FORD 6R60/80
EXTREMELY HARSH UP & DOWN SHIFTS

COMPLAINT: A Ford family vehicle with the 6R60/80 transmission may have a complaint of extremely harsh up or downshifts under heavy throttle or forced downshifts. These shifts can be quite violent and can actually result in a fail-safe condition.
Other complaints can be but not limited to:
1. Falling in and out of gear.
2. Setting DTC U0101 - Lost Communication With TCM.
3. Setting DTC U0140 - Lost Communication With BCM.
4. Setting DTC U1900 - CAN Communication Bus Fault.
5. Setting DTC P0528 - Fan Speed Sensor Circuit No Signal.
The “Wrench” Lamp is on but no transmission codes are set, See Figure 1.
Rebuilding or replacing the transmission will not fix the vehicle, nor will clearing the KAM and performing the drive cycle, reprogramming will also be ineffective.
A voltage check of the CAN BUS circuits which can be checked at DLC pins 6 and 14 indicated that the voltage was much to high, normal voltage readings on the CAN HI circuit is typically 2.5V to 3.5V and 1.5V to 2.5V on the CAN LO circuit. A resistance check across DLC pins 6 and 14 read 63.4 Ohms which indicated there was not a CAN BUS wiring problem. It would appear the high CAN voltage was being induced from another source in the vehicle. Some modules on the CAN communication network would not communicate.
In some instances the transmission has been replaced, more than once, the ECM has been replaced, the TCM has been reprogrammed and the CAN wiring harness has been removed and inspected.

CAUSE: Ford three valve modular engines such as the 4.6L, 5.4L and 6.8L use Coil On Plug primary ignition and long reach spark plugs. The coil packs and/or spark plugs are faulty causing the above mentioned complaints.
The CAN BUS wire harness is routed close to these coil packs, especially Coil On Plug #4. The electrical interference produced by faulty coil packs are what induced the high voltage into the CAN BUS wiring resulting in the high voltage seen on the waveform patterns.
This is also responsible for the DTCs that were set as well as the lack of communication with certain modules. There also ***may*** be a engine miss felt but no misfire codes are set.
Most importantly it is the faulty coil packs and spark plugs that are causing the violent on throttle shifts from the transmission as well as the sudden neutralization and the limp in condition.

CORRECTION: Replace all spark plugs and coil packs preferably with O.E.M. parts.

SERVICE INFORMATION:
To begin the diagnosis, connect a multimeter set to ohms to Data Link Connector terminals 6 and 14. The resistance should be between 60 and 65 ohms, if it is, the CAN BUS wires are not shorted or open, Refer to Figure 2.
Next connect a scope to DLC terminals 6 and 14 in order to check the voltage on the CAN Hi and CAN LO circuits. CAN HI should be 2.5 to 3.5 Volts, Refer to Figures 3 and 4. CAN LO should be 1.5 to 2.5 Volts. Higher voltage than that indicates an EMI problem. Even though the CAN BUS wires are twisted they are not shielded and can therefore be affected by electrical noise.
Next, connect a scan tool to the DLC and proceed to the “Global OBD-II” area. Navigate to the “Misfire Counter”. Check to see if misfires are present even though you do not have any misfire codes, Refer to Figure 5.

If evidence of misfire events are present use the scan tool to navigate to the Mode $06 area where the technician will be able to read the Component ID (CID)that's being test as well as the Test ID (TID) result of the test.
With Ford OBD-II Mode $06, Misfire CIDs range from 53 to 56. CID 53 is cylinder misfire events. CID 54 is the highest rate and threshold of a Type "A" misfire. CID 55 is the highest rate and threshold of a Type "B" misfire. CID 56 is the number of cylinder events that were tested, Refer to Figure 6.
TIDs run from 1 through 10, these numbers represent which cylinder has been tested, Refer to Figure 6. If the test value exceeds the test limit then the respective cylinder components must be inspected.
Another test that can be performed to confirm which cylinder(s) is having the misfire event, is a Cylinder Power Balance Test as seen in Figure 7. With positive test results the malfunctioning cylinder(s) should have their spark plug(s) and coil pack(s) replaced, it is recommended that ALL coil packs and spark plugs be replaced at this time with O.E.M. components. All previous testing has been done to diagnose the electrical ignition system components.
The mechanical cylinder contribution can be accomplished by performing a "Relative Compression" test, Refer to Figure 8, in the event that the engine has a serious mechanical problem.

Faulty coil packs may have deteriorated boots which allow leakage which cause electrical interference. They may also have a burn spot on the boot which indicates electrical arcing, Refer to Figure 9.
When replacing the coil packs, make certain the spring contact that is inside the spark plug boot is all the way against the coil. Also check coil pack connectors and wiring for any problems that may prevent the coil pack from maximum efficiency.
The spark plugs that Ford uses in their 4.6L, 5.4L and 6.8L three valve modular engines is a long reach two piece design. Because of this, when spark plug removal is attempted by the inexperienced, the plugs break off in the cylinder head. This could turn into a very unpleasant situation unless some precautions are taken, Refer to Figure 10.
Before spark plug removal is attempted, bring the engine up to normal operating temperature. Perform a top engine decarbonizing procedure, See Figure 11, using one of the many products available in order to remove the carbon from the lower electrode shield of the spark plug which gets it stuck in the cylinder head.
Then with the coil on plug removed spray a rust inhibiting product into the spark plug hole, Refer to Figure 12. At this time, the spark plugs should unscrew in one piece. In the event the spark plug does break, repeat the rust inhibitor treatment and acquire one of the spark plug removal tool kits such as the Lisle LIS65600 shown in Figure 13 to remove the broken piece of the spark plug.
Before the new spark plugs are installed, put a thin coating of a copper based anti-seize compound on the lower electrode shield of the spark plug to keep it from seizing to the cylinder head as seen in Figure 14. DO NOT apply any anti-seize compound at the tip of the electrode.
This issue should not exist after model year 2008 as the cylinder head was redesigned and does not use a shrouded long reach spark plug.
Set spark plug gap to .045" to .051". Using a 9/16" spark plug socket, torque spark plugs to 25 lb. ft.

Many thanks to "G" Truglia of A.T.T.S for providing technical information and photos used in this bulletin.

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THE WRENCH LAMP MAY BE ON BUT NO TRANSMISSION CODES ARE SET

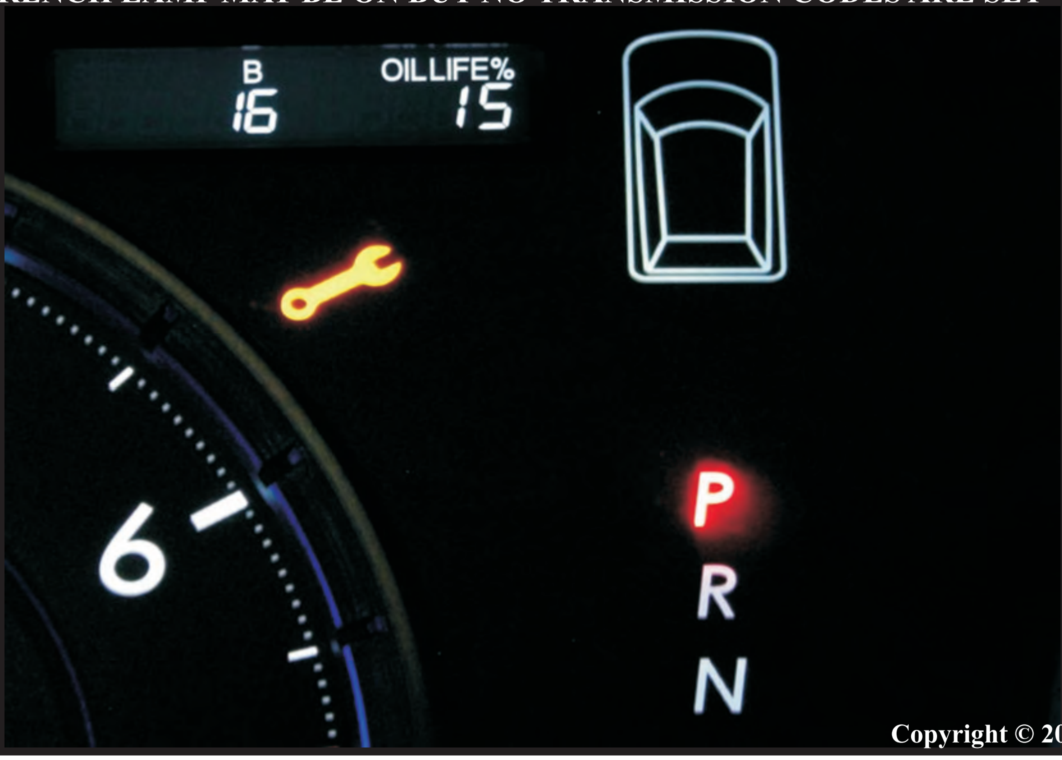
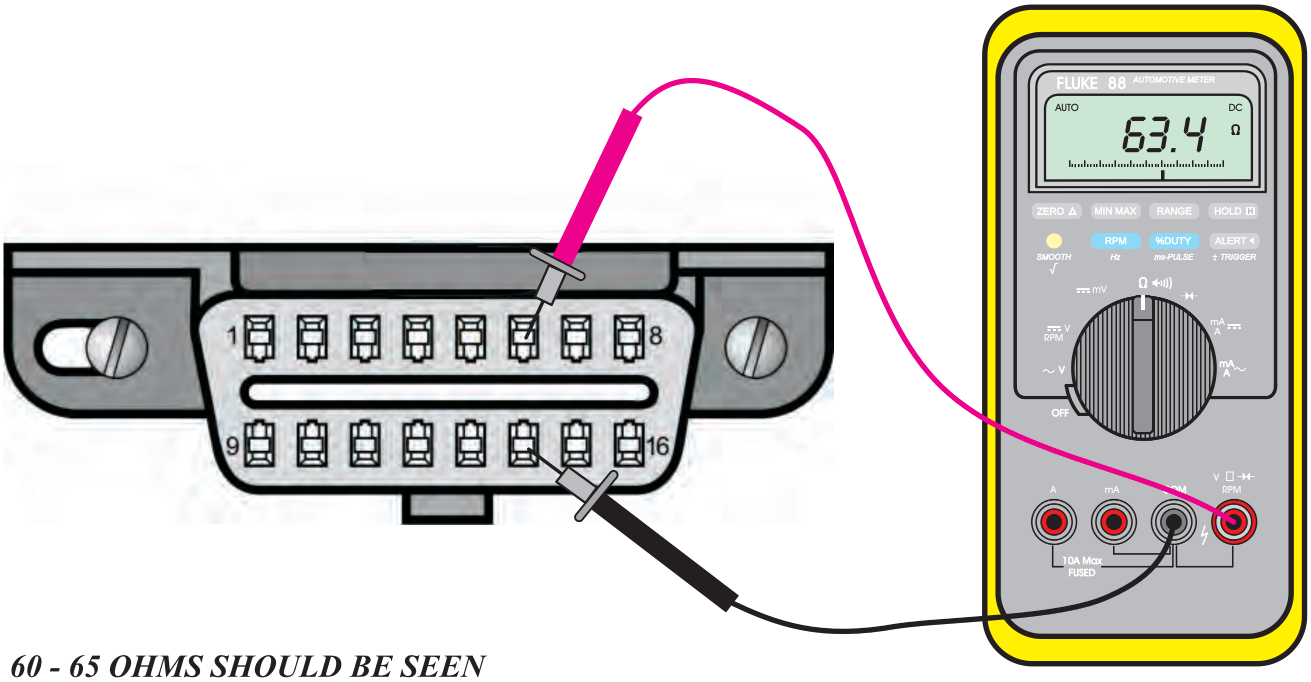


Figure 1

CONNECT METER TO DLC PINS 6 AND 14



60 - 65 OHMS SHOULD BE SEEN IF CIRCUITS ARE GOOD

Figure 2

FORD 6R60/80

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VOLTAGE ON CAN BUS CIRCUITS ARE TOO HIGH

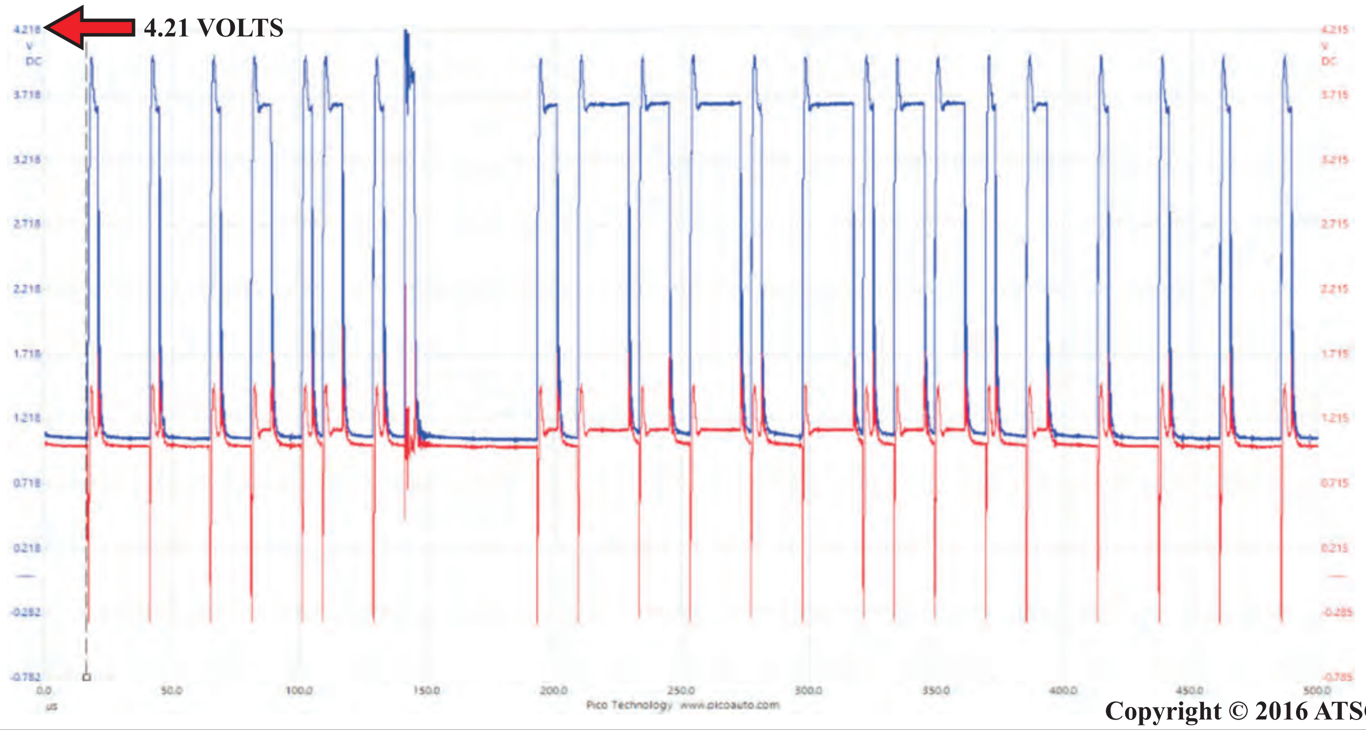

Figure 3

VOLTAGE ON CAN BUS CIRCUITS ARE CORRECT

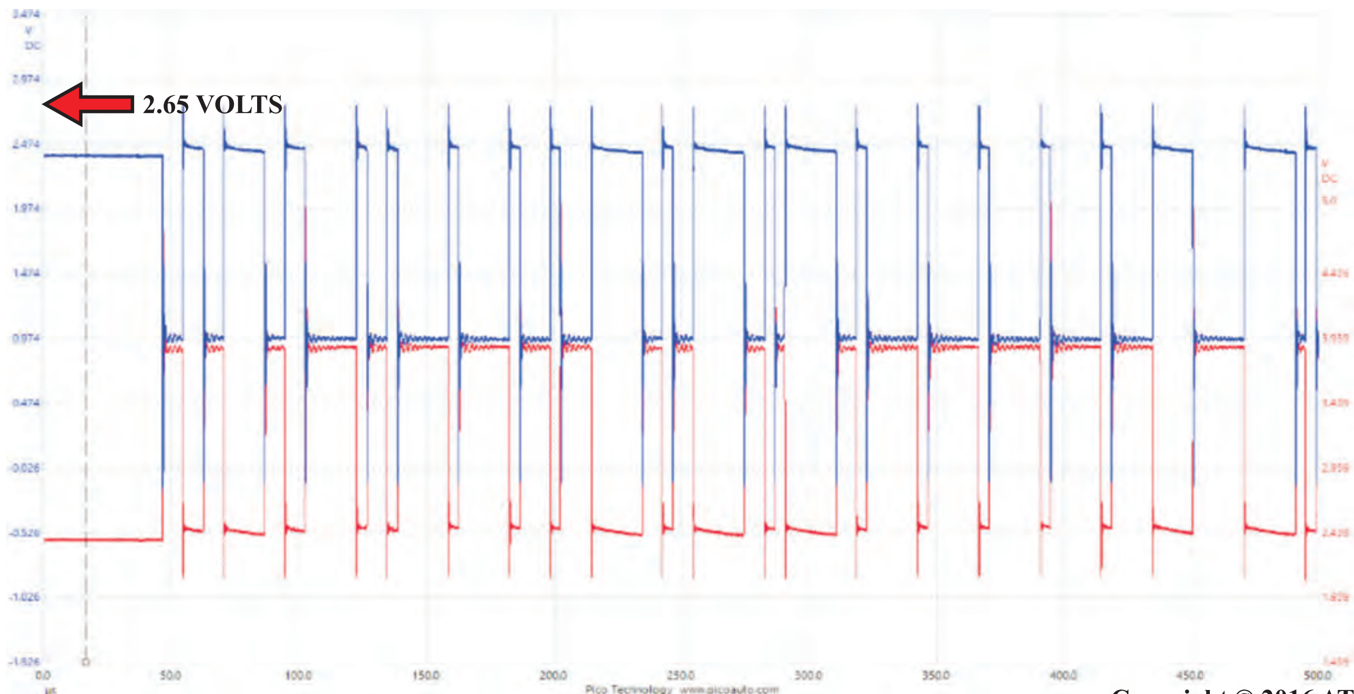

Figure 4

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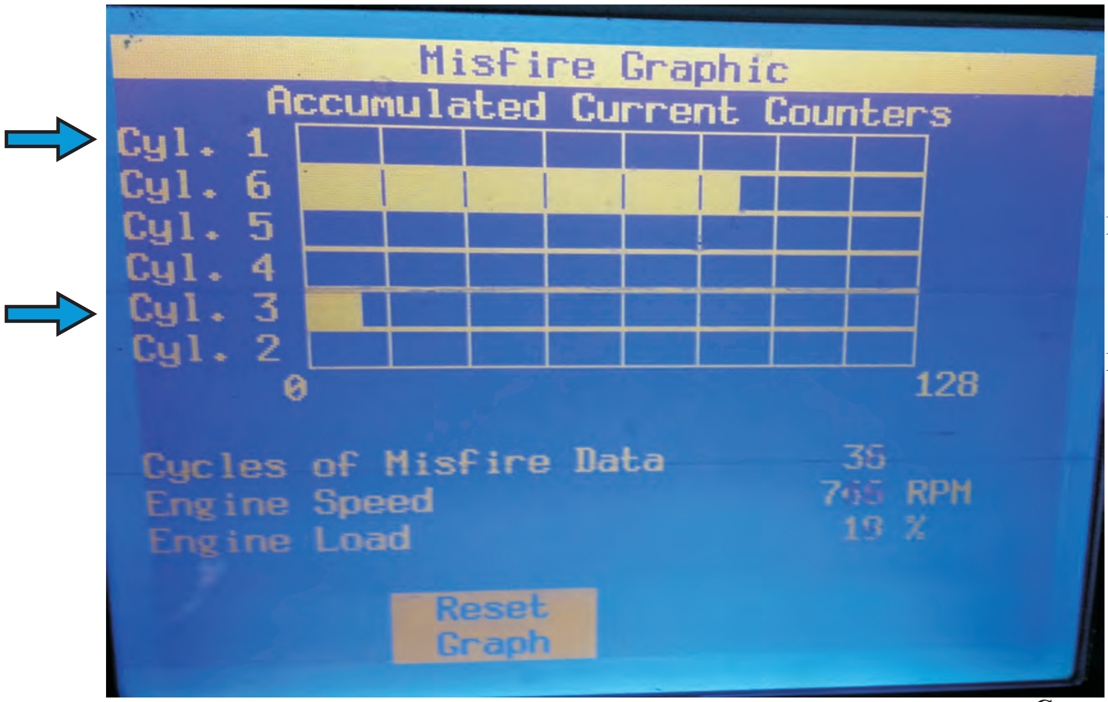
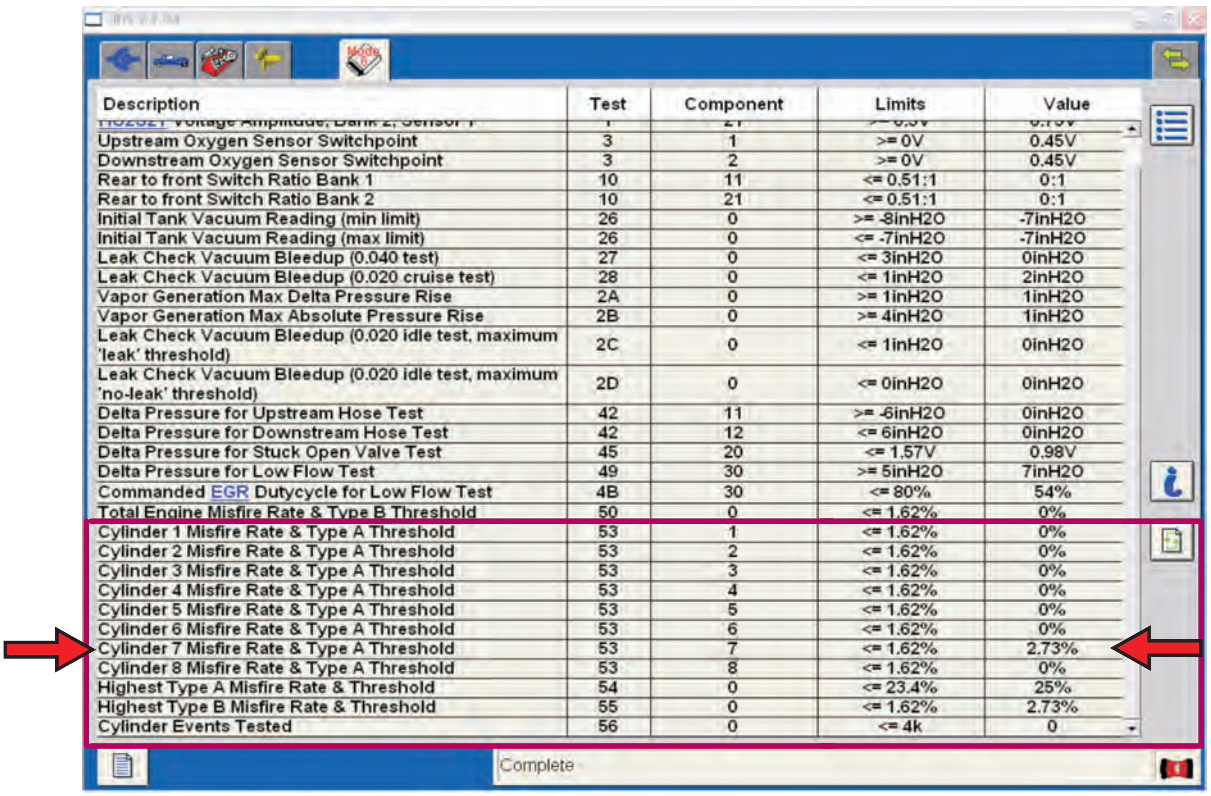
GLOBAL OBD-II MISFIRE COUNTER



CYLINDER 6 HAS A HIGH MISFIRE COUNT

CYLINDER 3 HAS A LOW MISFIRE COUNT

Figure 5



Description	Test	Component	Limits	Value
Upstream Oxygen Sensor Switchpoint	3	1	>= 0V	0.45V
Downstream Oxygen Sensor Switchpoint	3	2	>= 0V	0.45V
Rear to front Switch Ratio Bank 1	10	11	<= 0.51:1	0:1
Rear to front Switch Ratio Bank 2	10	21	<= 0.51:1	0:1
Initial Tank Vacuum Reading (min limit)	26	0	>= -8inH2O	-7inH2O
Initial Tank Vacuum Reading (max limit)	26	0	<= -7inH2O	-7inH2O
Leak Check Vacuum Bleedup (0.040 test)	27	0	<= 3inH2O	0inH2O
Leak Check Vacuum Bleedup (0.020 cruise test)	28	0	<= 1inH2O	2inH2O
Vapor Generation Max Delta Pressure Rise	2A	0	>= 1inH2O	1inH2O
Vapor Generation Max Absolute Pressure Rise	2B	0	>= 4inH2O	1inH2O
Leak Check Vacuum Bleedup (0.020 idle test, maximum 'leak' threshold)	2C	0	<= 1inH2O	0inH2O
Leak Check Vacuum Bleedup (0.020 idle test, maximum 'no-leak' threshold)	2D	0	<= 0inH2O	0inH2O
Delta Pressure for Upstream Hose Test	42	11	>= -6inH2O	0inH2O
Delta Pressure for Downstream Hose Test	42	12	<= 6inH2O	0inH2O
Delta Pressure for Stuck Open Valve Test	45	20	<= 1.57V	0.98V
Delta Pressure for Low Flow Test	49	30	>= 5inH2O	7inH2O
Commanded EGR Dutycycle for Low Flow Test	4B	30	<= 80%	54%
Total Engine Misfire Rate & Type B Threshold	50	0	<= 1.62%	0%
Cylinder 1 Misfire Rate & Type A Threshold	53	1	<= 1.62%	0%
Cylinder 2 Misfire Rate & Type A Threshold	53	2	<= 1.62%	0%
Cylinder 3 Misfire Rate & Type A Threshold	53	3	<= 1.62%	0%
Cylinder 4 Misfire Rate & Type A Threshold	53	4	<= 1.62%	0%
Cylinder 5 Misfire Rate & Type A Threshold	53	5	<= 1.62%	0%
Cylinder 6 Misfire Rate & Type A Threshold	53	6	<= 1.62%	0%
Cylinder 7 Misfire Rate & Type A Threshold	53	7	<= 1.62%	2.73%
Cylinder 8 Misfire Rate & Type A Threshold	53	8	<= 1.62%	0%
Highest Type A Misfire Rate & Threshold	54	0	<= 23.4%	25%
Highest Type B Misfire Rate & Threshold	55	0	<= 1.62%	2.73%
Cylinder Events Tested	56	0	<= 4k	0

Complete

Figure 6

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CYLINDER POWER BALANCE TEST

CYLINDER #7 HAS A 30% DROP IN CONTRIBUTION

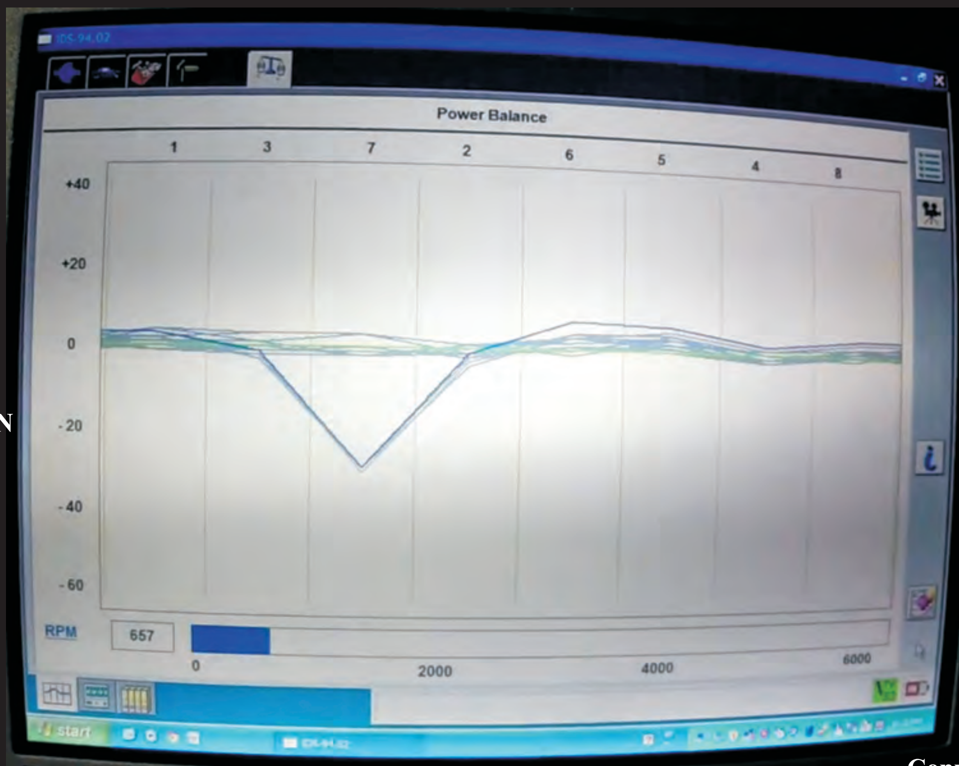
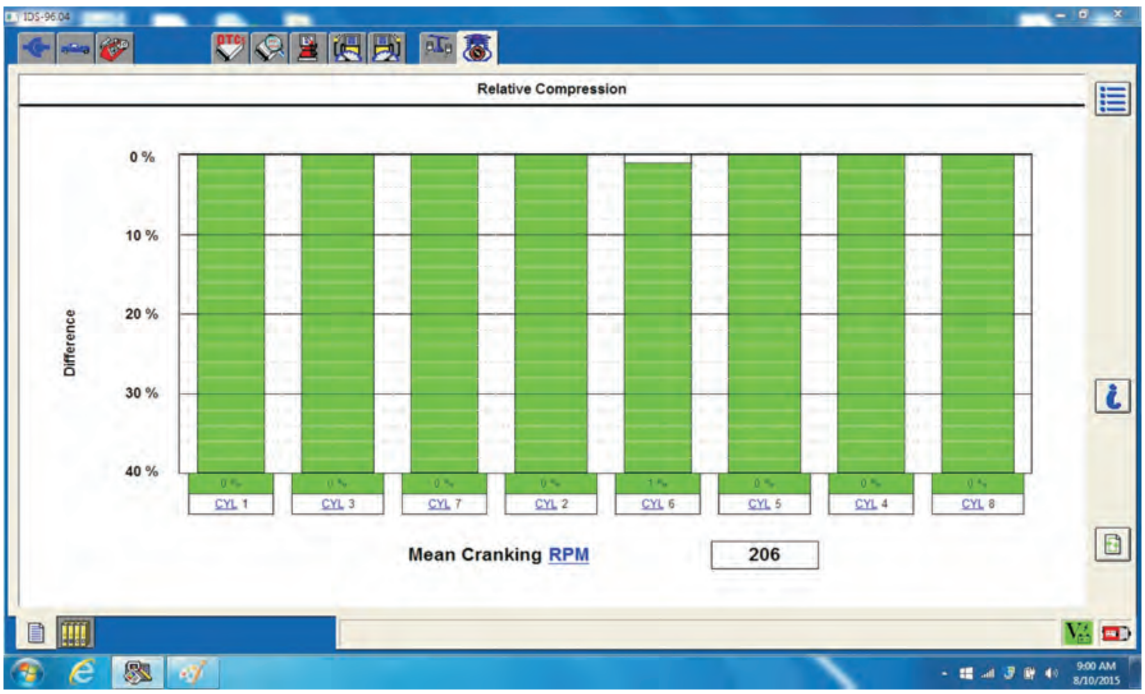


Figure 7

RELATIVE COMPRESSION TEST



Engine Is In Good Mechanical Health

Figure 8

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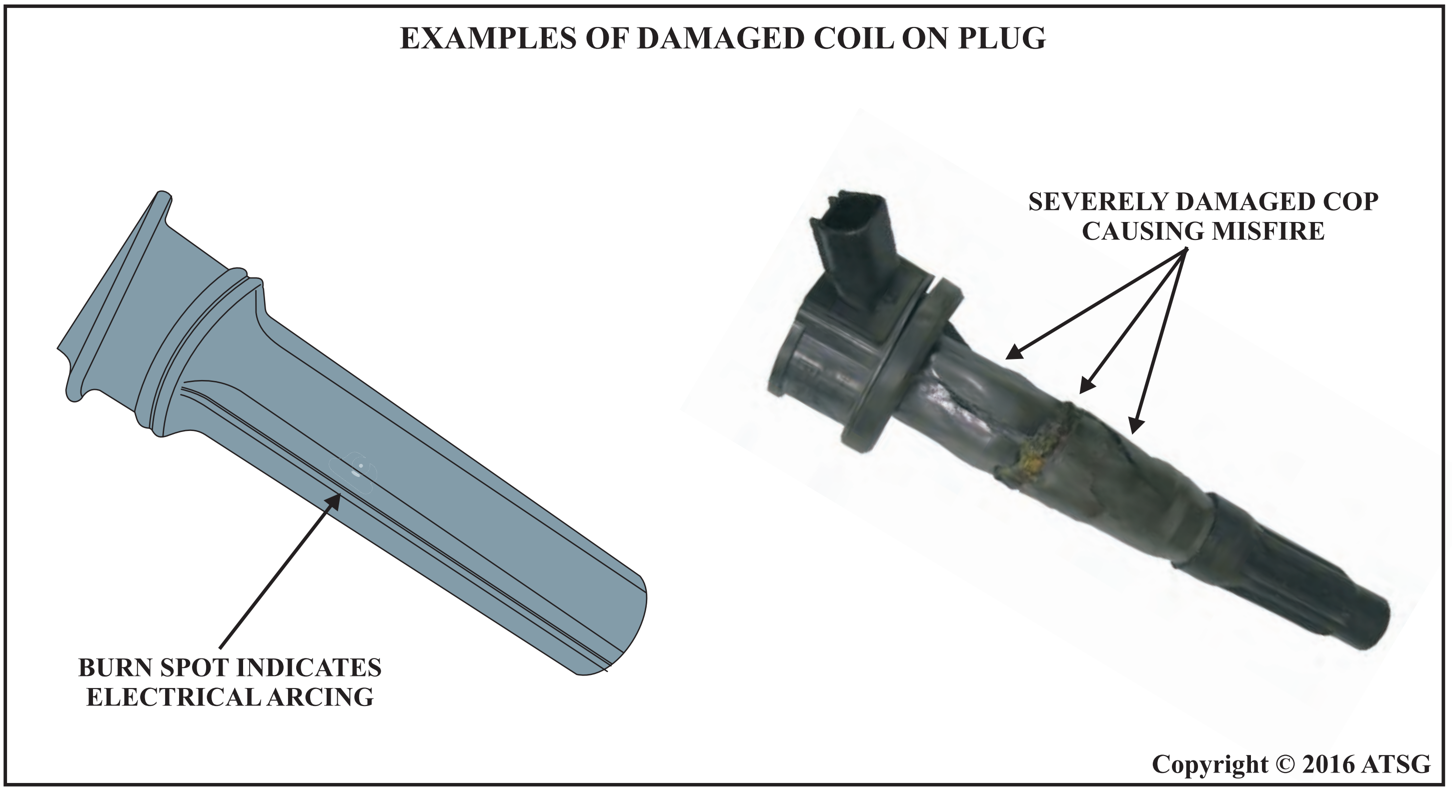

Figure 9

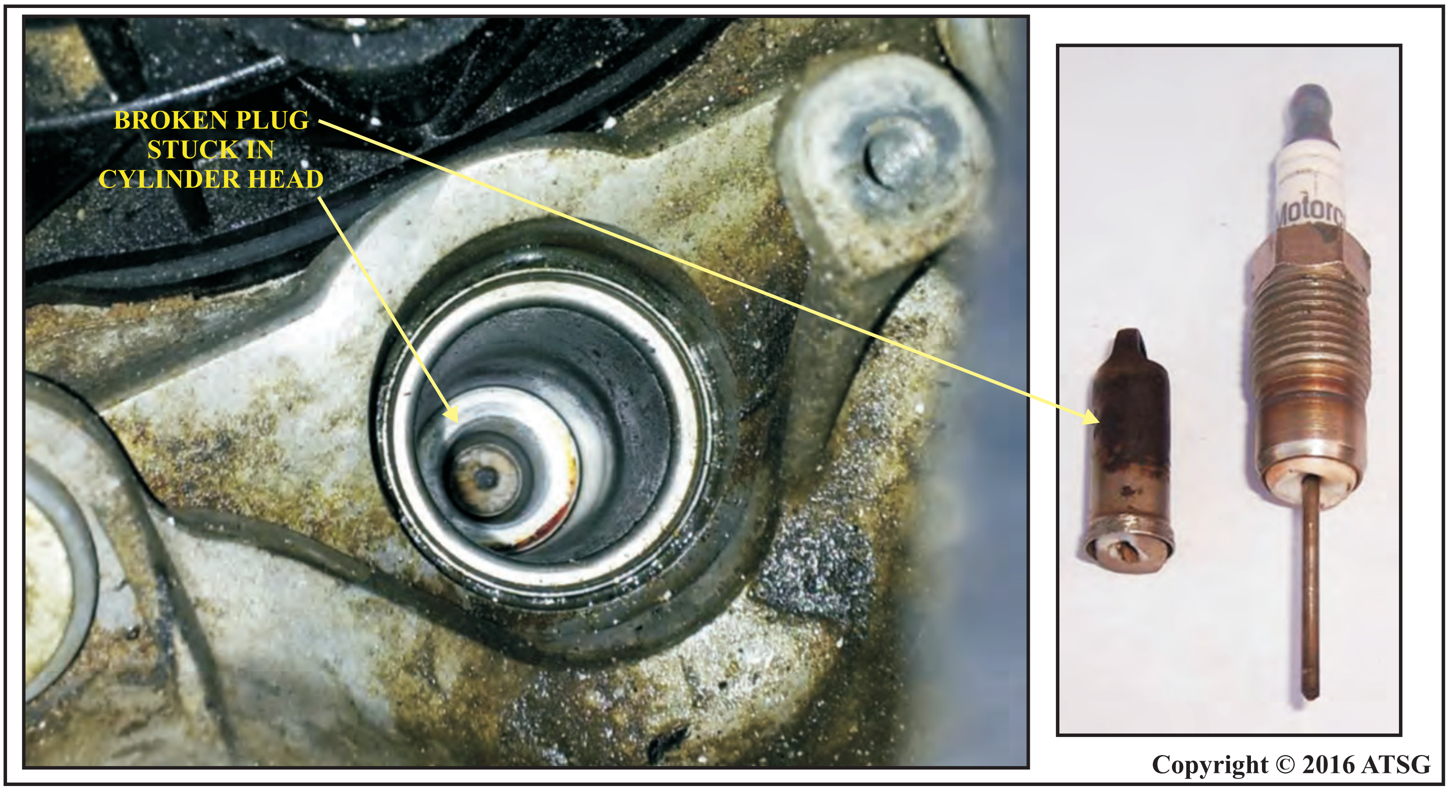

Figure 10

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UPPER ENGINE DECARBONIZING PROCEDURE

This Procedure Should Loosen The Spark Plug Electrode Shield

Figure 11

Rust Inhibitor Will Help To Loosen The Spark Plug Threaded Area

Figure 12

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LISLE BROKEN SPARK PLUG REMOVAL TOOL KIT #LIS65600

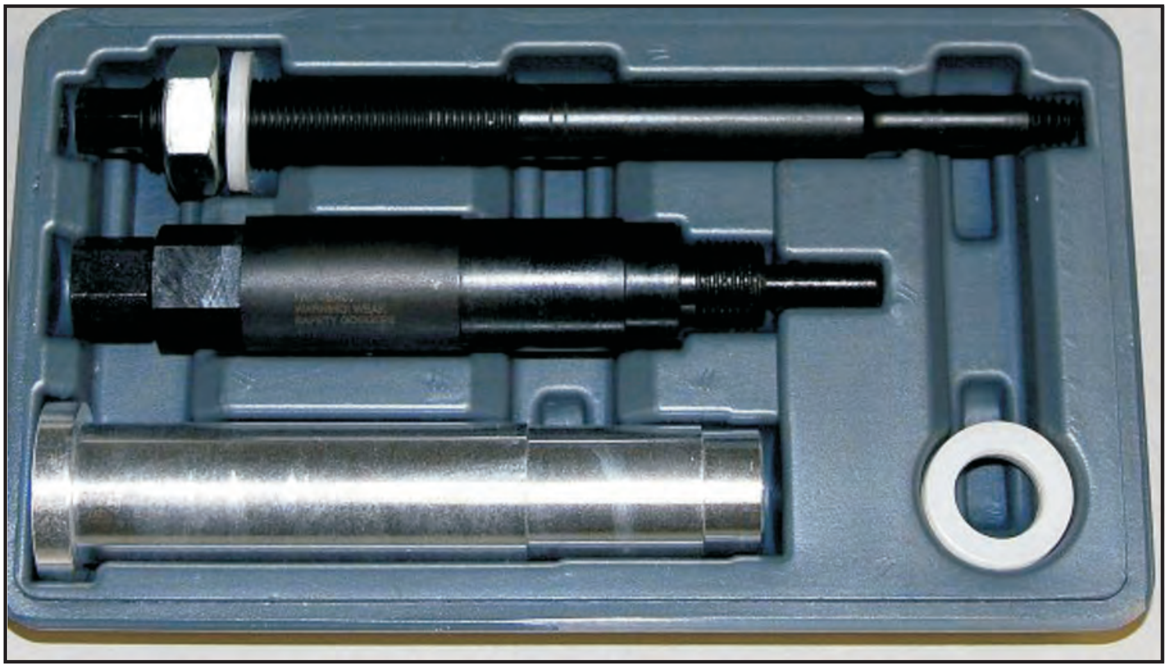

Figure 13

Figure 14