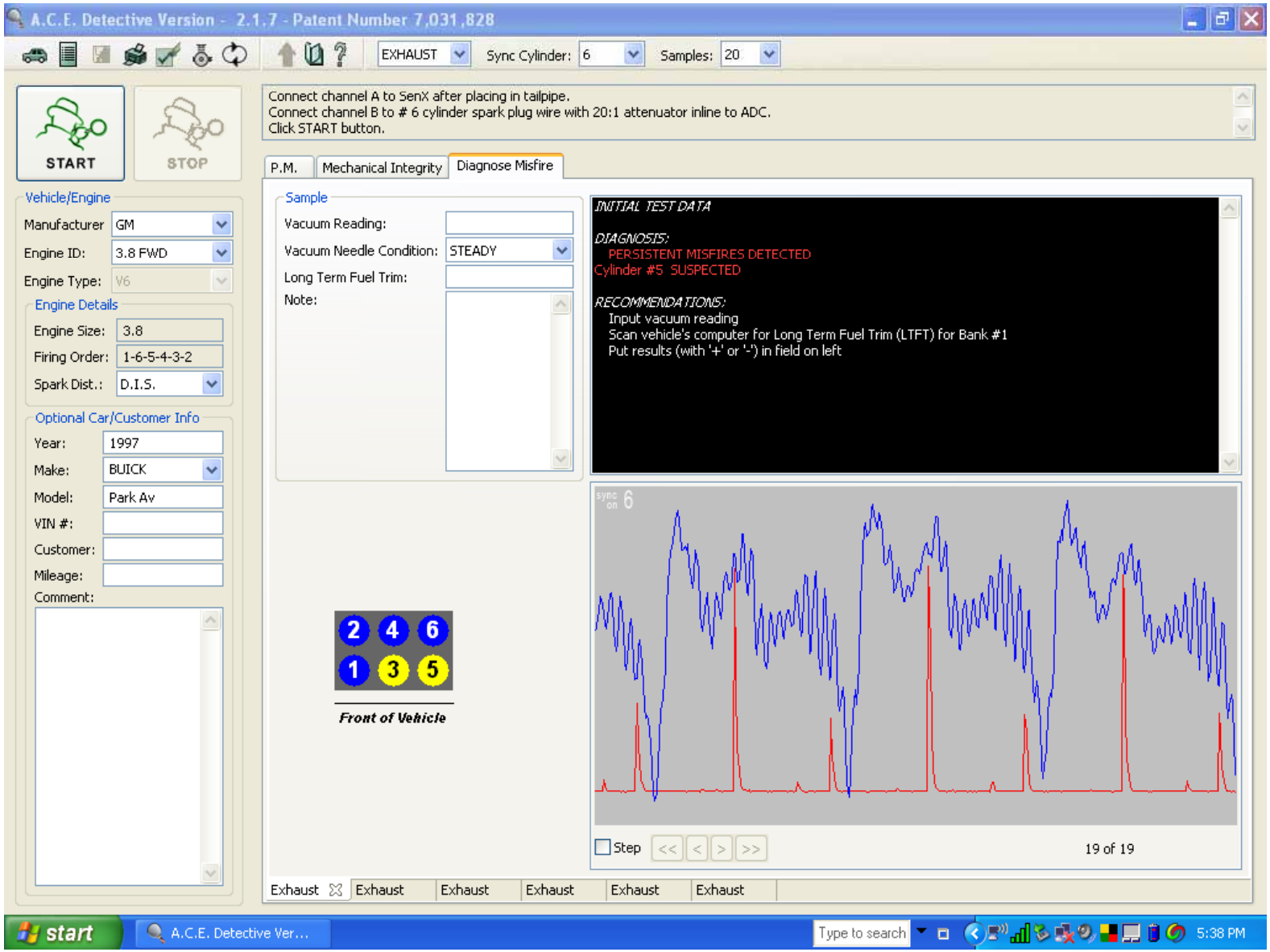

PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\fl_exh_idle.psd]
File Edit Settings View Window Automotive Help
20 ms/div
A ±5 V
B -3-27kVpos
C Off
D Off
Running Exhaust Waveform
Engine Firing Order 1 6 5 4 3 2
Synch on Cylinder# 6- Compression
V
kVpos
ms
Stopped
Trigger
Auto
ch B
Rising
13.3
kVpos
-17
%
start
Microsoft PowerPoint ...
PicoScope - [C:\Progr...
1:47 PM

ACE Misfire Software

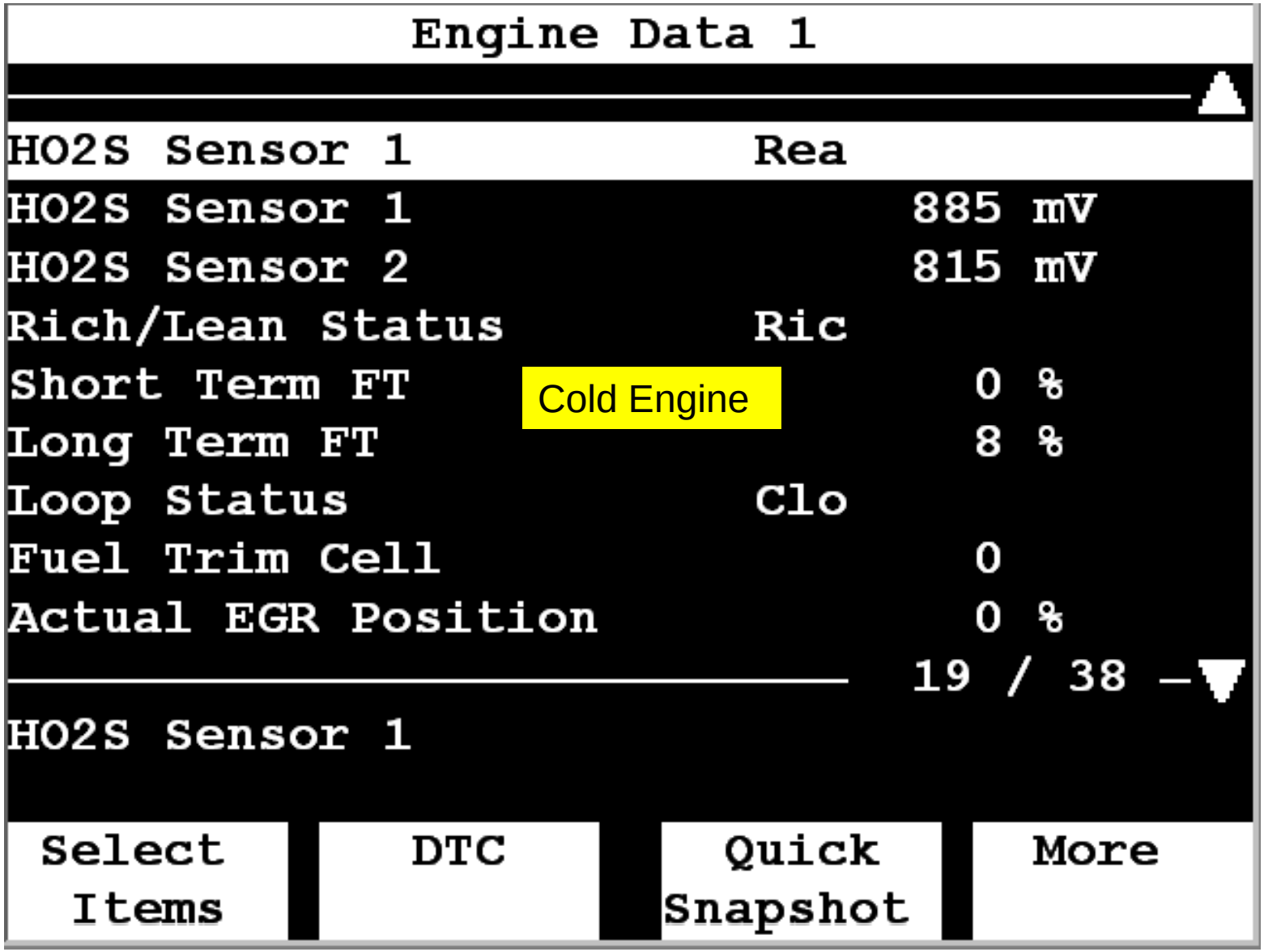

A.C.E. Detective Version - 2.1.7 - Patent Number 7,031,828
EXHAUST
Sync Cylinder: 6
Samples: 20
START
STOP
Connect channel A to SenX after placing in tailpipe.
Connect channel B to # 6 cylinder spark plug wire with 20:1 attenuator inline to ADC.
Click START button.
P.M.
Mechanical Integrity
Diagnose Misfire
Vehicle/Engine
Manufacturer GM
Engine ID: 3.8 FWD
Engine Type: V6
Engine Details
Engine Size: 3.8
Firing Order: 1-6-5-4-3-2
Spark Dist.: D.I.S.
Optional Car/Customer Info
Year: 1997
Make: BUICK
Model: Park Av
VIN #:
Customer:
Mileage:
Comment:
Sample
Vacuum Reading:
Vacuum Needle Condition: STEADY
Long Term Fuel Trim:
Note:
CHANGE SINCE LAST TEST:
Relative Combustion Efficiency has not changed significantly (-1%)
Number of misfires has not changed significantly (0%)
DIAGNOSIS:
PERSISTENT MISFIRES DETECTED
Cylinder #5 SUSPECTED
RECOMMENDATIONS:
Input vacuum reading
Scan vehicle's computer for Long Term Fuel Trim (LTFT) for Bank #1
Put results (with '+' or '-') in field on left
2 4 6
1 3 5
Front of Vehicle
sync on 6
Step
18 of 18
Exhaust
Exhaust
Exhaust
Exhaust
Exhaust
Exhaust
start
A.C.E. Detective Ver...
Type to search
5:36 PM


A.C.E. Detective Version - 2.1.7 - Patent Number 7,031,828
EXHAUST
Sync Cylinder: 6
Samples: 20
START
STOP
Connect channel A to SenX after placing in tailpipe.
Connect channel B to # 6 cylinder spark plug wire with 20:1 attenuator inline to ADC.
Click START button.
P.M.
Mechanical Integrity
Diagnose Misfire
Vehicle/Engine
Manufacturer GM
Engine ID: 3.8 FWD
Engine Type: V6
Engine Details
Engine Size: 3.8
Firing Order: 1-6-5-4-3-2
Spark Dist.: D.I.S.
Optional Car/Customer Info
Year: 1997
Make: BUICK
Model: Park Av
VIN #:
Customer:
Mileage:
Comment:
Sample
Vacuum Reading:
Vacuum Needle Condition: STEADY
Long Term Fuel Trim:
Note:
CHANGE SINCE LAST TEST:
Relative Combustion Efficiency has not changed significantly (7%)
Number of misfires has not changed significantly (-1%)
DIAGNOSIS:
PERSISTENT MISFIRES DETECTED: Cylinder #5
RECOMMENDATIONS:
Input vacuum reading
Scan vehicle's computer for Long Term Fuel Trim (LTFT) for Bank #1
Put results (with '+' or '-') in field on left
2 4 6
1 3 5
Front of Vehicle
sync on 6
Step
20 of 20
Exhaust
Exhaust
Exhaust
Exhaust
Exhaust
Exhaust
start
A.C.E. Detective Ver...
Type to search
5:37 PM

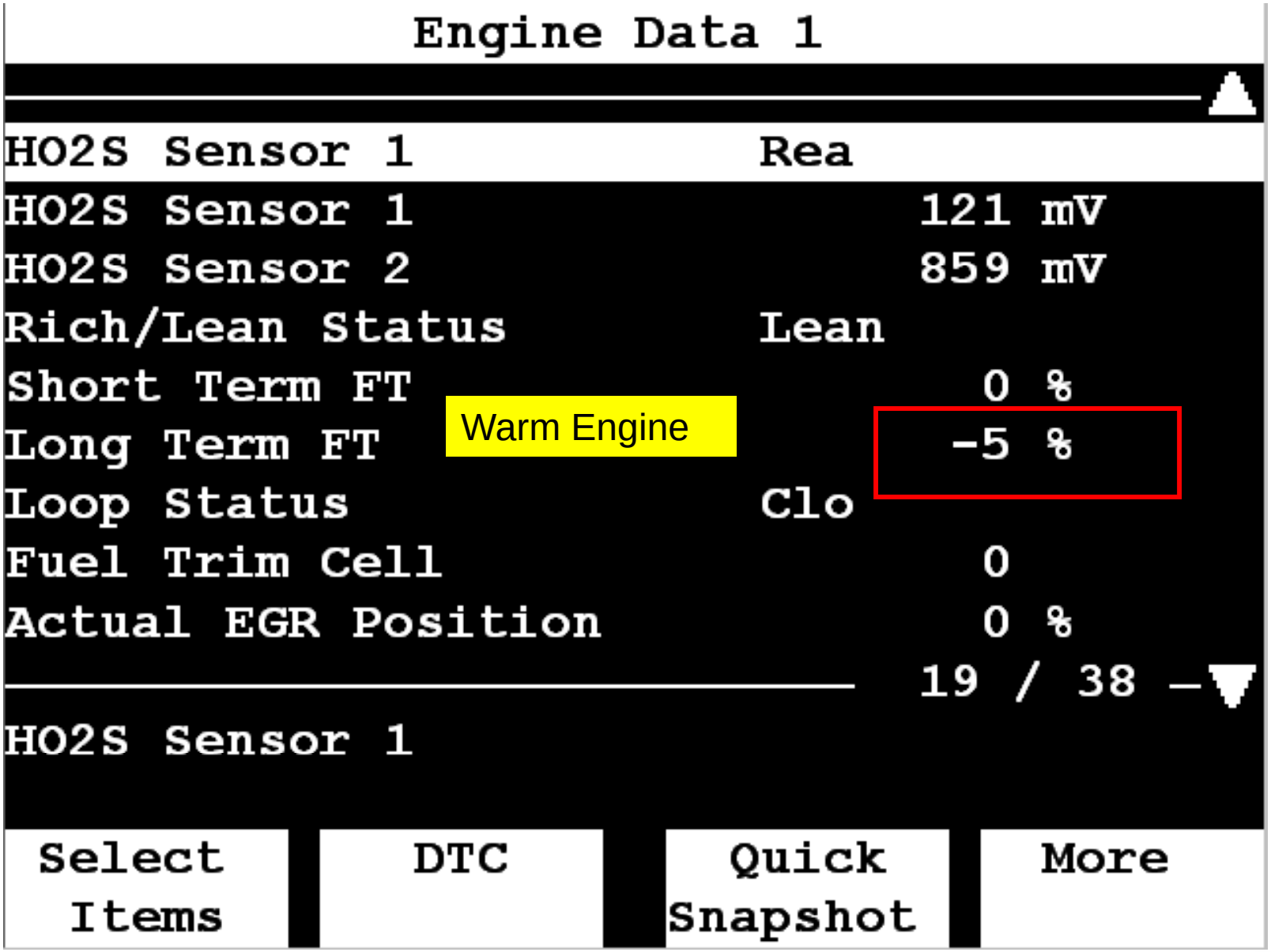

A.C.E. Detective Version - 2.1.7 - Patent Number 7,031,828
EXHAUST
Sync Cylinder: 6
Samples: 20
START
STOP
Connect channel A to SenX after placing in tailpipe.
Connect channel B to # 6 cylinder spark plug wire with 20:1 attenuator inline to ADC.
Click START button.
Vehicle/Engine
Manufacturer GM
Engine ID: 3.8 FWD
Engine Type: V6
Engine Details
Engine Size: 3.8
Firing Order: 1-6-5-4-3-2
Spark Dist.: D.I.S.
Optional Car/Customer Info
Year: 1997
Make: BUICK
Model: Park Av
VIN #:
Customer:
Mileage:
Comment:
P.M.
Mechanical Integrity
Diagnose Misfire
Sample
Vacuum Reading:
Vacuum Needle Condition: STEADY
Long Term Fuel Trim:
Note:
CHANGE SINCE LAST TEST:
Relative Combustion Efficiency has not changed significantly (1%)
Number of misfires has not changed significantly (0%)
DIAGNOSIS:
PERSISTENT MISFIRES DETECTED: Cylinder #5
RECOMMENDATIONS:
Input vacuum reading
Scan vehicle's computer for Long Term Fuel Trim (LTFT) for Bank #1
Put results (with '+' or '-') in field on left
2 4 6
1 3 5
Front of Vehicle
sync on 6
Step
<< < > >>
18 of 18
Exhaust
Exhaust
Exhaust
Exhaust
Exhaust
Exhaust
start
A.C.E. Detective Ver...
Type to search
5:38 PM


A.C.E. Detective Version - 2.1.7 - Patent Number 7,031,828
EXHAUST
Sync Cylinder: 6
Samples: 20
START
STOP
Connect channel A to SenX after placing in tailpipe.
Connect channel B to # 6 cylinder spark plug wire with 20:1 attenuator inline to ADC.
Click START button.
Vehicle/Engine
Manufacturer GM
Engine ID: 3.8 FWD
Engine Type: V6
Engine Details
Engine Size: 3.8
Firing Order: 1-6-5-4-3-2
Spark Dist.: D.I.S.
Optional Car/Customer Info
Year: 1997
Make: BUICK
Model: Park Av
VIN #:
Customer:
Mileage:
Comment:
P.M.
Mechanical Integrity
Diagnose Misfire
Sample
Vacuum Reading:
Vacuum Needle Condition: STEADY
Long Term Fuel Trim:
Note:
INITIAL TEST DATA
DIAGNOSIS:
PERSISTENT MISFIRES DETECTED
Cylinder #5 SUSPECTED
RECOMMENDATIONS:
Input vacuum reading
Scan vehicle's computer for Long Term Fuel Trim (LTFT) for Bank #1
Put results (with '+' or '-') in field on left
2 4 6
1 3 5
Front of Vehicle
sync on 6
Step
19 of 19
Exhaust
start
A.C.E. Detective Ver...
Type to search
5:38 PM

Fuel Trim and Vacuum Readings

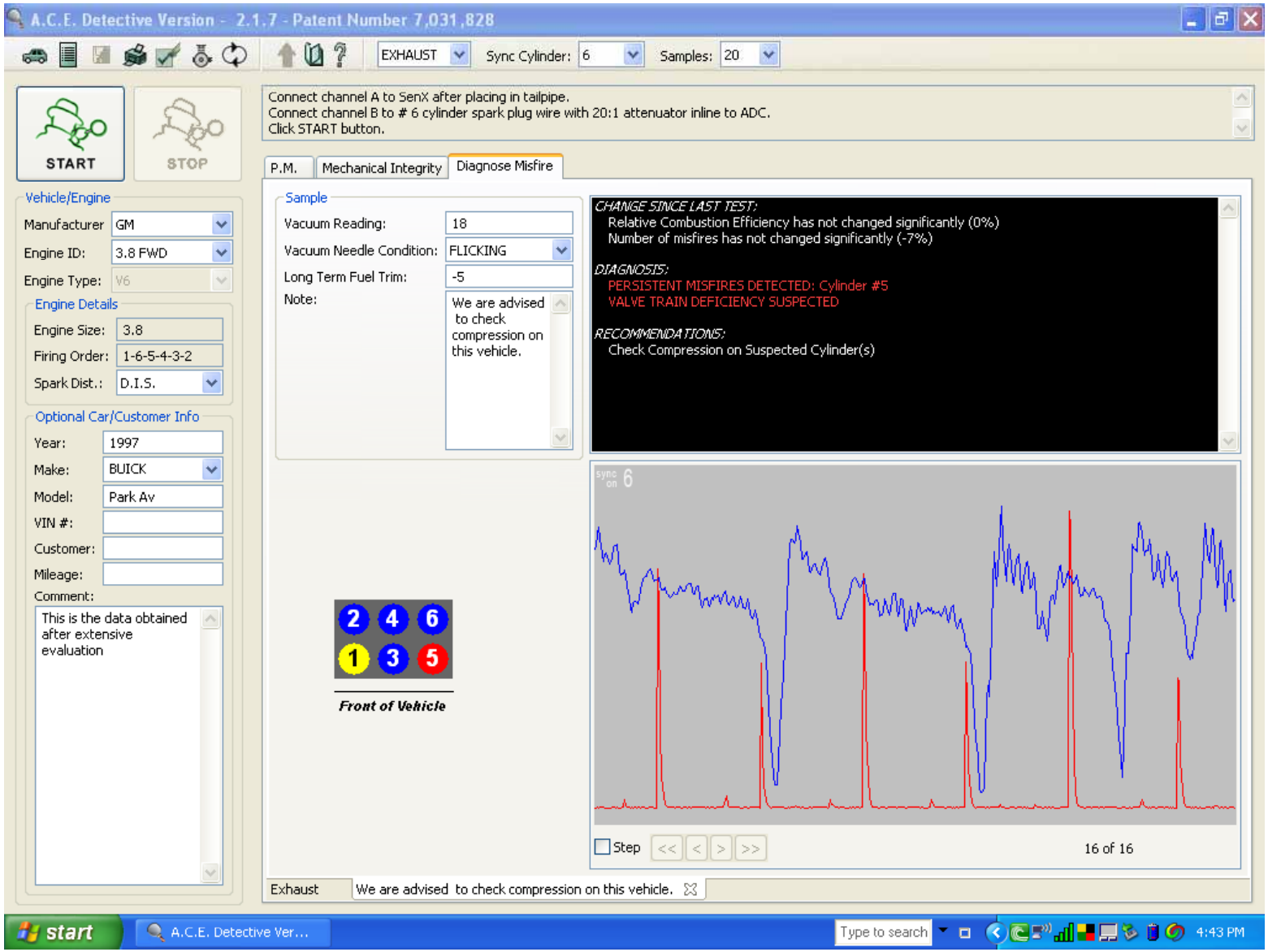

Engine Data 1
HO2S Sensor 1 Rea
HO2S Sensor 1 885 mV
HO2S Sensor 2 815 mV
Rich/Lean Status Ric
Short Term FT 0 %
Long Term FT 8 %
Loop Status Clo
Fuel Trim Cell 0
Actual EGR Position 0 %
19 / 38
HO2S Sensor 1
Select Items
DTC
Quick Snapshot
More

Cold Engine


Engine Data 1
HO2S Sensor 1 Rea
HO2S Sensor 1 121 mV
HO2S Sensor 2 859 mV
Rich/Lean Status Lean
Short Term FT 0 %
Long Term FT -5 %
Loop Status Clo
Fuel Trim Cell 0
Actual EGR Position 0 %
19 / 38
HO2S Sensor 1
Select Items
DTC
Quick Snapshot
More

Warm Engine

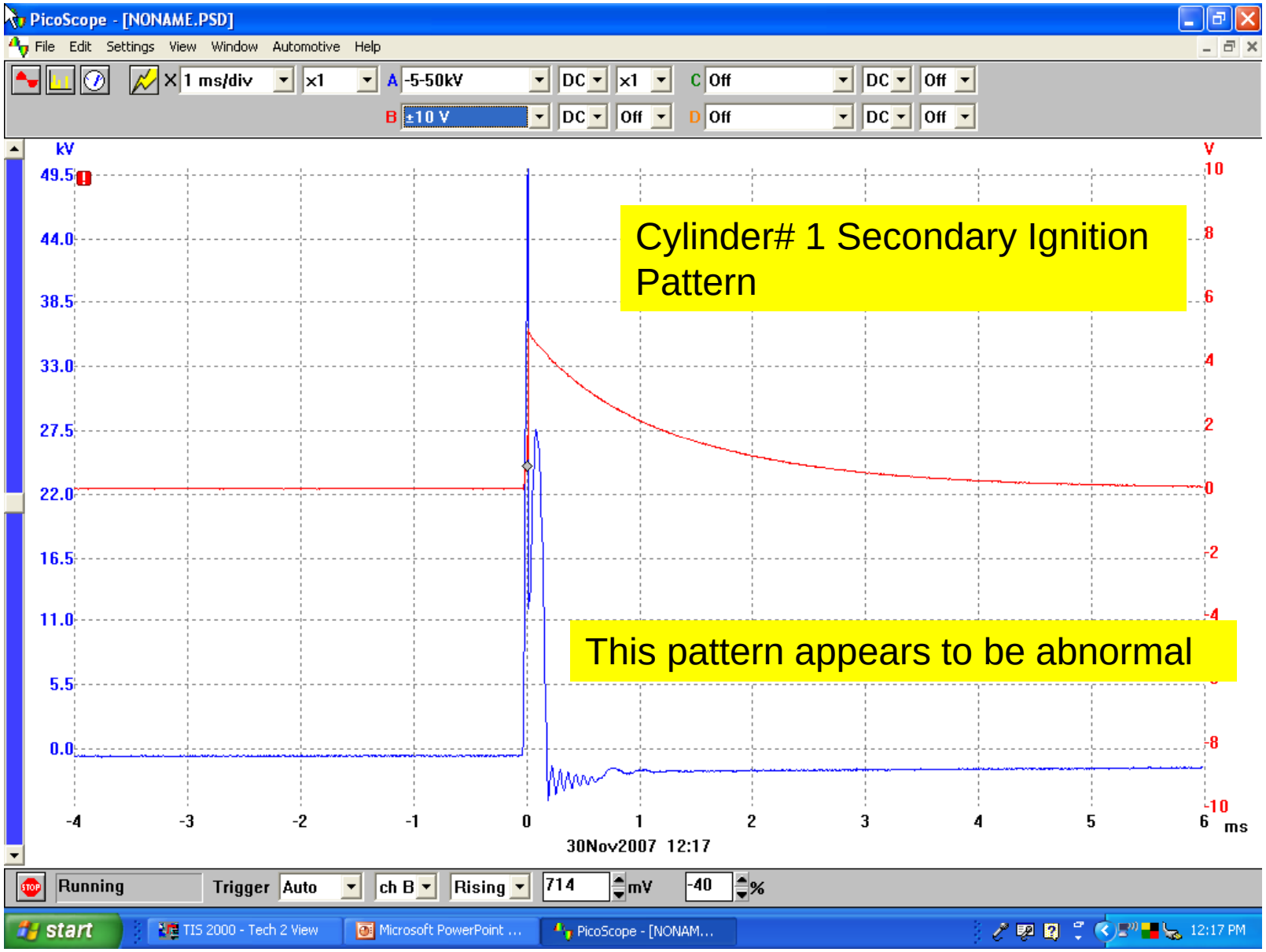

18 inches Mercury-Needle Flickers
15
10
5
-50
-40
-30
-20
-10
-70
-80
-90
-100
kpa
n.Hg vac
ZERO
mityvac

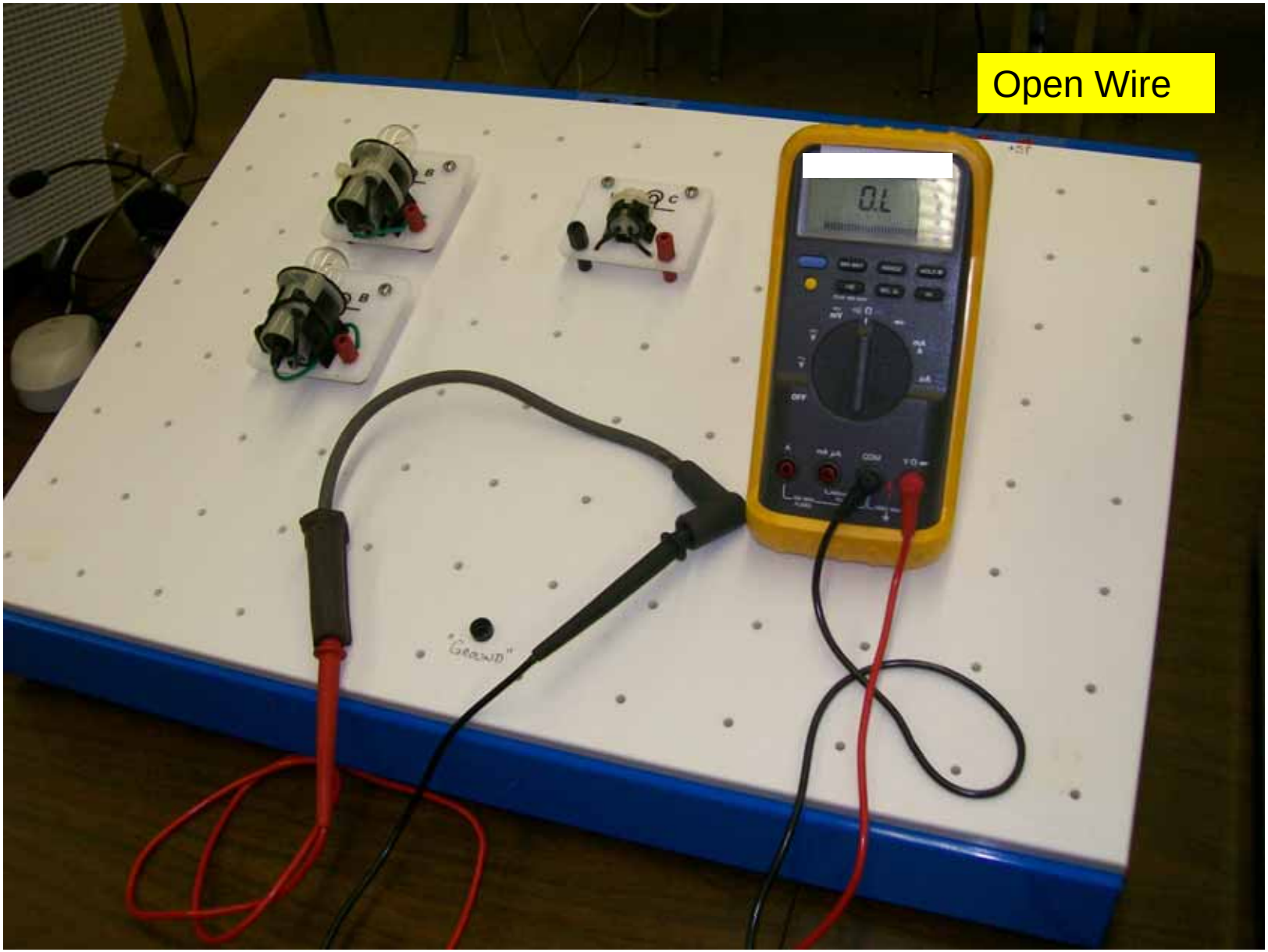

A.C.E. Detective Version - 2.1.7 - Patent Number 7,031,828
EXHAUST
Sync Cylinder: 6
Samples: 20
START
STOP
Connect channel A to SenX after placing in tailpipe.
Connect channel B to # 6 cylinder spark plug wire with 20:1 attenuator inline to ADC.
Click START button.
Vehicle/Engine
Manufacturer GM
Engine ID: 3.8 FWD
Engine Type: V6
Engine Details
Engine Size: 3.8
Firing Order: 1-6-5-4-3-2
Spark Dist.: D.I.S.
Optional Car/Customer Info
Year: 1997
Make: BUICK
Model: Park Av
VIN #:
Customer:
Mileage:
Comment:
This is the data obtained after extensive evaluation
P.M.
Mechanical Integrity
Diagnose Misfire
Sample
Vacuum Reading: 18
Vacuum Needle Condition: FLICKING
Long Term Fuel Trim: -5
Note:
We are advised to check compression on this vehicle.
CHANGE SINCE LAST TEST:
Relative Combustion Efficiency has not changed significantly (0%)
Number of misfires has not changed significantly (-7%)
DIAGNOSIS:
PERSISTENT MISFIRES DETECTED: Cylinder #5
VALVE TRAIN DEFICIENCY SUSPECTED
RECOMMENDATIONS:
Check Compression on Suspected Cylinder(s)
2 4 6
1 3 5
Front of Vehicle
sync on 6
Step
<< < > >>
16 of 16
Exhaust
We are advised to check compression on this vehicle.
start
A.C.E. Detective Ver...
Type to search
4:43 PM

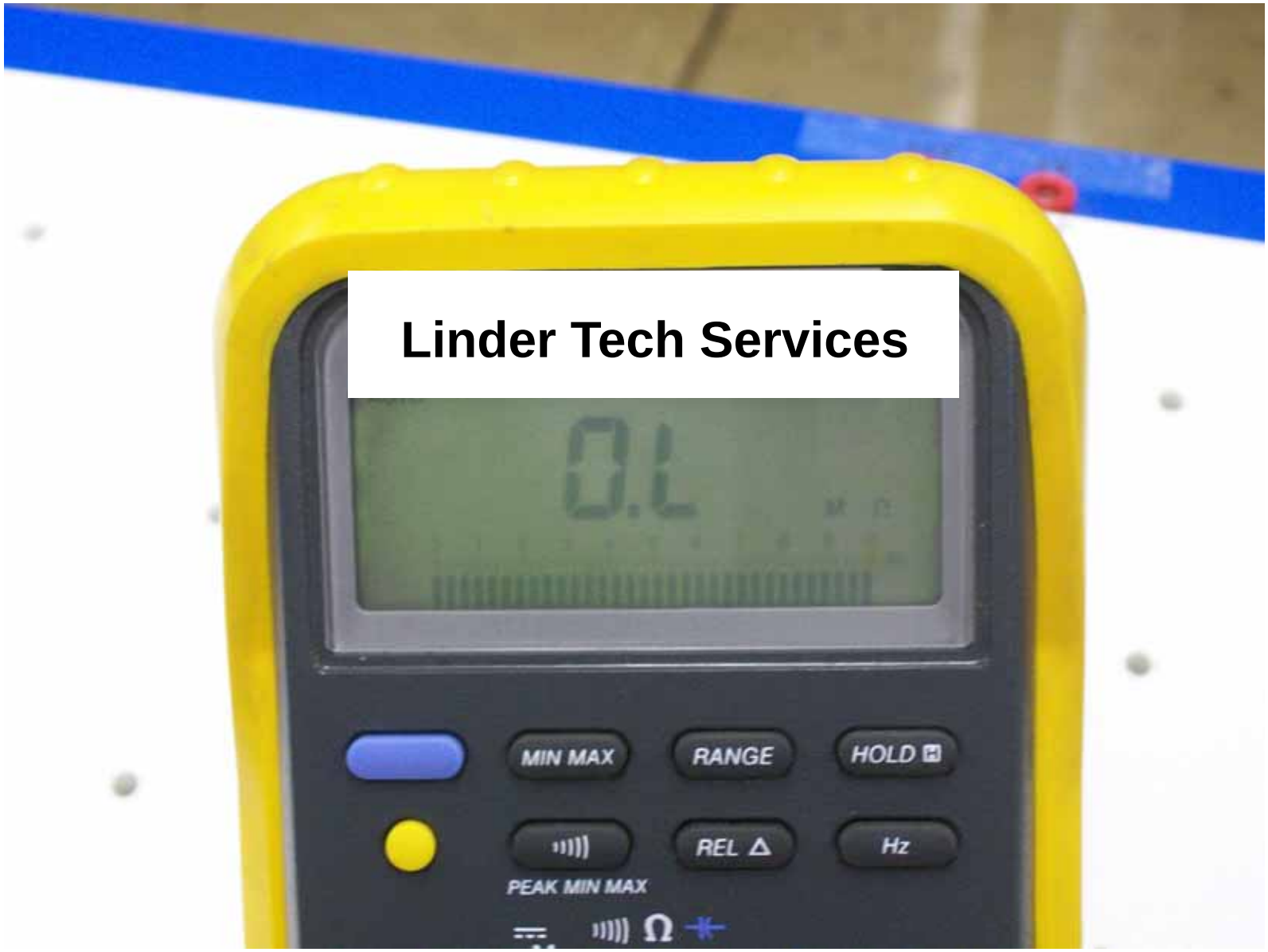
1997 Buick Park Av

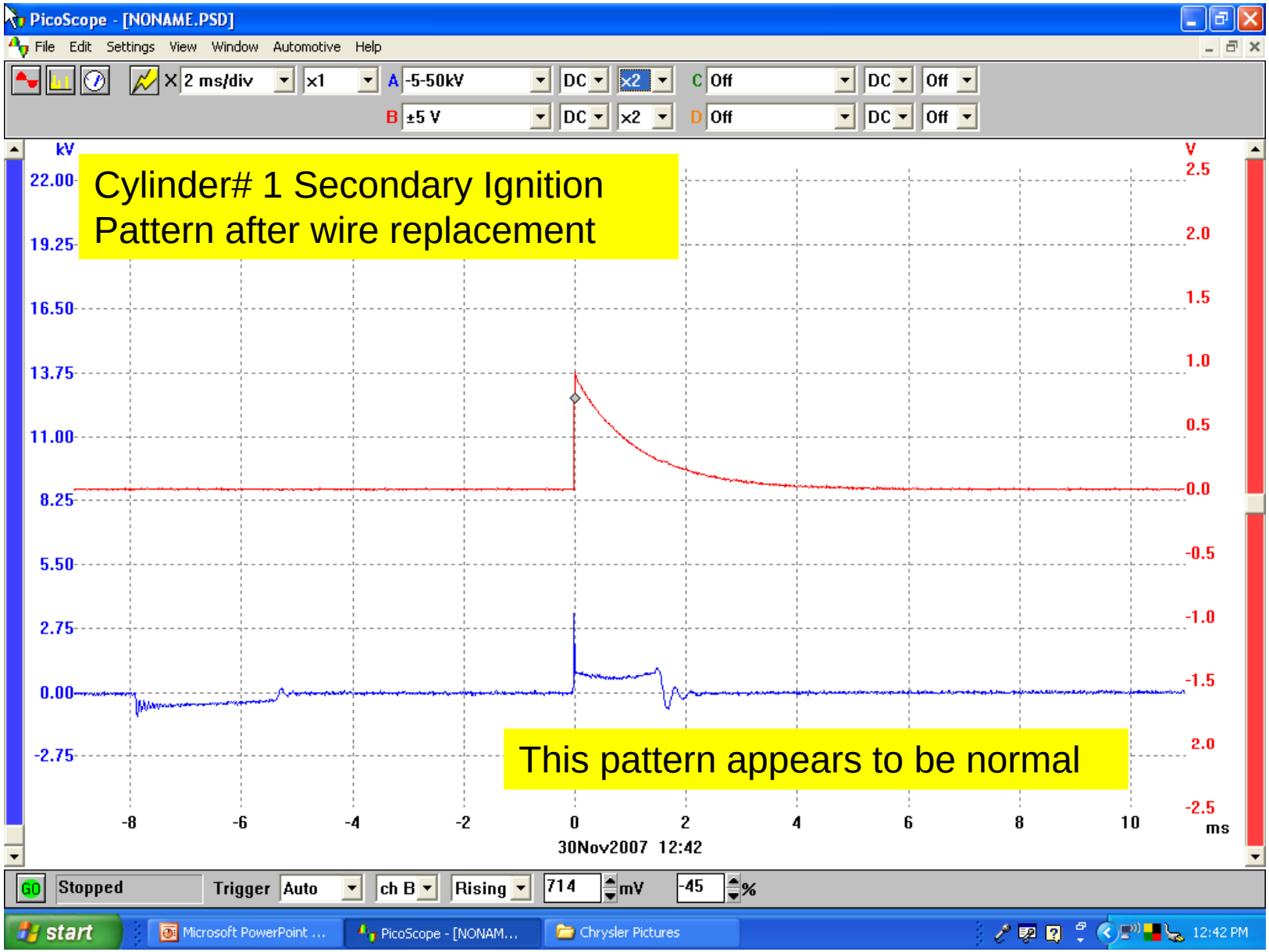
- This misfire activity appears to be mechanical or an ignition related issue.

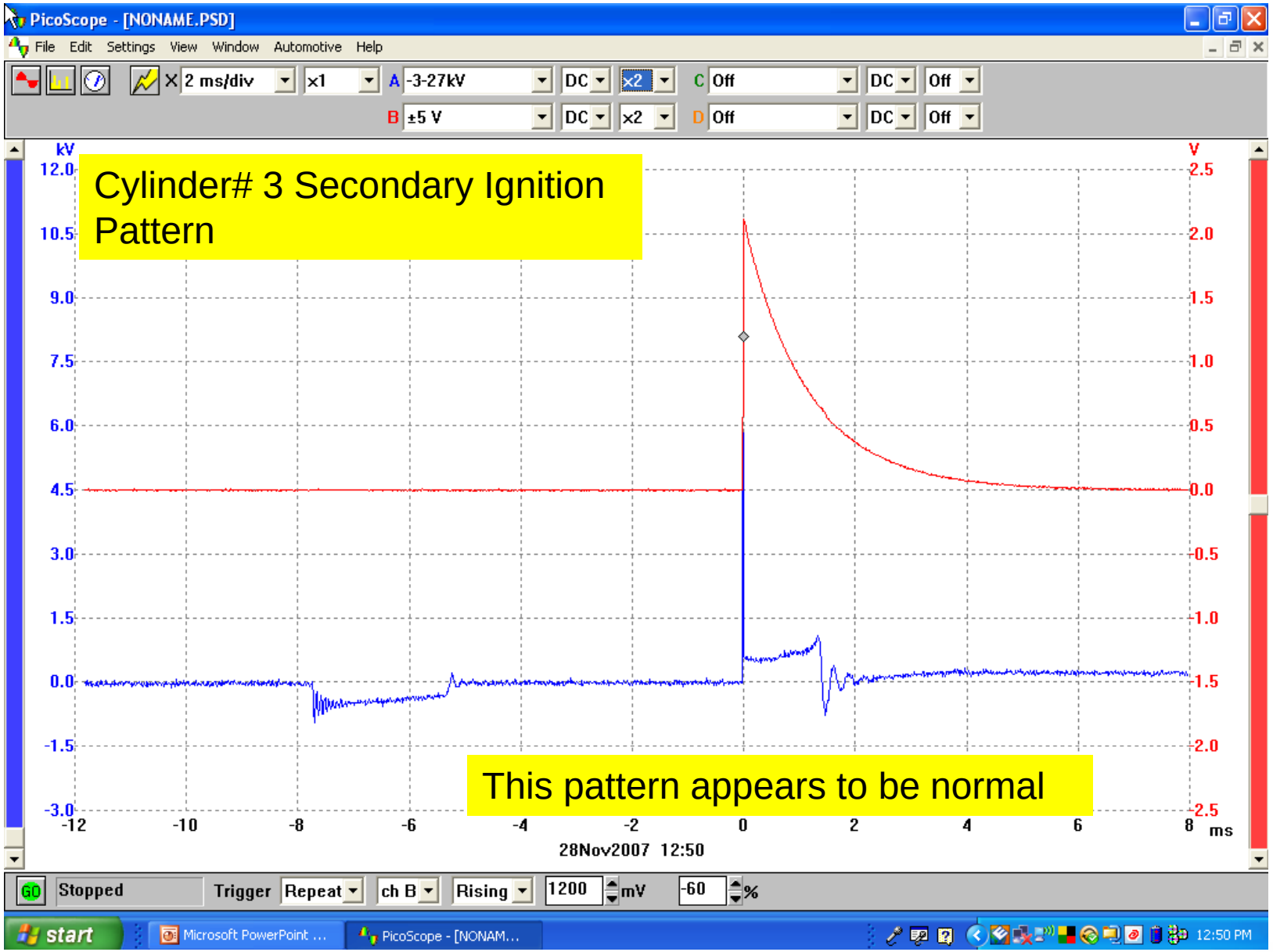
Secondary Ignition Waveforms

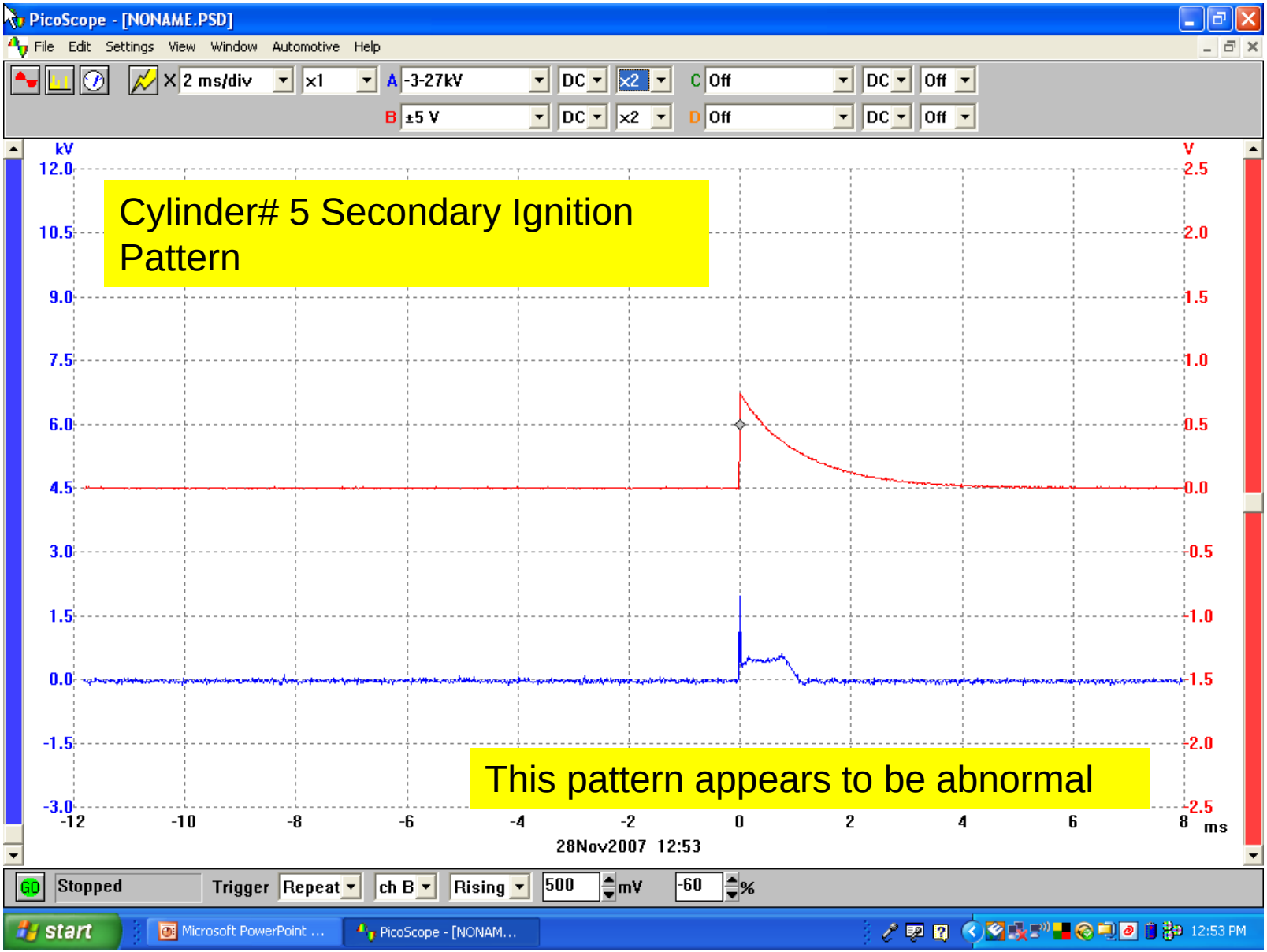

PicoScope - [NONAME.PSD]
File Edit Settings View Window Automotive Help
1 ms/div
A -5-50kV
B ±10 V
C Off
D Off
kV
V
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5
0.0
10
8
6
4
2
0
-2
-4
-8
-10
-4 -3 -2 -1 0 1 2 3 4 5 6 ms
30Nov2007 12:17
Cylinder# 1 Secondary Ignition Pattern
This pattern appears to be abnormal
Running
Trigger
Auto
ch B
Rising
714
mV
-40
%
start
TIS 2000 - Tech 2 View
Microsoft PowerPoint ...
PicoScope - [NONAM...
12:17 PM


Open Wire
0.L


Linder Tech Services
0.L
MIN MAX
RANGE
HOLD
REL Δ
Hz
PEAK MIN MAX
Ω


PicoScope - [NONAME.PSD]
File Edit Settings View Window Automotive Help
2 ms/div
A -5-50kV
B ±5 V
C Off
D Off
Cylinder# 1 Secondary Ignition Pattern after wire replacement
This pattern appears to be normal
kV
V
ms
30Nov2007 12:42
Stopped
Trigger Auto
ch B
Rising
714 mV
-45 %
start
Microsoft PowerPoint ...
PicoScope - [NONAM...
Chrysler Pictures
12:42 PM

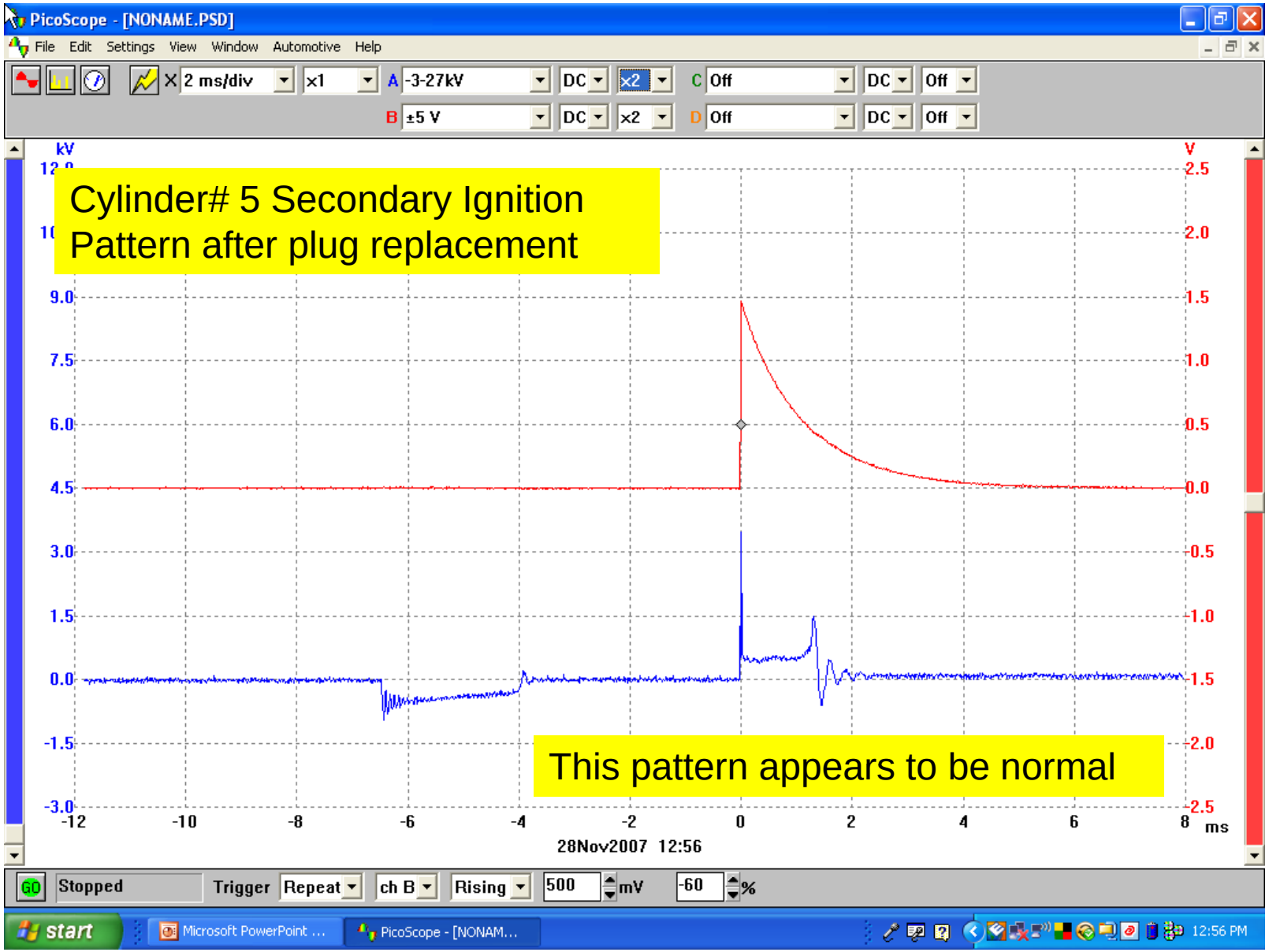

PicoScope - [NONAME.PSD]
File Edit Settings View Window Automotive Help
2 ms/div
A -3-27kV
B ±5 V
C Off
D Off
kV
V
Cylinder# 3 Secondary Ignition Pattern
This pattern appears to be normal
28Nov2007 12:50
ms
Stopped
Trigger
Repeat
ch B
Rising
1200
mV
-60
%
start
Microsoft PowerPoint ...
PicoScope - [NONAM...
12:50 PM


PicoScope - [NONAME.PSD]
File Edit Settings View Window Automotive Help
2 ms/div
A -3-27kV
B ±5 V
C Off
D Off
kV
V
Cylinder# 5 Secondary Ignition Pattern
This pattern appears to be abnormal
28Nov2007 12:53
ms
Stopped
Trigger
Repeat
ch B
Rising
500 mV
-60 %
start
Microsoft PowerPoint ...
PicoScope - [NONAM...
12:53 PM

1997 Buick Park Av

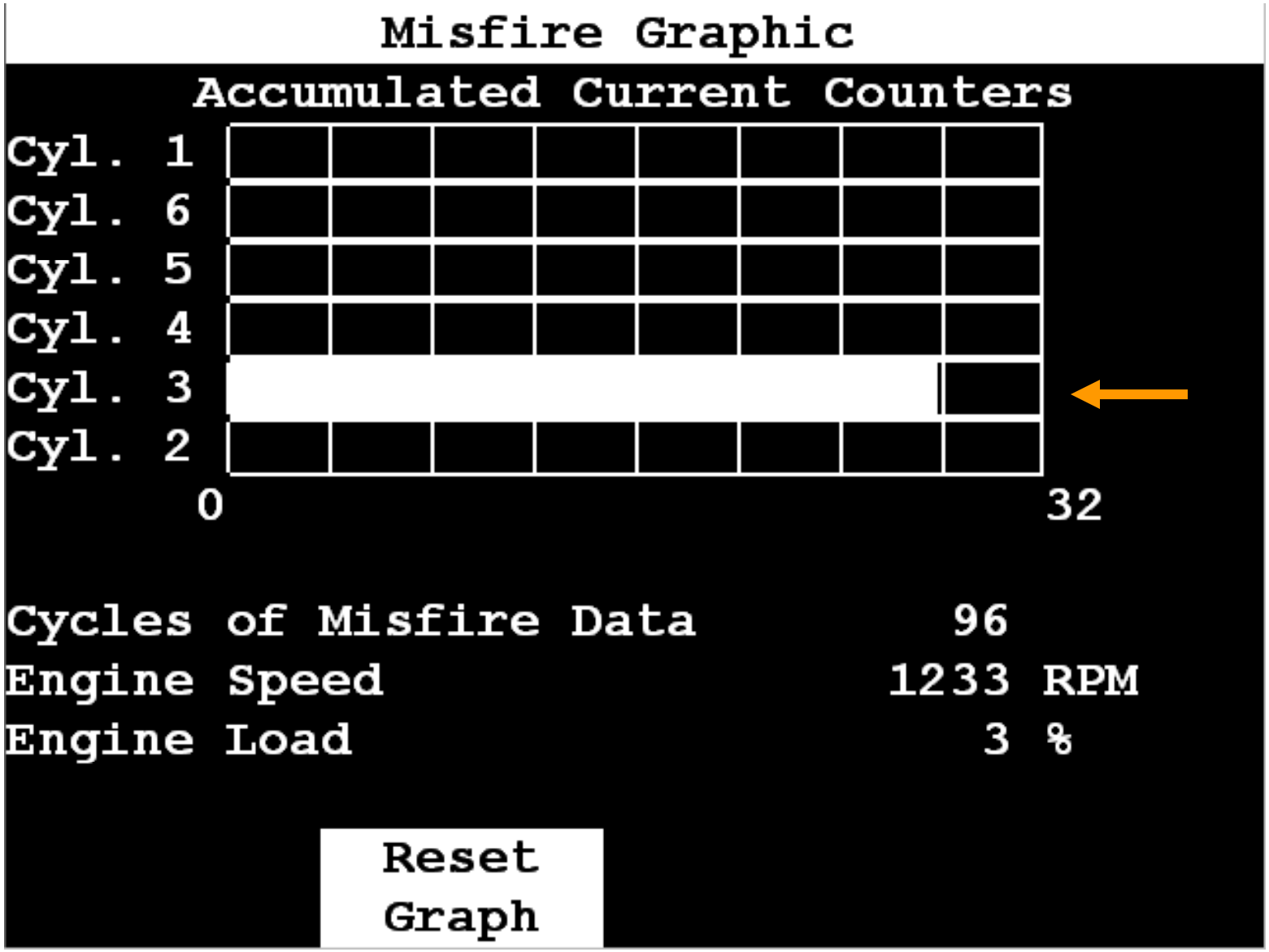
- The ignition wire was checked and passes its test
- A visual of the spark plug indicated it to be at a failure status


Cylinder# 5 has a Fouled Spark Plug

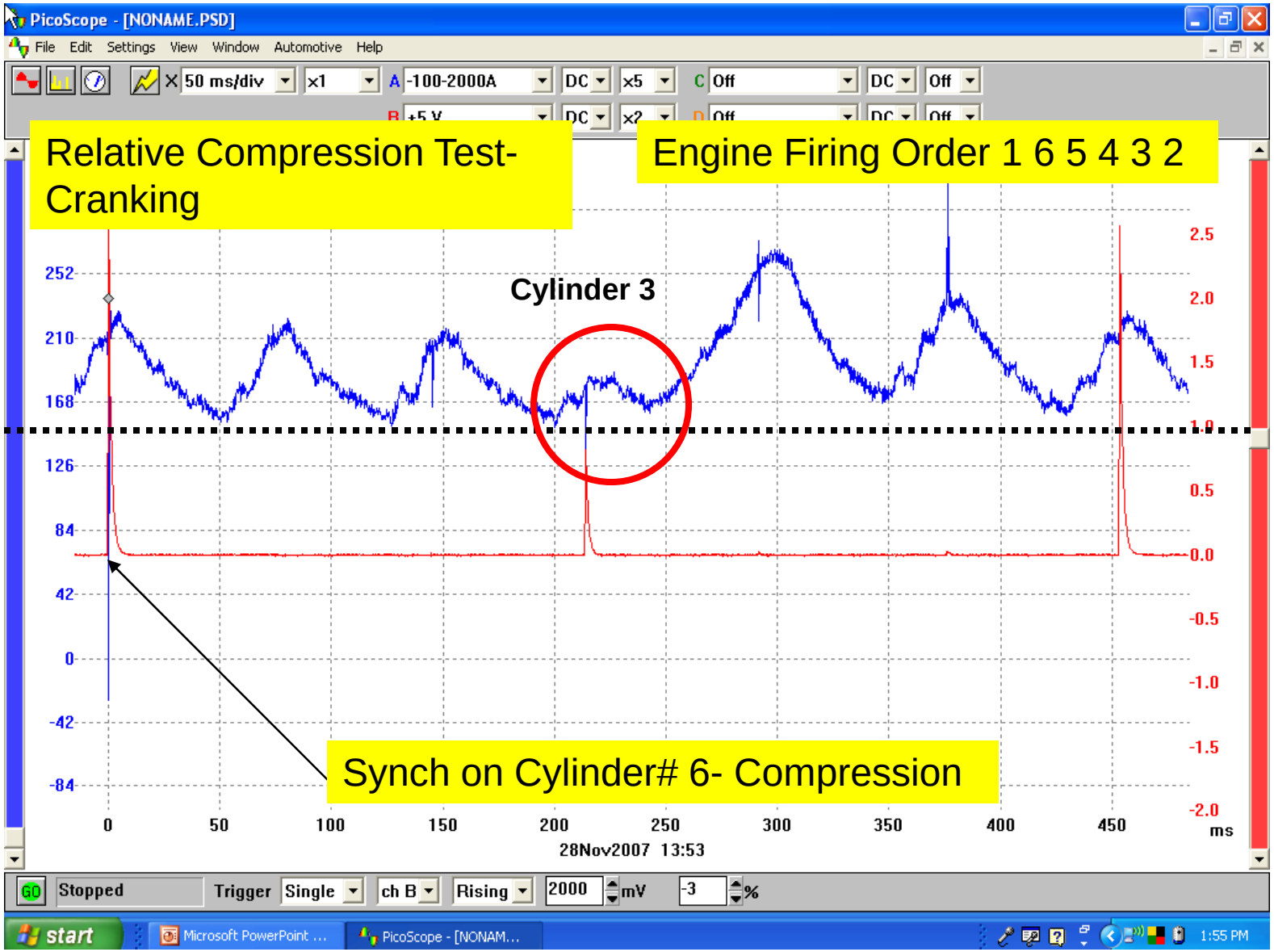

PicoScope - [NONAME.PSD]
File Edit Settings View Window Automotive Help
2 ms/div
A -3-27kV
B ±5 V
C Off
D Off
kV
V
Cylinder# 5 Secondary Ignition Pattern after plug replacement
This pattern appears to be normal
28Nov2007 12:56
Stopped
Trigger
Repeat
ch B
Rising
500 mV
-60 %
start
Microsoft PowerPoint ...
PicoScope - [NONAM...
12:56 PM

1997 Buick Park Av

- Misfire activity on cylinder #1 and #5 has been corrected
- Cylinder #3 alone now shows consistent misfire activity on the Tech 2 scantool
- Time to review fuel trim and vacuum readings again


Misfire Graphic
Accumulated Current Counters
Cyl. 1
Cyl. 6
Cyl. 5
Cyl. 4
Cyl. 3
Cyl. 2
0
32
Cycles of Misfire Data 96
Engine Speed 1233 RPM
Engine Load 3 %
Reset Graph

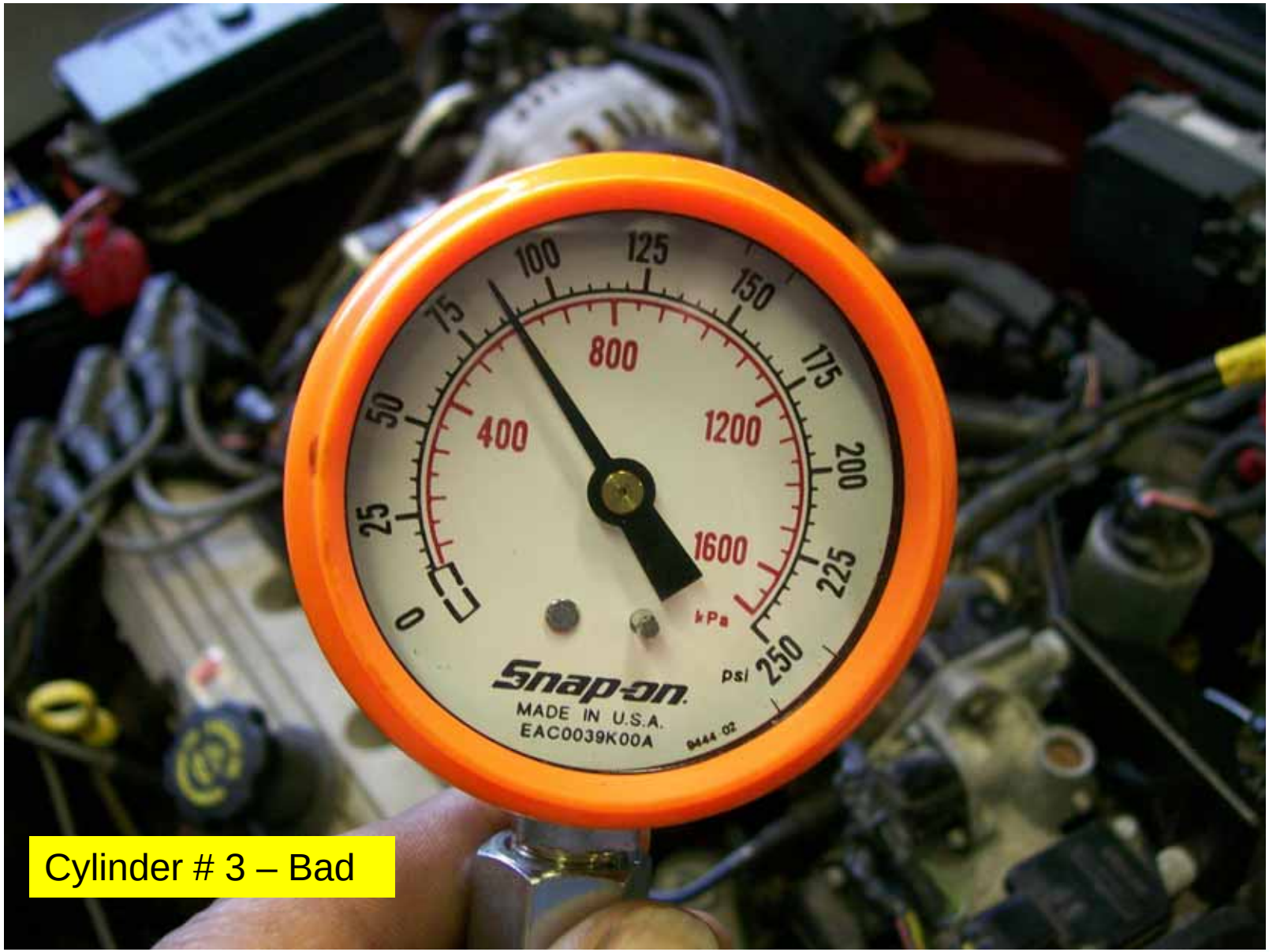
Relative Compression Test


PicoScope - [NONAME.PSD]
File Edit Settings View Window Automotive Help
50 ms/div
x1
A -100-2000A
DC
x5
C Off
DC
Off
B +5 V
DC
x2
D Off
DC
Off
Relative Compression Test- Cranking
Engine Firing Order 1 6 5 4 3 2
Cylinder 3
252
210
168
126
84
42
0
-42
-84
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
0
50
100
150
200
250
300
350
400
450
ms
28Nov2007 13:53
Synch on Cylinder# 6- Compression
GO
Stopped
Trigger
Single
ch B
Rising
2000
mV
-3
%
start
Microsoft PowerPoint ...
PicoScope - [NONAM...
1:55 PM

1997 Buick Park Av

- If you get this activity, you should run a compression test on that cylinder right away
- The crankcase vacuum should also be checked as well as engine vacuum

Cylinder # 1 – Good

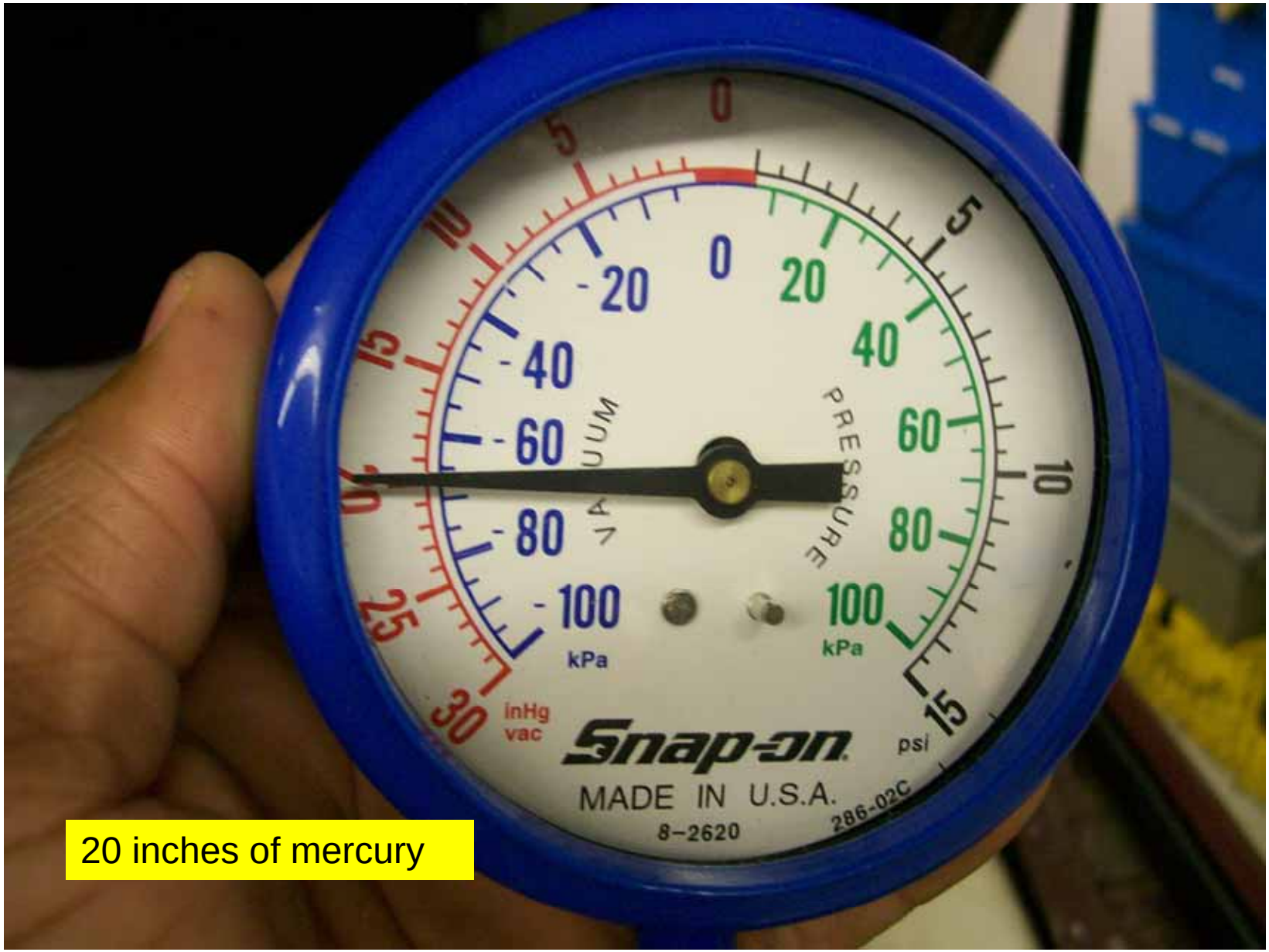


Cylinder # 3 – Bad

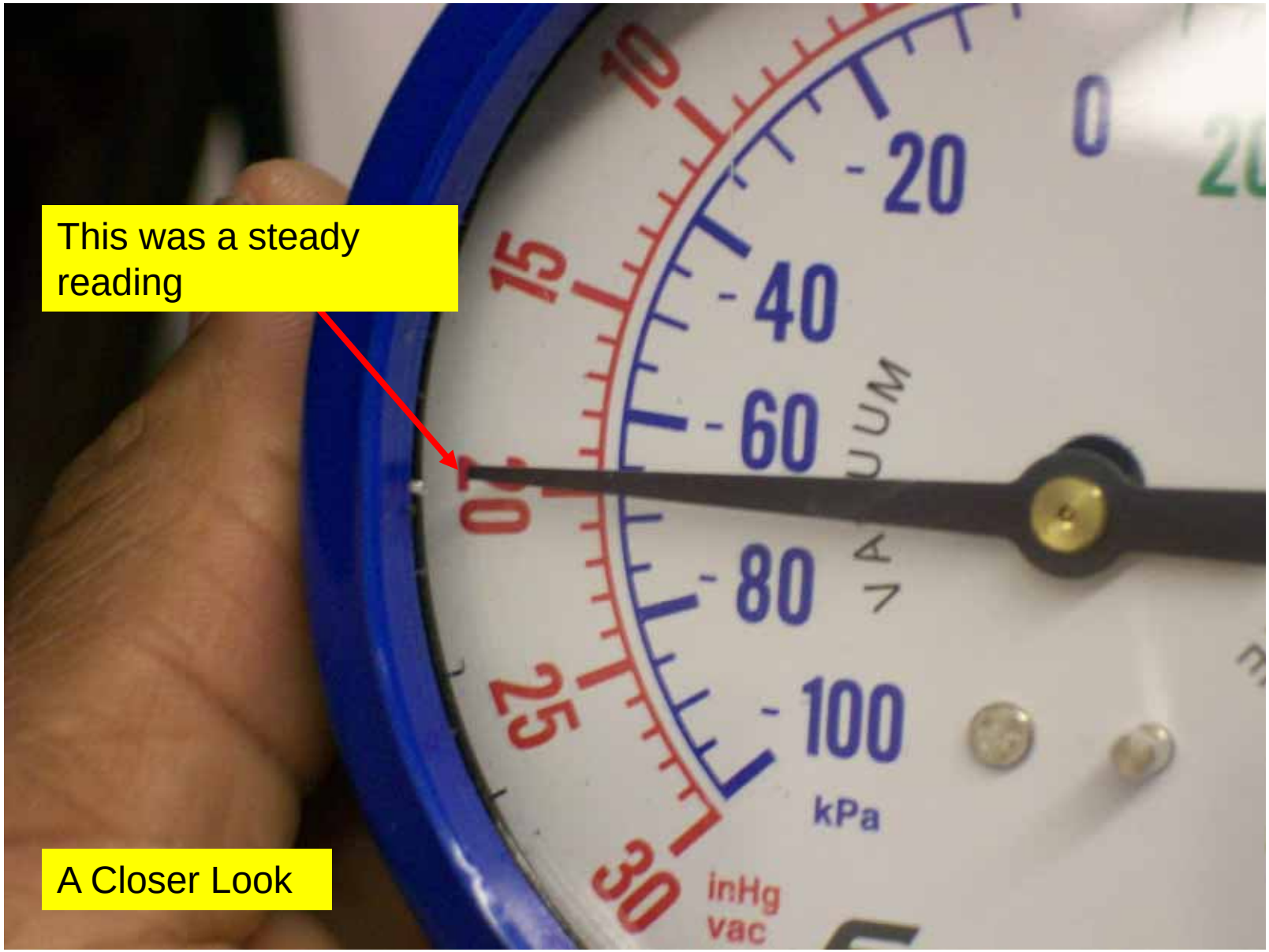
1997 Buick Park Av

- It has been confirmed that there is a mechanical issue with cylinder#3

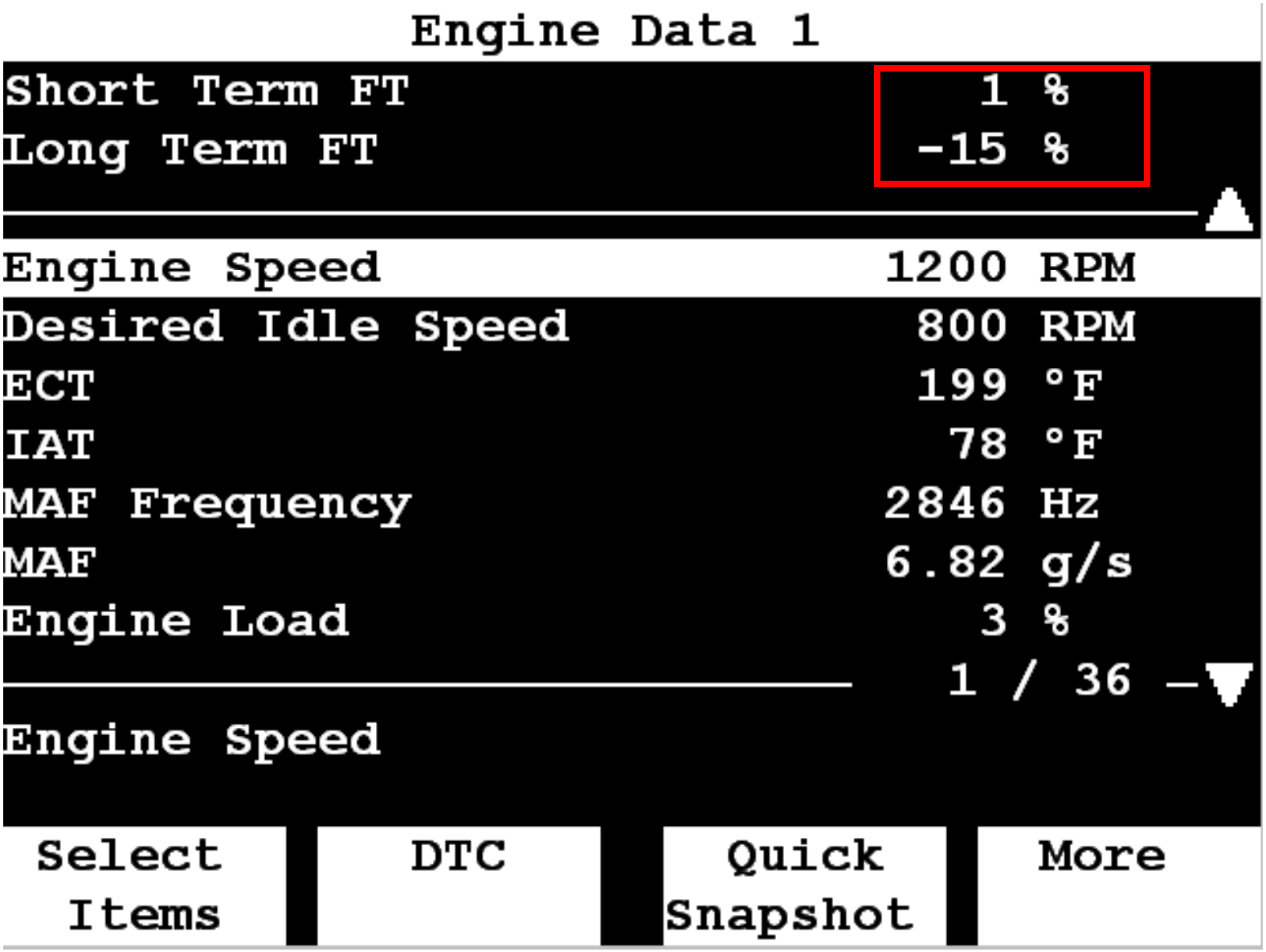
Vacuum Readings



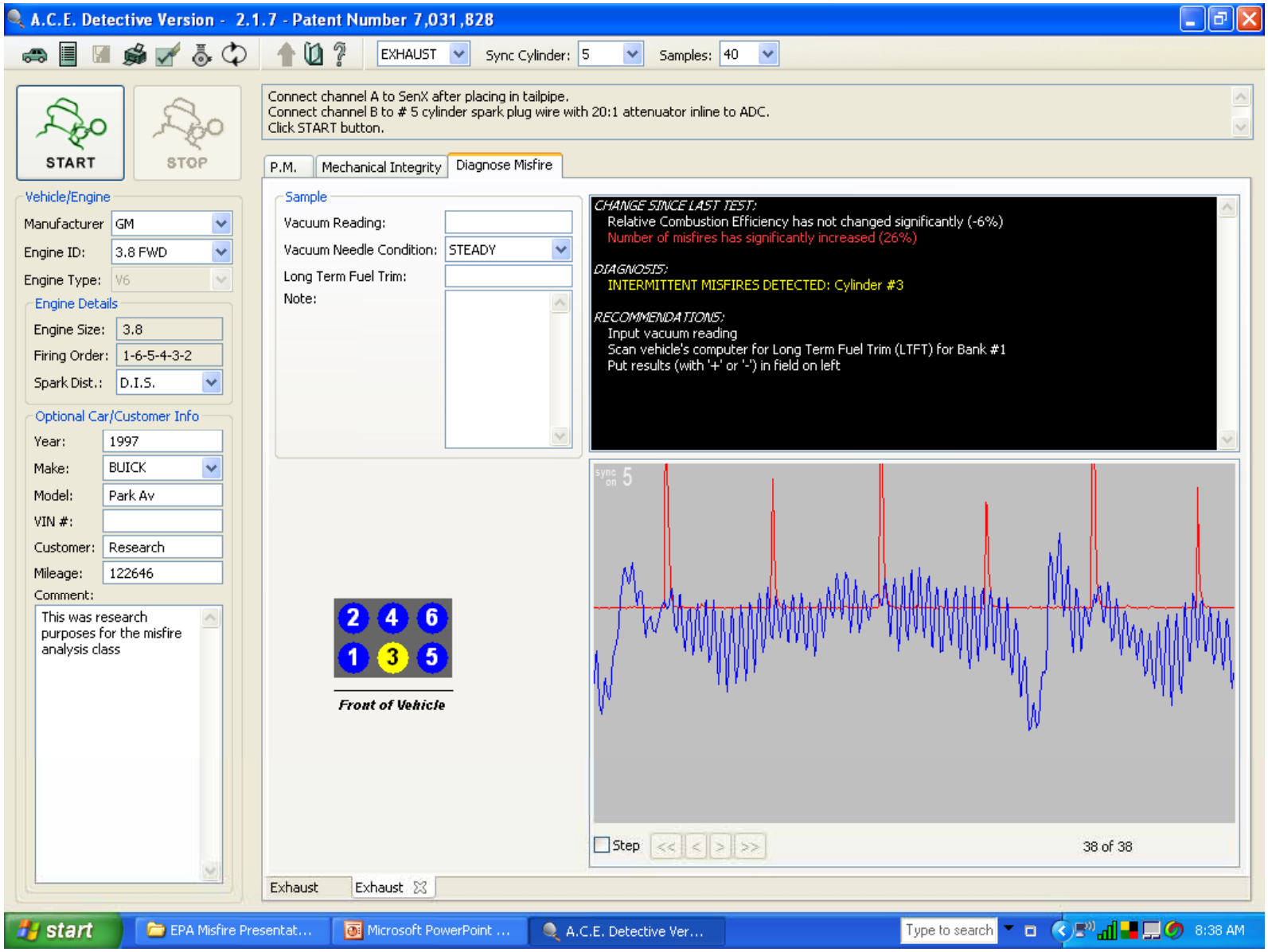
20 inches of mercury

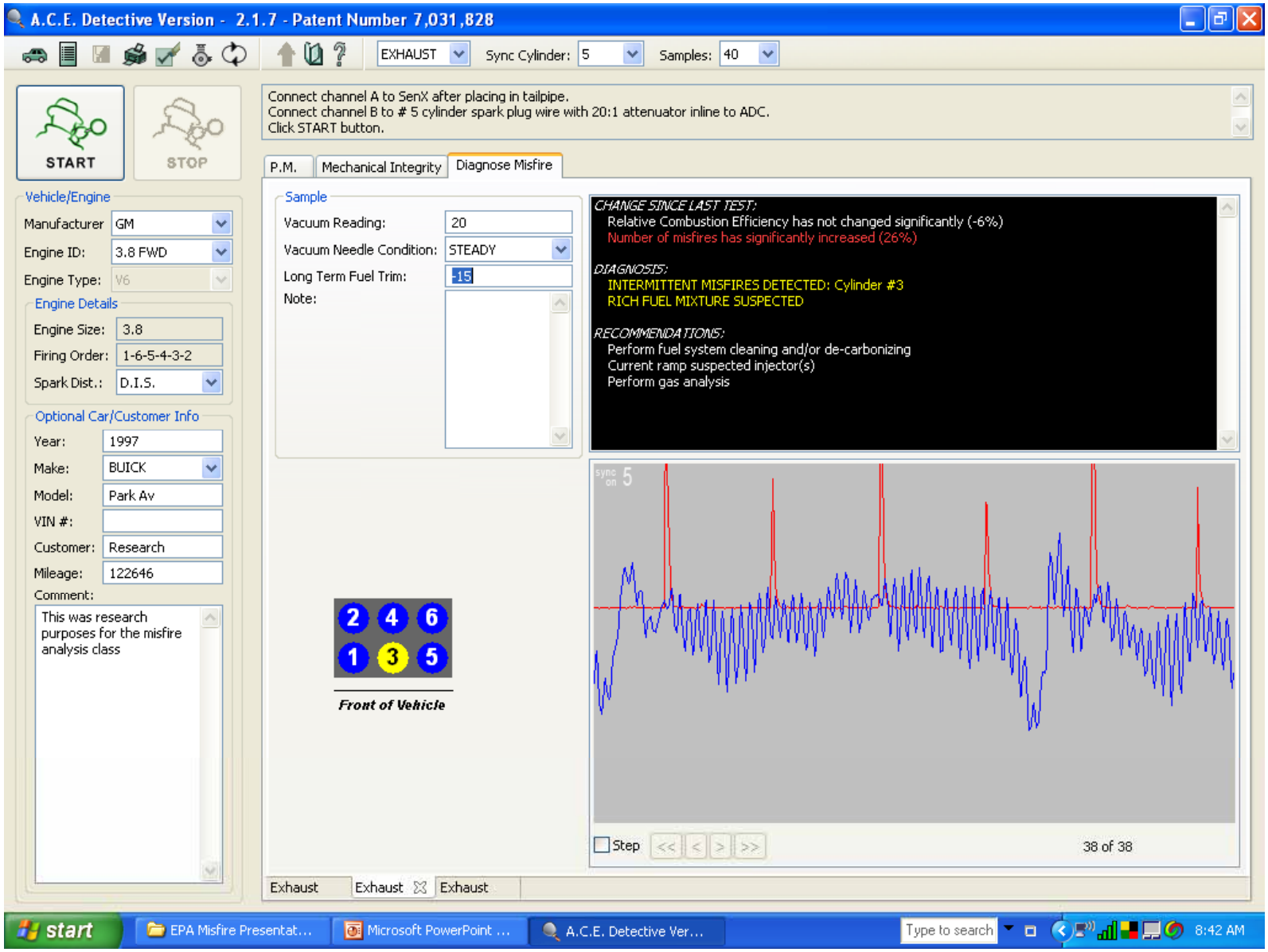

This was a steady reading
A Closer Look
10
15
20
25
30
20
40
60
80
100
0
kPa
inHg
vac

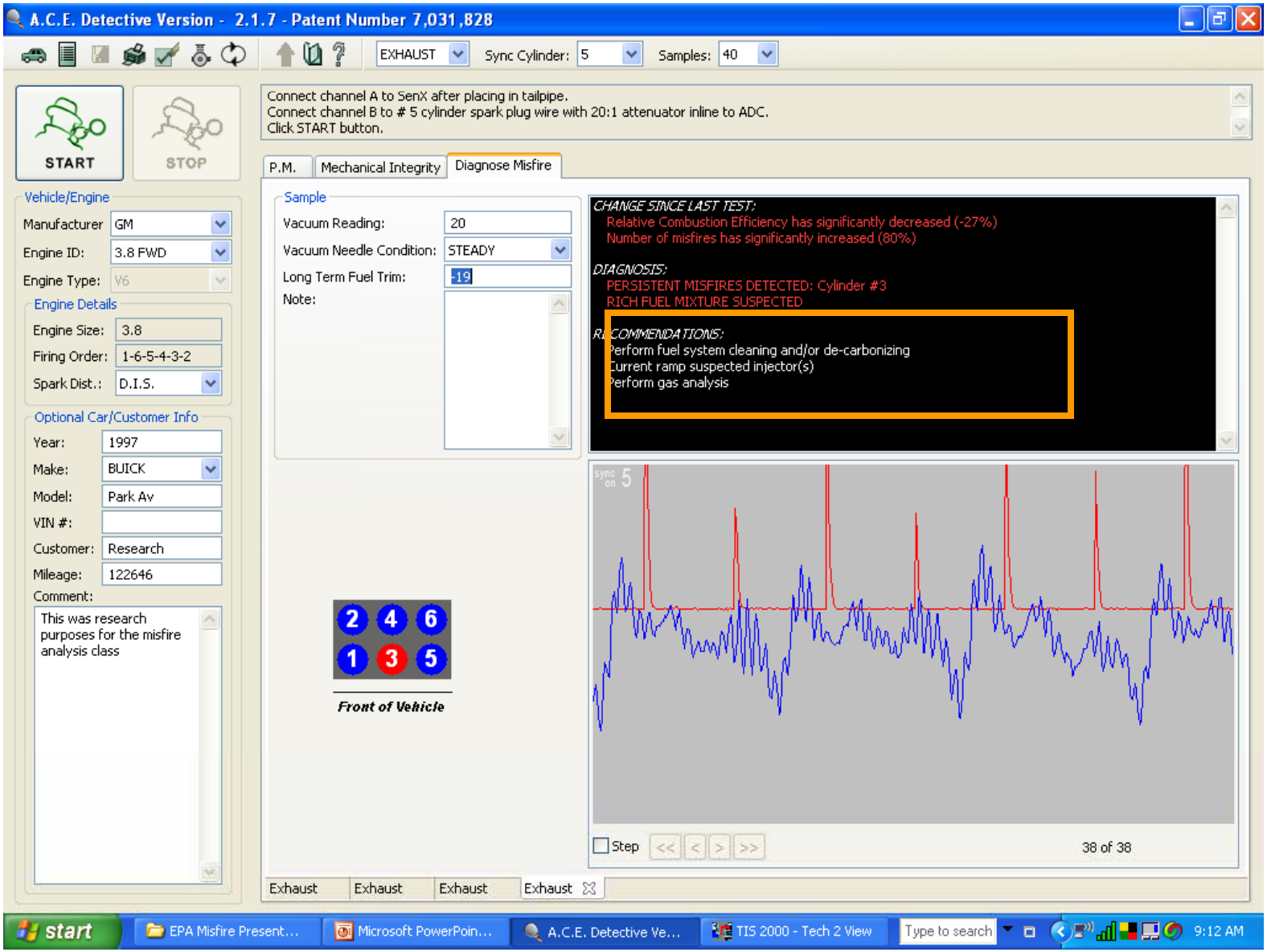
Fuel Trim Readings

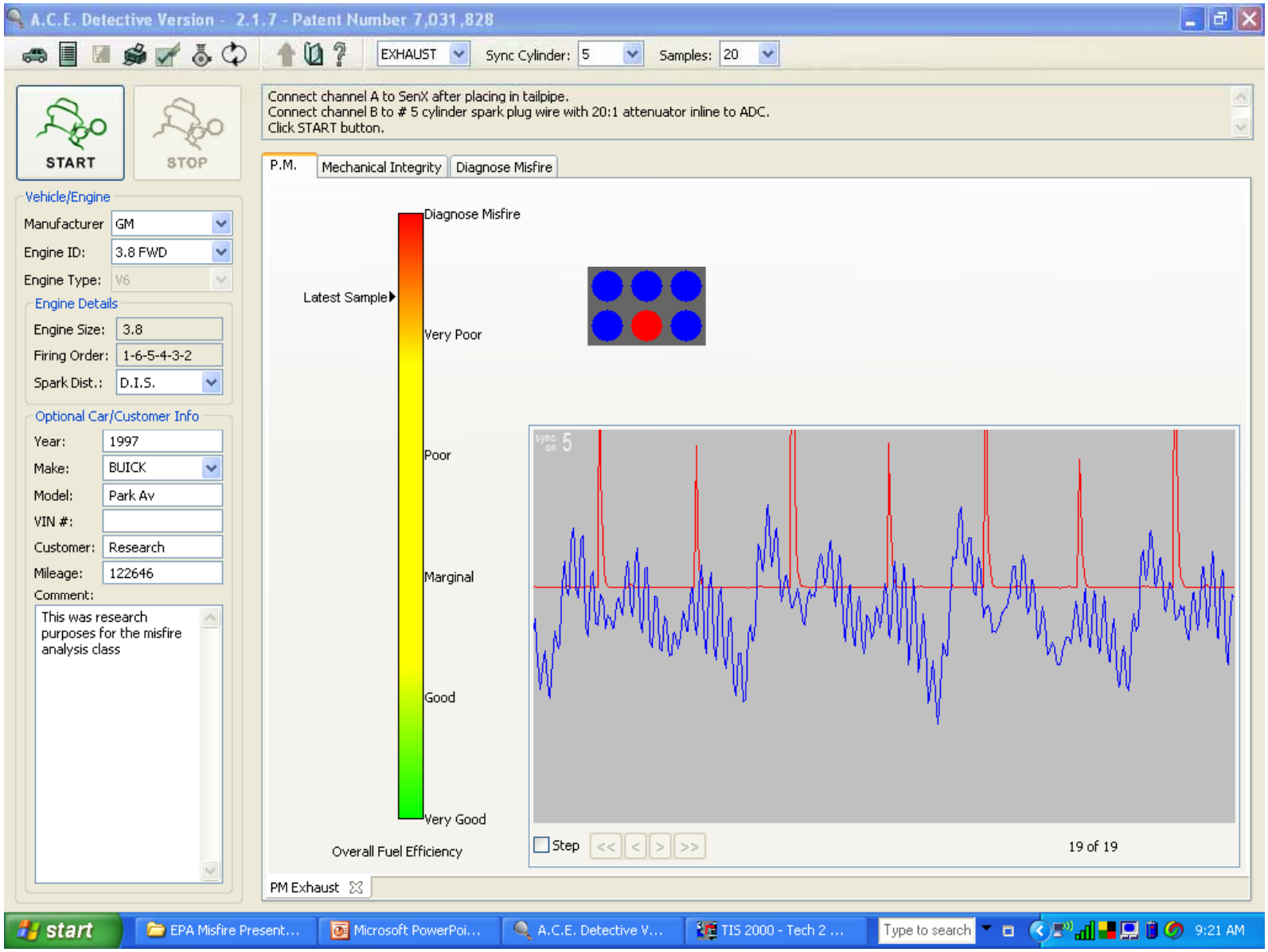

Engine Data 1
Short Term FT 1 %
Long Term FT -15 %
Engine Speed 1200 RPM
Desired Idle Speed 800 RPM
ECT 199 °F
IAT 78 °F
MAF Frequency 2846 Hz
MAF 6.82 g/s
Engine Load 3 %
1 / 36
Engine Speed
Select Items
DTC
Quick Snapshot
More

ACE Misfire Software

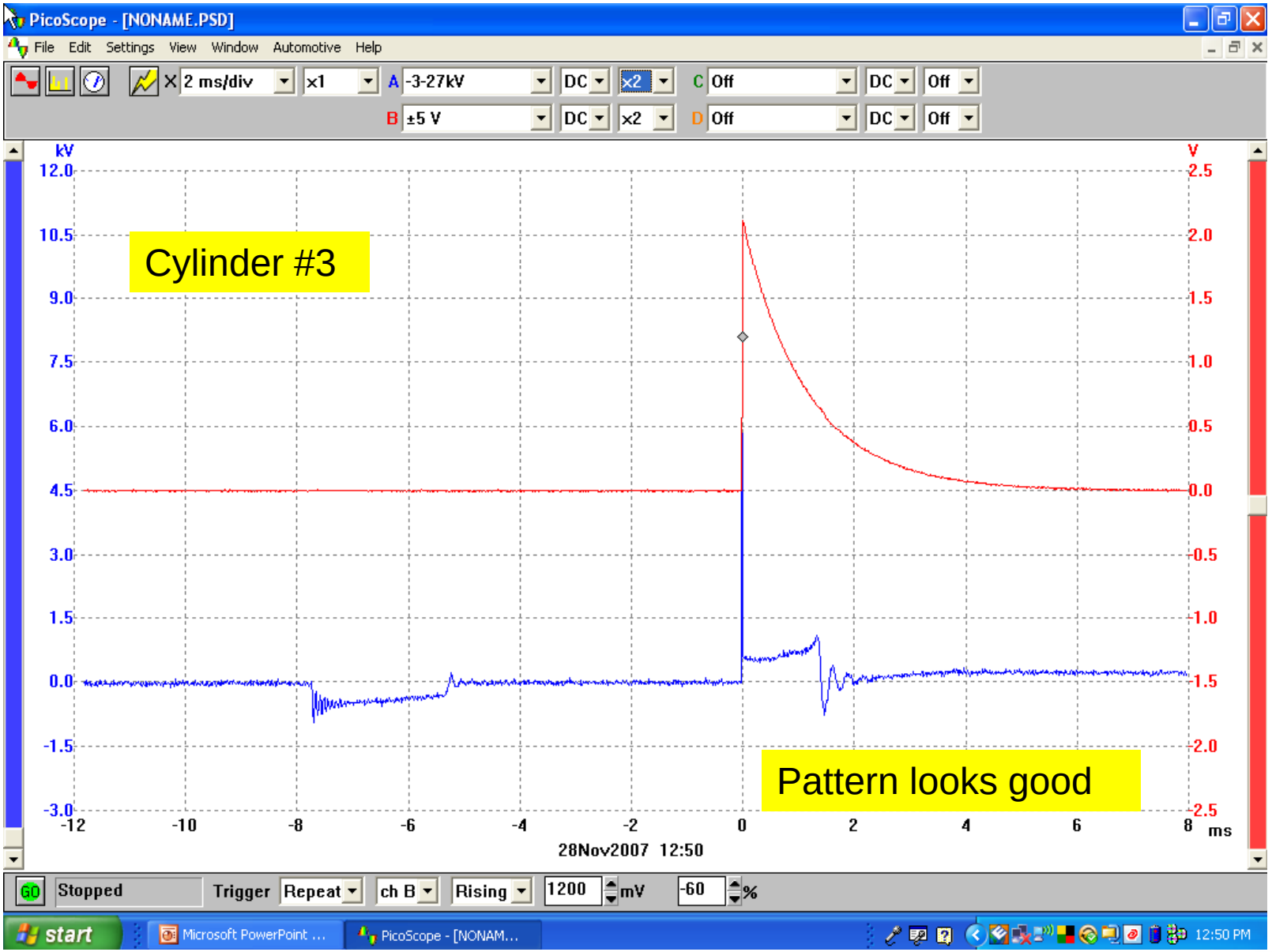

A.C.E. Detective Version - 2.1.7 - Patent Number 7,031,828
EXHAUST
Sync Cylinder: 5
Samples: 40
START
STOP
Connect channel A to SenX after placing in tailpipe.
Connect channel B to # 5 cylinder spark plug wire with 20:1 attenuator inline to ADC.
Click START button.
P.M.
Mechanical Integrity
Diagnose Misfire
Vehicle/Engine
Manufacturer GM
Engine ID: 3.8 FWD
Engine Type: V6
Engine Details
Engine Size: 3.8
Firing Order: 1-6-5-4-3-2
Spark Dist.: D.I.S.
Optional Car/Customer Info
Year: 1997
Make: BUICK
Model: Park Av
VIN #:
Customer: Research
Mileage: 122646
Comment:
This was research purposes for the misfire analysis class
Sample
Vacuum Reading:
Vacuum Needle Condition: STEADY
Long Term Fuel Trim:
Note:
CHANGE SINCE LAST TEST:
Relative Combustion Efficiency has not changed significantly (-6%)
Number of misfires has significantly increased (26%)
DIAGNOSIS:
INTERMITTENT MISFIRES DETECTED: Cylinder #3
RECOMMENDATIONS:
Input vacuum reading
Scan vehicle's computer for Long Term Fuel Trim (LTFT) for Bank #1
Put results (with '+' or '-') in field on left
2 4 6
1 3 5
Front of Vehicle
sync on 5
Step
38 of 38
Exhaust
Exhaust
start
EPA Misfire Presentat...
Microsoft PowerPoint ...
A.C.E. Detective Ver...
Type to search
8:38 AM


A.C.E. Detective Version - 2.1.7 - Patent Number 7,031,828
EXHAUST
Sync Cylinder: 5
Samples: 40
START
STOP
Connect channel A to SenX after placing in tailpipe.
Connect channel B to # 5 cylinder spark plug wire with 20:1 attenuator inline to ADC.
Click START button.
P.M.
Mechanical Integrity
Diagnose Misfire
Vehicle/Engine
Manufacturer GM
Engine ID: 3.8 FWD
Engine Type: V6
Engine Details
Engine Size: 3.8
Firing Order: 1-6-5-4-3-2
Spark Dist.: D.I.S.
Optional Car/Customer Info
Year: 1997
Make: BUICK
Model: Park Av
VIN #:
Customer: Research
Mileage: 122646
Comment:
This was research purposes for the misfire analysis class
Sample
Vacuum Reading: 20
Vacuum Needle Condition: STEADY
Long Term Fuel Trim: -15
Note:
CHANGE SINCE LAST TEST:
Relative Combustion Efficiency has not changed significantly (-6%)
Number of misfires has significantly increased (26%)
DIAGNOSIS:
INTERMITTENT MISFIRES DETECTED: Cylinder #3
RICH FUEL MIXTURE SUSPECTED
RECOMMENDATIONS:
Perform fuel system cleaning and/or de-carbonizing
Current ramp suspected injector(s)
Perform gas analysis
2 4 6
1 3 5
Front of Vehicle
sync on 5
Step
38 of 38
Exhaust
Exhaust
Exhaust
start
EPA Misfire Presentat...
Microsoft PowerPoint ...
A.C.E. Detective Ver...
Type to search
8:42 AM

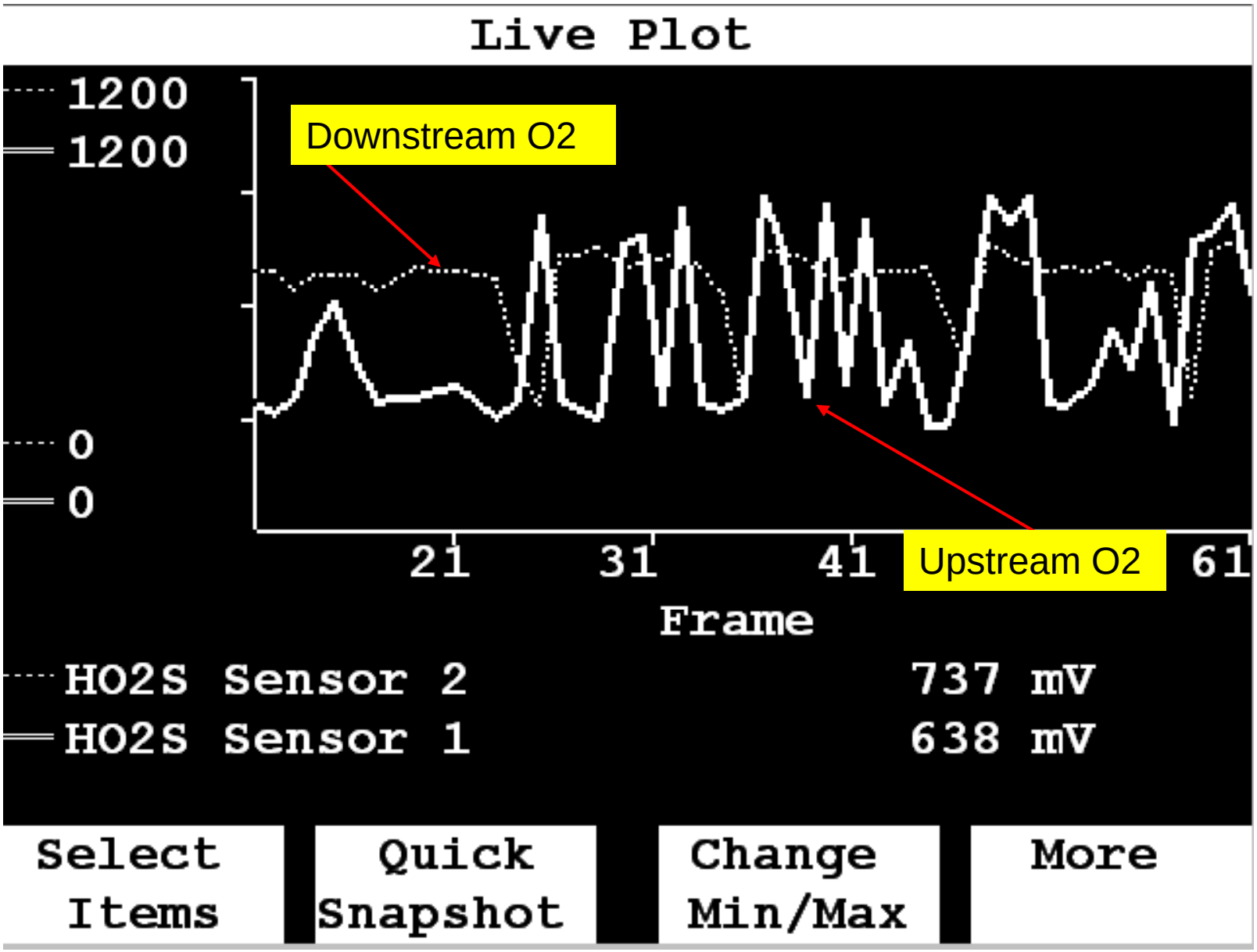

A.C.E. Detective Version - 2.1.7 - Patent Number 7,031,828
EXHAUST
Sync Cylinder: 5
Samples: 40
START
STOP
Connect channel A to SenX after placing in tailpipe.
Connect channel B to # 5 cylinder spark plug wire with 20:1 attenuator inline to ADC.
Click START button.
P.M.
Mechanical Integrity
Diagnose Misfire
Vehicle/Engine
Manufacturer GM
Engine ID: 3.8 FWD
Engine Type: V6
Engine Details
Engine Size: 3.8
Firing Order: 1-6-5-4-3-2
Spark Dist.: D.I.S.
Optional Car/Customer Info
Year: 1997
Make: BUICK
Model: Park Av
VIN #:
Customer: Research
Mileage: 122646
Comment:
This was research purposes for the misfire analysis class
Sample
Vacuum Reading: 20
Vacuum Needle Condition: STEADY
Long Term Fuel Trim: -19
Note:
CHANGE SINCE LAST TEST:
Relative Combustion Efficiency has significantly decreased (-27%)
Number of misfires has significantly increased (80%)
DIAGNOSIS:
PERSISTENT MISFIRES DETECTED: Cylinder #3
RICH FUEL MIXTURE SUSPECTED
RECOMMENDATIONS:
Perform fuel system cleaning and/or de-carbonizing
Current ramp suspected injector(s)
Perform gas analysis
2 4 6
1 3 5
Front of Vehicle
sync on 5
Step
38 of 38
Exhaust
Exhaust
Exhaust
Exhaust
start
EPA Misfire Present...
Microsoft PowerPoin...
A.C.E. Detective Ve...
TIS 2000 - Tech 2 View
Type to search
9:12 AM

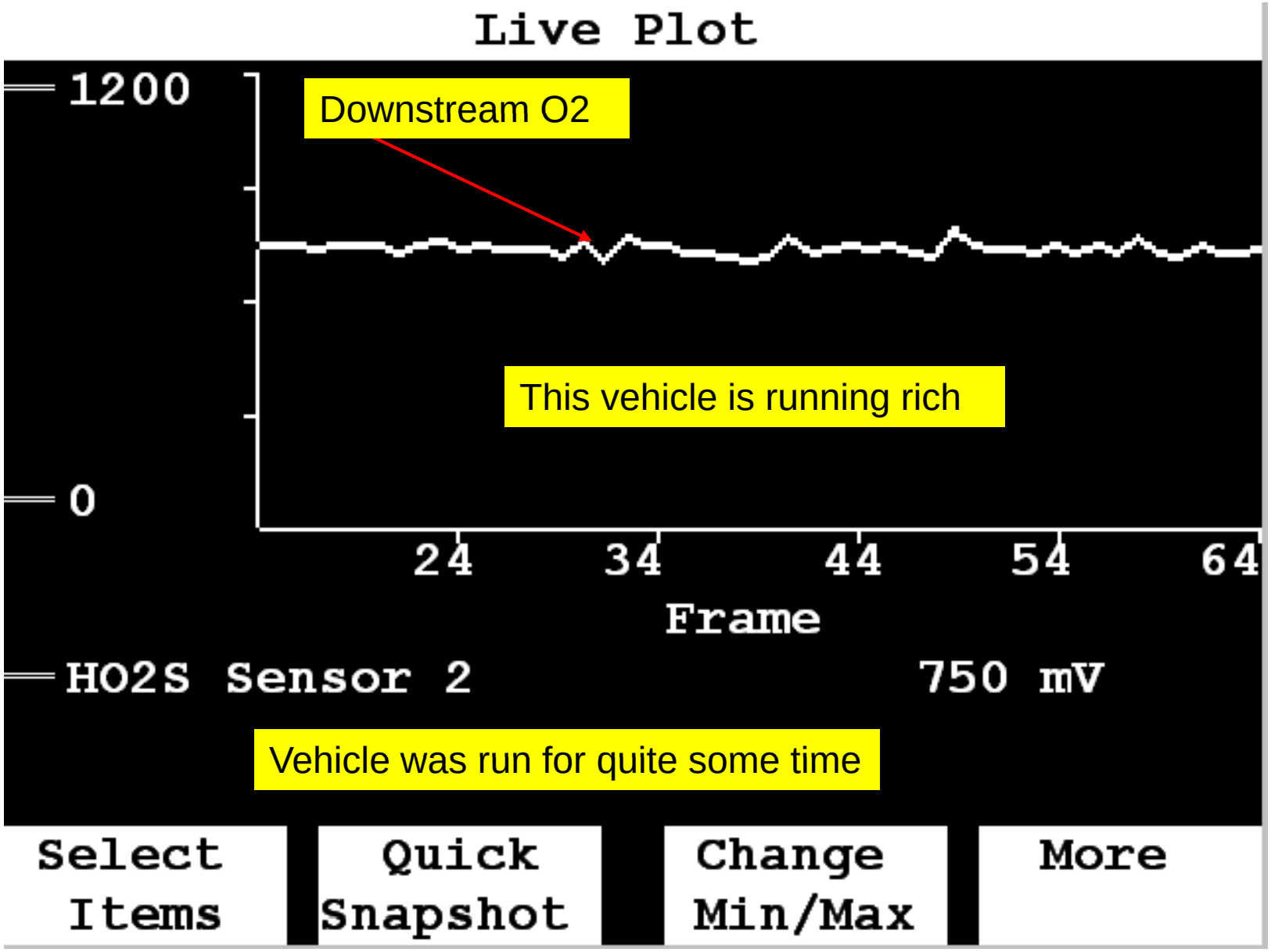

A.C.E. Detective Version - 2.1.7 - Patent Number 7,031,828
EXHAUST
Sync Cylinder: 5
Samples: 20
START
STOP
Connect channel A to SenX after placing in tailpipe.
Connect channel B to # 5 cylinder spark plug wire with 20:1 attenuator inline to ADC.
Click START button.
Vehicle/Engine
Manufacturer GM
Engine ID: 3.8 FWD
Engine Type: V6
Engine Details
Engine Size: 3.8
Firing Order: 1-6-5-4-3-2
Spark Dist.: D.I.S.
Optional Car/Customer Info
Year: 1997
Make: BUICK
Model: Park Av
VIN #:
Customer: Research
Mileage: 122646
Comment:
This was research purposes for the misfire analysis class
P.M.
Mechanical Integrity
Diagnose Misfire
Diagnose Misfire
Latest Sample
Very Poor
Poor
Marginal
Good
Very Good
Overall Fuel Efficiency
sync on 5
Step
<< < > >>
19 of 19
PM Exhaust
start
EPA Misfire Present...
Microsoft PowerPoi...
A.C.E. Detective V...
TIS 2000 - Tech 2 ...
Type to search
9:21 AM

Secondary Ignition Waveforms


PicoScope - [NONAME.PSD]
File Edit Settings View Window Automotive Help
2 ms/div
A -3-27kV
B ±5 V
C Off
D Off
kV
V
Cylinder #3
Pattern looks good
28Nov2007 12:50
ms
Stopped
Trigger
Repeat
ch B
Rising
1200
mV
-60
%
start
Microsoft PowerPoint ...
PicoScope - [NONAM...
12:50 PM

Fuel System Analysis


Live Plot
1200
1200
0
0
Downstream O2
Upstream O2
21
31
41
61
Frame
HO2S Sensor 2
737 mV
HO2S Sensor 1
638 mV
Select Items
Quick Snapshot
Change Min/Max
More


Live Plot
1200
0
Downstream O2
This vehicle is running rich
24
34
44
54
64
Frame
HO2S Sensor 2
750 mV
Vehicle was run for quite some time
Select Items
Quick Snapshot
Change Min/Max
More

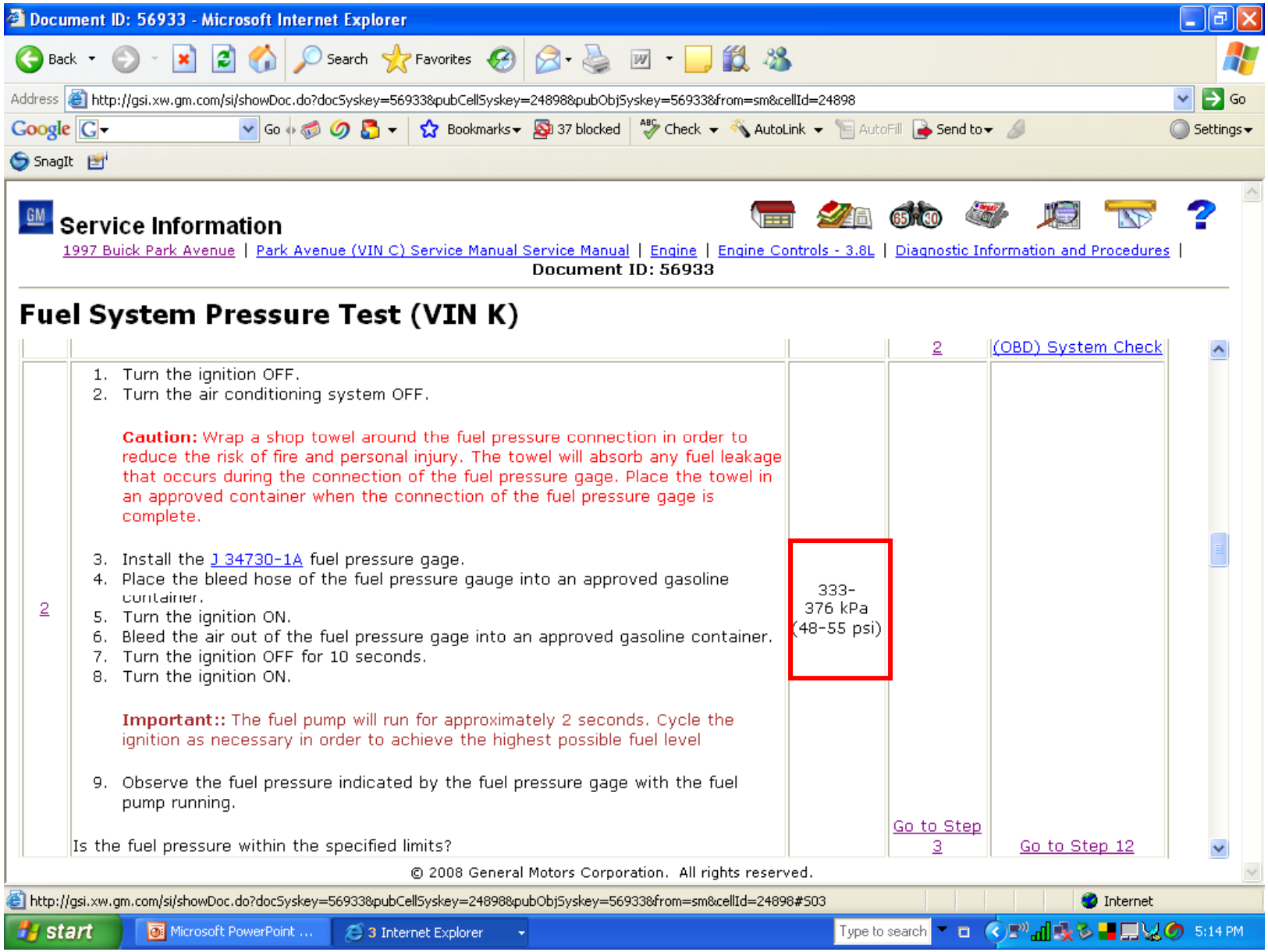
1997 Buick Park Av

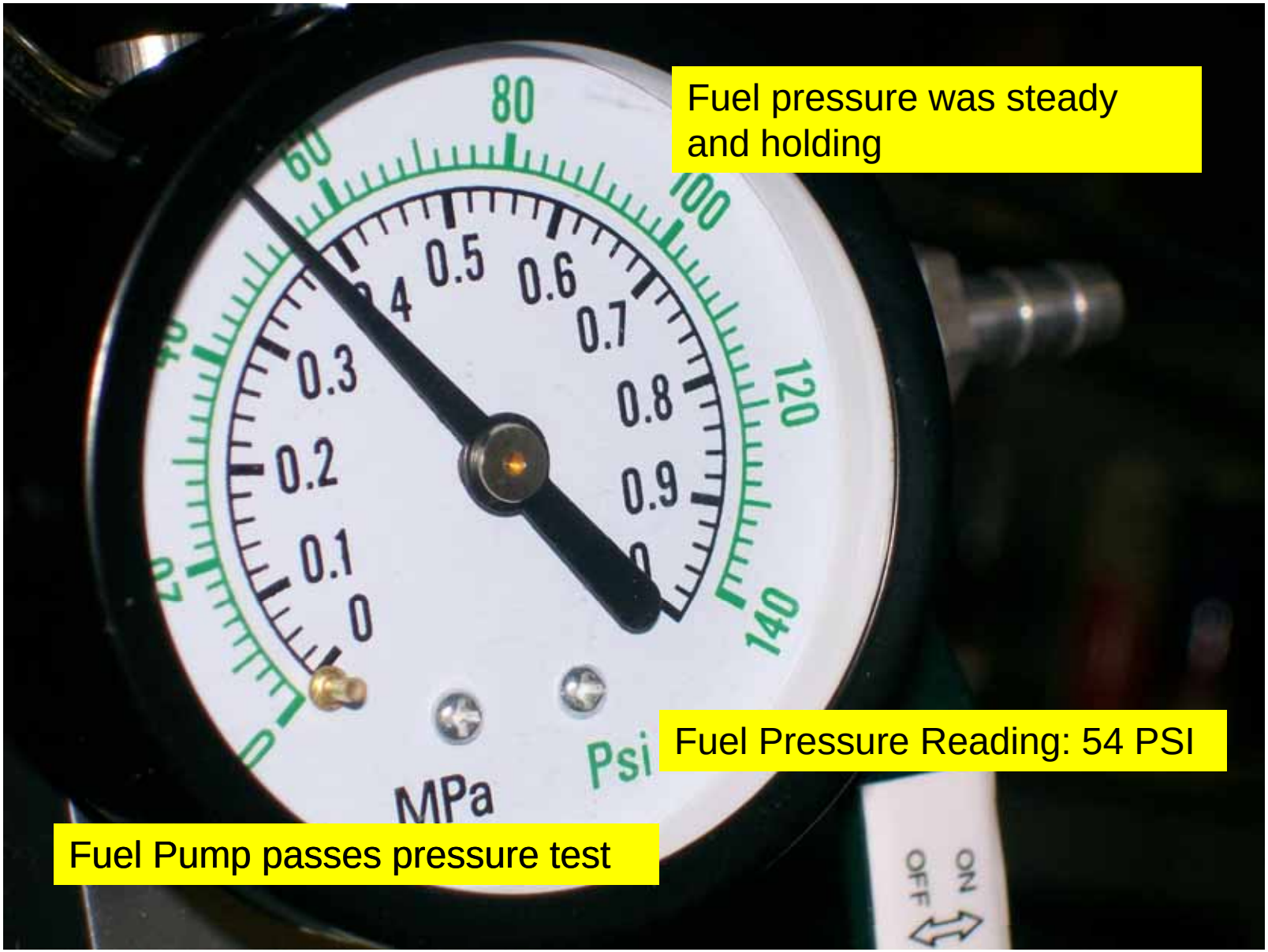
- Fuel Pump
  - Pressure/check valve Test
  - Volume
  - Amperage
- Fuel Pressure Regulator
  - Pull line off, note increase in Pressure
  - Apply vacuum to regulator

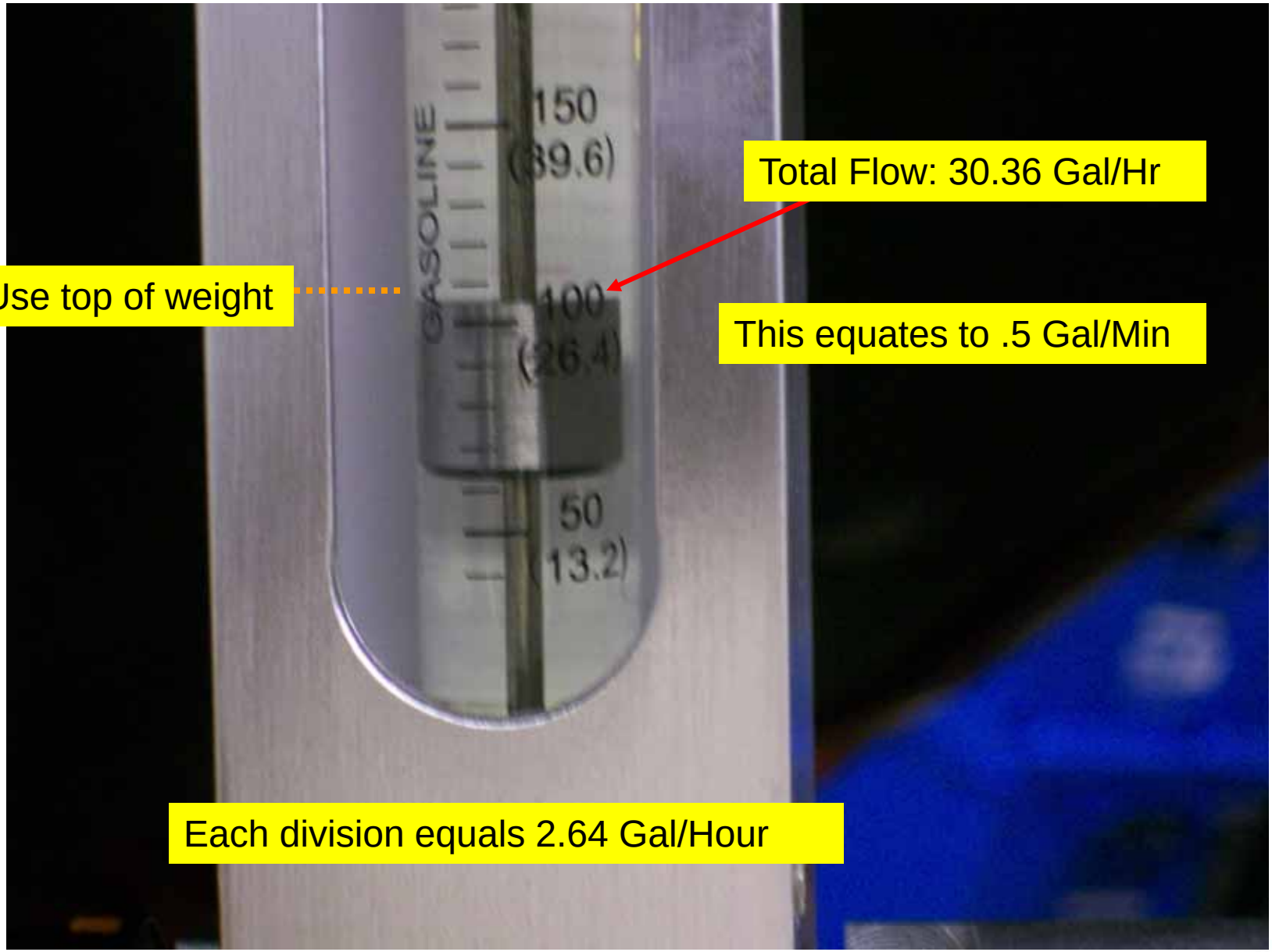
1997 Buick Park Av

- Fuel Injectors
  - Voltage Waveforms
  - Current Waveforms
  - Pressure Waveforms
- Fuel Trims
  - Significant impact will be noted on fuel related issues

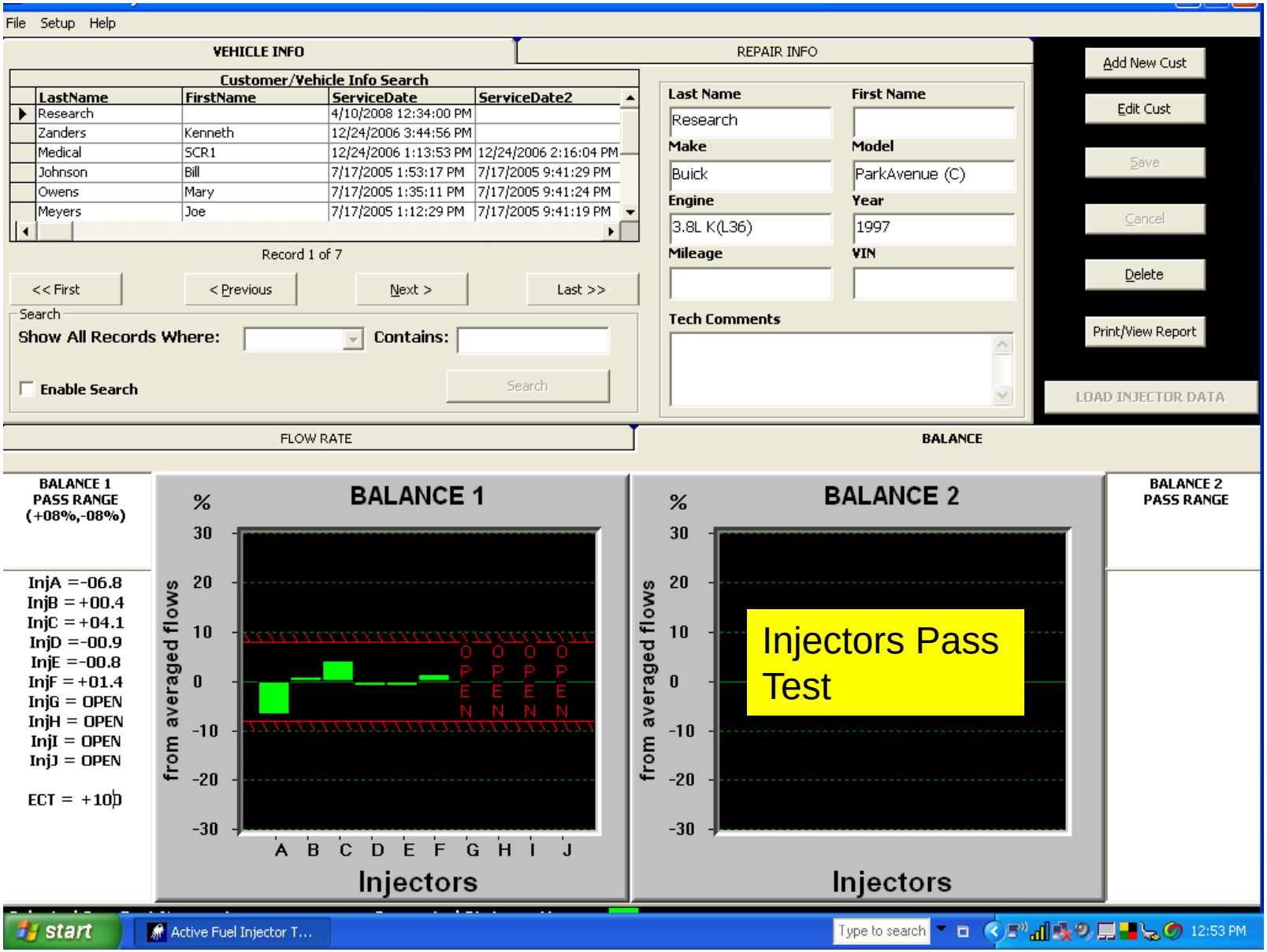
Fuel Flow Meter


Document ID: 56933 - Microsoft Internet Explorer
Back
Search
Favorites
Address
http://gsi.xw.gm.com/si/showDoc.do?docSyskey=56933&pubCellSyskey=24898&pubObjSyskey=56933&from=sm&cellId=24898
Go
Google
Bookmarks
37 blocked
Check
AutoLink
AutoFill
Send to
Settings
SnagIt
Service Information
1997 Buick Park Avenue | Park Avenue (VIN C) Service Manual Service Manual | Engine | Engine Controls - 3.8L | Diagnostic Information and Procedures |
Document ID: 56933
Fuel System Pressure Test (VIN K)
2
(OBD) System Check
1. Turn the ignition OFF.
2. Turn the air conditioning system OFF.
Caution: Wrap a shop towel around the fuel pressure connection in order to reduce the risk of fire and personal injury. The towel will absorb any fuel leakage that occurs during the connection of the fuel pressure gage. Place the towel in an approved container when the connection of the fuel pressure gage is complete.
3. Install the J 34730-1A fuel pressure gage.
4. Place the bleed hose of the fuel pressure gauge into an approved gasoline container.
5. Turn the ignition ON.
6. Bleed the air out of the fuel pressure gage into an approved gasoline container.
7. Turn the ignition OFF for 10 seconds.
8. Turn the ignition ON.
Important:: The fuel pump will run for approximately 2 seconds. Cycle the ignition as necessary in order to achieve the highest possible fuel level
9. Observe the fuel pressure indicated by the fuel pressure gage with the fuel pump running.
Is the fuel pressure within the specified limits?
333-376 kPa (48-55 psi)
Go to Step 3
Go to Step 12
© 2008 General Motors Corporation. All rights reserved.
http://gsi.xw.gm.com/si/showDoc.do?docSyskey=56933&pubCellSyskey=24898&pubObjSyskey=56933&from=sm&cellId=24898#503
Internet
start
Microsoft PowerPoint ...
3 Internet Explorer
Type to search
5:14 PM

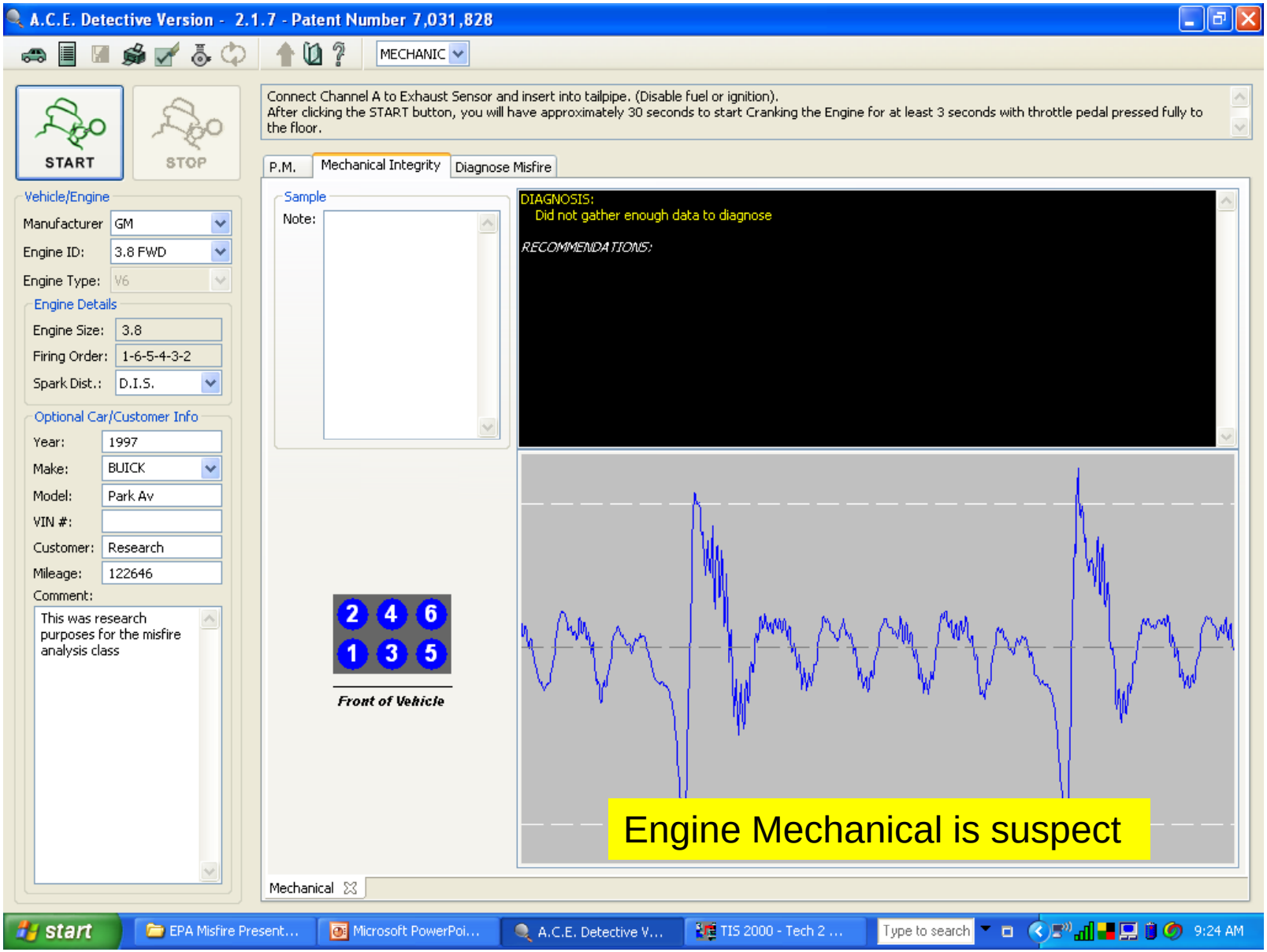

Fuel pressure was steady and holding
Fuel Pressure Reading: 54 PSI
Fuel Pump passes pressure test
80
100
120
140
0.5
0.6
0.7
0.8
0.9
0.3
0.2
0.1
0
MPa
Psi
ON
OFF

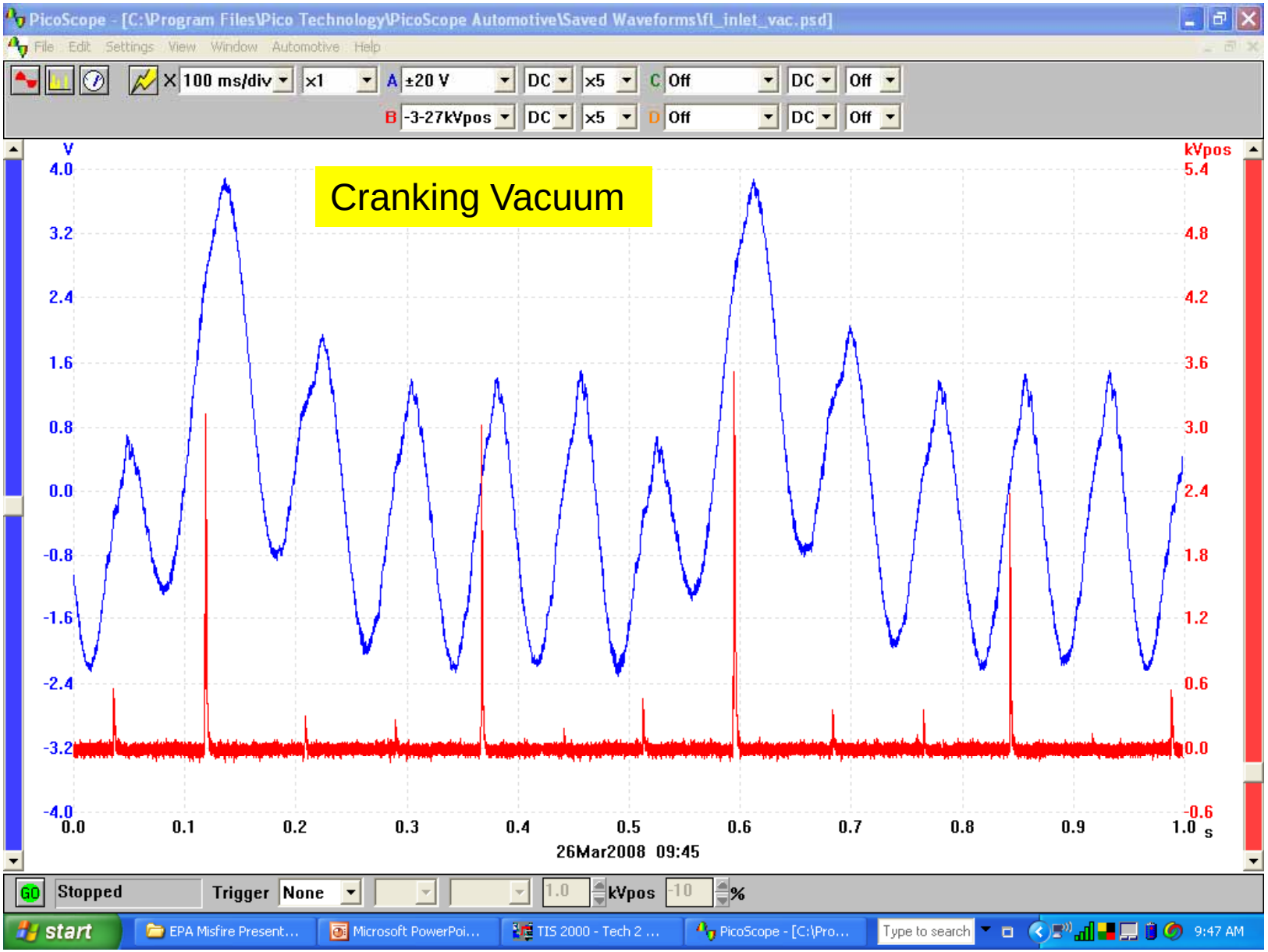

GASOLINE
150
(39.6)
100
(26.4)
50
(13.2)
Total Flow: 30.36 Gal/Hr
Use top of weight
This equates to .5 Gal/Min
Each division equals 2.64 Gal/Hour

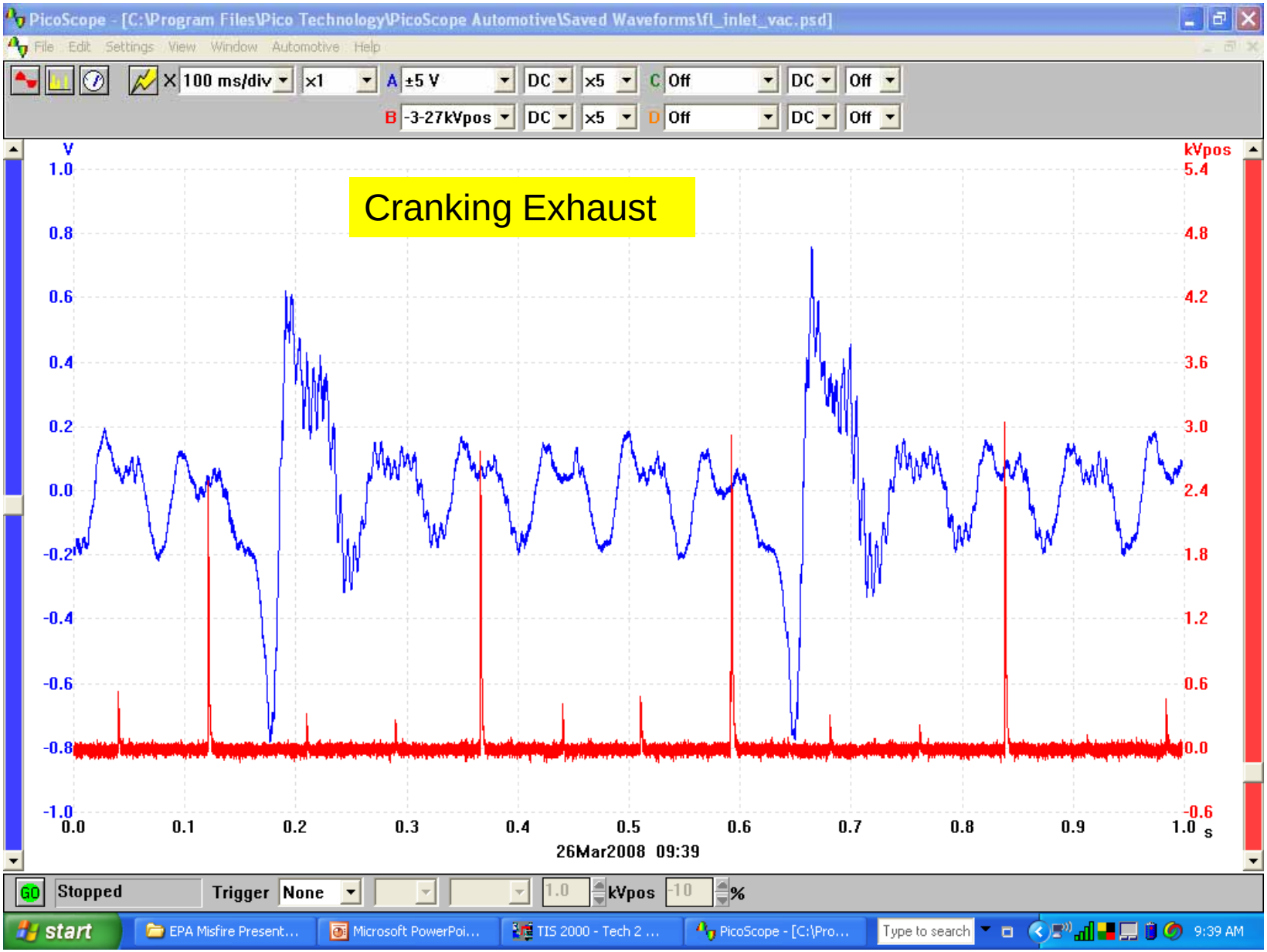

ACTIVE TUNE
INJECTION SYSTEMS

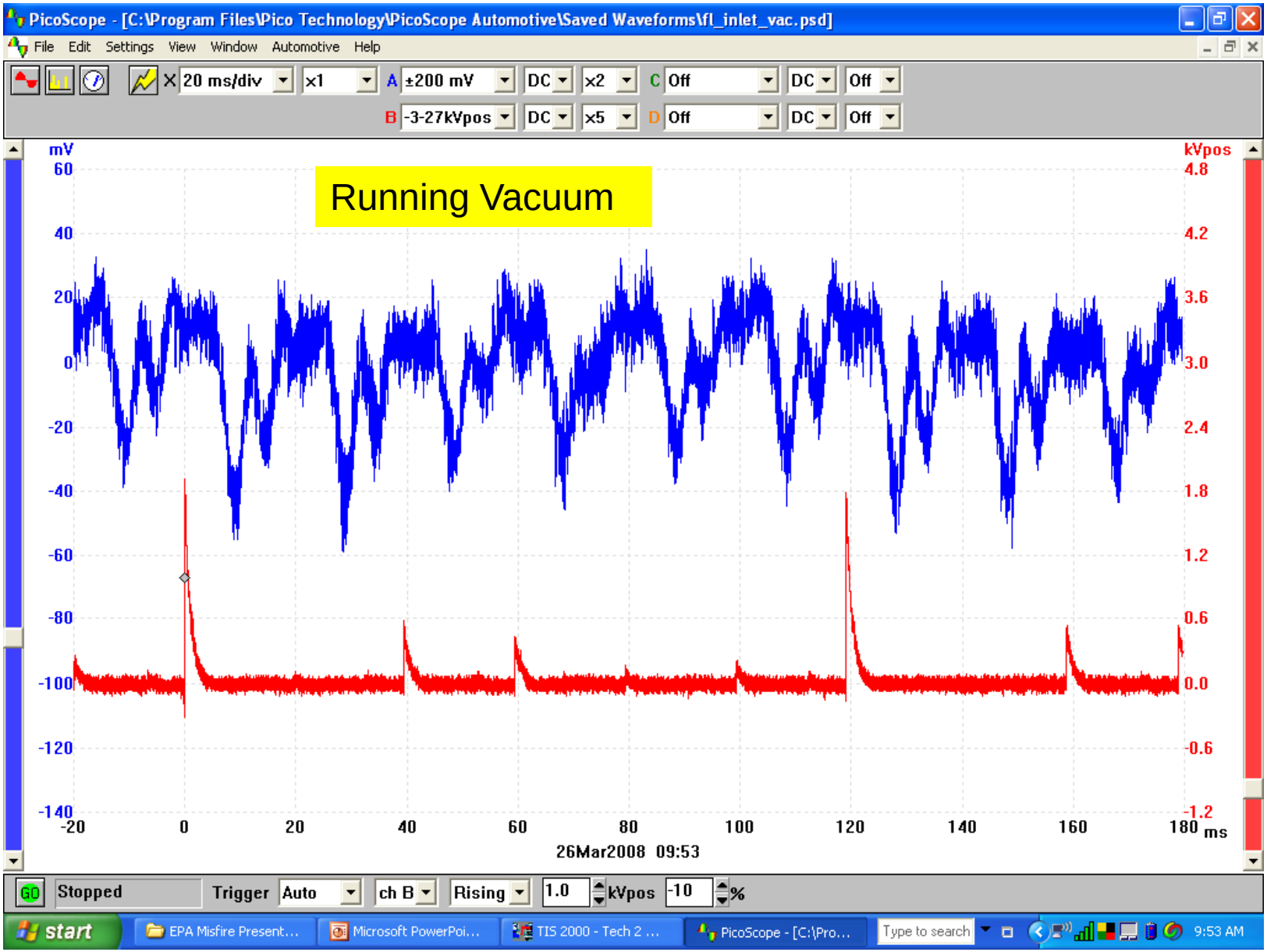

File Setup Help
VEHICLE INFO
REPAIR INFO
Customer/Vehicle Info Search
LastName FirstName ServiceDate ServiceDate2
Research 4/10/2008 12:34:00 PM
Zanders Kenneth 12/24/2006 3:44:56 PM
Medical SCR1 12/24/2006 1:13:53 PM 12/24/2006 2:16:04 PM
Johnson Bill 7/17/2005 1:53:17 PM 7/17/2005 9:41:29 PM
Owens Mary 7/17/2005 1:35:11 PM 7/17/2005 9:41:24 PM
Meyers Joe 7/17/2005 1:12:29 PM 7/17/2005 9:41:19 PM
Record 1 of 7
<< First
< Previous
Next >
Last >>
Search
Show All Records Where:
Contains:
Enable Search
Search
Last Name
Research
First Name
Make
Buick
Model
ParkAvenue (C)
Engine
3.8L K(L36)
Year
1997
Mileage
VIN
Tech Comments
Add New Cust
Edit Cust
Save
Cancel
Delete
Print/View Report
LOAD INJECTOR DATA
FLOW RATE
BALANCE
BALANCE 1
PASS RANGE
(+08%,-08%)
InjA =-06.8
InjB =+00.4
InjC =+04.1
InjD =-00.9
InjE =-00.8
InjF =+01.4
InjG = OPEN
InjH = OPEN
InjI = OPEN
InjJ = OPEN
ECT = +10D
BALANCE 1
%
30
20
10
0
-10
-20
-30
from averaged flows
OPEN
A B C D E F G H I J
Injectors
BALANCE 2
PASS RANGE
BALANCE 2
%
Injectors Pass Test
Injectors
start
Active Fuel Injector T...
Type to search
12:53 PM

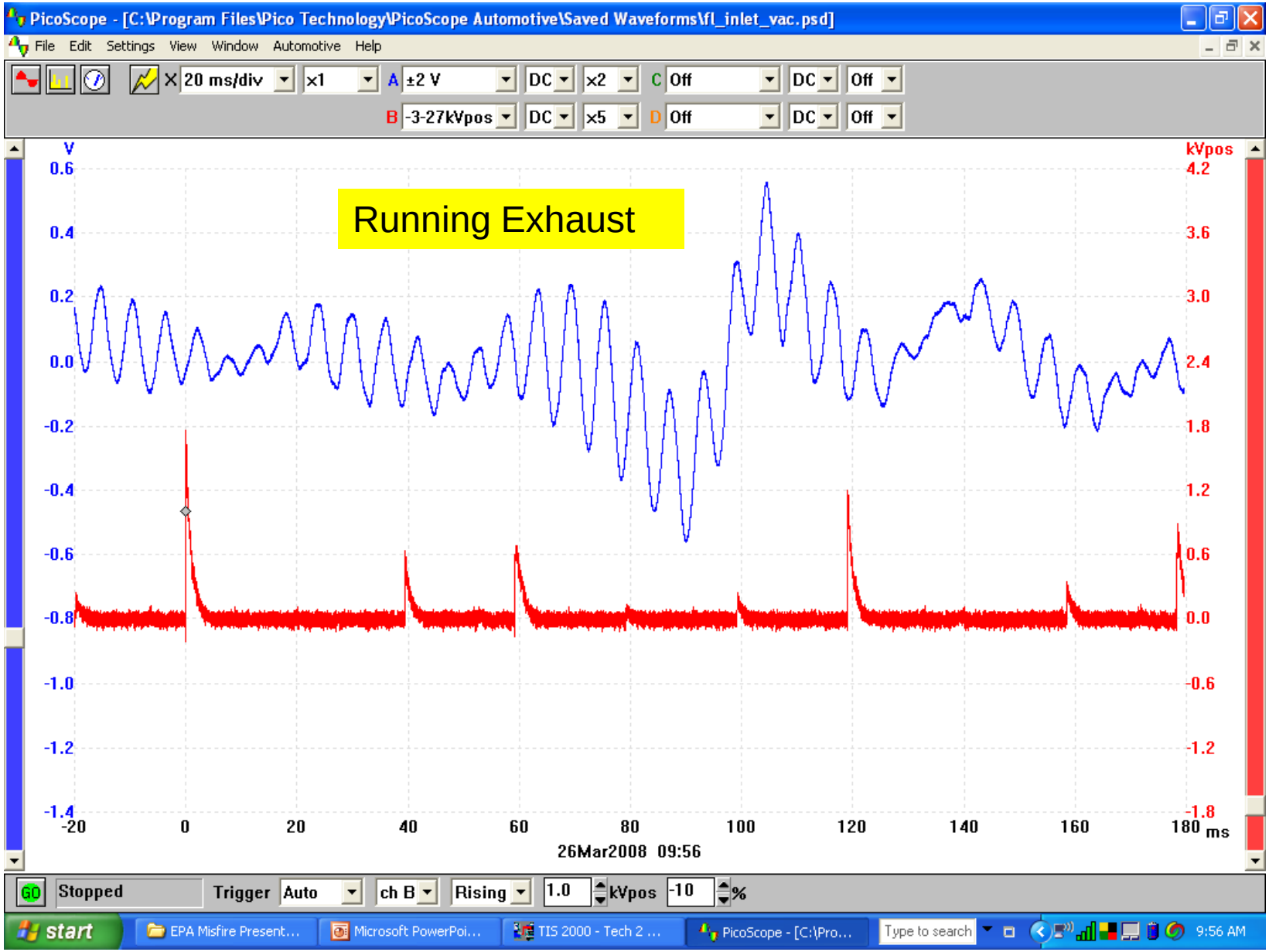
Engine Mechanical Analysis


A.C.E. Detective Version - 2.1.7 - Patent Number 7,031,828
MECHANIC
START
STOP
Connect Channel A to Exhaust Sensor and insert into tailpipe. (Disable fuel or ignition).
After clicking the START button, you will have approximately 30 seconds to start Cranking the Engine for at least 3 seconds with throttle pedal pressed fully to the floor.
P.M.
Mechanical Integrity
Diagnose Misfire
Vehicle/Engine
Manufacturer GM
Engine ID: 3.8 FWD
Engine Type: V6
Engine Details
Engine Size: 3.8
Firing Order: 1-6-5-4-3-2
Spark Dist.: D.I.S.
Optional Car/Customer Info
Year: 1997
Make: BUICK
Model: Park Av
VIN #:
Customer: Research
Mileage: 122646
Comment:
This was research purposes for the misfire analysis class
Sample
Note:
DIAGNOSIS:
Did not gather enough data to diagnose
RECOMMENDATIONS:
2 4 6
1 3 5
Front of Vehicle
Engine Mechanical is suspect
Mechanical
start
EPA Misfire Present...
Microsoft PowerPoi...
A.C.E. Detective V...
TIS 2000 - Tech 2 ...
Type to search
9:24 AM


PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\fl_inlet_vac.psd]
File Edit Settings View Window Automotive Help
100 ms/div x1 A ±20 V DC x5 C Off DC Off
B -3-27kVpos DC x5 D Off DC Off
Cranking Vacuum
V
kVpos
4.0 3.2 2.4 1.6 0.8 0.0 -0.8 -1.6 -2.4 -3.2 -4.0
5.4 4.8 4.2 3.6 3.0 2.4 1.8 1.2 0.6 0.0 -0.6
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 s
26Mar2008 09:45
GO Stopped Trigger None 1.0 kVpos -10 %
start EPA Misfire Present... Microsoft PowerPoi... TIS 2000 - Tech 2 ... PicoScope - [C:\Pro... Type to search 9:47 AM


PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\fl_inlet_vac.psd]
File Edit Settings View Window Automotive Help
X 100 ms/div x1 A ±5 V DC x5 C Off DC Off
B -3-27kVpos DC x5 D Off DC Off
Cranking Exhaust
V
kVpos
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
5.4
4.8
4.2
3.6
3.0
2.4
1.8
1.2
0.6
0.0
-0.6
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 s
26Mar2008 09:39
GO Stopped Trigger None 1.0 kVpos -10 %
start
EPA Misfire Present...
Microsoft PowerPoi...
TIS 2000 - Tech 2 ...
PicoScope - [C:\Pro...
Type to search
9:39 AM

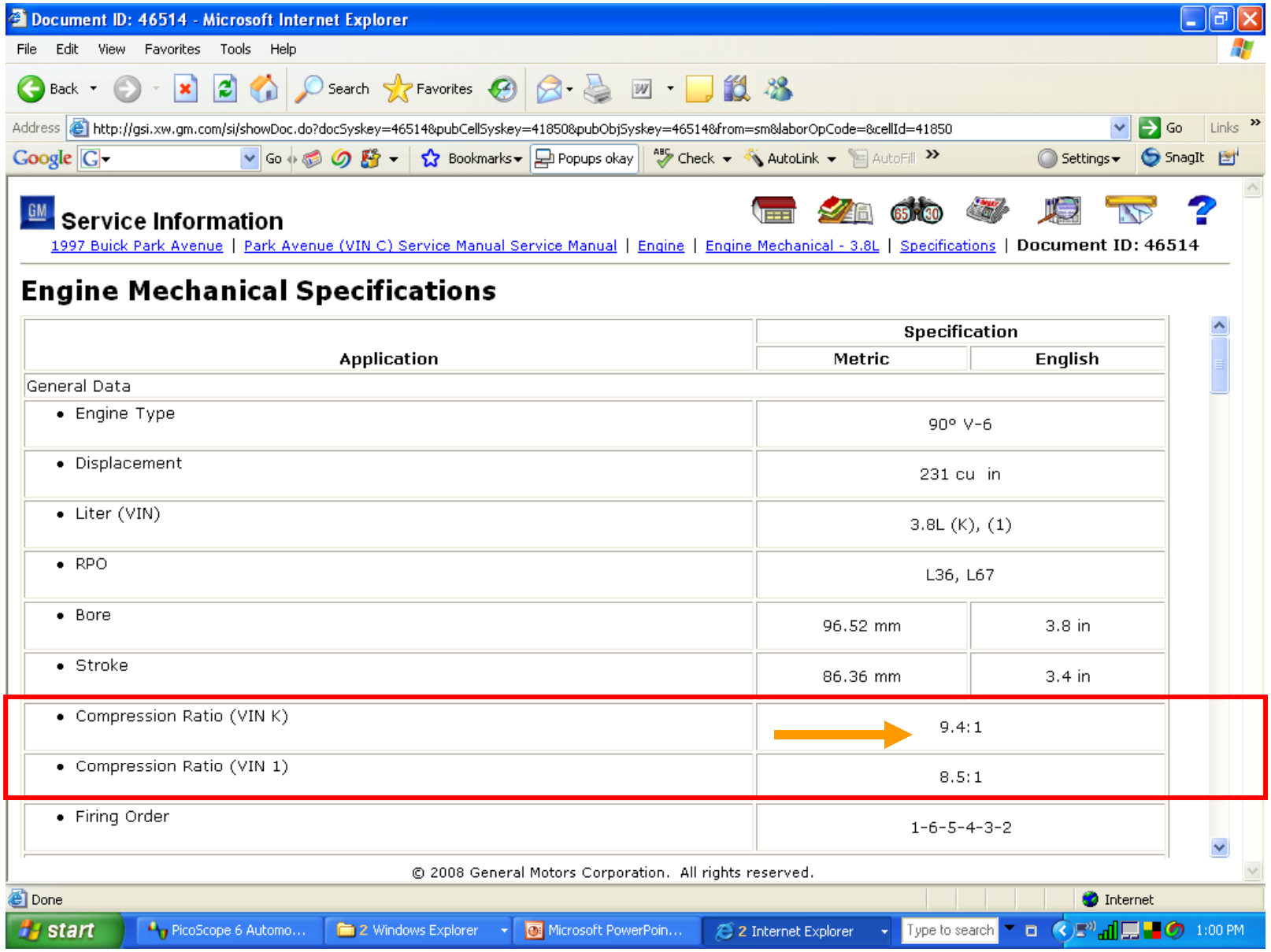

PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\fl_inlet_vac.psd]
File Edit Settings View Window Automotive Help
20 ms/div x1 A ±200 mV DC x2 C Off DC Off
B -3-27kVpos DC x5 D Off DC Off
Running Vacuum
mV
kVpos
60 40 20 0 -20 -40 -60 -80 -100 -120 -140
4.8 4.2 3.6 3.0 2.4 1.8 1.2 0.6 0.0 -0.6 -1.2
-20 0 20 40 60 80 100 120 140 160 180 ms
26Mar2008 09:53
GO Stopped Trigger Auto ch B Rising 1.0 kVpos -10 %
start
EPA Misfire Present...
Microsoft PowerPoi...
TIS 2000 - Tech 2 ...
PicoScope - [C:\Pro...
Type to search
9:53 AM


PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\fl_inlet_vac.psd]
File Edit Settings View Window Automotive Help
20 ms/div
A ±2 V
B -3-27kVpos
C Off
D Off
Running Exhaust
V
kVpos
26Mar2008 09:56
ms
Stopped
Trigger Auto
ch B Rising
1.0 kVpos
-10 %
start
EPA Misfire Present...
Microsoft PowerPoi...
TIS 2000 - Tech 2 ...
PicoScope - [C:\Pro...
Type to search
9:56 AM

1997 Buick Park Av

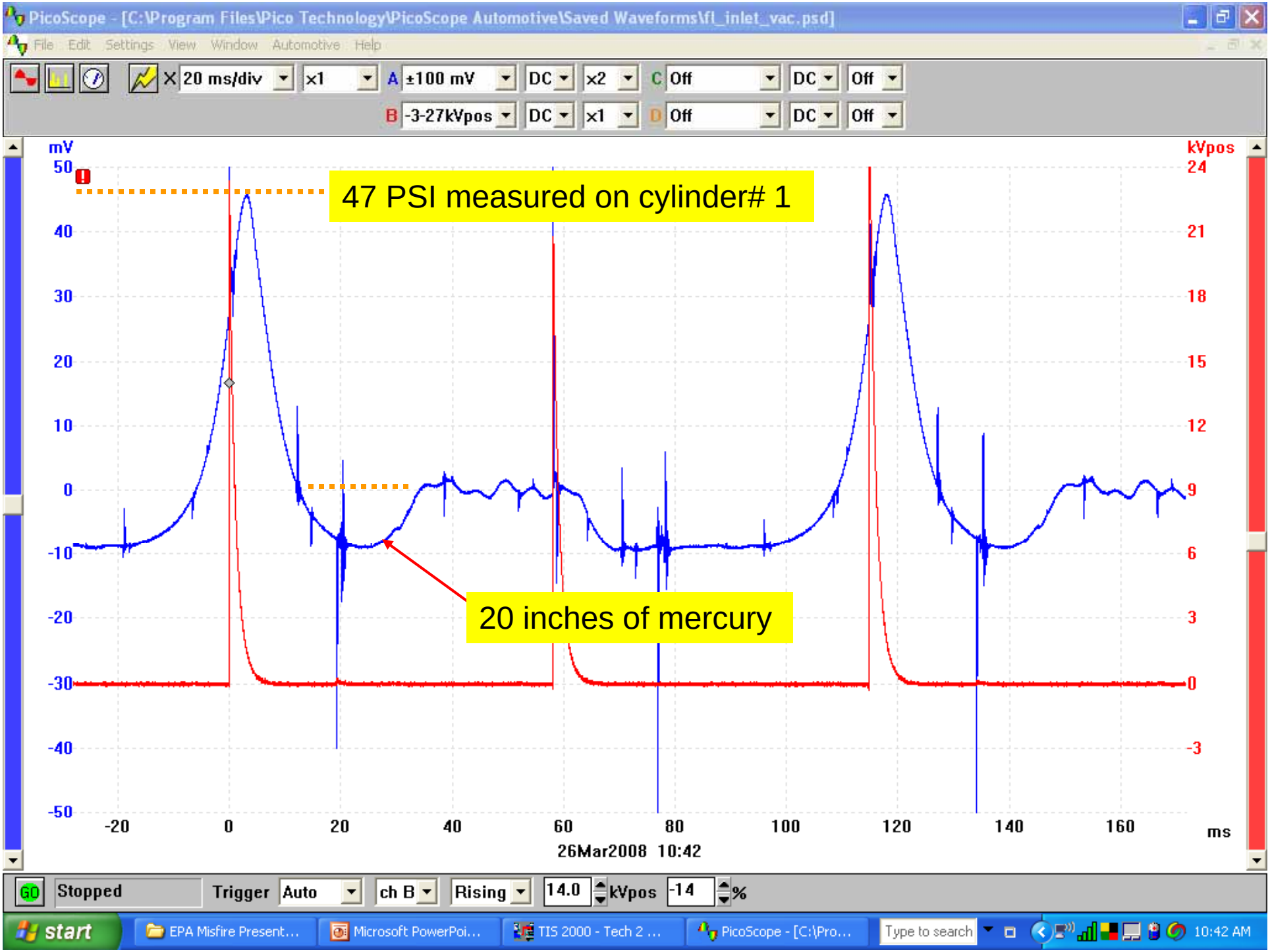
- This vehicle will need a pressure waveform analysis performed
- The information recorded stills points to a mechanical condition on this engine
- There is also concern on the negative going fuel trims

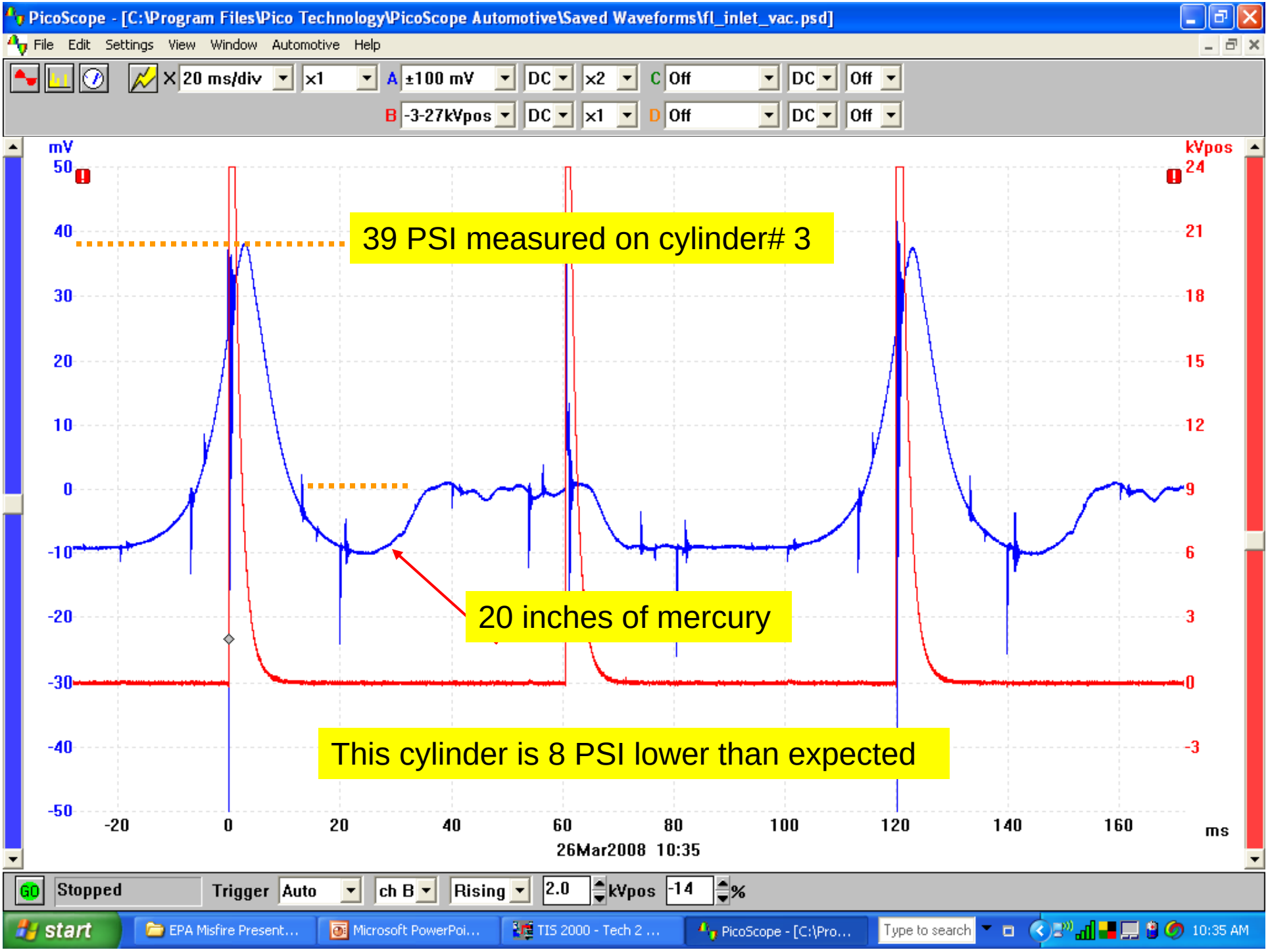
Transducer for Mechanical Testing


Document ID: 46514 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://gsi.xw.gm.com/si/showDoc.do?docSyskey=46514&pubCellSyskey=41850&pubObjSyskey=46514&from=sm&laborOpCode=&cellId=41850
Go Links
Google Go Bookmarks Popups okay Check AutoLink AutoFill Settings SnagIt
Service Information
1997 Buick Park Avenue | Park Avenue (VIN C) Service Manual Service Manual | Engine | Engine Mechanical - 3.8L | Specifications | Document ID: 46514
Engine Mechanical Specifications
Application
Specification
Metric
English
General Data
• Engine Type
90° V-6
• Displacement
231 cu in
• Liter (VIN)
3.8L (K), (1)
• RPO
L36, L67
• Bore
96.52 mm
3.8 in
• Stroke
86.36 mm
3.4 in
• Compression Ratio (VIN K)
9.4:1
• Compression Ratio (VIN 1)
8.5:1
• Firing Order
1-6-5-4-3-2
© 2008 General Motors Corporation. All rights reserved.
Done
Internet
start
PicoScope 6 Automo...
2 Windows Explorer
Microsoft PowerPoin...
2 Internet Explorer
Type to search
1:00 PM

1997 Buick Park Av

- There is about 5 PSI in the manifold with the engine running
- The amount of pressure in the cylinder is equal to 9.4 x 5 PSI = 47 PSI
- This is the amount of pressure that should be observed with the engine running

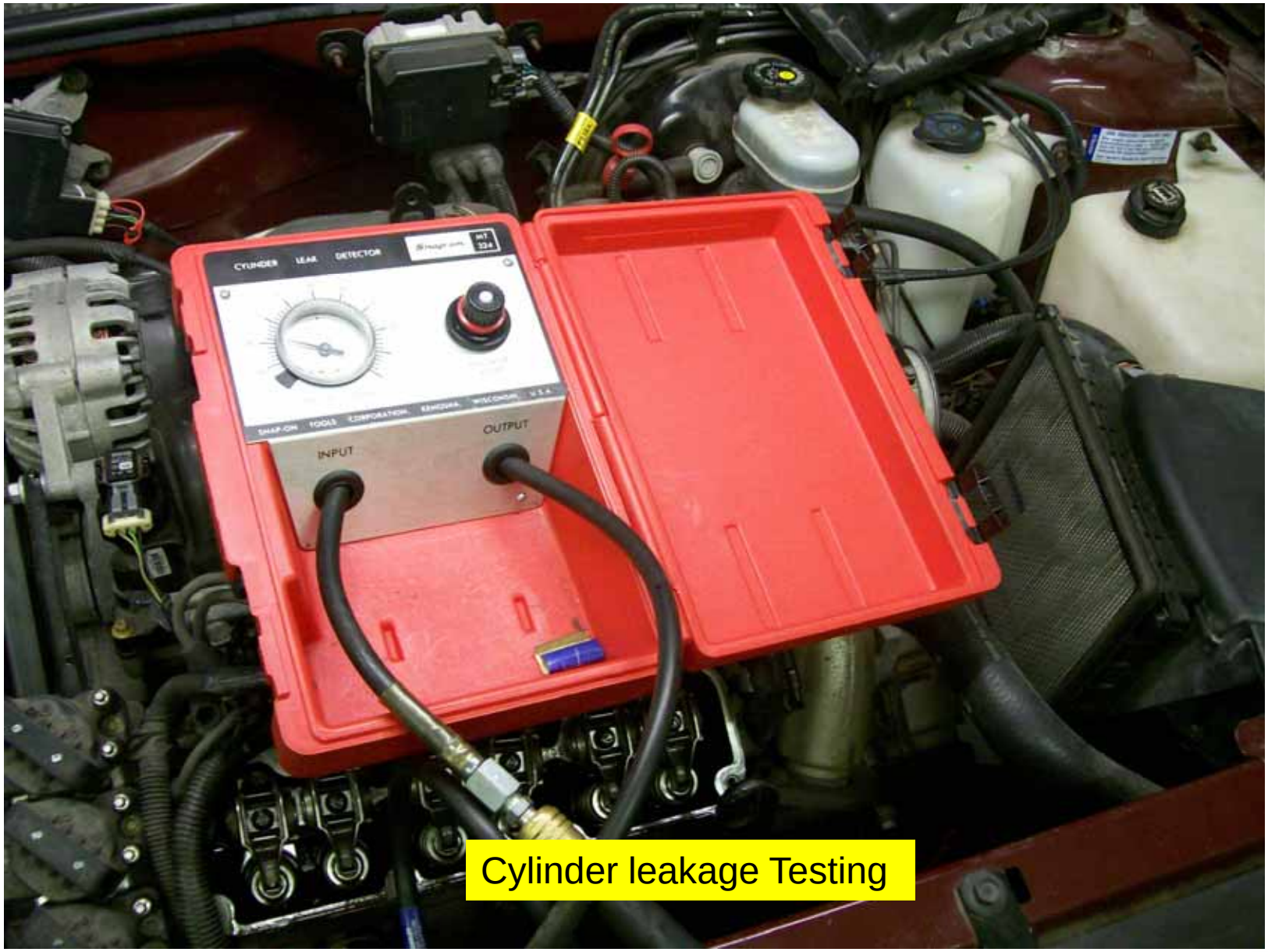

PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\fl_inlet_vac.psd]
File Edit Settings View Window Automotive Help
X 20 ms/div x1 A ±100 mV DC x2 C Off DC Off
B -3-27kVpos DC x1 D Off DC Off
mV
kVpos
47 PSI measured on cylinder# 1
20 inches of mercury
50 40 30 20 10 0 -10 -20 -30 -40 -50
24 21 18 15 12 9 6 3 0 -3
-20 0 20 40 60 80 100 120 140 160 ms
26Mar2008 10:42
GO Stopped Trigger Auto ch B Rising 14.0 kVpos -14 %
start
EPA Misfire Present...
Microsoft PowerPoi...
TIS 2000 - Tech 2 ...
PicoScope - [C:\Pro...
Type to search
10:42 AM


PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\fl_inlet_vac.psd]
File Edit Settings View Window Automotive Help
X 20 ms/div x1 A ±100 mV DC x2 C Off DC Off
B -3-27kVpos DC x1 D Off DC Off
mV
kVpos
39 PSI measured on cylinder# 3
20 inches of mercury
This cylinder is 8 PSI lower than expected
ms
26Mar2008 10:35
Stopped Trigger Auto ch B Rising 2.0 kVpos -14 %
start
EPA Misfire Present...
Microsoft PowerPoi...
TIS 2000 - Tech 2 ...
PicoScope - [C:\Pro...
Type to search
10:35 AM

1997 Buick Park Av

- There are several possible suspects that may could cause this issue:
  - Valve issues
  - Piston issues

Conventional Test Procedure



Cylinder leakage Testing


Snap-on
50
60
40
70
30
80
20
90
10
100
0
Snap-on
DO NOT
EXCEED
60 PSI
KENOSHA, WI, U.S.A.
76% Leakage was noted


675 CCA
230
POISON
VideoStik
Let's use the video stik


Let’s go in and take a look

1997 Buick Park Av Summary

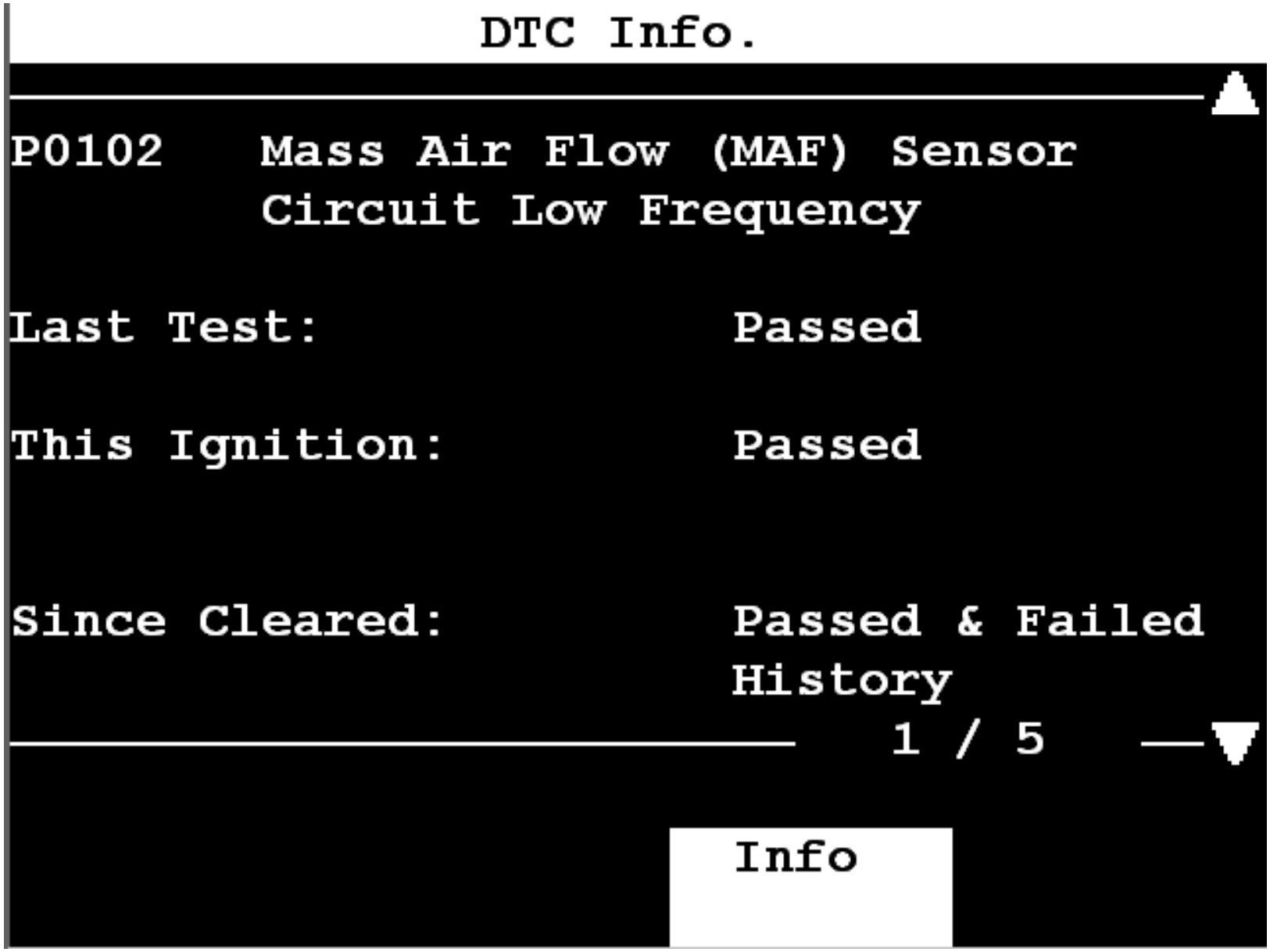
- A visual inspection of the cylinder revealed that the top of the cylinder piston head was cracked, thereby leading to a slight loss in compression as witnessed by the pressure waveform.

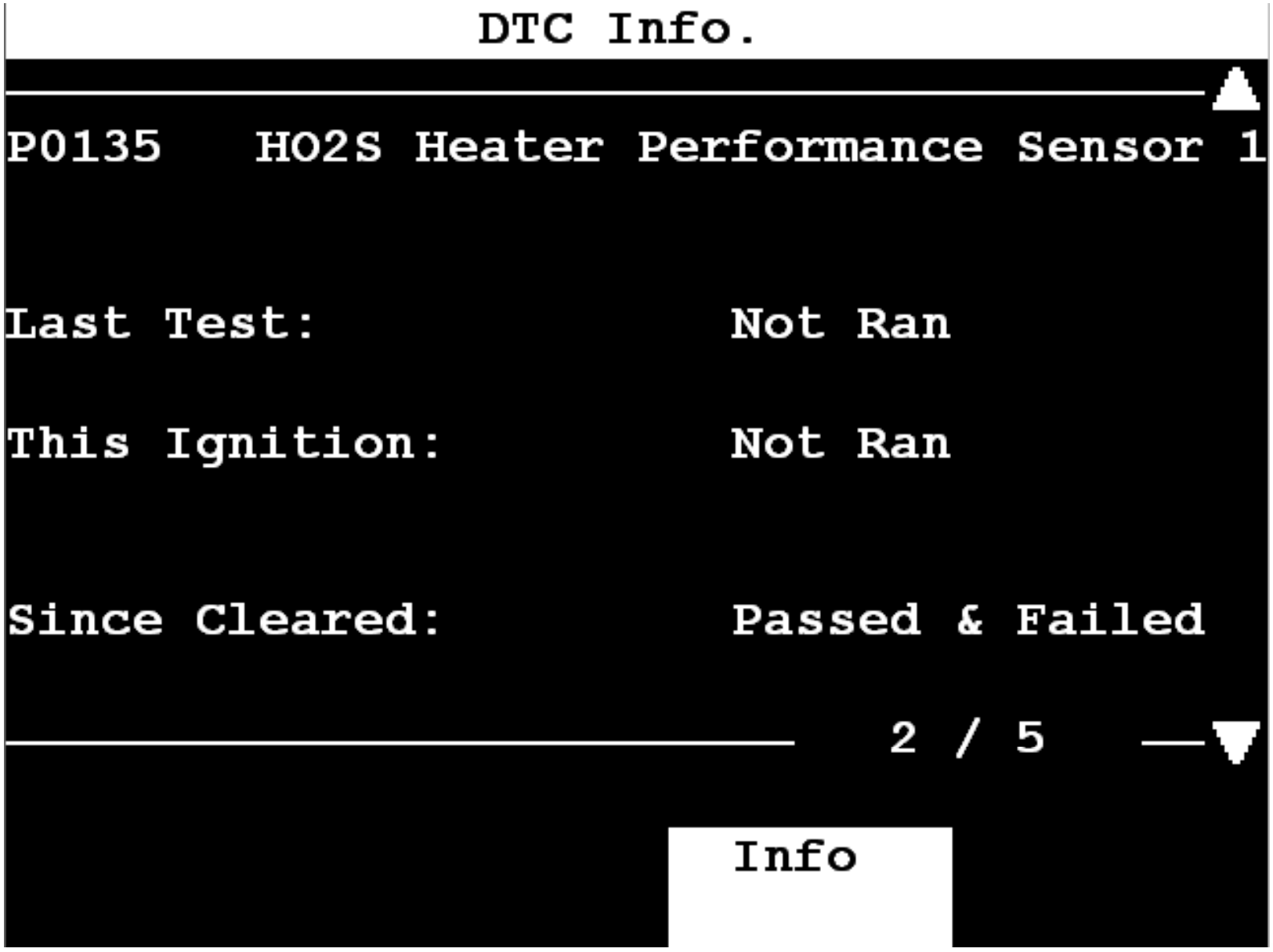
Case Study #2

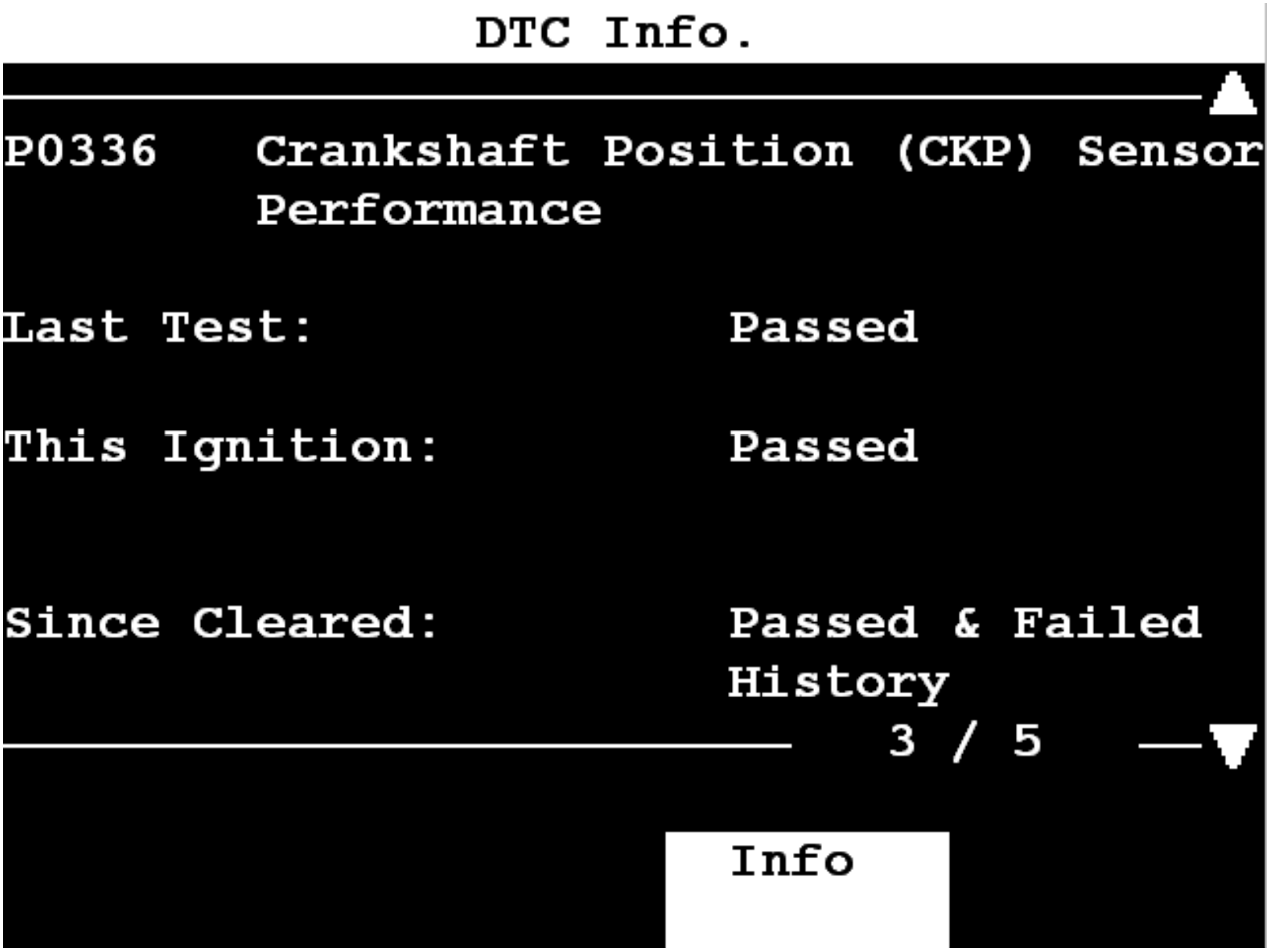
1998 Pontiac Grand Prix

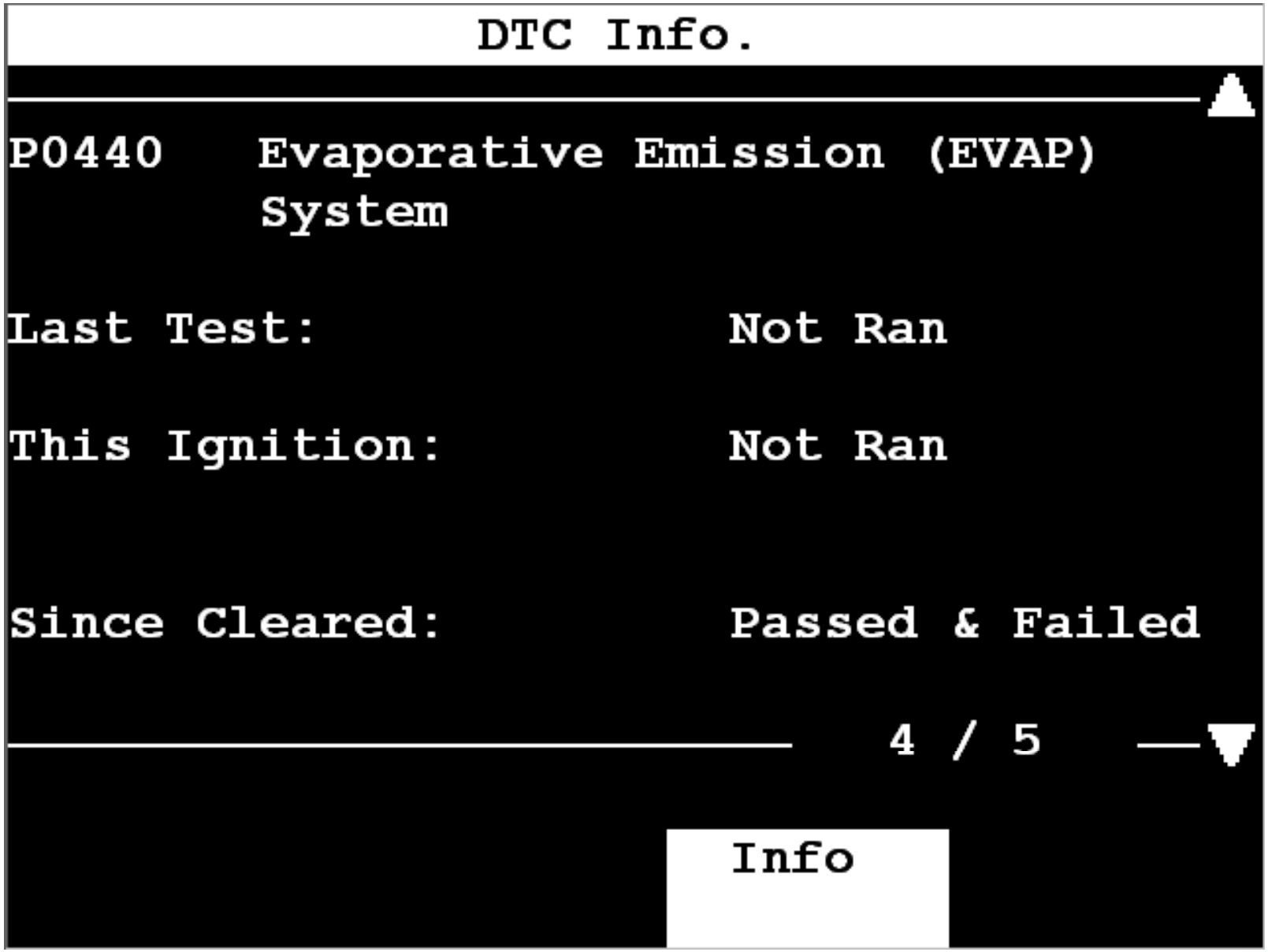
1998 Pontiac Grand Prix

- This vehicle has misfire activity once the engine warms up
- The spark plugs and wires have been replaced
- The crank sensor has been replaced


DTC Info.
P0102 Mass Air Flow (MAF) Sensor Circuit Low Frequency
Last Test: Passed
This Ignition: Passed
Since Cleared: Passed & Failed History
1 / 5
Info


DTC Info.
P0135 HO2S Heater Performance Sensor 1
Last Test: Not Ran
This Ignition: Not Ran
Since Cleared: Passed & Failed
2 / 5
Info


DTC Info.
P0336 Crankshaft Position (CKP) Sensor Performance
Last Test: Passed
This Ignition: Passed
Since Cleared: Passed & Failed History
3 / 5
Info


DTC Info.
P0440 Evaporative Emission (EVAP) System
Last Test: Not Ran
This Ignition: Not Ran
Since Cleared: Passed & Failed
4 / 5
Info

DTC Info.

P0442 Evaporative Emission (EVAP)
System Small Leak Detected

Last Test: Not Ran

This Ignition: Not Ran

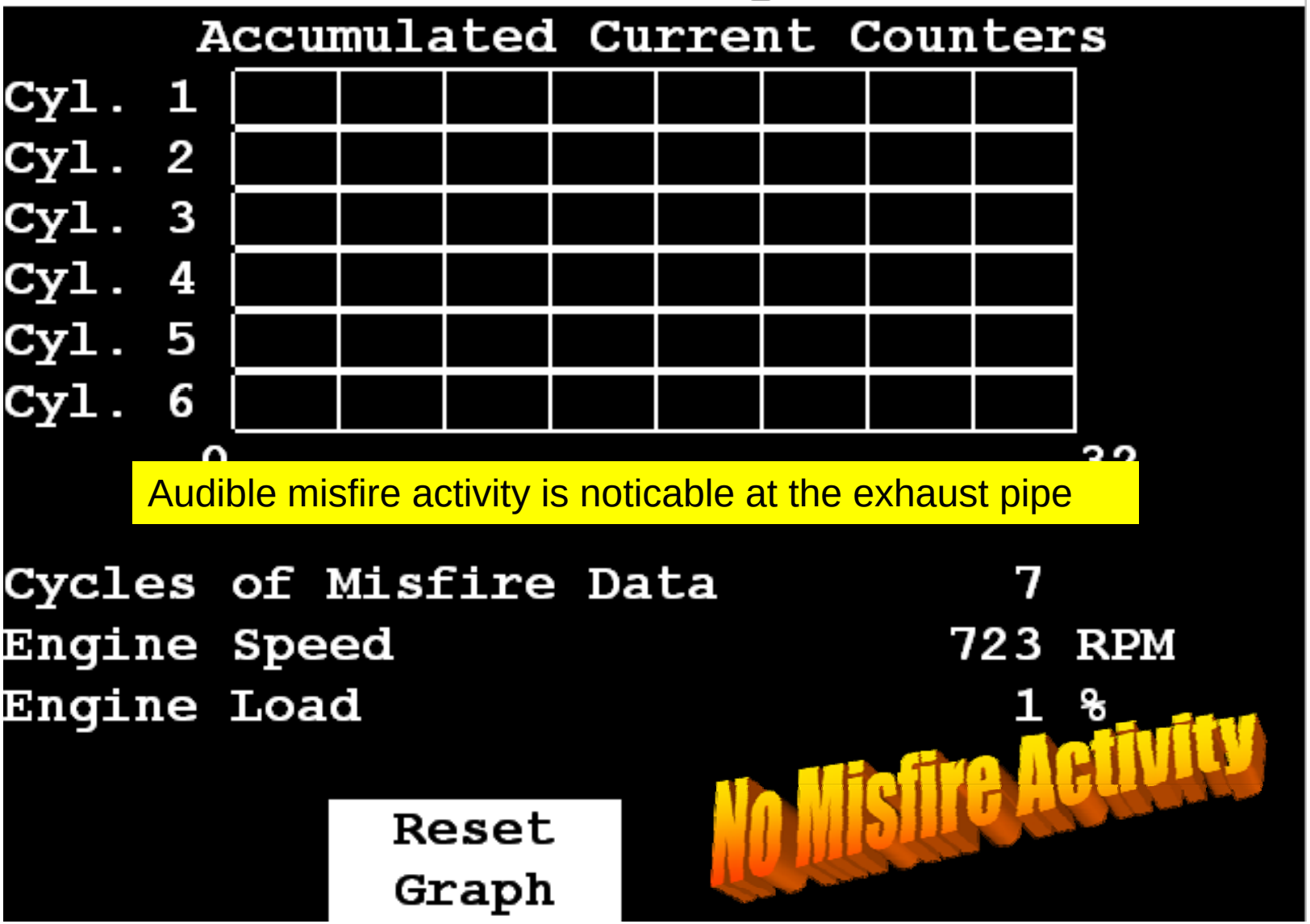
Since Cleared: Passed & Failed
History

5 / 5

No Misfire Codes

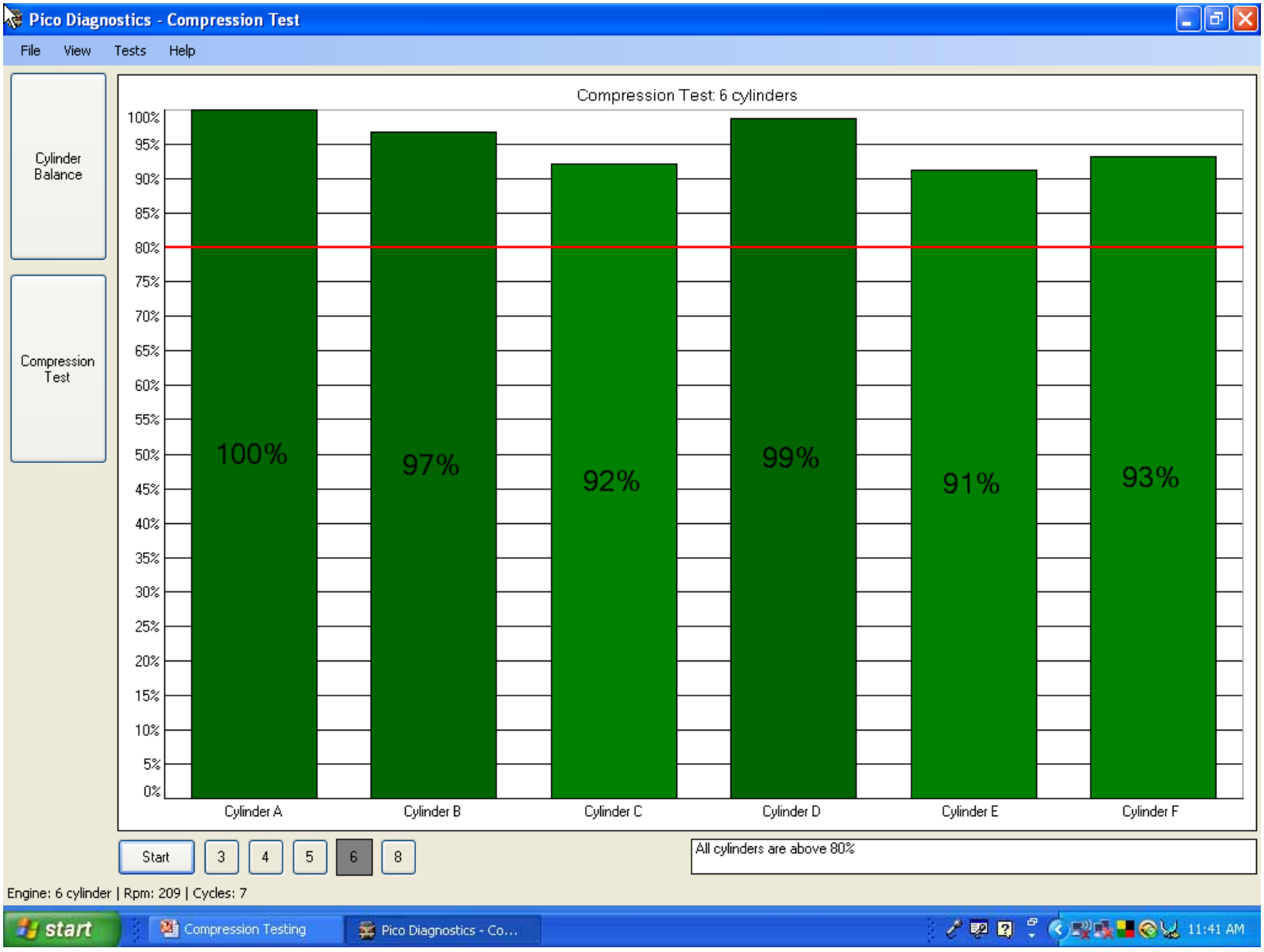
Info

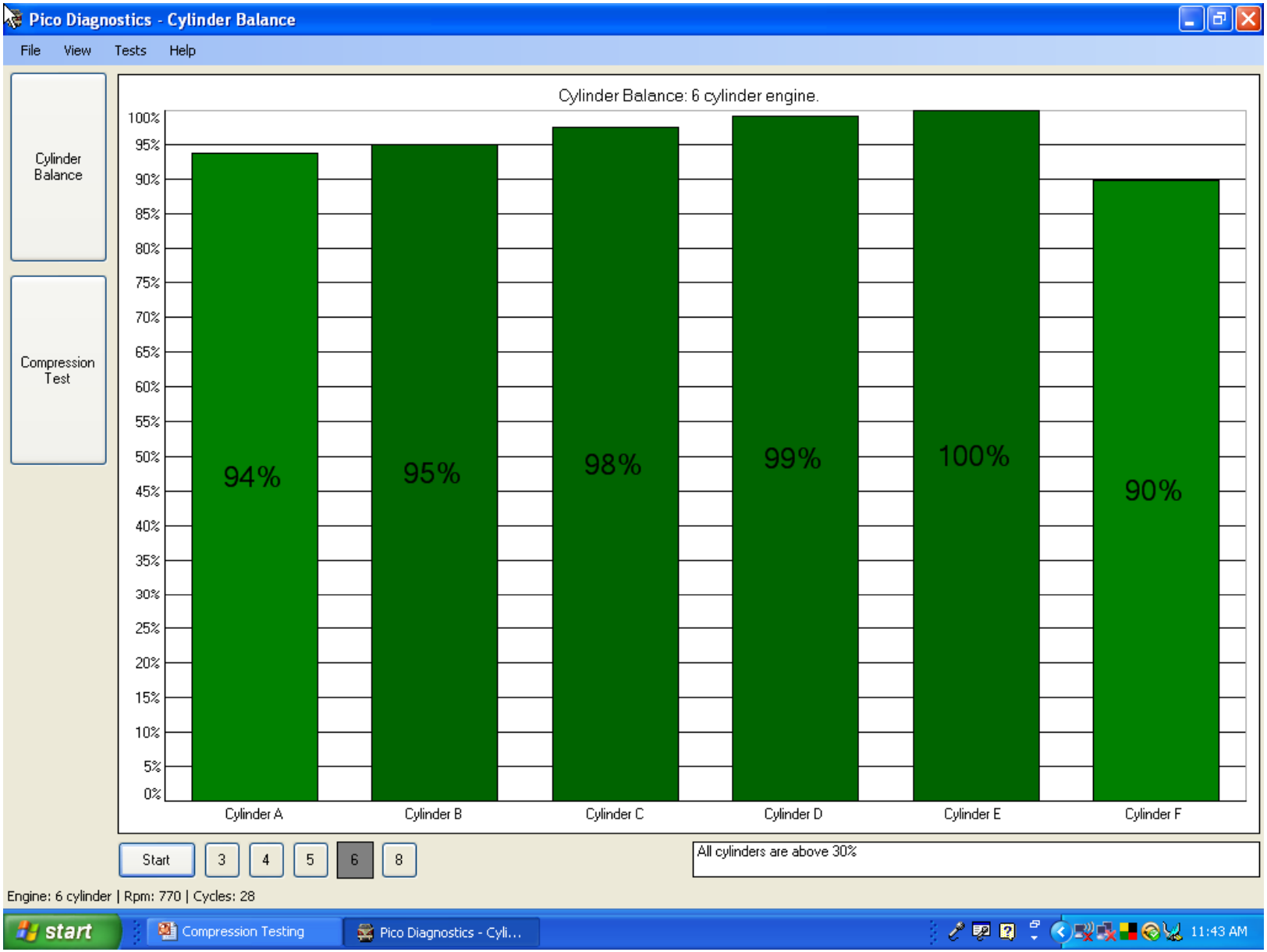
Misfire Graphic



PICO Diagnostics

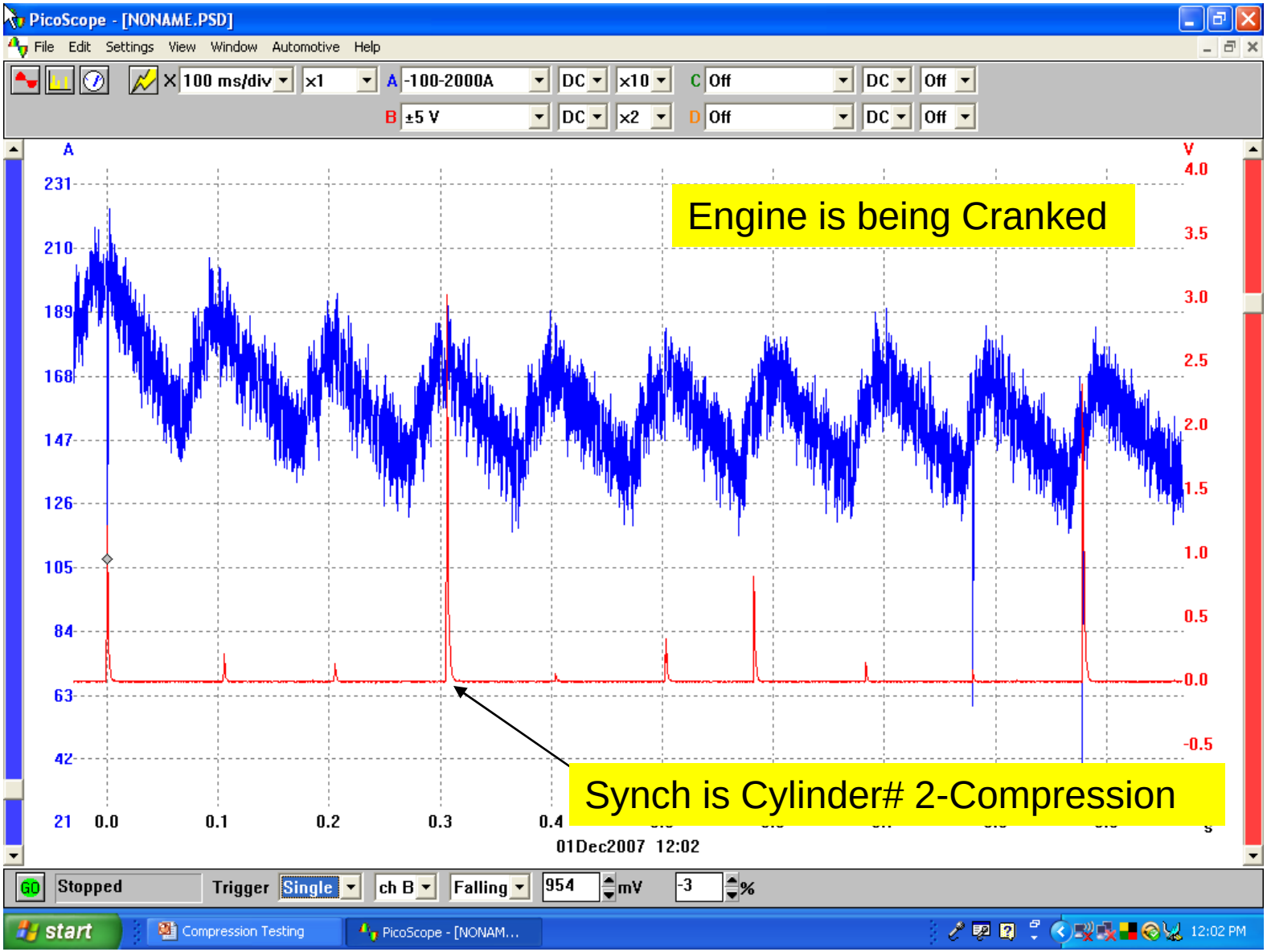
Relative Compression


Pico Diagnostics - Compression Test
File
View
Tests
Help
Cylinder Balance
Compression Test
Compression Test: 6 cylinders
100%
95%
90%
85%
80%
75%
70%
65%
60%
55%
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
100%
97%
92%
99%
91%
93%
Cylinder A
Cylinder B
Cylinder C
Cylinder D
Cylinder E
Cylinder F
Start
3
4
5
6
8
All cylinders are above 80%
Engine: 6 cylinder | Rpm: 209 | Cycles: 7
start
Compression Testing
Pico Diagnostics - Co...
11:41 AM

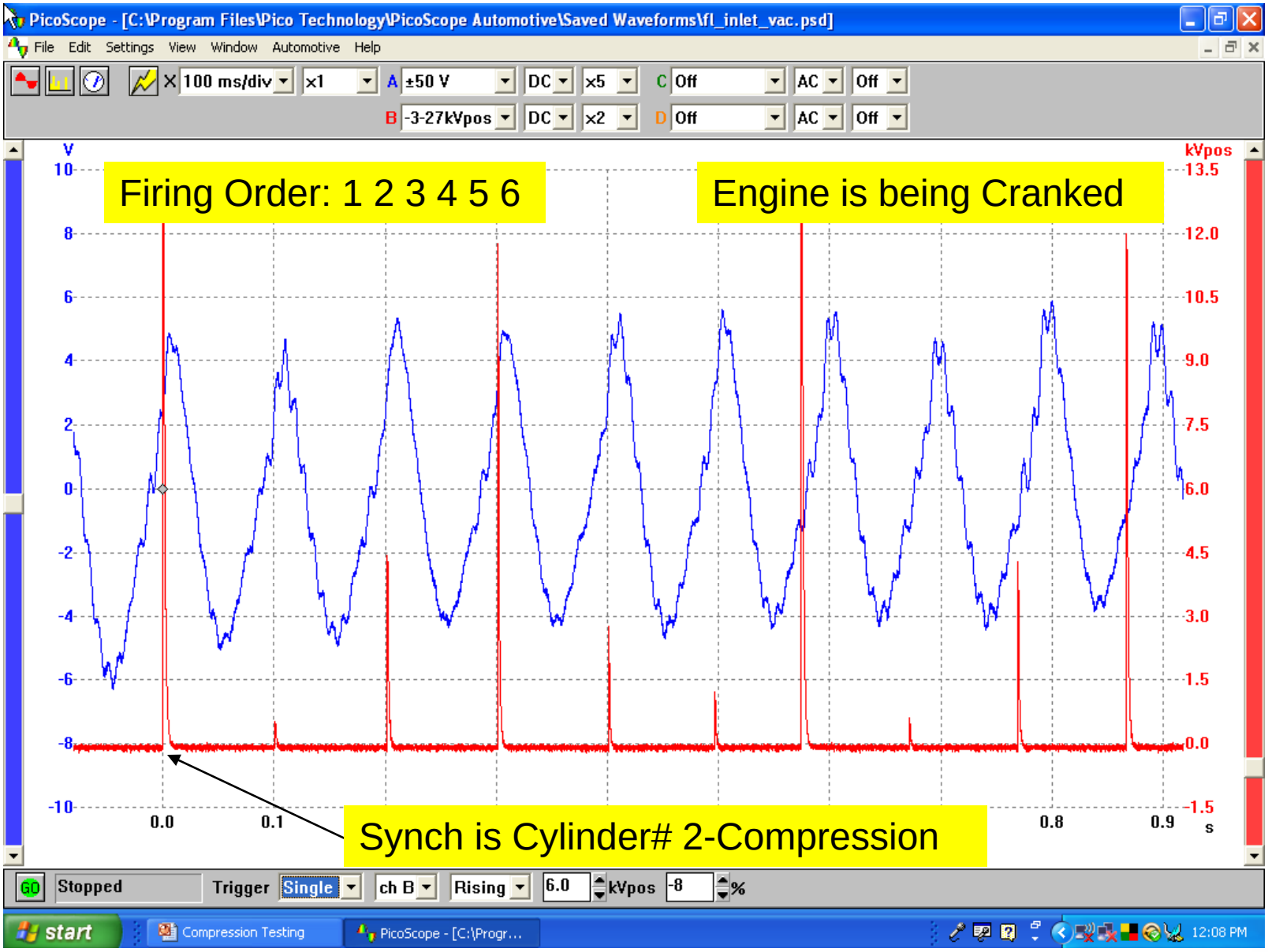

Pico Diagnostics - Cylinder Balance
File
View
Tests
Help
Cylinder Balance
Compression Test
Cylinder Balance: 6 cylinder engine.
100%
95%
90%
85%
80%
75%
70%
65%
60%
55%
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
94%
95%
98%
99%
100%
90%
Cylinder A
Cylinder B
Cylinder C
Cylinder D
Cylinder E
Cylinder F
Start
3
4
5
6
8
All cylinders are above 30%
Engine: 6 cylinder | Rpm: 770 | Cycles: 28
start
Compression Testing
Pico Diagnostics - Cyli...
11:43 AM

Relative Compression

Labscope

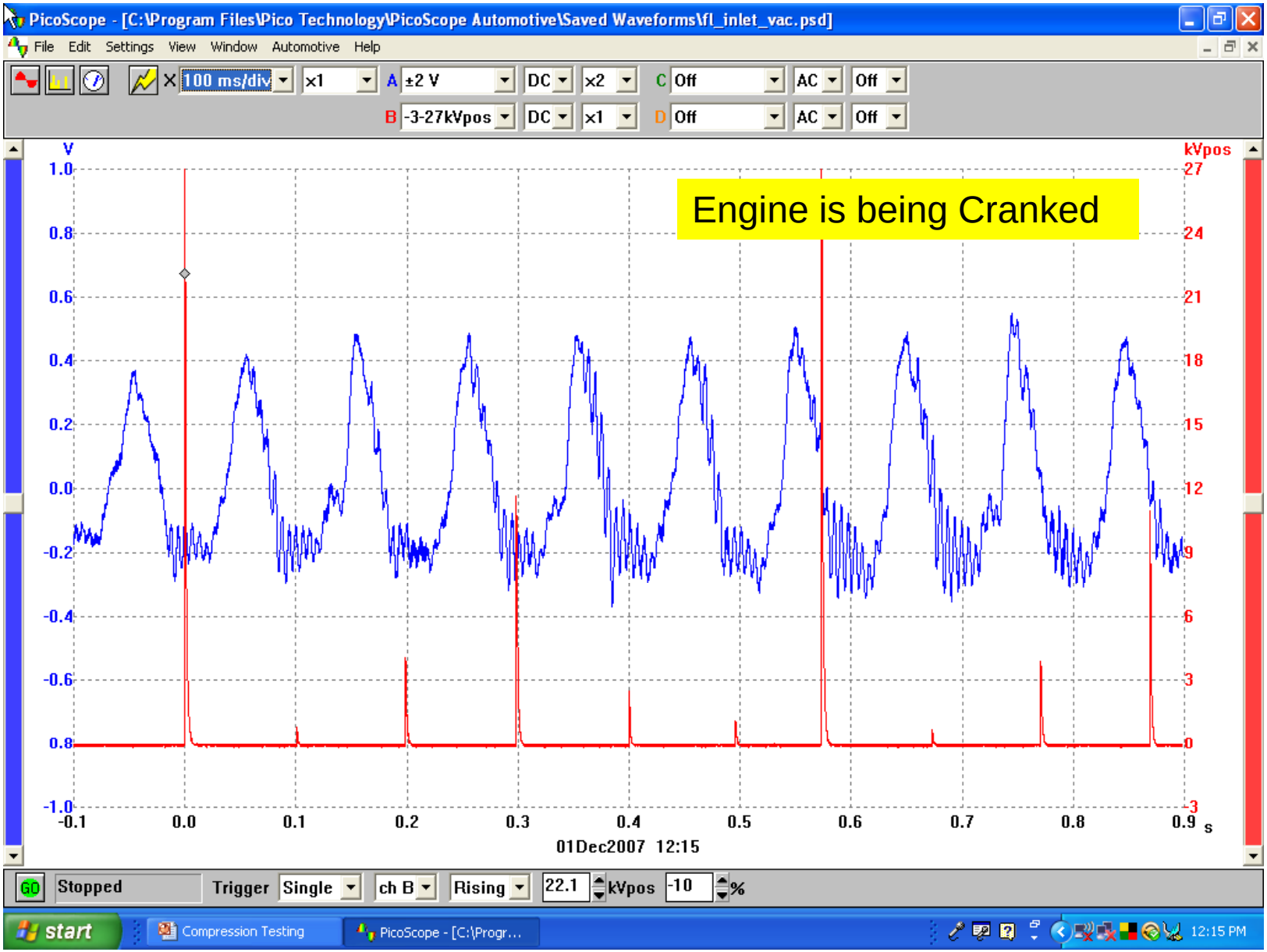

PicoScope - [NONAME.PSD]
File Edit Settings View Window Automotive Help
100 ms/div
A -100-2000A
B ±5 V
C Off
D Off
Engine is being Cranked
Synch is Cylinder# 2-Compression
01Dec2007 12:02
Stopped
Trigger Single
ch B
Falling
954 mV
-3 %
start
Compression Testing
PicoScope - [NONAM...
12:02 PM

Vacuum Waveforms


PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\fl_inlet_vac.psd]
File Edit Settings View Window Automotive Help
100 ms/div x1 A ±50 V DC x5 C Off AC Off
B -3-27kVpos DC x2 D Off AC Off
V
kVpos
Firing Order: 1 2 3 4 5 6
Engine is being Cranked
Synch is Cylinder# 2-Compression
0.0 0.1 0.8 0.9 s
Stopped Trigger Single ch B Rising 6.0 kVpos -8 %
start Compression Testing PicoScope - [C:\Progr... 12:08 PM


PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\fl_inlet_vac.psd]
File Edit Settings View Window Automotive Help
20 ms/div x1 A ±2 V DC x2 C Off AC Off
B -3-27kVpos DC x1 D Off AC Off
Firing Order: 1 2 3 4 5 6
Engine is Running
V
kVpos
0.8 0.6 0.4 0.2 0.0 -0.2 -0.4 -0.6 -0.8 -1.0 -1.2
24 21 18 15 12 9 6 3 0 -3
-20 0 20 40 60 80 100 120 140 160 180 ms
01Dec2007 12:22
Stopped Trigger Auto ch B Rising 14.8 kVpos -10 %
start Compression Testing PicoScope - [C:\Progr... 12:22 PM

Exhaust Waveforms


PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\fl_inlet_vac.psd]
File Edit Settings View Window Automotive Help
100 ms/div
A ±2 V
B -3-27kVpos
C Off
D Off
Engine is being Cranked
V
kVpos
01Dec2007 12:15
Stopped
Trigger Single ch B Rising 22.1 kVpos -10 %
start
Compression Testing
PicoScope - [C:\Progr...
12:15 PM

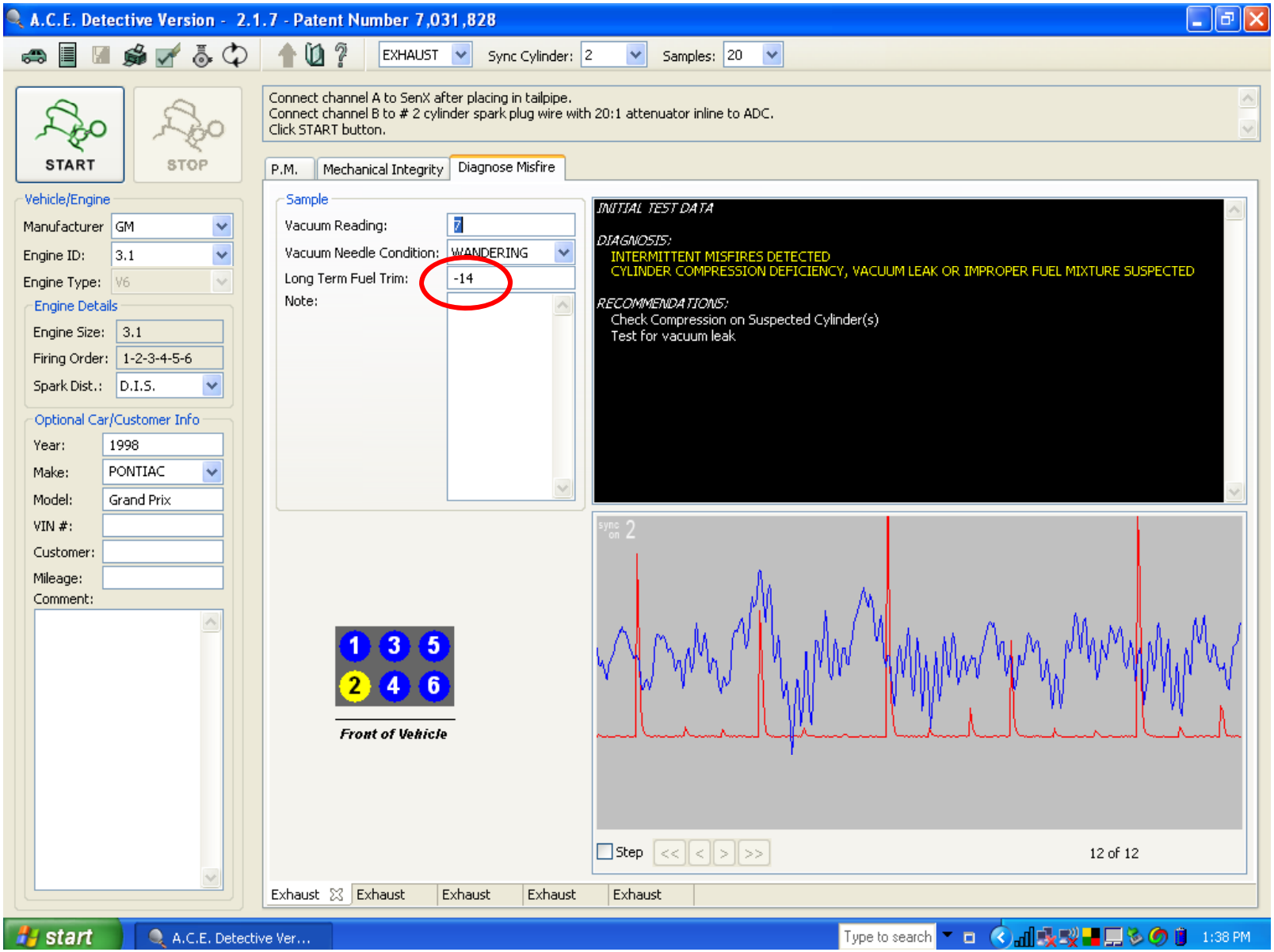

PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\fl_inlet_vac.psd]
File Edit Settings View Window Automotive Help
20 ms/div
A ±2 V
B -3-27kVpos
C Off
D Off
V
kVpos
Engine is Running
Synch on cylinder # 2
01Dec2007 12:19
ms
Stopped
Trigger
Auto
ch B
Rising
11.2
kVpos
-14
%
start
Compression Testing
PicoScope - [C:\Progr...
12:19 PM

Vacuum Levels


Engine Running Vacuum Reading: 7 Inches Mercury
Let’s Smoke the System!

ACE Misfire Software

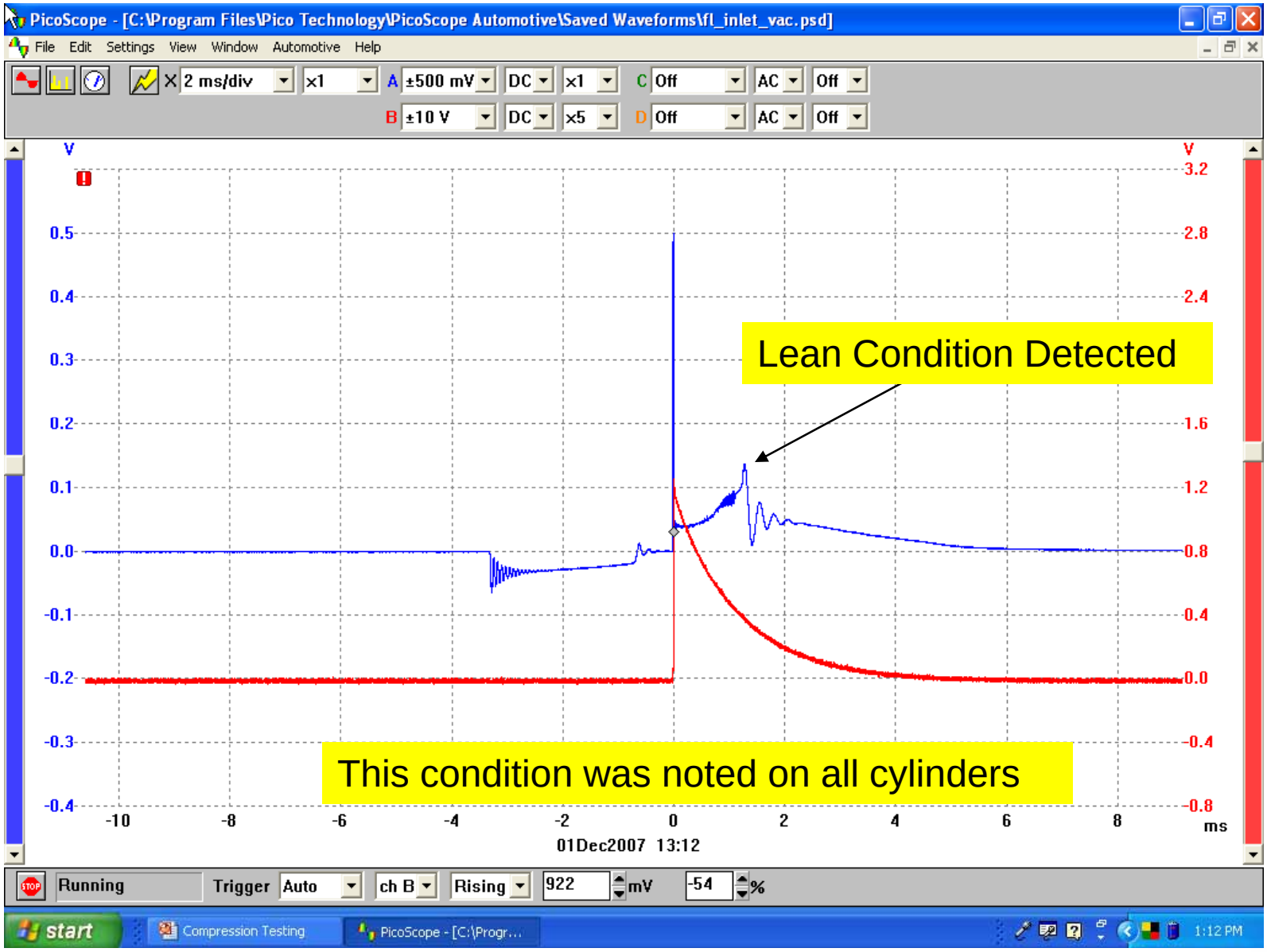
A Double Check


A.C.E. Detective Version - 2.1.7 - Patent Number 7,031,828
EXHAUST
Sync Cylinder: 2
Samples: 20
START
STOP
Connect channel A to SenX after placing in tailpipe.
Connect channel B to # 2 cylinder spark plug wire with 20:1 attenuator inline to ADC.
Click START button.
Vehicle/Engine
Manufacturer GM
Engine ID: 3.1
Engine Type: V6
Engine Details
Engine Size: 3.1
Firing Order: 1-2-3-4-5-6
Spark Dist.: D.I.S.
Optional Car/Customer Info
Year: 1998
Make: PONTIAC
Model: Grand Prix
VIN #:
Customer:
Mileage:
Comment:
P.M.
Mechanical Integrity
Diagnose Misfire
Sample
Vacuum Reading: 7
Vacuum Needle Condition: WANDERING
Long Term Fuel Trim: -14
Note:
INITIAL TEST DATA
DIAGNOSIS:
INTERMITTENT MISFIRES DETECTED
CYLINDER COMPRESSION DEFICIENCY, VACUUM LEAK OR IMPROPER FUEL MIXTURE SUSPECTED
RECOMMENDATIONS:
Check Compression on Suspected Cylinder(s)
Test for vacuum leak
1 3 5
2 4 6
Front of Vehicle
sync on 2
Step
12 of 12
Exhaust
Exhaust
Exhaust
Exhaust
Exhaust
start
A.C.E. Detective Ver...
Type to search
1:38 PM

1998 Pontiac Bonneville

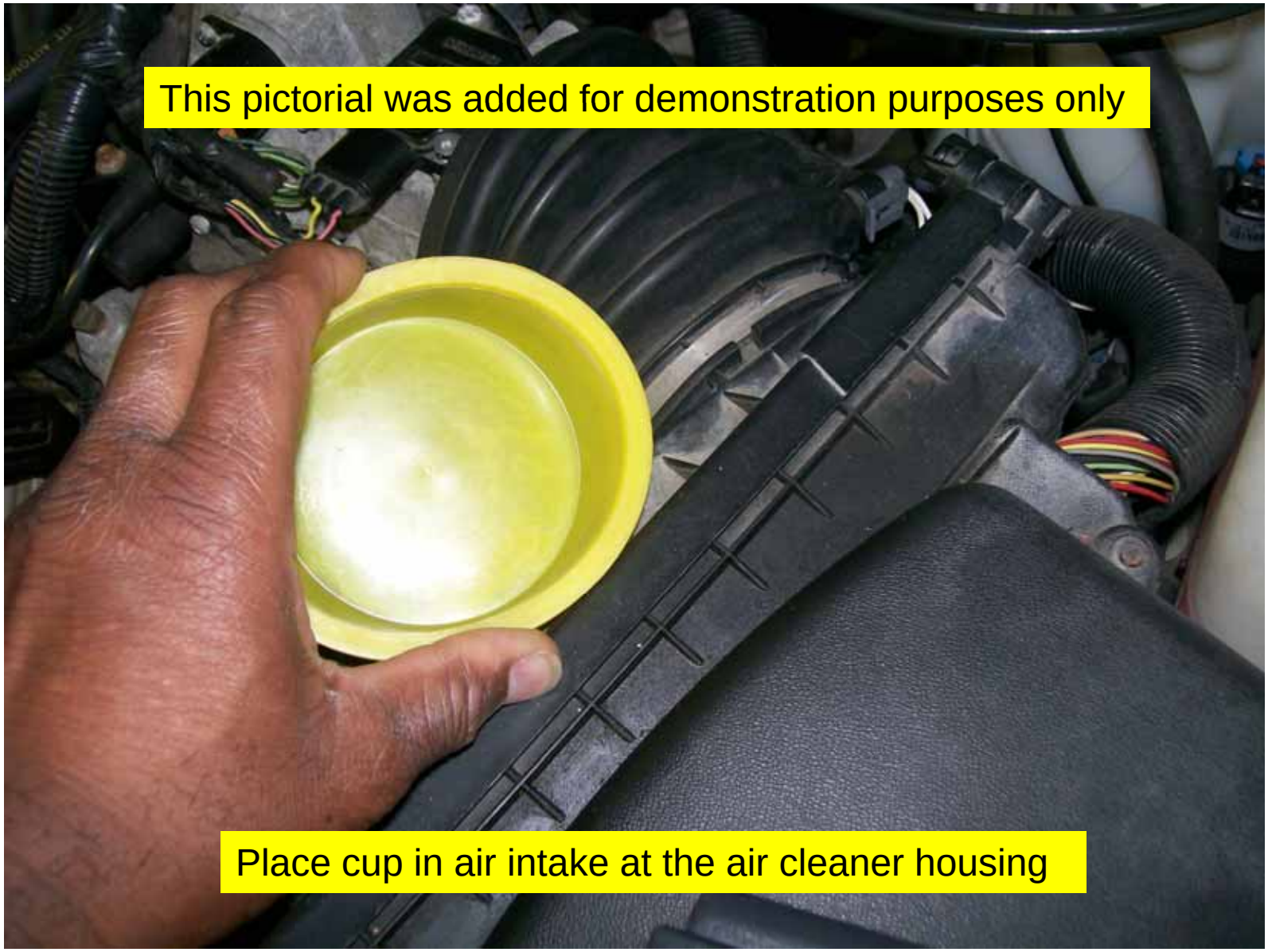
- This misfire activity appears to be mechanical or a vacuum leak issue.

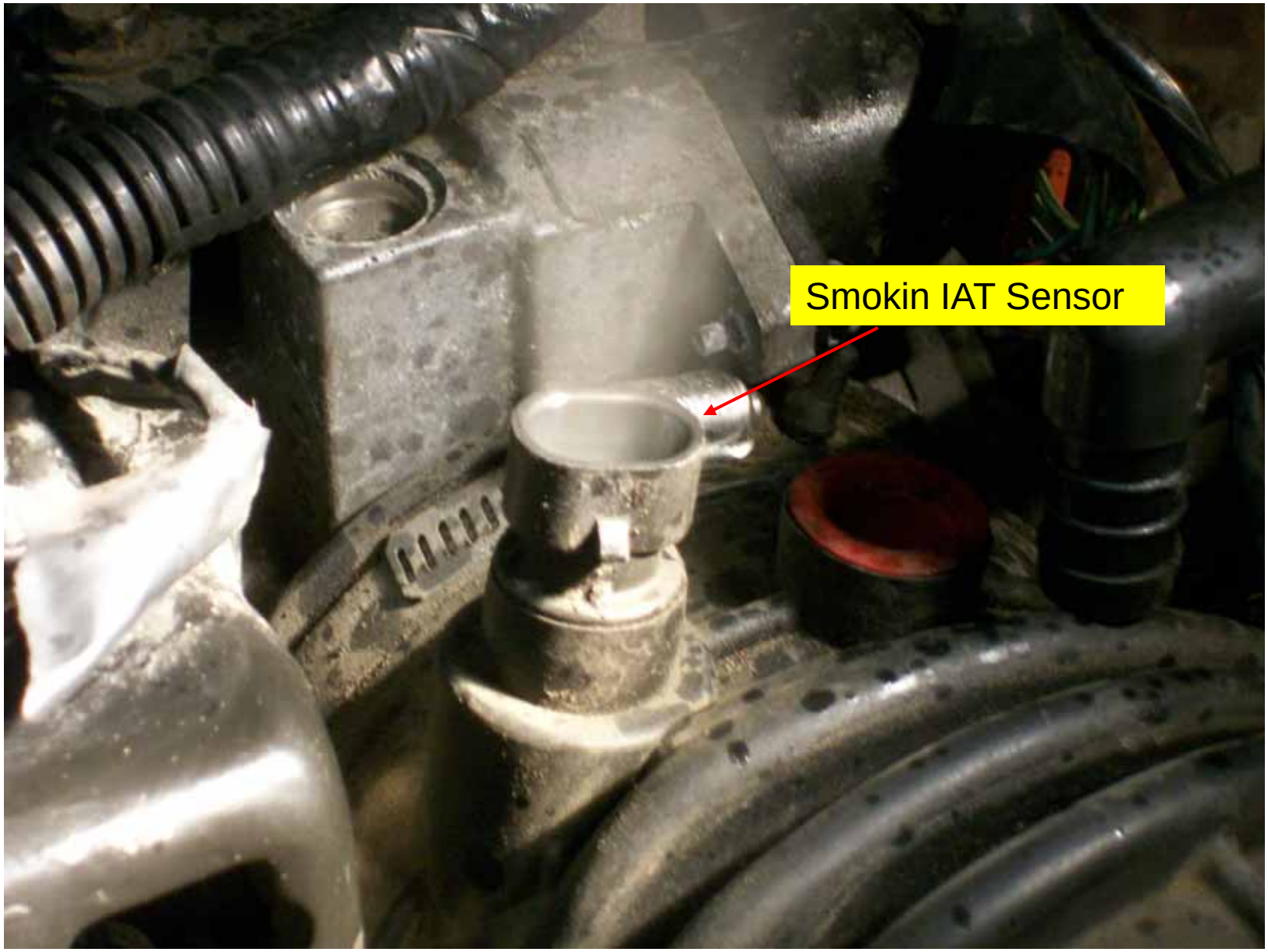
Secondary Ignition Waveforms

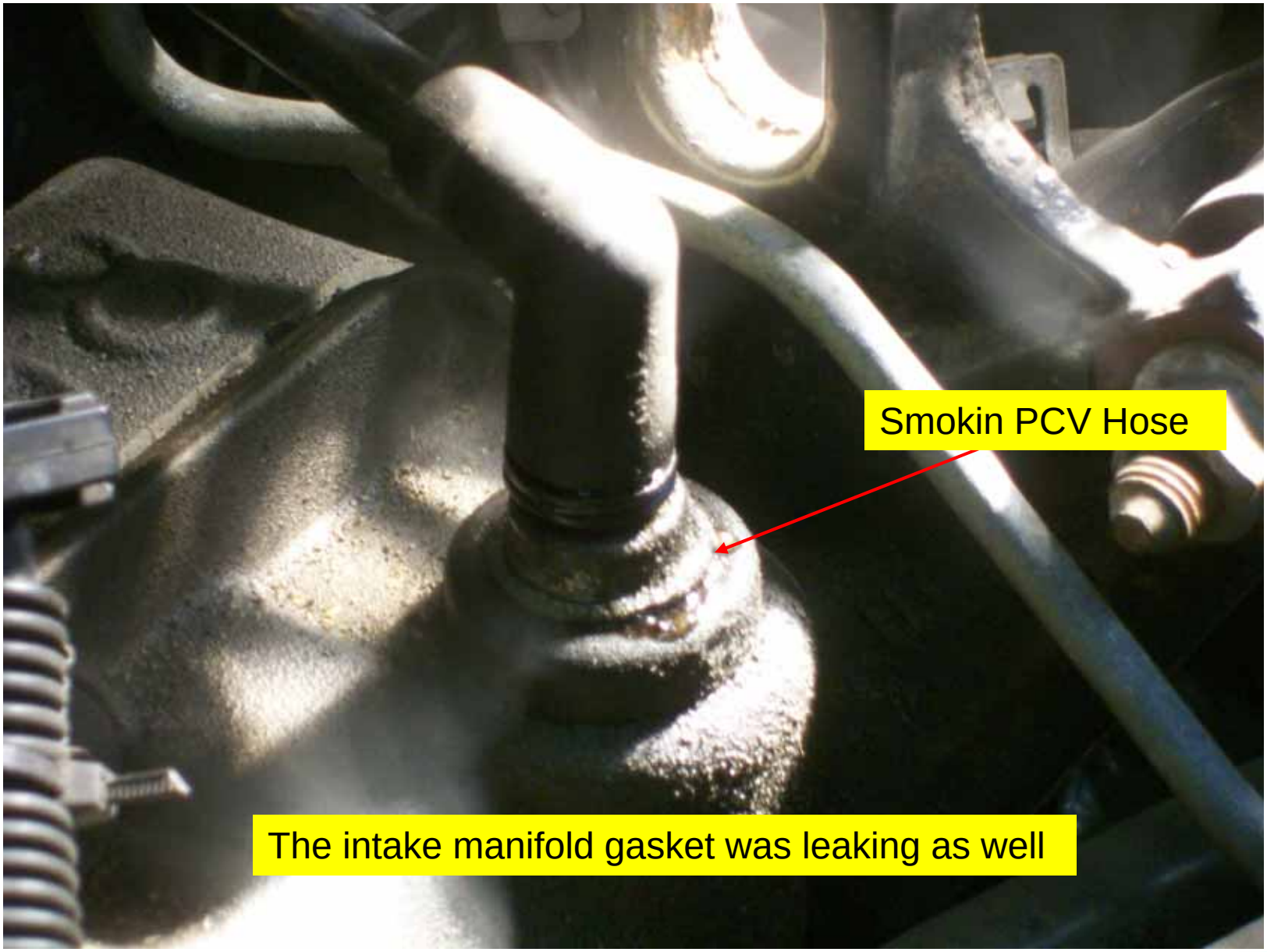

PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\fl_inlet_vac.psd]
File Edit Settings View Window Automotive Help
2 ms/div
A ±500 mV
B ±10 V
Lean Condition Detected
This condition was noted on all cylinders
01Dec2007 13:12
Running
Trigger Auto
ch B Rising
922 mV
-54 %
start
Compression Testing
PicoScope - [C:\Progr...
1:12 PM

1998 Pontiac Grand Prix

- A vacuum cup was placed in the intake at the air cleaner housing
- The system was then smoked for leaks
- A smoke machine should be used anytime vacuum readings are low


This pictorial was added for demonstration purposes only
Place cup in air intake at the air cleaner housing


Smokin IAT Sensor


Smokin PCV Hose
The intake manifold gasket was leaking as well

1998 Pontiac Grand Prix

- The IAT sensor and PCV valve hose assembly were replaced
- The intake manifold gasket was replaced as well
- The vehicle is now operating as designed

Case Study #3

1996 Mercedes Benz

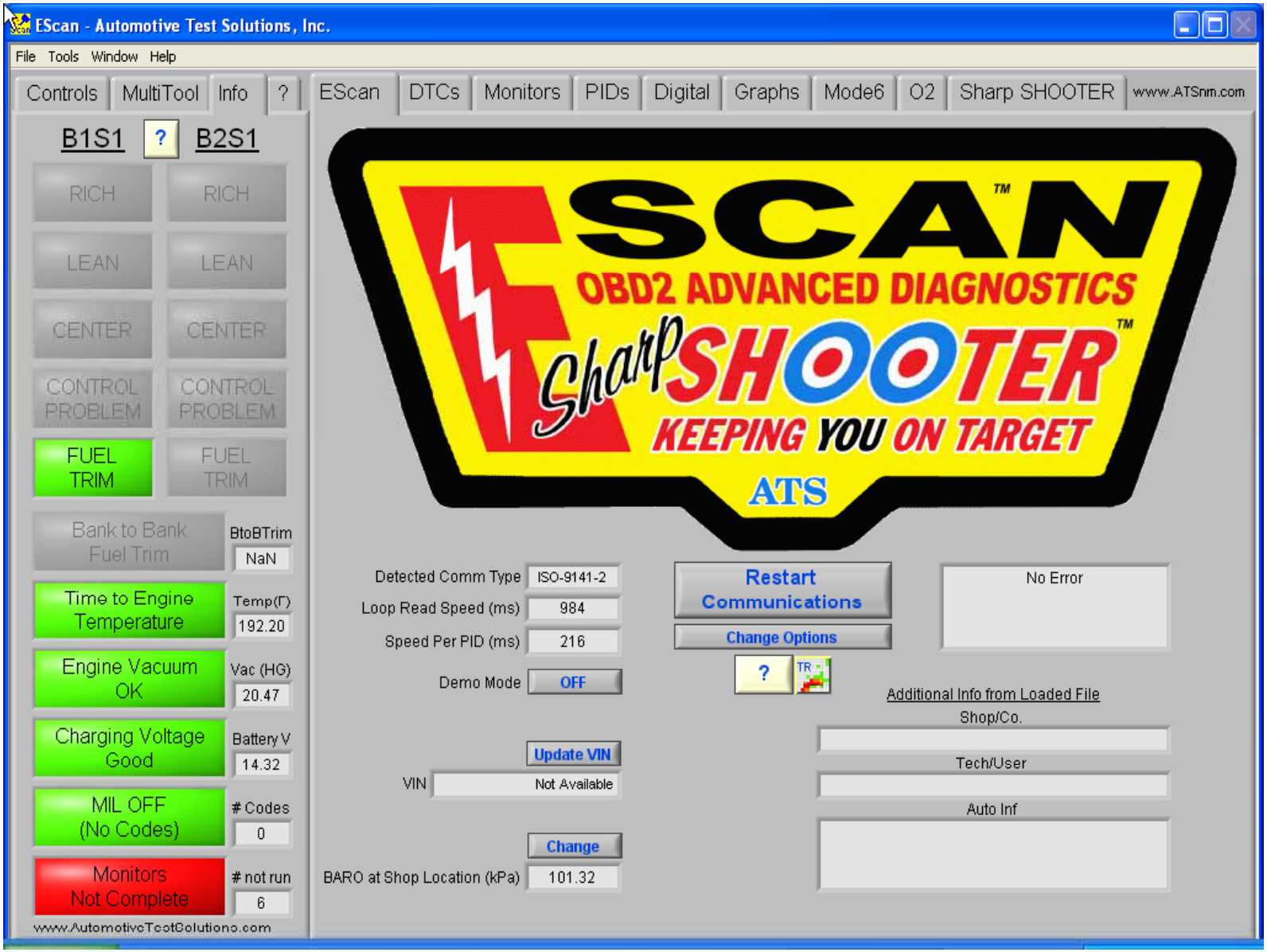

GQC MASONRY
All Types of Masonry
630-863-2142

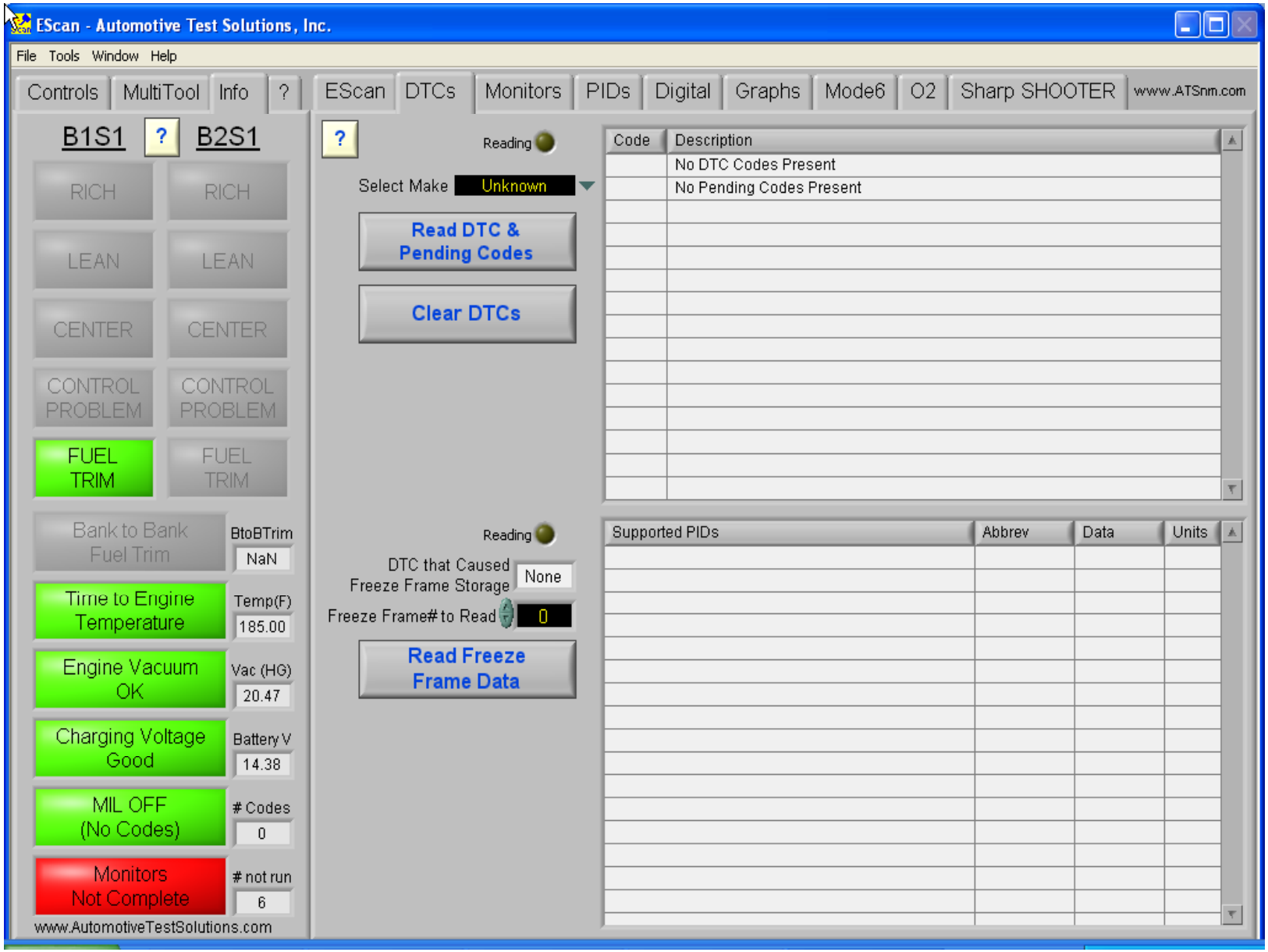
1996 Mercedes Benz

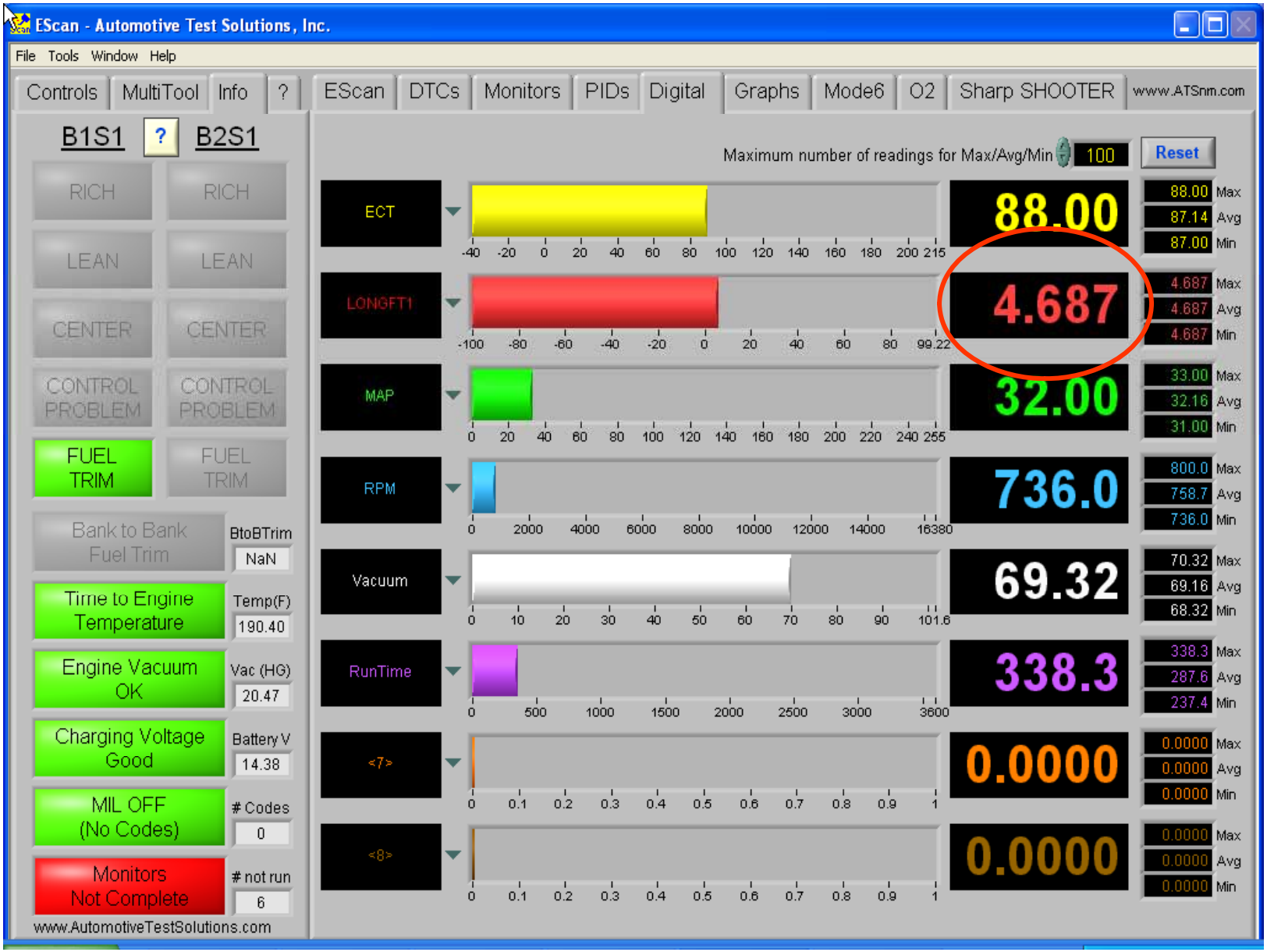
- A single cylinder misfire is occurring.
- All trouble code information has been cleared by the repairing technician.
- The scantool shows that the 2-5 coil pair has a spark duration of 2.5 ms.
- The technician states the miss occurs on cylinder# 6

1996 Mercedes Benz

- Long Term Fuel Trim is at + 5%.
- The fuel injector for cylinder # 6 has been replaced.
- One cylinder has been checked for compression and the results showed 150 PSI.


EScan - Automotive Test Solutions, Inc.
File Tools Window Help
Controls MultiTool Info ? EScan DTCs Monitors PIDs Digital Graphs Mode6 O2 Sharp SHOOTER www.ATSnm.com
B1S1 ? B2S1
RICH RICH
LEAN LEAN
CENTER CENTER
CONTROL PROBLEM CONTROL PROBLEM
FUEL TRIM FUEL TRIM
Bank to Bank Fuel Trim
BtoBTrim NaN
Time to Engine Temperature
Temp(F) 192.20
Engine Vacuum OK
Vac (HG) 20.47
Charging Voltage Good
Battery V 14.32
MIL OFF (No Codes)
Codes 0
Monitors Not Complete
not run 6
www.AutomotiveTestSolutions.com
SCAN
OBD2 ADVANCED DIAGNOSTICS
SharpSHOOTER
KEEPING YOU ON TARGET
ATS
Detected Comm Type ISO-9141-2
Loop Read Speed (ms) 984
Speed Per PID (ms) 216
Demo Mode OFF
Restart Communications
Change Options
No Error
Additional Info from Loaded File
Shop/Co.
Tech/User
Auto Inf
Update VIN
VIN Not Available
Change
BARO at Shop Location (kPa) 101.32

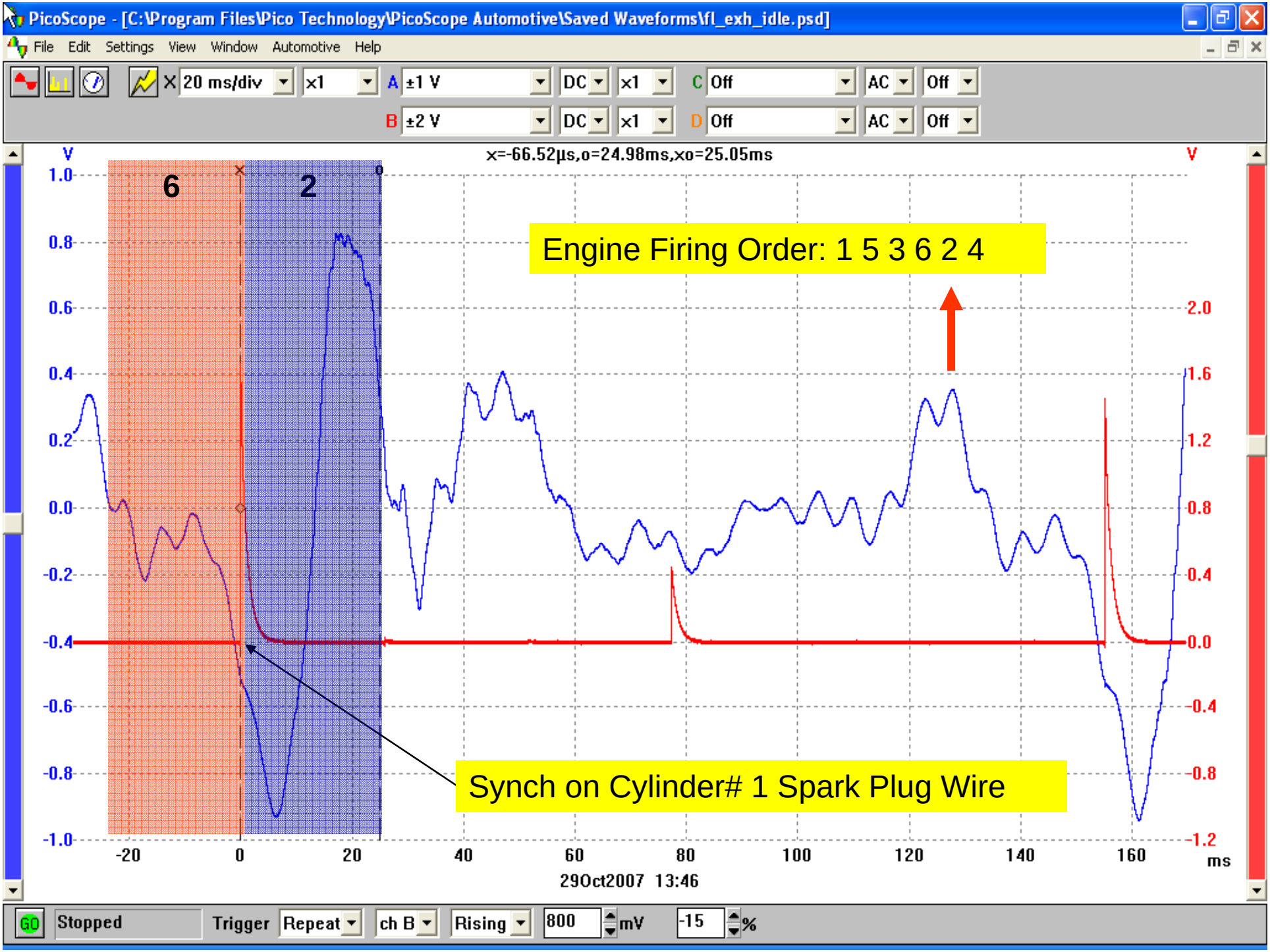

EScan - Automotive Test Solutions, Inc.
File Tools Window Help
Controls MultiTool Info ? EScan DTCs Monitors PIDs Digital Graphs Mode6 O2 Sharp SHOOTER www.ATSnm.com
B1S1 ? B2S1
RICH RICH
LEAN LEAN
CENTER CENTER
CONTROL PROBLEM CONTROL PROBLEM
FUEL TRIM FUEL TRIM
Bank to Bank Fuel Trim
BtoBTrim NaN
Time to Engine Temperature
Temp(F) 185.00
Engine Vacuum OK
Vac (HG) 20.47
Charging Voltage Good
Battery V 14.38
MIL OFF (No Codes)
Codes 0
Monitors Not Complete
not run 6
www.AutomotiveTestSolutions.com
?
Reading
Select Make Unknown
Read DTC & Pending Codes
Clear DTCs
Code Description
No DTC Codes Present
No Pending Codes Present
Reading
DTC that Caused Freeze Frame Storage None
Freeze Frame# to Read 0
Read Freeze Frame Data
Supported PIDs Abbrev Data Units

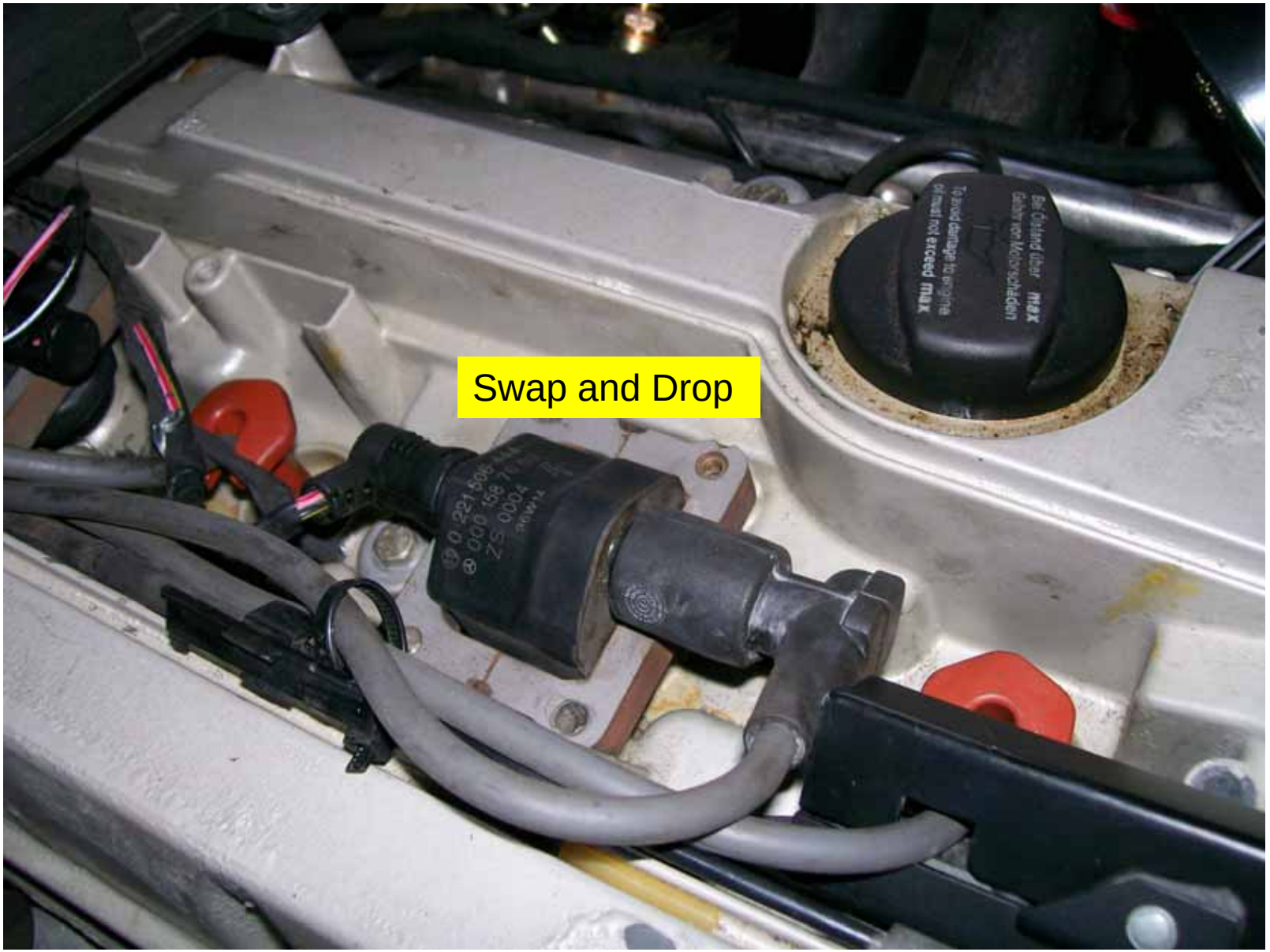

EScan - Automotive Test Solutions, Inc.
File Tools Window Help
Controls MultiTool Info ? EScan DTCs Monitors PIDs Digital Graphs Mode6 O2 Sharp SHOOTER www.ATSnm.com
B1S1 ? B2S1
RICH RICH
LEAN LEAN
CENTER CENTER
CONTROL PROBLEM CONTROL PROBLEM
FUEL TRIM FUEL TRIM
Bank to Bank Fuel Trim
BtoBTrim NaN
Time to Engine Temperature
Temp(F) 190.40
Engine Vacuum OK
Vac (HG) 20.47
Charging Voltage Good
Battery V 14.38
MIL OFF (No Codes)
Codes 0
Monitors Not Complete
not run 6
www.AutomotiveTestSolutions.com
Maximum number of readings for Max/Avg/Min 100
Reset
ECT 88.00 Max 88.00 Avg 87.14 Min 87.00
LONGFT1 4.687 Max 4.687 Avg 4.687 Min 4.687
MAP 32.00 Max 33.00 Avg 32.16 Min 31.00
RPM 736.0 Max 800.0 Avg 758.7 Min 736.0
Vacuum 69.32 Max 70.32 Avg 69.16 Min 68.32
RunTime 338.3 Max 338.3 Avg 287.6 Min 237.4
<7> 0.0000 Max 0.0000 Avg 0.0000 Min 0.0000
<8> 0.0000 Max 0.0000 Avg 0.0000 Min 0.0000

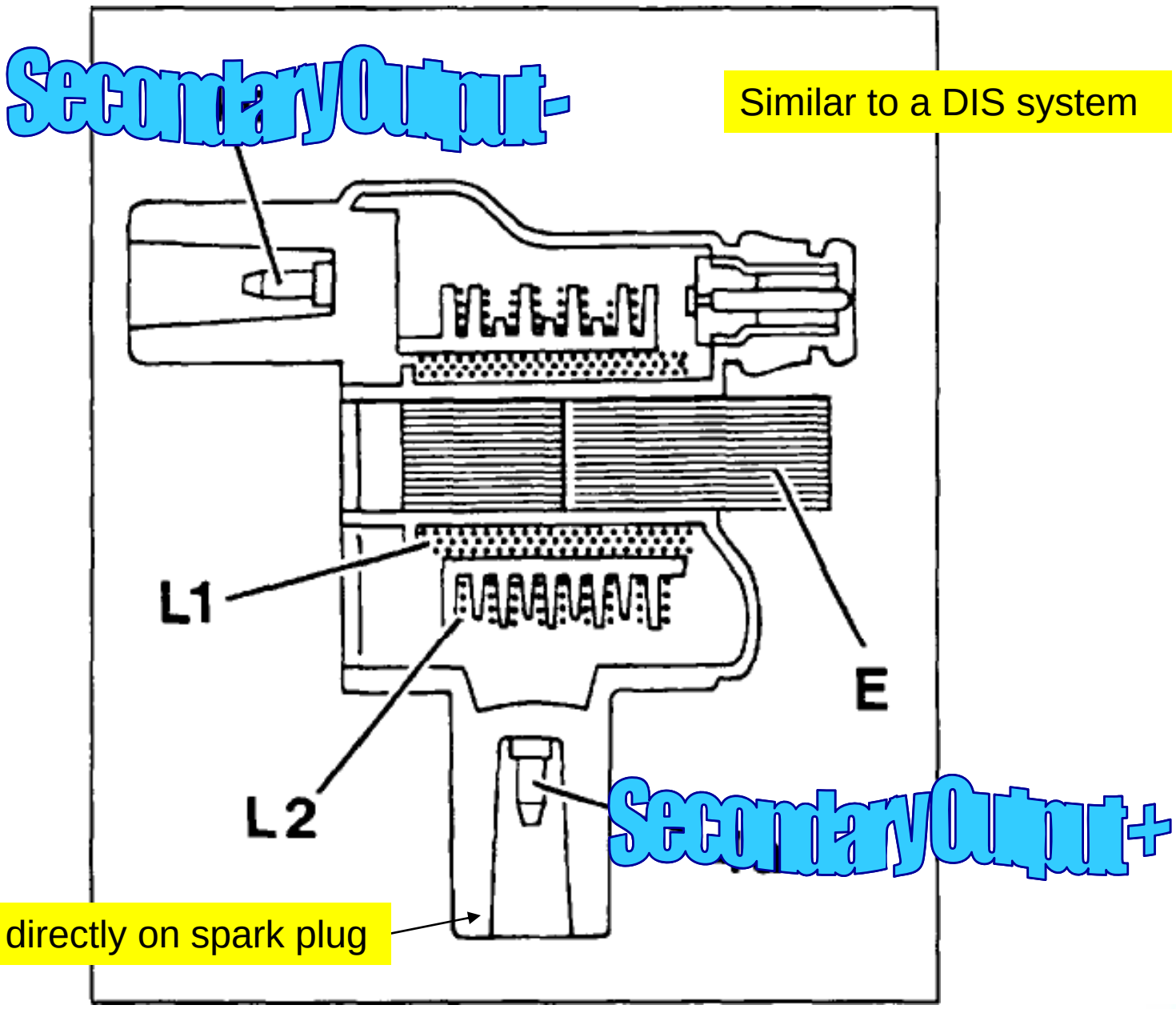
1996 Mercedes Benz

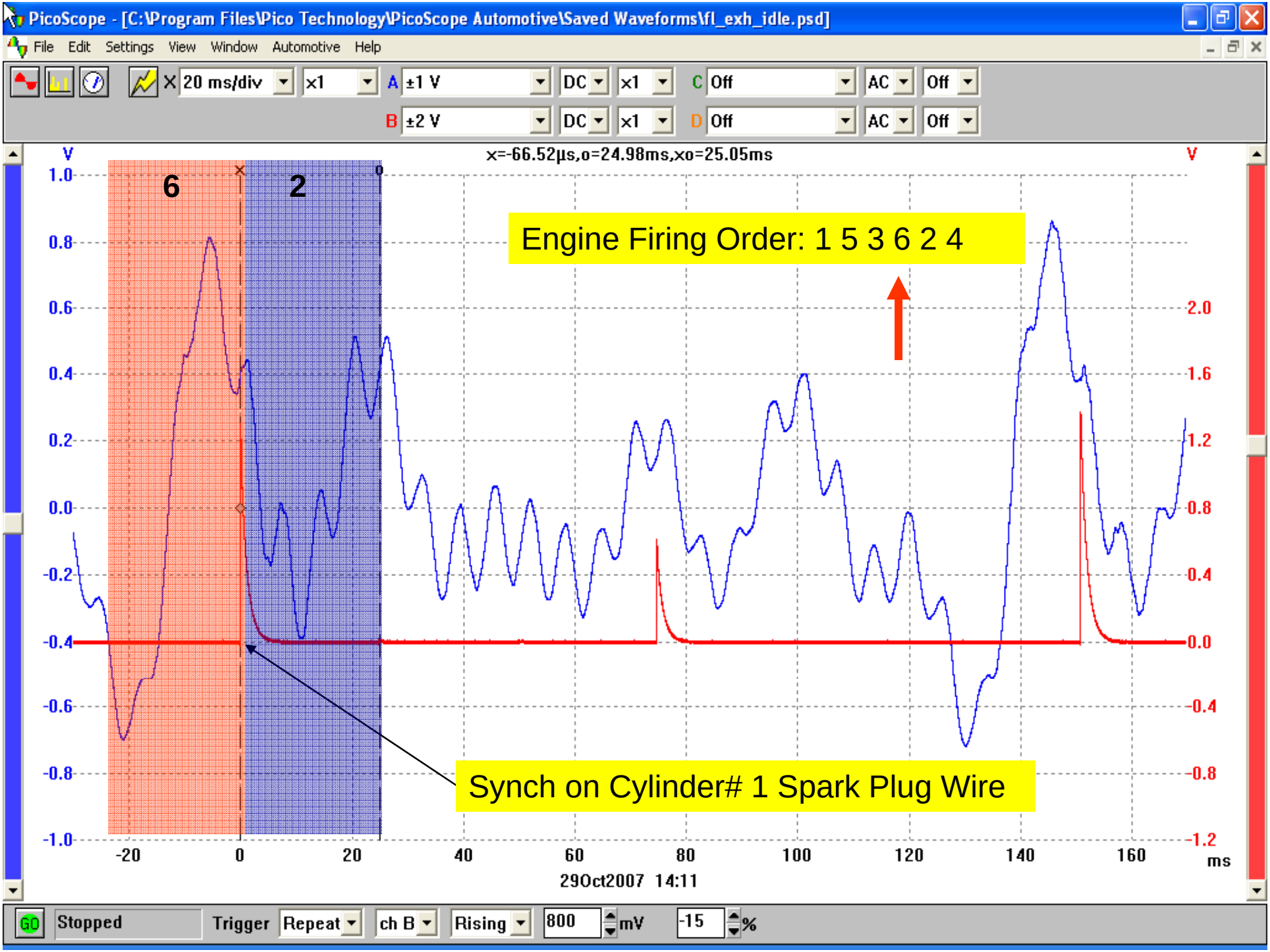
- This misfire activity appears to be ignition related


EScan - Automotive Test Solutions, Inc.
File Tools Window Help
Controls MultiTool Info ?
EScan DTCs Monitors PIDs Digital Graphs Mode6 O2 Sharp SHOOTER www.ATSnm.com
B1S1 ? B2S1
RICH RICH
LEAN LEAN
CENTER CENTER
CONTROL PROBLEM CONTROL PROBLEM
FUEL TRIM FUEL TRIM
Bank to Bank Fuel Trim
BtoBTrim
NaN
Time to Engine Temperature
Temp(F)
190.40
Engine Vacuum OK
Vac (HG)
20.47
Charging Voltage Good
Battery V
14.26
MIL OFF (No Codes)
Codes
0
Monitors Not Complete
not run
6
www.AutomotiveTestSolutions.com
Stacked Dual/Combo Measure
Clear Data
Number of Points displayed on Graph
100
ECT
88
LONGFT1
4.687
MAP
32
RPM
768
Vacuum
69.32
RunTime
423.4
<7>
0
<8>
0
05:40 05:50 06:00 06:10 06:20 06:30 06:40 06:50 07:00 07:10 07:20 07:29


PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\fl_exh_idle.psd]
File Edit Settings View Window Automotive Help
20 ms/div
A ±1 V
B ±2 V
C Off
D Off
x=-66.52µs,o=24.98ms,xo=25.05ms
6
2
Engine Firing Order: 1 5 3 6 2 4
Synch on Cylinder# 1 Spark Plug Wire
29Oct2007 13:46
Stopped
Trigger
Repeat
ch B
Rising
800
mV
-15
%


Swap and Drop

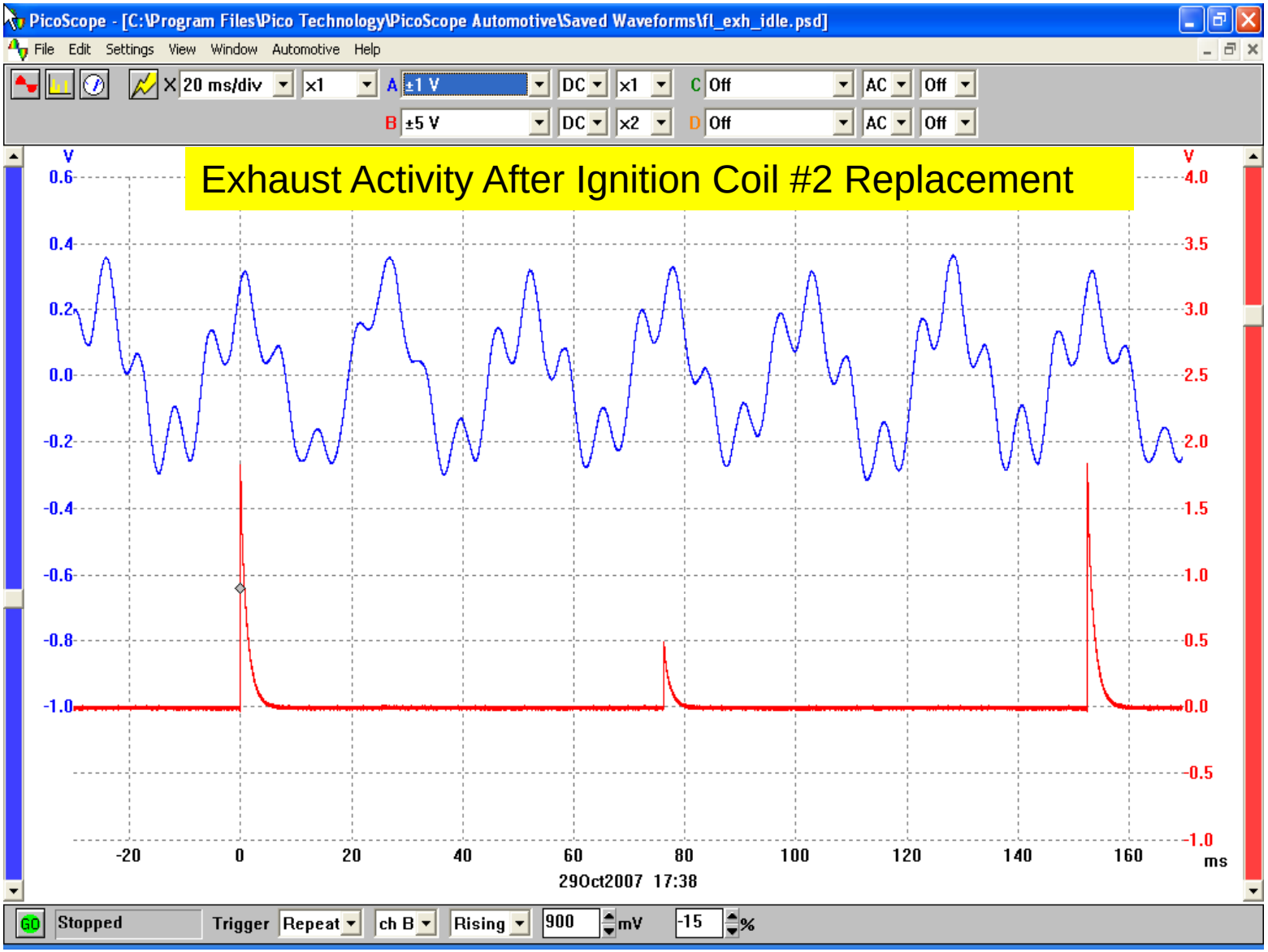

Secondary Output -
Similar to a DIS system
L1
E
L2
Secondary Output +
Mounts directly on spark plug


PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\fl_exh_idle.psd]
File Edit Settings View Window Automotive Help
X 20 ms/div x1 A ±1 V DC x1 C Off AC Off
B ±2 V DC x1 D Off AC Off
x=-66.52µs,o=24.98ms,xo=25.05ms
V
6
2
Engine Firing Order: 1 5 3 6 2 4
Synch on Cylinder# 1 Spark Plug Wire
1.0 0.8 0.6 0.4 0.2 0.0 -0.2 -0.4 -0.6 -0.8 -1.0
2.0 1.6 1.2 0.8 0.4 0.0 -0.4 -0.8 -1.2
-20 0 20 40 60 80 100 120 140 160 ms
29Oct2007 14:11
GO Stopped Trigger Repeat ch B Rising 800 mV -15 %

1996 Mercedes Benz

- The fix was the replacement of a bad ignition coil# 2.
- There were no visual signs of damage to the coil.
- A labscope pattern show no signs of failure per a primary current waveform.


Bad Ignition Coil #2


PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\fl_exh_idle.psd]
File Edit Settings View Window Automotive Help
X 20 ms/div x1 A ±1 V DC x1 C Off AC Off
B ±5 V DC x2 D Off AC Off
Exhaust Activity After Ignition Coil #2 Replacement
V
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
V
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-20 0 20 40 60 80 100 120 140 160 ms
29Oct2007 17:38
GO Stopped Trigger Repeat ch B Rising 900 mV -15 %

Case Study #4

1999 Volkswagon Passat


7817

1999 Volkswagon Passat

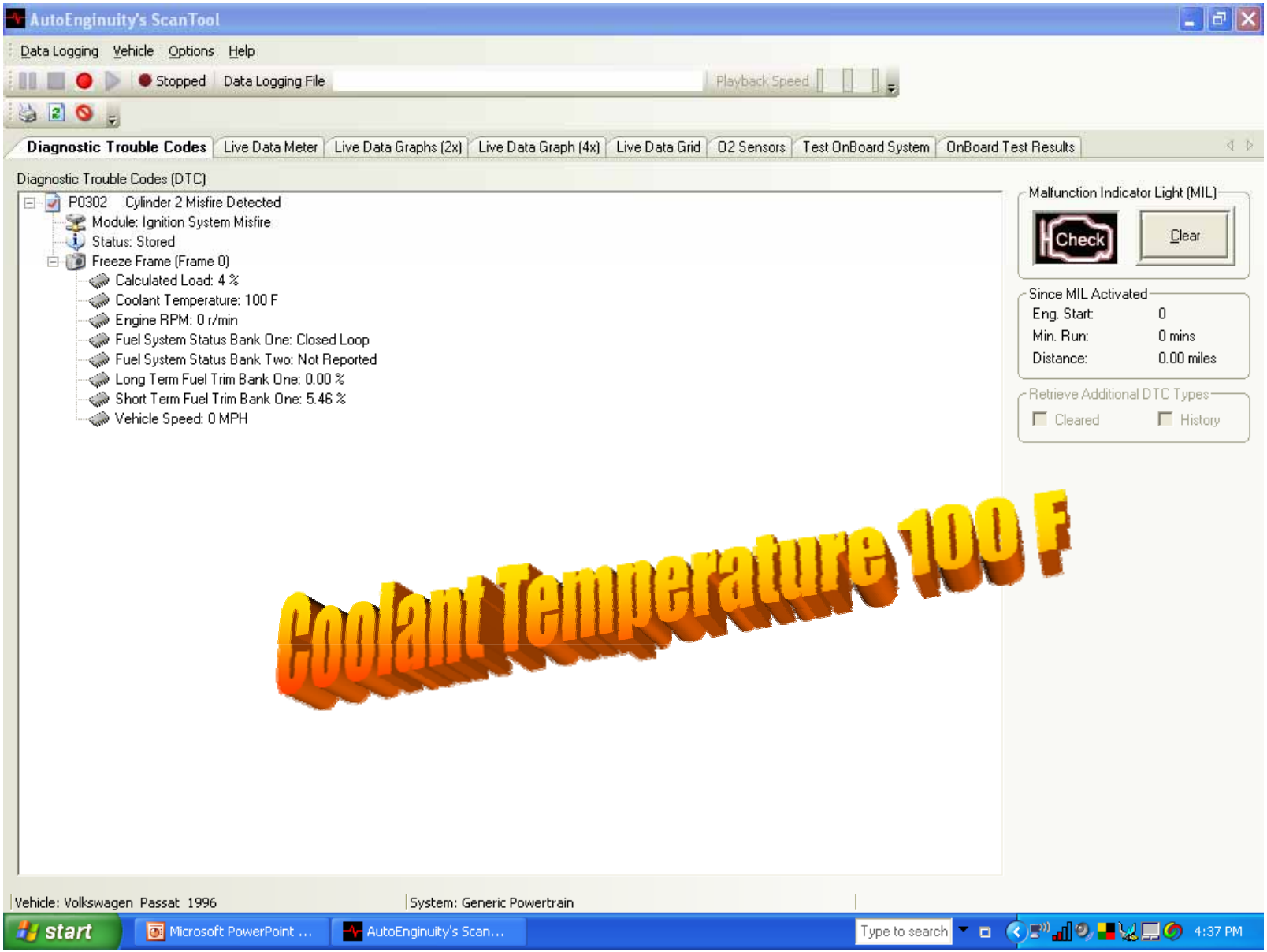
- Vacuum level is at 17 inches mercury.
- There appears to be no misfire activity as stated by the customer
- The vehicle is run for a long period of time to see if we can confirm misfire activity

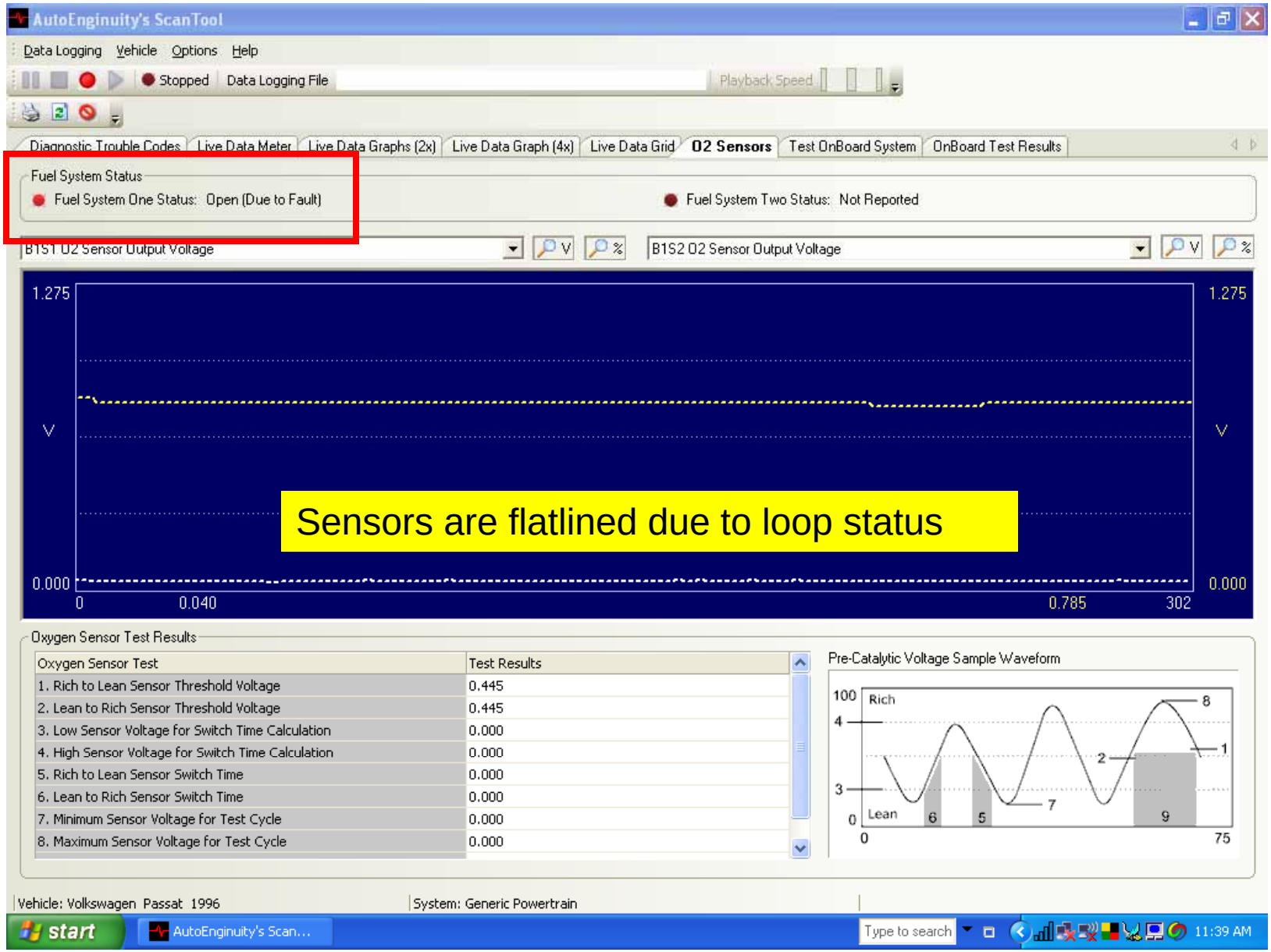

PASSAT

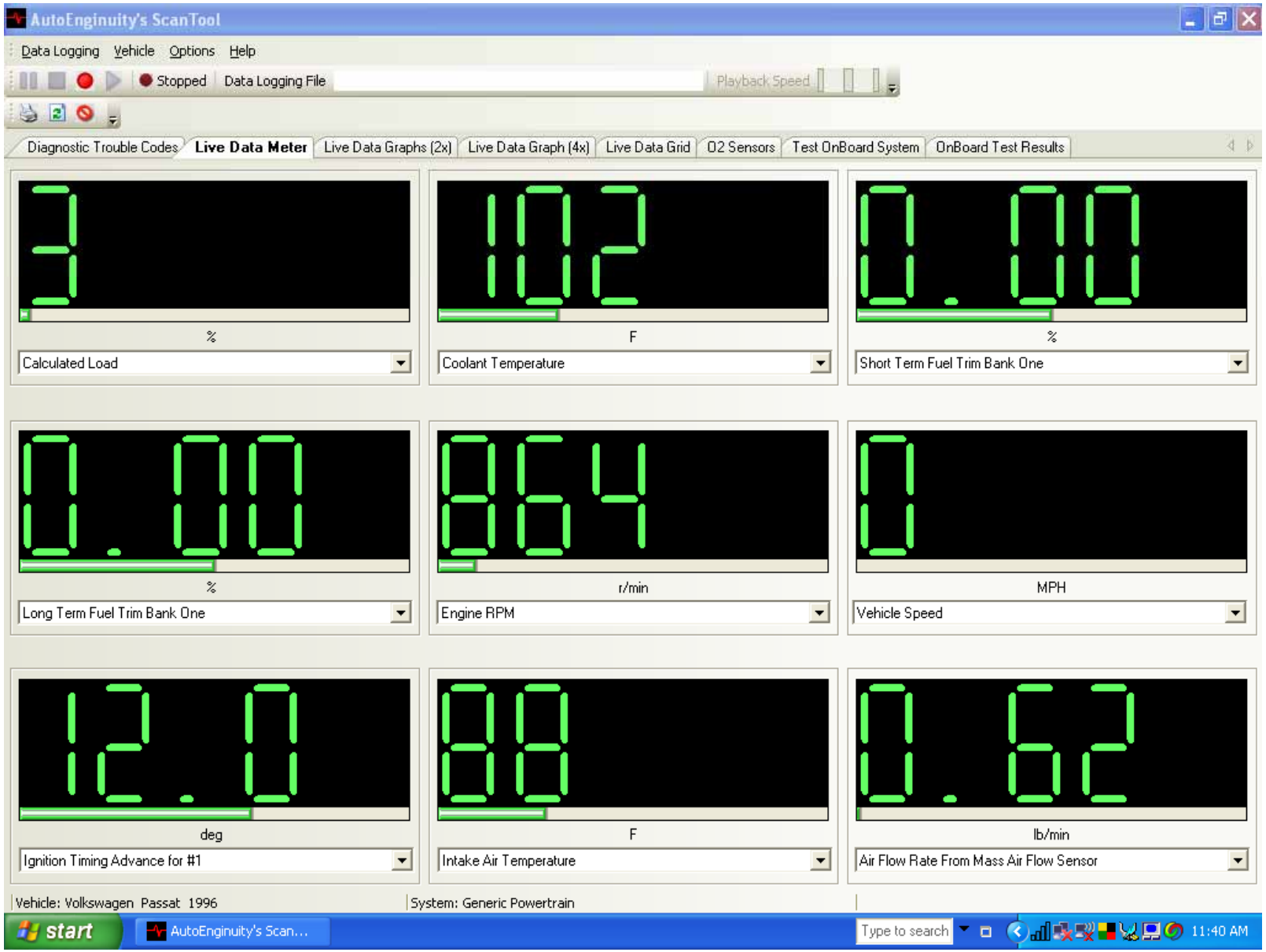
1999 Volkswagon Passat

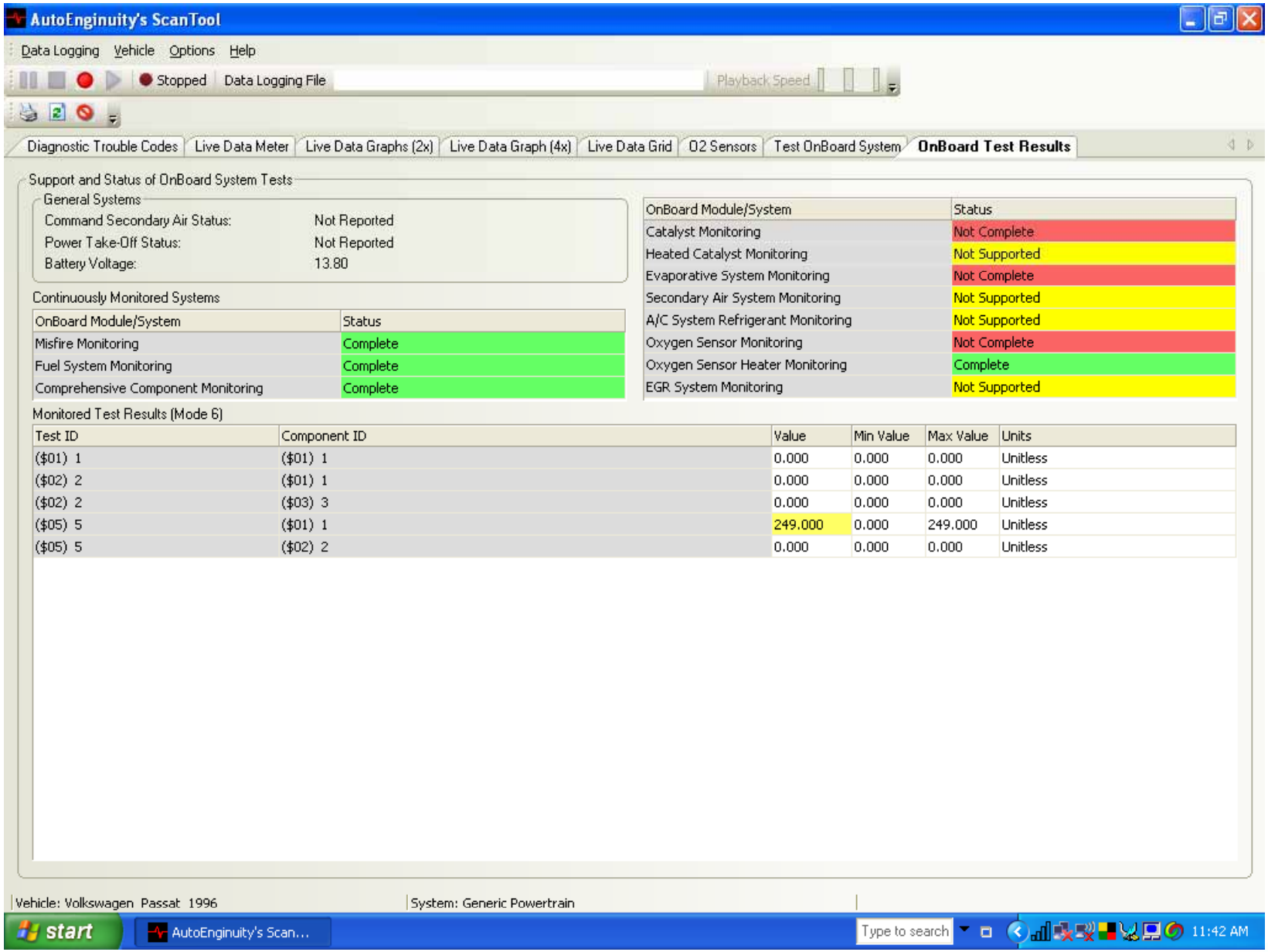
- The pre oxygen sensor went low and the post went slightly high.
- There is now misfire activity that is present
- Our vehicle went into what is called *open loop fault* status as a result of the misfire activity

Auto Enginuity Software

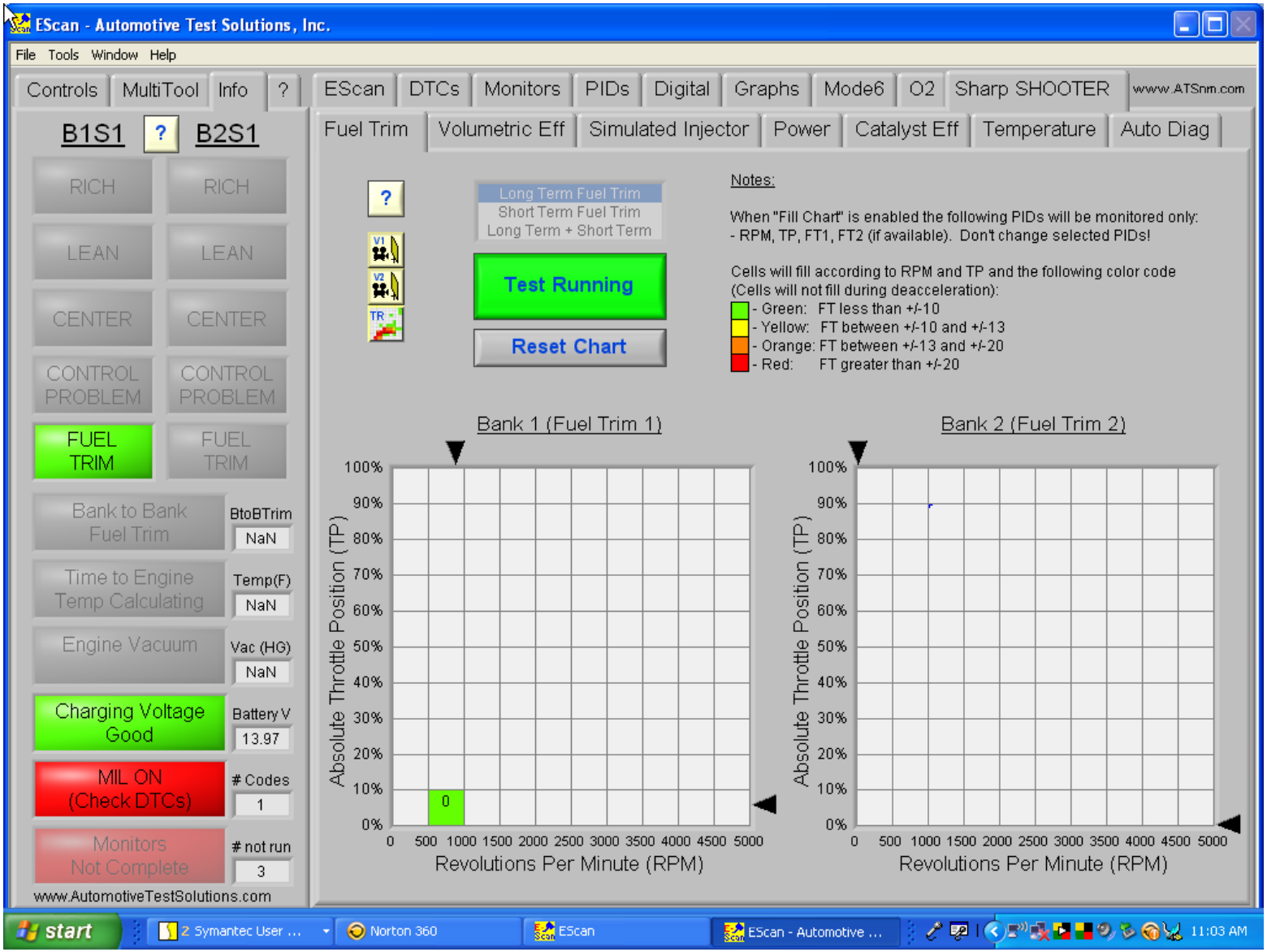

AutoEnginuity's ScanTool
Data Logging
Vehicle
Options
Help
Stopped
Data Logging File
Playback Speed
Diagnostic Trouble Codes
Live Data Meter
Live Data Graphs (2x)
Live Data Graph (4x)
Live Data Grid
O2 Sensors
Test OnBoard System
OnBoard Test Results
Diagnostic Trouble Codes (DTC)
P0302 Cylinder 2 Misfire Detected
Module: Ignition System Misfire
Status: Stored
Freeze Frame (Frame 0)
Calculated Load: 4 %
Coolant Temperature: 100 F
Engine RPM: 0 r/min
Fuel System Status Bank One: Closed Loop
Fuel System Status Bank Two: Not Reported
Long Term Fuel Trim Bank One: 0.00 %
Short Term Fuel Trim Bank One: 5.46 %
Vehicle Speed: 0 MPH
Malfunction Indicator Light (MIL)
Check
Clear
Since MIL Activated
Eng. Start: 0
Min. Run: 0 mins
Distance: 0.00 miles
Retrieve Additional DTC Types
Cleared
History
Coolant Temperature 100 F
Vehicle: Volkswagen Passat 1996
System: Generic Powertrain
start
Microsoft PowerPoint ...
AutoEnginuity's Scan...
Type to search
4:37 PM

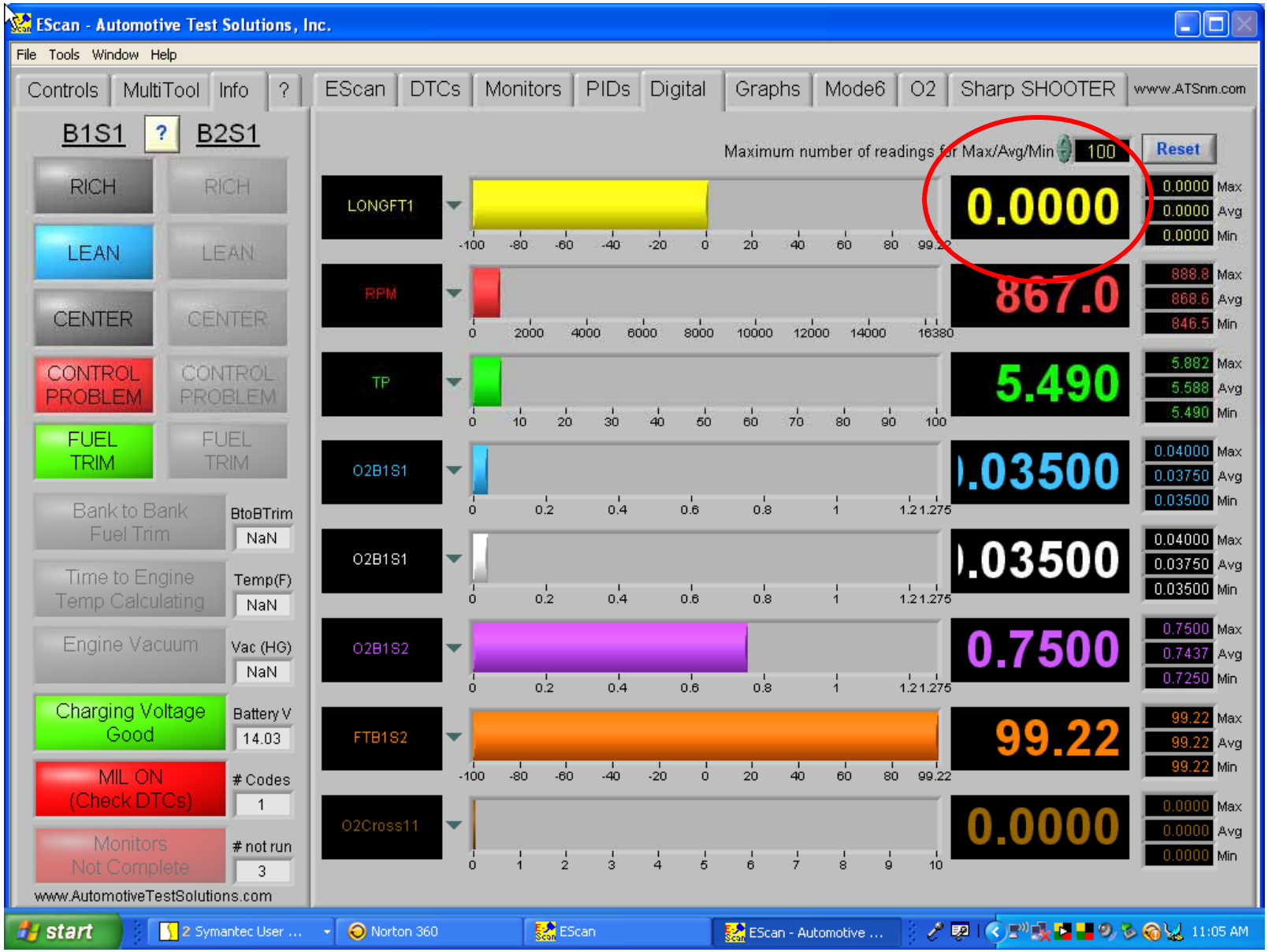

AutoEnginuity's ScanTool
Data Logging Vehicle Options Help
Stopped Data Logging File
Playback Speed
Diagnostic Trouble Codes Live Data Meter Live Data Graphs (2x) Live Data Graph (4x) Live Data Grid O2 Sensors Test OnBoard System OnBoard Test Results
Fuel System Status
Fuel System One Status: Open (Due to Fault)
Fuel System Two Status: Not Reported
B1S1 O2 Sensor Output Voltage
B1S2 O2 Sensor Output Voltage
1.275
V
0.000
0
0.040
0.785
302
Sensors are flatlined due to loop status
Oxygen Sensor Test Results
Oxygen Sensor Test
Test Results
1. Rich to Lean Sensor Threshold Voltage 0.445
2. Lean to Rich Sensor Threshold Voltage 0.445
3. Low Sensor Voltage for Switch Time Calculation 0.000
4. High Sensor Voltage for Switch Time Calculation 0.000
5. Rich to Lean Sensor Switch Time 0.000
6. Lean to Rich Sensor Switch Time 0.000
7. Minimum Sensor Voltage for Test Cycle 0.000
8. Maximum Sensor Voltage for Test Cycle 0.000
Pre-Catalytic Voltage Sample Waveform
100
Rich
4
3
0
Lean
75
Vehicle: Volkswagen Passat 1996
System: Generic Powertrain
start
AutoEnginuity's Scan...
Type to search
11:39 AM


AutoEnginuity's ScanTool
Data Logging
Vehicle
Options
Help
Stopped
Data Logging File
Playback Speed
Diagnostic Trouble Codes
Live Data Meter
Live Data Graphs (2x)
Live Data Graph (4x)
Live Data Grid
O2 Sensors
Test OnBoard System
OnBoard Test Results
3
%
Calculated Load
102
F
Coolant Temperature
0.00
%
Short Term Fuel Trim Bank One
0.00
%
Long Term Fuel Trim Bank One
864
r/min
Engine RPM
0
MPH
Vehicle Speed
12.0
deg
Ignition Timing Advance for #1
88
F
Intake Air Temperature
0.62
lb/min
Air Flow Rate From Mass Air Flow Sensor
Vehicle: Volkswagen Passat 1996
System: Generic Powertrain
start
AutoEnginuity's Scan...
Type to search
11:40 AM

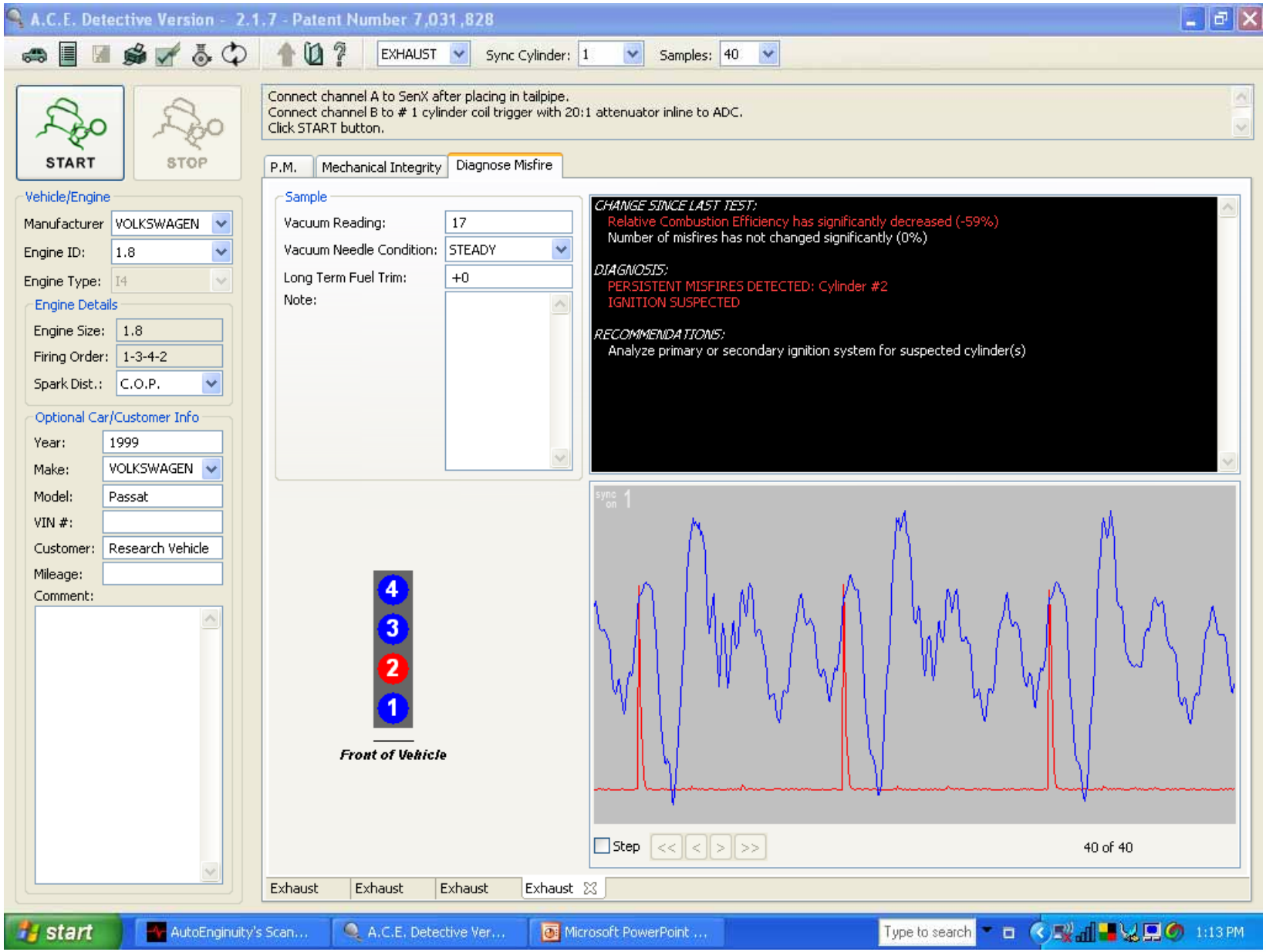

AutoEnginuity's ScanTool
Data Logging
Vehicle
Options
Help
Stopped
Data Logging File
Playback Speed
Diagnostic Trouble Codes
Live Data Meter
Live Data Graphs (2x)
Live Data Graph (4x)
Live Data Grid
O2 Sensors
Test OnBoard System
OnBoard Test Results
Support and Status of OnBoard System Tests
General Systems
Command Secondary Air Status: Not Reported
Power Take-Off Status: Not Reported
Battery Voltage: 13.80
Continuously Monitored Systems
OnBoard Module/System | Status
Misfire Monitoring | Complete
Fuel System Monitoring | Complete
Comprehensive Component Monitoring | Complete
OnBoard Module/System | Status
Catalyst Monitoring | Not Complete
Heated Catalyst Monitoring | Not Supported
Evaporative System Monitoring | Not Complete
Secondary Air System Monitoring | Not Supported
A/C System Refrigerant Monitoring | Not Supported
Oxygen Sensor Monitoring | Not Complete
Oxygen Sensor Heater Monitoring | Complete
EGR System Monitoring | Not Supported
Monitored Test Results (Mode 6)
Test ID | Component ID | Value | Min Value | Max Value | Units
($01) 1 | ($01) 1 | 0.000 | 0.000 | 0.000 | Unitless
($02) 2 | ($01) 1 | 0.000 | 0.000 | 0.000 | Unitless
($02) 2 | ($03) 3 | 0.000 | 0.000 | 0.000 | Unitless
($05) 5 | ($01) 1 | 249.000 | 0.000 | 249.000 | Unitless
($05) 5 | ($02) 2 | 0.000 | 0.000 | 0.000 | Unitless
Vehicle: Volkswagen Passat 1996
System: Generic Powertrain
start
AutoEnginuity's Scan...
Type to search
11:42 AM

EScan Software


EScan - Automotive Test Solutions, Inc.
File Tools Window Help
Controls MultiTool Info ?
EScan DTCs Monitors PIDs Digital Graphs Mode6 O2 Sharp SHOOTER
www.ATSnm.com
B1S1 ? B2S1
RICH RICH
LEAN LEAN
CENTER CENTER
CONTROL PROBLEM CONTROL PROBLEM
FUEL TRIM FUEL TRIM
Bank to Bank Fuel Trim
BtoBTrim
NaN
Time to Engine Temp Calculating
Temp(F)
NaN
Engine Vacuum
Vac (HG)
NaN
Charging Voltage Good
Battery V
13.97
MIL ON (Check DTCs)
Codes
1
Monitors Not Complete
not run
3
www.AutomotiveTestSolutions.com
Fuel Trim Volumetric Eff Simulated Injector Power Catalyst Eff Temperature Auto Diag
Long Term Fuel Trim
Short Term Fuel Trim
Long Term + Short Term
Test Running
Reset Chart
Notes:
When "Fill Chart" is enabled the following PIDs will be monitored only:
- RPM, TP, FT1, FT2 (if available). Don't change selected PIDs!
Cells will fill according to RPM and TP and the following color code
(Cells will not fill during deacceleration):
- Green: FT less than +/-10
- Yellow: FT between +/-10 and +/-13
- Orange: FT between +/-13 and +/-20
- Red: FT greater than +/-20
Bank 1 (Fuel Trim 1)
Bank 2 (Fuel Trim 2)
Absolute Throttle Position (TP)
100% 90% 80% 70% 60% 50% 40% 30% 20% 10% 0%
0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000
Revolutions Per Minute (RPM)
start
2 Symantec User ...
Norton 360
EScan
EScan - Automotive ...
11:03 AM

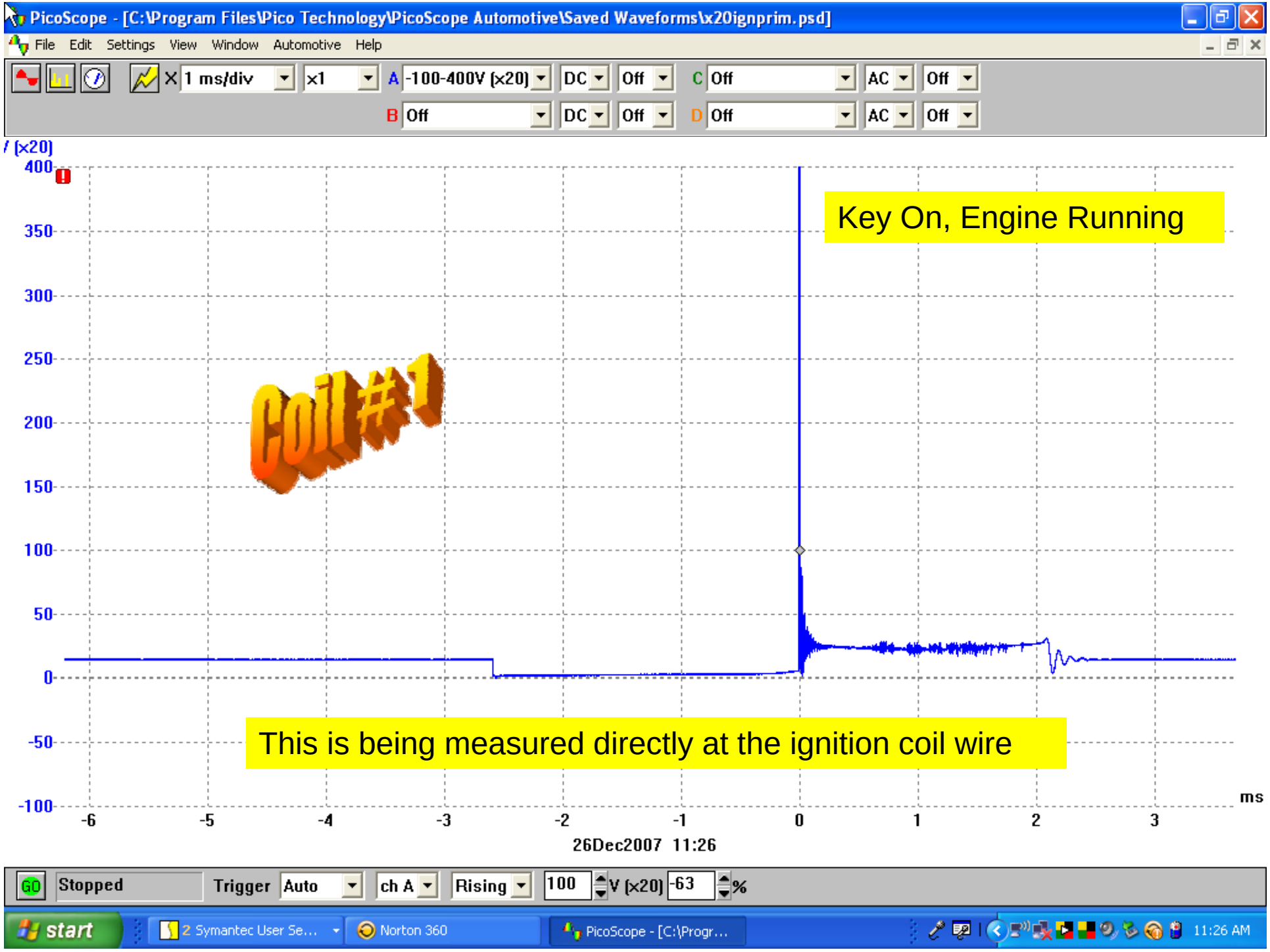

EScan - Automotive Test Solutions, Inc.
File Tools Window Help
Controls MultiTool Info ? EScan DTCs Monitors PIDs Digital Graphs Mode6 O2 Sharp SHOOTER www.ATSnm.com
B1S1 ? B2S1
RICH RICH
LEAN LEAN
CENTER CENTER
CONTROL PROBLEM CONTROL PROBLEM
FUEL TRIM FUEL TRIM
Bank to Bank Fuel Trim
BtoBTrim
NaN
Time to Engine Temp Calculating
Temp(F)
NaN
Engine Vacuum
Vac (HG)
NaN
Charging Voltage Good
Battery V
14.03
MIL ON (Check DTCs)
Codes
1
Monitors Not Complete
not run
3
www.AutomotiveTestSolutions.com
Maximum number of readings for Max/Avg/Min
100
Reset
LONGFT1
0.0000
0.0000 Max
0.0000 Avg
0.0000 Min
RPM
867.0
888.8 Max
868.6 Avg
846.5 Min
TP
5.490
5.882 Max
5.588 Avg
5.490 Min
O2B1S1
.03500
0.04000 Max
0.03750 Avg
0.03500 Min
O2B1S1
.03500
0.04000 Max
0.03750 Avg
0.03500 Min
O2B1S2
0.7500
0.7500 Max
0.7437 Avg
0.7250 Min
FTB1S2
99.22
99.22 Max
99.22 Avg
99.22 Min
O2Cross11
0.0000
0.0000 Max
0.0000 Avg
0.0000 Min
start
2 Symantec User ...
Norton 360
EScan
EScan - Automotive ...
11:05 AM

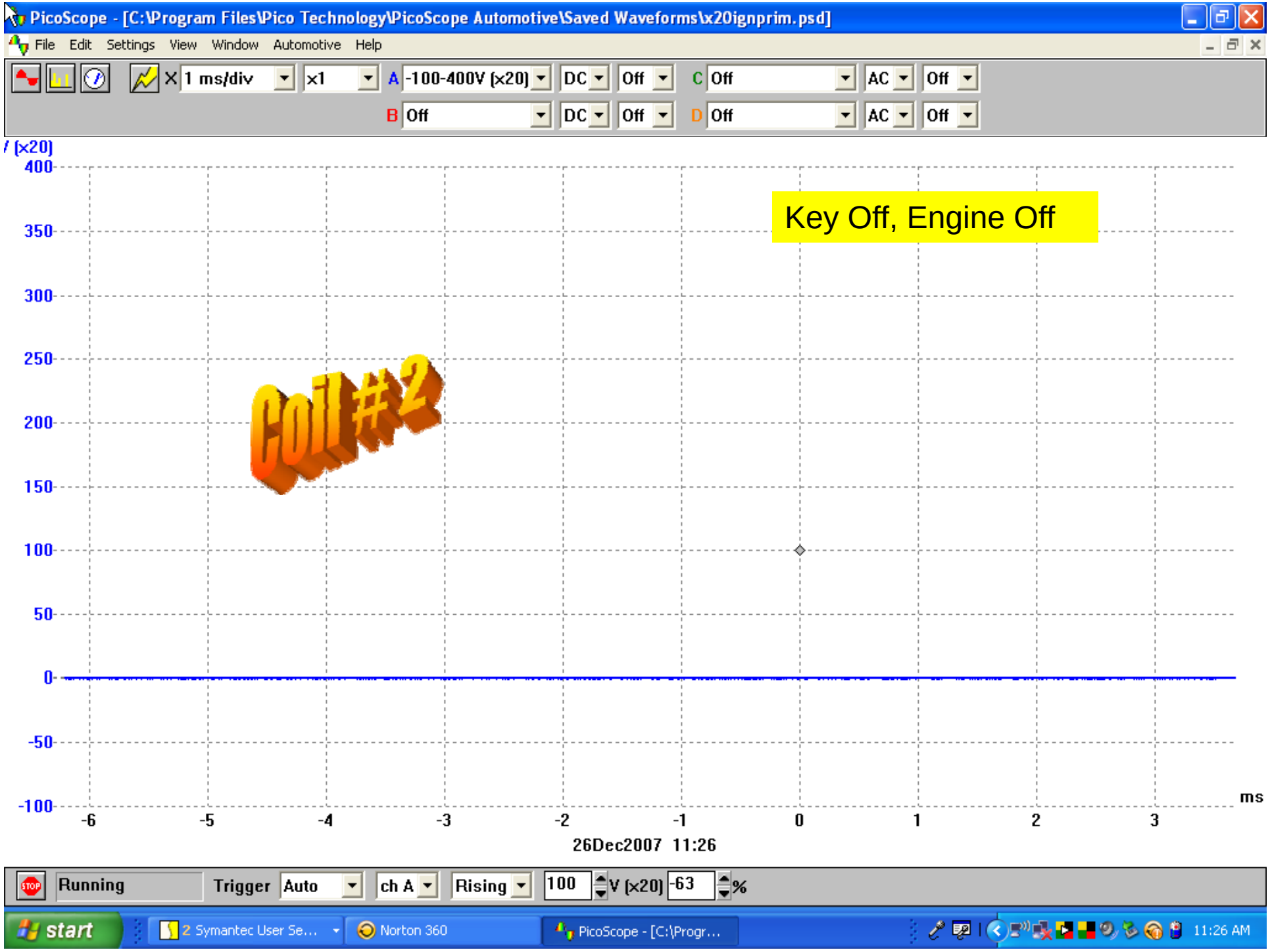
ACE Misfire Software

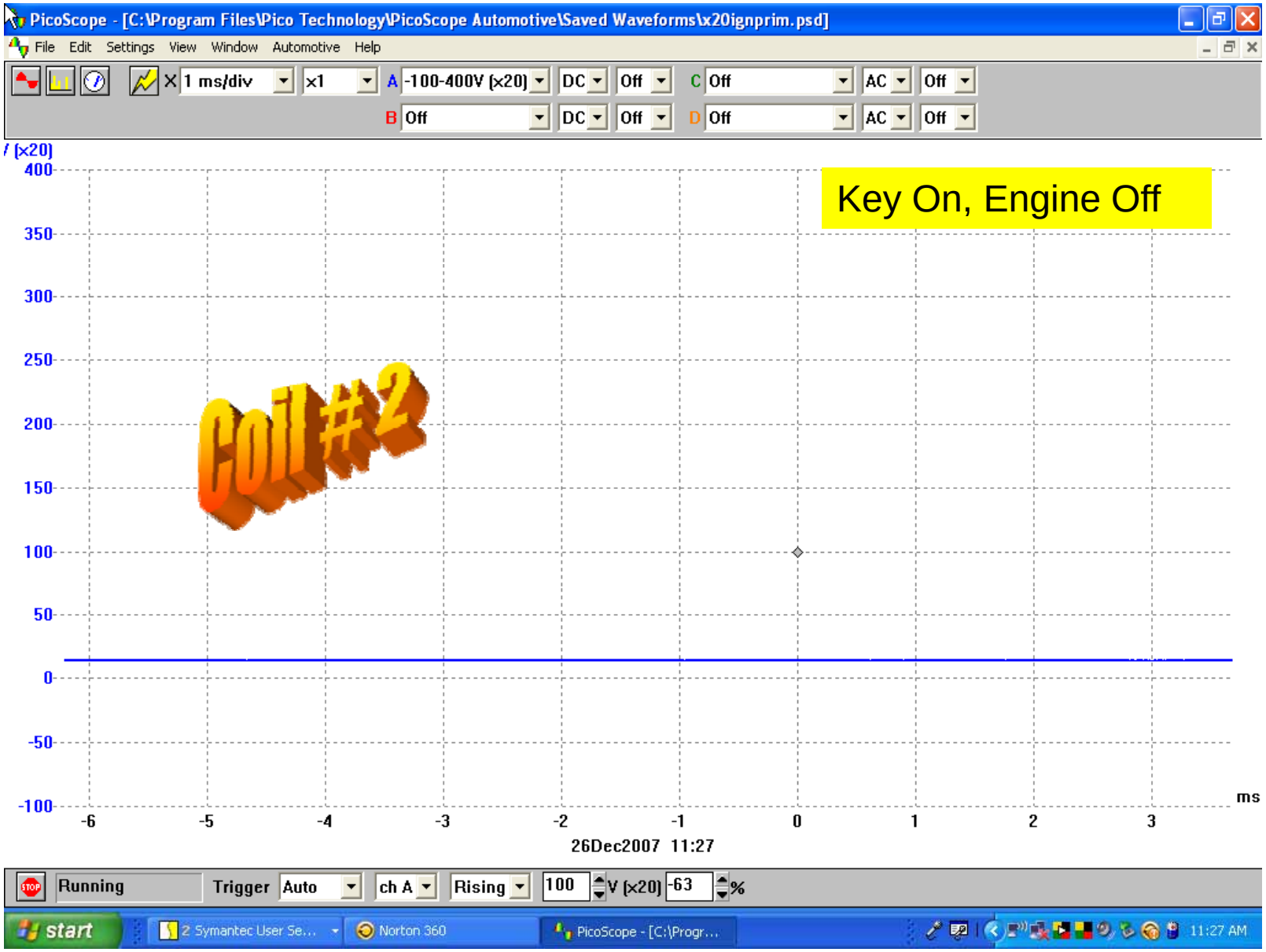

A.C.E. Detective Version - 2.1.7 - Patent Number 7,031,828
EXHAUST
Sync Cylinder: 1
Samples: 40
START
STOP
Connect channel A to SenX after placing in tailpipe.
Connect channel B to # 1 cylinder coil trigger with 20:1 attenuator inline to ADC.
Click START button.
Vehicle/Engine
Manufacturer VOLKSWAGEN
Engine ID: 1.8
Engine Type: I4
Engine Details
Engine Size: 1.8
Firing Order: 1-3-4-2
Spark Dist.: C.O.P.
Optional Car/Customer Info
Year: 1999
Make: VOLKSWAGEN
Model: Passat
VIN #:
Customer: Research Vehicle
Mileage:
Comment:
P.M.
Mechanical Integrity
Diagnose Misfire
Sample
Vacuum Reading: 17
Vacuum Needle Condition: STEADY
Long Term Fuel Trim: +0
Note:
CHANGE SINCE LAST TEST:
Relative Combustion Efficiency has significantly decreased (-59%)
Number of misfires has not changed significantly (0%)
DIAGNOSIS:
PERSISTENT MISFIRES DETECTED: Cylinder #2
IGNITION SUSPECTED
RECOMMENDATIONS:
Analyze primary or secondary ignition system for suspected cylinder(s)
4
3
2
1
Front of Vehicle
sync on 1
Step
40 of 40
Exhaust
Exhaust
Exhaust
Exhaust
start
AutoEnginuity's Scan...
A.C.E. Detective Ver...
Microsoft PowerPoint ...
Type to search
1:13 PM

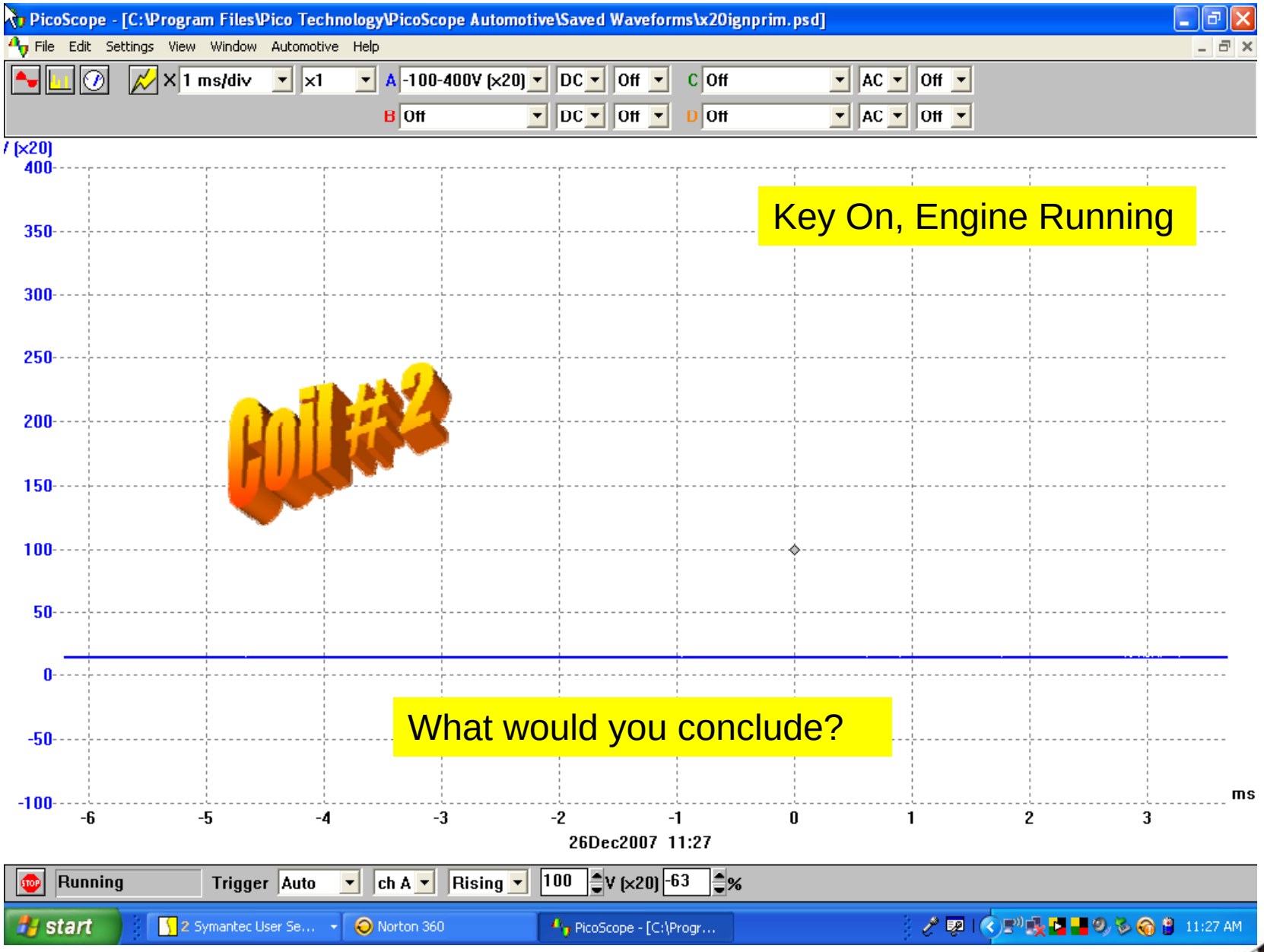
Primary Ignition Waveforms

Quick Evaluation


PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\x20ignprim.psd]
File Edit Settings View Window Automotive Help
X 1 ms/div x1 A -100-400V (x20) DC Off C Off AC Off
B Off DC Off D Off AC Off
/ (x20)
400
350
300
250
200
150
100
50
0
-50
-100
-6 -5 -4 -3 -2 -1 0 1 2 3
ms
26Dec2007 11:26
Key On, Engine Running
Coil #1
This is being measured directly at the ignition coil wire
GO Stopped Trigger Auto ch A Rising 100 V (x20) -63 %
start
2 Symantec User Se...
Norton 360
PicoScope - [C:\Progr...
11:26 AM


PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\x20ignprim.psd]
File Edit Settings View Window Automotive Help
X 1 ms/div x1
A -100-400V (x20) DC Off
B Off DC Off
C Off AC Off
D Off AC Off
/ (x20)
400
350
300
250
200
150
100
50
0
-50
-100
Key Off, Engine Off
Coil #2
-6 -5 -4 -3 -2 -1 0 1 2 3
ms
26Dec2007 11:26
Running
Trigger Auto ch A Rising 100 V (x20) -63 %
start
2 Symantec User Se...
Norton 360
PicoScope - [C:\Progr...
11:26 AM


PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\x20ignprim.psd]
File Edit Settings View Window Automotive Help
1 ms/div
x1
A -100-400V (x20)
DC
Off
C Off
AC
Off
B Off
D Off
/ (x20)
400
350
300
250
200
150
100
50
0
-50
-100
Key On, Engine Off
Coil #2
-6
-5
-4
-3
-2
-1
0
1
2
3
ms
26Dec2007 11:27
Running
Trigger
Auto
ch A
Rising
100
V (x20)
-63
%
start
2 Symantec User Se...
Norton 360
PicoScope - [C:\Progr...
11:27 AM


PicoScope - [C:\Program Files\Pico Technology\PicoScope Automotive\Saved Waveforms\x20ignprim.psd]
File Edit Settings View Window Automotive Help
1 ms/div
A -100-400V (x20)
B Off
C Off
D Off
/ (x20)
400
350
300
250
200
150
100
50
0
-50
-100
-6 -5 -4 -3 -2 -1 0 1 2 3
ms
Key On, Engine Running
Coil #2
What would you conclude?
26Dec2007 11:27
Running
Trigger Auto
ch A
Rising
100
V (x20)
-63
%
start
Symantec User Se...
Norton 360
PicoScope - [C:\Progr...
11:27 AM

1999 Volkswagon Passat

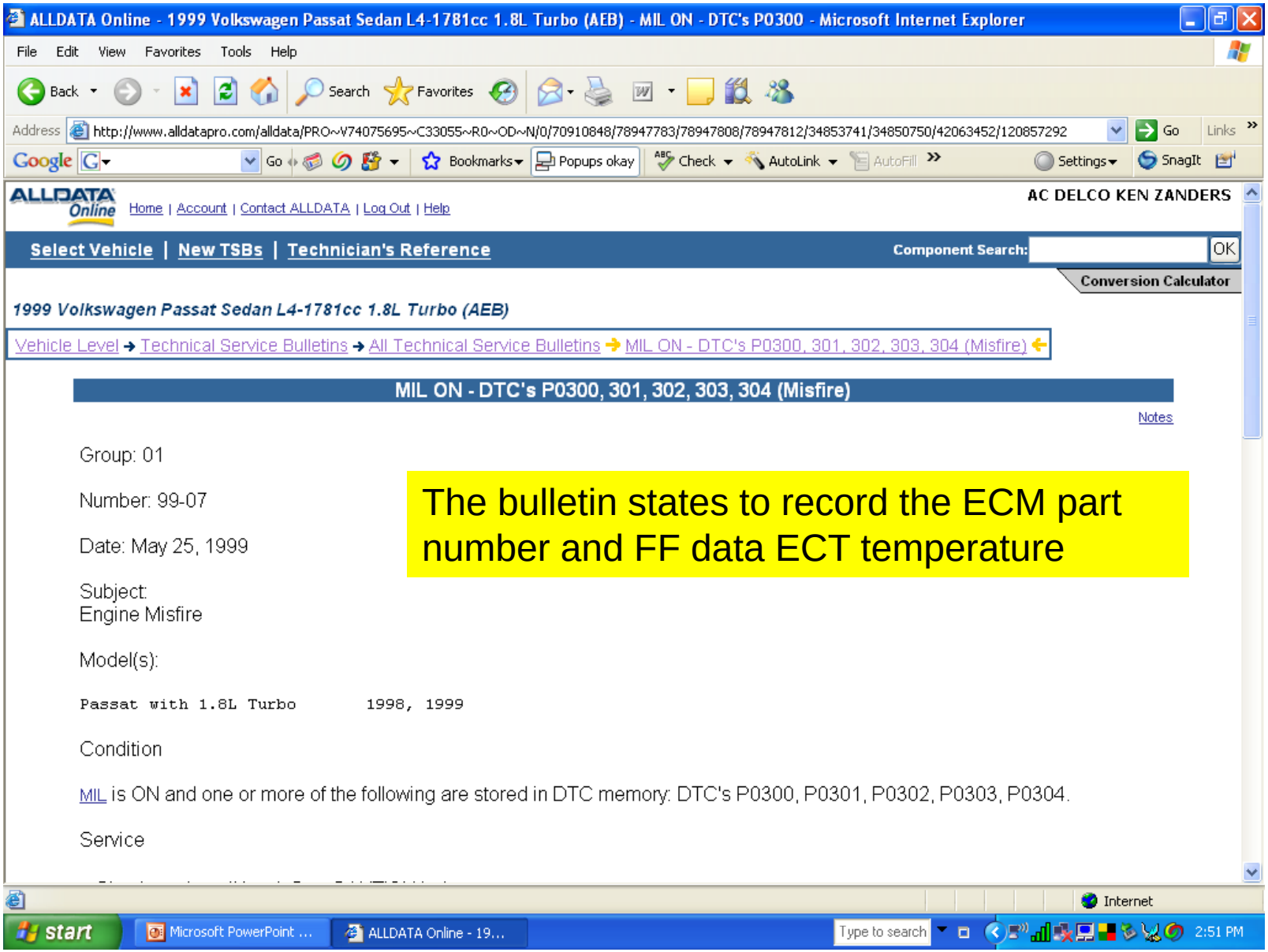
- This misfire activity appears to be ignition related

1999 Volkswagon Passat

- A swap and drop technique shows that the misfire does not follow the coil placement
- It appears that this may be a PCM, power stage output or a wiring issue

TSB Search

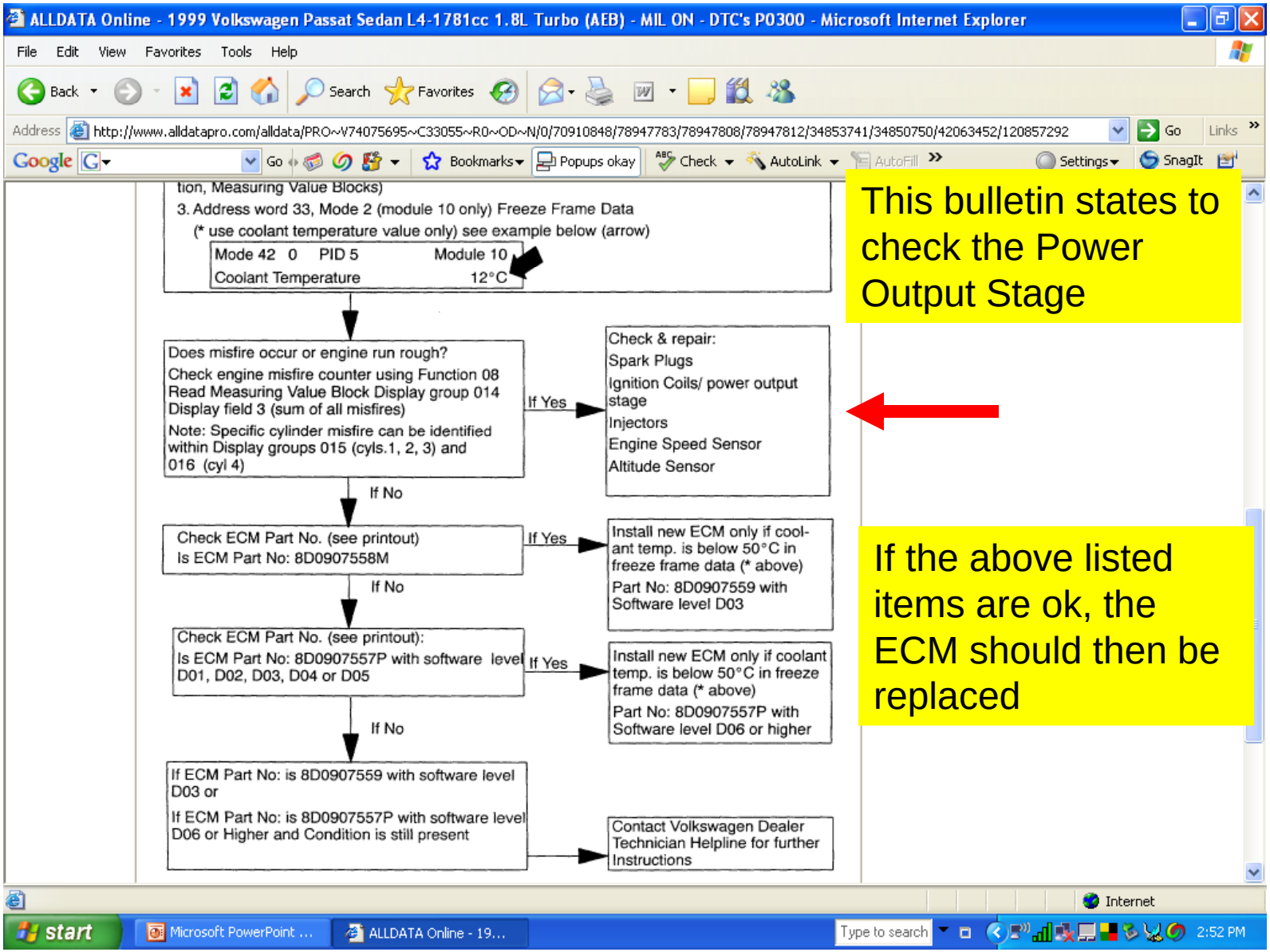
P0300 Codes



The bulletin states to record the ECM part number and FF data ECT temperature

1999 Volkswagon Passat

- ECM part # 8D0907558M was noted on the current ECM
- The Freeze Frame shows code storage was indicated at 100 F
- TSB# 99-07; Dated: May 25,1999 addresses P0300 codes



This bulletin states to check the Power Output Stage

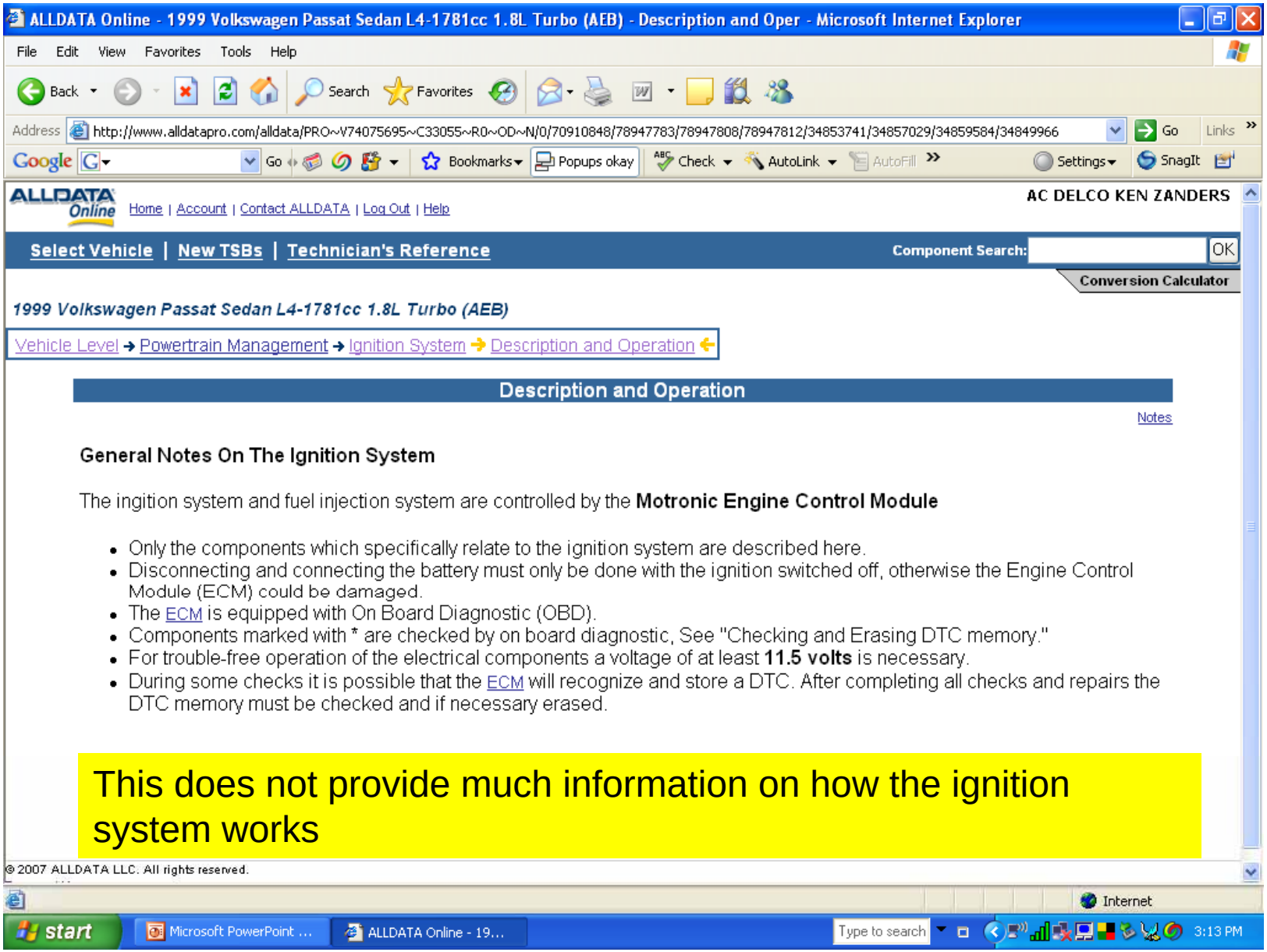
If the above listed items are ok, the ECM should then be replaced

1999 Volkswagon Passat

- The cost of the new ECM is $750.00
- It is important to make a through checkout of the ignition system before buying a new ECM

Description and Operation

Passat Ignition System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Address http://www.alldatapro.com/alldata/PRO~V74075695~C33055~R0~OD~N/0/70910848/78947783/78947808/78947812/34853741/34857029/34859584/34849966
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Select Vehicle | New TSBs | Technician's Reference
Component Search: OK
Conversion Calculator
1999 Volkswagen Passat Sedan L4-1781cc 1.8L Turbo (AEB)
Vehicle Level → Powertrain Management → Ignition System → Description and Operation
Description and Operation
Notes
General Notes On The Ignition System
The ingition system and fuel injection system are controlled by the Motronic Engine Control Module
Only the components which specifically relate to the ignition system are described here.
Disconnecting and connecting the battery must only be done with the ignition switched off, otherwise the Engine Control Module (ECM) could be damaged.
The ECM is equipped with On Board Diagnostic (OBD).
Components marked with * are checked by on board diagnostic, See "Checking and Erasing DTC memory."
For trouble-free operation of the electrical components a voltage of at least 11.5 volts is necessary.
During some checks it is possible that the ECM will recognize and store a DTC. After completing all checks and repairs the DTC memory must be checked and if necessary erased.
This does not provide much information on how the ignition system works
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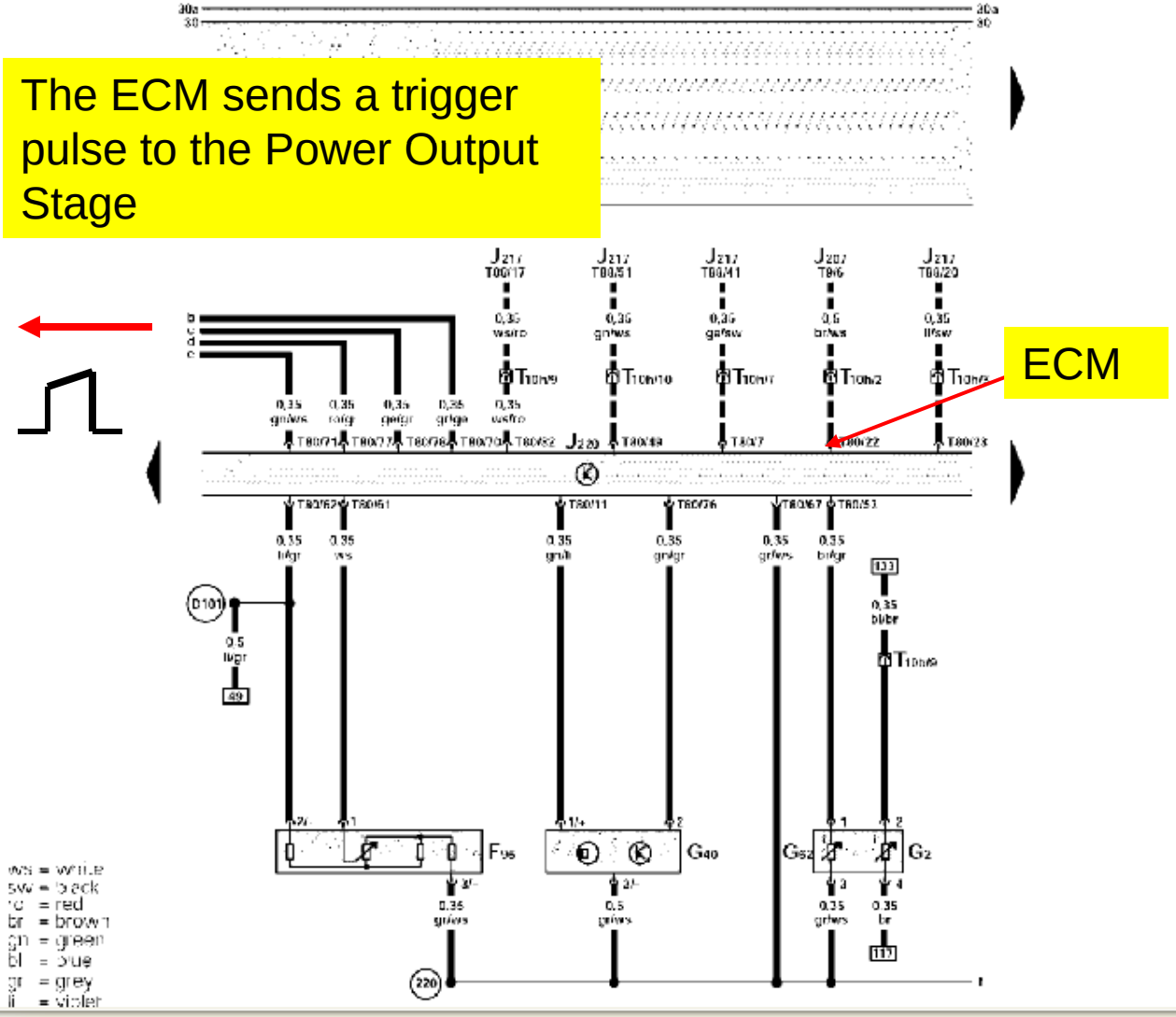
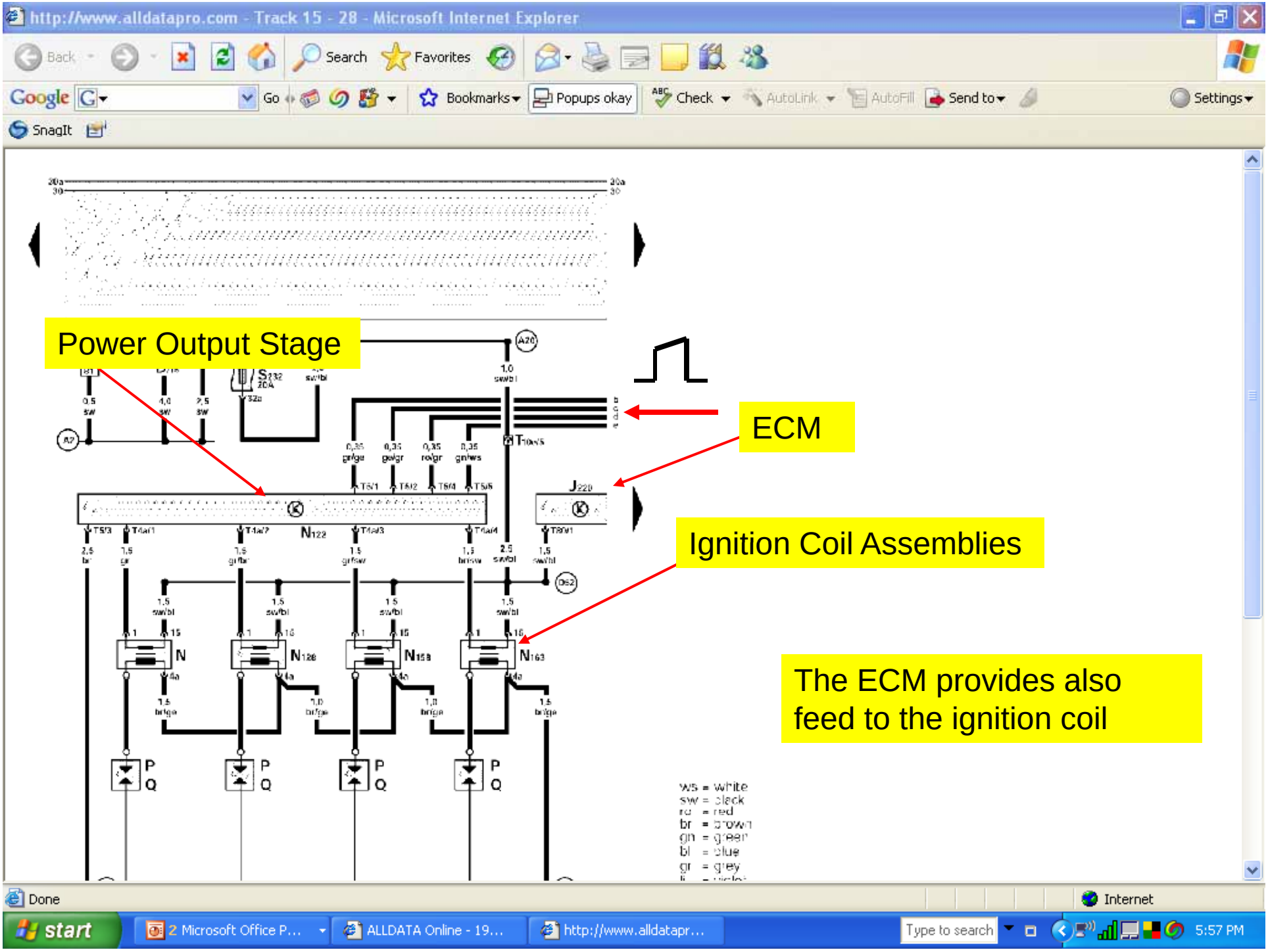
3:13 PM

The ECM sends a trigger pulse to the Power Output Stage

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Power Output Stage
ECM
Ignition Coil Assemblies
The ECM provides also feed to the ignition coil
N
N128
N158
N163
J220
N122
ws = white
sw = black
rt = red
br = brown
gn = green
bl = blue
gr = grey
Done
Internet
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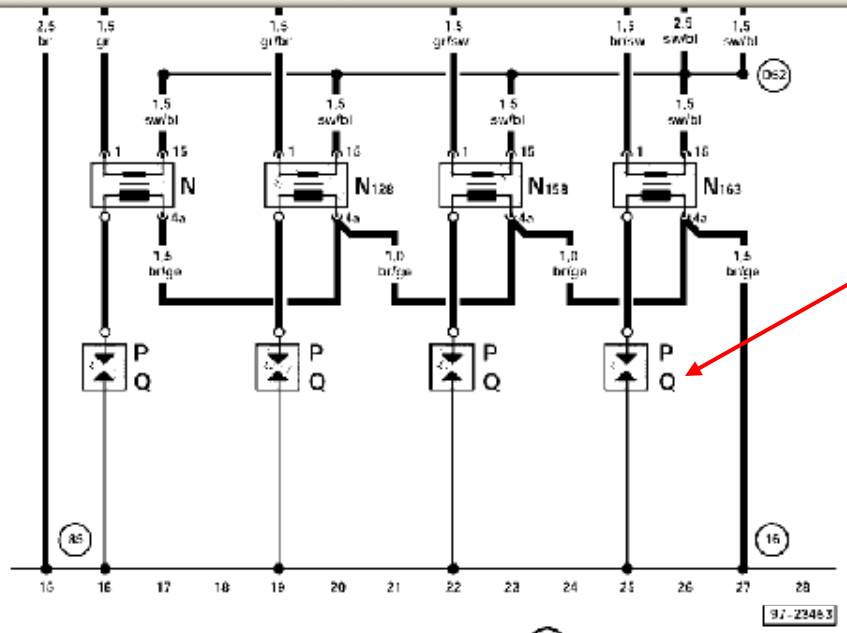

Spark Plugs

ws = white
sw = black
rt = red
br = brown
gn = green
bl = blue
gr = grey
li = violet
ge = yellow

D - Ignition/Starter Switch
J220 - Motronic Engine Control Module (ECM)
N - Ignition Coil
N122 - Power Output Stage
N128 - Ignition Coil 2
N158 - Ignition Coil 3
N163 - Ignition Coil 4
P - Spark Plug Connectors
Q - Spark Plugs
S231 - Fuse 31 in fuse holder
S232 - Fuse 32 in fuse holder
T4a - 4-Pin Connector, black, on power output stage
T5 - 5-Pin Connector, black, on power output stage
T10e - 10-Pin Connector, black, on protective housing for control module, in engine compartment, left
T80 - Connector, 80 point, on Motronic Engine Control Module (ECM)

(16) - Ground connection -1-, on valve cover
(85) - Ground connection -1-, in engine compartment wiring harness
(A2) - plus connection (15), in instrument panel wiring harness
(A30) - wire connection (15a), in instrument panel wiring harness
(D52) - plus connection (15a), in engine compartment wiring harness

The Power Output Stage will then ground the primary circuit for the coils thus firing the spark plugs

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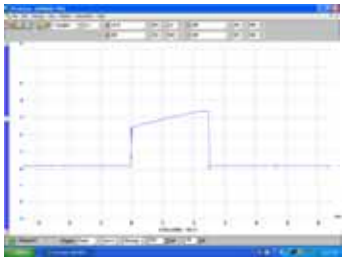
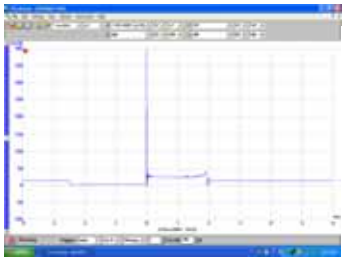
ECM



Trigger Pulse is sent

Power Output Stage

Ignition Coil Fires

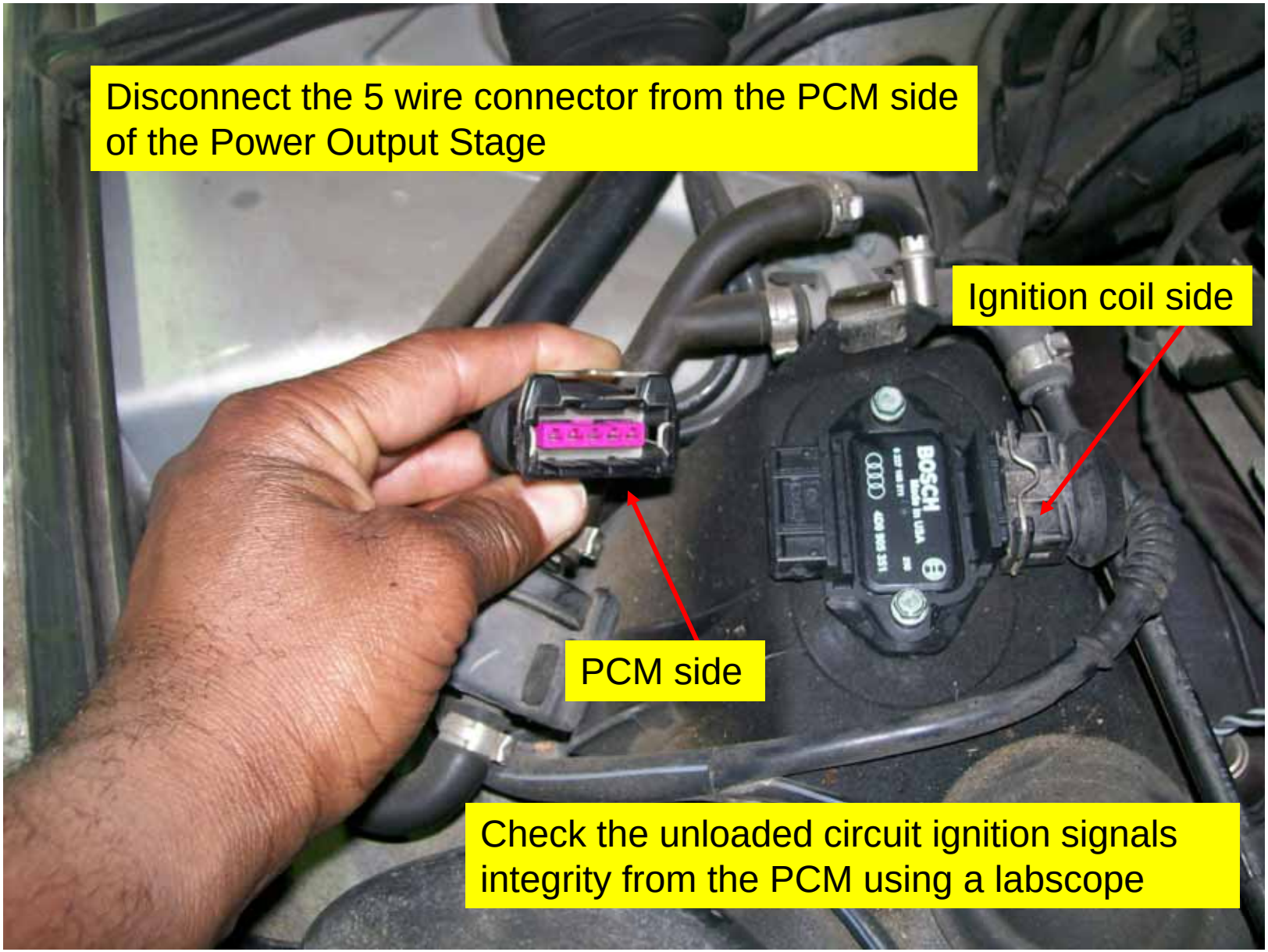


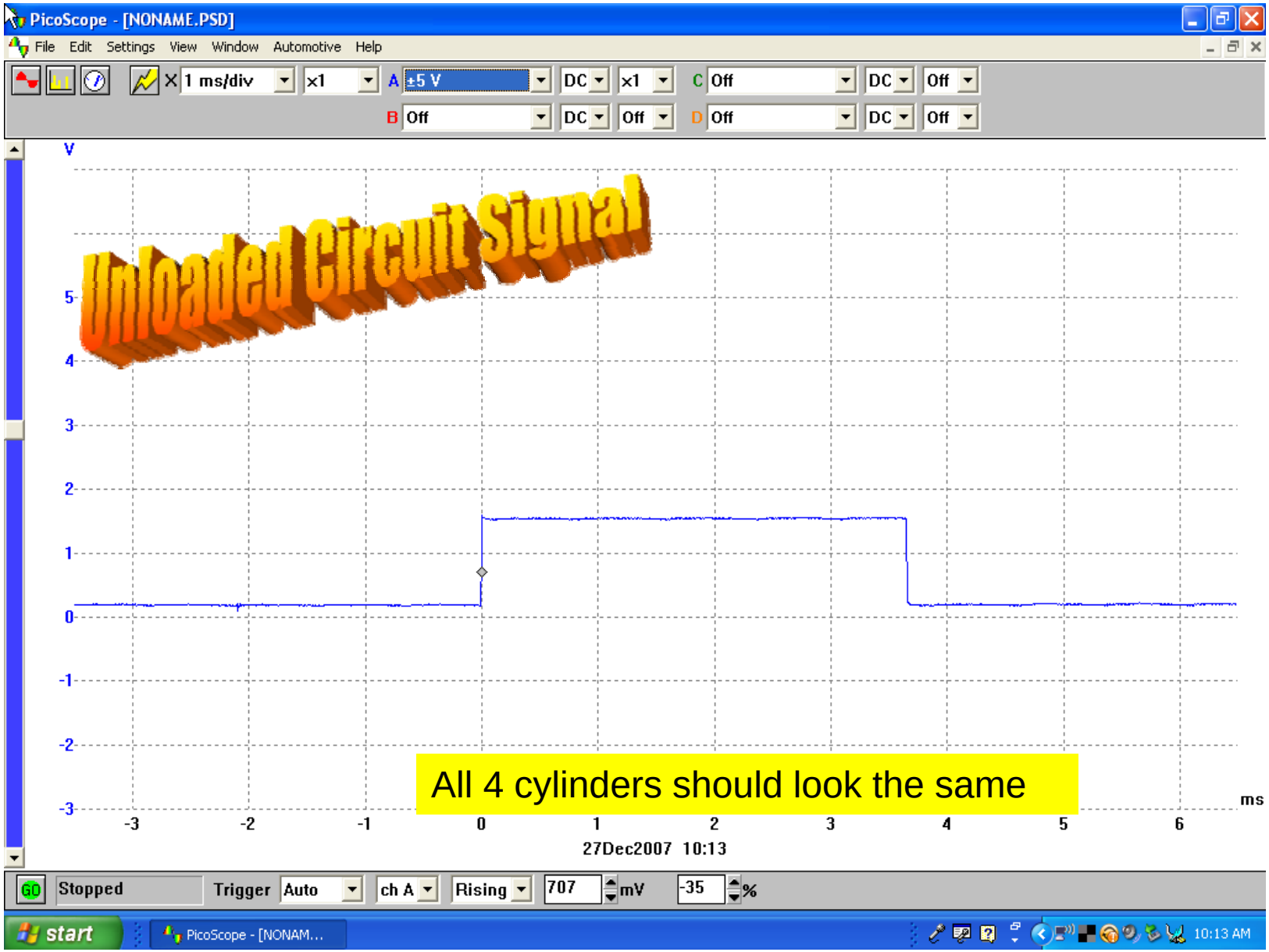
Primary Circuit is Grounded

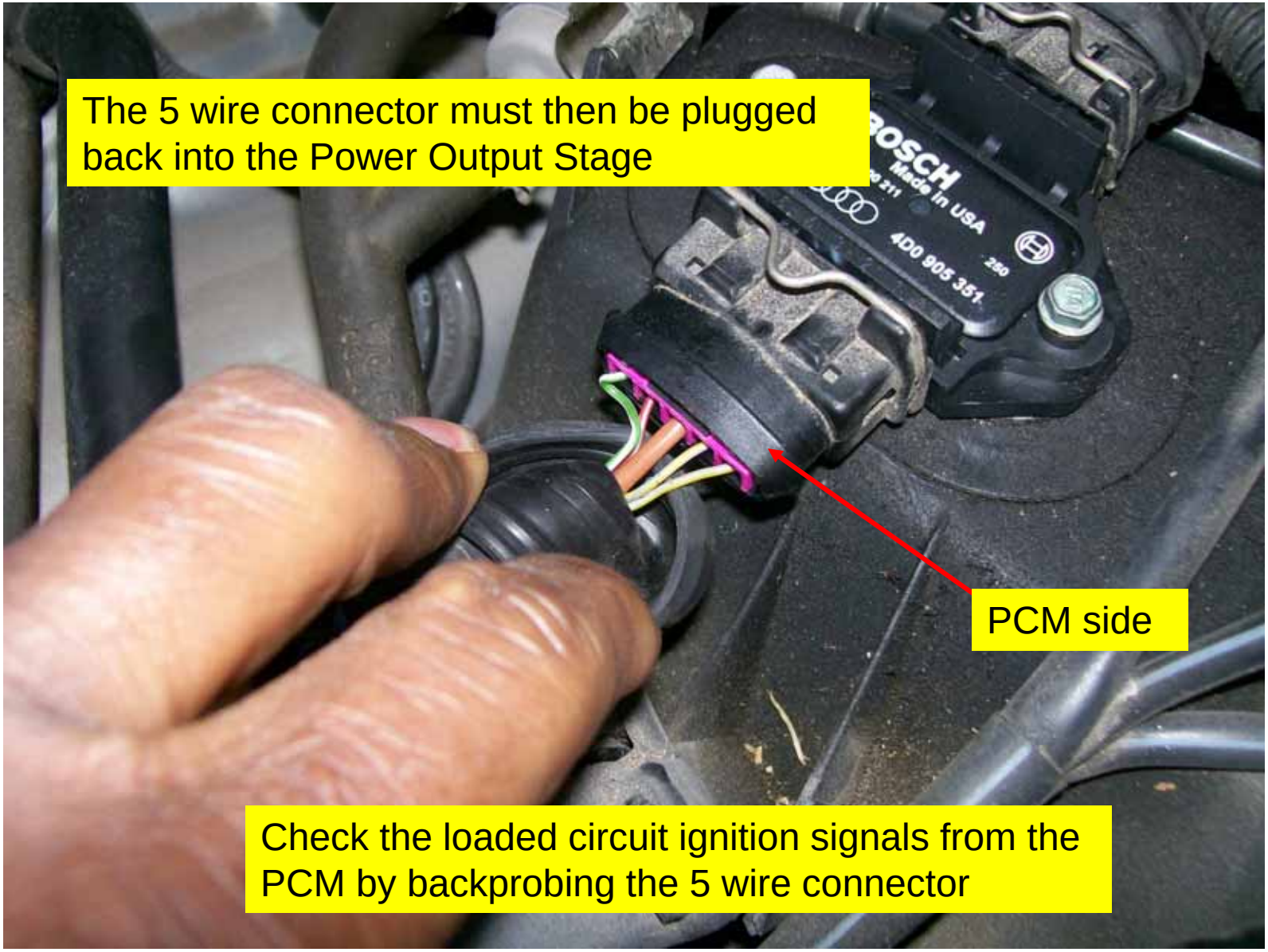
Ignition Coil

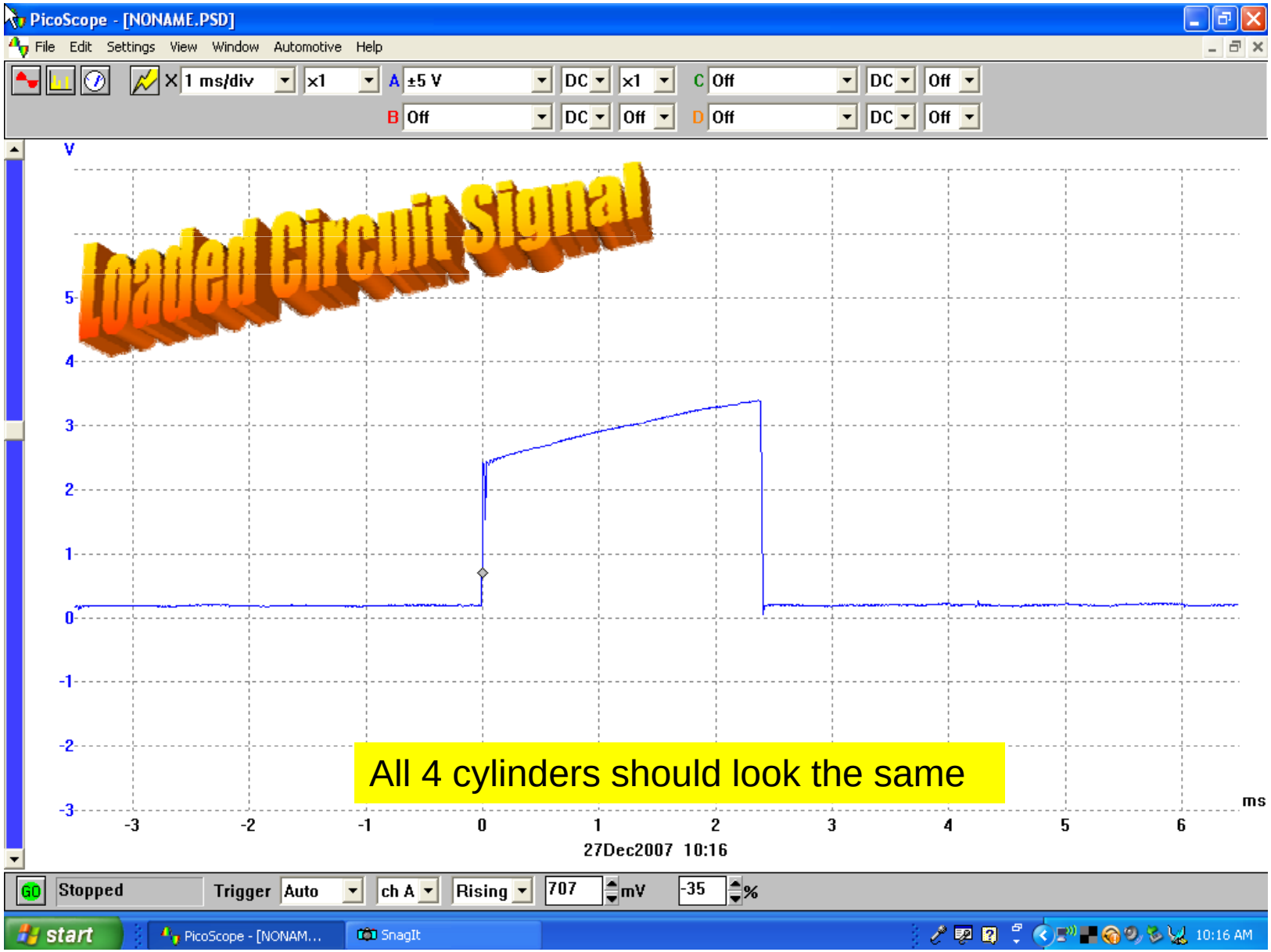
Activation Checking

Signal from PCM


Disconnect the 5 wire connector from the PCM side of the Power Output Stage
Ignition coil side
PCM side
Check the unloaded circuit ignition signals integrity from the PCM using a labscope

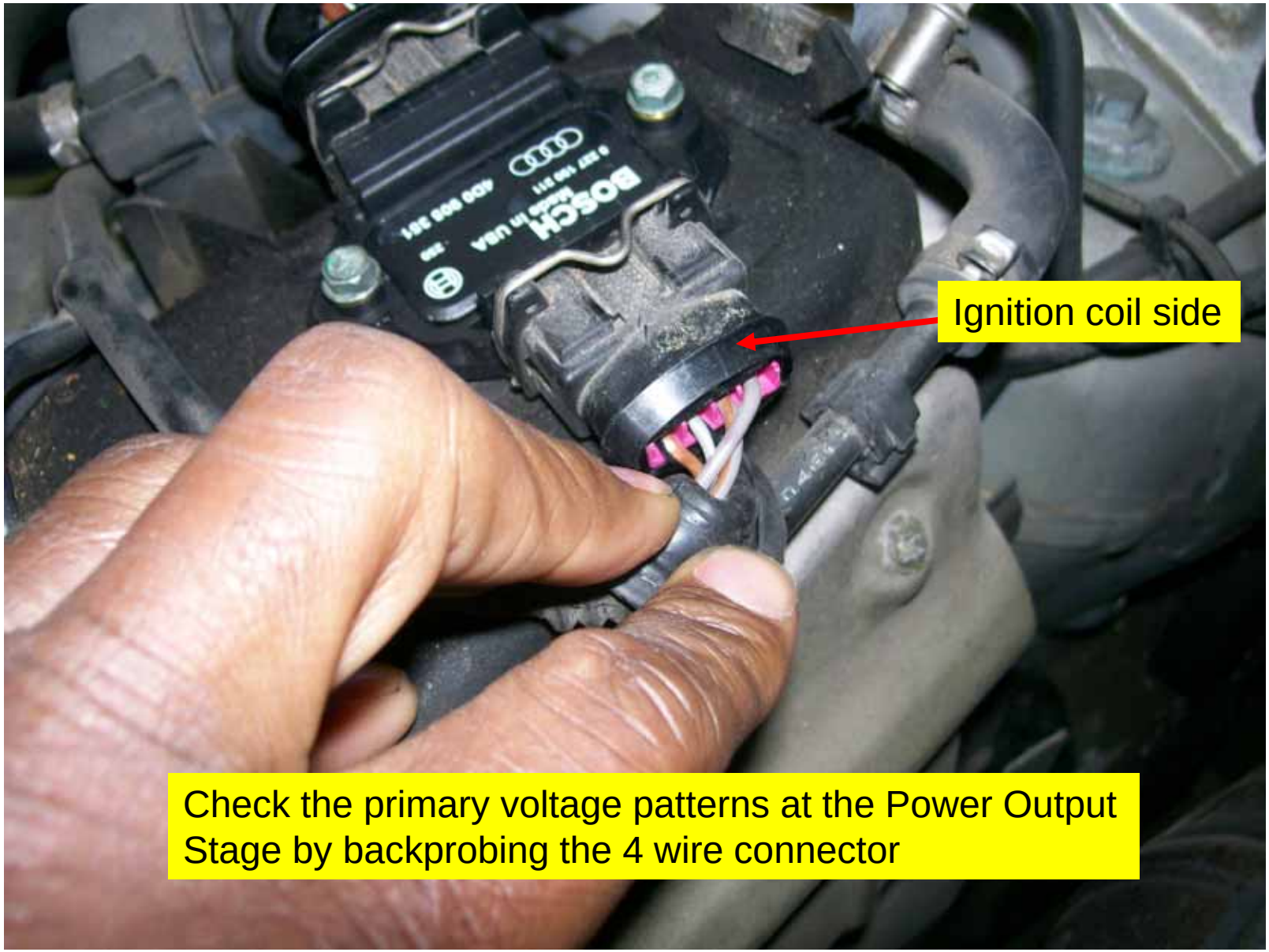

PicoScope - [NONAME.PSD]
File Edit Settings View Window Automotive Help
1 ms/div
A ±5 V
B Off
C Off
D Off
V
Unloaded Circuit Signal
All 4 cylinders should look the same
ms
27Dec2007 10:13
Stopped
Trigger
Auto
ch A
Rising
707
mV
-35
%
start
PicoScope - [NONAM...
10:13 AM

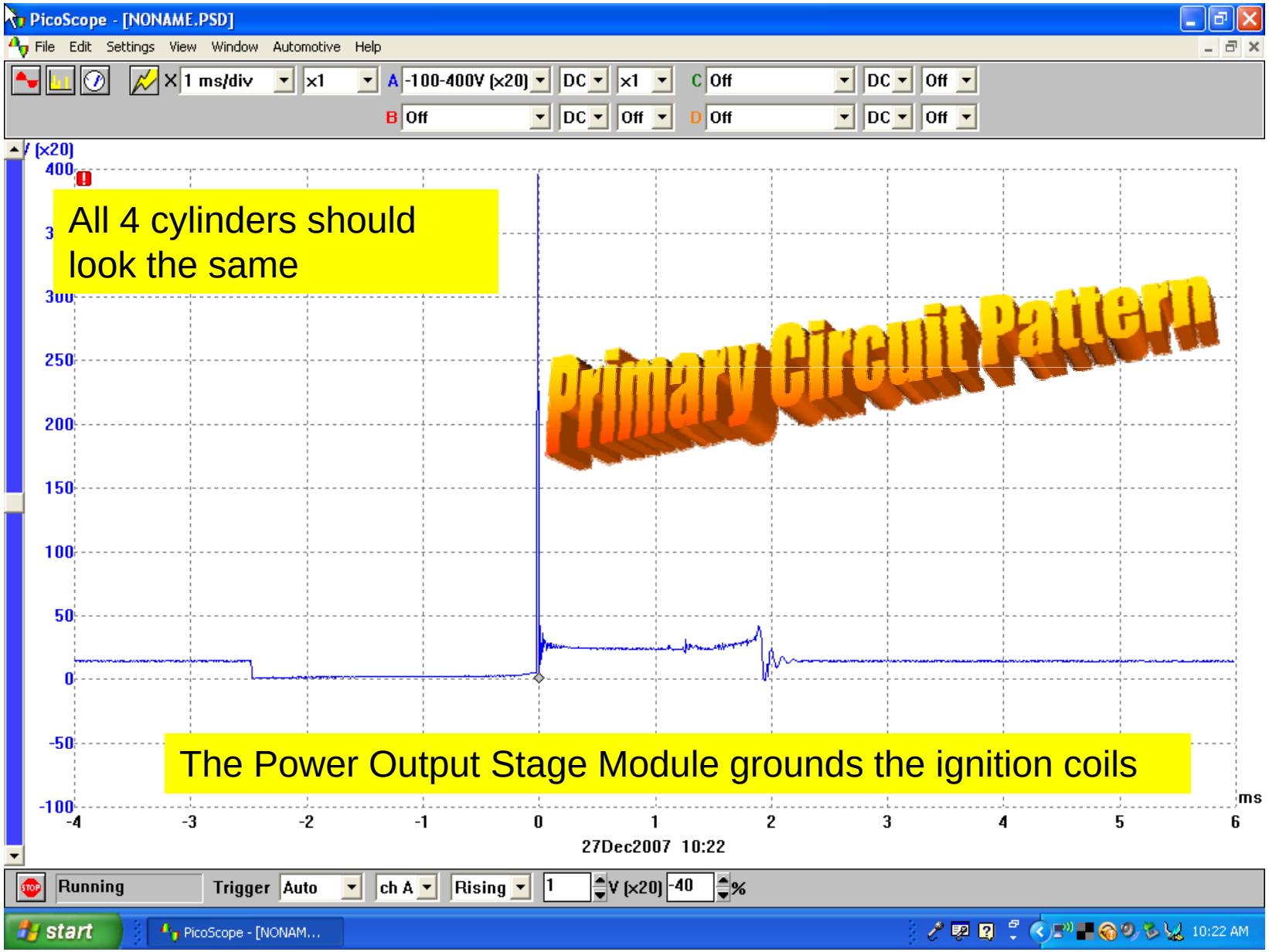

The 5 wire connector must then be plugged back into the Power Output Stage
BOSCH
Made in USA
4D0 905 351
PCM side
Check the loaded circuit ignition signals from the PCM by backprobing the 5 wire connector


PicoScope - [NONAME.PSD]
File Edit Settings View Window Automotive Help
X 1 ms/div x1 A ±5 V DC x1 C Off DC Off
B Off DC Off D Off DC Off
V
Loaded Circuit Signal
5
4
3
2
1
0
-1
-2
-3
All 4 cylinders should look the same
-3 -2 -1 0 1 2 3 4 5 6
ms
27Dec2007 10:16
GO Stopped Trigger Auto ch A Rising 707 mV -35 %
start PicoScope - [NONAM... SnagIt 10:16 AM

Power Output Stage Checking

Primary Circuit Grounding


Ignition coil side
Check the primary voltage patterns at the Power Output Stage by backprobing the 4 wire connector

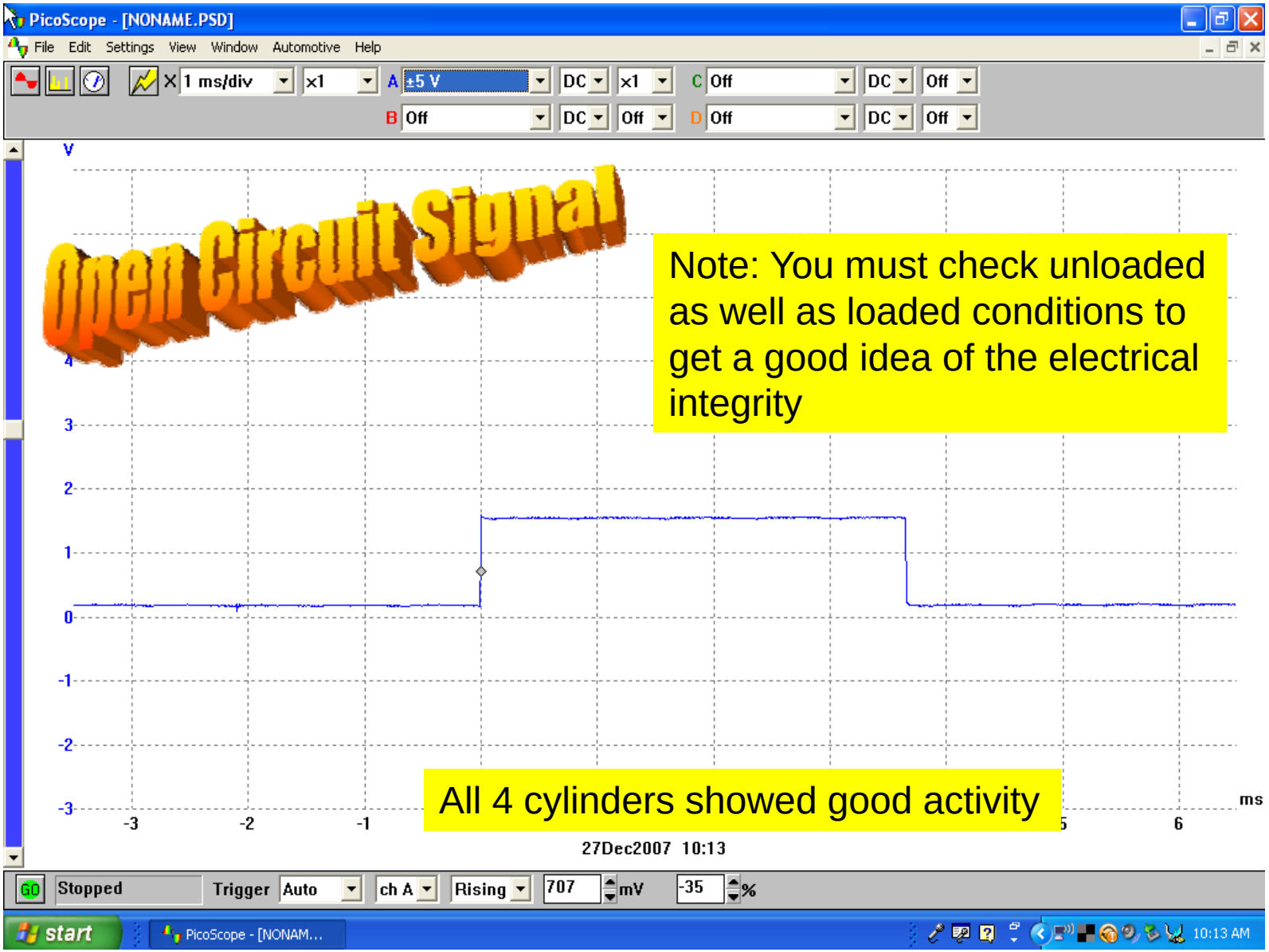

PicoScope - [NONAME.PSD]
File Edit Settings View Window Automotive Help
1 ms/div
A -100-400V (x20)
B Off
C Off
D Off
(x20)
400
300
250
200
150
100
50
0
-50
-100
All 4 cylinders should look the same
Primary Circuit Pattern
The Power Output Stage Module grounds the ignition coils
-4 -3 -2 -1 0 1 2 3 4 5 6
ms
27Dec2007 10:22
Running
Trigger
Auto
ch A
Rising
V (x20)
%
start
PicoScope - [NONAM...
10:22 AM

1999 Volkswagon Passat

PCM Activation Checking

1999 Volkswagon Passat

- Cylinders 1,2,3 and 4 showed good open circuit PCM ignition trigger patterns

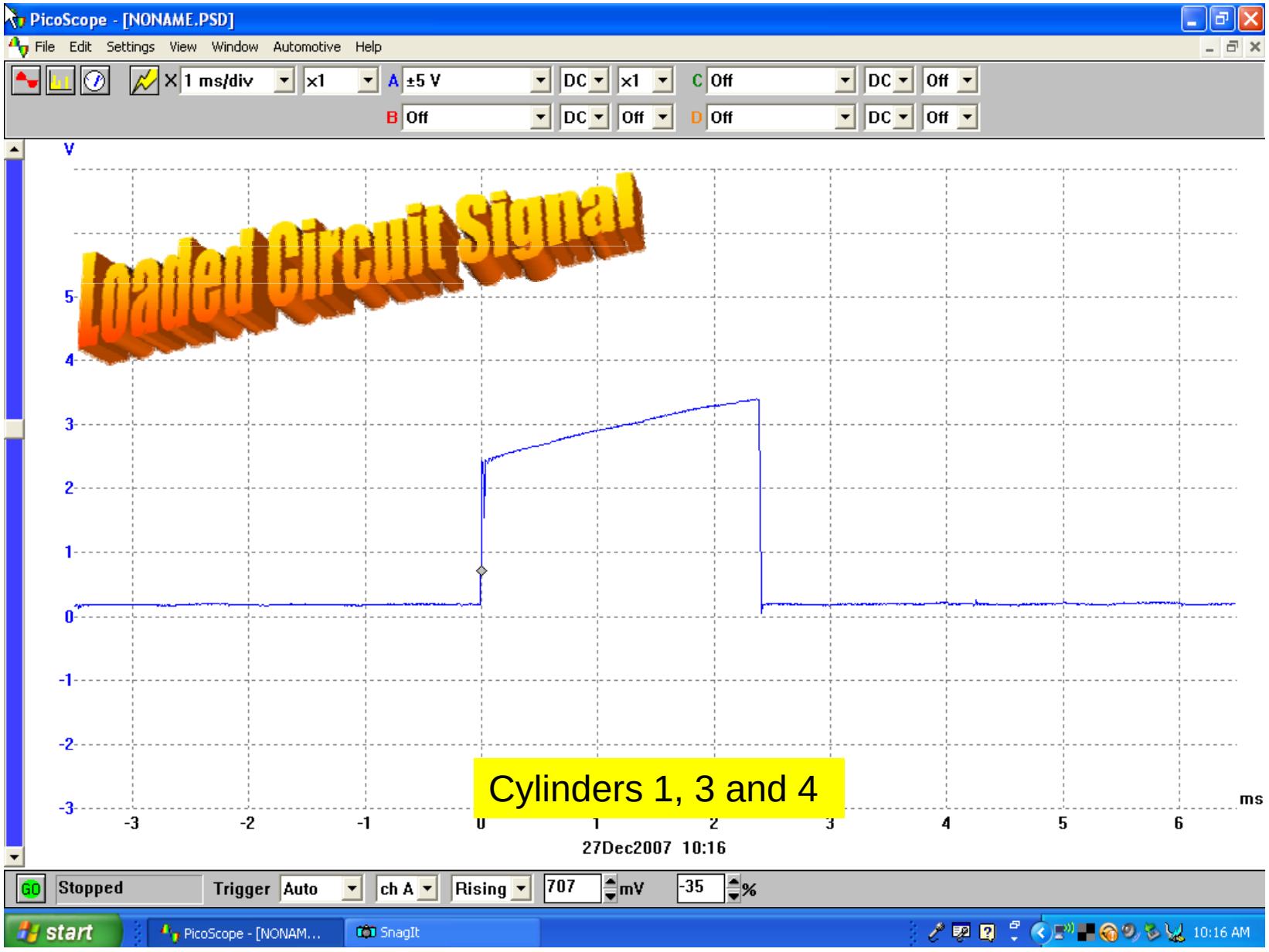

PicoScope - [NONAME.PSD]
File Edit Settings View Window Automotive Help
1 ms/div
A ±5 V
B Off
C Off
D Off
Open Circuit Signal
Note: You must check unloaded as well as loaded conditions to get a good idea of the electrical integrity
All 4 cylinders showed good activity
V
ms
27Dec2007 10:13
GO Stopped Trigger Auto ch A Rising 707 mV -35 %
start
10:13 AM

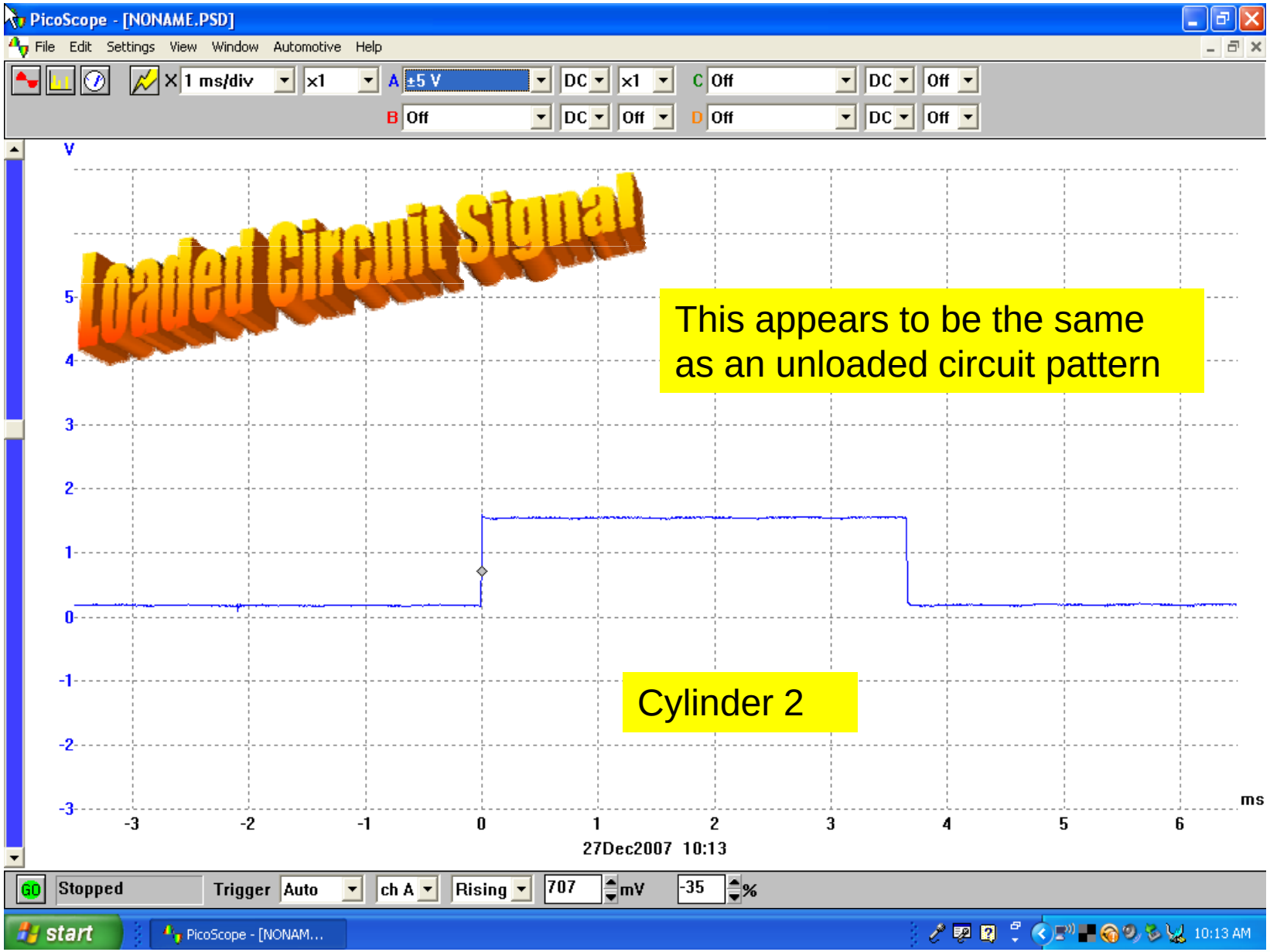
1999 Volkswagon Passat

Power Stage Output Checking

1999 Volkswagon Passat

- Cylinders 1,3 and 4 showed good loaded circuit PCM ignition trigger patterns
- Cylinder 2 pattern looked the same as the unloaded circuit pattern
- The *Power Output Stage* is what provides the loading effect for this circuit


PicoScope - [NONAME.PSD]
File Edit Settings View Window Automotive Help
1 ms/div
A ±5 V
B Off
C Off
D Off
Loaded Circuit Signal
V
ms
27Dec2007 10:16
Cylinders 1, 3 and 4
Stopped
Trigger Auto
ch A
Rising
707 mV
-35 %
start
PicoScope - [NONAM...
SnagIt
10:16 AM


PicoScope - [NONAME.PSD]
File Edit Settings View Window Automotive Help
1 ms/div
A ±5 V
B Off
C Off
D Off
Loaded Circuit Signal
This appears to be the same as an unloaded circuit pattern
Cylinder 2
V
ms
27Dec2007 10:13
Stopped
Trigger Auto
ch A Rising
707 mV
-35 %
start
PicoScope - [NONAM...
10:13 AM

The PCM is working as designed, but the Power Stage Output needs to be replaced

1999 Volkswagon Passat

- The Power Stage Output was replaced and the vehicle is now operating as designed.

Thank You for Attending