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## Section 00

## Precautions

## CONTENTS

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# Precautions

## Precautions

### Definition of Caution, Notice, and Important

The diagnosis and repair procedures in the Service Manual contain both general and specific Cautions, Notices, and Important. SUZUKI is dedicated to the presentation of service information that helps the technician to diagnose and repair the systems necessary for the proper operation of the vehicle, however, certain procedures may present a hazard to the technician if they are not followed in the recommended manner. Cautions, Notices, and Important are elements designed to prevent these hazards, however, not all hazards can be foreseen. This information is placed at strategic locations within the service manual. This information is designed to prevent the following from occurring:

- Serious bodily injury to the technician
- Damage to the vehicle
- Unnecessary vehicle repairs
- Unnecessary component replacement
- Improper repair or replacement of vehicle components. Any caution or notice that appears in general information is referenced from the individual service categories.

### CAUTION Defined

When encountering a CAUTION, you will be asked to take a necessary action or not to take a prohibited action. If a CAUTION is not heeded, the following consequences may occur:

- Serious bodily injury to the technician
- Serious bodily injury to other technicians in the workplace area
- Serious bodily injury to the driver and/or passenger(s) of the vehicle, if the vehicle has been improperly repaired

### NOTICE Defined

Notices call special attention to a necessary action or to a prohibited action. If a NOTICE is not heeded, the following consequences may occur:

- Damage to the vehicle
- Unnecessary vehicle repairs
- Unnecessary component replacement
- Improper operation or performance of the system or component under repair
- Damage to any systems or components which are dependent upon the proper operation of the system or component under repair

- Improper operation or performance of any systems or components which are dependent upon the proper operation or performance of the system or component under repair
- Damage to fasteners, basic tools, or special tools
- The leakage of coolant, lubricant, or other vital fluids

### IMPORTANT Defined

IMPORTANT statements emphasize a necessary characteristic of a diagnostic or repair procedure. IMPORTANT statements are designed to do the following:

- Clarify a procedure
- Present additional information for accomplishing a procedure
- Give insight into the reason or reasons for performing a procedure in the manner recommended
- Present information that will help to accomplish a procedure in a more effective manner
- Present information that gives the technician the benefit of past experience in accomplishing a procedure with greater ease

### Approved Equipment for Collision Repair Caution

#### **▲ WARNING**

To avoid personal injury when exposed to welding flashes or to galvanized (Zinc Oxide) metal toxic fumes while grinding/cutting on any type of metal or sheet molded compound, you must work in a properly ventilated area, wearing an approved respirator, eye protection, earplugs, welding gloves, and protective clothing.

### Assistant Driving Caution

#### **▲ WARNING**

An assistant should drive the vehicle while the technician checks for the location of the reported condition. Otherwise, personal injury could result.

### Cleaning Solvent Caution

#### **▲ WARNING**

Bodily injury may occur if the cleaning solvent is inhaled or exposed to the skin.

## Eye Protection Caution

### **▲ WARNING**

Approved safety glasses and gloves should be worn when performing this procedure to reduce the chance of personal injury.

## Foam Sound Deadeners Caution

### **▲ WARNING**

Foam sound deadeners must be removed from areas within 152.4 mm (6 in) of where flame is to be used for body repairs. When reinstalling foam sound deadeners, avoid inhaling fumes as bodily injury may result.

## Gasoline/Gasoline Vapors Caution

### **▲ WARNING**

Gasoline or gasoline vapors are highly flammable. A fire could occur if an ignition source is present. Never drain or store gasoline or diesel fuel in an open container, due to the possibility of fire or explosion. Have a dry chemical (Class B) fire extinguisher nearby.

## Glass and Sheet Metal Handling Caution

### **▲ WARNING**

When working with any type of glass or sheet metal with exposed or rough edges, wear approved safety glasses and gloves in order to reduce the chance of personal injury.

## Moving Parts and Hot Surfaces Caution

### **▲ WARNING**

Avoid contact with moving parts and hot surfaces while working around a running engine in order to prevent physical injury.

## Protective Goggles and Glove Caution

### **▲ WARNING**

Always wear protective goggles and gloves when removing exhaust parts as falling rust and sharp edges from worn exhaust components could result in serious personal injury.

## Road Test Caution

### **▲ WARNING**

Road test a vehicle under safe conditions and while obeying all traffic laws. Do not attempt any maneuvers that could jeopardize vehicle control. Failure to adhere to these precautions could lead to serious personal injury and vehicle damage.

## Work Stall Test Caution

### **▲ WARNING**

One or more of the following guidelines may apply when performing specific required tests in the work stall:

- When a test requires spinning the drive wheels with the vehicle jacked up, adhere to the following precautions:
  - Do not exceed 56 km/h (35 mph) when spinning one drive wheel with the other drive wheel stopped. This limit is necessary because the speedometer indicates only one-half the actual vehicle speed under these conditions. Personal injury may result from excessive wheel spinning.
  - If all of the drive wheels are spinning at the same speed, do not exceed 112 km/h (70 mph). Personal injury may result from excessive wheel spinning.
  - All persons should stay clear of the rotating components and the balance weight areas in order to avoid possible personal injury.
  - When running an engine in the repair stall for an extended period of time, use care not to overheat the engine and the transmission.
- When a test requires jacking up the vehicle and running with the wheels and brake rotors removed, adhere to the following precautions:
  - Support the suspension at normal ride height.
  - Do not apply the brake with the brake rotors removed.
  - Do not place the transmission in PARK with the drive axles spinning.
  - Turn Off the ignition in order to stop the powertrain components from spinning.
- When running an engine in the work stall, use the exhaust removal system to prevent breathing dangerous gases.

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## Belt Dressing Notice

### **⚠ CAUTION**

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Do not use belt dressing on the drive belt. Belt dressing causes the breakdown of the composition of the drive belt. Failure to follow this recommendation will damage the drive belt.

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## Brake Fluid Effects on Paint and Electrical Components Notice

### **⚠ CAUTION**

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Avoid spilling brake fluid onto painted surfaces, electrical connections, wiring, or cables. Brake fluid will damage painted surfaces and cause corrosion to electrical components. If any brake fluid comes in contact with painted surfaces, immediately flush the area with water. If any brake fluid comes in contact with electrical connections, wiring, or cables, use a clean shop cloth to wipe away the fluid.

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## Clean, Dry, Low Pressure Gas Source Notice

### **⚠ CAUTION**

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Use the EVAP Pressure/Purge Diagnostic Station J 41413 in order to provide a clean, dry, low pressure gas source. Do not substitute any other pressurized gas source. Damage may result to the EVAP system.

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## Clearcoat/Ultraviolet Screeners Notice

### **⚠ CAUTION**

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Removing more than 0.5 mils of the clearcoat can result in early paint failure. The clearcoat contains ultraviolet screeners. Do not finesse sand more than what is required to remove the defect.

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## Component Fastener Tightening Notice

### **⚠ CAUTION**

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Replacement components must be the correct part number for the application. Components requiring the use of the thread locking compound, lubricants, corrosion inhibitors, or sealants are identified in the service procedure. Some replacement components may come with these coatings already applied. Do not use these coatings on components unless specified. These coatings can affect the final torque, which may affect the operation of the component. Use the correct torque specification when installing components in order to avoid damage.

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## Fastener Notice

### **⚠ CAUTION**

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Use the correct fastener in the correct location. Replacement fasteners must be the correct part number for that application. Fasteners requiring replacement or fasteners requiring the use of thread locking compound or sealant are identified in the service procedure. Do not use paints, lubricants, or corrosion inhibitors on fasteners or fastener joint surfaces unless specified. These coatings affect fastener torque and joint clamping force and may damage the fastener. Use the correct tightening sequence and specifications when installing fasteners in order to avoid damage to parts and systems.

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## Machined Surface Damage Notice

### **⚠ CAUTION**

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Do not nick, scratch or damage the sealing surface. The sealing surface is a machined surface. Damage to the machined surface can cause leakage.

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## OBDII Symbol Description Notice

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### ⚠ CAUTION

The OBD II symbol is used on the circuit diagrams in order to alert the technician that the circuit is essential for proper OBD II emission control circuit operation. Any circuit which fails and causes the malfunction indicator lamp (MIL) to turn ON, or causes emissions-related component damage, is identified as an OBD II circuit.

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## Pipe Wrench Positioning Notice

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### ⚠ CAUTION

The pipe wrench must be placed at the valve end of the steering gear and positioned up against the inner tie rod housing. Placing the pipe wrench in any other location will cause damage to the steering gear.

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## Test Probe Notice

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### ⚠ CAUTION

Do not insert test equipment probes (DVOM etc.) into any connector or fuse block terminal. The diameter of the test probes will deform most terminals. A deformed terminal will cause a poor connection, which will result in a system failure. Always use the J-35616 GM-Approved Terminal Test Kit in order to front probe terminals. Do not use paper clips or other substitutes to probe terminals.

When using the J-35616 GM-Approved Terminal Test Kit, ensure the terminal test adapter choice is the correct size for the connector terminal. Do not visually choose the terminal test adapter because some connector terminal cavities may appear larger than the actual terminal in the cavity. Using a larger terminal test adapter will damage the terminal. Refer to the J-35616 GM-Approved Terminal Test Kit label on the inside of the J-35616 GM-Approved Terminal Test Kit for the correct adapter along with the connector end view for terminal size.

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## Section 0

## General Information

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# General Information

## General Description

### Abbreviations and Meanings

Abbreviation	Meaning
<b>A</b>	
A	Ampere(s)
ABS	Antilock Brake System
A/C	Air Conditioning
AC	Alternating Current
ACC	Accessory, Automatic Climate Control
ACL	Air Cleaner
ACM	Air Conditioning Module
ACR4	Air Conditioning Refrigerant, Recovery, Recycling, Recharging
AD	Automatic Disconnect
A/D	Analog to Digital
ADL	Automatic Door Lock
A/F	Air/Fuel Ratio
AH	Active Handling
AIR	Secondary Air Injection
ALC	Automatic Level Control, Automatic Lamp Control
AM/FM	Amplitude Modulation/Frequency Modulation
Ant	Antenna
AP	Accelerator Pedal
APCM	Accessory Power Control Module
API	American Petroleum Institute
APP	Accelerator Pedal Position
APT	Adjustable Part Throttle
ASM	Assembly, Accelerator and Servo Control Module
ASR	Acceleration Slip Regulation
A/T	Automatic Transmission/Transaxle
ATC	Automatic Transfer Case, Automatic Temperature Control
ATDC	After Top Dead Center
ATSLC	Automatic Transmission Shift Lock Control
Auto	Automatic
avg	Average
A4WD	Automatic Four-Wheel Drive
AWG	American Wire Gage
<b>B</b>	
B+	Battery Positive Voltage
BARO	Barometric Pressure
BATT	Battery
BBV	Brake Booster Vacuum
BCA	Bias Control Assembly
BCM	Body Control Module
BHP	Brake Horsepower
BLK	Black
BLU	Blue
BP	Back Pressure
BPCM	Battery Pack Control Module
BPMV	Brake Pressure Modulator Valve

Abbreviation	Meaning
BPP	Brake Pedal Position
BRN	Brown
BTDC	Before Top Dead Center
BTM	Battery Thermal Module
BTSI	Brake Transmission Shift Interlock
Btu	British Thermal Units
<b>C</b>	
°C	Degrees Celsius
CAC	Charge Air Cooler
CAFE	Corporate Average Fuel Economy
Cal	Calibration
Cam	Camshaft
CARB	California Air Resources Board
CC	Coast Clutch
cm <sup>3</sup>	Cubic Centimeters
CCM	Convenience Charge Module, Chassis Control Module
CCOT	Cycling Clutch Orifice Tube
CCP	Climate Control Panel
CD	Compact Disc
CE	Commutator End
CEAB	Cold Engine Air Bleed
CEMF	Counter Electromotive Force
CEX	Cabin Exchanger
cfm	Cubic Feet per Minute
cg	Center of Gravity
CID	Cubic Inch Displacement
CKP	Crankshaft Position
CKT	Circuit
C/Ltr	Cigar Lighter
CL	Closed Loop
CLS	Coolant Level Switch
CMC	Compressor Motor Controller
CMP	Camshaft Position
CNG	Compressed Natural Gas
CO	Carbon Monoxide
CO <sub>2</sub>	Carbon Dioxide
Coax	Coaxial
COMM	Communication
Conn	Connector
CPA	Connector Position Assurance
CPP	Clutch Pedal Position
CPS	Central Power Supply
CPU	Central Processing Unit
CRT	Cathode Ray Tube
CRTC	Cathode Ray Tube Controller
CS	Charging System
CSFI	Central Sequential Fuel Injection
CTP	Closed Throttle Position
cu ft	Cubic Foot/Feet
cu in	Cubic Inch/Inches
CV	Constant Velocity Joint
CVRSS	Continuously Variable Road Sensing Suspension

Abbreviation	Meaning
Cyl	Cylinder(s)
<b>D</b>	
DAB	Delayed Accessory Bus
dB	Decibels
dBA	Decibels on A-weighted Scale
DC	Direct Current, Duty Cycle
DCM	Door Control Module
DE	Drive End
DEC	Digital Electronic Controller
DERM	Diagnostic Energy Reserve Module
DI	Distributor Ignition
dia	Diameter
DIC	Driver Information Center
Diff	Differential
DIM	Dash Integration Module
DK	Dark
DLC	Data Link Connector
DMCM	Drive Motor Control Module
DMM	Digital Multimeter
DMSDS	Drive Motor Speed and Direction Sensor
DMU	Drive Motor Unit
DOHC	Dual Overhead Camshafts
DPM	Driver Position Module
DR, Drvr	Driver
DRL	Daytime Running Lamps
DTC	Diagnostic Trouble Code
<b>E</b>	
EBCM	Electronic Brake Control Module
EBTCM	Electronic Brake and Traction Control Module
EC	Electrical Center, Engine Control
ECC	Electronic Climate Control
ECl	Extended Compressor at Idle
ECL	Engine Coolant Level
ECM	Engine Control Module, Electronic Control Module
ECS	Emission Control System
ECT	Engine Coolant Temperature
EEPROM	Electrically Erasable Programmable Read Only Memory
EEVIR	Evaporator Equalized Values in Receiver
EFE	Early Fuel Evaporation
EGR	Exhaust Gas Recirculation
EGR TVV	Exhaust Gas Recirculation Thermal Vacuum Valve
EHPS	Electro-Hydraulic Power Steering
EI	Electronic Ignition
ELAP	Elapsed
ELC	Electronic Level Control
E/M	English/Metric
EMF	Electromotive Force
EMI	Electromagnetic Interference
Eng	Engine
EOP	Engine Oil Pressure
EOT	Engine Oil Temperature
EPA	Environmental Protection Agency
EPR	Exhaust Pressure Regulator

Abbreviation	Meaning
EPROM	Erasable Programmable Read Only Memory
ESB	Expansion Spring Brake
ESC	Electronic Suspension Control
ESD	Electrostatic Discharge
ESN	Electronic Serial Number
ETC	Electronic Throttle Control, Electronic Temperature Control, Electronic Timing Control
ETCC	Electronic Touch Climate Control
ETR	Electronically Tuned Receiver
ETS	Enhanced Traction System
EVAP	Evaporative Emission
EVO	Electronic Variable Orifice
Exh	Exhaust
<b>F</b>	
°F	Degrees Fahrenheit
FC	Fan Control
FDC	Fuel Data Center
FED	Federal All United States except California
FEDS	Fuel Enable Data Stream
FEX	Front Exchanger
FF	Flexible Fuel
FFH	Fuel-Fired Heater
FI	Fuel Injection
FMVSS	Federal U.S. Motor Vehicle Safety Standards
FP	Fuel Pump
ft	Foot/Feet
FT	Fuel Trim
F4WD	Full Time Four-Wheel Drive
4WAL	Four-Wheel Antilock
4WD	Four-Wheel Drive
FW	Flat Wire
FWD	Front Wheel Drive, Forward
<b>G</b>	
g	Grams, Gravitational Acceleration
GA	Gage, Gauge
gal	Gallon
gas	Gasoline
GCW	Gross Combination Weight
Gen	Generator
GL	Gear Lubricant
GM	General Motors
GM SPO	General Motors Service Parts Operations
gnd	Ground
gpm	Gallons per Minute
GRN	Green
GRY	Gray
GVWR	Gross Vehicle Weight Rating
<b>H</b>	
H	Hydrogen
H <sub>2</sub> O	Water
Harn	Harness
HC	Hydrocarbons
HCM	HVAC Control Module
H/CMPR	High Compression

**0A-3 General Information:**

Abbreviation	Meaning
HD	Heavy Duty
HDC	Heavy Duty Cooling
hex	Hexagon, Hexadecimal
Hg	Mercury
Hi Alt	High Altitude
HO2S	Heated Oxygen Sensor
hp	Horsepower
HPL	High Pressure Liquid
HPS	High Performance System
HPV	High Pressure Vapor
HPVS	Heat Pump Ventilation System
Htd	Heated
HTR	Heater
HUD	Head-up Display
HVAC	Heater-Ventilation-Air Conditioning
HVACM	Heater-Vent-Air Conditioning Module
HVIL	High Voltage Interlock Loop
HVM	Heater Vent Module
Hz	Hertz
<b>I</b>	
IAC	Idle Air Control
IAT	Intake Air Temperature
IC	Integrated Circuit, Ignition Control
ICCS	Integrated Chassis Control System
ICM	Ignition Control Module
ID	Identification, Inside Diameter
IDI	Integrated Direct Ignition
IGBT	Insulated Gate Bi-Polar Transistor
ign	Ignition
ILC	Idle Load Compensator
in	Inch/Inches
INJ	Injection
inst	Instantaneous, Instant
IP	Instrument Panel
IPC	Instrument Panel Cluster
IPM	Instrument Panel Module
I/PEC	Instrument Panel Electrical Center
ISC	Idle Speed Control
ISO	International Standards Organization
ISS	Input Speed Shaft, Input Shaft Speed
<b>K</b>	
KAM	Keep Alive Memory
KDD	Keyboard Display Driver
kg	Kilogram
kHz	Kilohertz
km	Kilometer
km/h	Kilometers per Hour
km/l	Kilometers per Liter
kPa	Kilopascals
KS	Knock Sensor
kV	Kilovolts
<b>L</b>	
L	Liter
L4	Four Cylinder Engine, In-Line
L6	Six-Cylinder Engine, In-Line
lb	Pound
lb ft	Pound Feet Torque
lb in	Pound Inch Torque
LCD	Liquid Crystal Display

Abbreviation	Meaning
LDCL	Left Door Closed Locking
LDCM	Left Door Control Module
LDM	Lamp Driver Module
LED	Light Emitting Diode
LEV	Low Emissions Vehicle
LF	Left Front
lm	Lumens
LR	Left Rear
LT	Left
LT	Light
LT	Long Term
LTPi	Low Tire Pressure Indicator
LTPWS	Low Tire Pressure Warning System
LWB	Long Wheel Base
<b>M</b>	
MAF	Mass Air Flow
Man	Manual
MAP	Manifold Absolute Pressure
MAT	Manifold Absolute Temperature
max	Maximum
M/C	Mixture Control
MDP	Manifold Differential Pressure
MFI	Multiport Fuel Injection
mi	Miles
MIL	Malfunction Indicator Lamp
min	Minimum
MIN	Mobile Identification Number
mL	Milliliter
mm	Millimeter
mpg	Miles per Gallon
mph	Miles per Hour
ms	Millisecond
MST	Manifold Surface Temperature
MSVA	Magnetic Steering Variable Assist, Magnasteer®
M/T	Manual Transmission/Transaxle
MV	Megavolt
mV	Millivolt
<b>N</b>	
NAES	North American Export Sales
NC	Normally Closed
NEG	Negative
Neu	Neutral
NI	Neutral Idle
NiMH	Nickel Metal Hydride
NLGI	National Lubricating Grease Institute
N·m	Newton-meter Torque
NO	Normally Open
NOx	Oxides of Nitrogen
NPTC	National Pipe Thread Coarse
NPTF	National Pipe Thread Fine
NOVRAM	Non-Volatile Random Access Memory
<b>O</b>	
O2	Oxygen
O2S	Oxygen Sensor
OBD	On-Board Diagnostics
OBD II	On-Board Diagnostics Second Generation

Abbreviation	Meaning
OC	Oxidation Converter Catalytic
OCS	Opportunity Charge Station
OD	Outside Diameter
ODM	Output Drive Module
ODO	Odometer
OE	Original Equipment
OEM	Original Equipment Manufacturer
OHC	Overhead Camshaft
$\Omega$	Ohm
OL	Open Loop, Out of Limits
ORC	Oxidation Reduction Converter Catalytic
ORN	Orange
ORVR	On-Board Refueling Vapor Recovery
OSS	Output Shaft Speed
oz	Ounce(s)
<b>P</b>	
PAG	Polyalkylene Glycol
PAIR	Pulsed Secondary Air Injection
PASS, PSGR	Passenger
PASS-Key®	Personalized Automotive Security System
P/B	Power Brakes
PC	Pressure Control
PCB	Printed Circuit Board
PCM	Powertrain Control Module
PCS	Pressure Control Solenoid
PCV	Positive Crankcase Ventilation
PEB	Power Electronics Bay
PID	Parameter Identification
PIM	Power Inverter Module
PM	Permanent Magnet Generator
P/N	Part Number
PNK	Pink
PNP	Park/Neutral Position
PRNDL	Park, Reverse, Neutral, Drive, Low
POA	Pilot Operated Absolute Valve
POS	Positive, Position
POT	Potentiometer Variable Resistor
PPL	Purple
ppm	Parts per Million
PROM	Programmable Read Only Memory
P/S, PS	Power Steering
PSCM	Power Steering Control Module, Passenger Seat Control Module
PSD	Power Sliding Door
PSP	Power Steering Pressure
psi	Pounds per Square Inch
psia	Pounds per Square Inch Absolute
psig	Pounds per Square Inch Gauge
pt	Pint
PTC	Positive Temperature Coefficient
PWM	Pulse Width Modulated
<b>Q</b>	
QDM	Quad Driver Module
qt	Quart(s)
<b>R</b>	
R-12	Refrigerant-12
R-134a	Refrigerant-134a

Abbreviation	Meaning
RAM	Random Access Memory, Non-permanent memory device, memory contents are lost when power is removed.
RAP	Retained Accessory Power
RAV	Remote Activation Verification
RCDLR	Remote Control Door Lock Receiver
RDCM	Right Door Control Module
Ref	Reference
Rev	Reverse
REX	Rear Exchanger
RIM	Rear Integration Module
RF	Right Front, Radio Frequency
RFA	Remote Function Actuation
RFI	Radio Frequency Interference
RH	Right Hand
RKE	Remote Keyless Entry
Rly	Relay
ROM	Read Only Memory, Permanent memory device, memory contents are retained when power is removed.
RPM	Revolutions per Minute Engine Speed
RPO	Regular Production Option
RR	Right Rear
RSS	Road Sensing Suspension
RTD	Real Time Damping
RT	Right
RTV	Room Temperature Vulcanizing Sealer
RWAL	Rear Wheel Antilock
RWD	Rear Wheel Drive
<b>S</b>	
s	Second(s)
SAE	Society of Automotive Engineers
SC	Supercharger
SCB	Supercharger Bypass
SCM	Seat Control Module
SDM	Sensing and Diagnostic Module
SEO	Special Equipment Option
SFI	Sequential Multiport Fuel Injection
SI	System International Modern Version of Metric System
SIAB	Side Impact Air Bag
SIR	Supplemental Inflatable Restraint
SLA	Short/Long Arm Suspension
sol	Solenoid
SO2	Sulfur Dioxide
SP	Splice Pack
S/P	Series/Parallel
SPO	Service Parts Operations
SPS	Service Programming System, Speed Signal
sq ft, ft2	Square Foot/Feet
sq in, in2	Square Inch/Inches
SRC	Service Ride Control
SRI	Service Reminder Indicator
SRS	Supplemental Restraint System
SS	Shift Solenoid

**0A-5 General Information:**

Abbreviation	Meaning
ST	Scan Tool
STID	Station Identification Station ID
S4WD	Selectable Four-Wheel Drive
Sw	Switch
SWB	Short Wheel Base
SWPS	Steering Wheel Position Sensor
syn	Synchronizer
<b>T</b>	
TAC	Throttle Actuator Control
Tach	Tachometer
TAP	Transmission Adaptive Pressure, Throttle Adaptive Pressure
TBI	Throttle Body Fuel Injection
TC	Turbocharger, Transmission Control
TCC	Torque Converter Clutch
TCS	Traction Control System
TDC	Top Dead Center
TEMP	Temperature
Term	Terminal
TFP	Transmission Fluid Pressure
TFT	Transmission Fluid Temperature
THM	Turbo Hydro-Matic
TIM	Tire Inflation Monitoring, Tire Inflation Module
TOC	Transmission Oil Cooler
TP	Throttle Position
TPA	Terminal Positive Assurance
TPM	Tire Pressure Monitoring, Tire Pressure Monitor
TR	Transmission Range
TRANS	Transmission/Transaxle
TT	Tell Tail Warning Lamp
TV	Throttle Valve
TVRS	Television and Radio Suppression
TVV	Thermal Vacuum Valve
TWC	Three Way Converter Catalytic
TWC+OC	Three Way + Oxidation Converter Catalytic
TXV	Thermal Expansion Valve
<b>U</b>	
UART	Universal Asynchronous Receiver Transmitter
U/H	Underhood
U/HEC	Underhood Electrical Center
U-joint	Universal Joint
UTD	Universal Theft Deterrent
UV	Ultraviolet
<b>V</b>	
V	Volt(s), Voltage
V6	Six-Cylinder Engine, V-Type
V8	Eight-Cylinder Engine, V-Type
Vac	Vacuum
VAC	Vehicle Access Code
VATS	Vehicle Anti-Theft System
VCIM	Vehicle Communication Interface Mode
VCM	Vehicle Control Module
V dif	Voltage Difference
VDOT	Variable Displacement Orifice Tube

Abbreviation	Meaning
VDV	Vacuum Delay Valve
vel	Velocity
VES	Variable Effort Steering
VF	Vacuum Fluorescent
VIO	Violet
VIN	Vehicle Identification Number
VLR	Voltage Loop Reserve
VMV	Vacuum Modulator Valve
VR	Voltage Regulator
V ref	Voltage Reference
VSES	Vehicle Stability Enhancement System
VSS	Vehicle Speed Sensor
<b>W</b>	
w/	With
W/B	Wheel Base
WHL	Wheel
WHT	White
w/o	Without
WOT	Wide Open Throttle
W/P	Water Pump
W/S	Windshield
WSS	Wheel Speed Sensor
WU-OC	Warm Up Oxidation Converter Catalytic
WU-TWC	Warm Up Three-Way Converter Catalytic
<b>X</b>	
X-valve	Expansion Valve
<b>Y</b>	
yd	Yard(s)
YEL	Yellow

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ACDelco®	
Active Fuel Management™	
Acuzinc®	
Airbank®	
Allison®	
AMMCO®	
AUTOFUSE®	
AUTOTRAC®	
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Bendix®	
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Bosch®	
Bose®	
<b>C</b>	
Catapillar®	
CAT®	
C-Quam®	
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Delco®	
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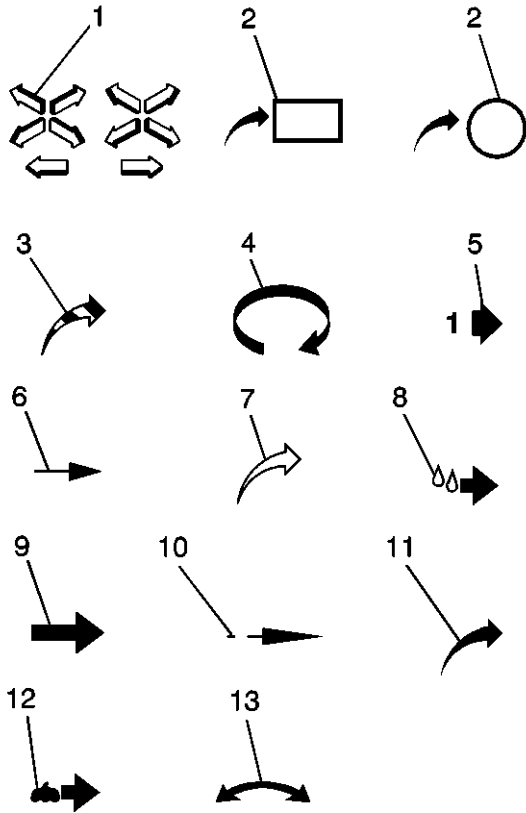
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<b>L</b>	
LOCTITE™	
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PASS-KEY®	
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Pro®	
<b>Q</b>	
Quad 4®	
<b>R</b>	
RAINSENSE™	
Rapid Fire®	
<b>S</b>	
ScotchBrite™	
Scotchguard™	
Signals®	
Sikkens™	
Soft-Ray®	
Solar-Ray®	
Stabiltrak®	
Sunrayce®	
Superlube®	
Syclone®	
<b>T</b>	
Tech 2®	
Techline®	
Teflon®	
Tefzel®	
Theft-I®	
Theftlock®	
Tiltmaster®	
TORX®	
Transjel®	
Transguide®	

## 0A-7 General Information:

Twilight Sentinel®	
	<b>U</b>
Ultralite®	
	<b>V</b>
Velcro®	
	<b>W</b>
Weatherpack™	

### Arrows and Symbols

This service manual uses various symbols in order to describe different service operations.



1. Front of Vehicle
2. View Detail
3. Ambient Air Mixed With Another Gas or Indicate Temperature Change
4. Motion or Direction
5. View Angle
6. Dimension (1:2)
7. Ambient/Clean Air Flow or Cool Air Flow
8. Lubrication Point — Oil or Fluid
9. Task Related
10. Sectioning (1:3)
11. Gas Other Than Ambient Air or Hot Air Flow
12. Lubrication Point — Grease or Jelly
13. Multidirectional Arrow

### RPO Code List

RPO	Description
AG1	Adjuster Front Seat, Power, Multi-directional, Driver
AJ1	Window Tinted, Deep, All Except Windshield and Doors
AK5	Restraint System, Seat, Inflatable, Driver and Passenger
AM9	Seat Rear, Split Back, Folding
AR9	Seat, Front Bucket, Deluxe
ASF	Restraint, Roof Side, LH and RH, Inflatable
BMI	Merchandised Package, Suzuki XL-7 Touring
BMJ	Merchandised, Suzuki XL-7 Limited
B1A	Plant Code Ingersol, Ontario, Canada
CF5	Roof, Sun, Glass, Sliding, Electric
C4Y	GVW RATING, 2 425 kg (5,346 lbs)
C6B	GVW RATING, 2 475 kg (5,456 lbs)
C67	HVAC System, Air Conditioner Front, Electronic Controls
C68	HVAC System, Air Conditioner Front, Auto, Electronic Controls
C69	HVAC System Rear, Air Conditioner
DD7	Mirror Inside Rearview, Light Sensitive, Compass
DD8	Mirror Inside Rearview, Light Sensitive
DG7	Mirror Outside, LH and RH, Remote Control, Electric, Color
DT4	Ashtray, Cigarette Lighter
D22	Mirror Outside, LH and RH, Remote Control, Electric
FE1	Suspension System, Soft Ride
FE9	Certification, Emission, Federal
FR4	Ratio, Transaxle Final Drive 2.48
JL9	Brake System, Power Front and Rear Disc, Antilock, Front and Rear Wheel
KA1	Heater, Seat, Front
KC5	Receptacle, Electrical, Accessory
KG4	Generator, 150 AMP
KW7	Generator, 170 AMP
K05	Heater Engine, Block
K34	Cruise Control, Automatic, Electronic
*LY7	Engine, Gas, 6 Cyl, 3.6L, SFI, V6, Alum, 60 Degrees, N36A
MX0	Merchandised Trans, Auto Provisions, O/D
M09	Transmission, Auto 5 SPD, Aisin, AF33, (Tiptronic)
M45	Transmission, Auto 5 SPD, Opel, AF33, (Tiptronic)
NE1	Certification, Emission, Geographically Restricted Registration For Vehicles Up To 14,000 lbs GVW (Use 2003 Model Year)
NK5	Steering Wheel, Standard
NP5	Steering Wheel, Leather Wrapped
NT7	Emission System, Federal, Tier 2
NU1	Emission System, California, Lev2
N75	Wheel, 17 x 7 Aluminum, Custom



RPO	Description
QB5	Wheel, 16 x 6.5 Steel
QKJ	Tire All, P235/65R16 - 101S BW R/PE ST TL AL2
QLJ	Tire All, P235/60R17 - 100S BW R/PE ST TL AL2
T96	Lamp, Fog, Front
UE1	Communication System, Vehicle, G.P.S. 1
UH8	Cluster, Instrument, Cool Temp, Trip Odometer, Tach
UQ4	Speaker System, 4, Base
US8	Radio, AM/FM Stereo, Seek/Scan, CD, Auto Tone, Clock, ETR, MP3, RDS
US9	Radio, AM/FM Stereo, Seek/Scan, RDS, Multiple Compact Disc, Auto Tone Control, Clock, ETR, MP3
UUC	Radio, AM/FM Stereo, Seek/Scan, CD, DVD, Auto Tone, Clock, ETR, MP3, RDS
UW6	Speaker System, 6, Custom
U1C	Radio, AM/FM Stereo, Seek/Scan, CD, Clock, ETR
U2K	Digital Audio System, S Band
U3U	Radio, Am/FM Stereo, Seek/Scan, DVD, CD, Clock, ETR, Navigation, Voice Recorder, MP3
U19	Speedometer, Instr, Kilo and Miles, Kilo Odometer
U65	Speaker System, 7, Premium
V1K	Bar, Luggage Carrier, Center Cross
V92	Trailer Provisions
YB6	Axle, (Base Equip) (Keep as Processing Option)
YF5	Certification, Emission, California

**NOTE**

\*GM PRO code "LY7" described throughout in this manual means the engine type name for the engine with "N36A" indication on the cylinder block and installed in XL7.

**US English/Metric Conversion**

English	Multiply/ Divide by	Metric
In order to calculate English measurement, divide by the number in the center column. In order to calculate metric measurement, multiply by the number in the center column.		
<b>Length</b>		
in	25.4	mm
ft	0.3048	m
yd	0.9144	
mi	1.609	km
<b>Area</b>		
sq in	645.2	sq mm
	6.45	sq cm
sq ft	0.0929	sq m
sq yd	0.8361	
<b>Volume</b>		
cu in	16,387.0	cu mm
	16.387	cu cm
	0.0164	L
qt	0.9464	
gal	3.7854	cu m
cu yd	0.764	
<b>Mass</b>		
lb	0.4536	kg
ton	907.18	
		0.907
<b>Force</b>		
kg F	9.807	newtons (N)
oz F	0.2780	
lb F	4.448	
<b>Acceleration</b>		
ft/s <sup>2</sup>	0.3048	m/s <sup>2</sup>
in/s <sup>2</sup>	0.0254	
<b>Torque</b>		
lb in	0.11298	N·m
lb ft	1.3558	
<b>Power</b>		
hp	0.745	kW
<b>Pressure (Stress)</b>		
inches of H <sub>2</sub> O	0.2488	kPa
lb/sq in	6.895	
<b>Energy (Work)</b>		
Btu	1055.0	J (J= one Ws)
lb ft	1.3558	
kW hour	3,600,000.0	
<b>Light</b>		
Foot Candle	10.764	lm/m <sup>2</sup>
<b>Velocity</b>		
mph	1.6093	km/h
<b>Temperature</b>		
(°F - 32) 5/9	=	°C
°F	=	(9/5 °C + 32)
<b>Fuel Performance</b>		
235.215/mpg	=	100 km/L

**0A-9 General Information:**

**Decimal and Metric Equivalents**

Fraction (in)	Decimal (in)	Metric (mm)
1/64	0.015625	0.39688
1/32	0.03125	0.79375
3/64	0.046875	1.19062
1/16	0.0625	1.5875
5/64	0.078125	1.98437
3/32	0.09375	2.38125
7/64	0.109375	2.77812
1/8	0.125	3.175
9/64	0.140625	3.57187
5/32	0.15625	3.96875
11/64	0.171875	4.36562
3/16	0.1875	4.7625
13/64	0.203125	5.15937
7/32	0.21875	5.55625
15/64	0.234375	5.95312
1/4	0.25	6.35
17/64	0.265625	6.74687
9/32	0.28125	7.14375
19/64	0.296875	7.54062
5/16	0.3125	7.9375
21/64	0.328125	8.33437
11/32	0.34375	8.73125
23/64	0.359375	9.12812
3/8	0.375	9.525
25/64	0.390625	9.92187
13/32	0.40625	10.31875
27/64	0.421875	10.71562
7/16	0.4375	11.1125
29/64	0.453125	11.50937
15/32	0.46875	11.90625
31/64	0.484375	12.30312
1/2	0.5	12.7
33/64	0.515625	13.09687
17/32	0.53125	13.49375
35/64	0.546875	13.89062
9/16	0.5625	14.2875
37/64	0.578125	14.68437
19/32	0.59375	15.08125
39/64	0.609375	15.47812
5/8	0.625	15.875
41/64	0.640625	16.27187
21/32	0.65625	16.66875
43/64	0.671875	17.06562
11/16	0.6875	17.4625
45/64	0.703125	17.85937
23/32	0.71875	18.25625
47/64	0.734375	18.65312
3/4	0.75	19.05
49/64	0.765625	19.44687
25/32	0.78125	19.84375
51/64	0.796875	20.24062
13/16	0.8125	20.6375
53/64	0.828125	21.03437
27/32	0.84375	21.43125
55/64	0.859375	21.82812
7/8	0.875	22.225
57/64	0.890625	22.62187
29/32	0.90625	23.01875

Fraction (in)	Decimal (in)	Metric (mm)
59/64	0.921875	23.41562
15/16	0.9375	23.8125
61/64	0.953125	24.20937
31/32	0.96875	24.60625
63/64	0.984375	25.00312
1	1.0	25.4

**Fasteners**

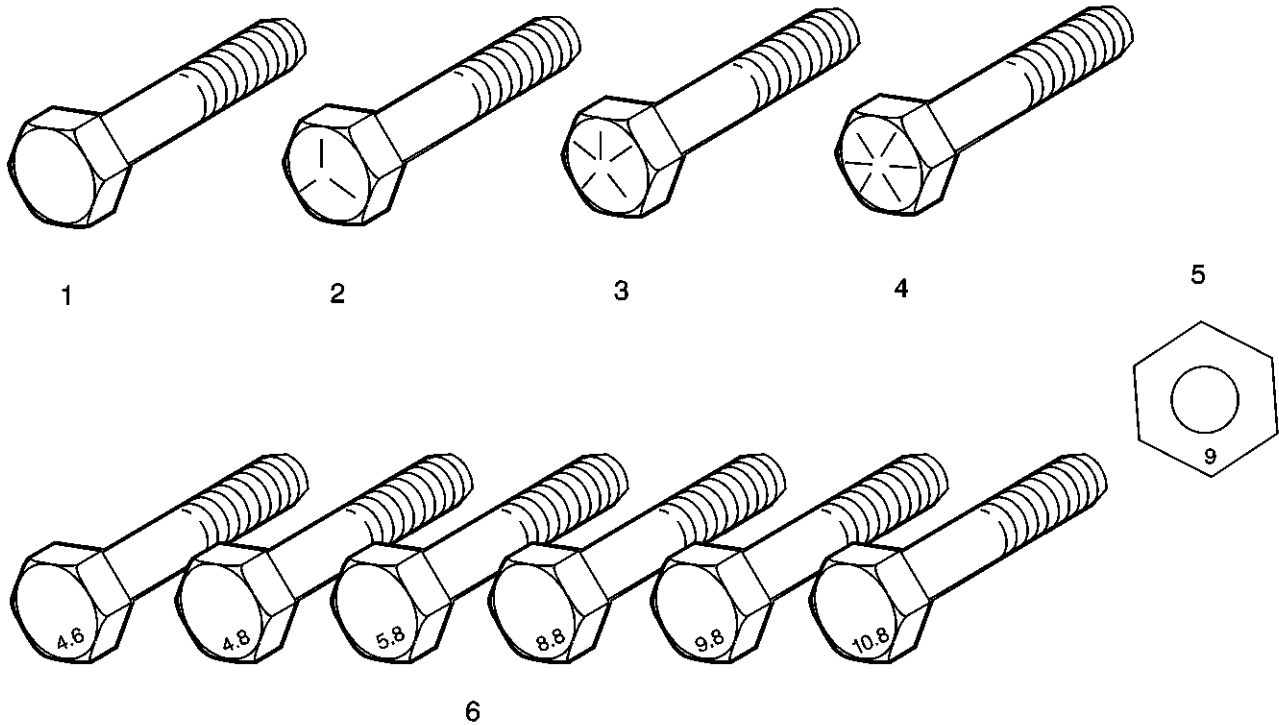
**Metric Fasteners**

This vehicle provides fastener dimensions using the metric system. Most metric fasteners are approximate in diameter to equivalent English fasteners. Make replacements using fasteners of the same nominal diameter, thread pitch, and strength.

A number marking identifies the OE metric fasteners except cross-recess head screws. The number also indicates the strength of the fastener material. A Posidrive® or Type 1A cross-recess identifies a metric cross-recess screw. For best results, use a Type 1A cross-recess screwdriver, or equivalent, in Posidrive® recess head screws.

North American Industries have adopted a portion of the ISO-defined standard metric fastener sizes. The purpose was to reduce the number of fastener sizes used while retaining the best thread qualities in each thread size. For example, the metric M6.0 X 1 screw, with nearly the same diameter and 25.4 threads per inch replaced the English 1/4-20 and 1/4-28 screws. The thread pitch is midway between the English coarse and fine thread pitches.

**Fastener Strength Identification**



1. English Bolt, Grade 2 (Strength Class)	4. English Bolt, Grade 8 (Strength Class)
2. English Bolt, Grade 5 (Strength Class)	5. Metric Nut, Strength Class 9
3. English Bolt, Grade 7 (Strength Class)	6. Metric Bolts, Strength Class Increases as Numbers Increase

The most commonly used metric fastener strength property classes are 9.8 and 10.9. The class identification is embossed on the head of each bolt. The English, inch strength classes range from grade 2 to grade 8. Radial lines are embossed on the head of each bolt in order to identify the strength class. The number of lines on the head of the bolt is 2 lines less than the actual grade. For example, a grade 8 bolt will have 6 radial lines on the bolt head. Some metric nuts are marked with a single digit strength identification number on the nut face.

Many metric fasteners available in the aftermarket parts channels are designed to metric standards of countries other than the United States, and may exhibit the following:

- Lower strength
- No numbered head marking system
- Wrong thread pitch

## 0A-11 General Information:

The metric fasteners on this vehicle is designed to new, international standards. The following are the common sizes and pitches, except for special applications:

- M6.0 X 1
- M8 X 1.25
- M10 X 1.5
- M12 X 1.75
- M14 X 2.00
- M16 X 2.00

### Prevailing Torque Fasteners

Prevailing torque fasteners create a thread interface between the fastener and the fastener counterpart in order to prevent the fastener from loosening.

#### All Metal Prevailing Torque Fasteners

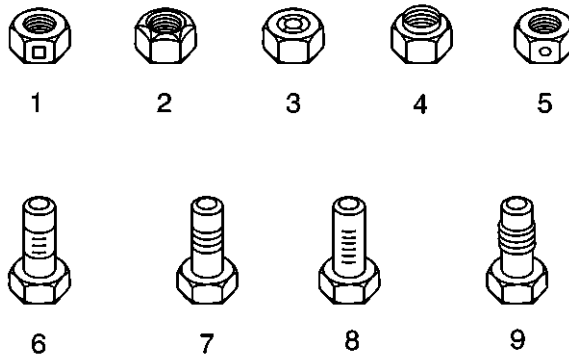
These fasteners accomplish the thread interface by a designed distortion or deformation in the fastener.

#### Nylon Interface Prevailing Torque Fasteners

These fasteners accomplish the thread interface by the presence of a nylon material on the fastener threads.

#### Adhesive Coated Fasteners

These fasteners accomplish the thread interface by the presence of a thread-locking compound on the fastener threads. Refer to the appropriate repair procedure in order to determine if the fastener may be reused and the applicable thread-locking compound to apply to the fastener.



1. Prevailing Torque Nut, Center Lock Type
2. Prevailing Torque Nut, Top Lock Type
3. Prevailing Torque Nut, Nylon Patch Type
4. Prevailing Torque Nut, Nylon Washer Insert Type
5. Prevailing Torque Nut, Nylon Insert Type
6. Prevailing Torque Bolt, Dry Adhesive Coating Type
7. Prevailing Torque Bolt, Thread Profile Deformed Type
8. Prevailing Torque Bolt, Nylon Strip Type
9. Prevailing Torque Bolt, Out-of-Round Thread Area Type

A prevailing torque fastener may be reused ONLY if:

- The fastener and the fastener counterpart are clean and not damaged
- There is no rust on the fastener
- The fastener develops the specified minimum torque against its counterpart prior to the fastener seating

**Metric Prevailing Torque Fastener Minimum Torque Development**

Application	Specification	
	Metric	English
All Metal Prevailing Torque Fasteners		
6 mm	0.4 N·m	4 lb in
8 mm	0.8 N·m	7 lb in
10 mm	1.4 N·m	12 lb in
12 mm	2.1 N·m	19 lb in
14 mm	3 N·m	27 lb in
16 mm	4.2 N·m	37 lb in
20 mm	7 N·m	62 lb in
24 mm	10.5 N·m	93 lb in
Nylon Interface Prevailing Torque Fasteners		
6 mm	0.3 N·m	3 lb in
8 mm	0.6 N·m	5 lb in
10 mm	1.1 N·m	10 lb in
12 mm	1.5 N·m	13 lb in
14 mm	2.3 N·m	20 lb in
16 mm	3.4 N·m	30 lb in
20 mm	5.5 N·m	49 lb in
24 mm	8.5 N·m	75 lb in

**English Prevailing Torque Fastener Minimum Torque Development**

Application	Specification	
	Metric	English
All Metal Prevailing Torque Fasteners		
1/4 in	0.5 N·m	4.5 lb in
5/16 in	0.8 N·m	7.5 lb in
3/8 in	1.3 N·m	11.5 lb in
7/16 in	1.8 N·m	16 lb in
1/2 in	2.3 N·m	20 lb in
9/16 in	3.2 N·m	28 lb in
5/8 in	4 N·m	36 lb in
3/4 in	7 N·m	54 lb in
Nylon Interface Prevailing Torque Fasteners		
1/4 in	0.3 N·m	3 lb in
5/16 in	0.6 N·m	5 lb in
3/8 in	1 N·m	9 lb in
7/16 in	1.3 N·m	12 lb in
1/2 in	1.8 N·m	16 lb in
9/16 in	2.5 N·m	22 lb in
5/8 in	3.4 N·m	30 lb in
3/4 in	5 N·m	45 lb in

## Thread Inserts

General purpose thread repair kits. These kits are available commercially.

### Repair Procedure

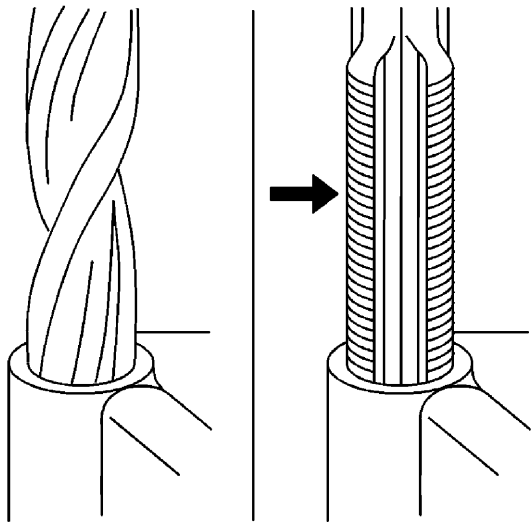
**⚠ WARNING**

Refer to Safety Glasses Caution.

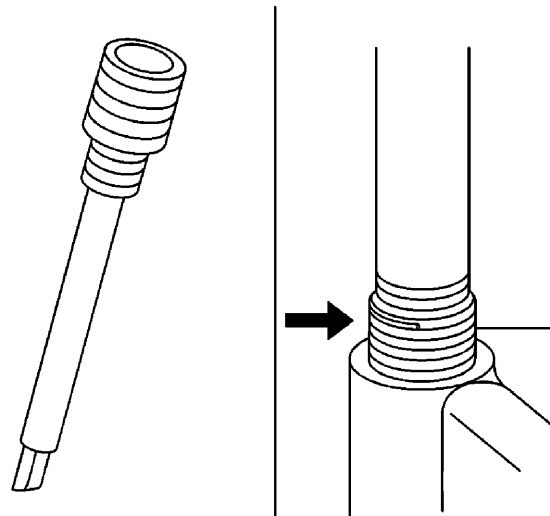
**NOTE**

Refer to the thread repair kit manufacturer's instructions regarding the size of the drill and tap to use.

Avoid any buildup of chips. Back out the tap every few turns and remove the chips.



1. Determine the size, the pitch, and the depth of the damaged thread. If necessary, adjust the stop collars on the cutting tool and tap to the required depth.
2. Drill out the damaged threads. Clean out any chips.
3. Lubricate the tap with light engine oil. Tap the hole. Clean the threads.



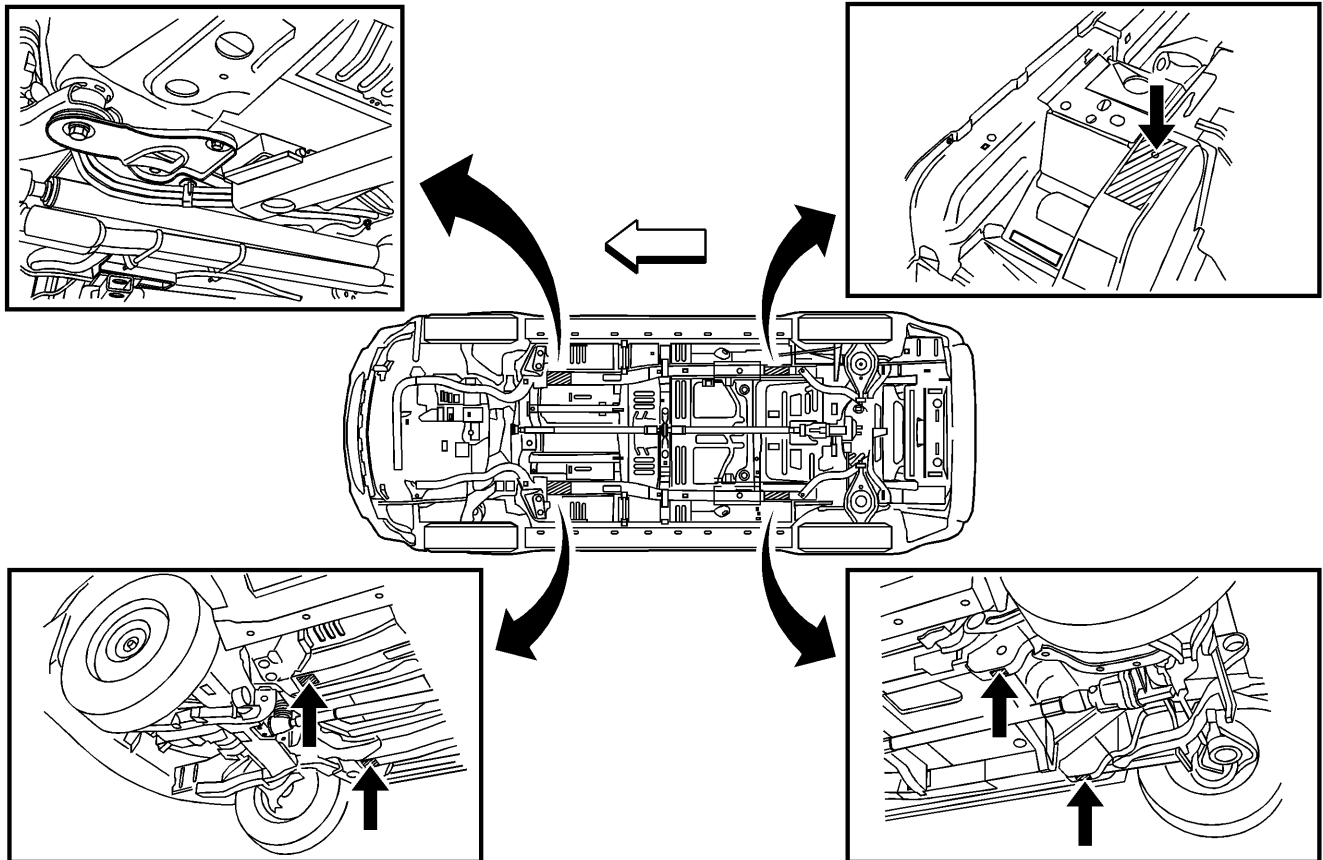
4. Thread the thread insert onto the mandrel of the installer. Engage the tang of the insert onto the end of the mandrel.

**NOTE**

The insert should be flush to one turn below the surface.

5. Lubricate the insert with light engine oil, except when installing in aluminum and install the insert.
6. If the tang of the insert does not break off when backing out the installer, break the tang off with a drift.

## Lifting and Jacking the Vehicle



### ⚠ WARNING

To avoid any vehicle damage, serious personal injury or death when major components are removed from the vehicle and the vehicle is supported by a hoist, support the vehicle with jack stands at the opposite end from which the components are being removed and strap the vehicle to the hoist.

### ⚠ WARNING

To avoid any vehicle damage, serious personal injury or death, always use the jackstands to support the vehicle when lifting the vehicle with a jack.

### ⚠ CAUTION

Perform the following steps before beginning any vehicle lifting or jacking procedure:

- Remove or secure all of the vehicle's contents in order to avoid any shifting or any movement that may occur during the vehicle lifting or jacking procedure.
- The lifting equipment or the jacking equipment weight rating must meet or exceed the weight of the vehicle and any vehicle contents.
- The lifting equipment or the jacking equipment must meet the operational standards of the lifting equipment or jacking equipment's manufacturer.
- Perform the vehicle lifting or jacking procedure on a clean, hard, dry, level surface.
- Perform the vehicle lifting or jacking procedure only at the identified lift points. **DO NOT** allow the lifting equipment or jacking equipment to contact any other vehicle components.

Failure to perform the previous steps could result in damage to the lifting equipment or the jacking equipment, the vehicle, and/or the vehicle's contents.

### Vehicle Lifting-Frame Contact Lift

#### Front Lift Pads

When lifting the vehicle with a frame-contact lift, place the front lift pads approximately 12.2 in (310 mm) inboard from the front pinchweld flanges.

#### Rear Lift Pads

When lifting the vehicle with a frame-contact lift, place the rear lift pads 10.0 in (255 mm) inboard from the rear pinchweld flanges.

### Vehicle Jacking

#### Under the Center of the Rear Suspension

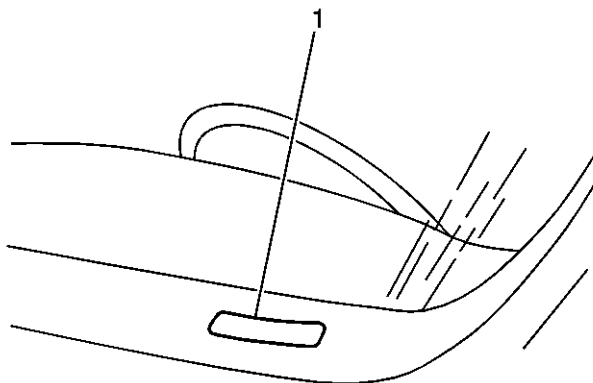
Lift the rear of the vehicle by placing the floor jack lift pad at the center of the rear suspension.

### Supporting the Vehicle with Jackstands

#### NOTE

Place jackstands **ONLY** under strong and stable vehicle structures.

### Vehicle, Engine and Transmission, Transfer Case, Axle ID, and VIN Location, Derivative and Usage

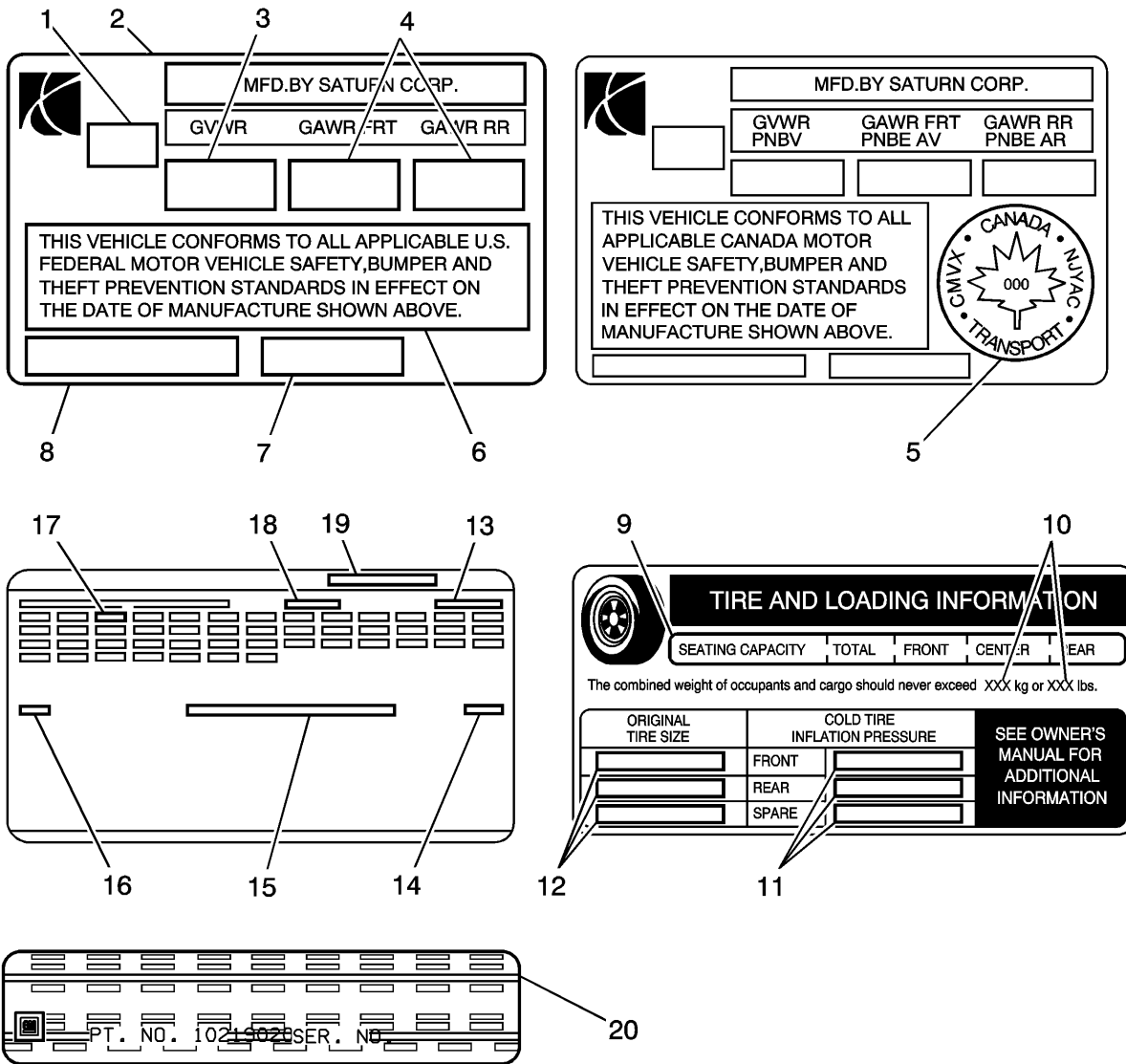


Position	Definition	Character	Description
<b>Vehicle Identification Number (VIN) System</b>			
The VIN plate (1) is the legal identifier of the vehicle. The VIN plate is located on the upper left corner of the instrument panel and can be seen through the windshield from the outside of the vehicle.			
1, 2, 3	Manufacturer	2 S 3	SUZUKI (Canada CAMI production)
4	Line	D	SUZUKI XL7
5	Chassis Type	A, B	A: AWD B: FWD
6	Grade Type	11, 21, 41,	—
7		51, 71, 91	
8	Engine Type	7	3.6L V6 SFI 60 Degree V Aluminum (RPO LY7)
9	Check Digit	—	Check Digit
10	Model Year	7	2007
11	Plant Location	6	CAMI
12-17	Plant Sequence Number	—	Plant Sequence Number
<b>VIN Derivative Characters</b>			
All engines and transmissions are stamped with a partial VIN. This table identifies the different VIN derivative characters and their respective positions.			
1	Division	S	Suzuki
2	Model Year	7	2007
3	Plant Location	6	CAMI



Position	Definition	Character	Description
4--9	Plant Sequence Number	—	Plant Sequence Number
A VIN derivative can be used to determine if a vehicle contains the original engine or transmission by matching the VIN derivative positions to their accompanying positions in the complete VIN.			
<b>AF33-5 M09-M45 Transaxle ID and VIN Derivative Locations</b>			
Refer to "Transmission Identification Information".			
<b>3.6L LY7 Engine ID and VIN Derivative Locations</b>			
Refer to "Engine Identification: ".			

**Vehicle Certification, Tire Placard, Anti-Theft, and Service Parts ID Label**



**0A-17 General Information:**

Callout	Description
<b>Vehicle Certification Label</b>	
The vehicle certification label is located on the driver door and displays the following assessments:	
<ul style="list-style-type: none"> <li>• Gross vehicle weight rating (GVWR)</li> <li>• Gross axle weight rating (GAWR), front and rear</li> <li>• The gross vehicle weight (GVW) is the weight of the vehicle and everything it carries. The GVW must not exceed the GVWR. Include the following items when figuring the GVW: <ul style="list-style-type: none"> <li>– The base vehicle weight (factory weight)</li> <li>– The weight of all vehicle accessories</li> <li>– The weight of the driver and the passengers</li> <li>– The weight of the cargo</li> </ul> </li> </ul>	
1	Name of Manufacturer
2	Gross Vehicle Weight Rating
3	Gross Axle Weight Rating (Front, Rear)
4	Canadian Safety Mark (w/RPO Z49)
5	Certification Statement
6	Vehicle Class Type (Pass Car, etc.)
7	Vehicle Identification Number
8	Date of Manufacture (Mo/Yr)
<b>Tire Placard</b>	
The tire placard label is located on the center pillar and displays the following assessments:	
9	Specified Occupant Seating Positions
10	Maximum Vehicle Capacity Weight
11	Original Equipment Tires Size
12	Tire Pressure, Front, Rear, and Spare (Cold)
<b>Service Parts ID Label</b>	
The vehicle service parts identification label is located in the instrument panel (I/P) compartment. The label is use to help identify the vehicle original parts and options.	
13	Model Designation
14	Order Number
15	Exterior Color
16	Paint Technology
17	Vehicle Identification Number
18	Wheel Base
19	Part Number Location
<b>Anti-Theft Label</b>	
20	<p>The Federal law requires that manufacturer label certain body parts on this vehicle with the VIN. The purpose of the law is to reduce the number of motor vehicle thefts by helping in the tracing and recovery of parts from stolen vehicles.</p> <p>Labels are permanently affixed to an interior surface of the part. The label on the replacement part contains the letter R, the manufacturer's logo, and the DOT symbol.</p> <p>The anti-theft label must be covered before any painting, and rustproof procedures, and uncovered after the procedures. Failure to follow the precautionary steps may result in liability for violation of the Federal Vehicle Theft Prevention Standard and possible suspicion to the owner that the part was stolen.</p>

## Vibration Theory and Terminology

### Vibration Theory

The designs and engineering requirements of vehicles have undergone drastic changes over the last several years.

Vehicles are stiffer and provide more isolation from road input than they did previously. The structures of today's stiffer vehicles are less susceptible to many of the vibrations which could be present in vehicles of earlier designs, however, vibrations can still be detected in a more modern vehicle if a transfer path is created between a rotating component and the body of the vehicle.

There are not as many points of isolation from the road in many vehicles today. If a component produces a strong enough vibration, it may overcome the existing isolation and the component needs to be repaired or replaced.

The presence/absence of unwanted noise and vibration is linked to the customer's perception of the overall quality of the vehicle.

Vibration is the repetitive motion of an object, back and forth, or up and down. The following components cause most vehicle vibrations:

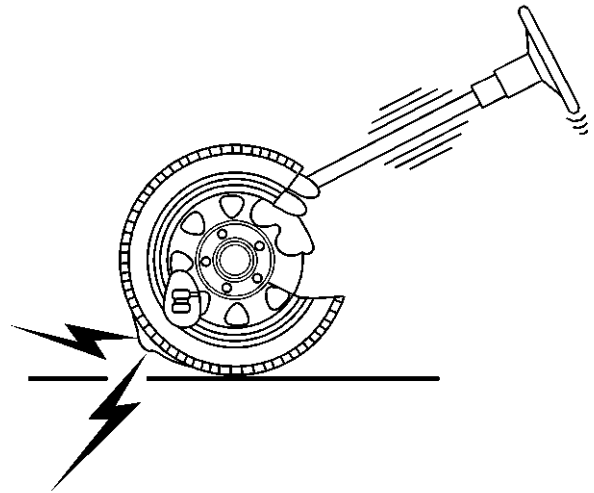
- A rotating component
  - The engine combustion process firing impulses
- Rotating components will cause vibrations when excessive imbalance or runout is present. During vibration diagnosis, the amount of allowable imbalance or runout should be considered a TOLERANCE and not a SPECIFICATION. In other words, the less imbalance or runout the better.

Rotating components will cause a vibration concern when they not properly isolated from the passenger compartment: Engine firing pulses can be detected as a vibration if a motor mount is collapsed.

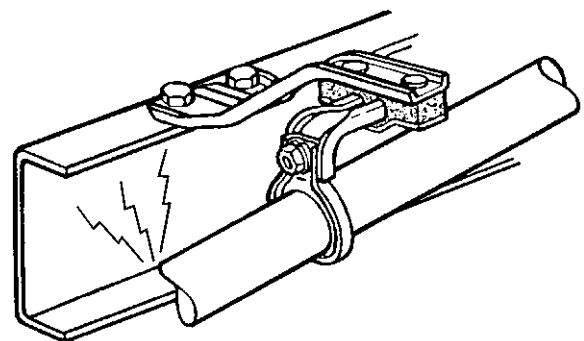
A vibrating component operates at a consistent rate (km/h, mph, or RPM). Measure the rate of vibration in question. When the rate/speed is determined, relate the vibration to a component that operates at an equal rate/speed in order to pinpoint the source. Vibrations also tend to transmit through the body structure to other components. Therefore, just because the seat vibrates does not mean the source of vibration is in the seat.

Vibrations consist of the following three elements:

- The source - the cause of the vibration
- The transfer path - the path the vibration travels through the vehicle
- The responder - the component where the vibration is felt



In the preceding picture, the source is the unbalanced tire. The transfer path is the route the vibrations travels through the vehicle's suspension system into the steering column. The responder is the steering wheel, which the customer reports as vibrating. Eliminating any one of these three elements will usually correct the condition. Decide, from the gathered information, which element makes the most sense to repair. Adding a brace to the steering column may keep the steering wheel from vibrating, but adding a brace is not a practical solution. The most direct and effective repair would be to properly balance the tire.



Vibration can also produce noise. As an example, consider a vehicle that has an exhaust pipe grounded to the frame. The source of the vibration is the engine firing impulses traveling through the exhaust. The transfer path is a grounded or bound-up exhaust hanger. The responder is the frame. The floor panel vibrates, acting as a large speaker, which produces noise. The best repair would be to eliminate the transfer path. Aligning the exhaust system and correcting the grounded condition at the frame would eliminate the transfer path.

### Basic Vibration Terminology

The following are the 2 primary components of vibration diagnosis:

- The physical properties of objects
- The object's properties of conducting mechanical energy

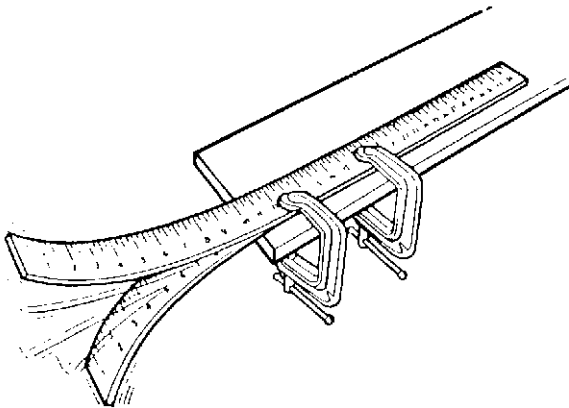
The repetitive up and down or back and forth movement of a component cause most customer vibration complaints. The following are the common components that vibrate:

- The steering wheel
- The seat cushion
- The frame
- The IP

Vibration diagnosis involves the following simple outline:

1. Measure the repetitive motion and assign a value to the measurement in cycles per second or cycles per minute.
2. Relate the frequency back on terms of the rotational speed of a component that is operating at the same rate or speed.
3. Inspect and test the components for conditions that cause vibration.

For example, performing the following steps will help demonstrate the vibration theory:



1. Clamp a yardstick to the edge of a table, leaving about 50 cm (20 in) hanging over the edge of the table.
2. Pull down on the edge of the stick and release while observing the movement of the stick.

The motion of the stick occurs in repetitive cycles. The cycle begins at midpoint, continues through the lowest extreme of travel, then back past the midpoint, through the upper extreme of travel, and back to the midpoint where the cycle begins again.

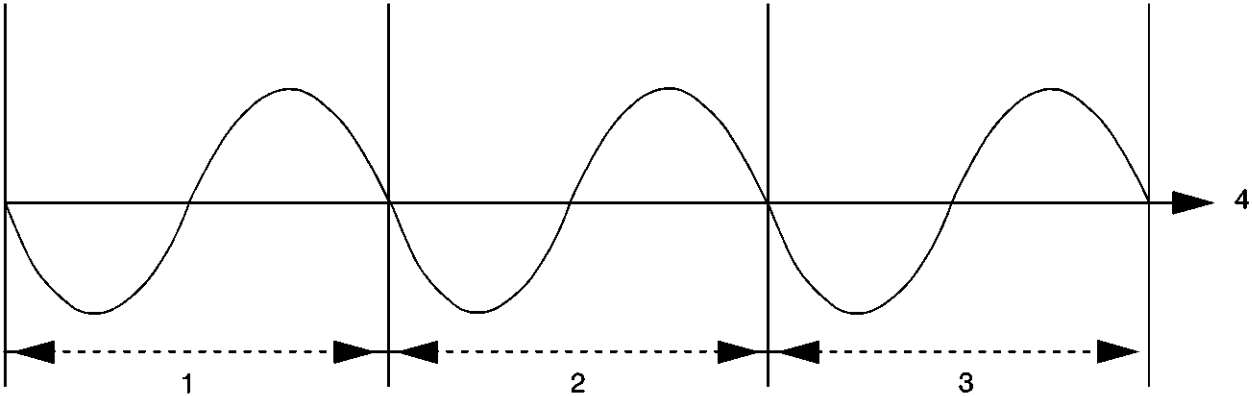
The cycle occurs over and over again at the same rate, or frequency. In this case, about 10 cycles in one second. If we measure the frequency to reflect the number of complete cycles that the yardstick made in one minute, the measure would be  $10 \text{ cycles} \times 60 \text{ seconds} = 600 \text{ cycles per minute (cpm)}$ .

We have also found a specific amount of motion, or amplitude, in the total travel of the yardstick from the very top to the very bottom. Redo the experiment as follows:

1. Reclamp the yardstick to the edge of a table, leaving about 25 cm (10 in) hanging over the edge of the table.
2. Pull down on the edge of the stick and release while observing the movement of the stick.

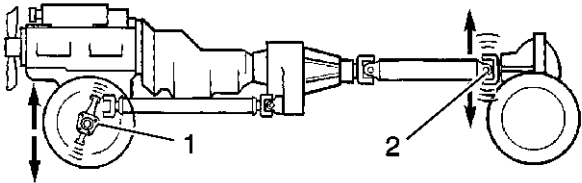
The stick vibrates at a much faster frequency: 30 cycles per second (1,800 cycles per minute).

Cycle



1. 1st Cycle	3. 3rd Cycle
2. 2nd Cycle	4. Time

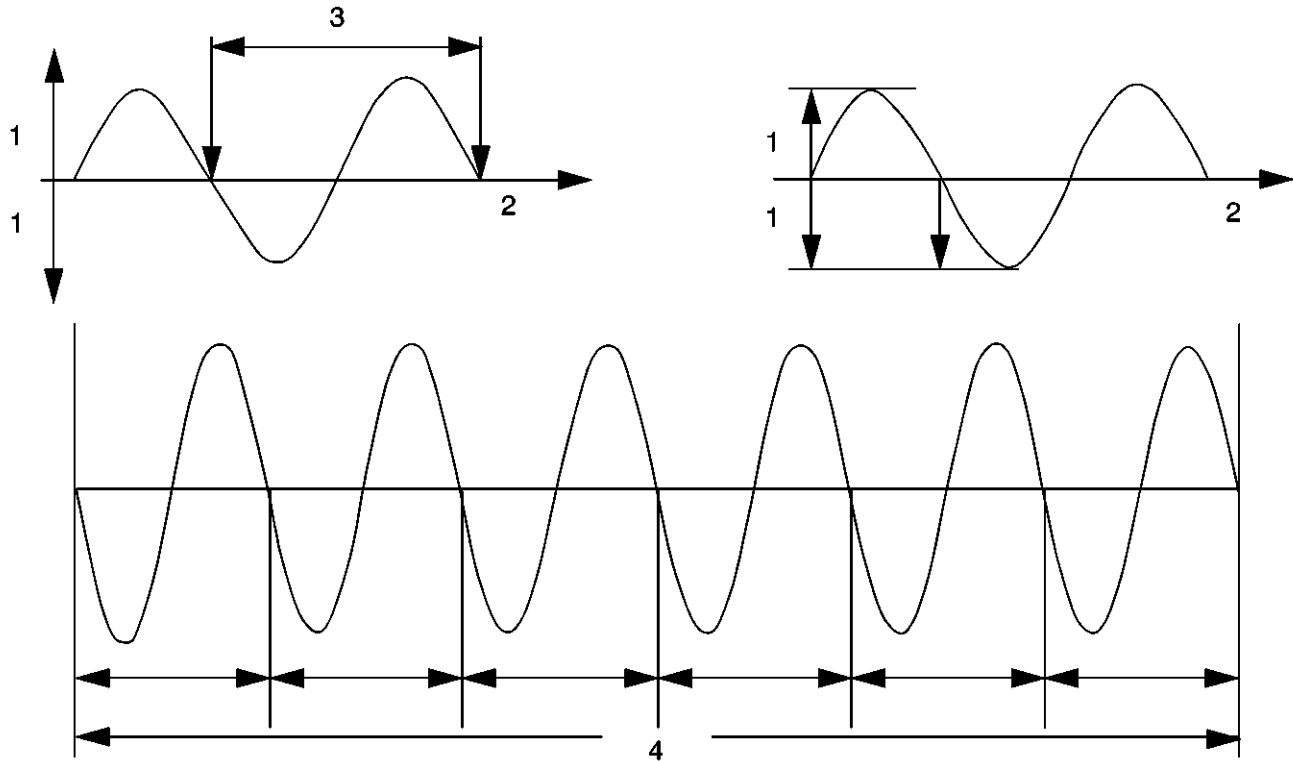
Vibration Cycles in Powertrain Components



1. Spindle
2. Pinion Nose

The word cycle comes from the same root as the word circle. A circle begins and ends at the same point, as thus, so does a cycle. All vibrations consist of repetitive cycles.

**Frequency**

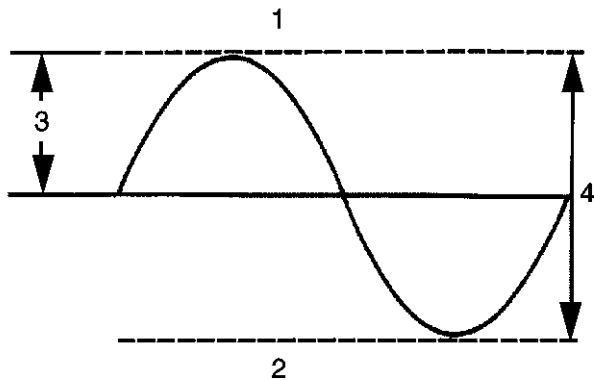


1. Amplitude	3. Time in Seconds
2. Reference	4. 1 Second

Frequency is defined as the rate at which an event occurs during a given period of time. With a vibration, the event is a cycle, and the period of time is 1 second. Thus, frequency is expressed in cycles per second.

The proper term for cycles per seconds is Hertz (Hz). This is the most common way to measure frequency. Multiply the Hertz by 60 to get the cycles or revolutions per minute (RPM).

**Amplitude**



1. Maximum
2. Minimum
3. Zero-to-Peak Amplitude

4. Peak-to-Peak Amplitude
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Amplitude is the maximum value of a periodically varying quantity. Used in vibration diagnostics, we are referring it to the magnitude of the disturbance. A severe disturbance would have a high amplitude; a minor disturbance would have a low amplitude.

Amplitude is measured by the amount of actual movement, or the displacement. For example, consider the vibration caused by an out-of-balance wheel at 80 km/h (50 mph) as opposed to 40 km/h (25 mph). As the speed increases, the amplitude increases.

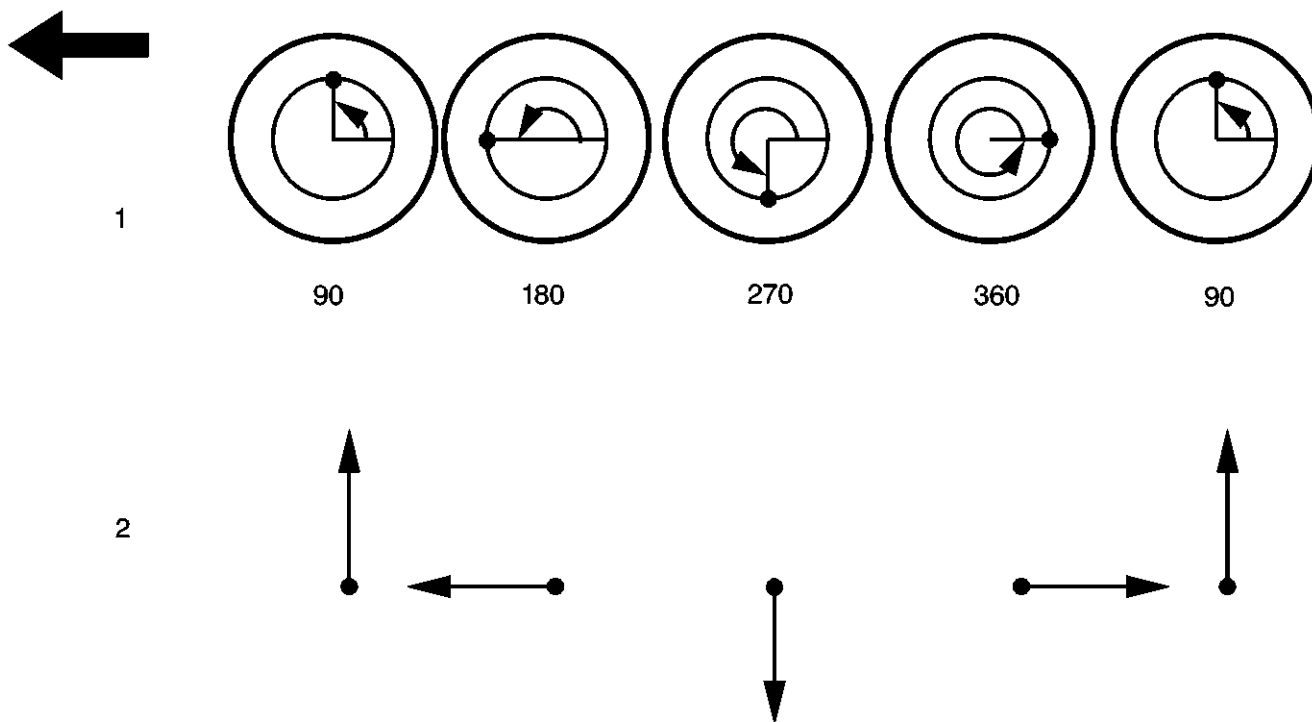
**Free Vibration**

Free vibration is the continued vibration in the absence of any outside force. In the yardstick example, the yardstick continued to vibrate even after the end was released.

**Forced Vibration**

Forced vibration is when an object is vibrating continuously as a result of an outside force.

Centrifugal Force Due to an Imbalance



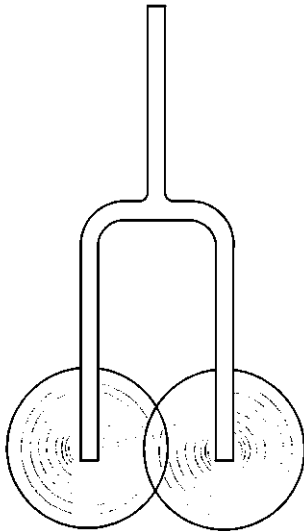
1. Location of Imbalance (Degrees)	2. Centrifugal Force Acting on Spindle
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A spinning object with an imbalance generates a centrifugal force. Performing the following steps will help to demonstrate centrifugal force:

1. Tie a nut to a string.
2. Hold the string. The nut hangs vertically due to gravity.
3. Spin the string. The nut will spin in a circle.

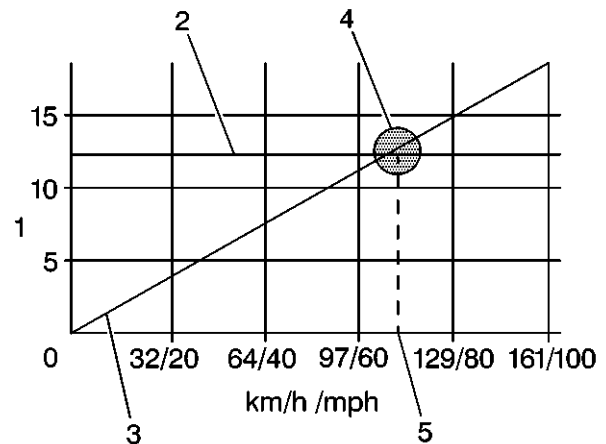
Centrifugal force is trying to make the nut fly outward, causing the pull you feel on your hand. An unbalanced tire follows the same example. The nut is the imbalance in the tire. The string is the tire, wheel, and suspension assembly. As the vehicle speed increases, the disturbing force of the unbalanced tire can be felt in the steering wheel, the seat, and the floor. This disturbance will be repetitive (Hz) and the amplitude will increase. At higher speeds, both the frequency and the amplitude will increase. As the tire revolves, the imbalance, or the centrifugal force, will alternately lift the tire up and force the tire downward, along with the spindle, once for each revolution of the tire.

### Natural or Resonant Frequency



The natural frequency is the frequency at which an object tends to vibrate. Bells, guitar strings, and tuning forks are all examples of objects that tend to vibrate at specific frequencies when excited by an external force. Suspension systems, and even engines within the mounts, have a tendency to vibrate at certain frequencies. This is why some vibration complaints occur only at specific vehicle speeds or engine RPM. The stiffness and the natural frequency of a material have a relationship. Generally, the stiffer the material, the higher the natural frequency. The opposite is also true. The softer a material, the lower the natural frequency. Conversely, the greater the mass, the lower the natural frequency.

### Resonance

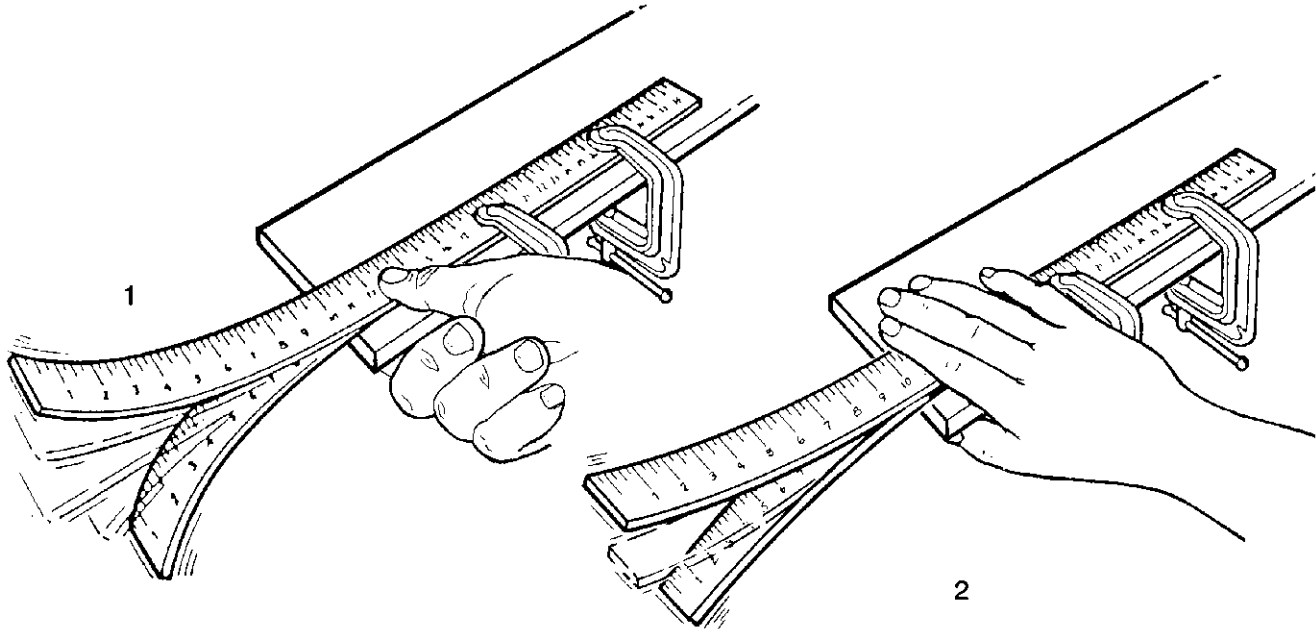


1. Frequency - cps
2. Suspension Frequency
3. Unbalanced Excitation
4. Point of Resonance
5. Problem Speed

All objects have natural frequencies. The natural frequency of a typical automotive front suspension is in the 10-15 Hz range. This natural frequency is the result of the suspension design. The suspension's natural frequency is the same at all vehicle speeds. As the tire speed increases along with the vehicle speed, the disturbance created by the tire increases in frequency. Eventually, the frequency of the unbalanced tire will intersect with the natural frequency of the suspension. This causes the suspension to vibrate. The intersecting point is called the resonance. The amplitude of a vibration will be greatest at the point of resonance. While the vibration may be felt above and below the problem speed, the vibration may be felt the most at the point of resonance.



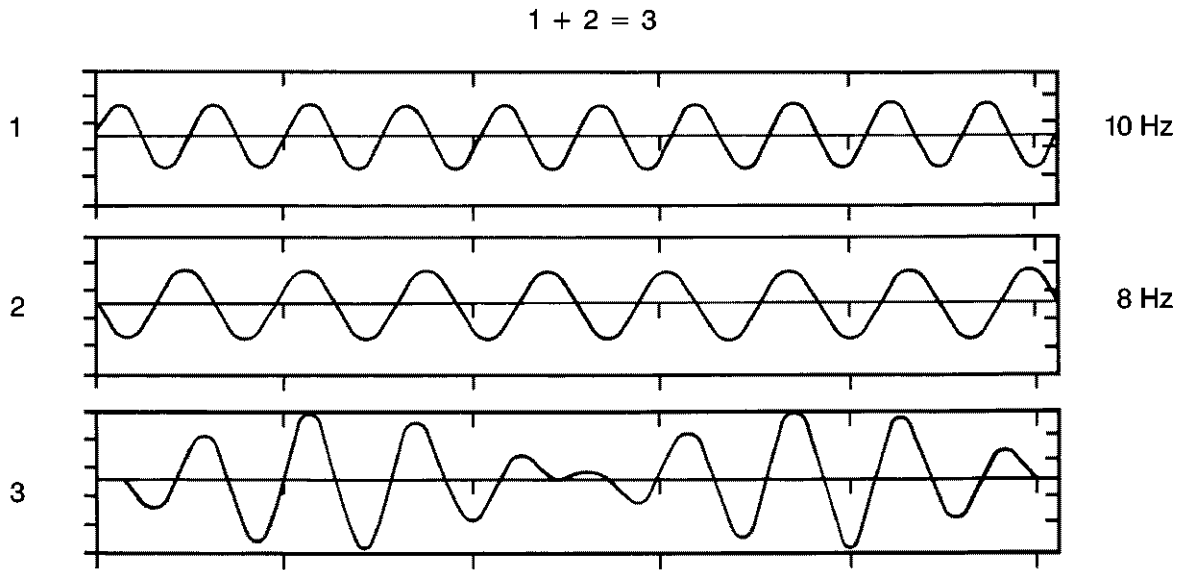
Damping



1. Low Damping	2. High Damping
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Damping is the ability of an object or material to dissipate or absorb vibration. The automotive shock absorber is a good example. The function of the shock absorber is to absorb or dampen the oscillations of the suspension system.

Beating (Phasing)

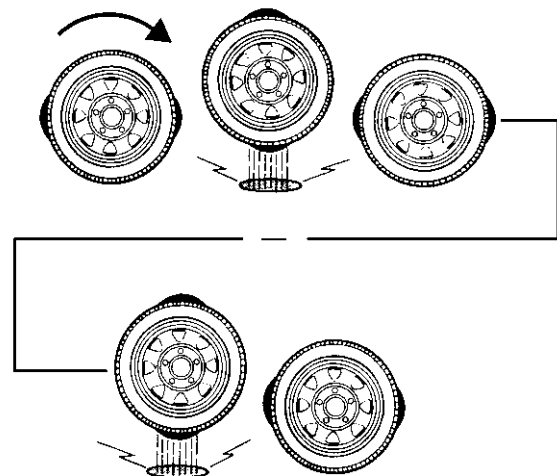
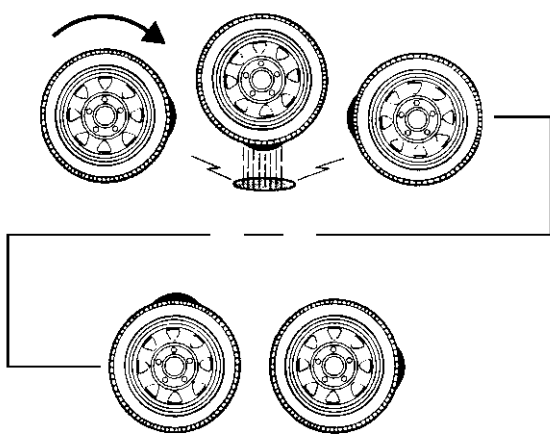


Two separate disturbances that are relatively close together in frequency will lead to a condition called beating, or phasing. A beating vibration condition will increase in intensity or amplitude in a repetitive fashion as the vehicle travels at a steady speed. This beating vibration can produce the familiar droning noise heard in some vehicles. Beating occurs when 2 vibrating forces are adding to each other's amplitude. However, 2 vibrating forces can also subtract from each other's amplitude. The adding and subtracting of amplitudes in similar frequencies is called beating. In many cases, eliminating either one of the disturbances can correct the condition.

**Order**

Order refers to how many times an event occurs during 1 revolution of a rotating component.

For example, a tire with 1 high spot would create a disturbance once for every revolution of the tire. This is called first-order vibration.



An oval-shaped tire with 2 high spots would create a disturbance twice for every revolution. This is called second-order vibration. Three high spots would be third-order, and so forth. Two first-order vibrations may add or subtract from the overall amplitude of the disturbance, but that is all. Two first-order vibrations do not equal a second-order. Due to centrifugal force, an unbalanced component will always create at least a first-order vibration.

### Service Programming System (SPS)

For step by step programming instructions, please refer to the techline information system (TIS) terminal. Review the information below to ensure proper programming protocol.

#### NOTE

- **DO NOT program a control module unless you are directed by a service procedure or you are directed by a service bulletin. Programming a control module at any other time will not permanently correct a customer's concern.**
- **It is essential that the Tech 2 and the TIS terminal are both equipped with the latest software before performing service programming system (SPS).**
- **Some modules will require additional programming/setup events performed before or after programming.**
- **Some vehicles may require the use of a CANDi module for programming.**
- **Review the appropriate service information for these procedures.**
- **DTCs may set during programming. Clear DTCs after programming is complete.**
- **Clearing powertrain DTCs will set the Inspection/Maintenance (I/M) system status indicators to NO.**

Ensure the following conditions are met before programming a control module:

- **Vehicle system voltage**
  - There is not a charging system concern. All charging system concerns must be repaired before programming a control module.
  - Battery voltage is greater than 12 volts but less than 16 volts. The battery must be charged before programming the control module if the battery voltage is low.
  - A battery charger is NOT connected to the vehicle's battery. Incorrect system voltage or voltage fluctuations from a battery charger, may cause programming failure or control module damage.
  - Turn OFF or disable any system that may put a load on the vehicle's battery, such as the following components:
    - Twilight sentinel
    - Interior lights
    - Daytime running lights (DRL)—Applying the parking brake, on most vehicles, disables the DRL system.
    - Heating, ventilation, and air conditioning (HVAC) systems
    - Engine cooling fans, radio, etc.
- The ignition switch must be in the proper position. The Tech 2 prompts you to turn ON the ignition, with the engine OFF. DO NOT change the position of the ignition switch during the programming procedure, unless instructed to do so.
- Make certain all tool connections are secure, including the following components and circuits:
  - The RS-232 communication cable port
  - The connection at the data link connector (DLC)
  - The voltage supply circuits
- DO NOT disturb the tool harnesses while programming. If an interruption occurs during the programming procedure, programming failure or control module damage may occur.
- DO NOT turn OFF the ignition if the programming procedure is interrupted or unsuccessful. Ensure that all control module and DLC connections are secure and the TIS terminal operating software is up to date. Attempt to reprogram the control module. If the control module cannot be programmed, replace the control module.

## DTC Symptom Description - Vehicle Diagnostic Information

A DTC symptom is a 2-digit number which adds additional detail to a DTC. The DTC symptom provides additional information without requiring a large increase in the number of new DTCs.

### DTC Symptom Categories

The DTC symptom is made up of 2 alphanumeric digits. The first digit following the DTC indicates the DTC symptom category. There are 16 possible categories available in the range of 0 through the letter F. Currently there are 8 categories in use, 0 through 7. These 8 categories together with their definitions are given below.

Category Number	Category Name	Category Description
0	General Electrical Failures	This category includes standard wiring failure modes, direct current quantities related by Ohm's Law and quantities related to amplitude, frequency or rate of change, and wave shape.
1	Additional General Electrical Failures	This category includes the overflow from the previous category.
2	FM/PWM (Frequency/Pulse Width Modulated) Failures	This category includes faults related to frequency modulated and pulse width modulated inputs and outputs of the electronic control module (ECU). This category also includes faults where position is determined by counts.
3	ECU Internal Failures	This category includes faults related to memory, software, and internal electrical circuitry; requiring ECU replacement.
4	ECU Programming Failures	This category includes faults related to operational software, calibrations, and options, remedied by programming the ECU.
5	Algorithm Based Failures	This category includes faults based on comparing two or more input parameters for plausibility or comparing a single parameter to itself with respect to time.
6	Mechanical Failures	This category includes faults detected by inappropriate motion in response to an ECU controlled output.
7	Bus Signal/Message Failures	This category includes faults related to bus hardware and signal integrity. This category is also used when the physical input for a signal is located in one ECU and another ECU diagnoses the circuit.
8-F	Reserved by Document	Not in use at this time.

## DTC Symptom Subtypes

The second digit of the DTC symptom is the subtype of the DTC symptom. These subtypes and their categories, together with their definitions, are given in the following table. DTC symptom 00 is a special case. If 00 is displayed, only the base code number and its description apply. Information regarding the fault will be provided in the code setting criteria.

### Example

The DTC symptoms associated with each DTC provide more information about the fault that caused that DTC. An example of a DTC displayed can be B1451 05 where the B1451 is the DTC, and 05 after the space represents the DTC symptom. While the DTC indicates that the fault is in the accessory power circuit, this DTC symptom indicates the circuit is shorted to battery or open. Another possible symptom for this code is B1451 02, where B1451 indicates the accessory power circuit, and 02 indicates the circuit is shorted to ground.

DTC Symptom	DTC Symptom Description
00	No Additional Information
01	Short to Battery
02	Short to Ground
03	Voltage Below Threshold
04	Open Circuit
05	Short to Battery or Open
06	Short to Ground or Open
07	Voltage Above Threshold
08	Signal Invalid
09	Rate of Change Above Threshold
0A	Rate of Change Below Threshold
0B	Current Above Threshold
0C	Current Below Threshold
0D	Resistance Above Threshold
0E	Resistance Below Threshold
0F	Erratic
10	Reserved
11	Above Maximum Threshold
12	Below Minimum Threshold
13	Voltage Low/High Temperature
14	Voltage High/Low Temperature
15	Signal Rising Time Failure
16	Signal Falling Time Failure
17	Signal Shape/Waveform Failure
18	Signal Amplitude Less Than Minimum
19	Signal Amplitude Greater Than Maximum
1A	Bias Level Out of Range
1F	Intermittent
21	Incorrect Period
22	Low Time Less Than Minimum
23	Low Time Greater Than Maximum
24	High Time Less Than Minimum
25	High Time Greater Than Maximum
26	Frequency Too Low
27	Frequency Too High
28	Incorrect Frequency
29	Too Few Pulses
2A	Too Many Pulses

DTC Symptom	DTC Symptom Description
2B	Missing Reference
2C	Reference Compare Error
31	General Checksum Failure
32	General Memory Failure
33	Special Memory Failure
34	RAM Failure
35	ROM Failure
36	EEPROM Failure
37	Watchdog/Safety Processor Failure
38	Supervision Software Failure
39	Internal Electronic Failure
41	Operational Software/Calibration Data Set Not Programmed
42	Calibration Data Set Not Programmed
43	EEPROM Error
44	Security Access Not Activated
45	Variant Not Programmed
46	Vehicle Configuration Not Programmed
47	VIN Not Programmed
48	Theft/Security Data Not Programmed
49	RAM Error
4A	Checksum Error
4B	Calibration Not Learned
51	Calculation Failure
52	Compare Failure
53	Temperature Low
54	Temperature High
55	Expected Number of Transitions/Events Not Reached
56	Allowable Number of Transitions/Events Exceeded
57	Expected Reaction After Event Did Not Occur
58	Incorrect Reaction After Event
59	Circuit/Component Protection Time-Out
61	Actuator Stuck
62	Actuator Stuck Open
63	Actuator Stuck Closed
64	Actuator Slipping
65	Emergency Position Not Reachable
71	Invalid Serial Data Received (Signal Validity Bit Indicates Failure)
72	Alive Counter Incorrect/Not Updated
73	Parity Error
74	Value of Signal Protection Calculation Incorrect
75	Signal Above Allowable Range
76	Signal Below Allowable Range
7F	Erratic

**Service Materials (Lubricants, Oil, Grease, Sealant, Adhesive, Cleaner, etc)**

	Gm Part Name	Gm Part NO.	General Standard Name	Supplier	Application
Engine	Lubricant	GM P/N 1052367 (Canadian P/N 992869)	EOS Engine Assembly Prelube	Valspar	<ul style="list-style-type: none"> <li>• Crankshaft prelube</li> <li>• Piston pin bores in the piston and the connecting rod</li> <li>• Upper and lower bearing surfaces Engine Section</li> </ul>
	GM top engine cleaner	GM P/N 1052626 (Canadian P/N 993026)	Upper Engine and Fuel Injector Cleaner-Aerosol GM top engine cleaner, GM P/N 1052626 (Canadian P/N 993026) or AC-Delco Carburetor Tune-Up Conditioner,	AC-Delco carburetor tune-up conditioner P/N X66-P	Throttle body Engine Controls Throttle body service section
	Threadlocker (Thread lock sealant)	GM P/N 89021297 (Canadian P/N 10953488) J 42385-109	Hi Temp, High Strength Threadlocker LOCKTITE 277®	GM Goodwrench	Insert OD threads Engine Mechanical and Transfer case sections
	Engine oil	GM P/N 12345610 (Canadian P/N 993193)	GM 5W-30	GM Goodwrench, Various	Engine oil Hydraulic lash adjuster Engine Mechanical Section
	Sealant	GM P/N 12346004 (Canadian P/N 10953480)	Permatex 56521	Permatex	<ul style="list-style-type: none"> <li>• Coolant and oil plug threads</li> <li>• Drain plug threads</li> <li>• Left side oil gallery threaded plug</li> <li>• Left side coolant drain threaded plug</li> </ul>
	Spray cleaner	GM P/N 12346139 or 12377981 (Canadian P/N 10953463)	Use 12378556 USA except California - Use 12378392	GM Goodwrench, Various	Tapped hole Engine Mechanical Section
	Anti-seize compound	GM P/N 12377953	Anti-seize compound	Various	Reinstalled HO2S thread Engine Electrical Devices Section such as O2 sensor replacement
	Sealant RTV (Room Temp. Vulcanizing) sealant	GM P/N 12378521 (Canadian P/N 88901148)	Three Bond TB1217	Three Bond	<ul style="list-style-type: none"> <li>• Oil pan</li> <li>• PCV orifice</li> <li>• Coolant expansion plugs</li> <li>• Crankshaft rear oil seal housing</li> <li>• Block pan rail and the crankshaft rear oil seal housing</li> <li>• Engine front cover</li> <li>• Engine front cover split</li> </ul>
	DEX-COOL antifreeze	GM P/N 12346290 (Canadian P/N 10953464)	DEX-COOL antifreeze	GM Goodwrench	Mixture of 50/50 DEX-COOL antifreeze and clean water

	Gm Part Name	Gm Part NO.	General Standard Name	Supplier	Application
Transmission /Transaxle	Automatic transmission fluid Type T- IV	GM P/N 88900925 (Canadian P/N 22689186)	MOBIL ATF 3309 SUZUKI ATF 3317	Exxon mobile	Automatic transmission inner parts
	Threadlocker	GM P/N 12345382 (Canadian P/N 10953489)	Permatex® 24200	Permatex	All seat belt fasteners AT case cover bolts
	Sealant	GM P/N 89020326 (Canadian P/N 89021188)	Three Bond TB1281	Three Bond	Case sealing surfaces <ul style="list-style-type: none"> <li>Control valve body cover</li> <li>Torque converter housing assembly</li> </ul> Automatic Trans Section
Brake	—	—	DOT 3	GM Goodwrench, Various	Brake fluid
Driveline /Axle	Threadlocker (Thread lock sealant)	GM P/N 89021297 (Canadian P/N 10953488) J 42385-109	Hi Temp, High Strength Threadlocker LOCKTITE 277®	GM Goodwrench	Insert OD threads Engine Mechanical and Transfer case sections
	Synthetic Gear Oil GL75W90	GM P/N 89021677 (Canadian P/N 89021678)	75W-90GL-5synthetic	BURMAH CASTROL BOT 190 Chev-Tex, flexpac	Rear differential Transfer case fill
	Threadlocker	GM P/N 89021297 (Canadian P/N 10953488)	Threadlocker	Permatex	Propeller shaft mounting/CVJ bolts Center bearing to vehicle bolts Propeller shaft rear attaching bolts Differential and Prop Shaft Sections
Steering	Power steering fluid	GM P/N 89021184 (Canadian P/N 89021186)	—	—	Power steering system

**0A-31 General Information:**

	<b>Gm Part Name</b>	<b>Gm Part NO.</b>	<b>General Standard Name</b>	<b>Supplier</b>	<b>Application</b>
Body	Windshield cleaner	GM P/N 89021822 (Canadian P/N 992727)	Glass Cleaner	Accrapac/ Kemkrest	Windshield
	Polyolefin adhesive primer	—	Adhesion Promoter	GM Goodwrench, Various	High strength plastic (Flexible plastic part) Body section
	Urethane adhesive kit GM spec. GM 3651G	GM P/N 12346392 (Canadian P/N 10952983)	—	GM Goodwrench	Urethane adhesive-installed window Adhesive service kit description in Body general description section
	GM Goodwrench structural bonding Epoxy	GM P/N 12345726	Epoxy	GM Goodwrench, Various	Seat metal (Rigid plastic part) Body Structure Section
	GM Goodwrench SRIM repair kit	GM P/N 12378523	—	GM Goodwrench, Various	SRIM most rigid plastic part Body Structure Section
	Metal panel bonding adhesive (Fast set) GM 6449G	GM P/N 12378566 (Canadian P/N 88901674) Lord Fusor P/N 110B/111B	Fast Set Panel Bonding Adhesive	General Motors materials and products manufactured by Lord Adhesives	Door panel hemming Door outer panel replacement Body/Door Section
	Medium set panel bonding adhesive	GM P/N 12378567 (Canadian P/N 88901675) Lord Fusor P/N 108B/109B	Medium Set Panel Bonding Adhesive	General Motors materials and products manufactured by Lord Adhesives	Body Structure Section
	Repair compound	GM P/N 88861039 or 8886140	—	GM Goodwrench, Various	High strength plastic (Flexible plastic part) Body Structure Section
	GM-approved weld-thru coating or equivalent	—	3M 05917	3M	Body panel mating surfaces
	Fusor super flexible anti-flutter foam-fast set, Fusor P/N 121/124 or equivalent	—	—	GM Goodwrench, Various	Between door outer panel and inner safety beam Body Structure Section
	Panel bonding adhesive	—	3M P/N 8116 Ashland Plio Grip Panel	3M	Body Structure Section
HVAC	—	GM P/N 12378526 (Canadian P/N 88900060)	PAG oil Polyalkylene glycol	—	Compressor
Others	Cutting type fluid	GM P/N 1052864 (Canadian P/N 992881)	WD 40®	Valspar	When performing the drilling, counterboring and tapping procedures. Base engine service thread repair



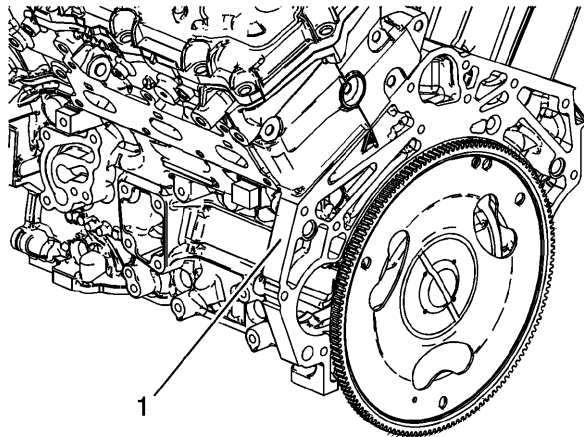
# Component Location

## Engine Identification

### Vehicle Identification Number

The Vehicle Identification Number (VIN) Derivative is located in one place on the engine and is a seventeen digit number stamped or laser etched onto the block at the vehicle assembly plant. If reading the identification number the following information can be obtained:

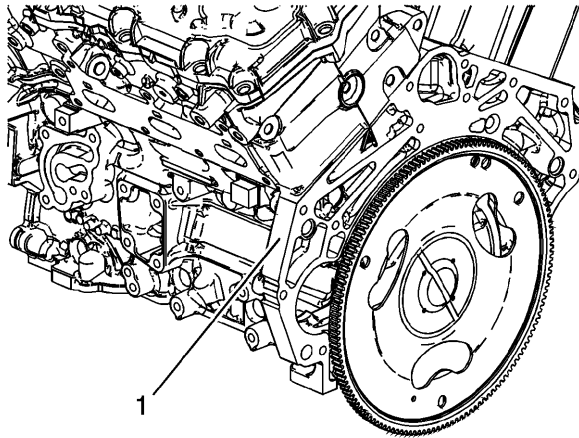
- The first three digits identify the vehicle make.
- The fourth digit is the vehicle line.
- The fifth digit identifies the chassis type.
- The sixth & seventh digits are the grade type.
- The eight digit is the engine.
- The ninth digit is a check digit.
- The tenth digit is the model year.
- The eleventh digit is the manufacturing plant.
- The twelfth to seventeenth digits are the serial number.



The engine block is marked with the VIN on a pad area on the left rear side (1).

### Engine Plant Sequence Number

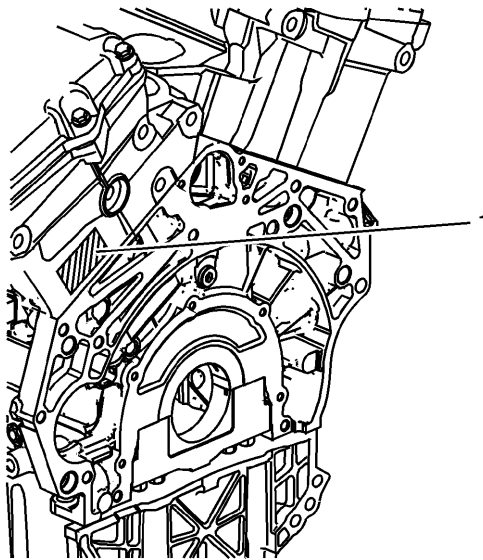
The engine plant sequence number is located in one place on the engine and is a twelve digit number stamped or laser etched onto the block at the engine assembly plant.



The engine block is marked with the engine plant sequence number on a pad area on the left rear side (1).

### Engine Traceability Label

The engine traceability label is located in a place on the engine and consists of the broadcast code, bar code and sequence number.

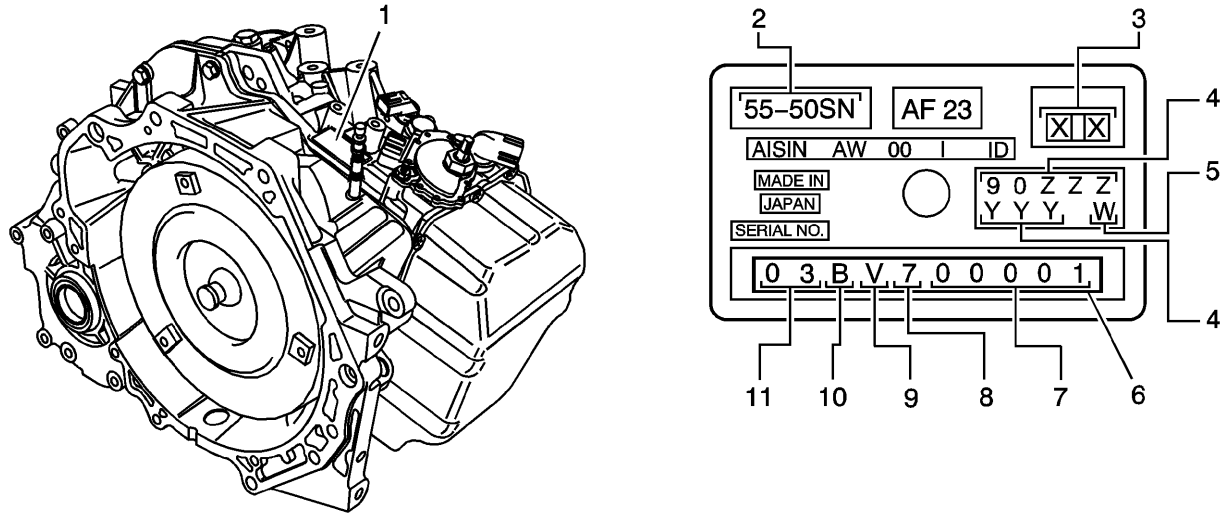


The engine traceability label (1) is located on the rear of the left cylinder head.

## Engine Barcode Description

Position	Definition	Character	Description
<b>Engine Barcode Description</b>			
<b>The Engine Barcode format is 10XXX-XXXXXXXXXX, totaling 15 characters.</b>			
1-2	Flex ID	10	Component ID
3-5	Broadcast Code	BWD	Broadcast Code
6	Hyphen	—	Hyphen
7-13	Serial Number	—	Serial Number
14-15	Blank	—	Intentionally Blank

## Transmission Identification Information



1. Transmission I.D. Location	7. Serial Number During the Month of Manufacture
2. Model Number	8. Assembly Line Code
3. I.D. Code	9. Model of Transaxle, V = 55-50SN
4. GM Part Number	10. Month of Manufacture, A = Jan, B = Feb, etc
5. Calibration Code	11. Year of Manufacture, 03 = 2003
6. AW Production Unit Number	

## Diagnostic Information and Procedures

### Diagnostic Procedure Instructions - Vehicle Diagnostic Information

The following is an overview of instructions for all 16 categories which may be included in a diagnostic procedure.

#### Diagnostic Instructions

A link to the “Diagnostic System Check - Vehicle Diagnostic Information” is provided here. This procedure should be performed prior to performing other diagnostic procedures, as this prevents misdiagnosis where there are integrated system dependencies.

A link to the “Strategy Based Diagnosis: ” is provided here. This provides an overview on how a technician should diagnose a vehicle.

A link to the “Diagnostic Procedure Instructions - Vehicle Diagnostic Information” is provided here. This information is an overview of instructions for all 16 categories which may be included in a diagnostic procedure.

#### DTC Descriptor

Describes what DTCs are diagnosed in this procedure. The DTC number, with Symptom Description when applicable, and descriptor are written out.

## Diagnostic Fault Information

The diagnostic Fault Information table identifies each circuit that makes up an electrical subsystem and the associated circuit faults. DTCs and symptoms are listed in the table for all circuit fault modes. This information can be used to diagnose an electrical fault, or as a quick visual aid showing how the different symptoms and DTCs apply for the subsystem being diagnosed.

Even though all the DTCs and symptoms are shown in this table it does not mean they will all be diagnosed in the same procedure.

An example table from an engine coolant temperature (ECT) procedure:

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
ECT Sensor Signal	P0117	P0118	P0118	P0125 P0128
ECT Low Reference	—	P0118	P0118	P0125 P0128

## Typical Scan Tool Data

The Typical Scan Tool Data table identifies a scan tool data parameter and its value in reference to potential circuit faults.

An example table from an ECT procedure:

### ECT Sensor Temperature - PCM

Circuit	Short to Ground	Open	Short to Voltage
<b>Operating Conditions:</b> Engine Running			
<b>Parameter Normal Range:</b> -32 to +130°C (-26 to +275°F)			
ECT Signal	-40°C (-40°F)	140°C (284°F)	-40°C (-40°F)
Low Reference	—	-40°C (-40°F)	-40°C (-40°F) <sup>1</sup>
<sup>1</sup> Internal ECM damage may occur if shorted to B+			

### Circuit/System Description

Circuit/System Description identifies how a circuit/system normally functions.

### Conditions for Running the DTC

Conditions for Running the DTC, identifies what conditions must be present to allow the diagnostic to run.

### Conditions for Setting the DTC

Conditions for Setting the DTC, identifies the condition(s) that must be present in order to fail the diagnostic and when to set the DTC.

### Action Taken When the DTC Sets

Actions Taken When the DTC sets, identifies the default actions taken when a control module sets a DTC.

### Conditions for Clearing the DTC

Conditions for Clearing the DTC, identifies the conditions that must be met in order to clear the DTC.

### Diagnostic Aids

Diagnostic Aids are suggestions which explain other methods to diagnose the condition. It also provides unique information about the system used to assist the technician in finding and repairing a vehicle condition.

### Reference Information

Reference Information includes links providing additional information for the diagnostic procedure.

For example:

- Schematic Reference
- Connector End View Reference
- Description and Operation
- Electrical Information Reference
- DTC Type Reference
- Scan Tool Reference
- Special Tools Required

### **Circuit/System Verification**

The diagnostic format does not force a technician to any of the 3 diagnostic categories (Circuit/System Verification, Circuit/System Testing and Component Testing). However, performing the Circuit/System Verification category first, aids in determining if a vehicle condition is current. This category also serves to route the technician to another diagnostic procedure which should be performed first; for example, a DTC with a higher priority.

Circuit/System Verification is a non-intrusive procedure outlining how to verify that a system or a portion of a system is functioning correctly. During the verification process, the vehicle is kept intact and tested as a complete system. This verification is used to assist the technician in determining whether a condition is current or intermittent. When a condition is determined to be intermittent, a technician can use the link in Electrical Information Reference: "Testing for Intermittent Conditions and Poor Connections: ".

The technician should be able to identify if the fault is occurring on the input circuit - signal or on the output circuit - control when applicable. The technician will need to decide from the verification results if the system is working correctly or if further diagnosis needs to be performed in either Circuit/System Testing and/or Component Testing.

### **Circuit/System Testing**

The diagnostic format does not force a technician to any of the 3 diagnostic categories (Circuit/System Verification, Circuit/System Testing and Component Testing). However, beginning with the Circuit/System Verification category aids in determining if a vehicle condition is current.

Circuit/System Testing is a step by step, positive-flow, testing sequence which allows the technician to perform each test step, in sequence, until a fault is detected. If the result of a test step is achieved, the normal flow is to proceed to the next step. If the result is NOT achieved, the repair arrow bullet will identify what actions need to take place.

Intrusive diagnostics are performed to locate the system fault. System harness connections are disconnected from the module or component to test individual circuit functions. The module or component will be used to assist in verifying the circuit function. When a test does not pass, the repair steps will indicate what circuit faults to test. For example, short to voltage, short to ground or open/high resistance.

When testing for individual circuit faults, the technician is expected to include terminal inspections such as connection surfaces and terminal tension at both the harness and component/module. Additionally, a technician can use the links in Electrical Information Reference: "Testing for Intermittent Conditions and Poor Connections: " or "Circuit Testing: ".

The control modules and components will also be diagnosed during these test steps. A retest of a control module or component should always be performed before replacement. For example, re-connect all components and modules and retest the system to verify the condition still exists before replacing modules or components.

### **Component Testing**

The diagnostic format does not force a technician to any of the 3 diagnostic categories (Circuit/System Verification, Circuit/System Testing and Component Testing). However, beginning with the Circuit/System Verification category aids in determining if a vehicle condition is current.

Component Testing can offer static and/or dynamic component tests. These tests can be used to verify if a component is operating correctly to avoid unnecessary replacement.

Testing modules in this category will not be offered. In most cases, the module is used to verify the harness circuits in the Circuit/System Testing category and a retest of the module should always be performed before replacement.

### **Repair Instructions**

Repair Instructions provides a link to "Diagnostic Repair Verification - Vehicle Diagnostic Information". This link describes how to verify the vehicle is repaired.

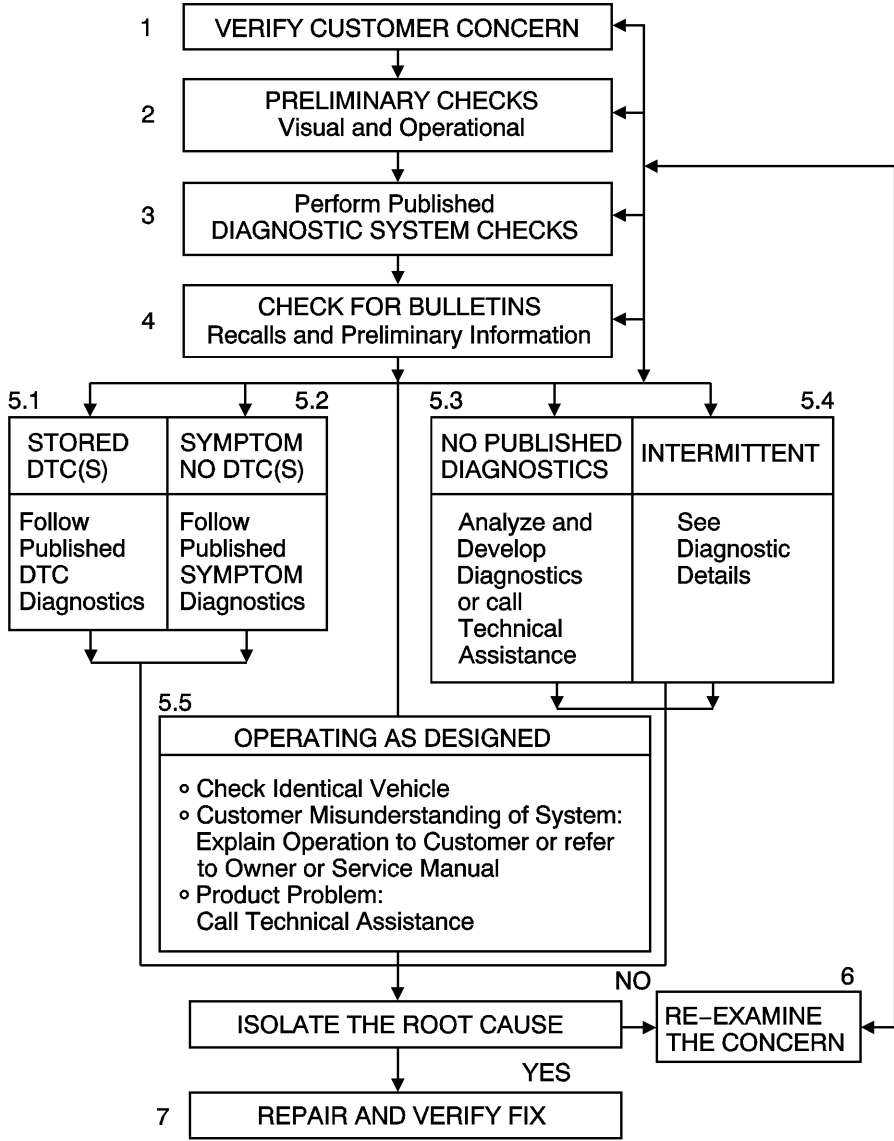
All links to Repair or Replacement procedures are located here.

### **Repair Verification**

Repair Verification describes how to verify the vehicle is repaired when additional instructions are needed beyond what is in Diagnostic Repair Verification.

**Strategy Based Diagnosis - Vehicle Diagnostic Information**

The goal of Strategy Based Diagnostics is to provide guidance when you create a plan of action for each specific diagnostic situation. Following a similar plan for each diagnostic situation, you will achieve maximum efficiency when you diagnose and repair vehicles. Although each of the Strategy Based Diagnostics boxes is numbered, you are not required to complete every box in order to successfully diagnose a customer concern. The first step of your diagnostic process should always be, verify the Customer Concern box. The final step of your diagnostic process should be Repair and verify the Fix box 7. Refer to the following chart for the correct Strategy Based Diagnostics.



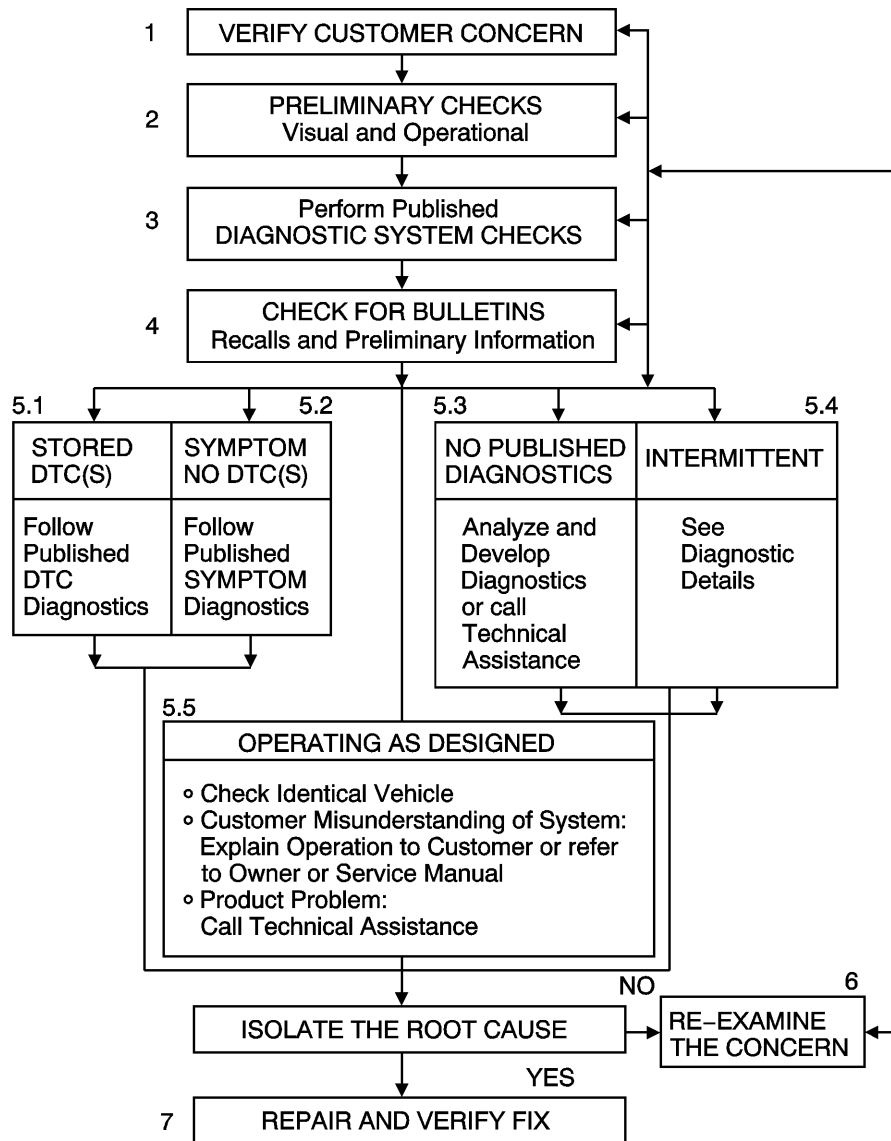
<p>1. Verify the Customer Concern: The first part of this step is to obtain as much information as possible from the customer. Are there aftermarket accessories on the vehicle? When does the condition occur? Where does the condition occur? How long does the condition last? How often does the condition occur? In order to verify the concern, the technician should be familiar with the normal operation of the system and refer to the owner or service manual for any information needed.</p>	<p>5.3. No Published Diagnostics: Analyze the Concern. Develop a plan for the diagnostics. The service manual schematics will help you to see system power, ground, input and output circuits. You can also identify splices and other areas where multiple circuits are tied together. Look at component locations to see if components, connectors or harnesses may be exposed to extreme temperature, moisture, road salt or other corrosives battery acid, oil or other fluids. Utilize the wiring diagrams, system description and operation, and system circuit description.</p>
<p>2. Preliminary Checks: Conduct a thorough visual inspection. Review the service history. Detect unusual sounds or odors. Gather diagnostic trouble code (DTC) information in order to achieve an effective repair.</p>	<p>5.4. Intermittents: An intermittent condition is one that does not occur continuously and will occur when certain conditions are met. Generally, intermittents are caused by faulty electrical connections and wiring, malfunctioning components, electromagnetic/radio frequency interference, and aftermarket equipment. Combine technician knowledge with efficient use of the available service information. Evaluate the symptoms and conditions described by the customer. Use a check sheet or other method in order to identify the component. Follow the suggestions for intermittent diagnosis found in the service manual. A scan tool and a digital multi-meter may have data capturing capabilities that can assist in detection of intermittents.</p>

**0A-37 General Information:**

3. Perform Published Diagnostic System Check: The Diagnostic System Check verifies the proper operation of the system. This will lead the technician in an organized approach to diagnostics.	5.5. Vehicle Operates as Designed: This condition exists when the vehicle is found to operate normally. The condition described by the customer may be normal. Compare with another like vehicle that is operating normally under the same conditions described by the customer. Explain your findings and the operation of that system to the customer.
4. Check Bulletins, Recalls and Preliminary Information (PI)s.	6. Re-examine the Concern: If a technician cannot successfully find or isolate the concern, a re-evaluation is necessary. Re-verify the concern. The concern could be an intermittent or normal condition.
5.1. Stored DTCs: Follow the designated DTC in order to make an effective repair.	7. Repair and Verify Fix: After isolating the cause, make the repairs and validate for the correct operation. Verify that the symptom has been corrected, which may involve road testing the vehicle.
5.2. Symptom No DTC: Select the appropriate symptom. Follow the diagnostic steps or suggestions in order to complete the repair.	

**Strategy Based Diagnosis**

The goal of Strategy Based Diagnostics is to provide guidance when you create a plan of action for each specific diagnostic situation. Following a similar plan for each diagnostic situation, you will achieve maximum efficiency when you diagnose and repair vehicles. Although each of the Strategy Based Diagnostics boxes is numbered, you are not required to complete every box in order to successfully diagnose a customer concern. The first step of your diagnostic process should always be, verify the Customer Concern box. The final step of your diagnostic process should be Repair and verify the Fix box 7. Refer to the following chart for the correct Strategy Based Diagnostics.



<p>1. Verify the Customer Concern: The first part of this step is to obtain as much information as possible from the customer. Are there aftermarket accessories on the vehicle? When does the condition occur? Where does the condition occur? How long does the condition last? How often does the condition occur? In order to verify the concern, the technician should be familiar with the normal operation of the system and refer to the owner or service manual for any information needed.</p>	<p>5.3. No Published Diagnostics: Analyze the Concern. Develop a plan for the diagnostics. The service manual schematics will help you to see system power, ground, input and output circuits. You can also identify splices and other areas where multiple circuits are tied together. Look at component locations to see if components, connectors or harnesses may be exposed to extreme temperature, moisture, road salt or other corrosives battery acid, oil or other fluids. Utilize the wiring diagrams, system description and operation, and system circuit description.</p>
<p>2. Preliminary Checks: Conduct a thorough visual inspection. Review the service history. Detect unusual sounds or odors. Gather diagnostic trouble code (DTC) information in order to achieve an effective repair.</p>	<p>5.4. Intermittents: An intermittent condition is one that does not occur continuously and will occur when certain conditions are met. Generally, intermittents are caused by faulty electrical connections and wiring, malfunctioning components, electromagnetic/radio frequency interference, and aftermarket equipment. Combine technician knowledge with efficient use of the available service information. Evaluate the symptoms and conditions described by the customer. Use a check sheet or other method in order to identify the component. Follow the suggestions for intermittent diagnosis found in the service manual. A scan tool and a digital multi-meter may have data capturing capabilities that can assist in detection of intermittents.</p>
<p>3. Perform Published Diagnostic System Check: The Diagnostic System Check verifies the proper operation of the system. This will lead the technician in an organized approach to diagnostics.</p>	<p>5.5. Vehicle Operates as Designed: This condition exists when the vehicle is found to operate normally. The condition described by the customer may be normal. Compare with another like vehicle that is operating normally under the same conditions described by the customer. Explain your findings and the operation of that system to the customer.</p>
<p>4. Check Bulletins, Recalls and Preliminary Information (PI)s.</p>	<p>6. Re-examine the Concern: If a technician cannot successfully find or isolate the concern, a re-evaluation is necessary. Re-verify the concern. The concern could be an intermittent or normal condition.</p>
<p>5.1. Stored DTCs: Follow the designated DTC in order to make an effective repair.</p>	<p>7. Repair and Verify Fix: After isolating the cause, make the repairs and validate for the correct operation. Verify that the symptom has been corrected, which may involve road testing the vehicle.</p>
<p>5.2. Symptom No DTC: Select the appropriate symptom. Follow the diagnostic steps or suggestions in order to complete the repair.</p>	

## Vehicle-to-Vehicle Diagnostic Comparison

Comparing the customer's vehicle to a KNOWN GOOD vehicle that is essentially identical will help determine if the customer's concern may be characteristic of a vehicle design. To arrive at a valid conclusion, the comparison must be performed under the same conditions, using the same criteria, on a vehicle that has the same option content as the customer's vehicle.

The comparison vehicle must match the customer's vehicle in the following areas:

- Model Year
- Make
- Model
- Body style
- Powertrain configuration
- Driveline configuration
- Final drive ratio
- Tire/wheel size and type
- Suspension package
- Trailering package
- GVW rating
- Performance options
- Luxury options

## Diagnostic Trouble Code (DTC) List - Vehicle Diagnostic Information

This master DTC list includes all applicable DTCs in alphanumeric order with descriptors.

The GM LAN modules on this vehicle also support DTC Symptom information. Refer to "DTC Symptom Description - Vehicle Diagnostic Information" for additional information on DTC symptoms.

DTC	DTC Descriptor	Module that Sets the DTC	Diagnostic Procedure
<b>NOTE</b>			
<b>Do not clear any DTCs unless instructed to do so by a diagnostic procedure</b>			
<b>NOTE</b>			
<b>If any DTCs are Powertrain related DTCs, select Capture Info in order to store the DTC information with the scan tool</b>			
Diagnose any current DTCs in the following order:			
1. DTCs that begin with a U			
2. B1000, B1001, B1016, B1019, C0550, C0551, C0558, P0601, P0602, P0603, P0604, P0606, P2101, P2107, or P2610			
3. B1325, B1424, B1517, C0800, C0899, C0900, P0560, P0562, or P0563			
4. Component level DTCs			
5. System level DTCs			
6. Any remaining DTCs			
B0000	Vehicle Speed Information Circuit	Radio	"DTC B0000: "
B0005	In Park Switch Signal Circuit	BCM	"DTC B0005: "
B0012	Driver Frontal Deployment Loop Stage 1	SDM	"DTC B0012 or B0013: "
B0013	Driver Frontal Deployment Loop Stage 2	SDM	"DTC B0012 or B0013: "
B0014	Driver Side Frontal Deployment Loop	SDM	"DTC B0014-B0045: "
B0015	Driver Pretensioner Loop	SDM	"DTC B0014-B0045: "
B0016	Left Roof Rail Initiator 1 Deployment Loop	SDM	"DTC B0014-B0045: "
B0019	Passenger Frontal Deployment Loop Stage 1	SDM	"DTC B0014-B0045: "
B0020	Passenger Frontal Deployment Loop Stage 2	SDM	"DTC B0014-B0045: "
B0022	Passenger Pretensioner Deployment Loop	SDM	"DTC B0014-B0045: "
B0023	Right Roof Rail Initiator 1 Deployment Loop	SDM	"DTC B0014-B0045: "
B0052	Deployment Commanded	SDM	"DTC B0052 or B0053: "
B0053	Deployment Commanded With Loop DTCs Present	SDM	"DTC B0052 or B0053: "
B0055	Side Airbag Deployment Commanded	SDM	"DTC B0055: "
B0056	Passenger Frontal Airbag Suppressed	SDM	"DTC B0056: "
B0057	Passenger Side Airbag Suppressed	SDM	"DTC B0057: "
B0058	Passenger Pretensioner Suppressed	SDM	"DTC B0058: "
B0073	Passenger Seat Belt Sensor Circuit	SDM	"DTC B0073: "
B0081	Passenger Presence System	SDM	"DTC B0081: "
B0083	Front End Sensor 1	SDM	"DTC B0083 or B0084: "
B0084	Front End Sensor 2	SDM	"DTC B0083 or B0084: "
B0085	Left Front Side Impact Sensor	SDM	"DTC B0085 or B0086: "
B0086	Right Front Side Impact Sensor	SDM	"DTC B0085 or B0086: "
B0090	Rollover Sensor	SDM	"DTC B0090: "
B0158	Outside Air Temperature Sensor Circuit	BCM	"DTC B0158: "
B0228	Recirculate Position Feedback Circuit	HVAC	"DTC B0228, B0413, B0423, B0433, B3779 or B3782: "



DTC	DTC Descriptor	Module that Sets the DTC	Diagnostic Procedure
B0285	Electric Rear Defrost Circuit Low	BCM	"DTC B0285 or B0286: "
B0286	Electric Rear Defrost Circuit High	BCM	"DTC B0285 or B0286: "
B0413	Temperature Control 1 Feedback Circuit	HVAC	"DTC B0228, B0413, B0423, B0433, B3779 or B3782: "
B0423	Temperature Control 2 Feedback Circuit	HVAC	"DTC B0228, B0413, B0423, B0433, B3779 or B3782: "
B0433	Temperature Control 3 Feedback Circuit	HVAC	"DTC B0228, B0413, B0423, B0433, B3779 or B3782: "
B0835	Cruise Control System Active Indicator Circuit	BCM	"DTC B0835: "
B1000	Electronic Control Unit (ECU) Performance	BCM, DRR, IPC, PPS, Radio, RCDLR, ROS, RSA, SDM, TDM, VCIM	"DTC B1000: "
B1001	Option Configuration Error	BCM, HVSM, PPS, Radio, ROS, SDM, VCIM	"DTC B1001: "
		SDM	"DTC B1001 (SDM): "
B1016	VIN Not Programmed	BCM, TDM	"DTC B1016: "
B1019	System Configuration Error	SDM	"DTC B1019: "
B1025	Left Front Audio Output Circuit	Radio	"DTC B1025, B1035, B1045, or B1055: "
B1035	Right Front Audio Output Circuit	Radio	"DTC B1025, B1035, B1045, or B1055: "
B1045	Left Rear Audio Output Circuit	Radio	"DTC B1025, B1035, B1045, or B1055: "
B1055	Right Rear Audio Output Circuit	Radio	"DTC B1025, B1035, B1045, or B1055: "
B1259	Antenna Ground Circuit	DRR	"DTC B1259: "
B1287	Amplifier Control Signal Circuit	Radio	"DTC B1287: "
B1325	Device Power Circuit	HVSM, IPC, PPS, Radio	"DTC B1325: "
B1370	Device Ignition 1 ON and START Circuit	BCM	"DTC B1370: "
	Device Ignition 1 Circuit	SDM	"DTC B1370: "
B1380	Device Ignition Accessory Circuit	BCM	"DTC B1380: "
B1395	Analog Reference Voltage	HSM	"DTC B1395: "
B1405	Device Voltage Reference Output 2 Circuit	BCM	"DTC B1405: "
B1424	Device 1 Voltage Low	TDM	"DTC B1424: "
B1428	Ignition Switched Power Run/Crank Relay Circuit	BCM	"DTC B1428: "
B1433	Ignition Switched Power Relay 2 Circuit	BCM	"DTC B1433: "
B1441	Device Ignition Off/Run/Crank Circuit	BCM	"DTC B1441: "
B1475	Retained Accessory Power Circuit	BCM	"DTC B1475: "
B1516	Battery Current Sensor Signal	BCM	"DTC B1516: "
B1517	Battery Voltage	BCM	"DTC B1517: "
B1527	High Parasitic Load Detected	BCM	"DTC B1527: "
B1529	Device Voltage Reference Output Circuit	BCM	"DTC B1529: "
B1925	Left Seat Cushion Heater Sensor Circuit	HSM	"DTC B1925 or B2170: "
B2170	Right Seat Cushion Heater Sensor Circuit	HSM	"DTC B1925 or B2170: "
B2345	Seat Heater Disable Circuit	HSM	"DTC B2345: "
B2425	Left Seat Heater Circuit	HSM	"DTC B2425 or B2430: "
B2430	Right Seat Heater Circuit	HSM	"DTC B2425 or B2430: "
B2462	Global Positioning System (GPS)	Navigation Radio	"DTC B2462: "

**0A-41 General Information:**

<b>DTC</b>	<b>DTC Descriptor</b>	<b>Module that Sets the DTC</b>	<b>Diagnostic Procedure</b>
B2474	Navigation Display Head Backlighting Performance	Navigation Radio	"DTC B2474: "
B2508	Seat Heater Relay Circuit	HSM	"DTC B2508 or B2509: "
B2530	Front Fog Lamp Control Circuit	BCM	"DTC B2530: "
B2545	Backup Lamps Circuit	BCM	"DTC B2545: "
B2575	Headlamp Control Circuit	BCM	"DTC B2575: "
B257A	Headlamp Switch Input Signal Mismatch	BCM	"DTC B257A: "
B2580	Headlamp High Beam Control Circuit	BCM	"DTC B2580: "
B2585	Park Lamp Control Circuit	BCM	"DTC B2585: "
B2600	Daytime Running Lamp Control Circuit	BCM	"DTC B2600: "
B2610	Passenger Compartment Dimming 1 Circuit	BCM	"DTC B2610: "
B2615	Passenger Compartment Dimming 2 Circuit	BCM	"DTC B2615: "
B2645	Ambient Light Sensor Circuit	BCM	"DTC B2645: "
B2652	Passenger Compartment Dimming 3 Circuit	BCM	"DTC B2652: "
B2705	Gearshift Unlock Circuit	BCM	"DTC B2705: "
B2750	Horn Relay Coil Circuit	BCM	"DTC B2750: "
B2965	Key In Ignition Circuit Open	BCM	"DTC B2965: "
B3006	Hood Ajar Circuit Plausibility Failure	BCM	"DTC B3006: "
B3031	Security System Controller In Learn Mode	TDM	"DTC B3031: "
B3055	No Transponder Modulation or No Transponder	TDM	"DTC B3055: "
B3060	Unprogrammed Transponder Identification Code Received	TDM	"DTC B3060: "
B3105	Keyless Entry System Key Fobs Not Programmed	RCDLR	"DTC B3105: "
B3109	Keyless Entry Transmitter 1 Low Battery	RCDLR	"DTC B3109: "
B3110	Keyless Entry Transmitter 2 Low Battery	RCDLR	"DTC B3110: "
B3111	Keyless Entry Transmitter 3 Low Battery	RCDLR	"DTC B3111: "
B3112	Keyless Entry Transmitter 4 Low Battery	RCDLR	"DTC B3112: "
B3445	Stop Lamp Circuit	BCM	"DTC B3445: "
B3600	Passenger Compartment Dimming Request Signal Circuit	BCM	"DTC B3600: "
B3622	Steering Wheel Controls Signal Circuit	BCM	"DTC B3622: "
B3715	Front Wiper Relay Drive Circuit	BCM	"DTC B3715: "
B3779	Air Flow Control 9 Feedback Circuit	HVAC	"DTC B0228, B0413, B0423, B0433, B3779 or B3782: "
B3782	Air Flow Control 10 Feedback Circuit	HVAC	"DTC B0228, B0413, B0423, B0433, B3779 or B3782: "
B3794	Cruise Control Function Request Circuit	BCM	"DTC B3794: "
B3867	Right Park Lamp Control Circuit	BCM	"DTC B3867: "
B3873	Front Washer Relay Circuit	BCM	"DTC B3873: "
B3875	Wiper High Speed Relay Circuit	BCM	"DTC B3875: "
B3884	Center High Mounted Stop Lamp (CHMSL) Circuit	BCM	"DTC B3884: "
B3922	Front Wiper Function Select Circuit	BCM	"DTC B3922: "
B3933	Evaporator Temperature Sensor Circuit	HVAC	"DTC B3933: "
B3935	Transponder Authentication Error	VTD	"DTC B3935: "

DTC	DTC Descriptor	Module that Sets the DTC	Diagnostic Procedure
B3976	Unconfigured Transponder/Vehicle Configuration Not Programmed	TDM	"DTC B3976: "
C0035	Left Front Wheel Speed Sensor Circuit	EBCM	"DTC C0035-C0050: "
C0040	Right Front Wheel Speed Sensor Circuit	EBCM	"DTC C0035-C0050: "
C0045	Left Rear Wheel Speed Sensor Circuit	EBCM	"DTC C0035-C0050: "
C0050	Right Rear Wheel Speed Sensor Circuit	EBCM	"DTC C0035-C0050: "
C0110	Pump Motor Circuit	EBCM	"DTC C0110: "
C0131	ABS Pressure Circuit	EBCM	"DTC C0131: "
C0161	Antilock Brake System (ABS) Brake Switch/Sensor Circuit	EBCM	"DTC C0161: "
C0186	Lateral Accelerometer Circuit	EBCM	"DTC C0186: "
C0196	Yaw Rate Circuit	EBCM	"DTC C0196: "
C0201	Antilock Brake System (ABS) Enable Relay Contact Circuit	EBCM	"DTC C0201: "
C0252	Steering Wheel Position Sensor Uncorrelated	EBCM	"DTC C0252: "
C0267	Low Brake Fluid Indicated	EBCM	"DTC C0267: "
C0277	Brake Pedal Position Sensor Circuit	EBCM	"DTC C0277 or DTC C0890: "
C0280	Stability System Active Too Long	EBCM	"DTC C0280: "
C0292	VSES Combination Sensor Circuits	EBCM	"DTC C0292: "
C0297	Brake Applied Output Circuit	BCM	"DTC C0297: "
C0393	Rear Axle Coupling Solenoid Control Circuit	CCM	"DTC C0393: "
C0394	Rear Axle Coupling Temperature Sensor Circuit	CCM	"DTC C0394: "
C0460	Steering Position Signal	EBCM	"DTC C0460: "
C0550	Electronic Control Unit (ECU) Performance	EBCM	"DTC C0550: "
		CCM	"DTC C0550: "
C0551	Option Configuration Error	EBCM	"DTC C0551: "
C0558	Calibration Mismatch	CCM	"DTC C0558: "
C0561	System Disabled Information Stored	EBCM	"DTC C0561: "
		CCM	"DTC C0561: "
C0750	Left Front Low Tire Pressure Sensor	RCDLR	"DTC C0750, C0755, C0760, or C0765: "
C0755	Right Front Low Tire Pressure Sensor	RCDLR	"DTC C0750, C0755, C0760, or C0765: "
C0760	Left Rear Low Tire Pressure Sensor	RCDLR	"DTC C0750, C0755, C0760, or C0765: "
C0765	Right Rear Low Tire Pressure Sensor	RCDLR	"DTC C0750, C0755, C0760, or C0765: "
C0775	Low Tire Pressure System Sensors Not Learned	RCDLR	"DTC C0775: "
C0890	Device Voltage Reference Output 3 Circuit	BCM	"DTC C0277 or DTC C0890: "
C0899	Device Voltage Low	EBCM	"DTC C0899: "
C0900	Device Voltage High	EBCM	"DTC C0900: "
P0008	Engine Position System Performance Bank 1	ECM	"DTC P0008 or P0009: "
P0009	Engine Position System Performance Bank 2	ECM	"DTC P0008 or P0009: "
P0010	Intake Camshaft Position (CMP) Actuator Solenoid Control Circuit Bank 1	ECM	"DTC P0010, P0013, P0020, P0023, P2088, P2089, P2090, P2091, P2092, P2093, P2094, or P2095: "
P0011	Intake Camshaft Position (CMP) System Performance Bank 1	ECM	"DTC P0011, P0014, P0021, or P0024: "
P0013	Exhaust Camshaft Position (CMP) Actuator Solenoid Control Circuit Bank 1	ECM	"DTC P0010, P0013, P0020, P0023, P2088, P2089, P2090, P2091, P2092, P2093, P2094, or P2095: "
P0014	Exhaust Camshaft Position (CMP) System Performance Bank 1	ECM	"DTC P0011, P0014, P0021, or P0024: "

**0A-43 General Information:**

<b>DTC</b>	<b>DTC Descriptor</b>	<b>Module that Sets the DTC</b>	<b>Diagnostic Procedure</b>
P0016	Crankshaft Position (CKP) - Intake Camshaft Position (CMP) Correlation Bank 1	ECM	"DTC P0016, P0017, P0018, or P0019: "
P0017	Crankshaft Position (CKP) - Exhaust Camshaft Position (CMP) Correlation Bank 1	ECM	"DTC P0016, P0017, P0018, or P0019: "
P0018	Crankshaft Position (CKP) - Intake Camshaft Position (CMP) Correlation Bank 2	ECM	"DTC P0016, P0017, P0018, or P0019: "
P0019	Crankshaft Position (CKP) - Exhaust Camshaft Position (CMP) Correlation Bank 2	ECM	"DTC P0016, P0017, P0018, or P0019: "
P0020	Intake Camshaft Position (CMP) Actuator Solenoid Control Circuit Bank 2	ECM	"DTC P0010, P0013, P0020, P0023, P2088, P2089, P2090, P2091, P2092, P2093, P2094, or P2095: "
P0021	Intake Camshaft Position (CMP) System Performance Bank 2	ECM	"DTC P0011, P0014, P0021, or P0024: "
P0023	Exhaust Camshaft Position (CMP) Actuator Solenoid Control Circuit Bank 2	ECM	"DTC P0010, P0013, P0020, P0023, P2088, P2089, P2090, P2091, P2092, P2093, P2094, or P2095: "
P0024	Exhaust Camshaft Position (CMP) System Performance Bank 2	ECM	"DTC P0011, P0014, P0021, or P0024: "
P0030	HO2S Heater Control Circuit Bank 1 Sensor 1	ECM	"DTC P0030, P0031, P0032, P0036, P0037, P0038, P0050, P0051, P0052, P0056, P0057, or P0058: "
P0031	HO2S Heater Control Circuit Low Voltage Bank 1 Sensor 1	ECM	"DTC P0030, P0031, P0032, P0036, P0037, P0038, P0050, P0051, P0052, P0056, P0057, or P0058: "
P0032	HO2S Heater Control Circuit High Voltage Bank 1 Sensor 1	ECM	"DTC P0030, P0031, P0032, P0036, P0037, P0038, P0050, P0051, P0052, P0056, P0057, or P0058: "
P0036	Heater Control Circuit Bank 1 Sensor 2	ECM	"DTC P0030, P0031, P0032, P0036, P0037, P0038, P0050, P0051, P0052, P0056, P0057, or P0058: "
P0037	HO2S Heater Control Circuit Low Voltage Bank 1 Sensor 2	ECM	"DTC P0030, P0031, P0032, P0036, P0037, P0038, P0050, P0051, P0052, P0056, P0057, or P0058: "
P0038	HO2S Heater Control Circuit High Voltage Bank 1 Sensor 2	ECM	"DTC P0030, P0031, P0032, P0036, P0037, P0038, P0050, P0051, P0052, P0056, P0057, or P0058: "
P0050	HO2S Heater Control Circuit Bank 2 Sensor 1	ECM	"DTC P0030, P0031, P0032, P0036, P0037, P0038, P0050, P0051, P0052, P0056, P0057, or P0058: "
P0051	HO2S Heater Control Circuit Low Voltage Bank 2 Sensor 1	ECM	"DTC P0030, P0031, P0032, P0036, P0037, P0038, P0050, P0051, P0052, P0056, P0057, or P0058: "
P0052	HO2S Heater Control Circuit High Voltage Bank 2 Sensor 1	ECM	"DTC P0030, P0031, P0032, P0036, P0037, P0038, P0050, P0051, P0052, P0056, P0057, or P0058: "
P0056	HO2S Heater Control Circuit Bank 2 Sensor 2	ECM	"DTC P0030, P0031, P0032, P0036, P0037, P0038, P0050, P0051, P0052, P0056, P0057, or P0058: "
P0057	HO2S Heater Control Circuit Low Voltage Bank 2 Sensor 2	ECM	"DTC P0030, P0031, P0032, P0036, P0037, P0038, P0050, P0051, P0052, P0056, P0057, or P0058: "
P0058	HO2S Heater Control Circuit High Voltage Bank 2 Sensor 2	ECM	"DTC P0030, P0031, P0032, P0036, P0037, P0038, P0050, P0051, P0052, P0056, P0057, or P0058: "

DTC	DTC Descriptor	Module that Sets the DTC	Diagnostic Procedure
P0100	Mass Air Flow (MAF) Sensor Circuit	ECM	"DTC P0100, P0102, or P0103: "
P0101	Mass Air Flow (MAF) Sensor Performance	ECM	"DTC P0101: "
P0102	Mass Air Flow (MAF) Sensor Circuit Low Frequency	ECM	"DTC P0100, P0102, or P0103: "
P0103	Mass Air Flow (MAF) Sensor Circuit High Frequency	ECM	"DTC P0100, P0102, or P0103: "
P0111	Intake Air Temperature (IAT) Sensor Circuit Performance	ECM	"DTC P0111, P0112 or P0113: "
P0112	Intake Air Temperature (IAT) Sensor Circuit Low Voltage	ECM	"DTC P0111, P0112 or P0113: "
P0113	Intake Air Temperature (IAT) Sensor Circuit High Voltage	ECM	"DTC P0111, P0112 or P0113: "
P0115	Engine Coolant Temperature (ECT) Sensor Circuit	TCM	"DTC P0115, P0120, P0703, P0727, P0826, P1779, P2544, or P2637: "
P0116	Engine Coolant Temperature (ECT) Sensor Performance	ECM	"DTC P0116: "
P0117	Engine Coolant Temperature (ECT) Sensor Circuit Low Voltage	ECM	"DTC P0117 or P0118: "
P0118	Engine Coolant Temperature (ECT) Sensor Circuit High Voltage	ECM	"DTC P0117 or P0118: "
P0119	Engine Coolant Temperature (ECT) Sensor Circuit Intermittent	ECM	"DTC P0119: "
P0120	Throttle Position (TP) Sensor Circuit	TCM	"DTC P0115, P0120, P0703, P0727, P0826, P1779, P2544, or P2637: "
P0121	Throttle Position (TP) Sensor 1 Performance	ECM	"DTC P0121, P0122, P0123, P0221, P0222, or P0223: "
P0122	Throttle Position (TP) Sensor 1 Circuit Low Voltage	ECM	"DTC P0121, P0122, P0123, P0221, P0222, or P0223: "
P0123	Throttle Position (TP) Sensor 1 Circuit High Voltage	ECM	"DTC P0121, P0122, P0123, P0221, P0222, or P0223: "
P0125	Engine Coolant Temperature (ECT) Insufficient for Closed Loop	ECM	"DTC P0125 or P0128: "
P0128	Engine Coolant Temperature (ECT) Below Thermostat Regulating Temperature	ECM	"DTC P0125 or P0128: "
P0131	HO2S Circuit Low Voltage Bank 1 Sensor 1	ECM	"DTC P0131 or P0151: "
P0132	HO2S Circuit High Voltage Bank 1 Sensor 1	ECM	"DTC P0132 or P0152: "
P0133	HO2S Slow Response Bank 1 Sensor 1	ECM	"DTC P0133 or P0153: "
P0134	HO2S Circuit Insufficient Activity Bank 1 Sensor 1	ECM	"DTC P0134 or P0154: "
P0135	HO2S Heater Performance Bank 1 Sensor 1	ECM	"DTC P0135, P0141, P0155, or P0161: "
P0137	HO2S Circuit Low Voltage Bank 1 Sensor 2	ECM	"DTC P0137, P0138, P0140, P0157, P0158, or P0160: "
P0138	HO2S Circuit High Voltage Bank 1 Sensor 2	ECM	"DTC P0137, P0138, P0140, P0157, P0158, or P0160: "
P0140	HO2S Circuit Insufficient Activity Bank 1 Sensor 2	ECM	"DTC P0137, P0138, P0140, P0157, P0158, or P0160: "
P0141	HO2S Heater Performance Bank 1 Sensor 2	ECM	"DTC P0135, P0141, P0155, or P0161: "
P0151	HO2S Circuit Low Voltage Bank 2 Sensor 1	ECM	"DTC P0131 or P0151: "
P0152	HO2S Circuit High Voltage Bank 2 Sensor 1	ECM	"DTC P0132 or P0152: "

**0A-45 General Information:**

DTC	DTC Descriptor	Module that Sets the DTC	Diagnostic Procedure
P0153	HO2S Slow Response Bank 2 Sensor 1	ECM	"DTC P0133 or P0153: "
P0154	HO2S Circuit Insufficient Activity Bank 2 Sensor 1	ECM	"DTC P0134 or P0154: "
P0155	HO2S Heater Performance Bank 2 Sensor 1	ECM	"DTC P0135, P0141, P0155, or P0161: "
P0157	HO2S Circuit Low Voltage Bank 2 Sensor 2	ECM	"DTC P0137, P0138, P0140, P0157, P0158, or P0160: "
P0158	HO2S Circuit High Voltage Bank 2 Sensor 2	ECM	"DTC P0137, P0138, P0140, P0157, P0158, or P0160: "
P0160	HO2S Circuit Insufficient Activity Bank 2 Sensor 2	ECM	"DTC P0137, P0138, P0140, P0157, P0158, or P0160: "
P0161	HO2S Heater Performance Bank 2 Sensor 2	ECM	"DTC P0135, P0141, P0155, or P0161: "
P0201	Injector 1 Control Circuit	ECM	"DTC P0201, P0202, P0203, P0204, P0205, P0206, P0261, P0262, P0264, P0265, P0267, P0268, P0270, P0271, P0273, P0274, P0276, or P0277: "
P0202	Injector 2 Control Circuit	ECM	"DTC P0201, P0202, P0203, P0204, P0205, P0206, P0261, P0262, P0264, P0265, P0267, P0268, P0270, P0271, P0273, P0274, P0276, or P0277: "
P0203	Injector 3 Control Circuit	ECM	"DTC P0201, P0202, P0203, P0204, P0205, P0206, P0261, P0262, P0264, P0265, P0267, P0268, P0270, P0271, P0273, P0274, P0276, or P0277: "
P0204	Injector 4 Control Circuit	ECM	"DTC P0201, P0202, P0203, P0204, P0205, P0206, P0261, P0262, P0264, P0265, P0267, P0268, P0270, P0271, P0273, P0274, P0276, or P0277: "
P0205	Injector 5 Control Circuit	ECM	"DTC P0201, P0202, P0203, P0204, P0205, P0206, P0261, P0262, P0264, P0265, P0267, P0268, P0270, P0271, P0273, P0274, P0276, or P0277: "
P0206	Injector 6 Control Circuit	ECM	"DTC P0201, P0202, P0203, P0204, P0205, P0206, P0261, P0262, P0264, P0265, P0267, P0268, P0270, P0271, P0273, P0274, P0276, or P0277: "
P0221	Throttle Position (TP) Sensor 2 Performance	ECM	"DTC P0121, P0122, P0123, P0221, P0222, or P0223: "
P0222	Throttle Position (TP) Sensor 2 Circuit Low Voltage	ECM	"DTC P0121, P0122, P0123, P0221, P0222, or P0223: "
P0223	Throttle Position (TP) Sensor 2 Circuit High Voltage	ECM	"DTC P0121, P0122, P0123, P0221, P0222, or P0223: "
P0261	Injector 1 Control Circuit Low Voltage	ECM	"DTC P0201, P0202, P0203, P0204, P0205, P0206, P0261, P0262, P0264, P0265, P0267, P0268, P0270, P0271, P0273, P0274, P0276, or P0277: "
P0262	Injector 1 Control Circuit High Voltage	ECM	"DTC P0201, P0202, P0203, P0204, P0205, P0206, P0261, P0262, P0264, P0265, P0267, P0268, P0270, P0271, P0273, P0274, P0276, or P0277: "
P0264	Injector 2 Control Circuit Low Voltage	ECM	"DTC P0201, P0202, P0203, P0204, P0205, P0206, P0261, P0262, P0264, P0265, P0267, P0268, P0270, P0271, P0273, P0274, P0276, or P0277: "

DTC	DTC Descriptor	Module that Sets the DTC	Diagnostic Procedure
P0265	Injector 2 Control Circuit High Voltage	ECM	"DTC P0201, P0202, P0203, P0204, P0205, P0206, P0261, P0262, P0264, P0265, P0267, P0268, P0270, P0271, P0273, P0274, P0276, or P0277: "
P0267	Injector 3 Control Circuit Low Voltage	ECM	"DTC P0201, P0202, P0203, P0204, P0205, P0206, P0261, P0262, P0264, P0265, P0267, P0268, P0270, P0271, P0273, P0274, P0276, or P0277: "
P0268	Injector 3 Control Circuit High Voltage	ECM	"DTC P0201, P0202, P0203, P0204, P0205, P0206, P0261, P0262, P0264, P0265, P0267, P0268, P0270, P0271, P0273, P0274, P0276, or P0277: "
P0270	Injector 4 Control Circuit Low Voltage	ECM	"DTC P0201, P0202, P0203, P0204, P0205, P0206, P0261, P0262, P0264, P0265, P0267, P0268, P0270, P0271, P0273, P0274, P0276, or P0277: "
P0271	Injector 4 Control Circuit High Voltage	ECM	"DTC P0201, P0202, P0203, P0204, P0205, P0206, P0261, P0262, P0264, P0265, P0267, P0268, P0270, P0271, P0273, P0274, P0276, or P0277: "
P0273	Injector 5 Control Circuit Low Voltage	ECM	"DTC P0201, P0202, P0203, P0204, P0205, P0206, P0261, P0262, P0264, P0265, P0267, P0268, P0270, P0271, P0273, P0274, P0276, or P0277: "
P0274	Injector 5 Control Circuit High Voltage	ECM	"DTC P0201, P0202, P0203, P0204, P0205, P0206, P0261, P0262, P0264, P0265, P0267, P0268, P0270, P0271, P0273, P0274, P0276, or P0277: "
P0276	Injector 6 Control Circuit Low Voltage	ECM	"DTC P0201, P0202, P0203, P0204, P0205, P0206, P0261, P0262, P0264, P0265, P0267, P0268, P0270, P0271, P0273, P0274, P0276, or P0277: "
P0277	Injector 6 Control Circuit High Voltage	ECM	"DTC P0201, P0202, P0203, P0204, P0205, P0206, P0261, P0262, P0264, P0265, P0267, P0268, P0270, P0271, P0273, P0274, P0276, or P0277: "
P0300	Engine Misfire Detected	ECM	"DTC P0300-P0306: "
P0301	Cylinder 1 Misfire Detected	ECM	"DTC P0300-P0306: "
P0302	Cylinder 2 Misfire Detected	ECM	"DTC P0300-P0306: "
P0303	Cylinder 3 Misfire Detected	ECM	"DTC P0300-P0306: "
P0304	Cylinder 4 Misfire Detected	ECM	"DTC P0300-P0306: "
P0305	Cylinder 5 Misfire Detected	ECM	"DTC P0300-P0306: "
P0306	Cylinder 6 Misfire Detected	ECM	"DTC P0300-P0306: "
P0327	Knock Sensor (KS) Circuit Low Voltage Bank 1	ECM	"DTC P0326, P0327, P0328, P0331, P0332, or P0333: "
P0328	Knock Sensor (KS) Circuit High Frequency Bank 1	ECM	"DTC P0326, P0327, P0328, P0331, P0332, or P0333: "
P0332	Knock Sensor (KS) Circuit Low Voltage Bank 2	ECM	"DTC P0326, P0327, P0328, P0331, P0332, or P0333: "
P0333	Knock Sensor (KS) Circuit High Frequency Bank 2	ECM	"DTC P0326, P0327, P0328, P0331, P0332, or P0333: "
P0335	Crankshaft Position (CKP) Sensor A Circuit	ECM	"DTC P0335, P0336, or P0338: "
P0336	Crankshaft Position (CKP) Sensor Performance	ECM	"DTC P0335, P0336, or P0338: "
P0338	Crankshaft Position (CKP) Sensor Circuit High Duty Cycle	ECM	"DTC P0335, P0336, or P0338: "

**0A-47 General Information:**

<b>DTC</b>	<b>DTC Descriptor</b>	<b>Module that Sets the DTC</b>	<b>Diagnostic Procedure</b>
P0341	Intake Camshaft Position (CMP) Sensor Performance Bank 1	ECM	"DTC P0341, P0342, P0343, P0346, P0347, P0348, P0366, P0367, P0368, P0391, P0392, or P0393: "
P0342	Intake Camshaft Position (CMP) Sensor Circuit Low Voltage Bank 1	ECM	"DTC P0341, P0342, P0343, P0346, P0347, P0348, P0366, P0367, P0368, P0391, P0392, or P0393: "
P0343	Intake Camshaft Position (CMP) Sensor Circuit High Voltage Bank 1	ECM	"DTC P0341, P0342, P0343, P0346, P0347, P0348, P0366, P0367, P0368, P0391, P0392, or P0393: "
P0346	Intake Camshaft Position (CMP) Sensor Performance Bank 2	ECM	"DTC P0341, P0342, P0343, P0346, P0347, P0348, P0366, P0367, P0368, P0391, P0392, or P0393: "
P0347	Intake Camshaft Position (CMP) Sensor Circuit Low Voltage Bank 2	ECM	"DTC P0341, P0342, P0343, P0346, P0347, P0348, P0366, P0367, P0368, P0391, P0392, or P0393: "
P0348	Intake Camshaft Position (CMP) Sensor Circuit High Voltage Bank 2	ECM	"DTC P0341, P0342, P0343, P0346, P0347, P0348, P0366, P0367, P0368, P0391, P0392, or P0393: "
P0366	Exhaust Camshaft Position (CMP) Sensor Performance Bank 1	ECM	"DTC P0341, P0342, P0343, P0346, P0347, P0348, P0366, P0367, P0368, P0391, P0392, or P0393: "
P0367	Exhaust Camshaft Position (CMP) Sensor Circuit Low Voltage Bank 1	ECM	"DTC P0341, P0342, P0343, P0346, P0347, P0348, P0366, P0367, P0368, P0391, P0392, or P0393: "
P0368	Exhaust Camshaft Position (CMP) Sensor Circuit High Voltage Bank 1	ECM	"DTC P0341, P0342, P0343, P0346, P0347, P0348, P0366, P0367, P0368, P0391, P0392, or P0393: "
P0391	Exhaust Camshaft Position (CMP) Sensor Performance Bank 2	ECM	"DTC P0341, P0342, P0343, P0346, P0347, P0348, P0366, P0367, P0368, P0391, P0392, or P0393: "
P0392	Exhaust Camshaft Position (CMP) Sensor Circuit Low Voltage Bank 2	ECM	"DTC P0341, P0342, P0343, P0346, P0347, P0348, P0366, P0367, P0368, P0391, P0392, or P0393: "
P0393	Exhaust Camshaft Position (CMP) Sensor Circuit High Voltage Bank 2	ECM	"DTC P0341, P0342, P0343, P0346, P0347, P0348, P0366, P0367, P0368, P0391, P0392, or P0393: "
P0420	Catalyst System Low Efficiency Bank 1	ECM	"DTC P0420 or P0430: "
P0430	Catalyst System Low Efficiency Bank 2	ECM	"DTC P0420 or P0430: "
P0442	Evaporative Emission (EVAP) System Small Leak Detected	ECM	"DTC P0442: "
P0443	Evaporative Emission (EVAP) Purge Solenoid Control Circuit	ECM	"DTC P0443, P0458, or P0459: "
P0446	Evaporative Emissions (EVAP) Vent System Performance	ECM	"DTC P0446: "
P0449	Evaporative Emission (EVAP) Vent Solenoid Valve Control Circuit	ECM	"DTC P0449, P0498, or P0499: "
P0451	Fuel Tank Pressure (FTP) Sensor Performance	ECM	"DTC P0451: "
P0452	Fuel Tank Pressure (FTP) Sensor Circuit Low Voltage	ECM	"DTC P0452 or P0453: "
P0453	Fuel Tank Pressure (FTP) Sensor Circuit High Voltage	ECM	"DTC P0452 or P0453: "
P0455	Evaporative Emission (EVAP) System Large Leak Detected	ECM	"DTC P0455: "
P0458	Evaporative Emission (EVAP) Purge Solenoid Control Circuit Low Voltage	ECM	"DTC P0443, P0458, or P0459: "



DTC	DTC Descriptor	Module that Sets the DTC	Diagnostic Procedure
P0459	Evaporative Emission (EVAP) Purge Solenoid Control Circuit High Voltage	ECM	"DTC P0443, P0458, or P0459: "
P0461	Fuel Level Sensor 1 Performance	ECM	"DTC P0461: "
P0462	Fuel Level Sensor 1 Circuit Low Voltage	ECM	"DTC P0462: "
P0463	Fuel Level Sensor 1 Circuit High Voltage	ECM	"DTC P0463: "
P0464	Fuel Level Sensor 1 Circuit Intermittent	ECM	"DTC P0464: "
P0480	Cooling Fan Relay 2 Control Circuit	ECM	"DTC P0480, P0481, P0691, P0692, P0693, or P0694: "
P0481	Cooling Fan Relay 2 and 3 Control Circuit	ECM	"DTC P0480, P0481, P0691, P0692, P0693, or P0694: "
P0496	Evaporative Emission (EVAP) System Flow During Non-Purge	ECM	"DTC P0496: "
P0498	Evaporative Emission (EVAP) Vent Solenoid Valve Control Circuit Low Voltage	ECM	"DTC P0449, P0498, or P0499: "
P0499	Evaporative Emission (EVAP) Vent Solenoid Valve Control Circuit High Voltage	ECM	"DTC P0449, P0498, or P0499: "
P0506	Idle Speed Low	ECM	"DTC P0506, P0507, or P050A: "
P0507	Idle Speed High	ECM	"DTC P0506, P0507, or P050A: "
P050A	Cold Start Idle Air Control (IAC) System Performance	ECM	"DTC P0506, P0507, or P050A: "
P0513	Theft Deterrent Key Incorrect	ECM	"DTC P0513: "
P0520	Engine Oil Pressure (EOP) Sensor Circuit	ECM	"DTC P0520: "
P0532	Air Conditioning (A/C) Refrigerant Pressure Sensor Circuit Low Voltage	ECM	"DTC P0532 or P0533: "
P0533	Air Conditioning (A/C) Refrigerant Pressure Sensor Circuit High Voltage	ECM	"DTC P0532 or P0533: "
P0560	System Voltage	ECM	"DTC P0560: "
P0562	System Voltage Low	ECM	"DTC P0562: "
		TCM	"DTC P0562 or P0563: "
P0563	System Voltage High	ECM	"DTC P0563: "
		TCM	"DTC P0562 or P0563: "
P0571	Cruise Control Brake Switch Circuit	ECM	"DTC P0571: "
P0572	Brake Switch Circuit 1 Low Voltage	ECM	"DTC P0572: "
P0573	Brake Switch Circuit 1 High Voltage	ECM	"DTC P0573: "
P0575	Cruise Control Switch Signal Circuit	ECM	"DTC P0575: "
P0601	Control Module Read Only Memory (ROM)	ECM	"DTC P0601, P0602, P0603, P0604, P0605, P0606, P0607, P1600, P1621, P1627, P1680, P1681, P1683, or P2610: "
	Transmission Control Module (TCM) Read Only Memory (ROM)	TCM	"DTC P0601, P0602, P0603, or P0604: "
P0602	Control Module Not Programmed	ECM	"DTC P0601, P0602, P0603, P0604, P0605, P0606, P0607, P1600, P1621, P1627, P1680, P1681, P1683, or P2610: "
	Transmission Control Module (TCM) Not Programmed	TCM	"DTC P0601, P0602, P0603, or P0604: "
P0603	Control Module Long Term Memory Reset	ECM	"DTC P0601, P0602, P0603, P0604, P0605, P0606, P0607, P1600, P1621, P1627, P1680, P1681, P1683, or P2610: "
	Transmission Control Module (TCM) Long Term Memory Reset	TCM	"DTC P0601, P0602, P0603, or P0604: "

**0A-49 General Information:**

<b>DTC</b>	<b>DTC Descriptor</b>	<b>Module that Sets the DTC</b>	<b>Diagnostic Procedure</b>
P0604	Control Module Random Access Memory (RAM)	ECM	"DTC P0601, P0602, P0603, P0604, P0605, P0606, P0607, P1600, P1621, P1627, P1680, P1681, P1683, or P2610: "
	Transmission Control Module (TCM) Random Access Memory (RAM)	TCM	"DTC P0601, P0602, P0603, or P0604: "
P0606	Control Module Internal Performance	ECM	"DTC P0601, P0602, P0603, P0604, P0605, P0606, P0607, P1600, P1621, P1627, P1680, P1681, P1683, or P2610: "
P0615	Starter Relay Control Circuit	ECM	"DTC P0615: "
P0616	Starter Relay Control Circuit Low Voltage	ECM	"DTC P0616: "
P0617	Starter Relay Control Circuit High Voltage	ECM	"DTC P0617: "
P0621	Generator L-Terminal Circuit	ECM	"DTC P0621: "
P0622	Generator F-Terminal Circuit	ECM	"DTC P0622: "
P0625	Generator F-Terminal Circuit Low Voltage	ECM	"DTC P0625: "
P0626	Generator F-Terminal Circuit High Voltage	ECM	"DTC P0626: "
P0627	Fuel Pump Relay Control Circuit	ECM	"DTC P0627, P0628, or P0629: "
P0628	Fuel Pump Relay Control Circuit Low Voltage	ECM	"DTC P0627, P0628, or P0629: "
P0629	Fuel Pump Relay Control Circuit High Voltage	ECM	"DTC P0627, P0628, or P0629: "
P0633	Theft Deterrent Key Not Programmed	ECM	"DTC P0633: "
P0638	Throttle Actuator Control (TAC) Command Performance	ECM	"DTC P0638, P2100, P2101, or P2119: "
P0642	5 Volt Reference 1 Circuit Low Voltage	ECM	"DTC P0642 or P0643: "
P0643	6 Volt Reference 1 Circuit High Voltage	ECM	"DTC P0642 or P0643: "
P0645	Air Conditioning (A/C) Clutch Relay Control Circuit	ECM	"DTC P0645, P0646, or P0647: "
P0646	Air Conditioning (A/C) Clutch Relay Control Circuit Low Voltage	ECM	"DTC P0645, P0646, or P0647: "
P0647	Air Conditioning (A/C) Clutch Relay Control Circuit High Voltage	ECM	"DTC P0645, P0646, or P0647: "
P0650	Malfunction Indicator Lamp (MIL) Control Circuit	ECM	"DTC P0650: "
P0652	5 Volt Reference 2 Circuit Low Voltage	ECM	"DTC P0652 or P0653: "
P0653	6 Volt Reference 2 Circuit High Voltage	ECM	"DTC P0652 or P0653: "
P0685	Engine Controls Ignition Relay Control Circuit	ECM	"DTC P0685, P0686, P0687, P0689, or P0690: "
P0686	Engine Controls Ignition Relay Control Circuit Low Voltage	ECM	"DTC P0685, P0686, P0687, P0689, or P0690: "
P0687	Engine Controls Ignition Relay Control Circuit High Voltage	ECM	"DTC P0685, P0686, P0687, P0689, or P0690: "
P0689	Engine Controls Ignition Relay Feedback Circuit Low Voltage	ECM	"DTC P0685, P0686, P0687, P0689, or P0690: "
P0690	Engine Controls Ignition Relay Feedback Circuit High Voltage	ECM	"DTC P0685, P0686, P0687, P0689, or P0690: "
P0691	Cooling Fan Relay 1 Control Circuit Low Voltage	ECM	"DTC P0480, P0481, P0691, P0692, P0693, or P0694: "
P0692	Cooling Fan Relay 1 Control Circuit High Voltage	ECM	"DTC P0480, P0481, P0691, P0692, P0693, or P0694: "
P0693	Cooling Fan Relays 2 and 3 Control Circuit Low Voltage	ECM	"DTC P0480, P0481, P0691, P0692, P0693, or P0694: "

DTC	DTC Descriptor	Module that Sets the DTC	Diagnostic Procedure
P0694	Cooling Fan Relays 2 and 3 Control Circuit High Voltage	ECM	"DTC P0480, P0481, P0691, P0692, P0693, or P0694: "
P0698	5 Volt Reference 3 Circuit Low Voltage	ECM	"DTC P0698 or P0699: "
P0699	5 Volt Reference 3 Circuit High Voltage	ECM	"DTC P0698 or P0699: "
P0700	Transmission Control Module (TCM) Requested MIL Illumination	ECM	"DTC P0700: "
P0703	Brake Switch Circuit	ECM	"DTC P0115, P0120, P0703, P0727, P0826, P1779, P2544, or P2637: "
P0706	Transmission Range (TR) Switch Performance	TCM	"DTC P0706-P0708: "
P0707	Transmission Range (TR) Switch Circuit Low Voltage	TCM	"DTC P0706-P0708: "
P0708	Transmission Range (TR) Switch Circuit High Voltage	TCM	"DTC P0706-P0708: "
P0711	Transmission Fluid Temperature (TFT) Sensor Performance	TCM	"DTC P0711, P0712, or P0713: "
P0712	Transmission Fluid Temperature (TFT) Sensor Circuit Low Voltage	TCM	"DTC P0711, P0712, or P0713: "
P0713	Transmission Fluid Temperature (TFT) Sensor Circuit High Voltage	TCM	"DTC P0711, P0712, or P0713: "
P0717	Input Speed Sensor Circuit Low Voltage	TCM	"DTC P0717 or P0722: "
P0722	Output Speed Sensor Circuit Low Voltage	TCM	"DTC P0717 or P0722: "
P0727	Engine Speed No Signal	TCM	"DTC P0115, P0120, P0703, P0727, P0826, P1779, P2544, or P2637: "
P0730	Incorrect Gear Ratio	TCM	"DTC P0730: "
P0731	Incorrect 1st Gear Ratio	TCM	"DTC P0731: "
P0732	Incorrect 2nd Gear Ratio	TCM	"DTC P0732: "
P0733	Incorrect 3rd Gear Ratio	TCM	"DTC P0733: "
P0734	Incorrect 4th Gear Ratio	TCM	"DTC P0734: "
P0735	Incorrect 5th Gear Ratio	TCM	"DTC P0735: "
P0736	Incorrect Reverse Ratio	TCM	"DTC P0736: "
P0741	Torque Converter Clutch (TCC) System - Stuck Off	TCM	"DTC P0741: "
P0742	Torque Converter Clutch (TCC) System - Stuck On	TCM	"DTC P0742: "
P0762	Shift Solenoid (SS) 3 Valve Performance - Stuck On	TCM	"DTC P0762: "
P081A	Starter Inhibit Circuit Low Voltage	TCM	"DTC P081A or P081B: "
P081B	Starter Inhibit Circuit High Voltage	TCM	"DTC P081A or P081B: "
P0826	Up and Down Shift Switch Circuit	TCM	"DTC P0115, P0120, P0703, P0727, P0826, P1779, P2544, or P2637: "
P0864	TCM Communication Circuit Performance	ECM	"DTC P0864: "
P0897	Transmission Fluid Life	TCM	"DTC P0897: "
P0962	Line Pressure Control (PC) Solenoid Control Circuit Low Voltage	TCM	"DTC P0962, P0963, P0966, P0967, P0970, or P0971: "
P0963	Line Pressure Control (PC) Solenoid Control Circuit High Voltage	TCM	"DTC P0962, P0963, P0966, P0967, P0970, or P0971: "
P0966	Torque Converter Clutch (TCC) Pressure Control (PC) Solenoid Control Circuit Low Voltage	TCM	"DTC P0962, P0963, P0966, P0967, P0970, or P0971: "
P0967	Torque Converter Clutch (TCC) Pressure Control (PC) Solenoid Control Circuit High Voltage	TCM	"DTC P0962, P0963, P0966, P0967, P0970, or P0971: "

**0A-51 General Information:**

<b>DTC</b>	<b>DTC Descriptor</b>	<b>Module that Sets the DTC</b>	<b>Diagnostic Procedure</b>
P0970	Shift Pressure Control (PC) Solenoid Control Circuit Low Voltage	TCM	"DTC P0962, P0963, P0966, P0967, P0970, or P0971: "
P0971	Shift Pressure Control (PC) Solenoid Control Circuit High Voltage	TCM	"DTC P0962, P0963, P0966, P0967, P0970, or P0971: "
P0973	Shift Solenoid (SS) 1 Control Circuit Low Voltage	TCM	"DTC P0973, P0974, P0976, P0977, P0979, P0980, P0982, P0983, P0985, or P0986: "
P0974	Shift Solenoid (SS) 1 Control Circuit High Voltage	TCM	"DTC P0973, P0974, P0976, P0977, P0979, P0980, P0982, P0983, P0985, or P0986: "
P0976	Shift Solenoid (SS) 2 Control Circuit Low Voltage	TCM	"DTC P0973, P0974, P0976, P0977, P0979, P0980, P0982, P0983, P0985, or P0986: "
P0977	Shift Solenoid (SS) 2 Control Circuit High Voltage	TCM	"DTC P0973, P0974, P0976, P0977, P0979, P0980, P0982, P0983, P0985, or P0986: "
P0979	Shift Solenoid (SS) 3 Control Circuit Low Voltage	TCM	"DTC P0973, P0974, P0976, P0977, P0979, P0980, P0982, P0983, P0985, or P0986: "
P0980	Shift Solenoid (SS) 3 Control Circuit High Voltage	TCM	"DTC P0973, P0974, P0976, P0977, P0979, P0980, P0982, P0983, P0985, or P0986: "
P0982	Shift Solenoid (SS) 4 Control Circuit Low Voltage	TCM	"DTC P0973, P0974, P0976, P0977, P0979, P0980, P0982, P0983, P0985, or P0986: "
P0983	Shift Solenoid (SS) 4 Control Circuit High Voltage	TCM	"DTC P0973, P0974, P0976, P0977, P0979, P0980, P0982, P0983, P0985, or P0986: "
P0985	Shift Solenoid (SS) 5 Control Circuit Low Voltage	TCM	"DTC P0973, P0974, P0976, P0977, P0979, P0980, P0982, P0983, P0985, or P0986: "
P0986	Shift Solenoid (SS) 5 Control Circuit High Voltage	TCM	"DTC P0973, P0974, P0976, P0977, P0979, P0980, P0982, P0983, P0985, or P0986: "
P1011	Intake Camshaft Position (CMP) Actuator Park Position Bank 1	ECM	"DTC P1011-P1014: "
P1012	Exhaust Camshaft Position (CMP) Actuator Park Position Bank 1	ECM	"DTC P1011-P1014: "
P1013	Intake Camshaft Position (CMP) Actuator Park Position Bank 2	ECM	"DTC P1011-P1014: "
P1014	Exhaust Camshaft Position (CMP) Actuator Park Position Bank 2	ECM	"DTC P1011-P1014: "
P1380	Misfire Detected - Rough Road Data Not Available	ECM	"DTC P1380: "
P1551	Throttle Valve Rest Position Not Reached During Learn	ECM	"DTC P1551: "
P1629	Theft Deterrent Fuel Enable Signal Not Received	ECM	"DTC P1629: "
P1631	Theft Deterrent Fuel Enable Signal Not Correct	ECM	"DTC P1631: "
P1632	Theft Deterrent Fuel Disable Signal Received	ECM	"DTC P1632: "
P167D	Ignition Control (IC) Performance	ECM	"DTC P167D: "
P1719	Incorrect Shifting Detected	TCM	"DTC P1719: "
P1779	Torque Delivered Signal	TCM	"DTC P0115, P0120, P0703, P0727, P0826, P1779, P2544, or P2637: "
P2088	Intake Camshaft Position (CMP) Actuator Solenoid Control Circuit Low Voltage Bank 1	ECM	"DTC P0010, P0013, P0020, P0023, P2088, P2089, P2090, P2091, P2092, P2093, P2094, or P2095: "
P2089	Intake Camshaft Position (CMP) Actuator Solenoid Control Circuit High Voltage Bank 1	ECM	"DTC P0010, P0013, P0020, P0023, P2088, P2089, P2090, P2091, P2092, P2093, P2094, or P2095: "
P2090	Exhaust Camshaft Position (CMP) Actuator Solenoid Control Circuit Low Voltage Bank 1	ECM	"DTC P0010, P0013, P0020, P0023, P2088, P2089, P2090, P2091, P2092, P2093, P2094, or P2095: "
P2091	Exhaust Camshaft Position (CMP) Actuator Solenoid Control Circuit High Voltage Bank 1	ECM	"DTC P0010, P0013, P0020, P0023, P2088, P2089, P2090, P2091, P2092, P2093, P2094, or P2095: "

DTC	DTC Descriptor	Module that Sets the DTC	Diagnostic Procedure
P2092	Intake Camshaft Position (CMP) Actuator Solenoid Control Circuit Low Voltage Bank 2	ECM	"DTC P0010, P0013, P0020, P0023, P2088, P2089, P2090, P2091, P2092, P2093, P2094, or P2095: "
P2093	Intake Camshaft Position (CMP) Actuator Solenoid Control Circuit High Voltage Bank 2	ECM	"DTC P0010, P0013, P0020, P0023, P2088, P2089, P2090, P2091, P2092, P2093, P2094, or P2095: "
P2094	Exhaust Camshaft Position (CMP) Actuator Solenoid Control Circuit Low Voltage Bank 2	ECM	"DTC P0010, P0013, P0020, P0023, P2088, P2089, P2090, P2091, P2092, P2093, P2094, or P2095: "
P2095	Exhaust Camshaft Position (CMP) Actuator Solenoid Control Circuit High Voltage Bank 2	ECM	"DTC P0010, P0013, P0020, P0023, P2088, P2089, P2090, P2091, P2092, P2093, P2094, or P2095: "
P2096	Post Catalyst Fuel Trim System Low Limit Bank 1	ECM	"DTC P2096 or P2098: "
P2097	Post Catalyst Fuel Trim System High Limit Bank 1	ECM	"DTC P2097 or P2099: "
P2098	Post Catalyst Fuel Trim System Low Limit Bank 2	ECM	"DTC P2096 or P2098: "
P2099	Post Catalyst Fuel Trim System High Limit Bank 2	ECM	"DTC P2097 or P2099: "
P2100	Throttle Actuator Control (TAC) Motor Control Circuit	ECM	"DTC P0638, P2100, P2101, or P2119: "
P2101	Control Module Throttle Actuator Position Performance	ECM	"DTC P0638, P2100, P2101, or P2119: "
P2105	Throttle Actuator Control (TAC) System - Forced Engine Shutdown	ECM	"DTC P2105: "
P2107	Throttle Actuator Control (TAC) Module Internal Circuit	ECM	"DTC P2107: "
P2119	Throttle Closed Position Performance	ECM	"DTC P0638, P2100, P2101, or P2119: "
P2122	Accelerator Pedal Position (APP) Sensor 1 Circuit Low Voltage	ECM	"DTC P2122, P2123, P2127, P2128, or P2138: "
P2123	Accelerator Pedal Position (APP) Sensor 1 Circuit High Voltage	ECM	"DTC P2122, P2123, P2127, P2128, or P2138: "
P2127	Accelerator Pedal Position (APP) Sensor 2 Circuit Low Voltage	ECM	"DTC P2122, P2123, P2127, P2128, or P2138: "
P2128	Accelerator Pedal Position (APP) Sensor 2 Circuit High Voltage	ECM	"DTC P2122, P2123, P2127, P2128, or P2138: "
P2138	Accelerator Pedal Position (APP) Sensor 1-2 Correlation	ECM	"DTC P2122, P2123, P2127, P2128, or P2138: "
P2176	Minimum Throttle Position Not Learned	ECM	"DTC P2176: "
P2177	Fuel Trim System Lean at Cruise or Accel Bank 1	ECM	"DTC P2177, P2179, P2187, or P2189: "
P2178	Fuel Trim System Rich at Cruise or Accel Bank 1	ECM	"DTC P2178, 2180, P2188, or P2190: "
P2179	Fuel Trim System Lean at Cruise or Accel Bank 2	ECM	"DTC P2177, P2179, P2187, or P2189: "
P2180	Fuel Trim System Rich at Cruise or Accel Bank 2	ECM	"DTC P2178, 2180, P2188, or P2190: "
P2187	Fuel Trim System Lean at Idle Bank 1	ECM	"DTC P2177, P2179, P2187, or P2189: "
P2188	Fuel Trim System Rich at Idle Bank 1	ECM	"DTC P2178, 2180, P2188, or P2190: "
P2189	Fuel Trim System Lean at Idle Bank 2	ECM	"DTC P2177, P2179, P2187, or P2189: "
P2190	Fuel Trim System Rich at Idle Bank 2	ECM	"DTC P2178, 2180, P2188, or P2190: "
P2227	Barometric Pressure (BARO) Sensor Performance	ECM	"DTC P2227, P2228, or P2229: "
P2228	Barometric Pressure (BARO) Sensor Circuit Low Voltage	ECM	"DTC P2227, P2228, or P2229: "

**0A-53 General Information:**

<b>DTC</b>	<b>DTC Descriptor</b>	<b>Module that Sets the DTC</b>	<b>Diagnostic Procedure</b>
P2229	Barometric Pressure (BARO) Sensor Circuit High Voltage	ECM	"DTC P2227, P2228, or P2229: "
P2231	HO2S Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 1	ECM	"DTC P2231 or P2234: "
P2232	HO2S Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 2	ECM	"DTC P2232 or P2235: "
P2234	HO2S Signal Circuit Shorted to Heater Circuit Bank 2 Sensor 1	ECM	"DTC P2231 or P2234: "
P2235	HO2S Signal Circuit Shorted to Heater Circuit Bank 2 Sensor 2	ECM	"DTC P2232 or P2235: "
P2270	HO2S Signal Stuck Lean Bank 1 Sensor 2	ECM	"DTC P2270 or P2272: "
P2271	HO2S Signal Stuck Rich Bank 1 Sensor 2	ECM	"DTC P2271 or P2273: "
P2272	HO2S Signal Stuck Lean Bank 2 Sensor 2	ECM	"DTC P2270 or P2272: "
P2273	HO2S Signal Stuck Rich Bank 2 Sensor 2	ECM	"DTC P2270 or P2272: "
P2300	Ignition Coil 1 Control Circuit Low Voltage	ECM	"DTC P2300, P2301, P2303, P2304, P2306, P2307, P2309, P2310, P2312, P2313, P2315, or P2316: "
P2301	Ignition Coil 1 Control Circuit High Voltage	ECM	"DTC P2300, P2301, P2303, P2304, P2306, P2307, P2309, P2310, P2312, P2313, P2315, or P2316: "
P2303	Ignition Coil 2 Control Circuit Low Voltage	ECM	"DTC P2300, P2301, P2303, P2304, P2306, P2307, P2309, P2310, P2312, P2313, P2315, or P2316: "
P2304	Ignition Coil 2 Control Circuit High Voltage	ECM	"DTC P2300, P2301, P2303, P2304, P2306, P2307, P2309, P2310, P2312, P2313, P2315, or P2316: "
P2306	Ignition Coil 3 Control Circuit Low Voltage	ECM	"DTC P2300, P2301, P2303, P2304, P2306, P2307, P2309, P2310, P2312, P2313, P2315, or P2316: "
P2307	Ignition Coil 3 Control Circuit High Voltage	ECM	"DTC P2300, P2301, P2303, P2304, P2306, P2307, P2309, P2310, P2312, P2313, P2315, or P2316: "
P2309	Ignition Coil 4 Control Circuit Low Voltage	ECM	"DTC P2300, P2301, P2303, P2304, P2306, P2307, P2309, P2310, P2312, P2313, P2315, or P2316: "
P2310	Ignition Coil 4 Control Circuit High Voltage	ECM	"DTC P2300, P2301, P2303, P2304, P2306, P2307, P2309, P2310, P2312, P2313, P2315, or P2316: "
P2312	Ignition Coil 5 Control Circuit Low Voltage	ECM	"DTC P2300, P2301, P2303, P2304, P2306, P2307, P2309, P2310, P2312, P2313, P2315, or P2316: "
P2313	Ignition Coil 5 Control Circuit High Voltage	ECM	"DTC P2300, P2301, P2303, P2304, P2306, P2307, P2309, P2310, P2312, P2313, P2315, or P2316: "
P2315	Ignition Coil 6 Control Circuit Low Voltage	ECM	"DTC P2300, P2301, P2303, P2304, P2306, P2307, P2309, P2310, P2312, P2313, P2315, or P2316: "
P2316	Ignition Coil 6 Control Circuit High Voltage	ECM	"DTC P2300, P2301, P2303, P2304, P2306, P2307, P2309, P2310, P2312, P2313, P2315, or P2316: "
P2534	Ignition 1 Switch Circuit Low Voltage	TCM	"DTC P2534: "
P2536	Ignition Accessory Switch Circuit	TCM	"DTC P2536: "
P2544	Transmission Torque Request Circuit	TCM	"DTC P0115, P0120, P0703, P0727, P0826, P1779, P2544, or P2637: "

DTC	DTC Descriptor	Module that Sets the DTC	Diagnostic Procedure
P2610	Control Module Ignition Off Timer Performance	ECM	"DTC P0601, P0602, P0603, P0604, P0605, P0606, P0607, P1600, P1621, P1627, P1680, P1681, P1683, or P2610: "
P2636	Fuel Transfer Pump Flow Insufficient	ECM	"DTC P2636: "
P2637	Transmission Torque Delivered Circuit	TCM	"DTC P0115, P0120, P0703, P0727, P0826, P1779, P2544, or P2637: "
P280A	Transmission Range (TR) Switch Circuit Not Learned	TCM	"DTC P280A: "
U0073	High Speed Communication Bus	BCM, DRR, HVSM, PPS, PSCM, Radio, RCDLR, ROS, RSA	"DTC U0073: "
U0100	Lost Communication With Engine/Powertrain Control Module (ECM/PCM)	BCM, PSCM	"DTC U0100-U0299: "
U0101	Lost Communication With Transmission Control Module (TCM)	BCM	"DTC U0100-U0299: "
U0104	Lost Communication With Cruise Control Module	BCM	"DTC U0100-U0299: "
U0121	Lost Communication With Electronic Brake Control Module (EBCM)	BCM	"DTC U0100-U0299: "
U0122	Lost Communication With Vehicle Dynamics Control Module	BCM	"DTC U0100-U0299: "
U0131	Lost Communication With Power Steering Control Module	BCM	"DTC U0100-U0299: "
U0140	Lost Communication With Body Control Module (BCM)	HVSM, PPS, PSCM, RCDLR, ROS, RSA, TDM	"DTC U0100-U0299: "
U0151	Lost Communication With Sensing and Diagnostic Module (SDM)	PPS, ROS	"DTC U0100-U0299: "
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module	BCM, HVSM, PPS, RCDLR, ROS, RSA, TDM	"DTC U0100-U0299: "
U0164	Lost Communication With HVAC Control Module	BCM, HVSM	"DTC U0100-U0299: "
U0168	Lost Communication With Vehicle Theft Deterrent (VTD) Control Module	BCM	"DTC U0100-U0299: "
U0170	Lost Communication With Passenger Presence System (PPS)	SDM	"DTC U0100-U0299: "
U0184	Lost Communication With Radio	BCM, DRR, RSA	"DTC U0100-U0299: "
U0198	Lost Communication With Communication Interface Module (OnStar®)	BCM	"DTC U0100-U0299: "
U0214	Lost Communication With Remote Function Actuator (RFA)	BCM	"DTC U0100-U0299: "
U1500	Inter-Device Dedicated Bus 1	EBCM, VCIM	"DTC U1500: "
U1814	Powertrain High Speed Communication Enable Circuit	BCM	"DTC U1814: "
U2099	High Speed Communication Enable Circuit	BCM	"DTC U2099: "
U2100	Controller Area Network (CAN) Bus Communication	EBCM, IPC	"DTC U2100: "
U2105	Lost Communication With Engine Control System	EBCM	"DTC U2105-U2199 (Except U2142 and U2143): " "DTC U2105-U2199 (U2142 or U2143 only): "

DTC	DTC Descriptor	Module that Sets the DTC	Diagnostic Procedure
U2106	Lost Communications With Transmission Control System	EBCM	"DTC U2105-U2199 (Except U2142 and U2143):" "DTC U2105-U2199 (U2142 or U2143 only):"
U2107	Lost Communications With Body Control System	EBCM	"DTC U2105-U2199 (Except U2142 and U2143):" "DTC U2105-U2199 (U2142 or U2143 only):"
U2142	Lost Communication With Yaw Rate Sensor (YRS)	EBCM	"DTC U2105-U2199 (Except U2142 and U2143):" "DTC U2105-U2199 (U2142 or U2143 only):"
U2143	Lost Communications With Steering Angle Sensor (SAS)	EBCM	"DTC U2105-U2199 (Except U2142 and U2143):" "DTC U2105-U2199 (U2142 or U2143 only):"

**Diagnostic Starting Point - Vehicle Diagnostic Information**

Begin the system diagnosis with "Diagnostic System Check - Vehicle Diagnostic Information". The Diagnostic System Check - Vehicle will provide the following information:

- The identification of the control modules which are not communicating through the serial data circuit.
- The identification of any stored diagnostic trouble codes (DTCs) and their status.

The use of the Diagnostic System Check - Vehicle will identify the correct procedures to begin vehicle diagnosis. These must be performed before system DTC or symptom diagnosis.

**Diagnostic Starting Point - Vibration Diagnosis and Correction**

The information contained in this Vibration Diagnosis and Correction section is designed to cover various vehicle designs and configurations. Not all content will apply to all vehicles.

**NOTE**

**The following steps must be completed before using the analysis tables or the symptom tables.**

1. Perform the "Vibration Analysis - Road Testing" table before using the other Vibration Analysis tables or the Symptom tables in order to effectively diagnose the customer's concern.  
The use of Vibration Analysis - Road Testing will first provide duplication of virtually any vibration concern and then identify the correct procedure for diagnosing the area of concern which has been duplicated.

2. Review the following Vibration Diagnostic Process.
3. Review the general descriptions to familiarize yourself with vibration theory and terminology, the J 38792-A, Electronic Vibration Analyzer (EVA) 2 and the J 38792-VS, Vibrate Software. Reviewing this information will help you determine whether the condition described by the customer is a potential operating characteristic or not.  
Refer to the following:
  - "Vibration Theory and Terminology"
  - "Electronic Vibration Analyzer (EVA) Description and Operation"
  - "Vibrate Software Description and Operation"
  - "Reed Tachometer Description"

**Vibration Diagnostic Process**

**NOTE**

**Using the following steps of the vibration diagnostic process will help you to effectively narrow-down and pin-point the search for the specific source of a vibration concern and to arrive at an accurate repair.**

1. Gather specific information on the customer's vibration concern.
2. Perform the road testing steps in sequence as identified in Vibration Analysis - Road Testing in order to duplicate the customer's concern and evaluate the symptoms of the concern under changing conditions. Observe what the vibration feels like and what it sounds like. Observe when the symptoms first appear, when they change, and when they cease.



3. Determine if the customer's vibration concern is truly an abnormal condition or something that is potentially an operating characteristic of the vehicle.
4. Systematically eliminate or "rule-out" possible vehicle systems.
5. Focus diagnostic efforts on the remaining vehicle system and systematically eliminate or "rule-out" possible components of that system.
6. Make a repair on the remaining component, or components, which have not been eliminated systematically, and must therefore be the cause of the vibration.
7. Verify that the customer's concern has been eliminated or at least brought to an acceptable level.
8. Again perform the road testing steps in sequence as identified in Vibration Analysis - Road Testing in order to verify that the vehicle did not have more than one vibration occurring.

### Preliminary Visual/Physical Inspection

- Inspect for aftermarket equipment and modifications which could affect the operation of the vehicle rotating component systems.
- Inspect the easily accessible or visible components of the vehicle rotating component systems for obvious damage or conditions which could cause the symptom.
- Inspect the tire inflation pressures for the proper pressure.

### Diagnostic Aids

Improper component routing or isolation, or components which are worn or faulty may be the cause of intermittent conditions that are difficult to duplicate. If the vibration concern could not be duplicated by following the steps of the Vibration Diagnostic Process, refer to "Vibration Diagnostic Aids".

## Diagnostic System Check - Vehicle Diagnostic Information

1. Verify that none of the following preliminary inspections/tests reveal the cause of the vehicle concern before beginning diagnosis:
  - Ensure that the battery is fully charged. Refer to "Battery Inspection/Test: ".
  - Ensure that the battery cables are clean and tight.
  - Inspect for any open fuses. Refer to "Power Distribution Schematics: " and "Electrical Center Identification Views: ".
  - Ensure that the grounds are clean, tight, and in the correct location. Refer to "Ground Distribution Schematics: " and "Power and Grounding Component Views: ".
  - Inspect the easily accessible systems or the visible system components for obvious damage or conditions that could cause the concern. This would include checking to ensure that all connections/connectors are fully seated and secured.
  - Inspect for aftermarket devices that could affect the operation of the system. Refer to "Checking Aftermarket Accessories: ".
  - Search for applicable service bulletins.
  - If the preceding inspections/tests resolve the concern, go to "Diagnostic Repair Verification - Vehicle Diagnostic Information".
2. Install a scan tool. Verify that the scan tool powers up.
  - If the scan tool does not power up, refer to "Scan Tool Does Not Power Up: ".
3. Ignition ON, Engine OFF, verify communication with all of the control modules on the vehicle. Refer to "Data Link References: " for information on the modules you should expect to communicate.
  - If the scan tool does not communicate with one or more of the expected control modules, refer to "Data Link References: ".

**0A-57 General Information:**

4. Verify that the following DTCs are not set: U1814, B1428.
  - If either of the DTCs are set, refer to “DTC U1814: ” or “DTC B1428: ”.

**NOTE**

**Open the drivers door to ensure retained accessory power mode (RAP) is inactive during this test. The engine may start during this test. Turn the engine OFF as soon as the crank power mode has been observed.**

5. With a scan tool, access the Body Control Module Power Mode data display list. Verify that all the parameters listed in the following table correspond to the ignition key position. The PMM Power Mode parameters table below illustrates the correct state of these parameters (circuits) with the corresponding ignition switch positions. The circuits related to the parameters are in parenthesis.
  - If any of the power mode parameters do not match in any ignition switch position, refer to “Power Mode Mismatch: ”.
6. Ignition ON, view the security indicator. The security indicator should not remain illuminated after the vehicle bulb check has completed.
  - If the security indicator remains illuminated after the bulb check, refer to “Diagnostic Trouble Code (DTC) List - Vehicle Diagnostic Information” and diagnose any of the following theft deterrent DTCs set as current: B1000, B302A, B3031, B3055, B3060, B3935, B3976, P0513, P0633, P1629, P1631, or P1632.
7. Attempt to start the engine. Verify that the engine cranks.
  - If the engine does not crank, refer to “Symptoms - Engine Electrical: ”.

8. Attempt to start the engine. Verify the engine starts and runs.
  - If the engine does not start and run, refer to “Engine Cranks but Does Not Run: ”.

**NOTE**

**Do not clear any DTCs unless instructed to do so by a diagnostic procedure.**

**NOTE**

**If any DTCs are Powertrain related DTCs, select Capture Info in order to store the DTC information with the scan tool.**

9. Use the appropriate scan tool selections to obtain DTCs from each of the vehicle modules. Verify there are no DTCs reported from any module.
  - If any DTCs are present, refer to “Diagnostic Trouble Code (DTC) List - Vehicle Diagnostic Information” and diagnose any current DTCs in the following order:
    - a. DTCs that begin with a U.
    - b. B1000, B1001, B1016, B1019, C0550, C0551, C0558, P0601, P0602, P0603, P0604, P0606, P2101, P2107, or P2610
    - c. B1325, B1424, B1517, C0800, C0899, C0900, P0560, P0562, or P0563
    - d. Component level DTCs.
    - e. System level DTCs.
    - f. Any remaining DTCs.
10. If the customer concern is related to inspection/maintenance (I/M) testing, refer to “Evaporative Emission Control System Description: ”.
  - If none of the previous tests or inspections addresses the concern, refer to “Symptoms -

**PMM Power Mode Parameters**

Ignition Switch Position	Current Power Mode	Ign. Off/Run/ Crank (Off/Run Crank voltage circuit)	Ignition Accessory/Run (Accessory voltage circuit)	Ignition Run/ Crank (Ignition 1 Voltage circuit)
Off Key Out	Off	Key Out/ACC	Inactive	Inactive
Off Key IN	Off	Key In/Off	Inactive	Inactive
Accessory	Accessory	Key In/ACC	Active	Inactive
Run	Run	Run	Active	Active
Start	Crank Request	Crank	Inactive	Active

## Diagnostic Repair Verification - Vehicle Diagnostic Information

1. Install any components or connectors that have been removed or replaced during diagnosis.
2. Perform any adjustment, programming or setup procedures that are required when a component or module is removed or replaced.
3. Clear the DTCs.
4. Turn OFF the ignition for 60 seconds.
5. If the repair was related to a DTC, duplicate the Conditions for Running the DTC and use the Freeze Frame/Failure Records, if applicable, in order to verify the DTC does not reset. If the DTC resets or another DTC is present, refer to the "Diagnostic Trouble Code (DTC) List - Vehicle Diagnostic Information" and perform the appropriate diagnostic procedure.

Or

If the repair was symptom related, duplicate the conditions under which the customer concern occurred to verify the repair. If the customer concern reoccurs, return to "Symptoms - Vehicle Diagnostic Information" and perform the appropriate symptom diagnostic.

## Symptoms - Vehicle Diagnostic Information General Information

"Symptoms - Vibration Diagnosis and Correction: "

### Body Systems

- "Symptoms - Fixed and Moveable Windows: "
- "Symptoms - Horns: "
- "Symptoms - Lighting Systems: "
- "Symptoms - Vehicle Access: "
- "Symptoms - Wipers and Washers: "

### Brakes

- "Symptoms - Antilock Brake System: "
- "Symptoms - Hydraulic Brakes: "
- "Symptoms - Park Brake: "

### Driveline/Axle

- "Symptoms - Propeller Shaft: "
- "Symptoms - Rear Drive Axle: "
- "Symptoms - Wheel Drive Shafts: "

## Driver Information and Entertainment

- "Symptoms - Entertainment: "
- "Symptoms - Displays and Gages: "
- "Symptoms - Secondary and Configurable Customer Controls: "

## Engine

- "Symptoms - Cruise Control: "
- "Symptoms - Engine Controls: "
- "Symptoms - Engine Cooling: "
- "Symptoms - Engine Electrical: "
- "Symptoms - Engine Exhaust: "
- "Symptoms - Engine Mechanical: "

## HVAC

"Symptoms - HVAC Systems - Automatic: "

## Power and Signal Distribution

- "Symptoms - Data Communications: "
- "Symptoms - Wiring Systems: "

## Roof

"Symptoms - Roof: "

## Safety and Security

- "Symptoms - Remote Functions: "
- "Symptoms - Seat Belts: "
- "Symptoms - SIR: "
- "Symptoms - Theft Deterrent: "

## Seats

- "Symptoms - Seats: "
- "Symptoms - Seat Heating and Cooling: "
- "Symptoms - Seat Heating and Cooling: "

## Steering

- "Symptoms - Power Steering System: "
- "Symptoms - Steering Wheel and Column: "

## Suspension

- "Symptoms - Suspension General Diagnosis: "
- "Symptoms - Tire Pressure Monitoring: "

## Transmission/Transaxle

- "Symptoms - Automatic Transmission: "
- "Symptoms - Automatic Transmission Shift Lock Control: "
- "Symptoms - Transfer Case: "

## Symptoms - Vibration Diagnosis and Correction

### NOTE

Perform the following steps in sequence BEFORE using these symptom tables.

1. Begin the diagnosis of a vibration concern by reviewing “Diagnostic Starting Point - Vibration Diagnosis and Correction” to become familiar with the diagnostic process used to properly diagnose vibration concerns.
2. Perform the “Vibration Analysis - Road Testing” table before using these symptom tables in order to duplicate and effectively diagnose the customer’s concern.

### Symptom Tables

Refer to a Vibration Analysis table as indicated in the following symptom tables, based on the most dominant characteristic of the customer’s vibration concern, felt or heard, that is evident during the appropriate condition of the occurrence.

#### Vibration Symptoms that are Felt

Category	Description	Typical Frequency Range	Condition of Occurrence	Area of Focus
Shake	Can sometimes be seen or felt in the steering wheel, seat or console. Related terminology: shimmy, wobble, waddle, shudder, hop	5-20 Hz	Vehicle Speed Sensitive Still occurs during coast down in NEUTRAL	Go to “Vibration Analysis - Tire and Wheel: ”
			Vehicle Speed Sensitive Affected by torque/load	Go to “Vibration Analysis - Driveline: ”
			Vehicle Speed Sensitive Affected by steering input	Go to “Vibration Analysis - Hub and/or Axle Input: ”
			Engine Speed Sensitive	Go to “Vibration Analysis - Engine: ”
Roughness	Similar to the feeling of holding a jigsaw.	20-50 Hz	Vehicle Speed Sensitive Still occurs during coast down in NEUTRAL	Go to “Vibration Analysis - Tire and Wheel: ”
			Vehicle Speed Sensitive Affected by torque/load	Go to “Vibration Analysis - Driveline: ”
			Vehicle Speed Sensitive Affected by steering input	Go to “Vibration Analysis - Hub and/or Axle Input: ”
			Engine Speed Sensitive	Go to “Vibration Analysis - Engine: ”
Buzz	Similar to the feeling of holding an electric razor. May be felt in the hands through the steering wheel, in the feet through the floor, or in the seat of the pants.	50-100 Hz	Vehicle Speed Sensitive Affected by torque/load	Go to “Vibration Analysis - Driveline: ”
			Vehicle Speed Sensitive Affected by steering input	Go to “Vibration Analysis - Hub and/or Axle Input: ”
			Engine Speed Sensitive	Go to “Vibration Analysis - Engine: ”
Tingling	May produce a “pins and needles” sensation or may put hands or feet “to sleep”. Highest vibration frequency range that can still be felt.	Greater than 100 Hz	Vehicle Speed Sensitive Affected by torque/load	Go to “Vibration Analysis - Driveline: ”
			Vehicle Speed Sensitive Affected by steering input	Go to “Vibration Analysis - Hub and/or Axle Input: ”
			Engine Speed Sensitive	Go to “Vibration Analysis - Engine: ”