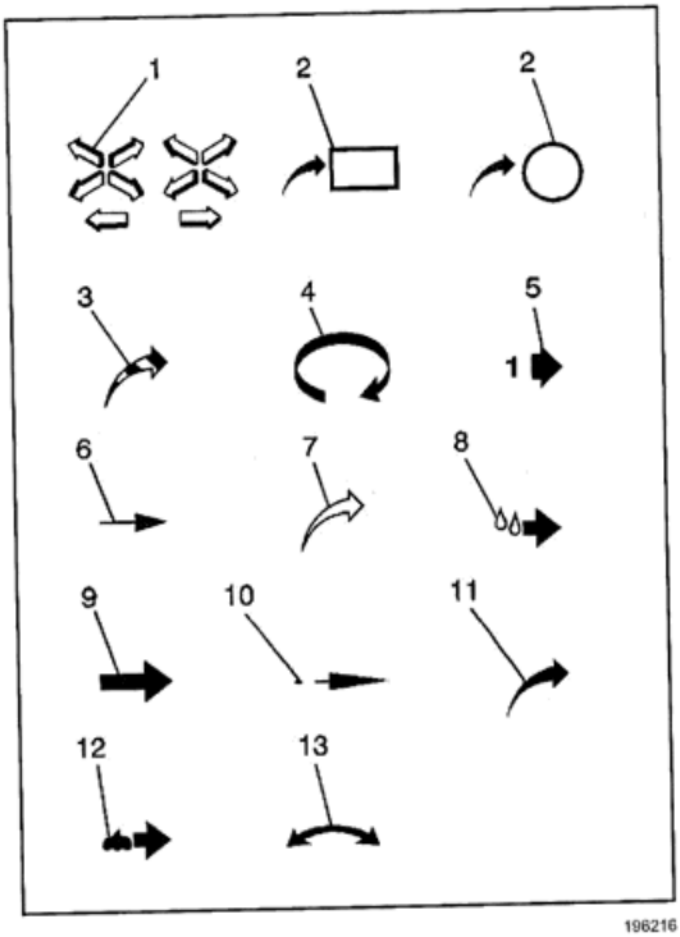
General Information

Introduction

Arrows and Symbols

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



196216

Legend

(1) Front of Vehicle
(2) View Detail
(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

Acronyms and Units

Acronyms

Acronym	Meaning	Definition
2WD	Two-Wheel Drive	Indicates that a vehicle has 2 driven wheels OR that a 4WD vehicle uses only 2 wheels for propulsion. So it can be the description of a vehicle configuration OR the operational mode of the drivetrain.
4WD	Four-Wheel Drive	Four-wheeled vehicle with a drivetrain that allows all four wheels to receive power from the engine simultaneously which provides better control on various surfaces. Can be used to describe the configuration of the vehicle OR as the operational mode of the drivetrain. 4WD vehicles usually can turn 2 wheels off to be in a 2WD mode. See also AWD.
A/C	Air Conditioning	The cooling and dehumidification of indoor air for thermal comfort.
A/D	Analog to Digital	Used in context of converting electrical analog signals to digital signals.
ABS	Antilock Braking System	System on motor vehicles which prevents the wheels from locking while braking which helps the driver maintain control in heavy braking conditions.
AC	Alternating Current	An electrical current whose magnitude and direction vary cyclically.
AM	Amplitude Modulation	Method of impressing data onto an alternating-current (AC) carrier waveform.
APP	Accelerator Pedal Position	A pedal that controls the throttle valve.
AWD	All-Wheel Drive	All-wheel-drive systems are designed to function on all types of surfaces, both on- and off-road, and most of them cannot be switched off. This can also be called full-time four wheel drive. See also 4WD.
AWG	American Wire Gauge	American wire gauge is a standardized wire gauge system used since 1857 predominantly in the United States for the diameters of round, solid, nonferrous, electrically conducting wire. E.g. a wire of AWG10 has a diameter of 2.588mm, AWG20 corresponds to a diameter of 0.812mm.
B+	Battery Positive Voltage	The electrical potential on the positive terminal of the battery.
BARO	Barometric Pressure	Atmospheric pressure as measured by a barometer.
BCM	Body Control Module	This module supplies vehicle occupants with visual and audible information and controls various vehicle functions,
BECM	Battery Energy Control Module	Control module used to regulate the battery voltage.
BPP	Brake Pedal Position	Position of the foot pedal that moves a piston in the master brake cylinder.
CAN	Controller Area Network	Serial data connection between control modules by Bosch
CCM	Chassis Control Module	The module that controls various vehicle functions on the Chassis, like Engine/Trans Mount, Active Grille Air Shutter, Load Leveling, etc...
CD	Compact Disc	A small optical disk on which data such as music, text, or graphic images is digitally encoded.
CNG	Compressed Natural Gas	This a substitute for gasoline or diesel fuel. It is made by compressing natural gas (which is mainly composed by methane (CH_4), in a percentage range of 70% to 98%)
CO	Carbon Monoxide	This is a product of the incomplete combustion of carbon-containing compounds, at room temperature this is a gas. It consists of one carbon atom covalently bonded to one oxygen atom.
CO2	Carbon Dioxide	Chemical compound composed of two oxygen atoms covalently bonded to a single carbon atom.
CPA	Connector Position Assurance	Part of an electrical connector that prevents the connector from moving out of its socket. Usually needs to be pressed to unlock the connector when disconnecting it.
CPP	Clutch Pedal Position	A lever operated with the foot that controls the coupling that connects or disconnects driving and driven parts of a driving mechanism.

Acronyms (cont'd)

Acronym	Meaning	Definition
CV	Constant Velocity	Used in conjunction with CV joints, which connect two shafts at an angle while both shafts always have the same rotational speed without variations.
CVT	Continuously Variable Transmission	A transmission in which the ratio of the rotational speeds of two shafts, as the input shaft and output shaft of a vehicle or other machine, can be varied continuously within a given range, providing an infinite number of possible ratios which improves fuel economy.
D	Drive	D on the transmission gear selector lever.
DAB	Digital Audio Broadcast	Technology for broadcasting of audio using digital radio (carries information via digital signal) transmission.
DC	Direct Current	Continuous current, constant flow of electric charge.
DLC	Data Link Connector	This is an electronic connector typically located underneath the driver's side dashboard, just above the pedals. The connector has 16 pins.
DMM	Digital Multimeter	Electronic measuring instrument that combines several functions in one unit. The most basic instruments include an ammeter, voltmeter, and ohmmeter.
DOHC	Dual Overhead Camshaft	Dual overhead camshafts (DOHC) are higher performance engines, they produce more power, and can run at higher speeds because they allow an engine to have four valves per cylinder. Each camshaft operates two of the valves, one camshaft handles the intake valves, and one handles the exhaust valves
DPF	Diesel Particulate Filter	Device designed to remove diesel particulate matter or soot from the exhaust gas of a diesel engine.
DRL	Daytime Running Lamps	White lights mounted on the front of an automobile that automatically switch on when the key is turned and are intended for daytime use, to increase the visibility of the automobile.
DSCC	Distance Sensing Cruise Control	A type of cruise control that automatically maintains the distance between vehicles.
DSP	Digital Signal Processor	A specialized microprocessor designed specifically for digital signal processing, generally in real-time computing.
DTC	Diagnostic Trouble Code	An electronic signal stored in an automotive computer, indicating the presence of a fault detected by that computer.
DVD	DVD	A popular optical disc storage media format the size of a CD. Used mainly for movies but also for data. DVD has no spelled out version (officially it does not mean Digital Video Disc or Digital Versatile Disc, it just means DVD).
EBCM	Electronic Brake Control Module	This module contains a microprocessor and software for antilock braking system operation.
ECM	Engine Control Module	This electronic module works with a vehicle's sensors and engine control devices to insure that the engine operates at maximum efficiency and performance. It performs three vital functions. Receives electronic signals from engine sensors. Analyzes the data and makes an engine performance decision (based on the pre-set parameters within the unit). Sends an "output command" to an actuator that adjusts engine performance.
ECT	Engine Coolant Temperature	A measure of how hot or cold the fluid which flows through the engine in order to prevent its overheating, transferring the heat produced by the device to other devices that utilize or dissipate it.
EEPROM	Electrically Erasable Programmable Read-Only Memory	A non-volatile storage chip used in computers and other devices to store small amounts of volatile data, e.g. calibration tables or device configuration.
EGR	Exhaust Gas Recirculation	Is an NOx (nitrogen oxide and nitrogen dioxide) reduction technique used in most gasoline and diesel engines. EGR works by recirculating a portion of an engine's exhaust gas back to the engine cylinders.
EMI	Electromagnetic Interference	Electromagnetic interference (also called radio frequency interference) is a disturbance that affects an electrical circuit due to either electromagnetic conduction or electromagnetic radiation emitted from an external source.

Acronyms (cont'd)

Acronym	Meaning	Definition
ESD	Electrostatic Discharge	The sudden and momentary electric current that flows between two objects at different electrical potentials.
EV	Electric Vehicle	A category of vehicles that only have an electric drive system.
EVAP	Evaporative Emission	A system that controls the fuel fumes in the fuel tank.
FM	Frequency Modulation	In telecommunication this is a way to convey information over a carrier wave by varying its frequency.
FWD	Front-Wheel Drive	A form of engine/transmission layout used in motor vehicles, where the engine drives the front wheels only.
GMLAN	General Motors Local Area Network	A local-area network is a computer network covering a small geographic area, like a home or vehicle. This specific type of LAN connects several controllers inside the vehicle and was developed by General Motors.
GPS	Global Positioning System	Satellite-based navigation system made up of a network of 24 satellites placed into orbit by the U.S. Department of Defense.
GSM	Global System for Mobile Communications	Globally accepted standard for digital cellular communication.
GVW	Gross Vehicle Weight	Maximum total weight of a road vehicle or trailer that is loaded, including the weight of the vehicle itself plus fuel, passengers, cargo, and trailer tongue weight.
HD	Heavy Duty	Robust design to accommodate large work loads.
HID	High Intensity Discharge	A type of light that produces a bright light by using gas filled bulbs. (gas is usually mercury, metal halide, and high-pressure sodium) Uses very little battery power and is a very "cool" light.
HO2S	Heated Oxygen Sensor	Heated oxygen sensors have an internal heater circuit that brings the sensor up to operating temperature more quickly than an unheated sensor. An oxygen sensor must be hot (about 600–650°F) before it will generate a voltage signal. The hot exhaust from the engine will provide enough heat to bring an O2 sensor up to operating temperature.
HVAC	Heating Ventilation Air Conditioning	This system is sometimes referred to as climate control. Ventilation air ducts installed throughout a vehicle that supply conditioned air to a room through rectangular or round outlet vents.
I^2C	Inter-Integrated Circuit	Serial data connection between Integrated Circuits (microchips) inside a control module invented by Phillips
IAT	Intake Air Temperature	Temperature of the air entering intake air flow system of the engine.
ICE	Internal Combustion Engine	An engine in which the combustion of fuel and an oxidizer (typically air) occurs in a confined space called a combustion chamber.
ID	Identification	Number or Code that identifies a component or control module. Can be written on the part or be transmitted on a bus or via radio.
ISP	Internet Service Provider	A company that furnishes corporations and individual consumers with various services, mainly access to the Internet.
ISS	Input Shaft Speed	Rotational speed of the input shaft of a transmission.
LAN	Local Area Network	Standard network connection PC's.
LCD	Liquid Crystal Display	A thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector.
LED	Light Emitting Diode	Small light bulbs that fit easily into an electrical circuit they do not have a filament that will burn out, and they do not get especially hot. They are illuminated solely by the movement of electrons in a semiconductor material.
LIN	Local Interconnect Network	Computer networking bus system used within automotive network architectures. Similar to CAN, but cheaper and less powerful.
LPG	Liquefied Petroleum Gas	A mixture of mainly propane and butane, produced commercially and stored under pressure to keep it in a liquid state.
MAF	Mass Air Flow	The amount of air drawn into the engine
MAP	Manifold Absolute Pressure	Pressure in the engine intake system after the throttle valve referenced to a perfect vacuum.

Acronyms (cont'd)

Acronym	Meaning	Definition
MDI	Multiple Diagnostics Interface	A device used by GM dealers that enables a PC to communicate with the control modules in a vehicle.
MIL	Malfunction Indicator Lamp	An indicator of the internal status of a car engine.
MOST	Media Oriented Systems Transport	Serial communication bus to transmit audio and video information.
N	Neutral	A state of the transmission in which it is not engaged.
NiMH	Nickel Metal Hydride	A type of rechargeable battery that uses a hydrogen absorbing alloy for the negative electrode.
NOx	Nitrogen Oxides	Refers to any of the following oxygen compounds of nitrogen or a mixture of them. Nitric Oxide, Nitrogen dioxide, Nitrous Oxide, Dinitrogen trioxide, Dinitrogen tetroxide, Dinitrogen pentoxide.
O2	Oxygen	A colorless, odorless, tasteless, gaseous chemical element with the chemical symbol O and atomic number 8.
O2S	Oxygen Sensor	An electronic device that measures the proportion of oxygen (O2) in the gas or liquid being analyzed.
OBD	On-Board Diagnostic	A generic term referring to a vehicle's self-diagnostic and reporting capability.
OEM	Original Equipment Manufacturer	A producer that provides a product to its customers, who proceed to modify or bundle it before distributing it to their customers.
OSS	Output Shaft Speed	Rotational speed of the output shaft of a transmission.
P	Park	A state in which the transmission is set so one can leave the vehicle.
PCB	Printed Circuit Board	A thin plate on which chips and other electronic components are placed.
PCM	Powertrain Control Module	A control module that features the functions of both, the engine and the transmission control module.
PCMCIA	Personal Computer Memory Card Industry Association	An international standards body and trade association with over 100 member companies that was founded in 1989 to establish standards for Integrated Circuit cards and to promote interchangeability among mobile computers where ruggedness, low power, and small size were critical.
PIN	Personal Identification Number	A secret numeric password shared between a user and a system that can be used to authenticate the user to the system.
PPE	Personal Protective Equipment	Protective clothing, helmets, goggles, or other garment designed to protect the wearer's body from injury.
PRNDL	Park, Reverse, Neutral, Drive, Low	Park, Reverse, Neutral, Drive, Low (automatic transmission positions).
PTC	Positive Temperature Coefficient	Refers to materials that experience an increase in electrical resistance when their temperature is raised.
PTO	Power Take-Off	A splined driveshaft, usually on a tractor or truck that can be used to provide power to an attachment or separate machine. This mechanism allows implements to draw energy from the tractor's engine.
PVC	Polyvinyl Chloride	A thermoplastic copolymer.
PWM	Pulse Width Modulation	Square shaped type of signal that carries the information in the ratio between on and off times.
R	Reverse	Rearward: directed or moving toward the rear;
RAM	Random Access Memory	A type of computer data storage. It today takes the form of integrated circuits that allow the stored data to be accessed in any order.
RCT	Radiator Coolant Temperature	This is the heat intensity of the radiator coolant measured in degrees. The radiator is a part of the cooling system that removes the engine heat. Coolant is a mixture of water and antifreeze (ethylene glycol) which lowers the freezing point of the water in the coolant system, this fluid also picks up heat from the engine and transfers it to the air.
RDS	Radio Data System	A standard from the European Broadcasting Union for sending small amounts of digital information using conventional FM radio broadcasts.

Acronyms (cont'd)

Acronym	Meaning	Definition
RF	Radio Frequency	A frequency or rate of oscillation within the range of about 3 Hz and 300 GHz. This range corresponds to frequency of alternating current electrical signals used to produce and detect radio waves.
ROM	Read-Only Memory	A class of storage media used in computers and other electronic devices. Data stored in ROM cannot be modified.
RPO	Regular Production Option	A three digit/letter code given to parts, assemblies, and systems originally installed on the vehicle. These RPO codes designate options and are assigned by General Motors.
RSA	Rear Seat Audio	An auxiliary set of controls that operate the main audio system from the rear seat. Rear passengers can also operate a different media source than the front passengers.
RWD	Rear-Wheel Drive	A common engine/transmission layout in which the engine is in the front of the vehicle, but the front mid-engine, rear mid-engine and rear engine layouts are also used.
SCV	Speed Controlled Volume	The volume control is set for a desired sound level in the vehicle as the vehicle increases its speed, the sound level is adjusted.
SDM	Sensing and Diagnostic Module	The name given to air bag modules used in General Motors vehicles.
SIM	Subscriber Identity Module	Part of a removable smart card Integrated Circuit Card. This is used for mobile cellular telephone devices such as mobile computers and mobile phones. SIM cards securely store the service-subscriber key used to identify a subscriber. The SIM card allows users to change phones by simply removing the SIM card from one mobile phone and inserting it into another mobile phone or broadband telephony device.
SIR	Supplemental Inflatable Restraint	Technical term for the air bag. Air bag is a stretchable membrane, which inflates during an automobile accident to provide cushioning to the passenger's head and torso to prevent injury to the passengers.
SPI	Serial Peripheral Interface	This is an interface that enables the serial (one bit at a time) exchange of data between two devices. An SPI operates in full duplex mode. This means that data can be transferred in both directions at the same time. It is a standard bus technology like CAN or I2C.
SPS	Service Programming System	System that enables repair facilities to update the software in control modules.
SUV	Sport Utility Vehicle	A passenger vehicle which combines the towing capacity of a pickup truck with the passenger-carrying space of a minivan.
SVS	Service Vehicle Soon	Indicator lamp or symbol for a malfunction related to a vehicle component or system.
TA	Traffic Announcement	Message spoken on radio regarding the movement of vehicles or pedestrians through an area or along a route. The buttons on radios that enable this announcements are also often labeled TA.
TAC	Throttle Actuator Control	A motor which moves the engine throttle plate or valve, controlled by the engine control module. A throttle plate limits the amount of air entering a internal combustion gasoline engine.
TAP	Transmission Adaptive Pressure	The transmission control module learns each component's characteristics and adjusts fluid pressure accordingly.
TCC	Torque Converter Clutch	Resides in a torque converter to connect an engine to an automatic transmission. The clutch is applied when conditions are correct to achieve a 1:1 ratio of engine crankshaft to transmission input shaft.
TCM	Transmission Control Module	A module that controls electronic automatic transmissions. It uses sensors from the vehicle as well as data provided by the Engine Control Module to calculate how and when to change gears in the vehicle for optimum performance, fuel economy and shift quality.
TDC	Top Dead Center	The piston is in its highest position relative to the combustion chamber.
TIS	Techline Information System	The PC-based global dealership diagnostic software that provides the technician the ability to reference the most recent service information via the service department's computer.
TPA	Terminal Position Assurance	An additional locking mechanism inside an electric connector that holds the pins in place.

Acronyms (cont'd)

Acronym	Meaning	Definition
TV	Television	A telecommunication system for broadcasting and receiving moving pictures and sound over a distance.
USB	Universal Serial Bus	A type of communication bus connection between a computer and a peripheral device.
VCI	Vehicle Communications Interface	A diagnostic tool that communicates to modules of multiple communication protocols in a vehicle by converting vehicle serial data into PC serial data communication.
VIN	Vehicle Identification Number	Used by manufacturers to uniquely identify motor vehicles using 17 characters.
VSCM	Vehicle Stability Control Module	This module uses information from several sensors to detect a loss of vehicle traction, then works with the antilock brake system to apply individual brakes to help keep the vehicle on its intended path.
VSS	Vehicle Speed Sensor	Sends data regarding how fast the car is traveling at the moment of driving. It is designed to be able to record the rate at which the vehicle's crankshaft is spinning.
WOT	Wide Open Throttle	When the throttle blade or valve is at its maximum open position, allowing maximum air to enter an internal combustion gasoline engine.
WLAN	Wireless Local Area Network	Standard to transmit digital data via radio frequency.
XM	XM (Satellite Radio)	XM Satellite Radio Holdings (XM) is one of two satellite radio services in the United States and Canada. XM provides pay-for-service radio, analogous to cable television. Its service includes 73 different music channels, 39 news, sports, talk, and entertainment channels, 21 regional traffic and weather channels and 23 play-by-play sports channels (2008).
XML	Extensible Markup Language	A markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable.

Units

Unit	Meaning	Definition
m^2	Square Meter	Area
A	Ampere	Electrical
Ah	Ampere Hour	Electrical
C	Coulomb	Electrical
dBm	Decibel Meter	Electrical
dBmV	Decibel Millivolt	Electrical
mV/DIV	Millivolts per Division	Electrical
mV/s	Millivolts per Second	Electrical
Ω	Ohm	Electrical
V	Volt	Electrical
V/DIV	Volts per Division	Electrical
V/ms	Volts per Millisecond	Electrical
W	Watt	Electrical
mm^3/stroke	Cubic Millimeters per Stroke	Flow
gal/h	Gallons per Hour	Flow
g/s	grams per second	Flow
g/stroke	Grams per Stroke	Flow
kg/100km	Kilograms per 100 Kilometer	Flow
kg/h	Kilograms per Hour	Flow

Units (cont'd)

Unit	Meaning	Definition
km/L	kilometer/liter	Flow
L/100km	Liters per 100 Kilometers	Flow
L/h	Liters per Hour	Flow
L/min	Liters per Minute	Flow
MPG	Miles per Gallon	Flow
mg/s	Milligrams per Second	Flow
mg/stroke	Milligrams per stroke	Flow
ft	feet	Length
in	Inch	Length
m	Meter	Length
mi	Mile	Length
bar	Bar	Mechanical
bar/min	Bars per Minute	Mechanical
in. H2O	Inches of Water	Mechanical
in. H2O/s	Inches of Water per second	Mechanical
kPa/s	Kilopascals per Second	Mechanical
N	Newton	Mechanical
N•m	Newton Meter	Mechanical
Pa	Pascal	Mechanical
Pa/s	Pascals per Second	Mechanical

Units (cont'd)

Unit	Meaning	Definition
lb ft	Pound Foot	Mechanical
PSI	Pound-Force per Square Inch	Mechanical
Counts	Counts	Misc.
Cycles	Cycles	Misc.
dB	Decibel	Misc.
°	Degree	Misc.
°C	Degree Centigrade	Misc.
°CA	Degree Crankshaft Angle	Misc.
°F	Degree Fahrenheit	Misc.
°/s	Degree per Second	Misc.
Hz	Hertz	Misc.
kbit/s	Kilobit per second	Misc.
lx	Lux	Misc.
ppm	Parts per Million	Misc.
%	Percent	Misc.
%/min	Percents per Minute	Misc.
%/sec	Percents per Second	Misc.
Pulses	Pulses	Misc.
:1	Ratio	Misc.
RPM	Revolutions per Minute	Misc.
Steps	Steps	Misc.
W/m²	Watts per Square Meter	Misc.
g	g (Acceleration)	Movement
km/h	Kilometers per Hour	Movement
m/s	Meters per Second	Movement
m/s³	Meters per Second Cubed	Movement

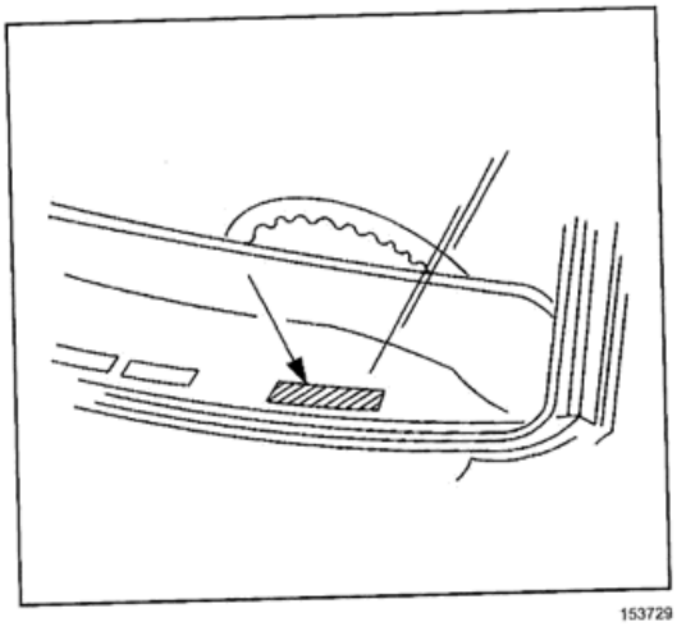
Units (cont'd)

Unit	Meaning	Definition
m/s²	Meters per Second Squared	Movement
MPH	Miles per Hour	Movement
mm/s	Millimeters per Second	Movement
d	Day	Time
h	Hour	Time
hh:mm:ss	Hour:Minute:Second	Time
ms/DIV	Milliseconds per Division	Time
min	Minute	Time
s	Second	Time
s/DIV	Seconds per Division	Time
yy-mm-dd	Year-Month-Day (2 digits)	Time
yyyy-mm-dd	Year-Month-Day (4 digits, preferred)	Time
m³	Cubic Meter	Volume
gal	Gallon	Volume
L	Liter	Volume
mL	milliliters	Volume
US gal	US Gallon	Volume
US pt	US Pint	Volume
US qt	US Quart	Volume
kg	Kilogram	Weight

Customer Concern Verification Sheets

The GM Customer Concern Verification Sheets have been designed to improve communications between the service customer and the technician. The more clearly the technician understands the concern and its symptoms, the more likely the concern will be fixed right the first time.

Vehicle, Engine and Transmission ID and VIN Location, Derivative and Usage



153729

The vehicle identification number (VIN) plate is the legal identifier of the vehicle. The VIN plate is located on the upper left corner of the instrument panel (I/P) and can be seen through the windshield from the outside of the vehicle:

Vehicle, Engine and Transmission ID and VIN Location, Derivative and Usage

Position	Definition	Character	Description
1	Country of Origin	1	United States
		3	Mexico
2	Manufacturer	G	General Motors
3	Make	1	Chevrolet
4–5	Vehicle Line/Series	A	Chevrolet Sonic LS (Automatic)
		B	Chevrolet Sonic LS (Manual)
		C	Chevrolet Sonic LT (Automatic)
		D	Chevrolet Sonic LT (Manual)
		E	Chevrolet Sonic LTZ (Automatic)
		F	Chevrolet Sonic LTZ (Manual)
6	Body Style	5	69 – Sedan, 4-Door, 4 Window, Notchback
		6	48 – Sedan, 4-Door, 4 Window, Hatchback
7	Restraint System	A	Active Manual Belts, Airbag Delete
		C	Active Manual Belts, Airbag – Driver & Passenger – Front (1st row)
		D	Active Manual Belts, Airbag – Driver & Passenger – Front (1st row), & Front Seat Side (1st row)
		E	Active Manual Belts, Airbags – Driver & Passenger – Front (1st row), & Front Seat Side (1st row), Roof Side (all seating rows)
		S	Active Manual Belts, Airbags – Driver & Passenger Front (1st row), Front Seat Side (1st row) & Rear Seat Side (2nd row), Roof Side (all seating rows), Driver & Passenger knee (1st row)

Vehicle, Engine and Transmission ID and VIN Location, Derivative and Usage (cont'd)

Position	Definition	Character	Description
8	Engine Type	B	RPO LUV Engine – Gas, 4 Cylinder, 1.4L, MFI, DOHC, Turbo, VVT, Alum, E85 Max
		C	RPO LDE Engine – Gas, 4 Cylinder, 1.6L, MFI, DOHC, VVT, Variable Camshaft Phasing, Variable Intake Module (VIM)
		D	RPO LFJ – Gas, 4 Cylinder, 1.6L MFI, E100 Max
		G	RPO LWE Engine – Gas, 4 Cylinder, 1.8L, MFI, DOHC, VVT, 103 KW
		H	RPO LUW Engine – Gas/Ethanol, 4 Cylinder, 1.8L, MFI, 103KW, DOHC, E85
9	Check Digit	X	Calculated by POMS
10	Model Year	D	2013
11	Plant Location	4	Orion
		S	Ramos Arizpe
12–17	Plant Sequence Number	—	Plant Sequence Number

1.6L (LDE/LFJ) Engine ID and VIN Derivative Location

Refer to *Engine Identification on page 9-953*.

6T30/6T40/6T45/6T50 (MH9) Transmission ID and VIN Derivative Location

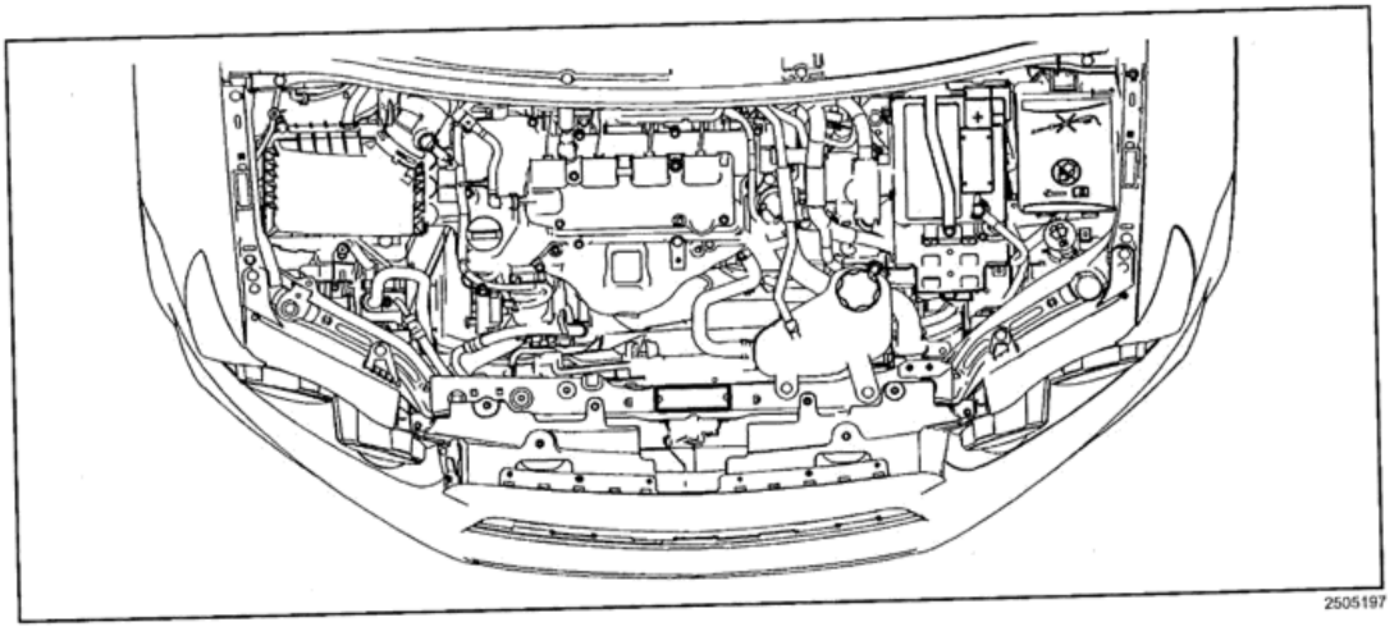
Refer to *Transmission Identification Information on page 17-317*.

M20-6 (MZ7) Transmission ID and VIN Derivative Location

Refer to *Transmission Identification Information on page 17-593*.

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

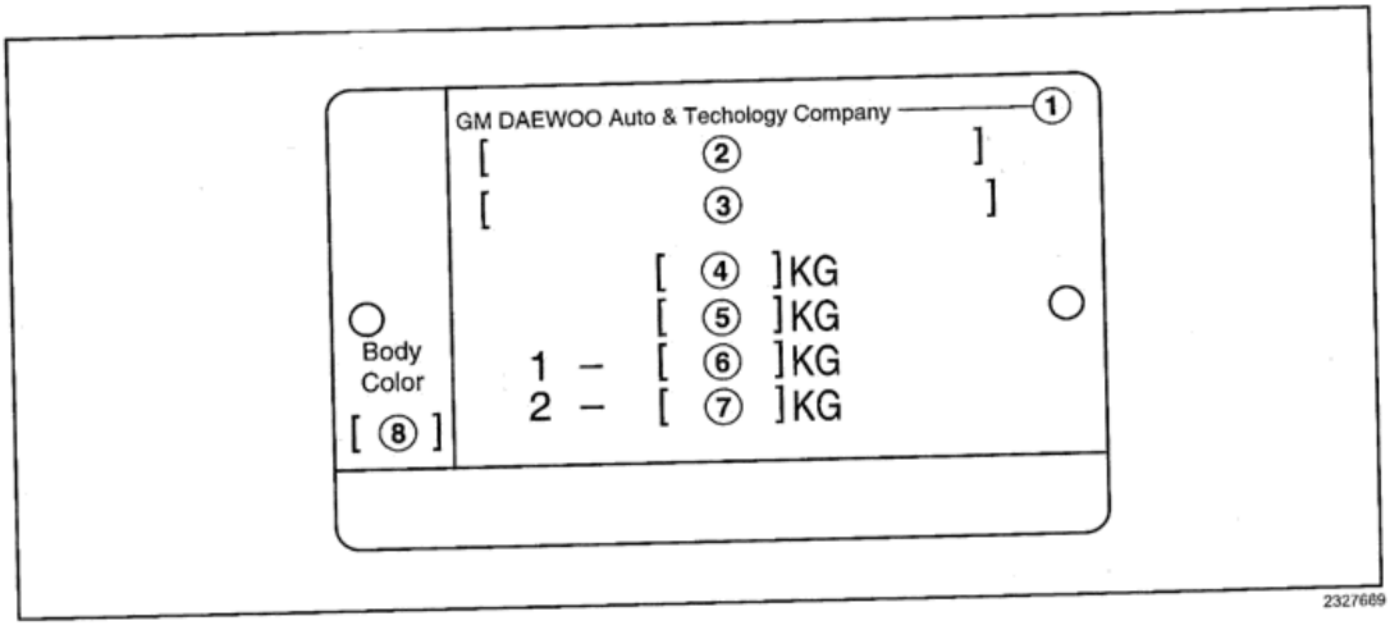
Certification Plate Location



2505197

The vehicle identification number (VIN) plate is attached to the top of the front end upper tie bar which is located under the radiator opening upper cover.

Identification Plate Location

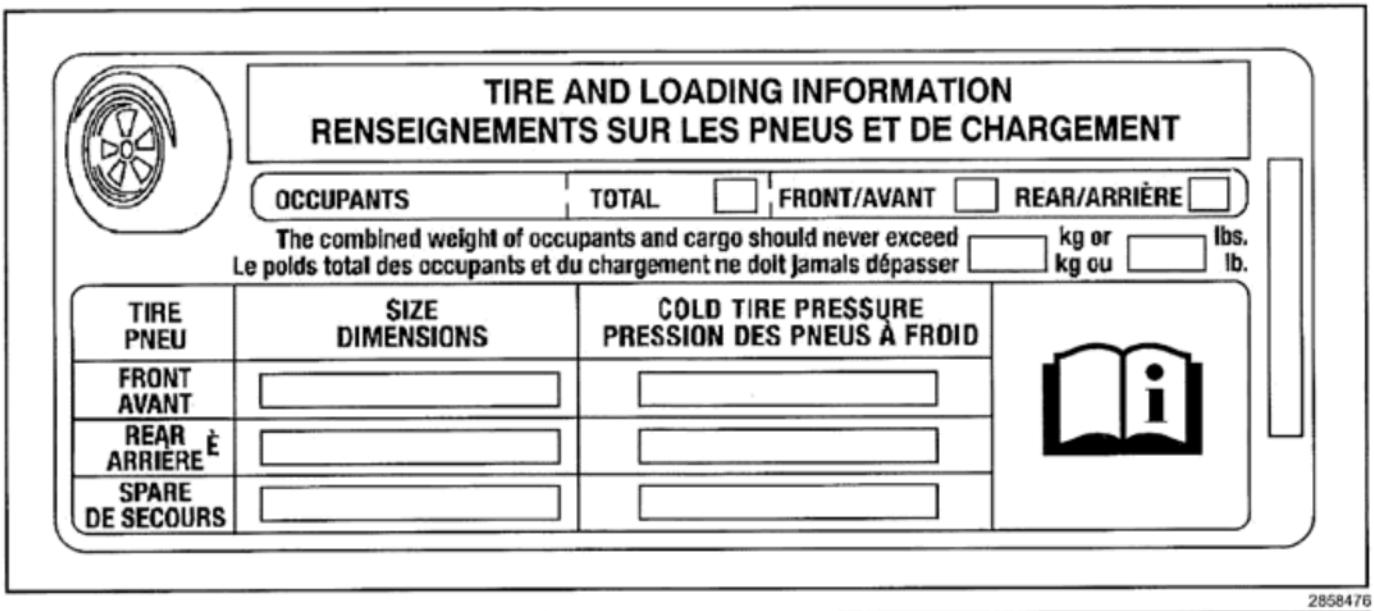


2327689

Legend

(1) Manufacturer Name
(2) Whole Vehicle Type Approval Number
(3) VIN (Vehicle Identification Number)
(4) GVW
(5) Combination Weight (GVW + Braked Trailer Weight)
(6) Maximum Permissible Axle Weight – Front
(7) Maximum Permissible Axle Weight – Rear
(8) Body Color

Tire Placard



2858476

The tire placard label is located on the driver side B-pillar and displays the following assessments:

- Tire size
- Tire pressure
  - Front
  - Rear
  - Various loading conditions

RPO Code List

The following table provides the description of the Regular Production Option (RPO) codes that are available on the vehicle. The vehicle's RPO list is printed on the Service Parts Identification Label.

RPO	Description
01A	Trim Color Seat - Jet Black VAR 1
01E	Trim Color Seat - DK Titanium
01K	Trim Color Seat - Brick
01S	Trim Color Seat - MED Titanium
02R	Trim Color Seat - MED Cashmere
02Y	Trim Color Seat - Jet Black & Stitching Brick
1A9	Trim Color Door Panel - MED Cashmere
1AF	Trim Color Door Panel - DK Titanium
1BF	Trim Color Door Panel - Brick
4AA	Interior Trim - Jet Black
4AQ	Interior Trim – V DK Pewter
5EA	Equipment - Package, CO2 - Reduction
9L3	Tire Spare - None
A33	Window - Power Operated, Rear DRS
A55	Window - Power Operated, Driver
A60	Lock Control Right Rear Compartment – Lid, Tailgate, Key Activated
A66	Window - Power Operated, Passenger
A69	Restraint - Seat Belt Tensioner, Front, VAR. 2
A70	Restraint - Seat Belt Tensioner, Front
A90	Lock Control RR CMPT - LID, REM CONT ELEC Release
A94	Lock Control RR CMPT - LID, REM CONT Manual Release
AAL	Restraint - Knee, Bolster, LH / RH
ABR	Window - Manual Operated, Front Door
ADL	Restraint System - Seat, Inflatable, Driver & Passenger, Single Stage
AE2	Latch - Rear Compartment, Safety, Manual Release
AG5	Adjuster Passenger Seat - Manual, 2 Way
AH3	Adjuster Front Seat - Manual, 4 Way, Driver
AH9	Adjuster Front Seat – Manual, 2 Way, Driver
AHU	Restraint Provisions - Belts, Adjuster, Height, Front
AJ3	Restraint System – Seat, Inflatable, Driver, Front
AJC	Restraint - Head, Front Seat, Up / Down Adjustment
AJD	Restraint - Head, Front Seat, Up / Down, Fore / Aft Adjustment, Folding Passenger
AJG	Restraint System - Seat, Inflatable, Driver & Passenger, Front & Seat Side, Single Stage
AKJ	Windshield Style - Shade Band
AKM	Window Type - Clear
AKN	Window Type - Tinted
AKP	Window Type - Solar Absorbing
AL0	Sensor Indicator - Inflatable Restraint, Front Passenger / Child Presence Detector
AM7	Seat Rear – Folding
AMA	Seat Rear – Split Back, Folding, Headrest

RPO	Description
AN1	Seat Rear - Bench
AQ2	Net – Convenience, Package
AQP	Restraint - Head, Rear Seat, Center
AR1	Restraint System – (None)
AR7	Seat - Front BKT, Standard
AT7	Restraint System Rear – Seat, SHLDR, RETR, 3 Point, 3 SHLDR
AU3	Lock Control – Side Door, Electronic
AWB	Restraint System Rear – Seat, LH and RH/ ELR and CTR/2 Point
AXG	Window - Power Operated - Express Driver Up / Down
AY0	Restraint System – Seat, Inflatable, Driver and Passenger Front, Seat Side, Roof Side
AYC	Restraint System - Seat, Inflatable, Driver & Passenger Front, Seat Side, Roof Side, Single Stage
AYF	Restaint System - Seat, Inflatable, Driver & Passenger Front, Front Seat Side & Rear Seat Side, Roof Side, Knee
B37	Covering – Floor Mat, Front and Rear, Auxiliary
B9U	Lock Control RR CMPT - L/Gate REM CONT, ELEC Open / Close
BA8	Compartment – Stowage, Front Seat, Passenger
BAH	Equipment - Security System, Immobilization, Step Two
BCM	Covering - Load Compartment, Movable
BCO	Plant Code - Bogota, Colombia
BGY	Plant Code - Dong Yue, China
BPF	Bumper Provisions - Front, Lower Spoiler Edge
BTT	Alarm - Remote Panic
BTV	Remote Start - Engine
BUP	Plant Code - Bupyeong 1, Korea
BXQ	Ornamentation - EXTR, PLR APLQ, Reveal, Black
C25	Wiper System - Rear Window, Intermittent
C32	Heater - Heating / Defroster System, Reinforced, Electric
C35	Heater - Duct, RR PASS
C41	HVAC System - Heater, Outside Air, with Fan
C49	Defogger - RR Window, Electric
C60	HVAC System - Air Conditioner FRT, MAN Controls
C7B	HVAC System - Air Conditioner FRT, HTR Core Not Required, Fan Speed Control Only
C80	Switch - Directional Signal, Wiper, Reverse Mount, STRG WHL
C91	Lamp - INTR, Roof, Courtesy
C95	Lamp, INTR, Roof, Courtesy & Dual Reading

RPO	Description
C99	Switch - INFL RST I/P MDL MAN Suppression
CAI	Lamp - Tail & Stop, w/o Fog, ECE
CD4	Wiper System - Windshield, Pulse, Variable Delay
CF5	Roof - Sun, Glass, Sliding, ELEC
D05	Arm Rest - Front Seat, Driver
D31	Mirror I/S R/V - Tilt
D6J	Mirror I/S Front VAN - Sunshade, w/o Mirror, Passenger, w/ Mirror
D7A	Handle O/S Door - Body Color, Chrome Strip
D72	Handle O/S Door - Black
D75	Handle O/S Door - Body Color
D87	Handle - O/S, L/Gate, R/CMPT, Black
D91	Handle - O/S, L/Gate, R/CMPT, Color
D9O	Sensor - Front Airbag (EFS) - Single
DC8	Mirror O/S - LH & RH, Remote Control, Manual Folding, Black
DG2	Mirror O/S - LH & RH, Remote Control, Manual Folding, Color
DG6	Mirror O/S - LH & RH, Remote Control, Electric, Manual Folding, Heated, Color
DHG	Mirror I/S Front VAN - Sunshade, Driver & Passenger, w/o Mirror
DL6	Mirror O/S - LH & RH, Remote Control, Electric, Manual Folding, Color
DL7	Mirror O/S - LH & RH, Remote Control, Electric, Heated, Power Folding, Color
DNJ	Mirror I/S Front VAN - Sunshade, w/Mirror, w/o Cover
DLV	Mirror I/S Front VAN - Sunshade, Driver & Passenger, w/Mirror & Cover
DUJ	Ashtray - Smoker's Package
E17	Bumper – 2.5 mph
E19	Bumper – 5.0 mph
E21	Handle - I/S, Door, Chrome
E22	Handle – Assist, Rear
E27	Handle – Assist, Passenger
E3E	Handle - O/S, L/Gate, R/CMPT, Chrome
E7Y	Fire Extinguisher – 2 kg
E91	Pocket – Front Seat Back, Passenger
EBL	Trim Seat - Cloth, Flash
EBM	Trim Seat - Cloth, Breva
ECE	Trim Seat - Leather (TBD1-GSV)(GMDAT)
F77	Ratio - Transaxle Final Drive 4.11
FE1	Suspension System – Soft Ride
FE4	Suspension System – Special Ride and Handling
FE9	Certification - Emission, Federal
FHA	Fuel System - Electronic, Returnless
FHB	Ratio - Transaxle Final Drive 3.47

RPO	Description
FHF	Trim Door - Hard Touch Paint
FHG	Trim Door - Soft Touch Paint
FHN	Vehicle Fuel - Gasoline E5
FHP	Vehicle Fuel - Gasoline E20
FHS	Vehicle Fuel - Gasoline E85
FHT	Vehicle Fuel - Gasoline E100
FHY	Vehicle Fuel - Diesel B10
FP9	Ratio - Transaxle Final Drive 3.55
FV1	Ratio - Transaxle Final Drive 3.72
FV2	Ratio - Transaxle Final Drive 4.18
FV5	Ratio – Transaxle Final Drive 4.19
FV7	Ratio - Transaxle Final Drive 4.29
FVE	Ratio - Transaxle Final Drive 4.63
FVG	Ratio - Transaxle Final Drive 4.64
FX1	Ratio - Transaxle Final Drive 3.94
FX3	Ride And Handling – Automatic Electronic Controlled
FXB	Ratio - Transaxle Final Drive 3.65
FY2	Ratio - Transaxle Final Drive 3.74
G83	Ratio - Transaxle Final Drive 4.47
GAN	Primary Color – Exterior, Switchblade Silver Met (G) 636R
GAR	Primary Color – Exterior, Carbon Flash Met (G) 501Q
GAZ	Primary Color – Exterior, Olympic White (G) 8624
GBA	Primary Color – Exterior, Black (G) 8555
GBE	Primary Color - Exterior, Crystal Claret Tintcoat (G) 505Q
GBV	Primary Color - Exterior, Cyber Gray MET (G) 637R
GCD	Primary Color - Exterior, Bright White (686H)
GCN	Primary Color - Exterior, Victory Red 9260
GCO	Primary Color - Exterior, SCO Yellow (9414)
GCR	Primary Color - Exterior, Inferno Orange MET (502Q)
GCW	Primary Color – Exterior, Misty Lake Met (683R)
GEL	Primary Color – Exterior, Dynamic Orange Met 728R
GGE	Primary Color – Exterior, Super Red (G) 717R
GIY	Primary Color - Exterior, Galaxy Silver MET (519F)
GJP	Primary Color - Exterior, Grenada Black (446P)
GLF	Primary Color - Exterior, Space Blue Metallic 819T
GMN	Primary Color - Exterior, Desert Bloom (876S)
GOB	Primary Color - Exterior, Cherry Red MET (G) 715J

RPO	Description
GQJ	Primary Color - Exterior, Grand Canyon Brown MET (894T)
GQM	Primary Color - Exterior, Boracay Blue MET (895T)
GQV	Primary Color - Exterior, Flame Red
GQW	Primary Color - Exterior, Urban Grey (658R)
J93	Brake System - Power, FRT Disc, RR Drum, ABS, 15"
J94	Brake System - Power, FRT Disc, RR Drum, 15"
J97	Brake System - Power, FRT Disc, RR Drum, ABS, 14"
JBD	Booster - Brake, Single Rate
JBE	Booster - Brake, Dual Rate
JDE	Bumper - Front & Rear, Lightweight
JPW	Brake System - Power, FRT Disc, RR Drum, 14"
K12	Filter – Air, Pollutant
K33	Cruise Control - Automatic, Electronic, Speed Governor
K34	Cruise Control - Automatic, Electronic
K4E	Battery – LN3, AGM, 12V, 70AH, 760 ENCCA
K09	Generator – 120 Amp
K60	Generator – 100 Amp
K97	Generator – 80 Amp
KA1	Heater - Seat, Front
KE3	Knob - TRANS CONT Lever, Chrome
KG9	Generator – 140 Amp
KI2	Knob - TRANS CONT Lever, Polyurethane
KL7	Conversion – Propane Gas (LP Gas)
KL9	ENG Control - Stop/Start SYS
KNV	Knob - TRANS CONT Lever, Satin Silver, Chrome
KPK	Heater - Oil Pan
KPL	Cap - Fuel Fill, Locking
KRK	Knob - TRANS CONT Lever, Leather, Satin Silver, Chrome
KTD	Key - Primary Rigid, Additional Rigid
KTF	Key - Primary Foldable, Additional Foldable
KTH	Lock Control - Side Door Lock / Unlock
KTI	Kit, Tire - Inflator
KTJ	Lock Control - Side Door Lock / Unlock, Trunk Release
KTK	Lock Control - Side Door Lock / Unlock, Remote Start
KTL	Lock Control - Side Door Lock / Unlock, Trunk Release, Remote Start
KTM	Key - Primary Foldable, Additional Rigid
KTN	Equipment - Additional Key (No Buttons)
L2I	Engine - Gas, 4 Cyl, 1.4L, MFI, L4, DOHC, FAM O, 74 KW, E85 MAX, GME

RPO	Description
L2N	Engine - Gas, 4 Cyl, 1.4L, MFI, L4, DOHC, FAM O, 74 KW, E20 MAX, GME
LCU	Engine - Gas, 4 Cyl, 1.4L, MFI, DOHC, PDA, FAM A/B, GMDAT
LDC	Engine - Gas, 4 Cyl, 1.2L, MFI, DOHC, PT-JV, Variable Camshaft Phasing
LDD	Engine - Gas, 4 Cyl, 1.4L, MFI, DOHC, Variable Camshaft Phasing, FAM 0
LDE	Engine - Gas, 4 Cyl, 1.6L, MFI, DOHC, VVT, Variable Camshaft Phasing, Variable Intake Module (VIM)
LDV	Engine - Diesel, 4 Cyl, 1.3L, L4, DI, DOHC, Turbo, 55KW, 190NM
LED	Engine - Gas, 4Cyl, 1.6L, MFI, DOHC, VVT, Variable Intake Module (VIM), E85 MAX
LFJ	Engine - Gas, 4 Cyl, 1.6L, MFI, E100 MAX
LHD	Vehicle Drive – Left Hand Drive
LSF	Engine - Diesel, 4 Cyl, 1.3L, CRI, DOHC, Turbo-VGT
LUV	Engine - Gas, 4 Cyl, 1.4L, MFI, DOHC, Turbo, VVT, ALUM, GME, E85 MAX
LUW	Engine - Gas, 4 Cyl, 1.8L, MFI, 103KW, DOHC, E85 MAX
LWD	Engine - Gas, 4Cyl, 1.2L, MFI, DOHC, 51KW
LWE	Engine - Gas, 4 Cyl, 1.8L, MFI, DOHC, VVT, 103 KW, GME
M26	Transmission - Manual 5 Speed, Opel, 65 MM, 1.96 2ND, 1.323 3RD, 0.946 4TH, 0.756 5TH, F17 (WR)
M97	Shifter Interlock - Brake, TRANS
MDC	Molding B/S Upper - Bright
MEM	Transmission - Manual FWD 5 Speed, Brazil, 180MM, 3.909 1ST, 0.674 5TH (F17; UR)
MFH	Transmission - Manual 5 Speed, D16 M/CR
MH9	Transmission - Auto 6 Speed, HMD, X24F
MX3	Transmission – Manual 5 Speed, Y4M SHD, 1ST 3.667, 5TH 0.761
MXP	Transmission – Manual 5 Speed, GMDAT, D16 Intermediate Semi-wide, 72MM, 3.727 1ST, 0.763 5TH
MZ4	Transmission - Manual 6 Speed, Opel, 76.5 MM, 3.82 1ST, 0.615 6TH, (M32 WR)
MZ7	Transmission - Manual 6 Speed, Opel, 76.5 MM, 4.273 1ST, 0.614 6TH (M20)
N08	Lock Control - Fuel Filler Door, REM CONT
N12	Exhaust System - Rear Exit
N30	Steering Wheel – Deluxe
N33	Steering Column – Tilt Type
N34	Steering Wheel – Leather, 3 Spokes
N37	Steering Column - Tilt, Telescoping
N40	Steering – Power, Non-Variable Ratio
N45	Steering Wheel – 3 Spokes
N54	Steering Wheel – 3 Spokes, Sport
N81	Tire Spare - Full Size

RPO	Description
NA3	Emission System – Japan
NCG	Lock - Electrical Child Lock System (Rear Door Latch)
NE1	Certification - Emission, Geographically Restricted Registration for Vehicles up to 14,000 LBS GVW
NE9	Emission System – EEC 09
NF7	Emission System - Federal, NLEV
NJ1	Steering - Power, Non-variable Ratio, Electric
NPH	Exhaust System - Heavy Duty
NQU	Emission System – Korean, ULEV
NT3	Emission System – EEC 00
NT4	Emission System – EEC 05
NT7	Emission System - Federal, Tier 2
NU6	Emission System - California, PZEV
NZA	Control - Steering Wheel, Wireless Interface, Radio & Phone, Handsfree Controls
ORN	Plant Code - Orion, MI, USA
PZY	Plate - Skid Front & Rear
Q1G	Tire All - 185/75R14 SL 89H BW HW1
Q1H	Tire All - P195/65R15 SL 89H BW AL2
Q1W	Tire All - 195/65R15 SL 91H BW HW2
Q1X	Tire All - 205/55R16 SL 91H BW HW3
Q3O	Tire All - P205/50R17 SL 88V BW AL3
Q5I	Tire All - 205/50R17 SL 89V BW HW3
Q6K	Tire All - 195/65R15 SL 91H BW HW3
Q6L	Tire All - 205/55R16 SL 91H BW HW4
Q8E	Jack – Mechanical, with Tools
QB0	Tire All - P185/75R14 SL 89H BW ALS
QLG	Tire All - P205/55R16 SL 89H BW AL3
QZF	Tire All - P195/65R15 SL 89H BW AL2 (Low Resistance)
RHD	Vehicle Drive – Right Hand Drive
RQ4	Tire All - 195/65R15 SL 91H BW HW2 (Low Resistance)
RRB	Wheel - 14x5.5, J, Steel, Design 1
RRK	Wheel - 15x6.0, J, Aluminum, Design 1
RRL	Wheel - 15x6.0, J, Steel, Design 1
RRV	Wheel - 16x6.0, J, Aluminum, Design 1
RS7	Wheel - 17x6.5, J, Aluminum, Design 1
T39	Lamp - Turn Signal, AUX
T3U	Lamp – Front Fog
T3W	Lamp System - Daytime Running, Reduced Intensity Low Beam
T3X	Lamp System – Daytime Running, Regular Intensity Low Beam
T43	Spoiler - Rear
T44	Alarm – Overspeed Warning, Acoustical
T4A	Headlamps - Halogen

RPO	Description
T67	Battery – LN3, FLA, 12V, 70AH, 512 ENCCA
T83	Headlamps Control - Automatic On - Off
TB1	Lamp – Tail and Stop, Korea
TBU	Plant Code - 6 October City, Egypt
TCU	License Plate - Front & Rear Mounting, ECE
TD1	Reflector – Safety Triangle
TL6	Grille – Radiator, Black
TM7	Battery – LN2, FLA, 12V, 60AH, 438 ENCCA
TN9	Battery – LN1, FLA, 12V, 50AH, 375 ENCCA
TR1	Lamp - Tail & Stop
TR6	Headlamps Control – Leveling System, Manual
TS6	Lamp – Stop, High Level
TTV	Spoiler - Rear, LID / Liftgate, Sport
U04	Horn – Single Note
U18	Speedometer – Instrument, Kilometer
U25	Lamp – Interior, Rear Compartment, Courtesy
U2K	Digital Audio System - S-Band
U58	Radio Faceplate - Integrated Center Console
U68	Display - Driver Information Center
U71	Antenna – Roof, Radio
UBA	Antenna - Roof, Radio, GPS, Phone, S-Band XM
UC1	Speedometer – Instrument, Miles
UC3	Control - Steering Wheel, Radio & Phone, Redundant Controls
UD7	Sensor Indicator – Rear Parking Assist
UDB	Display Instrument – Driver Info Enhanced (Segmented)
UDG	Display Instrument – Trip Odometer (Segmented)
UE1	Communication System - Vehicle, G.P.S.1
UE3	Communication System - Vehicle, G.P.S.3
UG7	Theft Deterrent - Vehicle Tracking and Restart Prevention
UGM	Sensor Equipment - Outside Air Temperature Sensor
UH0	Indicator – Seat Belt Warning , LH
UH1	Indicator – Seat Belt Warning , RH
UH5	Indicator – Seat Belt Warning, Rear Seat
UH7	Radio - AM/FM Stereo, Seek / Scan, CD, ETR, Clock DSP, MP3 / WMA, USB, AUX / IN, Wireless Interface
UJ2	Indicator - Engine Oil Life
UJM	Tire Press Indicator - Manual Learn
UL5	Radio - (None)
UM7	Radio – AM/FM Stereo, Seek/Scan, Clock, ETR
UPF	Wireless Interface - Short Range, Voice REC

RPO	Description
UQ9	Speaker System – (None)
UQJ	Restraint Provisions - Child, ISOFIX 2 Point Only
UQK	Restraint Provisions - Child, ISOFIX 2 Point Only, Point / LAT CH (INC 2 Top Tether Points)
UQL	Restraint Provisions - Child, ISOFIX 2 Point Only, Point / LAT CH (INC 3 Top Tether Points)
US8	Radio - AM/FM Stereo, Seek / Scan, CD, Auto Tone, Clock, ETR, MP3, RDS
USR	Receptacle - USB
UTJ	Theft Deterrent – Electrical, Unauthorized Entry
UTK	Theft Deterrent - Mechanical, Double Locking Latch
UW4	Speaker System – 4, Custom
UW6	Speaker System – 6, Custom
UY0	Battery – LN0, FLA, 12V, 40AH, 300 ENCCA
V22	Grille – Radiator, Chrome
V48	Coolant – Engine Maximum Protection
V5M	Calibration - TCM, Neutral Idle Control
VD1	Provision Options - Europe
VD8	Provisions – First Aid Kit
VEE	Bumper Front - Body Color, Front & Rear
VGC	Protector - Film, Paint Etch Preventive
VHY	Protector – Body Sheet Metal, High Corrosion Preventive
VK8	Holder – Eyeglasses
VKD	License Plate - Front & Rear Mounting, SAE
VMO	Panel Center - Instrument, Graphite Silver MET
VMT	Bumper - Front Low Speed, Rear Light Weight
VYK	Panel Center - Instrument, Jet Black
W1Y	Control - Steering Wheel, Radio, Redundant Controls
WU5	Switch – I/P LP Dimmer
XL4	Chassis – Protection Kit, Engine Compartment
XL7	Frequencies Rating - 315 MHZ, Long Distance
XL8	Frequencies Rating - 433 MHZ
XX7	Radio – Provisions, Installation, VAR 3
YF5	Certification - Emission, California
YG3	Ornamentation - EXTR, Head & Tail Lamps, Chrome Bezel
YG5	Ornamentation - EXTR, Head & Tail Lamps, High Gloss Finish
ZAA	Tire Spare - Compact

Fasteners

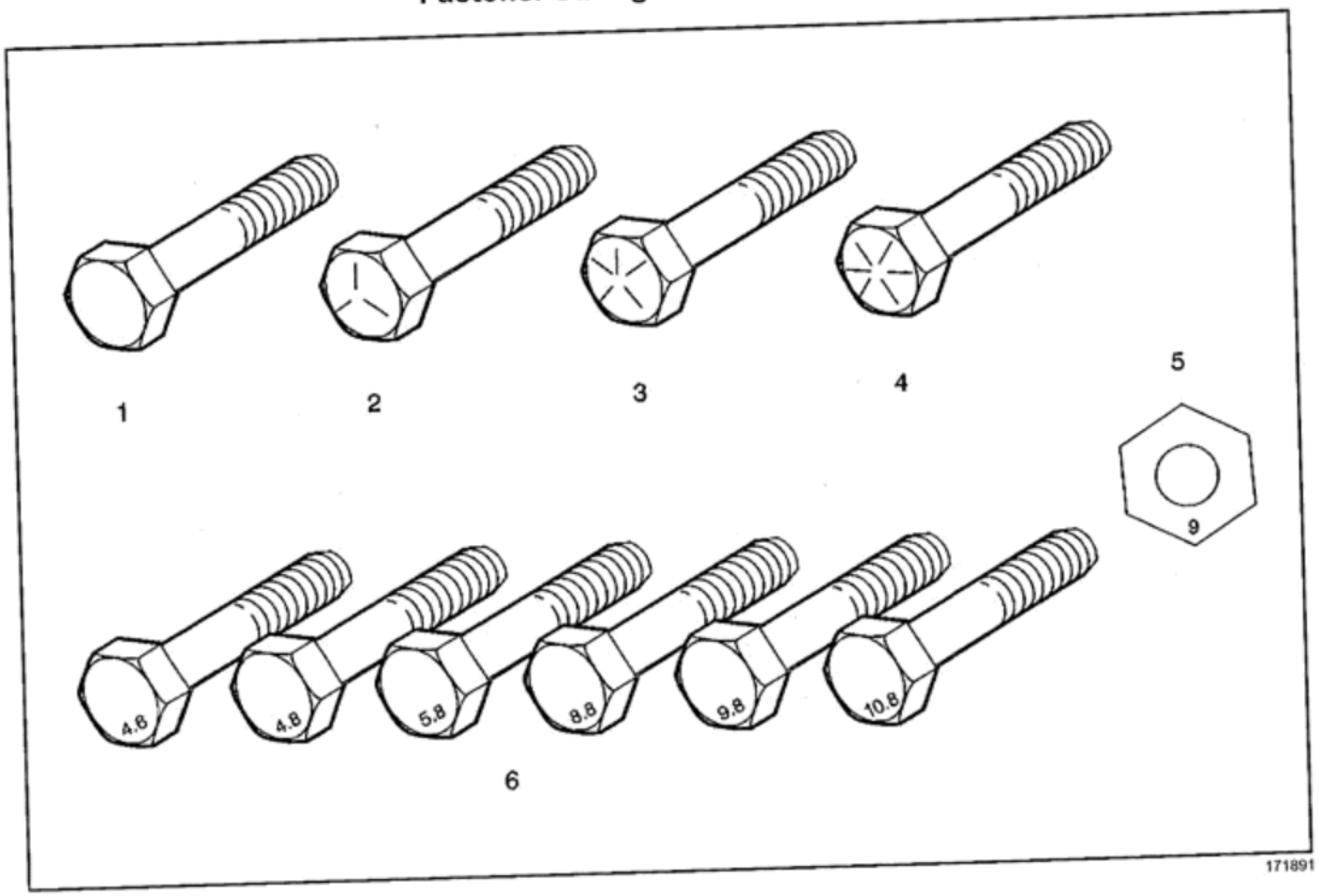
Metric Fasteners

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.

GM Engineering Standards and 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



Legend

(1) English Bolt, Grade 2 (Strength Class)
(2) English Bolt, Grade 5 (Strength Class)
(3) English Bolt, Grade 7 (Strength Class)
(4) English Bolt, Grade 8 (Strength Class)

(5) Metric Nut, Strength Class 9

(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.

The correct fasteners are available through GM SPO. 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

The metric fasteners on GM products are 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

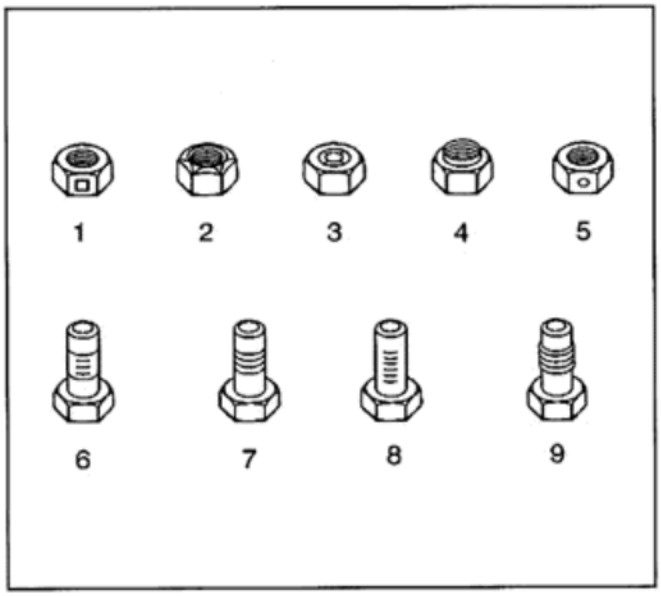
These fasteners accomplish the thread interface by a designed distortion or deformation in the fastener.

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.



171892

Legend

(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

Metric Prevailing Torque Fastener Minimum Torque Development (cont'd)

Application	Specification	
	Metric	English
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

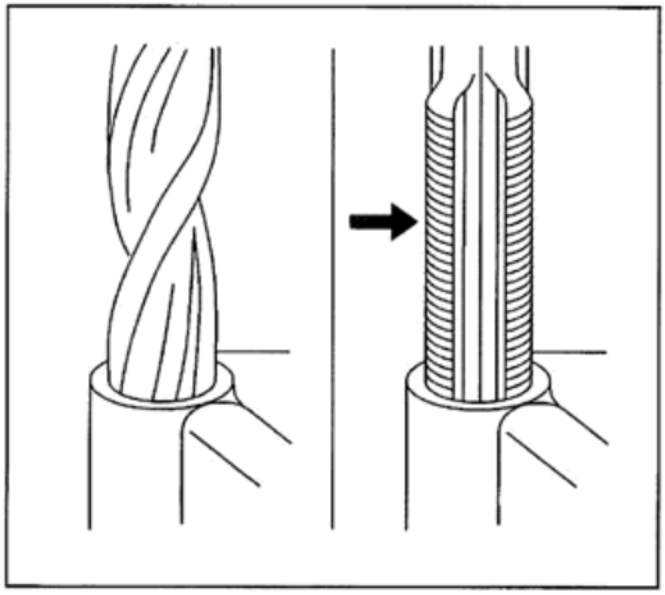
English Prevailing Torque Fastener Minimum Torque Development

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



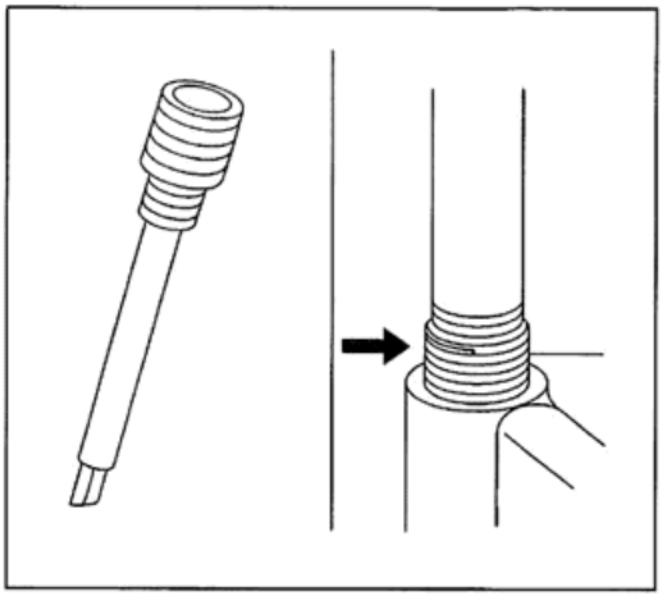
4962

Warning: Refer to Safety Glasses Warning on page 0-5.

Note: Refer to the thread repair kit manufacturer 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.



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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.

Registered and Non-Registered Trademarks

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W
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Door Lock and Ignition Lock Folding and Non-Folding Key Cutting

High Security keys are available from the service parts system.

Obtain the key code from the security card or from the GM Dealer World, Parts, Key Code Look Up system.

If you have the key code and access to a Triax-E., BD Laser or other code key cutting machine from the GM Dealer Equipment Catalog, you may cut a new key.

If you have the original key and access to a Matrix S, BD Laser or other key duplicating machine, you may duplicate the key.

If you do not have a high security key cutting machine, order the side cut key from the service parts system. Include the key code in the NOTE field. Indicate the timing and the method of the shipment.

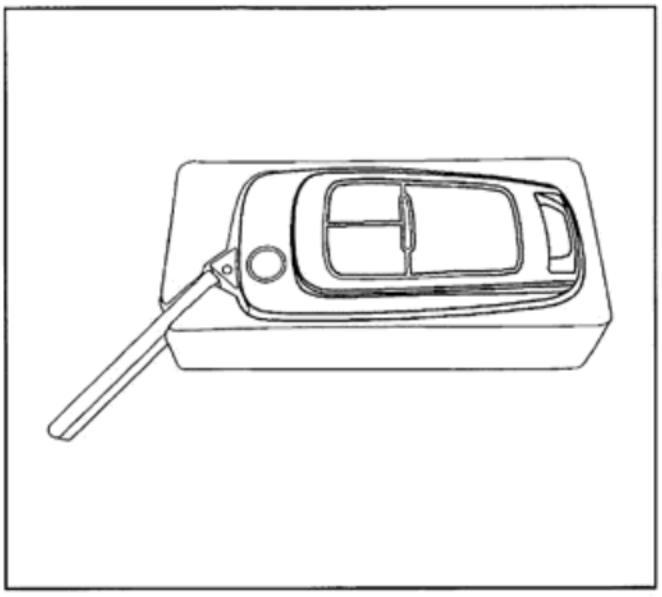
Inspect the new key operation in the lock cylinder. Ensure the new key operates effectively.

Door Lock and Ignition Lock Folding Key Blade Removal and Installation

Special Tools

BO-51098 Flip Key Blade Fixture

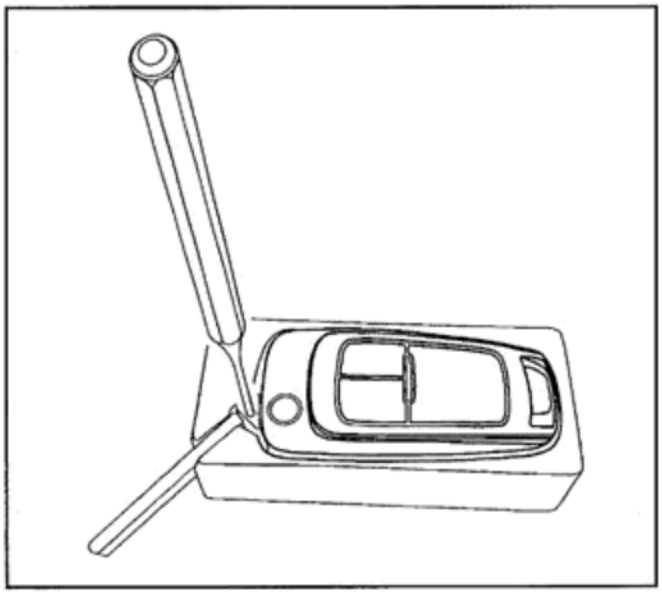
For equivalent region tools, refer to *Special Tools on page 1-32*.



2760548

Caution: Failure to properly support the Remote Keyless Entry (RKE) transmitter assembly while replacing the key blade may cause internal damage to the transmitter assembly.

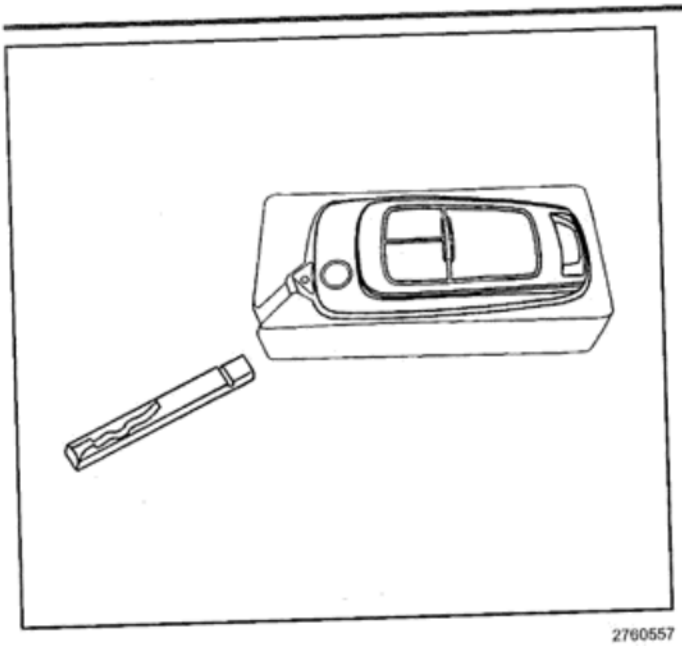
1. Insert the RKE transmitter in the fixture as shown.



2760553

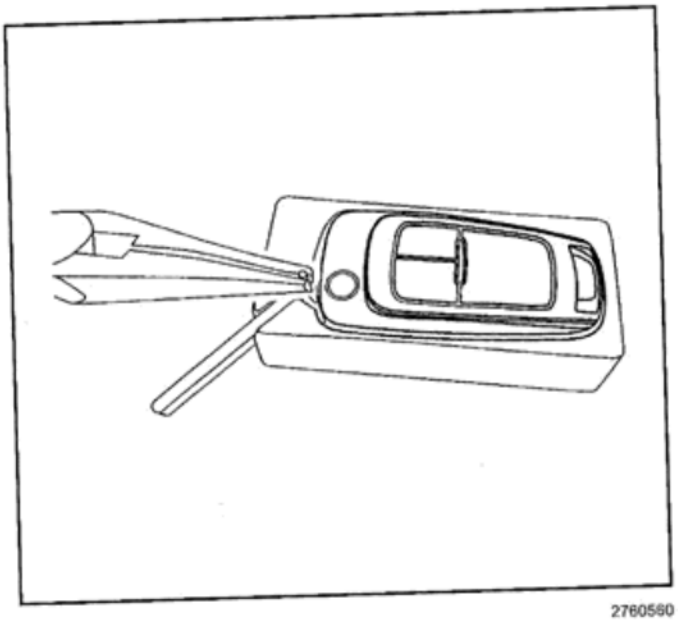
Note: It may be necessary to dress the pin drift on a grinder to maintain the diameter in order to drive the pin through the housing.

2. Using the *BO-51098* fixture, drive the retention pin from the transmitter assembly as shown.



2760557

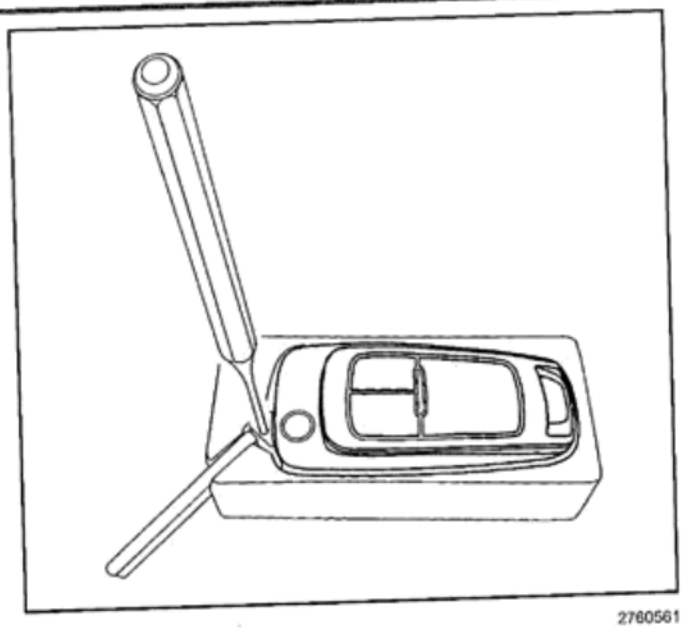
3. Remove the key blade from the transmitter assembly.
4. Install the coded blank into the transmitter assembly, insure the indentation on the key blade faces the retention pin.



2760560

Note: Use caution not to damage the surface, chrome plating, in the following steps.

5. Using needle nose pliers, insert the pin half way into the transmitter assembly.



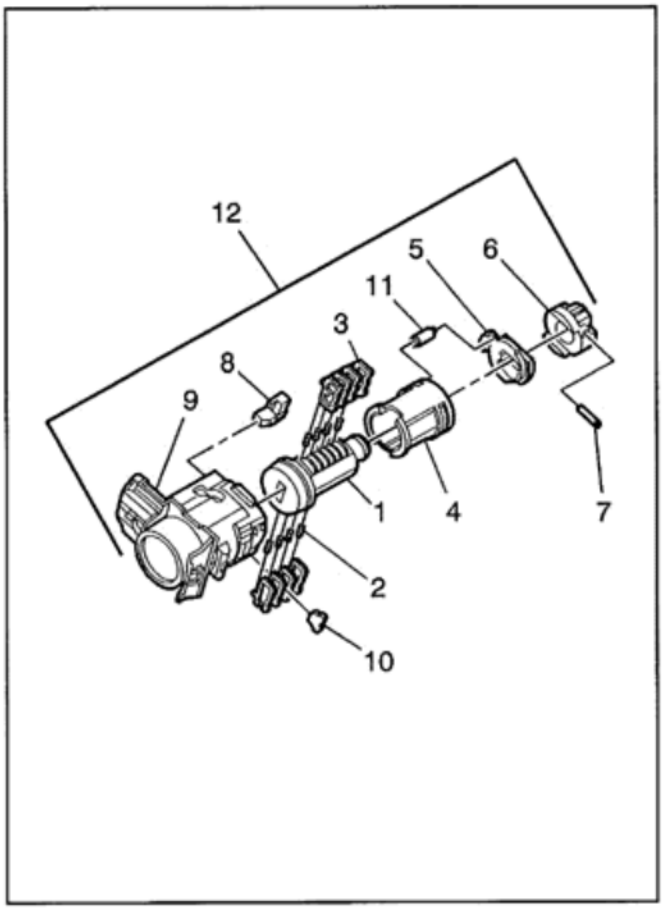
2760561

6. Using the *BO-51098* fixture, drive the roll pin flush to the surface.

Front Side Door Lock Cylinder Coding (Free Wheeling)

Special Tools

BO-49753 Assembly Tool

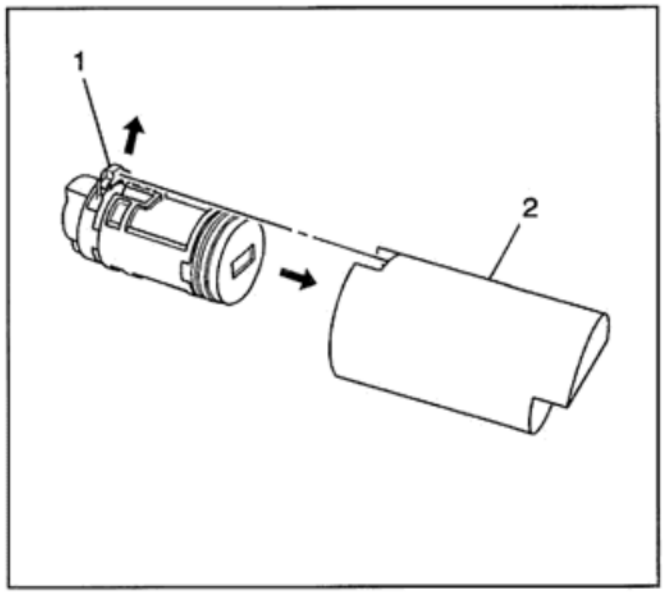


2196837

The door lock cylinder uses 8 of the 8 cut positions. The tumbler positions are staggered from side to side, 4 on one side and 4 on the other, are not self-retaining, and are not snap in.

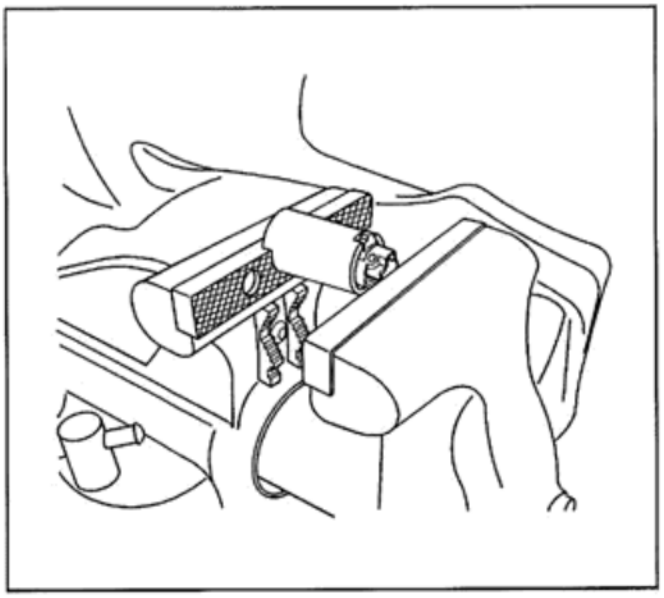
Note: All lock cylinders for side milled keys have right and left tumblers. The location of the tooth of the tumbler determines whether it is right of left. Illustrations in this procedure show the right tumblers on the top and the left tumblers on the bottom. All tumblers are marked 1R, 1L, 2R, or 2L. The number being cut depth and the letter meaning right or left.

1. Hold the door lock cylinder (1) so the side with the 4 tumbler spring pockets faces up, pocket nearest to the cylinder head.
2. Insert the tumbler springs (2) into the 4 spring pockets. This side uses left tumblers.
3. Install the tumbler (3) for key cut position one in the slot nearest to the front of the lock cylinder. Install the remaining tumblers, key cut positions 3, 5, and 7, following the key code and same process. Press the tumblers in place until they are secure.
4. Check the correct loading of the tumblers by inserting the key into the cylinder. All tumblers should be flush with the lock cylinder body.
5. Turn the cylinder so the side with the 4 tumbler spring wells faces up. This side uses right tumblers.
6. Insert the tumbler springs into the 4 spring pockets.
7. The first tumbler closest to the front of the lock cylinder to be loaded will be the second key cut position, the second number in the key code. Install the remaining tumblers for the key cut positions 4, 6, and 8. Press the tumblers in place until they are secure.
8. Check the correct loading of the tumblers by inserting the key into the cylinder. All tumblers should be flush with the lock cylinder body.
9. Insert the key and lightly lubricate the cylinder body diameter and tumbler surfaces and a small amount in the head of the cylinder using the supplied grease.
10. Insert the sleeve (4) onto the cylinder assembly.
11. Insert the clutch (5) and driver (6) onto the cylinder (1).



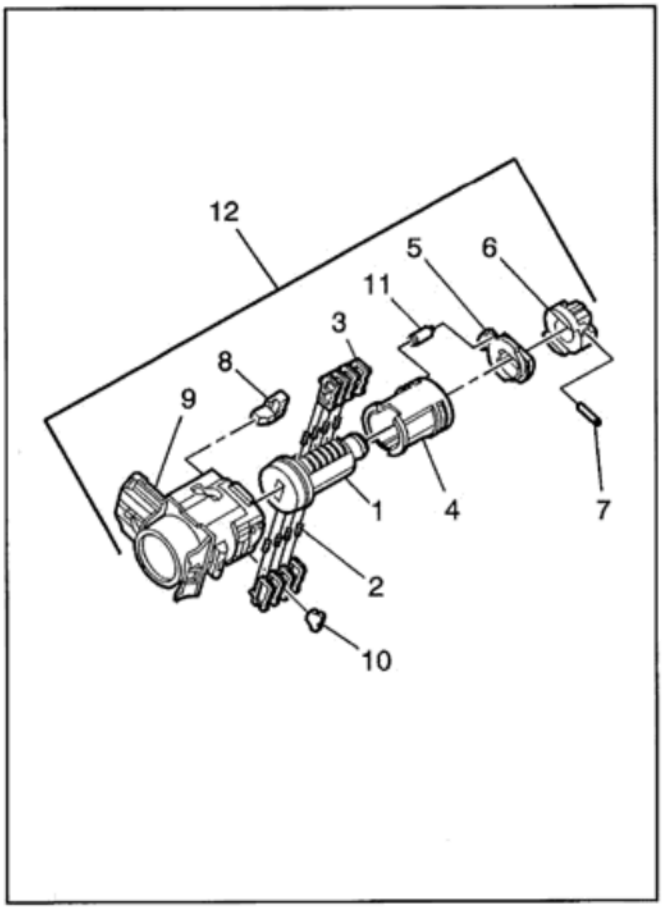
2197418

12. Load the cylinder into the *BO-49753* assembly tool so that the clutch (1) indexes with the notch in the opening of the tool (2).



2197416

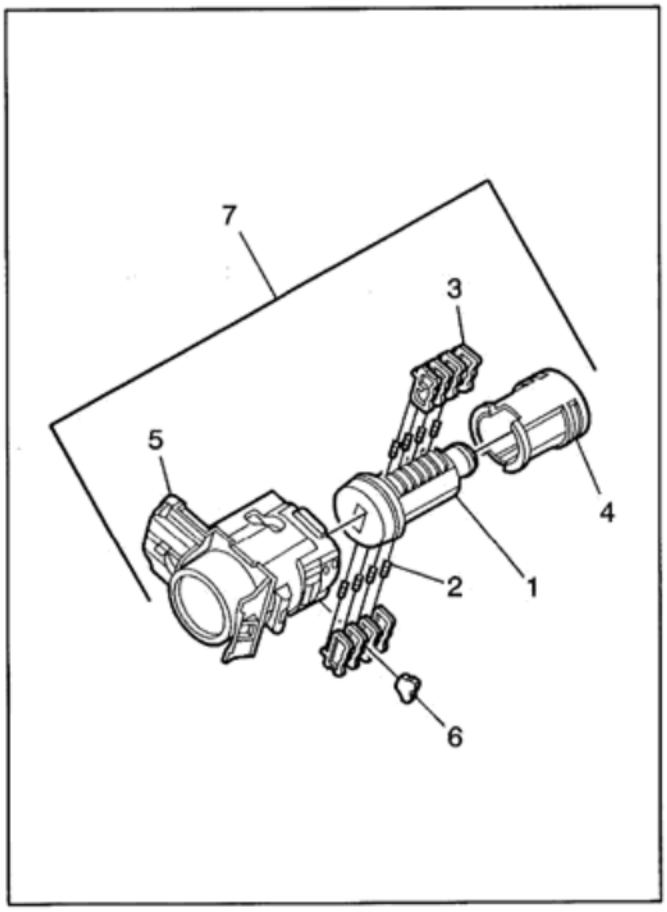
13. Load the assembly tool with the lock cylinder into a vice and tighten the vice ONLY enough to hold the tool and lock the cylinder in place.



2196837

14. Insert the roll pin (7) into the driver (6) and install it using a 1/16 inch pin punch.
15. Insert the buffer (8) in the case (9), verify the buffer is properly seated.
16. Install the free wheel pin (11) in the sleeve (4) and clutch (5) and insert the assembly into the case (9).
17. With the lock cylinder assembly installed in the case (9), install the retainer (10) and stake the retainer in place using a small punch and hammer to peen the case material onto the exposed ends of the installed retainer (10).
18. Insert the key into the lock and function the lock to check for proper assembly and smooth operation.

Front Side Door Lock Cylinder Coding (Non Free Wheeling)



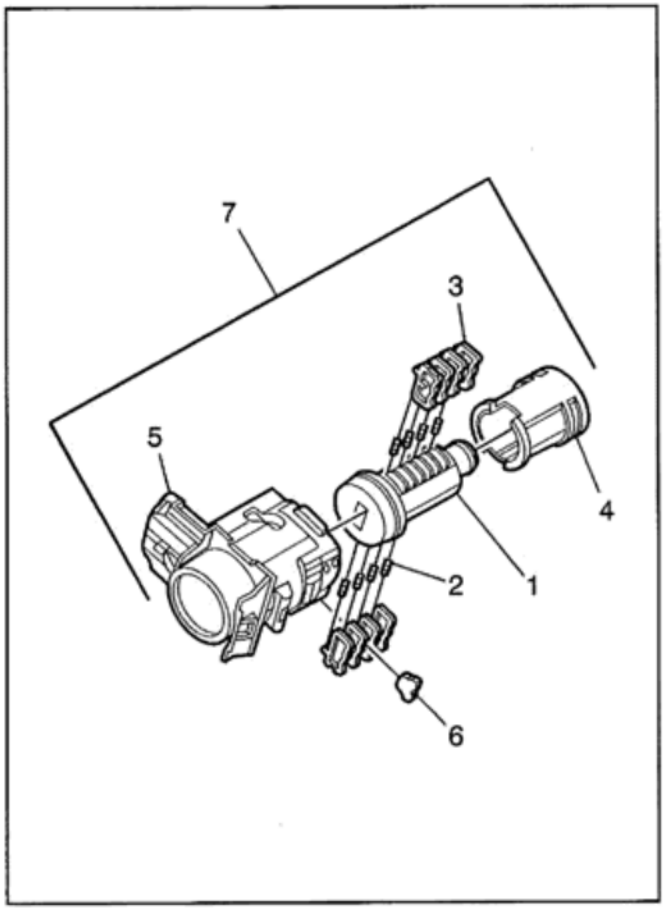
2225941

The door lock cylinder uses 8 of the 8 cut positions. The tumbler positions are staggered from side to side, 4 on one side and 4 on the other, are not self-retaining, and are not snap in.

Note: All lock cylinders for side milled keys have right and left tumblers. The location of the tooth of the tumbler determines whether it is right of left. Illustrations in this procedure show the right tumblers on the top and the left tumblers on the bottom. All tumblers are marked 1R, 1L, 2R, or 2L. The number being cut depth and the letter meaning right or left.

1. Hold the door lock cylinder (1) so the side with the 4 tumbler spring pockets faces up, pocket nearest to the cylinder head.
2. Insert the tumbler springs (2) into the 4 spring pockets. This side uses left tumblers.

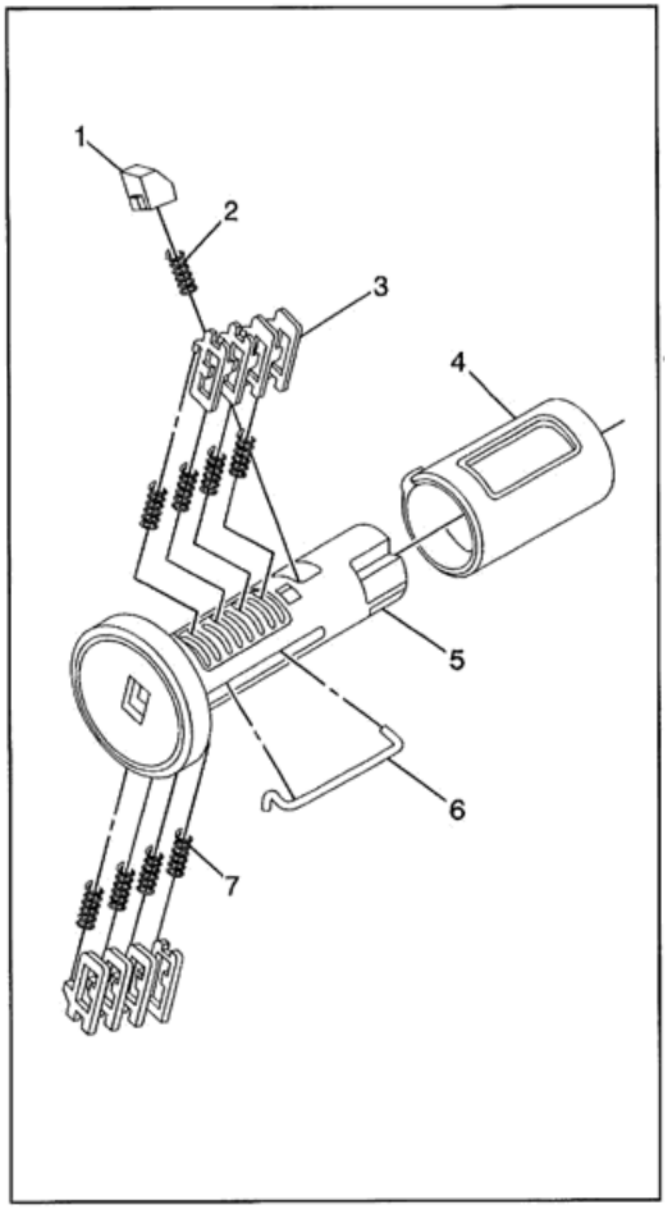
3. Install the tumbler (3) for key cut position one in the slot nearest to the front of the lock cylinder. Install the remaining tumblers, key cut positions 3, 5, and 7, following the key code and same process. Press the tumblers in place until they are secure.
4. Check the correct loading of the tumblers by inserting the key into the cylinder. All tumblers should be flush with the lock cylinder body.
5. Turn the cylinder so the side with the 4 tumbler spring wells faces up. This side uses right tumblers.
6. Insert the tumbler springs into the 4 spring pockets.
7. The first tumbler closest to the front of the lock cylinder to be loaded will be the second key cut position, the second number in the key code. Install the remaining tumblers for the key cut positions 4, 6, and 8. Press the tumblers in place until they are secure.
8. Check the correct loading of the tumblers by inserting the key into the cylinder. All tumblers should be flush with the lock cylinder body.
9. Insert the key and lightly lubricate the cylinder body diameter and tumbler surfaces and a small amount in the head of the cylinder using the supplied grease.
10. Insert the sleeve (4) onto the cylinder assembly.



2225941

11. Insert the assembly into the case (5).
12. With the lock cylinder assembly installed in the case (5), install the retainer (6) and stake the retainer in place using a small punch and hammer to peen the case material onto the exposed ends of the installed retainer (6).
13. Insert the key into the lock and function the lock to check for proper assembly and smooth operation.

Lock Cylinder Coding - Ignition



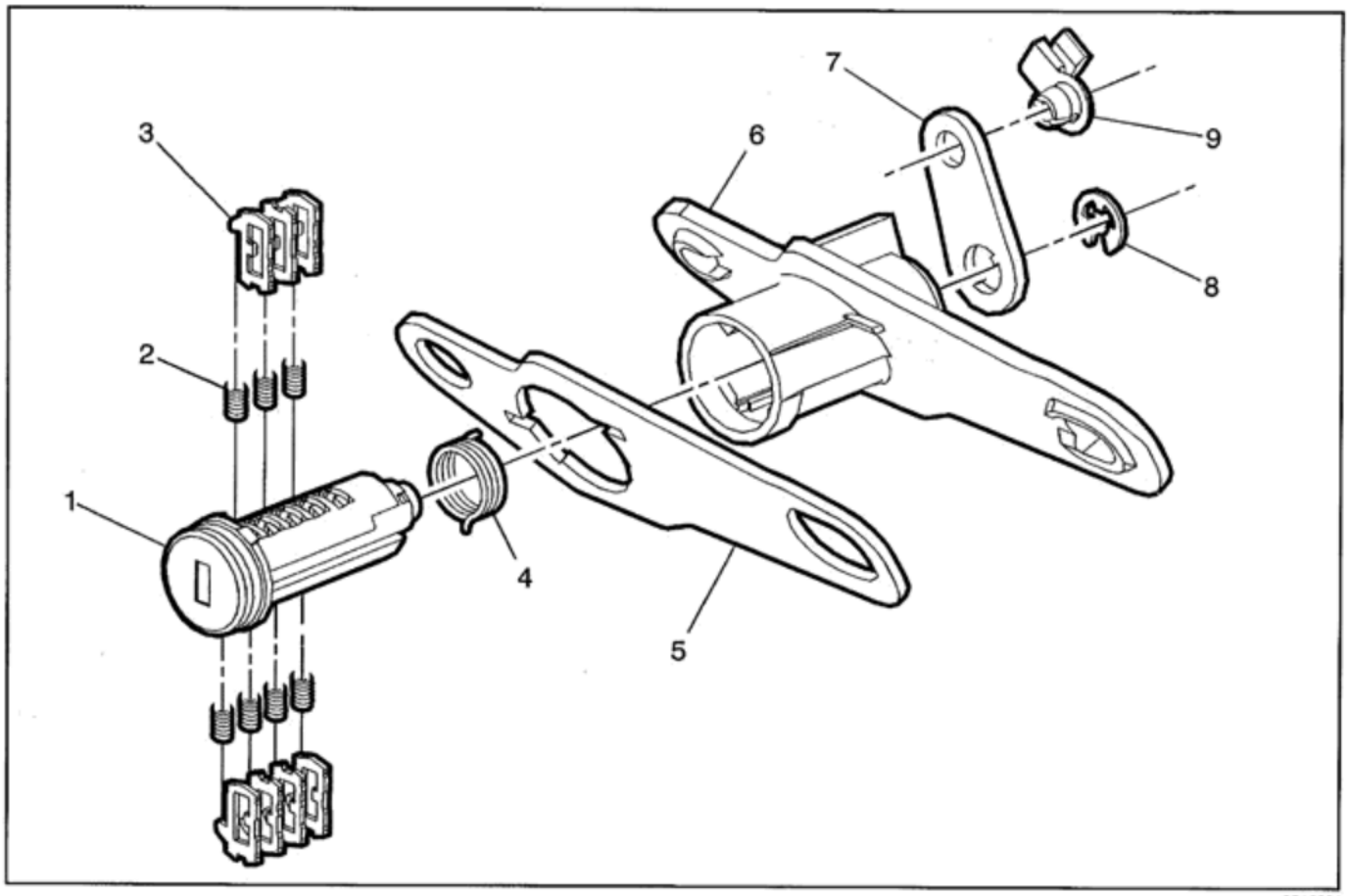
2197408

The ignition lock cylinder uses 8 key cut positions, 1–8. The ignition cylinder tumblers (3) are located on alternate sides of the cylinder (5). They are not snap-in and are not self-retaining. It follows the key code with the first tumbler being the first depth of the key code, closest to the head of the key.

Note: All lock cylinders for side milled keys have right and left tumblers. The location of the tooth of the tumbler determines whether it is right of left. Illustrations in this procedure show the right tumblers on the top and the left tumblers on the bottom. All tumblers are marked 1R, 1L, 2R, or 2L. The number being cut depth and the letter meaning right or left.

1. Hold the ignition cylinder assembly (5) so the side with the tumbler spring pocket located closest to the head of the cylinder is facing up.
2. Insert the tumbler spring (7) into each of the 4 spring pockets of the cylinder assembly. This side of the cylinder used left tumblers.
3. The first tumbler (3) to be loaded will be the first key cut position, which is the first number in the key code. Install the tumbler in the slot over the spring. Install the remaining right tumblers following the key code and same process, pressing the tumblers in place until they are secure.
4. Rotate the cylinder assembly. Insert the tumbler spring into each of the spring pockets of the cylinder assembly. This side of the cylinder used right tumblers.
5. The first tumbler (3) to be loaded will be the second key cut position, the second number in the key code. Install the first tumbler in the slot over the spring. Install the remaining left tumblers following the key code and same process, pressing the tumblers in place until they are secure.
6. Inspect for correct loading of the tumblers by inserting the key into the cylinder. All tumblers should drop flush with the lock cylinder body diameter.
7. With the key in the cylinder assembly insert the round connector (6), insert the retainer spring (2) in the retainer slot located in the cylinder assembly. Insert the retainer (1) lining it up in the slot over the spring. Depress the retainer and hold.
8. Insert the cylinder into the sleeve (4) as shown in the print. Make sure the actuator stays located properly in the cylinder.
9. When the key is removed, the lock should stay together.
10. Lightly lubricate the outside surface in the tumbler area of in the lock body and down the key slot using the provided grease. Insert and extract the key 5 times to lubricate the keyway.
11. Insert the key and function the lock 3 times to distribute the grease inside the sleeve.
12. Verify the key position for inserting the lock into the column.

Rear Compartment Lid Lock Cylinder Coding



2510231

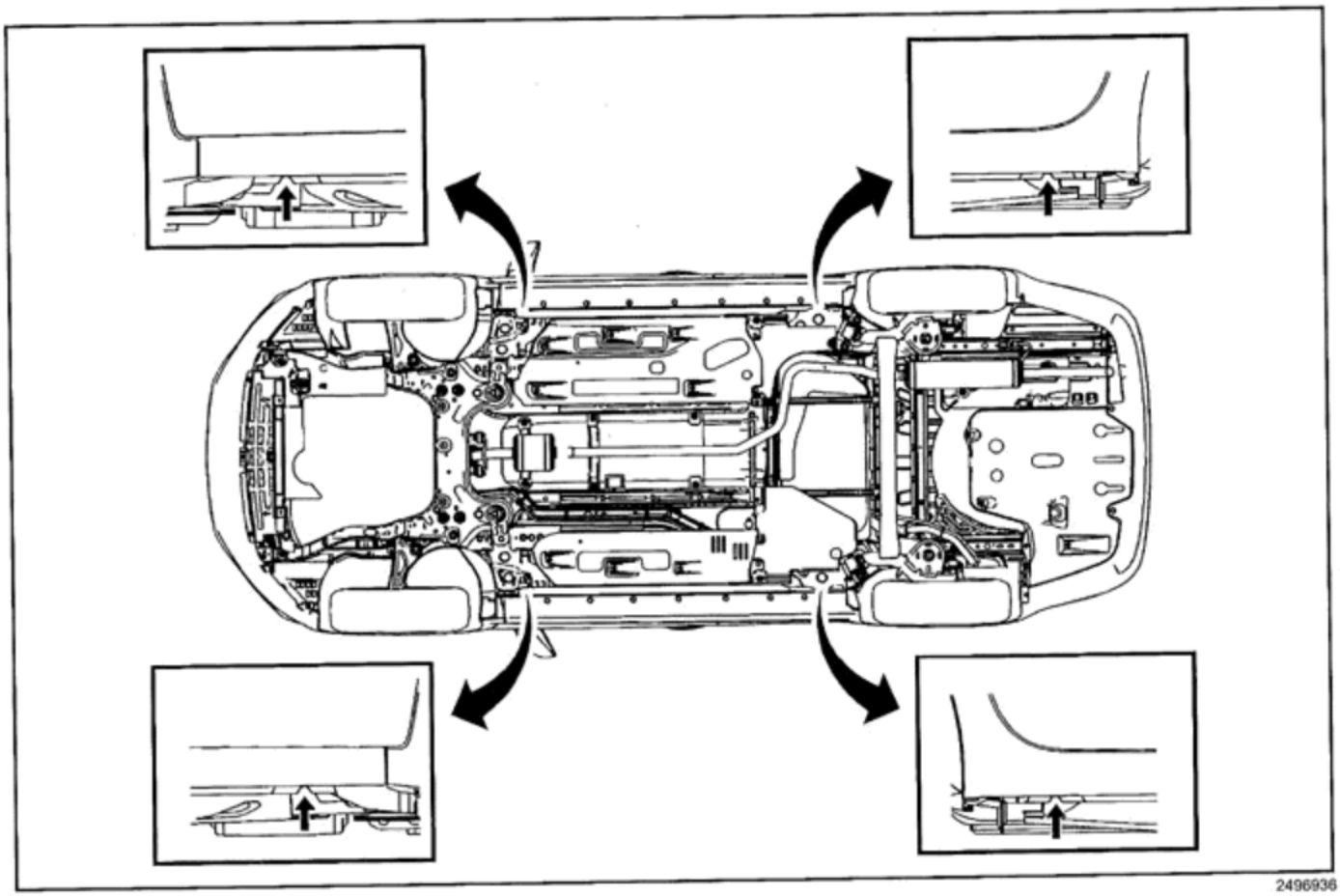
The rear compartment lid lock cylinder uses 7 of the 7 cut positions. The tumbler positions are staggered from side to side, 4 on one side and 3 on the other, are not self-retaining, and are not snap in.

Note: All lock cylinders for side milled keys have right and left tumblers. The location of the tooth of the tumbler determines whether it is right or left. Illustrations in this procedure show the right tumblers on the top and the left tumblers on the bottom. All tumblers are marked 1R, 1L, 2R, or 2L. The number being cut depth and the letter meaning right or left.

1. Tumbler spring (2) and tumbler (3) are to be assembled into the cylinder (1). In this case start with the tumbler nearest the cylinder head and work through until the last tumbler at the base. Use the key as a tool by pushing it in step by step to hold the already assembled tumblers in place.
2. Check the correct loading of the tumblers by inserting the key into the cylinder. All tumblers should be flush with the lock cylinder body.
3. Assemble the restoring spring (4) onto the rear of the cylinder.
4. Tape the pad (5) onto the housing (6).
5. Grease the housing.
6. Insert the lock cylinder (1) into the housing (6). Remove the key from the cylinder.
7. Install the lever (7) onto the end of the cylinder (1).
8. Attach the E-ring (8) to the cylinder, then crimp it to retain the lever assembly.
9. Snap the rod retainer (9) into the hole in the lever (7).
10. Insert the key into the lock and function the lock to check for proper assembly and smooth operation.

Lifting and Jacking the Vehicle

Note: The use of a LOW PROFILE LIFT ARMS SYSTEM may be required to avoid unwanted contact with the vehicle body and structure depending on lifting equipment used. Refer to the manufacturer recommendation for their applications of low profile lift arms system for their lifting equipment.



2496936

Danger: 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.

Danger: 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 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 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 contents.

Vehicle Lifting– Frame Contact Lift

Front Lift Pads

When lifting the vehicle with a frame-contact lift, place the front lift pads on the rocker outer panel weld flange, as shown.

Rear Lift Pads

When lifting the vehicle with a frame-contact lift, place the rear lift pads on the rocker outer panel weld flange, as shown.

Vehicle Jacking

Caution: When you are jacking the vehicle at the front locations, be certain that the jack or the jack lift pad does not contact the front fascia, front fascia air dam, or the front fenders. If such contact occurs, vehicle damage may result. When jacking at selected front locations additional clearance may be required for the jacking points.

Note: When you are lifting a vehicle with a service jack, block the wheels at the opposite end from which you are lifting. Use jack stands to provide additional support.

When using a service jack under the front of the vehicle use one of the following locations:

Front of Vehicle

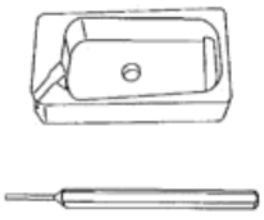
Place the service jack pad in the same location as shown for the front lift pads.

Rear of Vehicle

Note: Place jackstands ONLY under strong and stable vehicle structures.

Place the service jack pad in the same location as shown for the rear lift pads.

Special Tools and Equipment

Illustration	Tool Number/ Description
 2902359	BO-51098 Flip Key Blade Fixture

Special Tools Ordering Information

The special service tools shown in this service manual that have product numbers beginning with J, BO, GE, CH, DT, EN, EL, SA, OR KM are available for worldwide distribution from:

SPX Service Solutions
Kent-Moore Tools
28635 Mound Road
Warren, MI, U.S.A, 48092-3499

Phone: 1-800-GM-TOOLS (US & Canada)
Monday through Friday
8:00 am–7:00 pm Eastern Standard Time
Fax: 1-800-578-7375 or 586-578-7321
www.gmspecialservicetools.spx.com (Us & Canada only)

The TECH 2, MDI diagnostic tools & accessories, dealer equipment

Dealer Equipment and Services
5775 Enterprise Dr.
Warren, MI, U.S.A, 48092-3463

Phone: 1-800-GM-TOOLS (US & Canada)
Monday through Friday
8:00 am–6:00 pm EST
Fax: 1-586-578-7205
www.GMDEsolutions.net (US only) or
www.des-canada.ca (Canada only)