Chevrolet

Suburban

2002

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Product Information

2002 Chevrolet Suburban: America's Favorite Workhorse

Chevrolet Suburban, the oldest vehicle nameplate in the industry, adds conveniences to its popular LS trim, makes its standard 5.3-liter V8 engine ethanol-compliant and offers other refinements in 2002.

New for 2002

Suburban's standard LS trim now includes heated, outside rearview mirrors with self-dimming driver-side; comfortable six-way power driver and passenger seats; side-step assist steps; electric rear-window defogger; fog lamps; and HomeLink Universal transmitter. (HomeLink enables programming of three separate electronic home functions, such as garage doors, gates and exterior house lights.)

"Suburban continues to be America's premiere full-size SUV, and the top customer choice among vehicles of its size," said brand manager Steve Ramsey. "We continue to refine it to maintain a customer loyalty rate that has exceeded 50 percent."

Other model year changes include the availability of the Redfire Metallic exterior color with body-color components, including the front bumper, bodyside moldings and wheel flares. Electronic climate control with a sunroof is also available on LT models in 2002. Suburban 2WD and 4WD, half-ton and three-quarter-ton models come in two trim levels for 2002: LS and LT. The base trim has been discontinued.

Powertrains

Suburban's impressive powertrain lineup continues with the Vortec 5300 V8 as the standard engine on half-ton models. Ninety percent of Suburbans sold are 1500 series (half-ton models). The Vortec 6000 V8, however, is standard on the Suburban 2500 series (three-quarter-ton models), and the Vortec 8100 V8 is Optional.

Workhorse With Smooth Ride

Suburban's legendary workhorse reputation continues with enough space to fit a 4 x 8-foot sheet of plywood on the load floor with the doors closed (and rear seats removed). Pulling power can be as much as 12,000 pounds when Suburban is properly equipped. Yet Suburban maintains a smooth ride with the independent front torsion bar suspension that is more commonly found on high-end sport sedans.

Added Traction

Suburban also offers its Autoride system, which automatically controls shock damping on a continuous, real-time basis to smooth bumps in the road. The Autotrac four-wheel-drive system offers four drive modes plus neutral to suit nearly any driving conditions. Suburban's Electronic Traction Assist system for two-wheel-drive models delivers more controlled acceleration and stability over most slippery surfaces.

Z71 Off-Road Package

Suburban off-roaders have another choice: the Z71 model. Its specially tuned off-road suspension uses specific shock absorbers and jounce jumpers with standard stabilizer bars. A locking rear differential, four-wheel drive and P265/70R-17 all-terrain tires increase traction. Skid plates protect vital underbody components, and OnStar provides added security. Completing the package are Z71 badging, a rocker treatment, a roof rack, specific wheels, fog lamps, body-color grille and bumpers and tubular assist steps.

With those impressive choices plus refinements for 2002, the Suburban legend continues – and grows.

New For 2002

- Additions to standard LS trim
  - Heated, outside rearview mirrors with self-dimming driver side
  - Six-way power driver and passenger seats
  - Side-step assist steps
  - Electric rear-window defogger
  - Fog lamps
  - HomeLink Universal transmitter
- Vortec 5300 V8 capability for regular and ethanol-content fuel
- Electronic climate control available with sunroof
- Redfire Metallic exterior color available on LT model with body-color components
- Discontinuation of base trim

Model Lineup

	Engines			Transmissions		
	Vortec 5300 SFI V8	**Vortec 6000 SFI V8**	**Vortec 8100 SFI V8**	**4L60-E 4-spd auto**	**4L80-E 4-spd auto**	**4L85-E 4-spd auto**
LS / LT 1/2-ton	S	–	–	S	–	–
LS / LT 3/4-ton	–	S	O	S	O	O

Standard: S
Optional: O
Not available: –

Specifications

Overview

Model:	Chevrolet Suburban LS / LT 1/2-ton, LS / LT 3/4-ton
Body style / driveline:	full-size, four-door sport-utility vehicle, body-on-frame construction, front-engine, two- or four-wheel drive, 1/2- and 3/4-ton models
EPA vehicle class:	full-size sport-utility vehicle
Manufacturing location:	Janesville, Wisconsin, and Silao, Mexico
Key competitors:	Ford Excursion

Engine

	Vortec 5300 V8 (L59)	**Vortec 6000 V8 (LQ4)**	**Vortec 8100 V8 (L18)**
Type:	5.3-liter, V8 w/cast iron block	6.0-liter, V8 w/cast iron block	8.1-liter, V8 w/cast iron block
Displacement (cu in / cc):	327 / 5328	364 / 5967	496 / 8128
Bore & stroke (in / mm):	3.78 x 3.62 / 96 x 92	4.00 x 3.62 / 101.6 x 92	4.25 x 4.37 / 107.95 x 111
Cylinder head material:	cast aluminum	cast aluminum	cast iron
Valvetrain:	OHV	OHV	OHV
Ignition system:	composite distributor, platinum-tipped spark plugs, low-resistance spark plug wires	composite distributor, platinum-tipped spark plugs, low-resistance spark plug wires	coil near-plug ignition platinum- tipped spark plugs
Fuel delivery:	sequential fuel injection	sequential fuel injection	sequential fuel injection
Compression ratio:	9.5:1	9.4:1	9.1:1
Horsepower (hp / kw @ rpm):	285 / 213 @ 5200	320 / 239 @ 5000	340 / 254 @ 4200
Torque (lb-ft / Nm @ rpm):	325 / 441 @ 4000	360 / 488 @ 4000	455 / 617 @ 3200
Recommended fuel:	87 octane	87 octane	87 octane
Maximum engine speed (rpm):	6000	5600	5000
Emissions controls:	three-way catalytic converter, exhaust gas recirculation, positive crankcase ventilation, evaporative collection system	three-way catalytic converter, exhaust gas recirculation, positive crankcase ventilation, evaporative collection system	exhaust gas recirculation, air injection reaction (available)

Transmission

	4L60-E	**4L80-E**	**4L85-E**
Type:	four-speed electronic automatic	four-speed electronic automatic	four-speed electronic automatic
Gear ratios (:1):			
First:	3.06	2.48	2.48
Second:	1.63	1.48	1.48
Third:	1.00	1.00	1.00
Fourth:	0.70	0.75	0.75
Reverse:	2.29	2.08	2.08
Final drive ratio:	N/A	N/A	N/A

Chassis/Suspension

Front:	independent with torsion bars
Rear:	1/2-ton: 5-link coil spring;
	3/4-ton: two stage, semi-elliptic, multileaf springs and semifloating rear axle
Traction control system:	full-function standard; Precision Control System
Steering type:	
1/2-ton:	2WD: power electronic; 4WD: power, variable-assist, speed-sensitive
3/4-ton:	power electronic
Ratio:	1/2-ton: 12.7:1; 3/4-ton: 15 / 13:1 variable ratio
Steering wheel turns, lock-to-lock:	1/2-ton: 3.0; 3/4-ton: 3.25
Turning circle, curb-to-curb (ft/m):	1/2-ton: 42.3 / 12.9; 3/4-ton: 44.3 / 13.5

Brakes

Type:	four-wheel disc, four-wheel ABS, dual piston calipers w/ Dynamic Brake Proportioning
Rotor diameter x thickness (in / mm):	
Front:	1/2-ton: 12.01 x 1.14 / 305 x 29; 3/4-ton: 12.80 x 1.50 / 325 x 38
Rear:	1/2-ton: 13.0 x 1.18 / 320 x 20; 3/4-ton: 13.0 x 1.14 / 330 x 29

Wheels/Tires

Wheels:	1/2-ton: 16-inch x 7-inch cast aluminum
	3/4-ton: 16-inch x 7-inch steel forged aluminum
Tires:	1/2-ton: P265/70R16 all-season, steel-belted radials
	3/4-ton: LT245/75R16 all season, steel-belted radials

Dimensions

Exterior

Description	Specification
Wheelbase (in / mm):	130 / 3302
Overall length (in / mm):	219.3 / 5570
Overall width (in / mm):	1/2-ton: 78.9 / 2004; 3/4-ton: 79.8 / 2027
Overall height (in / mm):	
1/2-ton:	2WD: 75.8 / 1925; 4WD: 75.7 / 1923
3/4-ton:	2WD: 76.8 / 1951; 4WD: 77.1 / 1958
Min. ground clearance (in / mm):	1/2-ton: 8.4 / 213.4; 3/4-ton: 7.1 / 1803
Ground to top of load floor (in / mm):	
1/2 ton:	2WD: 29.3 / 74422; 4WD: 32.4 / 822.96
3/4 ton:	2WD: 30.6 / 777.24; 4WD: 31.8 / 807.72
Base curb weight (lbs / kg):	
1/2-ton:	2WD: 4947 / 2244; 4WD: 5219 / 2367
3/4-ton:	2WD: 5520 / 2504; 4WD: 5796 / 2629
Weight distribution (front / rear):	
1/2 ton:	2WD: 52 / 48; 4WD: 54 / 46
3/4 ton:	2WD: 51 / 49; 4WD: 53 / 47

Interior

	First Row	Second Row	Third Row
Seating capacity, 9 total:	3	3	3
Head room (in / mm):	40.7 / 1033.8	39.4 / 1000.8	37.4 / 950
Leg room (in / mm):	41.3 / 1049	38.6 / 980.4	27.3 / 693.4
Shoulder room (in / mm):	65.2 / 1656.1	65.1 / 1653.6	64.4 / 1635.8
Hip room (in / mm):	64.4 / 1559.6	61.3 / 1557.2	49.2 / 1249.7
Cargo volume (cu ft / liters):	131.6 / 3726	90.0 / 2549	45.7 / 1294

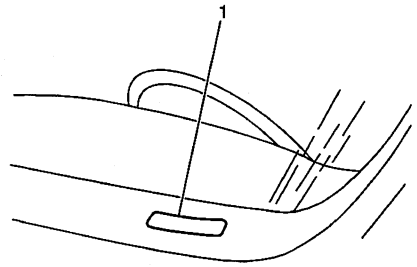
Capacities

	1/2 Ton	3/4 Ton
GVWR, standard:	2WD: 7000; 4WD: 7200	2WD: 8600; 4WD: 8600
Payload, maximum*:	2WD: 2086; 4WD: 2077	2WD: 3153; 4WD: 2840
Trailer towing maximum (lbs/kg):	2WD: 8800 / 3992 4WD: 8600 / 3901	12000 / 5443
Fuel tank (gal / liters):	31.0 / 117	37.5 / 142
Engine oil less filter (qts / liters):	5.5 / 5.20	5.5 / 5.20
Cooling system (qts / liters):	9.6 / 9.08	9.6 / 9.08

* Includes weight of driver, passengers, Optional equipment and cargo.

Vehicle Identification

Vehicle Identification Number (VIN)



The vehicle identification number (VIN) plate is the legal identifier of the vehicle. The VIN plate is located on the upper LH corner of the Instrument Panel and can be seen through the windshield from the outside of the vehicle:

Position	Definition	Character	Description
1	Country of Origin	1	United States
2	Manufacturer	G	General Motors
3	Make	C	Chevrolet Truck
4	GVWR/Brake System	E F	6001-7000/Hydraulic 7001-8000/Hydraulic
5	Truck Line/Chassis Type	C K	4x2 4x4
6	Series	7	¾ Ton Luxury
7	Body Type	3	Four-Door Utility
8	Engine Type	T U N	GM 5.3L V8 MFI (LM7 GM 6.0L V8 SFI (LQ4) GM 6.0L V8 SFI (LQ9)
9	Check Digit	--	Check Digit
10	Model Year	2	2002
11	Plant Location	J	Janesville
12-17	Plant Sequence Number	100,001	Plant Sequence Number

VIN Derivative

All engines and transmissions are stamped or laser etched with a partial vehicle identification number (VIN), which was derived from the complete VIN. A VIN derivative contains the following nine positions:

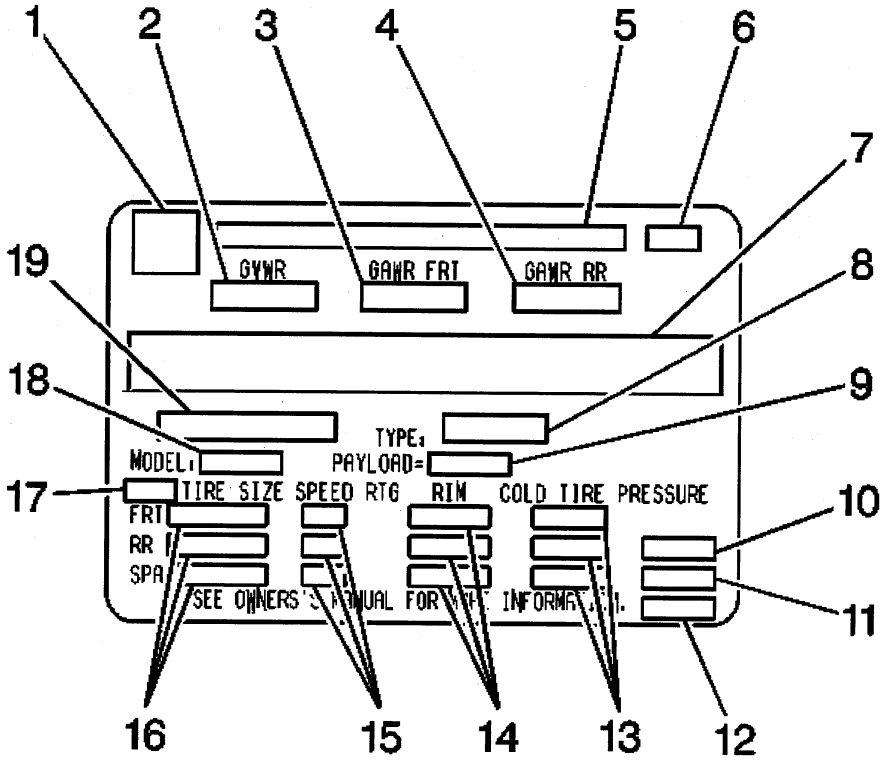
Position	Definition	Character	Description
1	Division	B C	Chevrolet Incomplete Chevrolet Truck
2	Model Year	2	2002
3	Plant Location	Z J	Fort Wayne, Indiana Janesville
4-9	Plant Sequence Number	--	--

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:

VIN Derivative Position	Equivalent VIN Position
1	2
2	10
3	11
4-5	12-17

Vehicle Certification Label (w/o RPO Z49)

Vehicle Certification Label -- Complete



(1) GM Logo
(2) Gross Vehicle Weight Rating
(3) Gross Axle Weight Rating - Front
(4) Gross Axle Weight Rating - Rear
(5) Name Of Manufacturer
(6) Final Manufacturer's Date
(7) Manufacturer's Statement
(8) Model Designation
(9) Payload
(10) DUAL - When Equipped
(11) Front Axle Reserve - When Equipped
(12) Total Capacity - When Required
(13) Tire Pressure
(14) Rim Size
(15) Speed Rating - When Required
(16) Tire Size
(17) GVW Rating Code
(18) Engineering Model
(19) Vehicle Identification Number

The vehicle certification label displays the following assessments:

- The Gross Vehicle Weight Rating (GVWR)
- The Gross Axle Weight Rating (GAWR) -- Front and Rear
- The vehicle's payload rating
- The original equipment tire sizes and the recommended tire pressures

Gross vehicle weight (GVW) is the weight of the vehicle and everything it carries. Include the following items when figuring the GVW:

- The base vehicle weight (factory weight)
- The weight of all vehicle accessories, like the winches or the plows
- The weight of the driver and the passengers
- The weight of the cargo

The gross vehicle weight must not exceed the Gross Vehicle Weight Rating.

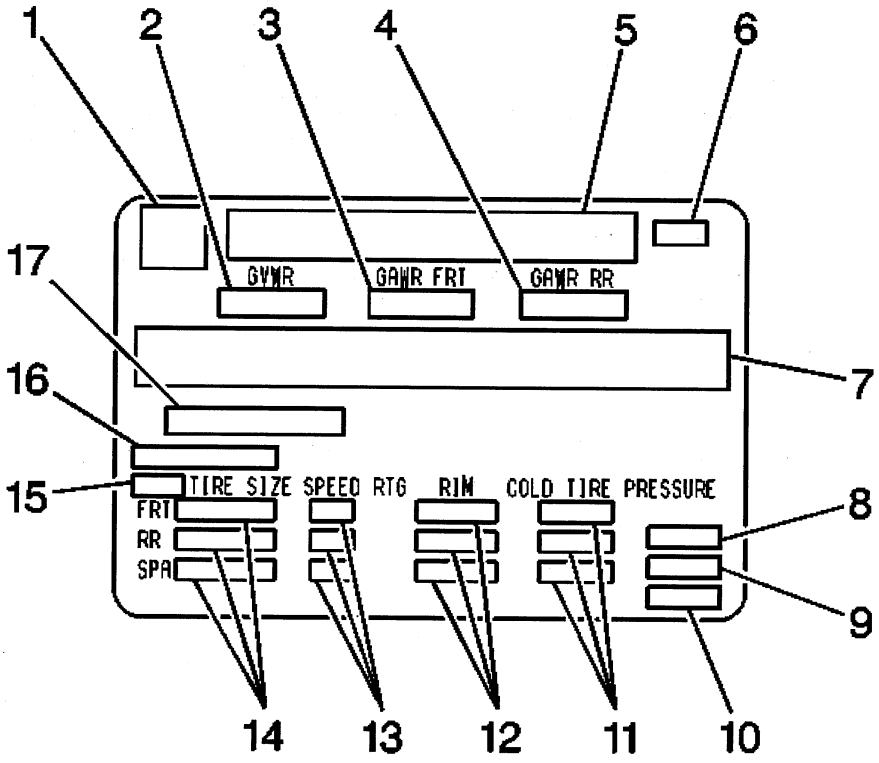
The front gross axle weight rating (GAWR FRT) is the weight exerted on the front axle. The rear gross axle weight rating (GAW RR) is the weight exerted on the rear axle. The front and rear gross axle weights must not exceed the front and rear gross axle weight ratings.

The payload rating defines the vehicle's maximum allowable cargo load. The cargo load includes the driver and the passengers. The payload rating is based on the vehicle's factory installed equipment. Deduct from the payload rating the weight of accessories added to the vehicle after the final date of manufacture .

The vehicle may have a Gross Combination Weight Rating (GCWR). The Gross Combination Weight Rating refers to the total maximum weight of the loaded tow vehicle (including driver and passengers) and a loaded trailer.

The vehicle's tires must be the proper size and properly inflated for the load the vehicle is carrying.

Vehicle Certification Label – Incomplete



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(5) Name of Manufacturer
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(7) Manufacturer's Statement
(8) DUAL - When Equipped
(9) Front Axle Reserve - When Required
(10) Total Capacity - When Required
(11) Tire Pressure - Spare Optional
(12) Rim Size - Spare Optional
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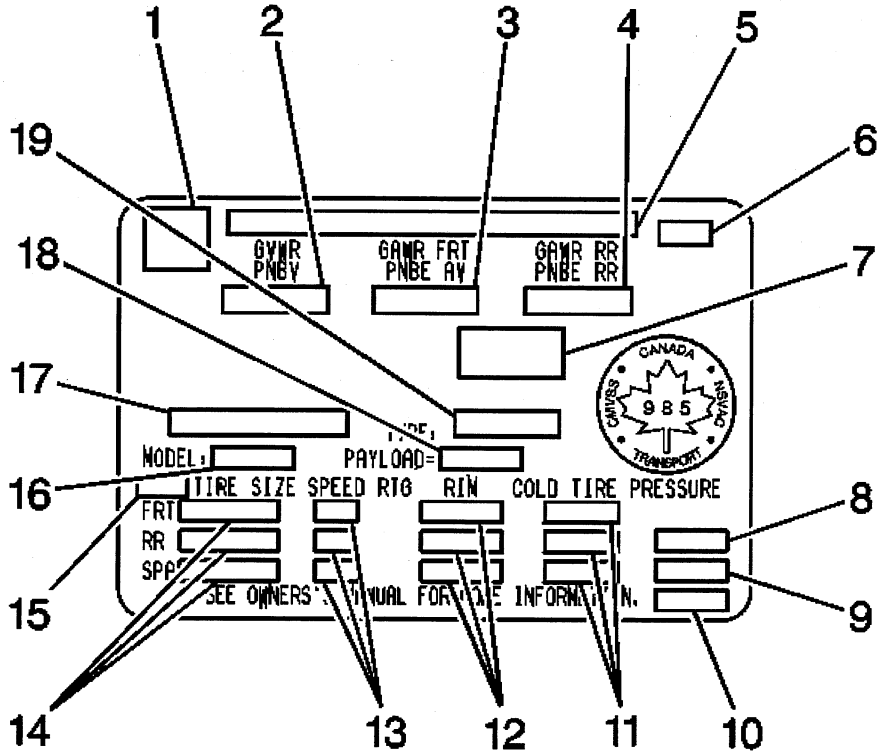
- The weight of the cargo

The gross vehicle weight must not exceed the Gross Vehicle Weight Rating.

The front gross axle weight rating (GAWR FRT) is the weight exerted on the front axle. The rear gross axle weight rating (GAW RR) is the weight exerted on the rear axle. The front and rear gross axle weights must not exceed the front and rear gross axle weight ratings.

Vehicle Certification Label (w/ RPO Z49)

Vehicle Certification Label – Complete



(1) Logo
(2) Gross Vehicle Weight Rating
(3) Gross Axle Weight Rating - Front
(4) Gross Axle Weight Rating - Rear
(5) Name of Manufacturer
(6) Final Manufacturer's Date
(7) RFI Statement - Canada Only
(8) DUAL - When Equipped
(9) Front Axle Reserve - When Equipped
(10) Total Capacity - When Required
(11) Tire Pressure
(12) Rim Size
(13) Speed Rating - When Required
(14) Tire Size
(15) GVW Rating Code
(16) Engineering Model
(17) Vehicle Identification Number
(18) Payload
(19) Model Designation

The vehicle certification label displays the following assessments:

- The Gross Vehicle Weight Rating (GVWR)
- The Gross Axle Weight Rating (GAWR) -- Front and Rear
- The vehicle's payload rating
- The original equipment tire sizes and the recommended tire pressures

Gross vehicle weight (GVW) is the weight of the vehicle and everything it carries. Include the following items when figuring the GVW:

- The base vehicle weight factory weight
- The weight of all vehicle accessories, like the winches or the plows
- The weight of the driver and the passengers
- The weight of the cargo

The gross vehicle weight must not exceed the Gross Vehicle Weight Rating.

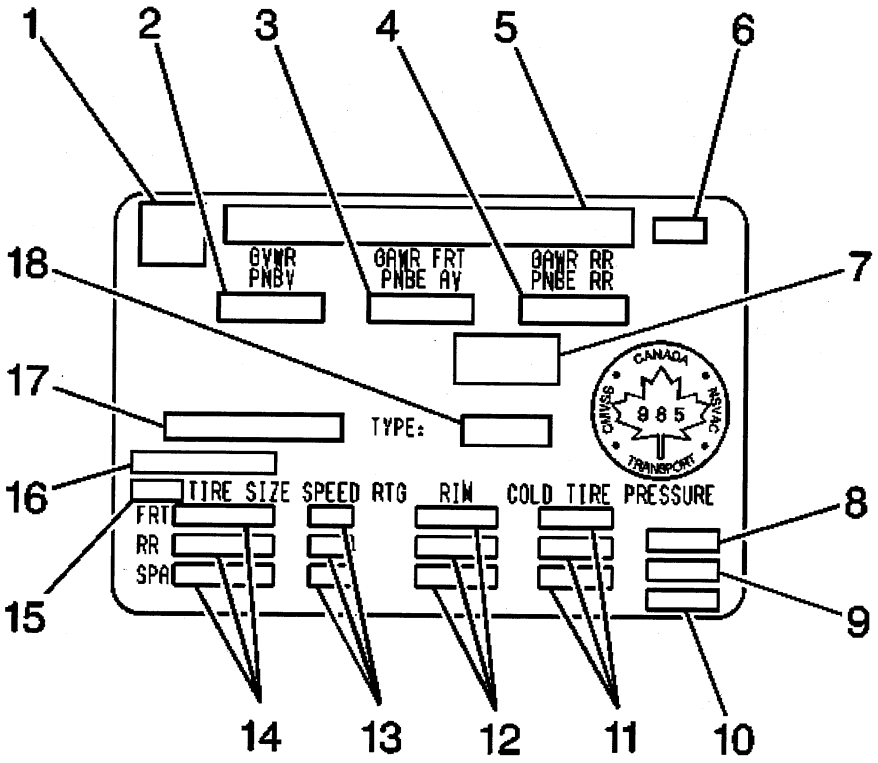
The front gross axle weight rating (GAWR FRT) is the weight exerted on the front axle. The rear gross axle weight rating (GAW RR) is the weight exerted on the rear axle. The front and rear gross axle weights must not exceed the front and rear gross axle weight ratings.

The payload rating defines the vehicle's maximum allowable cargo load. The cargo load includes the driver and the passengers. The payload rating is based on the vehicle's factory installed equipment. Deduct from the payload rating the weight of accessories added to the vehicle after the final date of manufacture .

The vehicle may have a Gross Combination Weight Rating (GCWR). The Gross Combination Weight Rating refers to the total maximum weight of the loaded tow vehicle including driver and passengers and a loaded trailer.

The vehicle tires must be the proper size and properly inflated for the load the vehicle is carrying.

Vehicle Certification Label – Incomplete



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(10) Total Capacity - When Required
(11) Tire Pressure - Spare Optional
(12) Rim Size - Spare Optional
(13) Speed Rating - When Required - Spare Optional
(14) Tire Size - Spare Optional
(15) GVW Rating Code
(16) Engineering Model
(17) Vehicle Identification Number
(18) Model Designation

The vehicle certification label displays the following assessments:

- The Gross Vehicle Weight Rating (GVWR)
- The Gross Axle Weight Rating (GAWR) -- Front and Rear
- The vehicle's payload rating
- The original equipment tire sizes and the recommended tire pressures

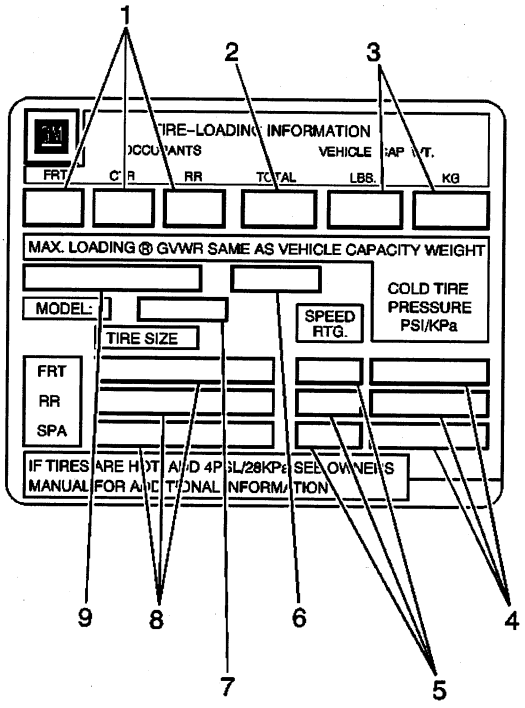
Gross vehicle weight (GVW) is the weight of the vehicle and everything it carries. Include the following items when figuring the GVW:

- The base vehicle weight factory weight
- The weight of all vehicle accessories, like the winches or the plows
- The weight of the driver and the passengers
- The weight of the cargo

The gross vehicle weight must not exceed the Gross Vehicle Weight Rating.

The front gross axle weight rating (GAWR FRT) is the weight exerted on the front axle. The rear gross axle weight rating (GAW RR) is the weight exerted on the rear axle. The front and rear gross axle weights must not exceed the front and rear gross axle weight ratings.

Tire Placard

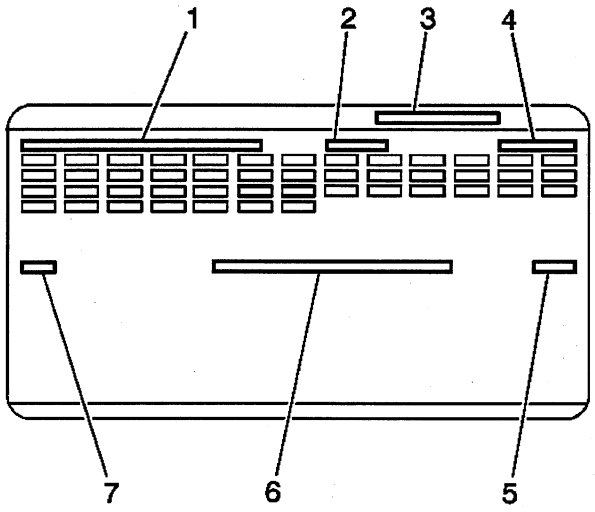


(1) Specified Occupant Seating Positions
(2) Total Occupant Seating
(3) Maximum Vehicle Capacity Weight
(4) Tire Pressures, Front, Rear, and Spare
(5) Tire Speed Rating, Front, Rear, and Spare
(6) Tire Label Code
(7) Engineering Model Minus First Character
(8) Tire Sizes, Front, Rear, and Spare
(9) Vehicle Identification Number

The Tire Placard is permanently located on the edge of the driver's door. Refer to the placard to obtain:

- The maximum vehicle capacity weight
- The cold tire inflation pressures
- The tire sizes (original equipment tires)
- The tire speed ratings (original equipment tires)

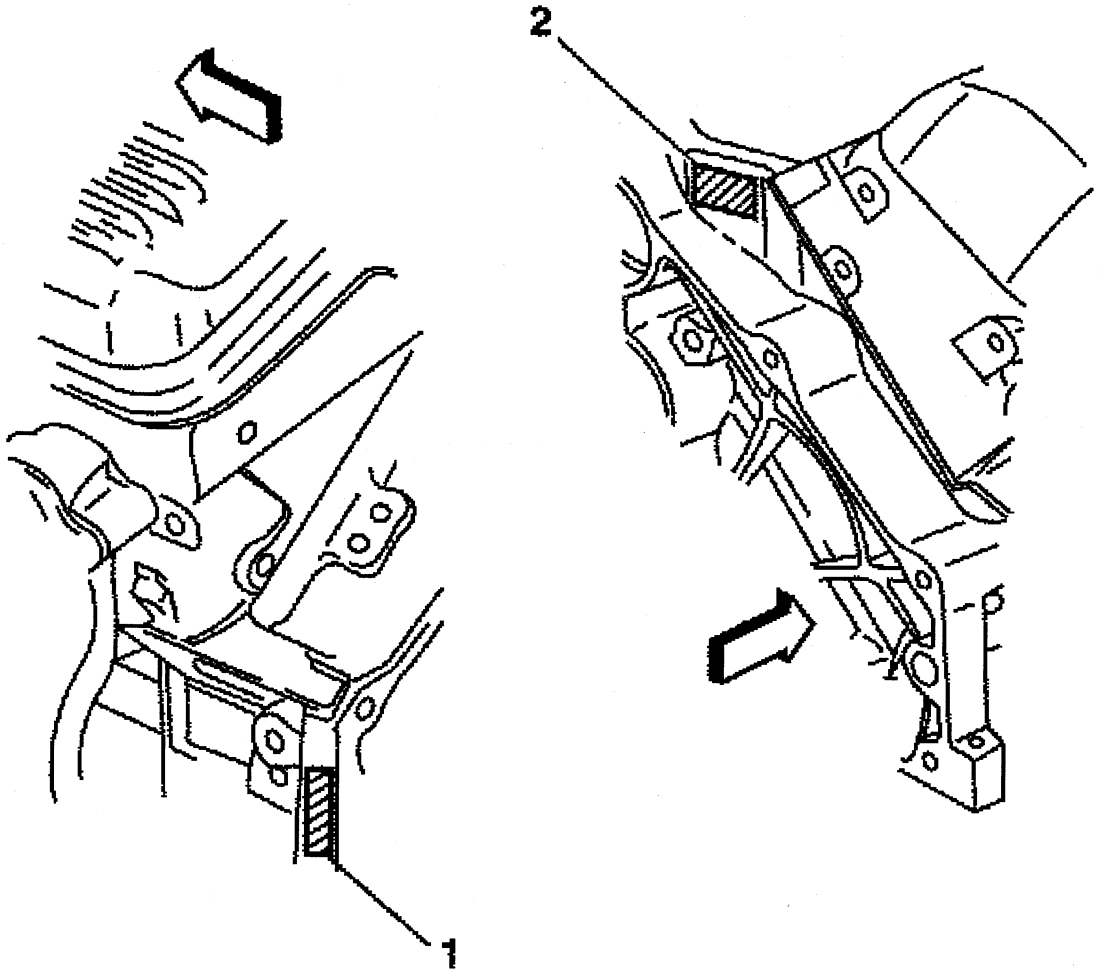
Service Parts Identification Label (SPID)



(1) Vehicle Identification Number
(2) Wheel Base
(3) Part Number Location
(4) Model Designation
(5) Order Number
(6) Exterior Color
(7) Paint Technology

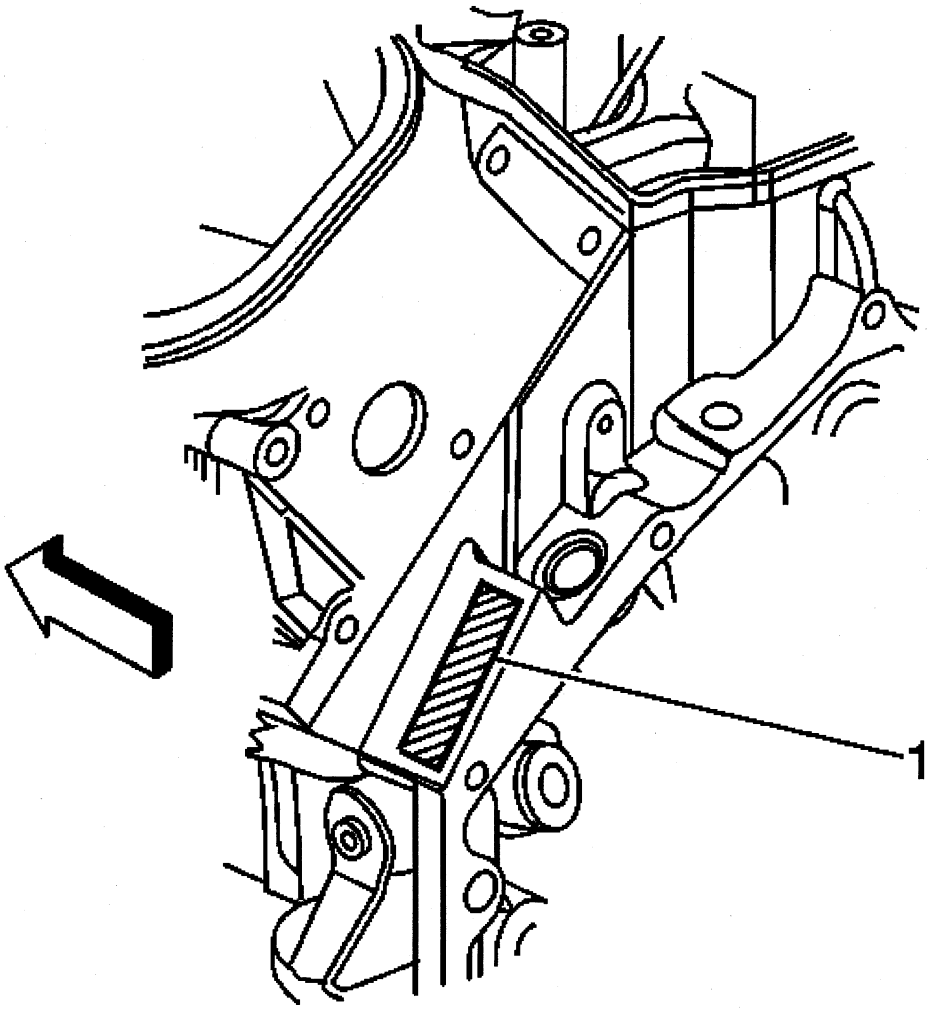
The service parts identification label is placed on the vehicle in order to help service and parts personnel identify the vehicle's original parts and the vehicle's original options.

Engine ID and VIN Derivative Location 5.3L & 6.0L



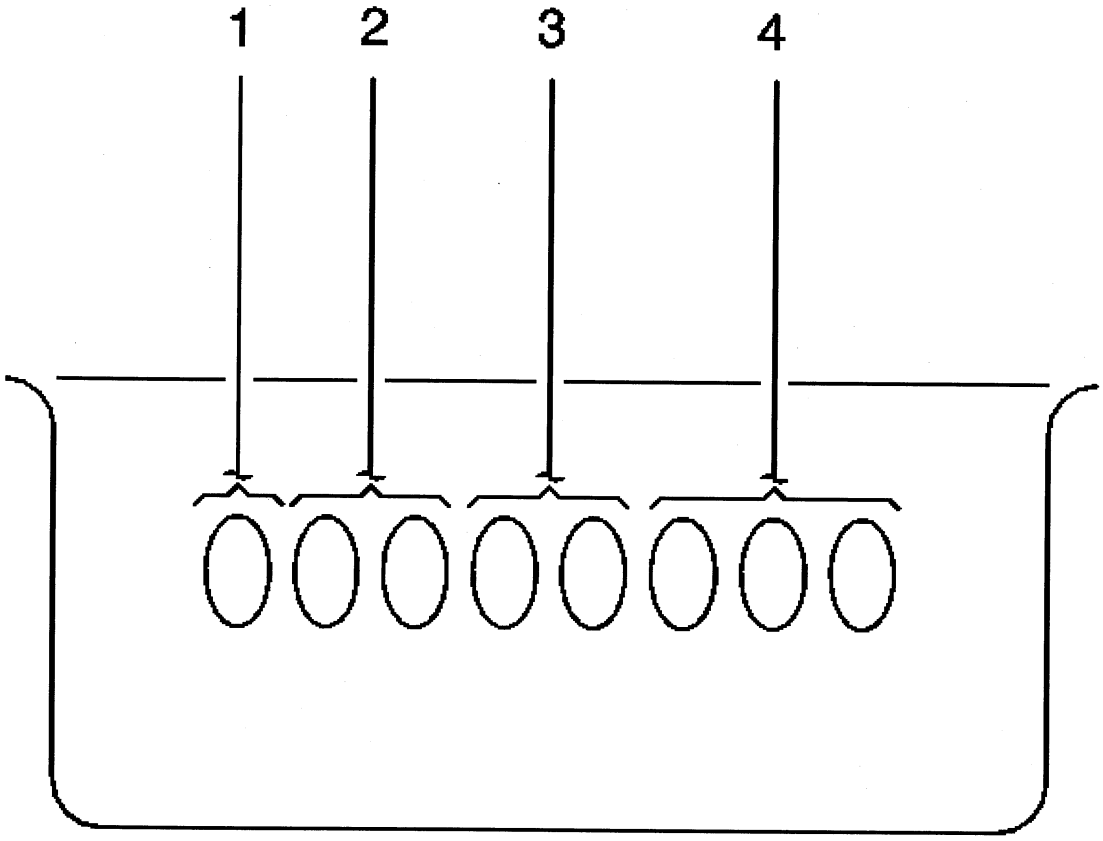
(1) Primary Engine Identification Number Location
(2) Secondary Engine Identification Number Location

Engine ID and VIN Derivative Location 8.1L



(1) Engine Identification Number Location

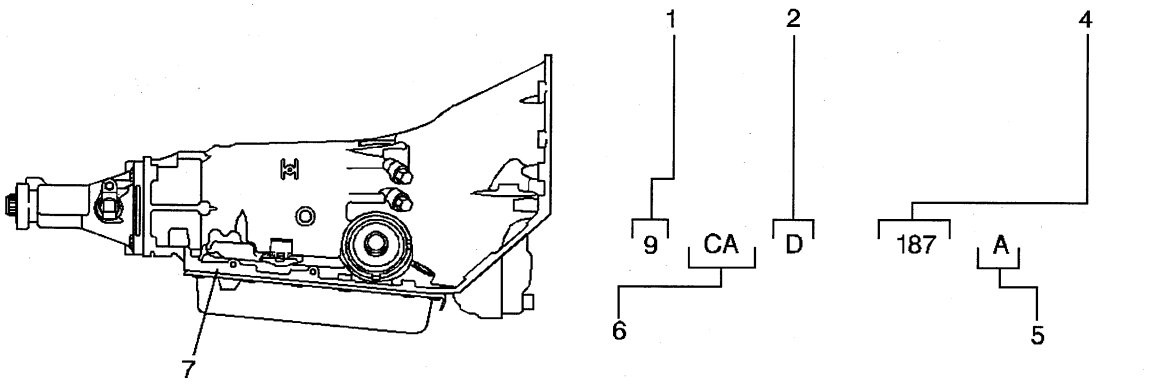
Engine ID Legend

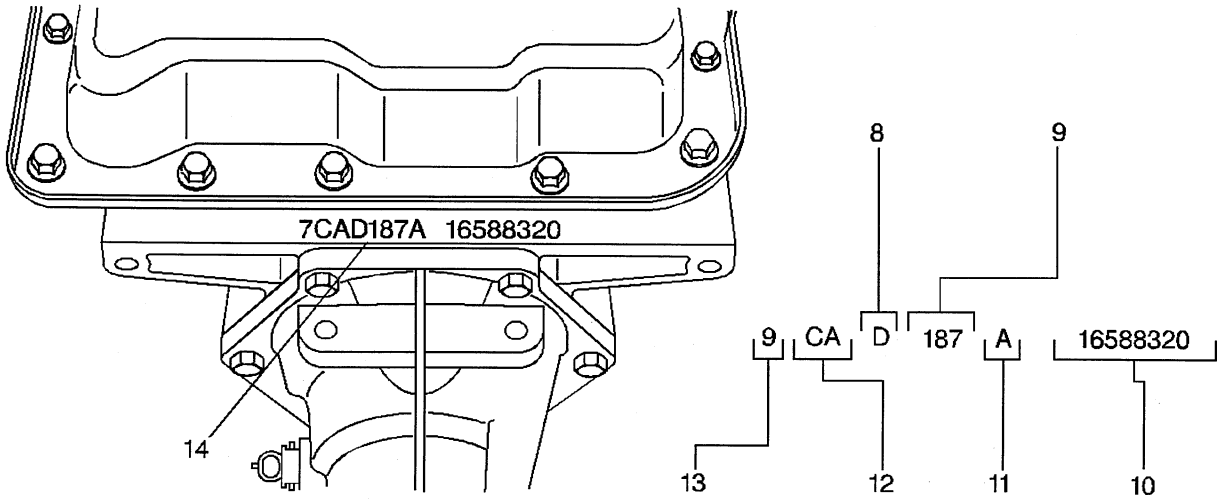


1. Source Code
2. Month of Build
3. Date of Build
4. Broadcast Code

Transmission ID and VIN Derivative Location

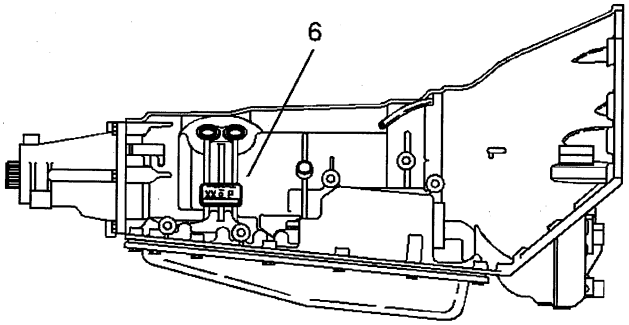
4L60-E Transmission ID Location

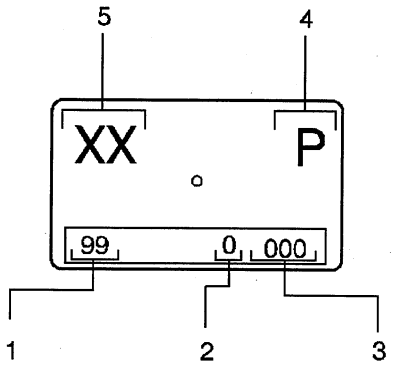




(1) Model Year
(2) Hydra-Matic 4L60-E
(4) Julian Date (or Day of the Year)
(5) Shift Built (A, B, J = First Shift; C, H, W = Second Shift)
(6) Model
(7) Transmission ID Location
(8) Hydra-Matic 4L60-E
(9) Julian Date (or Day of the Year)
(10) Serial No.
(11) Shift Built (A, B, J = First Shift; C, H, W = Second Shift)
(12) Model
(13) Model Year
(14) Transmission ID Location

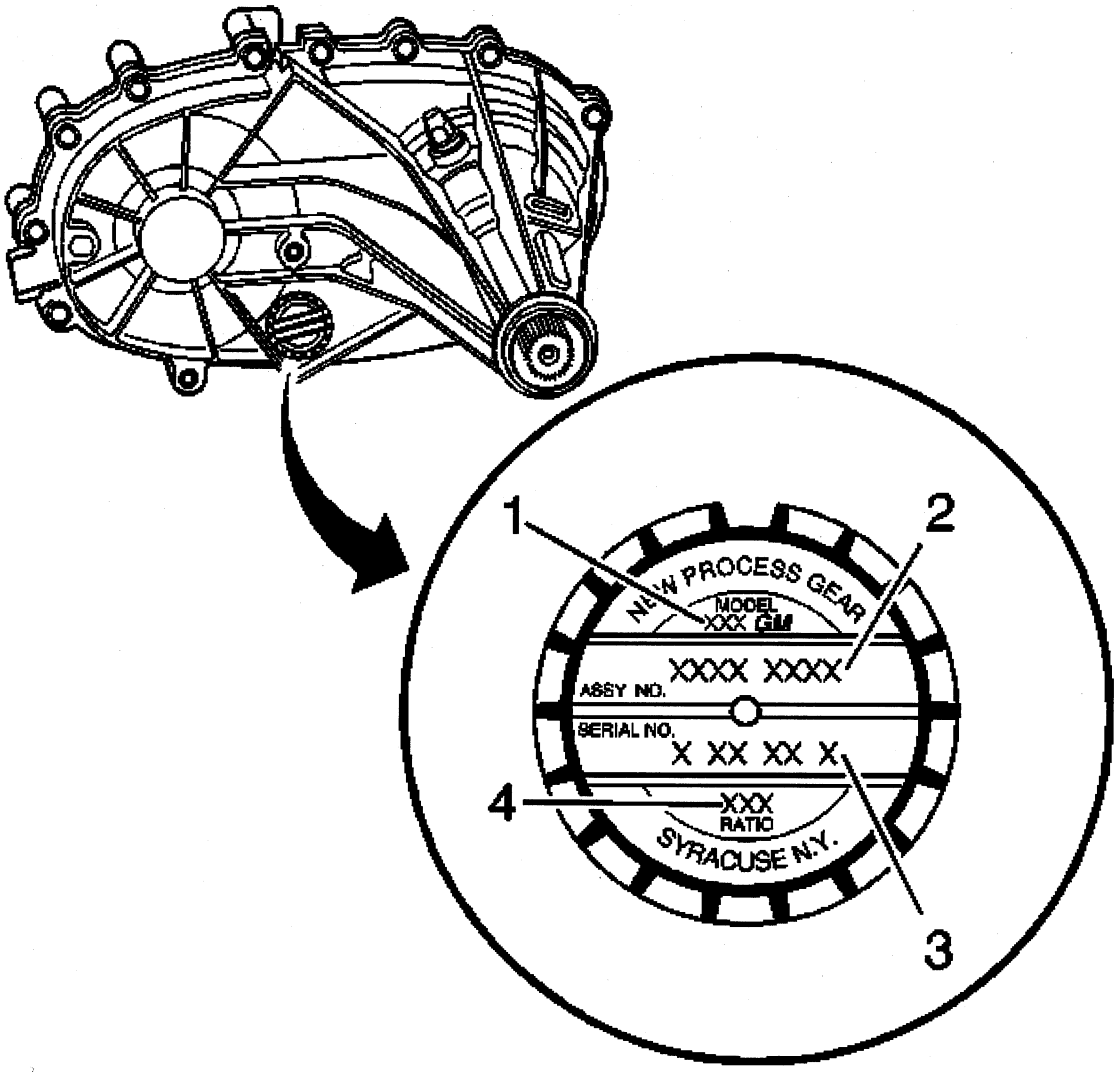
4L80-E Transmission ID Location





1. Calendar Year
2. Julian Date of the Year
3. Shift and Line Number
4. Plant
5. Model
6. Location on Transmission

Transfer Case Identification

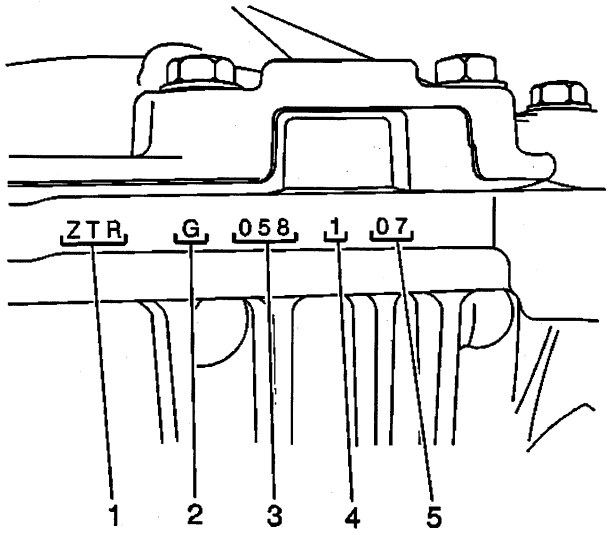


An identification tag is attached to the rear half of the transfer case. The tag provides the following information:

1 Model number (1)
   A First Digit-1 =Single Speed, 2=Two-Speed
   B Second Digit-2 = T Utility, 3 =T-Truck, L-Van, 4 or 6 = K Truck and Utility
   C Third Digit-1 = Manual, 3 = Electric Shift, 6 = Automatic, 9 = All Wheel Drive
2 Assembly number (2)
3 Serial number (Date and Shift Code) (3)
4 Low range reduction ratio (4)

The information on this tag is necessary for servicing the transfer case. If the tag is removed or becomes dislodged during service operations, keep the identification tag with the unit.

Axle Identification – Front



(1) Broadcast Code
(2) Supplier Code (G = American Axle)
(3) Julian Date (Day of Year)
(4) Shift Built (1 = First Shift; 2 = Second Shift) (Optional for 8.25" and 9.25" axles)
(5) Hour Built

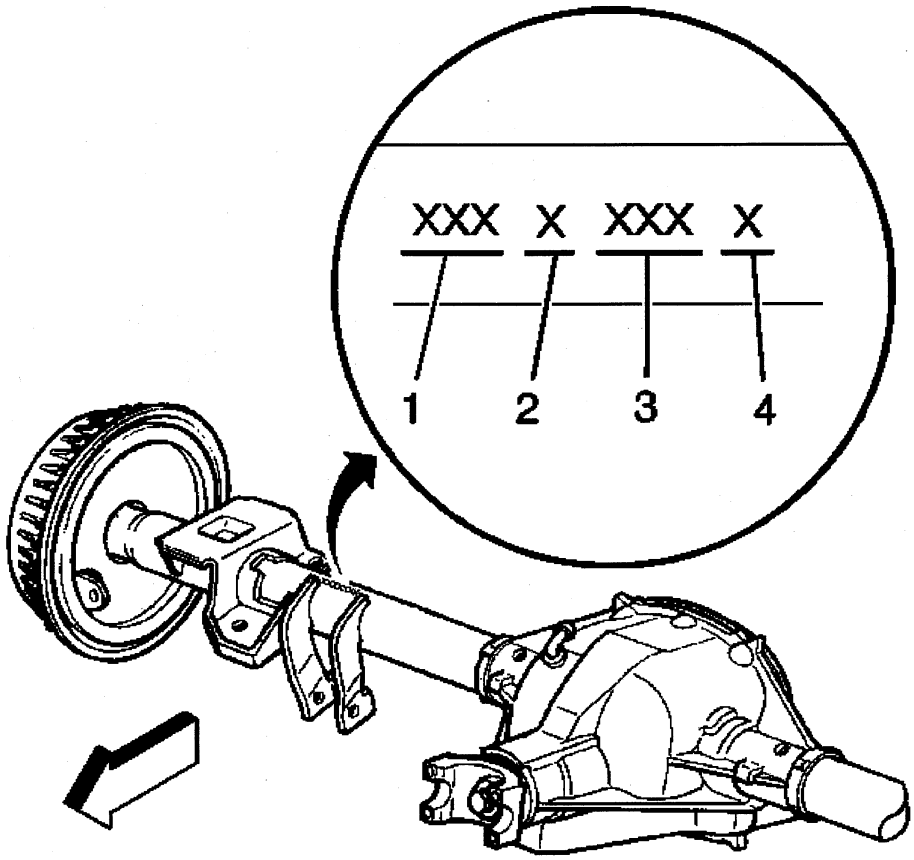
Front axle identification information is stamped on the top of the differential carrier assembly.

The following broadcast codes identifies the axle ratio:

Broadcast Code	Ratio
ZTM	3.08
ZTN, ZTU, ZTW, ZSY, ZA2, ZC2	3.42
ZTP, ZTR, ZTS, ZTX, ZSZ, ZB2,ZD2	3.73
ZTT,ZF2	4.10
ZH2	4.56

The information on the differential carrier assembly is necessary for servicing.

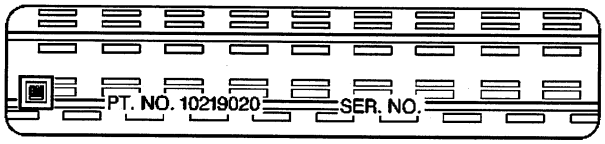
Axle Identification – Rear



(1) Rear Axle Ratio
(2) Build Source (C = Buffalo; K = Canada)
(3) Julian Date
(4) Shift Built (1 = First; 2 = Second)

All rear axles are identified by a broadcast code on the right axle tube near the carrier. The rear axle identification and manufacturer's codes must be known before attempting to adjust or to repair axle shafts or the rear axle case assembly. Rear axle ratio, differential type, manufacturer, and build date information is stamped on the right axle tube on the forward side.

Labeling - Anti-Theft



Notice

The anti-theft label found on some major body panels MUST be covered before performing any painting, rustproofing or undercoating procedures. The mask must also be removed following those procedures. Failure to follow these precautionary steps may result in liability for violation of the Federal Vehicle Theft Prevention Standard, and subject the vehicle owner to possible suspicion that the part was stolen.

Federal law requires General Motors (GM) to affix a label to certain parts on selected vehicles with the Vehicle Identification Number (VIN). The purpose of this law is to reduce the number of motor vehicle thefts by helping in the tracing and recovery of parts from stolen vehicles. The certification label on the driver's door qualifies as a theft deterrent label.

The theft deterrent label will be permanently affixed to an interior surface of the part and will contain the complete VIN. The label on replacement parts will contain the letter R, the manufacturer's logo, and the acronym for the Department of Transportation (DOT). DO NOT deface, or remove these labels.

RPO Code List

The production/process codes provide the description of the Regular Production Options (RPOs) used on the vehicle. The RPO list is printed on the Service Parts Identification Label. The following is a list of the RPO abbreviations and the description of each:

RPO	Description
AC7	Pipe Fuel Tank Fill Vent-Unrestricted
AE7	Seat FRT Split, Driver, PASS
AG1	Adjuster FRT ST Power, Multi-Directional, Driver
AG2	Adjuster PASS ST Power, Multi-Directional
AJ1	Windows Deep Tint, All Except W/S And DRS
AL4	Seat RR BKT
AM7	Seat RR Folding
AN3	Seat FRT, Individual (Non BKT)
ARL	Plant Code Arlington, TX USA
AS3	Seat RR
AT5	Seat Rear CTR, Folding
AU0	Remote Function Actuation - Keyless Entry - Domestic
AU3	Lock Control Side Door, Electric
AU8	Remote Function Actuation, Specific Frequency
AX4	Restraint Conversion Seat, MAN, European
A04	Windshield Tinted, Less Upper Shadeband
A31	Window Power Operated, All Doors
A95	Seat FRT BKT, High Back, Driver and PASS RECL
BAG	Parts Package Export
BA5	Ornamentation Extr, Custom
BG9	Covering Floor Rubber
BPH	Appearance Package Chevrolet "Off Road"
BS1	Insulation Acoustical PKG
BVE	Side Steps Runningboard
BVF	Side Steps Runningboard, Color Keyed
BW1	Ornamentation EXTR, RR End
BW2	Molding B/S Deluxe
B30	Floor Covering Carpet
B32	Covering FRT Floor Mats, AUX
B33	Covering Rear Floor MATS, AUX
B35	Covering Rear Floor Mats, Carpet Insert
B37	Covering Floor IMat, Front and Rear, Auxiliary
B39	Covering Floor Carpet, Load Floor
B58	Covering Floor MAT, FRT And RR, Carpeted Insert
B71	Wheel Opening Flares
B85	Molding - Body Side , Exterior, Bright
B96	Molding Wheel Opening
CF5	Roof Sun Glass, Sliding, Electric
CKD	Vehicle Completely Knocked Down
C25	Wiper System, Rear Window, Intermittent
C36	Heater Auxiliary
C49	Defogger RR Window, Electric
C5F	GVW Rating 8, %00 LBS
C5H	GVW Rating 6,900 LBS
C5M	GVW Rating 6,100 LBS
C5U	GVW Rating 6,800 LBS
C5W	GVW Rating 7,000 LBS

C6P	GVW Rating 8,600 LBS/3, 900KG
C60	HVAC System Air Conditioner FRT, MAN Controls
C68	HVAC System Air Conditioner FRT, Auto, Electronic Controls
C69	HVAC System RearAir Conditioner
C7H	GVW Rating 6,400 LBS/2, 900 KG
C7K	GVW Rating 6, 500 LBS
DE2	Mirror, O/S LH And RH, Manual Control, Folding, Color
DF2	Mirror, O/S LH And RH, Wide Load, Folding, Stainless Steel
DF5	Mirror, I/S R/V LT Sensitive, Compass, O/S Temp Display
DG5	Mirror O/S LH & RH, Wide Load, Large
DH2	Mirror, I/S Front Van, LH And RH, Illumination with Dual Sunshade
DK2	Mirror, O/S LH And RH, Remote Control, Electric, Heated, Color
DK6	Console Roof Interior
DK7	Console Roof Interior, Custom
DK8	Console Roof Interior, Deluxe
DL7	Mirror, O/S LH And RH, Remote Control, Electric, Heated, Power Folding, Color
DL8	Mirror, O/S LH And RH, Remote Control, Electric, Heated
DR2	Mirror, O/S LH And RH, Remote Control, Electric, Heated, Light Sensitive, Manual Folding, Color
D07	Console Front Compartment, Floor, Custom
D44	Mirror O/S Color
D48	Mirror O/S LH & RH, Remote Control, Electric, Color
D55	Console Front Compartment, Floor
EVA	Test DVT, EVAP Emission Requirement
E37	Pickup Box Inner DK Composite
E52	Body Equipment One Piece Lift Gate With Lift Glass
E62	Body Equipment Stepside, PUBX
E63	Body Equipment Fleetside Pick-UP Box
E95	Cover Tonneau, Rear Compartment
FF4	Arm LH Torsion Bar Spring Adj (C)
FF5	Arm RH Torsion Bar Spring Adj (D)
FF6	Arm LH Torsion Bar Spring Adj (E)
FF7	Arm RH Torsion Bar Spring Adj (F)
FK2	Arm LH Torsion Bar Spring Adj (A)
FK3	Arm RH Torsion Bar Spring Adj (B)
FT2	Arm LH Torsion Bar Spring Adj (FT2)
FT3	Arm RH Torsion Bar Spring Adj (FT3)
FWI	Plant Code Ft Wayne, IN, USA
FW1	Ride and Handling Manual Electronic Controlled
F60	Spring Front Heavy Duty
GMC	Plant Code Pontiac, MI, USA
GT4	Axle Rear 3.73 Ratio (DUP With 5 x 1)
GT5	Axle Rear 4.10 Ratio (DUP With GT8)
GU4	Axle Rear 3.08 Ratio
G65	Level Control Manual, Self-Adjusting
G69	Level Control Auto, Air, HD
G80	Axle Positraction Limited Slip
HOT	Apperance Package GMC "HOT Truck"
JAN	Plant Code Janesville, WI, USA
JC5	Brake Vac Power, 4-Wheel Disc, 7,200 lb
JE1	Brake System, Europe
JH5	Brake Hyd Power, 4-Wheel Disc, 7,200 lb
JH6	Brake Hyd Power, 4-Wheel Disc, 9,900 lb
J81	Indicator Switch, Export

KA6	Heater Seat, Rear
KC4	Heavy Duty Engine Oil Cooling
KC5	Receptacle Electrical, Accessory
KG8	Generator 130 Amp
KL5	Modification Engine, Natural Gas
KL6	Provisions Natural Gas
KNP	Cooling System Trans, HD
KUP	Throttle Control Electronic
K05	Heater Engine Block
K34	Cruise Control, Automatic, Electronic
K47	Air Cleaner High Capacity
K53	Fuel Sender Assembly, Robust Fuel System
LB7	Engine Diesel, 8 Cyl, 6.6L, DI, V8, Turbo. HO, Duramax
LM7	Engine Gas, 8 CYL, 5.3L, MFI, Iron, GM
LQ4	Engine Gas, 8 CYC, 6.0L, MFI, Iron, GM
LQ9	Engine Gas, 8 CYC, 6.0L, MFI, Iron, GM, HO
LR4	Engine Gas, 8 Cechy, 4.8L MFI, Iron, GM
LU3	Engine Gas, 6 Cyl, 4.3L, MFI, V6, 90 Deg
L18	Engine Gas, 8 CYL, 8.1L, MFI
L35	Engine Gas, 6 Cyl, 4.3L, CPI, V6, 90 Deg, HO
L59	Engine Flexible Fuel, (Gas/Alc), 8 CYL, 5.3L, MFI, V8, GM
MG5	Transmission Man 5 Spd, Getrag, 84mm, 4.001st, O/D
ML6	Transmission Man 6 Spd, ZF, 105 mm, 5.79 1st, 0.72 6th, O/D
MN8	Transmission Auto 4-Speed, HMD, 4L80-E, Heavy Duty
MT1	Transmission 4-Speed Auto W/Elect Controls H.D. - Hydra - Matic 4L80 - E
MW3	Transmission Man 5 Spd, NVG, 109 mm, 5.61 1st, O/D
M30	Transmission Auto 4-Speed, HMD, 4L60-E, Electronic
M32	Transmission - 4 Speed Auto W/Electric Controls L.D. - Hydra-Matic 4L60-E
NA1	Emission System GVW less than 8,500 lb
NA4	Emission System GVW greater than 8,500 lb
NC1	Emission System California, LEV
NC8	Emission System California, ULEV
NF2	Emission System Federal Tier 1
NF4	Emission System Clean Fuel Fleet
NM2	Emission System Export, Leaded Fuel
NN8	Emission Override, Unleaded Fuel, Export
NP1	Transfer Case Electric Shift Cont, Two Speed
NP2	Transfer Case Manual Shift Cont, Two Speed
NP3	Transfer Case All-Wheel Drive (AWD)
NP5	Steering Wheel Leather Wrapped
NP7	Steering Column EEC Approved
NP8	Transfer Case - (Active) - Push Button Control, 2 Speed
NT3	Emission System EEC OO
NW7	Traction Control - Electronic
NYS	Steering Four Wheel
NZZ	Skid Plate Off-Road
N05	Lock Control Fuel Filler Cap
N12	Rear Exit Tail Pipe
N30	Steering Wheel Deluxe
N88	Wheel - New - Aluminum - 17 x 7.5, Premium
N93	Wheel - New - Aluminum - 17 x 7.5
OSG	Plant Code Oshawa, ONT, Canada (TRK)
PF4	Wheel - Cast - Aluminum- 16 X 7.0

PF9	Wheel - Cast - Aluminum- 16 X 7.0
PRO	Apperance Package Sierra Professional
PY0	Wheel - New - Aluminum - 16 X 6.5
PY2	Wheel - Bright Chrome Appearance- 16 X 6.5
QAN	Tire All P265/70R 17 - 113S BW R/PE ST TL AL2
QAQ	Tire All P265/70R 17 - 113H BW R/PE ST TL AL2
QBN	Tire All LT245/75R16/C BW R/PE ST TL 00R
QBX	Tire All LT245/75R16/C WOL R/PE ST TL OOR
QCC	Tire all P255/70R16 BW R/PE ST TL ALS
QCJ	Tire all P255/70R16 WOL R/PE ST TL ALS
QCP	Tire All P255/70R16 - 109H BW R/PE ST TL ALS
QC3	Wheel 16 x 7, Aluminum, Special
QE4	Wheel Spare 16 x 6.5, Aluminum
QGA	Tire All P245/75R16 - 109S BW R/PE ST TL AT
QGB	Tire All P245/75R16 - 109S WOL R/PE ST TL AT
QGC	Tire All P265/75R16 - 114S BW R/PE ST TL AT
QGD	Tire All P265/75R16 - 114S WOL R/PE ST TL AT
QHS	Tire All P265/75R16 - 114H BW R/PE ST TL AT "A" TEMP Rating
QIW	Tire All LT245/75R16E R/PE ST TL OOR BL
QIX	Tire All LT265/75R16/C BW R/PE ST TL OOR 12OQ
QIZ	Tire All LT245/75R16/E BW R/PE ST TL OOR 12OQ
QJP	Tire All P265/70R17 - 113S BW R/PE ST TL OOR
QMJ	Tire All P265/70R16 - 111S BW R/PE ST TL AL2
QMK	Tire All P265/70R16 - 111S WOL R/PE ST TL AL2
QNF	Tire All P245/75R16 - 106S BW R/PE ST TL ALS
QNG	Tire All P265/75R16 - 106S WOL R/PE ST TL ALS
QNK	Tire All P245/75R16 - 109S BW R/PE ST TL ALS
QNL	Tire All P245/75R16 - 109S WOL R/PE ST TL ALS
R4W	Tire Brand All Michelin
R4Y	Tire Brand All Goodyear
SLT	Equipment Chevrolet 'LT' Sales Package
TL1	Grille Special
TP2	Battery Auxiliary
TRB	Grille Radiator, Body Color
TRW	Provisions Lamp, Roof Mounted
TR2	Lamp Turn Signal, Enlarged
TR6	Headlamps Control Leveling System, Manual
TS9	Lamp Stop, High Level - Delete
T2H	Ornamentation Extr, Export Unique Requirements
T2J	Ornamentation Interior, Export Unique Requirements
T62	Lamp System Daytime Running - Delete
T74	Headlamps Control Automatic, Delay
T78	Headlamps Control - Delete
T79	Lamp Fog, RR
T84	Headlamps RH Rule of the Road, E Mark
T89	Lamp Tail and Stop, Export
T96	Fog Lamps - Front
UC2	Speedometer INST, Kilo And Miles, Kilo Odometer, Positive Bias
UD4	Alarm Vehicle Speed, 120 K/H
UD7	Sensor Indicator Rear Parking Assist
UE1	Communication System Vehicle, G.P.S. 1
UG1	Garage Door Opened, Universal
UK3	Control Steering Wheel, Accessory

UK6	Radio Control RR Seat And Earphone Jacks
UL0	Radio - AM/FM Stereo, Cass. - Europe Compliant
UL9	Radio - AM/FM Stereo, Seek/Scan, Auto Reverse Music Search CASS, CD, Auto Tone, Clock, ETR, Bose
UM6	Radio - AM/FM Stereo, Seek/Scan, Auto Reverse Cassette, Clock And ETR
UM7	Radio - AM/FM Stereo, Seek/Scan Clock, And ETR - Base On All Models
UN0	Radio - AM/FM Stereo, Seek/Scan, Compact Disc, Auto Tone Control, Clock, And ETR - Radio Will Not Snap Fit Into I/P - No Attaching Fasteners
UP0	Radio - AM/FM Stereo, Seek/Scan, Auto Reverse Music Search Cassette, Compact Disc, Auto Tone Control, Clock, And ETR - Radio Will Not Snap Fit Into IP- No Attaching Fasteners, CD Will Be Remote Mounted Other Than The IP
UQ3	Speaker System, Performance Enhanced Audio
UQ5	Speaker System 4, Dual Front Door Mounted, Dual Extended Range Quarter Mounted
UQ7	Speaker System Premium Performance, Enhanced Audio, Bose®
UW3	Radio AM/FM Stereo, Seek/Scan, Auto REV Music Search Cassette, Data System, Clock, ETR
UY2	Wiring Provisions Camper & 5th Wheel Trailer
UY7	Wiring Harness Truck Trailer, HD
U01	Roof Marker Lamps
U1Z	Player Multiple Compac Disc, Passenger Compartment
U19	Speedometer INST, Kilo And Miles, Kilo Odometer
U34	Display Celsius Temperature
U68	Display Driver Info Center
U84	Antenna Body Side Window, Radio
VB3	Bumper Rear Step, Chrome, Impact Strip
VF7	Bumper RR Step - Delete
VGC	Protector Film, Paint Etch Preventive
VG3	Bumper Front Impact Strip
VJ3	Label, Plate ECE Approval Vehicle Identification
VJ4	Label, Export Child Seat Location
VJ7	Label, Fuel Unleaded Only
VK3	License Plate, Front Mounting Package
VPH	Vehicle Preparation Overseas Delivery
VP6	Noise Control
VR4	Trailer Hitch Weight Distributing Platform
VR6	Hook Tie-Down Shipping
VR7	Hook Tow, Second, Rear
VXS	Vehicle Complete
VZ2	Calibration Speedometer A
V22	Grille Radiator, Chrome
V76	Front Towing Hook
V92	Trailer Provisions
XAN	Tire Front P265/70R17-113S BW R/PE ST TL AL2
XAQ	Tire Front P265/70R17-113H BW R/PE ST TL AL2
XBN	Tire Front LT245/75R16/C BW R/PE ST TL OOR
XBX	Tire Front LT245/75R16/C WOL R/PE ST TL OOR
XCC	Tire Front P255/70R16 BW R/PE ST TL ALS
XCJ	Tire Front P255/70R16 WOL R/PE ST TL ALS
XCP	Tire Front P255/70R16-109H BW R/PE ST TL ALS
XGA	Tire Front P245/75R16-109S BW R/PE STTL AT
XGB	Tire Front P245/75R16-109S WOL R/PE STTL AT
XGC	Tire Front P265/75R16-114S BW R/PE ST TL AT
XGD	Tire Front P265/75R16-114S WOL R/PE ST TL AT
XGK	Tire Front LT245/75R16/E BW R/PE ST TL OOR 120Q

XGL	Tire Front LT265/75R16/C BL R/PE ST TL OOR
XHH	Tire Front LT245/75R16/E BW R/PE ST TL ALS 120Q
XHS	Tire Front P265/75R16-114H BW R/PE ST TL AT "A" Temp Rating
XJP	Tire Front P265/70R17-113S BW R/PE ST TL OOR
XMJ	Tire Front P265/70R16-111S BW R/PE ST TL AL2
XMK	Tire Front P265/70R16-111S WOL R/PE ST TL AL2
XNF	Tire Front P235/75R16-106S BW R/PE ST TL ALS
XNG	Tire Front P235/75R16-106S WOL R/PE ST TL ALS
XNK	Tire Front P245/75R16-109S BW R/PE ST TL ALS
XNL	Tire Front P245/75R16-109S WOL R/PE ST TL ALS
X88	Conversion Name Plate Chevrolet
YAN	Tire Rear P265/70R17-113S BW R/PE ST TL AL2
YAQ	Tire Rear P265/70R17-113H BW R/PE ST TL AL2
YBN	Tire Rear LT245/75R16/C BW R/PE ST TL OOR
YBX	Tire Rear LT245/75R16/C WOL R/PE ST TL OOR
YCC	Tire Rear P255/70R16 BW R/PE ST TL ALS
YCJ	Tire Rear P255/70R16 WOL R/PE ST TL ALS
YCP	Tire Rear P255/70R16-109H BW R/PE ST TL ALS
YE9	Convenience Package Comfort and Decor Level #3
VF2	Sales Package Ambulance Upfitter
YGA	Tire Rear P245/75R16-109S BW R/PE ST TL AT
YGB	Tire Rear P245/75R16-109S WOL R/PE ST TL AT
YGC	Tire Rear P265/75R16-114S BW R/PE ST TL AT
YGD	Tire Rear P265/75R16-114S WOL R/PE ST TL AT
YGK	Tire Rear LT245/75R16/E BW R/PE ST TL OOR 120Q
YGL	Tire Rear LT265/75R16/C BL R/PE ST OOR
YHH	Tire Rear LT245/75R16/E BW R/PE ST TL ALS 120Q
YHS	Tire Rear P265/75R16-114H BW R/PE ST TL AT "A" Temp Rating
YJP	Tire Rear P265/70R17-113S BW R/PE ST TL OOR
YMJ	Tire Rear P265/70R16-111S BW R/PE ST TL AL2
YMK	Tire Rear P265/70R16-111S WOL R/PE ST TL AL2
YNF	Tire Rear P235/75R16-106S BW R/PE ST TL ALS
YNG	Tire Rear P235/75R16-106S WOL R/PE ST TL ALS
YNK	Tire Rear P245/75R16-109S BW R/PE ST TL ALS
YNL	Tire Rear P245/75R16-109S WOL R/PE ST TL ALS
Y91	Merchandised PKG Luxury Edition
ZBN	Tire Spare LT245/75R16/C BL R/PE ST TBL OOR
ZBX	Tire Spare LT245/75R16/C WOL R/PE ST TL OOR
ZCC	Tire Spare LT245/70R16 BW R/PE ST TL ALS
ZCJ	Tire Spare LT245/70R16 WOL R/PE ST TL ALS
ZCP	Tire Spare P255/70R16-109H BW R/PE ST TL ALS
ZEC	Tire Spare P215/85R16/E BW R/PE ST TL HWY
ZEF	Tire Spare P215/85R16/E BW R/PE ST TL OOR
ZGA	Tire Spare P245/75R16-109S BW R/PE ST TL AT
ZGB	Tire Spare P245/75R16-109S WOL R/PE ST TL AT
ZGC	Tire Spare P265/75R16-114S BW R/PE ST TL AT
ZGD	Tire Spare P265/75R16-114S WOL R/PE ST TL AT
ZGK	Tire Spare LT245/75R16/E BW R/PE ST TL 00R 120Q
ZGL	Tire Spare LT265/75R16/C BL R/PE ST OOR
ZHH	Tire Spare LT245/75R16/E BW R/PE ST TL ALS 120Q
ZHS	Tire Spare P265/75R16-114H BW R/PE ST TL AT "A" Temp Rating
ZMJ	Tire Spare LT265/70R16-111S BW R/PE ST TL AL2
ZMK	Tire Spare LT265/70R16-111S WOL R/PE ST TL AL2

ZM9	Sales Package Comfort & Convenience
ZNF	Tire Spare P235/75R16-106S BW R/PE ST TL ALS
ZNG	Tire Spare P235/75R16-106S WOL R/PE ST TL ALS
ZNK	Tire Spare P245/75R16-109S BW R/PE ST TL ALS
ZNL	Tire Spare P245/75R16-109S WOL R/PE ST TL ALS
ZQ1	Chassis Package Smooth Ride
ZW7	Chassis Package Premium Smooth Ride
ZW9	Base Body or Chassis
ZX3	Chassis Package manual Select Damping
ZYK	Tire Spare LT215/85R16/D BL R/PE ST TL HWY
ZYL	Tire Spare LT215/85R16/D BL R/PE ST TL OOR
Z71	Chassis Package "Off Road"
Z75	Conversion Name Plate Cadillac
Z82	Trailer Provisions Special Equipment, H. D.
Z83	Chassis Package Solid Smooth Ride
Z85	Chassis Package Increased Capacity
Z88	Conversion Name PLT GMC

Technical Information

Maintenance and Lubrication

Capacities - Approximate Fluid

Application	Specification	
	Metric	English
Axle Capacities		
Front Drive Axle (8.25")	1.66 liters	1.75 quarts
Front Drive Axle (9.25")	1.73 liters	1.83 quarts
Rear Drive Axle (8.6")	2.28 liters	2.41 quarts
Rear Drive Axle (9.5")	2.6 liters	2.75 quarts
Rear Drive Axle (10.5")	2.6 liters	2.75 quarts
Rear Drive Axle (11.5")	3.62 liters	3.83 quarts
Engine Cooling System		
• 5.3 L (VIN T) Automatic Transmission	12.7 liters	13.4 quarts
• 5.3 L (VIN T) Automatic Transmission with optional Air Conditioning	14.1 liters	14.9 quarts
• 5.3 L (VIN T) Automatic Transmission with front A/C	13.6 liters	14.4 quarts
• 5.3 L (VIN T) Automatic Transmission with front and rear A/C	15.0 liters	15.8 quarts
• 6.0 L (VIN U) Automatic Transmission	14.0 liters	14.8 quarts
• 6.0 L (VIN U) Automatic Transmission with optional Engine Oil Cooler	13.6 liters	14.4 quarts
• 6.0 L (VIN U) Suburban/Yukon-Automatic Transmission	15.0 liters	15.8 quarts
• 6.0 L (VIN U) Suburban/Yukon-Automatic Transmission with optional Engine Oil Cooler	14.6 liters	15.4 quarts
• 6.0 L (VIN U) Denali-Automatic Transmission	14.0 liters	14.8 quarts
• 6.0 L (VIN U) Denali-Automatic Transmission with optional Engine Oil Cooler	14.6 liters	15.4 quarts
• 6.0 L (VIN U) Manual Transmission	14.4 liters	15.2 quarts
• 6.0 L (VIN U) Manual Transmission with optional Engine Oil Cooler	14.0 liters	14.8 quarts
• 8.1 L (VIN G) Automatic Transmission	19.6 liters	20.7 quarts
• 8.1 L (VIN G) Manual Transmission	20.0 liters	21.1 quarts
Engine Crankcase		
• 5.3 L (VIN T) With Filter	5.7 liters	6.0 quarts
• 6.0 L (VIN U) With Filter	5.7 liters	6.0 quarts
• 8.1 L (VIN G) With Filter	6.1 liters	6.5 quarts
Transmission		
• 4L60-E 4 Spd. HMD Auto (M30)	4.7 liters	5.0 quarts
• 4L60-E 4 Spd. HMD Auto (M30) After Complete Overhaul	10.6 liters	11.2 quart
• 4L80-E Auto (MT1)	7.3 liters	7.7 quarts
• 4L80-E Auto (MT1) After Complete Overhaul	12.8 liters	13.5 quart
Fuel Tank		
• XL (1500 Series)	117.3 liters	31 gallons
• XL (2500 Series)	141.9 liters	37.5 gallons
Power Steering Capacities (approximate)	0.77L-1.25 liters	0.81-1.32 quarts

Maintenance Items

Usage	Type
Air Cleaner	
• 4.8L (VIN V)	A1519C
• 5.3L (VIN T)	A1518C
• 6.0L (VIN U)	A1518C
• 8.1L (VIN G)	A1518C
Engine Oil Filter	
• 4.8L (VIN V)	PF46
• 5.3L (VIN T)	PF46
• 6.0L (VIN U)	PF46
• 6.6L (VIN 1)	P/N 97214983
• 8.1L (VIN G)	PF454
PCV Valve	
• 4.8L (VIN V)	CV948C
• 5.3L (VIN T)	CV948C
• 6.0L (VIN U)	CV948C
Spark Plugs and Gaps	
• 4.8L (VIN V)	PTJ16R15 (GAP 1.52 mm, 0.060 in)
• 5.3L (VIN T)	PTJ14R15 (GAP 1.52 mm, 0.060 in)
• 6.0L (VIN U)	PTJ16R15 (GAP 1.52 mm, 0.060 in)
• 8.1L (VIN G)	PTJ14R15 (GAP 1.52 mm, 0.060 in)
Fuel Filter	
• 4.8L (VIN V)	GF626
• 5.3L (VIN T)	GF626
• 6.0L (VIN U)	GF626
• 8.1L (VIN G)	GF626
Wiper Blades	P/N 15706394
Passenger Compartment Air Filter	P/N 52485513

Fluid and Lubricant Recommendations

Usage	Fluid/Lubricant
Automatic Transfer Case	Automatic transfer case fluid AUTO-TRAK II Fluid (GM P/N 12378508)
Automatic Transfer Case (Diesel Engine)	Automatic transfer case fluid (GM P/N 12378396)
Transfer Case (Pickup)	DEXRON®-III, Automatic Transmission Fluid
Automatic Transmission	DEXRON®-III, Automatic Transmission Fluid
Body Door Hinge Pins, Tailgate Hinge and Linkage, Folding Seat and Fuel Door Hinge	Multi-Purpose lubricant, Superlube® (GM P/N 12346241 or equivalent).
Chassis Lubrication	Chassis Lubricant (GM Part No. 12377985 or equivalent) or lubricant meeting requirements of NLGI # 2 Category LB or GC-LB.
Engine Coolant	50/50 mixture of clean drinkable water and use only GM Goodwrench® DEX-COOL® or Havoline® DEX-COOL® coolant.
Engine Oil	Engine oil with the American Petroleum Institute Certified For Gasoline Engines STARBURST symbol of the proper viscosity
Engine Oil (Diesel Engine)	Engine oil with the letters CH-4 or CG-4 is best for this vehicle. The CH-4 or CG-4 designation may appear either alone, or in combination with other API designations, such as API CH-4/SJ, CG-4/SH or CH-4/CG-4/SJ. These letters show American Petroleum Institute (API) level of quality.
Floor Shift Linkage	Lubriplate ® Lubricant Aerosol (GM Part No. 12346293 or equivalent) or lubricant meeting requirements of NLGI # 2 Category LB or GC-LB.
Front Axle (S4WD)	SAE 80W-90 Axle Lubricant (GM P/N 1052271 or equivalent).
Front Axle (F4WD)	SAE 75W-90 Synthetic Axle Lubricant (GM part No. 12378261) or equivalent meeting GM Specification 9986115.
Front Axle Propshaft Spline or One-Piece Propshaft Spline (Two-Wheel Drive with Auto. Trans.)	Spline Lubricant, Special Lubricant (GM Part No. 12345879) or lubricant meeting requirements of GM 9985830.
Hood Hinges	Multi-Purpose lubricant, Superlube ® (GM Part No. 12346241 or equivalent).
Hood Latch Assembly, Secondary Latch, Pivots, Spring Anchor and Release Pawl	Lubriplate ® Lubricant Aerosol (GM Part No. 12346293 or equivalent) or lubricant meeting requirements of NLGI # 2, Category LB or GC-LB.
Hydraulic Brake System	Delco Supreme 11® Brake Fluid (GM P/N 12377967 or equivalent DOT-3 brake fluid).
Hydraulic Clutch System	Hydraulic Clutch Fluid (GM Part No. 12345347 or equivalent DOT-3 brake fluid).
Key Lock Cylinders	Multi-Purpose Lubricant, Superlube® (GM P/N 12346241 or equivalent).
Manual Transfer Case	DEXRON®-III Automatic Transmission Fluid
Manual Transmission (5-Speed with Low Gear, RPO MW3	GM Goodwrench Synthetic Manual Transmission Fluid (GM Part No. 12346190-1 qt.) or equivalent SAE 75W-85 GL-4 gear oil.
Manual Transmission (5-Speed without Low Gear, RPO MG5)	Synchromesh Transmission Fluid (GM Part No. 12345349 or equivalent).
Manual Transmission (6-Speed)	TransSynd ™ Synthetic Automatic Transmission Fluid (GM Par No. 12378515).
Outer Tailgate Handle Pivot Points	Multi-Purpose lubricant, Superlube® (GM P/N 12346241 or equivalent).

Parking Brake Cable Guides	Chassis Lubricant (GM Part No. 12377985 or equivalent) or lubricant meeting requiremetns of NLGI # 2, Category LB or GC-LB.
Power Steering System	GM Power Steering Fluid (GM P/N 1052884 - 1 pint, 1050017 - 1 quart, or equivalent).
Weatherstrip Conditioning	Dielectric Silicone Grease (GM P/N 12345579 or equivalent).
Windshield Washer Solvent	GM Optikleen ® Washer Solvent (GM Part No. 1051515) or equivalent.
Weatherstrip Squeaks	Synthetic Grease with Teflon, Superlube ® (GM Part No. 12371287 or equivalent).
Tailgate Handle Pivot Points, Hinges, Latch Bolt and Linkage	Multi-Purpose lubricant, Superlube® (GM P/N 12346241 or equivalent).
Rear Axle	SAE 75W-90 Synthetic Axle Lubricant, GM Part No. 12378261 (in Canada use Part No. 10953455) or equivalent meeting GM Specification 9986115.
Rear Driveline Center Spline	Chassis Lubricant (GM Par No. 12377985 or equivalent) or lubricant meeting requirements of NLGI # 2, Category LB or GC-LB.

Descriptions and Operations

Power Steering System

The hydraulic power steering system consists of the following components:

- The pump
- The fluid reservoir
- The steering gear
- The pressure hose
- The return hose

The power steering pump is a vane-type pump. The pump houses the internal components inside the reservoir. The pump operates submerged in oil.

Two bore openings are located at the rear of the pump housing. The larger opening contains the following components:

- The cam ring
- The pressure plate
- The thrust plate
- The rotor and vane assembly
- The end plate

The smaller opening contains the following components:

- The pressure hose union
- The flow control valve
- The spring

The flow control orifice is part of the pressure control union. The pressure relief valve inside the flow control valve limits the pump pressure.

The power steering gear has a recirculating ball system. The system acts as a rolling thread between the worm shaft and the rack position. The lower end of the worm shaft is supported by a preloaded thrust bearing and two conical thrust races. The upper end of the worm shaft is supported by an adjusted plug. When you turn the worm shaft right, the rack piston moves up in the gear. When you turn the worm shaft left, the rack piston moves down in gear. The rack piston teeth mesh with the sector. The sector is part of the pitman shaft. The pitman shaft turns the wheels through the steering linkage.

The control valve in the steering gear directs the power steering fluid to either side of the rack piston. The rack piston converts the hydraulic pressure into a mechanical force. You can control the vehicle manually if the steering system becomes damaged and loses hydraulic pressure.

Steering Linkage

The steering linkage consists of the following components:

- A pitman arm
- An idler arm
- A relay rod
- 2 adjustable tie rods

When you turn the steering wheel, the steering gear rotates the pitman arm which forces the relay rod to one side. The tie rods connect to the relay rod with the ball studs. The tie rods transfer the steering force to the wheels. Use the tie rods in toe adjustments. The tie rods are adjustable. The pitman arm support the relay rod. The idler arm pivots on a support attached to the frame rail and the ball stud attaches to the relay rod.

The 2 tie rod are threaded into the tube and secured with jam nuts. Right and left hand threads are used in order to permit the adjustment of toe.

The condition of the steering linkage affects the steering performance. If parts are bent, damaged, worn, or poorly lubricated, potentially dangerous steering action will result.

Steering Wheel and Column

The steering wheel and column has 4 primary functions:

- Vehicle steering
- Vehicle security
- Driver convenience
- Driver safety

Vehicle Steering

The steering wheel is the first link between the driver and the vehicle. The steering wheel is fastened to a steering shaft within the column. At the lower end of the column, the intermediate shaft connects the column to the steering gear.

Vehicle Security

Theft deterrent components are mounted and designed into the steering column. The following components allow the column to be locked in order to minimize theft:

- The ignition switch
- The steering column lock
- The ignition cylinder

Driver Convenience

The steering wheel and column may also have driver controls attached for convenience and comfort. The following controls may be mounted on or near the steering wheel or column.

- The turn signal switch
- The hazard switch
- The headlamp dimmer switch
- The wiper/washer switch
- The horn pad/cruise control switch
- The redundant radio/entertainment system controls
- The tilt or tilt/telescoping functions
- The HVAC controls

Driver Safety

The energy-absorbing steering column compresses in the event of a front-end collision, which reduces the chance of injury to the driver. The mounting capsules break away from the mounting bracket in the event of an accident.

Variable Effort Steering Description

The electronic variable orifice (EVO) system increases or decreases the amount of fluid leaving the power steering pump. This provides the driver with a comfortable balance of steering wheel feel and power assist.

At vehicle standstill or at very low speeds, the system allows full hydraulic fluid flow for maximum power assist and reduced steering effort. As the vehicle gains speed, a variable orifice closes at the steering pump which reduces the pump fluid flow. This action provides a stiffer steering wheel response for an improved road feel and a greater directional stability at highway speeds.

A sensor mounted on the steering column detects the steering wheel movements associated with defensive driving maneuvers. A control module uses this sensor input and the vehicle speed in order to adjust the amount of current to the solenoid.

Suspension Description and Operation

Front Suspension

The front suspension has 2 primary purposes:

- Isolate the driver from irregularities in the road surface.
- Define the ride and handling characteristics of the vehicle.

The front suspension absorbs the impact of the tires travelling over irregular road surfaces and dissipates this energy throughout the suspension system. This process isolates the vehicle occupants from the road surface. The rate at which the suspension dissipates the energy and the amount of energy that is absorbed is how the suspension defines the vehicle's ride characteristics. Ride characteristics are designed into the suspension system and are not adjustable. The ride characteristics are mentioned in this description in order to aid in the understanding of the functions of the suspension system. The suspension system must allow for the vertical movement of the tire and wheel assembly as the vehicle travels over irregular road surfaces while maintaining the tire's horizontal relationship to the road.

This requires that the steering knuckle be suspended between an upper and a lower control arm. The lower control arm attaches from the steering knuckle at the outermost point of the control arm. The attachment is through a ball and socket type joint. The innermost end of the control arm is attached at 2 points to the vehicle frame through semi-rigid bushings. The upper control arm attaches to the frame in the same fashion. Attached to the lower control arm is a torsion bar. Torsion bars are steel or steel composite shaft that connects from the lower control arm an adjustable mount at the torsion bar crossmember. The torsion bar functions as a spring in this suspension system. The torsion bar absorbs energy from irregular road surfaces by twisting force along the center axis. The torsion bar has a resistance to this twisting motion and will return to the original, at-rest position similar to that of a spring.

A shock absorber is used in conjunction with this system in order to dampen out the oscillations of the torsion bar. A shock absorber is a basic hydraulic cylinder. The shock is filled with oil and has a moveable shaft that connects to a piston inside the shock absorber. Valves inside the shock absorber offer resistance to oil flow and consequently offer resistance to rapid movement of the piston and shaft. Each end of the shock absorber is connected in such a fashion in order to utilize this recoil action of a torsion bar alone.

Front suspension systems utilize a stabilizer shaft. The stabilizer bar connects between the left and right lower control arm assemblies through the stabilizer link and stabilizer shaft insulators. This bar controls the amount of independent movement of the suspension when the vehicle turns. Limiting the independent movement defines the vehicle's handling characteristics on turns.

Rear Suspension

All pickup models and 25 series Suburban/Yukon XL models use a rear spring suspension system and a solid rear axle suspension system. The rear axle is attached to the multi-rear springs by U-bolts. The front of the spring ends are attached to the frame at the front hangers through rubber bushings. The rear of the spring ends are attached to the frame with shackles that allow the springs to change their length, due to the spring compressing, while the vehicle is in motion. The ride control is provided by 2 identical direct dual-action shock absorbers that are angle-mounted between the frame and the brackets which are attached to the axle tubes.

All 15 series utility vehicles use a 5-link rear suspension system. The rear axle is attached to the frame with the upper control arms, lower control arms, and a track bar. Two coil springs and a link mounted rear stabilizer shaft complete the system.

The ride control is provided by 2 identical direct dual-action shock absorbers that are angle-mounted between the frame and the brackets which are attached to the axle tubes. Also available are the Autoride™ and self adjusting level control shocks as well as the gas charged monotube shocks. For information about the Autoride™ components refer to Real Time Damping below. The self adjusting level control shock utilizes a hydraulic pump inside each shock and raises the rear of the vehicle to the proper height based on inputs from the road surface while the vehicle is being driven.

Real Time Damping Description

The RTD system is bi-state real time damping system. The Electronic Suspension Control (ESC) module controls the suspension damper solenoids and suspension position sensors, along with parts of the automatic level control (ALC) system and electronic variable orifice (EVO) power steering system.

The RTD system consists of the following:

- ESC Module
- Compressor/Leveling Module
  - Air Pressure Sensor
  - Exhaust Solenoid
- Compressor Motor Relay
- Steering Handwheel Speed/Position Sensor
- Electronic Variable Orifice (EVO) Solenoid
- Suspension Damper Solenoids
- Suspension Position Sensors

The objective of the ESC module is to provide ride and handling results that are superior to a passive damper system, both on and off road at all load conditions. The ESC module monitors body-to-wheel height, vehicle speed, handwheel position/speed, lift/dive status and a driver tow/haul input switch status in real time and instantly selects a "normal" or "firm" mode. This is done for each of the front and rear shock absorbers in order to adjust the vehicle for specific road and driving conditions.

The ESC module will use the rear body-to-wheel displacements and vehicle speed inputs to keep the rear trim height of the vehicle at its desired level.

The ESC module also uses the steering handwheel position/speed sensor and vehicle speed inputs to control a power steering effort control valve.

The suspension damper solenoid is driven ON and OFF by the ESC module. To activate the solenoid, it is initially subjected to full battery voltage for a short period of time. Once the solenoid is pulled-in, the supply voltage is pulse width modulated (PWM). The amount the suspension damper solenoid is activated is based on inputs from the driver Tow/Haul switch, road inputs, position sensor inputs and the PCM. The ESC module provides a common ground for all four of the suspension damper solenoids.

The ESC module provides a common regulated voltage of approximately 5 volts to all four of the body-to-wheel suspension position sensors, air pressure sensor and the steering handwheel position/speed sensor. The ESC module receives VSS discrete output from the PCM. The suspension position sensors provide an analog signal voltage between 0.5 and 4.5 volts to the ESC module. This signal voltage represents the wheel's position relative to the body. The ESC module provides a 5 volt reference and a low reference to the suspension position sensors.

Ignition cycle counting is used by the ESC module to detect faults in the system. The objective is to eliminate false/intermittent codes while maintaining an acceptable level of system performance. The operation of the ignition cycle counting requires that a fault condition be present for four consecutive ignition cycles before it will set the fault code and display the "SERVICE RIDE CONTROL" message. If a fault code is present (without a fault being current), the system will go into one or more degraded modes without displaying a message. Resetting the ignition cycle counter is done by clearing codes with a scan tool. Clearing codes will override ignition cycle counting for one ignition cycle. Therefore, a fault condition will set the fault code immediately if it occurs on the first ignition cycle after the codes are cleared.

There are two different ESC modules being used in the 02 MY. They have the same Z55 RPO, except that one also has and additional ZK3 RPO. The module with the additional ZK3 RPO connects to the EVO solenoid.

Automatic Level Control Description

The RTD system is bi-state real time damping system. The Suspension Control module controls the suspension damper solenoids and suspension position sensors, along with parts of the automatic level control (ALC) system and electronic variable orifice (EVO) power steering system.

The Automatic Level Control system consists of the following:

- Suspension Control Module
- Compressor/Leveling Module
  - Air Pressure Sensor
  - Exhaust Solenoid
- Compressor Motor Relay

The objective of the Automatic Level Control System is to provide constant ride height at all load conditions. The Suspension Control module monitors body-to-wheel height, and vehicle speed.

The Suspension Control module will use the rear body-to-wheel displacements and vehicle speed inputs to keep the rear trim height of the vehicle at its desired level.

Wheels and Tires

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Hoist to Crossmember Nut	40 N·m	30 lb ft
Wheel Nut Stud	190 N·m	140 lb ft

General Description

The factory installed tires are designed to operate satisfactorily with loads up to and including the full rated load capacity when these tires are inflated to the recommended pressures.

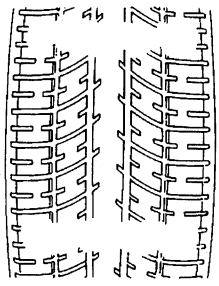
The following factors have an important influence on tire life:

- Correct tire pressures
- Correct wheel alignment
- Proper driving techniques
- Tire rotation

The following factors increase tire wear:

- Heavy cornering
- Excessively rapid acceleration
- Heavy braking

Tread Wear Indicators Description



The original equipment tires have tread wear indicators that show when you should replace the tires.

The location of these indicators are at 72 degree intervals around the outer diameter of the tire. The indicators appear as a 6 mm (0.25 in) wide band when the tire tread depth becomes 1.6 mm (2/32 in).

Metric Wheel Nuts and Bolts Description

Metric wheel/nuts and bolts are identified in the following way:

- The wheel/nut has the word Metric stamped on the face.
- The letter M is stamped on the end of the wheel bolt.

The thread sizes of metric wheel/nuts and the bolts are indicated by the following example: M12 x 1.5.

- M = Metric
- 12 = Diameter in millimeters
- 1.5 = Millimeters gap per thread

Tire Inflation Description

When you inflate the tires to the recommended inflation pressures, the factory-installed wheels and tires are designed in order to handle loads to the tire's rated load capacity. Incorrect tire pressures, or under-inflated tires, can cause the following conditions:

- Vehicle handling concerns
- Poor fuel economy
- Shortened tire life
- Tire overloading

Inspect the tire pressure when the following conditions apply:

- The vehicle has been sitting at least 3 hours.
- The vehicle has not been driven for more than 1.6 km (1 mi).
- The tires are cool.

Inspect the tires monthly or before any extended trip. Adjust the tire pressure to the specifications on the tire label. Install the valve caps or the extensions on the valves. The caps or the extensions keep out dust and water.

The kilopascal (kPa) is the metric term for pressure. The tire pressure may be printed in both kilopascal (kPa) and psi. One psi equals 6.9 kPa.

Inflation Pressure Conversion (Kilopascals to PSI)

kPa	psi	kPa	psi
140	20	215	31
145	21	220	32
155	22	230	33
160	23	235	34
165	24	240	35
170	25	250	36
180	26	275	40
185	27	310	45
190	28	345	50
200	29	380	55
205	30	415	60
Conversion: 6.9 kPa = 1 psi			

Tires with a higher than recommended pressure can cause the following conditions:

- A hard ride
- Tire bruising
- Rapid tread wear at the center of the tire

Tires with a lower than recommended pressure can cause the following conditions:

- A tire squeal on turns
- Hard steering
- Rapid wear and uneven wear on the edge of the tread
- Tire rim bruises and tire rim rupture
- Tire cord breakage
- High tire temperatures
- Reduced vehicle handling
- High fuel consumption
- Soft riding

Unequal pressure on the same axle can cause the following conditions:

- Uneven braking
- Steering lead
- Reduced vehicle handling

Tire Description

Caution

Do not mix different types of tires on the same vehicle such as radial, bias, and bias-belted tires except in emergencies because vehicle handling may be seriously affected and may result in loss of control and possible serious injury.

This vehicle is equipped with speed rated tires. Listed below are the common speed rating symbols and the corresponding maximum speeds:

Speed Symbol	Maximum Speed (km/h)	Maximum Speed (mp/h)
S	180	112
T	190	118
U	200	124
H	210	130
V	240	149
Z	Over 240	Over 149

A Tire Performance Criteria (TPC) specification number is molded in the sidewall near the tire size of all original equipment tires. Usually, a specific TPC number is assigned to each tire size. The TPC specification number assures that the tire meets the following GM's performance standards.

- Meets the standards for traction.
- Meets the standards for endurance.
- Meets the standards for dimension.
- Meets the standards for noise.
- Meets the standards for handling.
- Meets the standards for rolling resistance, and others.

The following is required of replacement tires:

- Replacement tires must be of the same size as the original tires.
- Replacement tires must be of the same speed rating as the original tires.
- Replacement tires must be of the same load index as the original tires.
- Replacement tires must be of the same construction as the original tires.
- Replacement tires must have the same TPC specification number as the original tires.

The following may seriously be affected by the use of any other tire size, tire speed rating or tire type:

- May seriously affect the ride.
- May seriously affect the handling.

- May seriously affect the speedometer/odometer calibration.
- May seriously affect the antilock brake system.
- May seriously affect the vehicle ground clearance.
- May seriously affect the trailering capacity.
- May seriously affect the tire clearance to the body.
- May seriously affect the tire clearance to the chassis.

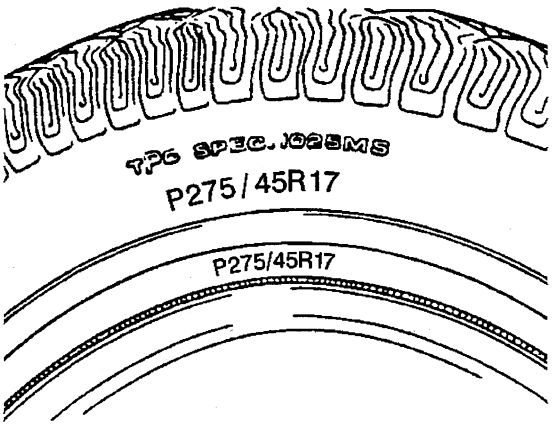
Conditions for Tire Replacement

Replace the tires when one and/or all of the following conditions are evident:

- When the tire(s) is worn to a point where 1.6 mm (2/32 in) or less of tread remains. The tires have built in tread wear indicators that appear between the tread grooves when the tread is worn to 1.6 mm (2/32 in) or less to help in the detection of this condition. Replace the tire when the indicators appear in two or more adjacent grooves at three spots around the tire.
- When the following conditions are evident on the tread:
  - When the tread is cracked.
  - When the tread is cut.
  - When the tread is snagged deeply enough to expose the cord.
  - When the tread is snagged deeply enough to expose the fabric.
  - When the sidewall is snagged deeply enough to expose the cord.
  - When the sidewall is snagged deeply enough to expose the fabric.
- When the following conditions are evident on the tire:
  - When the tire has a bump.
  - When the tire has a bulge (protrusion).
  - When the tire is split.
  - Please note that slight sidewall indentations are normal in radial tires.
- When the following damage is evident on the tire and the damage cannot be correctly repaired because of the size or the location of the damage:
  - When the tire has a puncture.
  - When the tire is cut, or other damage.

Always install new tires in pairs on the same axle. In the event that only one tire is replaced, then pair with the tire having the most tread.

All Seasons Tires Description

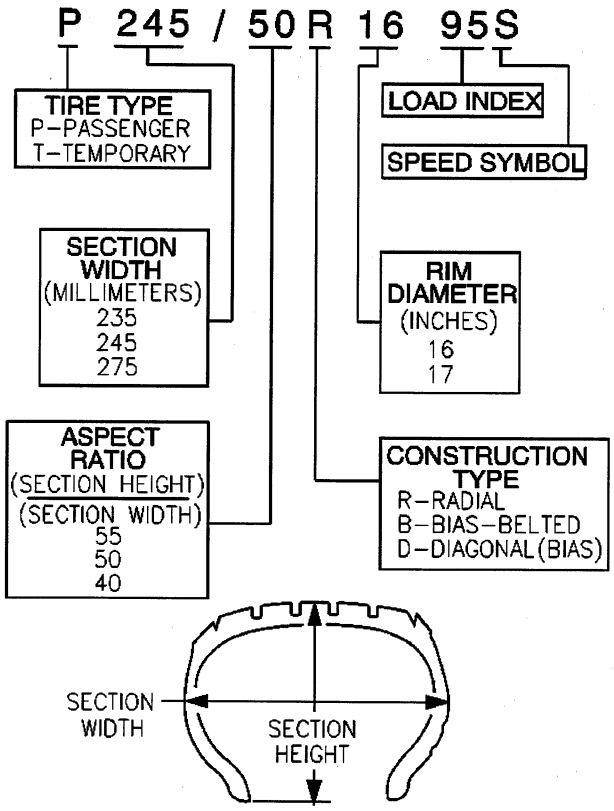


Most GM vehicles are equipped with steel belted all-season radial tires as standard equipment. These tires qualify as snow tires, with a higher than average rating for snow traction than the non-all season

radial tires previously used. Other performance areas, such as wet traction, rolling resistance, tread life, and air retention, are also improved. This is done by improvements in both tread design and tread compounds. These tires are identified by an M + S molded in the tire side wall after the tire size. The suffix MS is also molded in the tire side wall after the TPC specification number.

The optional handling tires used on some vehicles now also have the MS marking after the tire size and the TPC specification number.

P-Metric Sized Tires Description



Most P-metric tire sizes do not have exact corresponding alphanumeric tire sizes. Replacement tires should be of the same tire performance criteria (TPC) specification number including the same size, the same load range, and the same construction as those originally installed on the vehicle. Consult a tire dealer if you must replace the P-metric tire with other sizes. Tire companies can best recommend the closest match of alphanumeric to P-metric sizes within their own tire lines.

Driveline System Description and Operation

Driveline/Axle – Propeller Shaft

The propeller shaft is a tube with universal joints at both ends which do not require periodic maintenance, that transmit power from the transfer case or transmission output shaft to the differential.

Front Propeller Shaft Description

The front propeller shaft transmits rotating force from the transfer case to the front differential when the transfer case is engaged. The front propeller shaft connects to the transfer case using a splined slip joint.

One Piece Propeller Shaft Description

A 1 piece propeller shaft uses a splined slip joint to connect the driveline to the transmission or transfer case.

Two Piece Propeller Shaft Description

There are 3 universal joints used on the two piece propeller shaft, A center bearing assembly is used to support the propeller shaft connection point, and help isolate the vehicle from vibration.

Propeller Shaft Phasing Description

The propeller shaft is designed and built with the yoke lugs (ears) in line with each other. This produces the smoothest running shaft possible. A propeller shaft designed with built in yoke lugs in line is known as in - phase. An out of phase propeller shaft often causes vibration. The propeller shaft generates vibration from speeding up and slowing down each time the universal joint goes around. The vibration is the same as a person snapping a rope and watching the wave reaction flow to the end. An in phase propeller shaft is similar to 2 persons snapping a rope at the same time and watching the waves meet and cancel each other out. A total cancellation of vibration produces a smooth flow of power in the drive line. All splined shaft slip yokes are keyed in order to ensure proper phasing.

Universal Joint Description

The universal joint is connected to the propeller shaft. The universal consist of 4 caps with needle bearings and grease seals mounted on the trunnions of a cross or spider. These bearings and caps are greased at the factory and no periodic maintenance is required. There are 2 universal joints used in a one piece propeller shaft and 3 used in two piece propeller shaft. The bearings and caps are pressed into the yokes and held in place with snap rings, except for 2 bearings on some models witch are strapped onto the pinion flange of the differential. Universal joints are designed to handle the effects of various loads and rear axle windup conditions during acceleration and braking. The universal joint operates efficiently and safely within the designed angle variations. when the design angles are exceeded, the operational life of the joint decreases.

Center Bearing Description

Center bearings support the driveline when using 2 or more propeller shafts. The center bearing is a ball bearing mounted in a rubber cushion that attaches to a frame crossmember. The manufacturer prelubricates and seals the bearing. The cushion allows vertical motion at the driveline and helps isolate the vehicle from vibration.

Wheel Drive Shafts Description and Operation

Front Wheel Drive Shafts are flexible assemblies which consist of the following components:

- Front wheel drive shaft constant velocity joint outer joint.
- Front wheel drive shaft tri-pot joint inner joint.
- The front wheel drive shaft connects the front wheel drive shaft tri-pot joint and the front wheel drive shaft constant velocity joint.
- Wheel Drive Shaft Seal Cover 15 Series

- The front wheel drive shaft tri-pot joint is completely flexible, and moves with an in and out motion.
- The front wheel drive shaft constant velocity joint is flexible but can not move in and out.

The Wheel Drive Shaft is a balanced shaft that transmits rotational force from the front differential to the front wheels when the transfer case is engaged. The wheel drive shaft is mounted to the front differential by bolting the flange of the wheel drive shaft to the flange on the inner output shaft of the front differential. The other end of the wheel drive shaft is splined to fit into and drive the hub assembly when the transfer case is engaged. The tri-pot joint and constant velocity joint on the wheel drive shaft allows the shaft to be flexible to move with the suspension travel of the vehicle.

Front Drive Axle Description and Operation

Selectable Four Wheel Drive (S4WD) Front Axle Description and Operation

The Selectable Four Wheel Drive (S4WD) Front Axle consist of the following components:

- Differential Carrier Housing
- Differential Assembly
- Output Shafts (Left and Right Side)
- Inner Axle Shaft Housing
- Inner Axle Shaft (Right Side)
- Clutch Fork
- Clutch Fork Sleeve
- Electric Motor Actuator

The front axle on Selectable Four Wheel Drive model vehicles uses a central disconnect feature in order to engage and disengage the front axle. When the driver engages the 4WD system, the Transfer Case Control Module sends a signal to the electric motor actuator to energize and extend the plunger inside. The extended plunger moves the clutch fork and clutch fork sleeve across the inner axle shaft and the clutch fork shaft and locks the two shafts together. The locking of the two shafts allows the axle to operate in the same manner as a semi-floating rear axle. A propeller shaft connects the transfer case to the front axle. The differential carrier assembly uses a conventional ring and pinion gear set to transmit the driving force of the engine to the wheels. The open differential allows the wheels to turn at different rates of speed while the axle continues to transmit the driving force. This prevents tire scuffing when going around corners and premature wear on internal axle parts. The ring and pinion set and the differential are contained within the carrier. The axle identification number is located on top of the differential carrier assembly or on a label on the bottom of the right half of differential carrier assembly. The drive axles are completely flexible assemblies consisting of inner and outer constant velocity CV joints protected by thermoplastic boots and connected by a wheel drive shaft.

Full-Time Four Wheel Drive (F4WD) Front Axle Description and Operation

The Full-Time Four Wheel Drive (F4WD) Front Axle consist of the following components:

- Differential Carrier Housing
- Differential Assembly
- Output Shaft (Left Side)
- Inner Axle Shaft Housing
- Inner Axle Shaft (Right Side)

The front axle on Full-Time Four Wheel Drive model vehicles does not have a central disconnect feature in order to engage and disengage the front axle. The left and right axle shafts are connected directly to the differential case assembly. This allows the axle shafts and the propeller shaft to spin continuously. The transfer case controls the amount of torque applied to the front axle. The remaining components are the same as the selectable four wheel drive axle.

Rear Drive Axle Description and Operation

Rear axles for this vehicle consist of the following components:

- Differential axle housing
- Differential carrier
- Right and left axle tubes
- Right and left axle shafts

These axles are either full-floating or semi-floating. These axles can be identified as follows: the semi-floating axle has axle shafts with C-clips inside the differential carrier on the inner ends of the axle shafts. The full-floating axle has bolts at the hub retaining the axle shafts to the hub assembly. The axles can be identified by the stamping on the right side axle tube and may also be identified by the ring gear size. The ring gear sizes include 8.60, 9.50, and 10.50 inch axles. The locking differential information for these rear axles can be located in the locking differential section.

The driveline components in this vehicle have been system balanced at the factory. System balance provides for a smoother running driveline. These components include the propeller shafts, drive axles, pinion shafts and output shafts. Affixed to the rear axle is a system balanced driveline notice indicating that the driveline components have been factory tested. All components must be referenced marked before disassembly and reassembly in the exact relationship to each other the components had before removal.

An open differential has a set of four gears. Two are side gears and two are pinion gears. Some differentials have more than two pinion gears. Each side gear is splined to an axle shaft which turns when it's side gear rotates. The pinion gears are mounted on a differential pinion shaft, and the gears are free to rotate on this shaft. The pinion shaft is fitted into a bore in the differential case and is at right angles to the axle shafts. Power is transmitted through the differential as follows: the drive pinion rotates the ring gear. The ring gear, which is bolted to the differential case, rotates the case. The differential pinion, as it rotates the case, forces the pinion gears against the side gears. When both wheels have equal traction, the pinion gears do not rotate on the pinion shaft because the input force on the pinion gear is equally divided between the two side gears. Therefore, the pinion gears revolve with the pinion shaft, but do not rotate around the shaft itself. The side gears, being splined to the axle shafts and in mesh with the pinion gears rotate the axle shafts. If a vehicle were always driven in a straight line, the ring and pinion gears would be sufficient. The axle shaft could be solidly attached to the ring gear and both driving wheels would turn at equal speed. However, if it became necessary to turn a corner, the tires would scuff and slide because the differential allows the axle shafts to rotate at different speeds. When the vehicle turns a corner, the inner wheel turns slower than the outer wheel and slows it's rear axle side gear because the shaft is splined to the side gear. The rear axle pinion gears will roll around the slowed rear axle side gear, driving the rear axle side gear wheel faster.

Locking/Limited Slip Rear Axle Description and Operation

The locking differential consists of the following components:

- Differential case - 1 or 2 piece
- Locking differential spider - 2 piece case only
- Pinion gear shaft - 1 piece case only
- Differential pinion gear shaft lock bolt - 1 piece case only
- 2 clutch discs sets
- Locking differential side gear
- Thrust block
- Locking differential clutch disc guides
- Differential side gear shim
- Locking differential clutch disc thrust washer
- Locking differential governor
- Latching bracket
- Cam plate assembly

- Differential pinion gears
- Differential pinion gear thrust washers

The optional locking differential (RPO G80) enhances the traction capability of the rear axle by combining the characteristics of a limited-slip differential and the ability of the axle shafts to "lock" together when uneven traction surfaces exist. The differential accomplishes this in 2 ways. First by having a series of clutch plates at each side of the differential case to limit the amount of slippage between each wheel. Second, by using a mechanical locking mechanism to stop the rotation of the right differential side gear, or the left differential side gear on the 10.5 inch axle, in order to transfer the rotating torque of the wheel without traction to the wheel with traction. Each of these functions occur under different conditions.

Limited-Slip Function

Under normal conditions, when the differential is not locked, a small amount of limited-slip action occurs. The gear separating force developed in the right-hand (left-hand side on 10.5 inch axle) clutch pack is primarily responsible for this.

The operation of how the limited-slip function of the unit works can be explained when the vehicle makes a right-hand turn. Since the left wheel travels farther than the right wheel, it must rotate faster than the ring gear and differential case assembly. This results in the left axle and left side gear rotating faster than the differential case. The faster rotation of the left-side gear causes the pinion gears to rotate on the pinion shaft. This causes the right-side gear to rotate slower than the differential case.

Although the side gear spreading force produced by the pinion gears compresses the clutch packs, primarily the right side, the friction between the tires and the road surface is sufficient to overcome the friction of the clutch packs. This prevents the side gears from being held to the differential case.

Locking Function

Locking action occurs through the use of some special parts:

- A governor mechanism with 2 flyweights
- A latching bracket
- The left side cam plate and cam side gear

When the wheel-to-wheel speed difference is 100 RPM or more, the flyweights of the governor will fling out and one of them will contact an edge of the latching bracket. This happens because the left cam side gear and cam plate are rotating at a speed different, either slower or faster, than that of the ring gear and differential case assembly. The cam plate has teeth on its outer diameter surface in mesh with teeth on the shaft of the governor.

As the side gear rotates at a speed different than that of the differential case, the shaft of the governor rotates with enough speed to force the flyweights outward against spring tension. One of the flyweights catches its edge on the closest edge of the latching bracket, which is stationary in the differential case. This latching process triggers a chain of events.

When the governor latches, it stops rotating. A small friction clutch inside the governor allows rotation, with resistance, of the governor shaft while one flyweight is held to the differential case through the latching bracket. The purpose of the governor's latching action is to slow the rotation of the cam plate as compared to the cam side gear. This will cause the cam plate to move out of its detent position.

The cam plate normally is held in its detent position by a small wave spring and detent humps resting in matching notches of the cam side gear. At this point, the ramps of the cam plate ride up on the ramps of the cam side gear, and the cam plate compresses the left clutch pack with a self-energizing action.

As the left clutch pack is compressed, it pushes the cam plate and cam side gear slightly toward the right side of the differential case. This movement of the cam side gear pushes the thrust block which compresses the right-hand side gear clutch pack.

At this point, the force of the self-energizing clutches and the side gear separating force combine to hold the side gears to the differential case in the locking stage.

The entire locking process occurs in less than 1 second. The process works with either the left or right wheel spinning, due to the design of the governor and cam mechanism. A torque reversal of any kind will unlatch the governor, causing the cam plate to ride back down to its detent position. Cornering or deceleration during a transmission shift will cause a torque reversal of this type. The differential unit returns to its limited-slip function.

The self-energizing process would not occur if it were not for the action of one of the left clutch discs. This energizing disc provides the holding force of the ramping action to occur. It is the only disc which is splined to the cam plate itself. The other splined discs fit on the cam side gear.

If the rotating speed of the ring gear and differential case assembly is high enough, the latching bracket will pivot due to centrifugal force. This will move the flyweights so that no locking is permitted. During vehicle driving, this happens at approximately 32 km/h (20 mph) and continues at faster speeds.

When comparing the effectiveness of the locking differential, in terms of percent-of-grade capability to open and limited-slip units, the locking differential has nearly 3 times the potential of the limited-slip unit under the same conditions.

Locking Differential Torque-Limiting Disc

The locking differential design was modified in mid-1986 to include a load-limiting feature to reduce the chance of breaking an axle shaft under abusive driving conditions. The number of tangs on the energizing disc in the left-hand clutch pack was reduced allowing these tangs to shear in the event of a high-torque engagement of the differential locking mechanism.

At the time of failure of the load-limiting disc, there will be a loud bang in the rear axle and the differential will operate as a standard differential with some limited-slip action of the clutch packs at low torques.

The service procedure, when the disc tangs shear, involves replacing the left-hand clutch plates and the wave spring. It is also necessary to examine the axle shafts for twisting because at high torques it is possible to not only shear the load-limiting disc, but to also twist the axle shafts.

Transfer Case - NVG 236/246-NP8 (Two Speed Automatic)

Transfer Case Circuit Description

Transfer Case Shift Control Module

The transfer case shift control module uses the VIN information for calculations that are required for the different calibrations used based on axle ratio, transmission, tire size, and engine. The system does not know which calibration to use without this information.

Transfer Case Encoder Motor

The transfer case encoder motor consists of a permanent magnet (PM) DC motor and gear reduction assembly. It is located on the left hand side (drivers side) of the transfer case. When activated it turns the sector shaft of the transfer case (clockwise or counter clockwise) to shift the transfer case. The encoder motor is controlled with a pulse width modulated (PWM) circuit within the transfer case shift control module. This circuit consists of a driver on both the Motor Feed A and Motor Feed B circuits. The encoder motor is bi-directional to allow the motor to shift the transfer case from 2HI or 4HI to NEUTRAL and 4LO positions.

Transfer Case Encoder

The encoder is mounted to the transfer case encoder motor assembly and is replaced as an assembly. The encoder converts the sector shaft position (representing a mode or range) into electrical signals inputs to the transfer case shift control module. The module can detect what position the transfer case is in by monitoring the 4 encoder channels (P, A, B, and C). These inputs translates into AUTO 4WD, 2H, 4H, NEUTRAL, and 4L or in transition between gears.

Transfer Case Motor Lock

The transfer case motor lock is used to provide a 2H, 4H, and 4L lock-up feature. When the lock circuit is energized, the transfer case encoder motor is allowed to turn. When the transfer case is placed 2H, 4H,

or 4L the motor lock circuit has no power provided to it and the lock is applied. This assures that the transfer case remains in the current gear position. When AUTO 4WD is selected the motor lock remains applied until an adaptive mode (torque is applied to the front propshaft) is required. During an adaptive mode the motor lock circuit is energized and the motor lock is released, enabling the encoder motor to turn and apply torque to the front propshaft.

Transfer Case Speed Sensors

There are three speed sensors on the automatic transfer case (ATC), two on the rear output shaft and one on the front output shaft. Each speed sensor is a permanent magnet (PM) generator. The PM generator produces a pulsing AC voltage. The AC voltage level and number of pulses increases as speed increases.

Vehicle Speed Sensor

One of the two on the rear output shaft is the vehicle speed sensor (VSS) input to the/powertrain control module (PCM). The PCM sends this information to the transfer case shift control module via the Class 2 Serial Data bus.

Rear Propshaft Speed Sensor

The transfer case shift control module converts the pulsating AC voltage from the rear transfer case speed sensor to a rear propshaft speed in RPM to be used for calculations. The rear propshaft speed can be displayed with a scan tool.

Front Propshaft Speed Sensor

The transfer case shift control module converts the pulsating AC voltage from the front transfer case speed sensor to front propshaft speed in RPM to be used for calculations, and to monitor the difference between the front and rear sensor speed. It is also used in the AUTO 4WD mode of operation to determine the amount of slip and the percent of torque to apply to the front axle. The front propshaft speed can be displayed with a scan tool.

SERVICE indicator (4WD/AWD) Lamp

The SERVICE indicator (4WD/AWD) lamp is an integral part of the cluster and cannot be serviced separately. This lamp is used to inform the driver of the vehicle of malfunctions within the automatic transfer case (ATC) system. The SERVICE indicator (4WD/AWD) lamp is controlled by the transfer case shift control module via a Class 2 message or by a Sevice Indicator Control Circuit.

Braking System Description and Operation

Hydraulic Brake System Description and Operation

System Component Description

The hydraulic brake system consists of the following:

Hydraulic Brake Master Cylinder Fluid Reservoir

Contains supply of brake fluid for the hydraulic brake system.

Hydraulic Brake Master Cylinder

Converts mechanical input force into hydraulic output pressure.

Hydraulic output pressure is distributed from the master cylinder through two hydraulic circuits, supplying diagonally-opposed wheel apply circuits.

Hydraulic Brake Pressure Balance Control System

Regulates brake fluid pressure delivered to hydraulic brake wheel circuits, in order to control the distribution of braking force.

Pressure balance control is achieved through dynamic rear proportioning (DRP), which is a function of the ABS modulator.

Hydraulic Brake Pipes and Flexible Brake Hoses

Carries brake fluid to and from hydraulic brake system components.

Hydraulic Brake Wheel Apply Components

Converts hydraulic input pressure into mechanical output force.

System Operation

Mechanical force is converted into hydraulic pressure by the master cylinder, regulated to meet braking system demands by the pressure balance control system, and delivered to the hydraulic brake wheel circuits by the pipes and flexible hoses. The wheel apply components then convert the hydraulic pressure back into mechanical force which presses linings against rotating brake system components.

Brake Assist System Description and Operation

System Component Description

The brake assist system consists of the following:

Brake Pedal

Receives, multiplies and transfers brake system input force from driver.

Brake Pedal Pushrod

Transfers multiplied input force received from brake pedal to brake booster.

Vacuum Brake Booster

Uses source vacuum to decrease effort required by driver when applying brake system input force.

When brake system input force is applied, air at atmospheric pressure is admitted to the rear of both vacuum diaphragms, providing a decrease in brake pedal effort required. When input force is removed, vacuum replaces atmospheric pressure within the booster.

Vacuum Source

Supplies force used by vacuum brake booster to decrease brake pedal effort.

Vacuum Source Delivery System

Enables delivery and retention of source vacuum for vacuum brake booster.

System Operation

Brake system input force is multiplied by the brake pedal and transferred by the pedal pushrod to the hydraulic brake master cylinder. Effort required to apply the brake system is reduced by the vacuum brake booster.

Disc Brake System Description and Operation

System Component Description

The disc brake system consists of the following components:

Disc Brake Pads

Applies mechanical output force from the hydraulic brake calipers to friction surfaces of brake rotors.

Disc Brake Rotors

Uses mechanical output force applied to friction surfaces from the disc brake pads to slow speed of tire and wheel assembly rotation.

Disc Brake Pad Hardware

Secures disc brake pads firmly in proper relationship to the hydraulic brake calipers. Enables a sliding motion of brake pads when mechanical output force is applied.

Disc Brake Caliper Hardware

Provides mounting for hydraulic brake caliper and secures the caliper firmly in proper relationship to caliper bracket. Enables a sliding motion of the brake caliper to the brake pads when mechanical output force is applied.

System Operation

Mechanical output force is applied from the hydraulic brake caliper pistons to the inner brake pads. As the pistons press the inner brake pads outward, the caliper housings draw the outer brake pads inward. This allows the output force to be equally distributed. The brake pads apply the output force to the friction surfaces on both sides of the brake rotors, which slows the rotation of the tire and wheel assemblies. The correct function of both the brake pad and brake caliper hardware is essential for even distribution of braking force.

Park Brake System Description and Operation

The park brake system is applied by depressing the park brake pedal. Applying the park brake pedal places tension on the park brake cables, which actuates the rear park brake mechanism. The system mechanically forces the parking brake shoes against the drum of the rotor, locking the rear brakes.

All vehicles are equipped with a four-wheel disc braking system. The park brake system uses brake shoes which are inside a brake drum that is part of a one-piece drum/rotor casting. The brake shoes are mechanically applied to lock the rear brakes.

This section covers park brake component replacement and adjustment. The park brake must be adjusted any time the park brake cables have been replaced or disconnected, or if the park brake holding ability is inadequate. The lever on the disc brakes must also be properly seated when this procedure is performed.

The park brake is not designed for use in the place of service brakes and should be applied only after the vehicle is brought to a complete stop, except in an emergency. Before working on the park brake system, make sure the service brakes are in good working order and adjusted properly.

Park Brake Lever

The park brake lever is located on the left side of the driver's compartment and is activated by foot pressure. The park brake lever incorporates a cable self adjusting mechanism. The park brake release handle under the instrument panel allows the driver to release the park brake and control the foot lever release velocity. The park brake lever requires minimal pedal effort to engage the park brake.

Cable System

The park brake uses a cable system that includes a front cable, an intermediate cable with a threaded rod and an equalizer, and two rear cables. The front cable connects to the park brake lever on one end and to the intermediate cable at the other end. The rear cables attach to the equalizer on one end and to the lever on the disc brakes at the other end.

This vehicle is equipped with coated park brake cable assemblies. The wire strand is coated with a nylon material that slides over plastic seals inside the conduit end fittings. This is for corrosion protection and reduced park brake effort.

ABS Description and Operation

Antilock Brake System

When wheel slip is detected during a brake application, the ABS enters antilock mode. During antilock braking, hydraulic pressure in the individual wheel circuits is controlled to prevent any wheel from slipping. A separate hydraulic line and specific solenoid valves are provided for each wheel. The ABS can decrease, hold, or increase hydraulic pressure to each wheel brake. The ABS cannot, however, increase hydraulic pressure above the amount which is transmitted by the master cylinder during braking.

During antilock braking, a series of rapid pulsations is felt in the brake pedal. These pulsations are caused by the rapid changes in position of the individual solenoid valves as the EBCM responds to wheel speed sensor inputs and attempts to prevent wheel slip. These pedal pulsations are present only during antilock braking and stop when normal braking is resumed or when the vehicle comes to a stop. A ticking or popping noise may also be heard as the solenoid valves cycle rapidly. During antilock braking on dry pavement, intermittent chirping noises may be heard as the tires approach slipping. These noises and pedal pulsations are considered normal during antilock operation.

Vehicles equipped with ABS may be stopped by applying normal force to the brake pedal. Brake pedal operation during normal braking is no different than that of previous non-ABS systems. Maintaining a constant force on the brake pedal provides the shortest stopping distance while maintaining vehicle stability.

Engine Description and Operation

Drive Belt System Description

The drive belt system consists of the following components:

- The drive belt
- The drive belt tensioner
- The drive belt idler pulley
- The crankshaft balancer pulley
- The accessory drive component mounting brackets
- The accessory drive components
  - The power steering pump, if belt driven
  - The generator
  - The A/C compressor, if equipped
  - The engine cooling fan, if belt driven
  - The water pump, if belt driven
  - The vacuum pump, if equipped
  - The air compressor, if equipped

The drive belt system may use one belt or two belts. The drive belt is thin so that it can bend backwards and has several ribs to match the grooves in the pulleys. There also may be a V-belt style belt used to drive certain accessory drive components. The drive belts are made of different types of rubbers (chloroprene or EPDM) and have different layers or plys containing either fiber cloth or cords for reinforcement.

Both sides of the drive belt may be used to drive the different accessory drive components. When the back side of the drive belt is used to drive a pulley, the pulley is smooth.

The drive belt is pulled by the crankshaft balancer pulley across the accessory drive component pulleys. The spring loaded drive belt tensioner keeps constant tension on the drive belt to prevent the drive belt from slipping. The drive belt tensioner arm will move when loads are applied to the drive belt by the accessory drive components and the crankshaft.

The drive belt system may have an idler pulley, which is used to add wrap to the adjacent pulleys. Some systems use an idler pulley in place of an accessory drive component when the vehicle is not equipped with the accessory.

Engine Mechanical –5.3, 6.0L

General Specifications 5.3L (LM7 VIN T / L59 VIN Z)

Application	Specification	
	Metric	English
General Data		
• Engine Type	V8	
• Displacement	5.3L	325 CID
• Bore	96.000-96.018 mm	3.779-3.78 in
• Stroke	92.0 mm	3.622 in
• Compression Ratio	9.45:1	
• Firing Order	1-8-7-2-6-5-4-3	
• Spark Plug Gap	1.524 mm	0.06 in
Lubrication System		
• Oil Capacity (without Oil Filter Change)	4.73 Liters	5.0 Quarts
• Oil Capacity (with Oil Filter Change)	5.68 Liters	6.0 Quarts
• Oil Pressure (Minimum--Hot)	41 kPa at 1,000 engine RPM 124 kPa at 2,000 engine RPM 165 kPa at 4,000 engine RPM	6 psig at 1,000 engine RPM 18 psig at 2,000 engine RPM 24 psig at 4,000 engine RPM
• Oil Type	5W-30	
Camshaft		
• Camshaft End Play	0.025-0.305 mm	0.001-0.012 in
• Camshaft Journal Diameter	54.99-55.04 mm	2.164-2.166 in
• Camshaft Journal Diameter Out-of-Round	0.025 mm	0.001 in
• Camshaft Lobe Lift (Intake)	6.82 mm	0.268 in
• Camshaft Lobe Lift (Exhaust)	6.96 mm	0.274 in
• Camshaft Runout (Measured at the Intermediate Journals)	0.05 mm	0.002 in
Connecting Rod		
• Connecting Rod Bearing Bore Diameter	56.505-56.525 mm	2.224-2.225 in
• Connecting Rod Bearing Bore Out-of-Round	0.004-0.008 mm	0.00015-0.0003 in
• Connecting Rod Bearing Clearance (Production)	0.023-0.065 mm	0.0009-0.0025 in
• Connecting Rod Bearing Clearance (Service Limit)	0.023-0.076 mm	0.0009-0.003 in
• Connecting Rod Side Clearance	0.11-0.51 mm	0.00433-0.02 in
Crankshaft		
• Crankshaft Bearing Clearance (Production)	0.020-0.052 mm	0.0008-0.0021 in
• Crankshaft Bearing Clearance (Service)	0.020-0.065 mm	0.0008-0.0025 in
• Crankshaft Connecting Rod Journal Diameter (Production)	53.318-53.338 mm	2.099-2.1 in
• Crankshaft Connecting Rod Journal Diameter (Service Limit)	53.308 mm (Minimum)	2.0987 in (Minimum)
• Crankshaft Connecting Rod Journal Taper (Production)	0.005 mm (Maximum for one half of the Journal Length)	0.0002 in (Maximum for one half of the Journal Length)

• Crankshaft Connecting Rod Journal Taper (Service Limit)	0.02 mm (Maximum)	0.00078 in (Maximum)
• Crankshaft Connecting Rod Journal Out-of-Round (Production)	0.005 mm	0.0002 in
• Crankshaft Connecting Rod Journal Out-of-Round (Service Limit)	0.01 mm	0.0004 in
• Crankshaft End Play	0.04-0.2 mm	0.0015-0.0078 in
• Crankshaft Main Journal Diameter (Production)	64.993-65.007 mm	2.558-2.5593 in
• Crankshaft Main Journal Diameter (Service Limit)	64.993 mm	2.558 in
• Crankshaft Main Journal Out-of-Round (Production)	0.003 mm	0.0001 in
• Crankshaft Main Journal Out-of-Round (Service Limit)	0.008 mm	0.0003 in
• Crankshaft Main Journal Taper (Production)	0.01 mm	0.0004 in
• Crankshaft Main Journal Taper (Service Limit)	0.02 mm	0.00078 in
• Crankshaft Reluctor Ring Runout (Measured 1.0 mm (0.04 in) Below the Tooth Diameter)	0.7 mm (Maximum)	0.028 in (Maximum)
• Crankshaft Runout (at Rear Flange)	0.05 mm (Maximum)	0.002 in (Maximum)
• Crankshaft Thrust Wall Runout	0.025 mm	0.001 in
• Crankshaft Thrust Wall Width (Production)	26.14-26.32 mm	1.029-1.032 in
• Crankshaft Thrust Wall Width (Service)	26.2 mm (Maximum)	1.0315 in (Maximum)
Cylinder Bore		
• Cylinder Bore Diameter (Production)	96.0-96.018 mm	3.779-3.78 in
Cylinder Head		
• Cylinder Head Engine Block Deck Flatness (Measured within a 152.4 mm (6.0 in) area)	0.08 mm	0.003 in
• Cylinder Head Engine Block Deck Flatness (Measuring the Overall Length of the Cylinder Head)	0.1 mm	0.004 in
• Cylinder Head Exhaust Manifold Deck Flatness	0.22 mm	0.008 in
• Cylinder Head Height (Measured from the Head Deck to the Valve Rocker Arm Cover Seal Surface)	120.2 mm	4.732 in
• Cylinder Head Intake Manifold Deck Flatness	0.22 mm	0.008 in
Engine Block		
• Camshaft Bearing Bore 1 and 5 Diameter	59.12-59.17 mm	2.327-2.329 in
• Camshaft Bearing Bore 2 and 4 Diameter	58.87-58.92 mm	2.317-2.319 in
• Camshaft Bearing Bore 3 Diameter	58.62-58.67 mm	2.307-2.309 in
• Engine Block Cylinder Head Deck Surface Flatness (Measured within a 152.4 mm (6.0 in) area)	0.11 mm	0.004 in
• Engine Block Cylinder Head Deck Surface Flatness (Measuring the Overall Length of the Block Deck)	0.22 mm	0.008 in
• Engine Block Cylinder Head Deck Height (Measuring from the Centerline of Crankshaft to the Deck Face)	234.57-234.82 mm	9.235-9.245 in
• Main Bearing Bore Diameter (Production)	69.871-69.889 mm	2.750-2.751 in
• Main Bearing Bore Diameter Out-of-Round	0.005 mm	0.0002 in
• Valve Lifter Bore Diameter (Production)	21.417-21.443 mm	0.843-0.844 in

Intake Manifold		
• Intake Manifold Cylinder Head Deck Flatness (Measured within a 200 mm (7.87 in) Area that Includes Two Runner Port Openings)	0.3 mm	0.118 in
Oil Pan and Front/Rear Cover Alignment		
• Oil Pan to Rear of Engine Block Alignment (at Transmission Bellhousing Mounting Surface)	0.0-0.25 mm (Maximum)	0.0-0.01 in (Maximum)
• Front Cover Alignment (at Oil Pan Surface)	0.0-0.5 mm	0.0-0.02 in
• Rear Cover Alignment (at Oil Pan Surface)	0.0-0.5 mm	0.0-0.02 in
Piston		
• Piston - Piston Diameter - Measured Over Skirt Coating	96.002-96.036 mm	3.779-3.78 in
• Piston Out-of-Round (Service Limit)	0.018 mm	0.0007 in
• Piston - Piston to Bore Clearance - Production	-0.036 to +0.016 mm	-0.0014 to +0.0006 in
• Piston - Piston to Bore Clearance - Service Limit with Skirt Coating Worn Off	0.07 mm	0.0028 in
Piston Pin		
• Piston Pin Clearance to Piston Bore (Production)	0.012-0.022 mm	0.00047-0.00086 in
• Piston Pin Clearance to Piston Bore (Service Limit)	0.012-0.024 mm (Maximum)	0.00047-0.00094 in (Maximum)
• Piston Pin Diameter	23.997-24.0 mm	0.9447-0.9448 in
• Piston Pin Fit in Connecting Rod	0.02-0.043 mm (Interference)	0.00078-0.00169 in (Interference)
Piston Rings		
• Piston Compression Ring End Gap (Production--Top) (Measured in Cylinder Bore)	0.23-0.38 mm	0.009-0.0149 in
• Piston Compression Ring End Gap (Production--2nd) (Measured in Cylinder Bore)	0.44-0.64 mm	0.0173-0.0251 in
• Piston Oil Ring End Gap (Production) (Measured in Cylinder Bore)	0.18-0.69 mm	0.0070-0.0271 in
• Piston Compression Ring End Gap (Service--Top) (Measured in Cylinder Bore)	0.3-0.45 mm (Maximum)	0.012-0.018 in (Maximum)
• Piston Compression Ring End Gap (Service--2nd) (Measured in Cylinder Bore)	0.51-0.71 mm (Maximum)	0.02-0.028 in (Maximum)
• Piston Oil Ring End Gap-Service Limit (Measured in Cylinder Bore)	0.25-0.76 mm (Maximum)	0.01-0.03 in (Maximum)
• Piston Compression Ring Groove Clearance (Production--Top)	0.04-0.085 mm	0.00157-0.003346 in
• Piston Compression Ring Groove Clearance (Production--2nd)	0.04-0.08 mm	0.00157-0.003149 in
• Piston Oil Ring Groove Clearance (Production)	0.01-0.22 mm	0.0004-0.00866 in
• Piston Compression Ring Groove Clearance (Service--Top)	0.04-0.085 mm (Maximum)	0.00157-0.003346 in (Maximum)
• Piston Compression Ring Groove Clearance (Service--2nd)	0.04-0.08 mm (Maximum)	0.00157-0.003149 in (Maximum)
• Piston Oil Ring Groove Clearance (Service Limit)	0.01-0.22 mm (Maximum)	0.0004-0.00866 in (Maximum)

Valve System		
• Valve Face Angle	45 degrees	
• Valve Guide Installed Height (Measured from the Cylinder Head Spring Seat Surface to the Top of the Valve Guide)	17.32 mm	0.682 in
• Valve Lash	Net Lash - No Adjustment	
• Valve Lift (Exhaust)	11.85 mm	0.466 in
• Valve Lift (Intake)	11.6 mm	0.457 in
• Valve Lifter	Hydraulic Roller	
• Valve Margin	1.25 mm	0.05 in
• Valve Rocker Arm Ratio	1.70:1	
• Valve Seat Angle	46 degrees	
• Valve Seat Runout	0.05 mm (Maximum)	0.002 in (Maximum)
• Valve Seat Width (Exhaust)	1.78 mm	0.07 in
• Valve Seat Width (Intake)	1.02 mm	0.04 in
• Valve Spring Free Length	52.9 mm	2.08 in
• Valve Spring Installed Height (Exhaust)	45.75 mm	1.8 in
• Valve Spring Installed Height (Intake)	45.75 mm	1.8 in
• Valve Spring Pressure (Closed)	340 N at 45.75 mm	76 lb at 1.8 in
• Valve Spring Pressure (Open)	980 N at 33.55 mm	220 lb at 1.32 in
• Valve Stem Clearance (Production--Exhaust)	0.025-0.066 mm	0.001-0.0026 in
• Valve Stem Clearance (Production--Intake)	0.025-0.066 mm	0.001-0.0026 in
• Valve Stem Clearance (Service--Exhaust)	0.093 mm (Maximum)	0.0037 in (Maximum)
• Valve Stem Clearance (Service--Intake)	0.093 mm (Maximum)	0.0037 in (Maximum)
• Valve Stem Diameter (Production)	7.955-7.976 mm	0.3132-0.314 in
• Valve Stem Diameter (Service)	7.95 mm (Minimum)	0.313 in (Minimum)
• Valve Stem Oil Seal Installed Height (Measured from the Valve Spring Shim to Top Edge of Seal Body - First Design Seal)	18.1-19.1 mm	0.712-0.752 in

General Specifications 6.0L (LQ4 VIN U / LQ9 VIN N)

Application	Specification	
	Metric	English
General Data		
• Engine Type	V8	
• Displacement	6.0L	364 CID
• Bore	101.618-101.636 mm	4.0007-4.0014 in
• Stroke	92.0 mm	3.622 in
• Compression Ratio - LQ4 VIN U	9.40:1	
• Compression Ratio - LQ9 VIN N	10.0:1	
• Firing Order	1-8-7-2-6-5-4-3	
• Spark Plug Gap	1.524 mm	0.06 in
Lubrication System		
• Oil Capacity (without Oil Filter Change)	4.73 Liters	5.0 Quarts
• Oil Capacity (with Oil Filter Change)	5.68 Liters	6.0 Quarts
• Oil Pressure (Minimum--Hot)	41 kPa at 1,000 engine RPM 124 kPa at 2,000 engine RPM 165 kPa at 4,000 engine RPM	6 psig at 1,000 engine RPM 18 psig at 2,000 engine RPM 24 psig at 4,000 engine RPM
• Oil Type	5W-30	
Camshaft		
• Camshaft End Play	0.025-0.305 mm	0.001-0.012 in
• Camshaft Journal Diameter	54.99-55.04 mm	2.164-2.166 in
• Camshaft Journal Diameter Out-of-Round	0.025 mm	0.001 in
• Camshaft Lobe Lift (Intake)	6.96 mm	0.274 in
• Camshaft Lobe Lift (Exhaust)	7.13 mm	0.281 in
• Camshaft Runout (Measured at the Intermediate Journals)	0.05 mm	0.002 in
Connecting Rod		
• Connecting Rod Bearing Bore Diameter	56.505-56.525 mm	2.224-2.225 in
• Connecting Rod Bearing Bore Out-of-Round - LQ4	0.004-0.008 mm	0.00015-0.0003 in
• Connecting Rod Bearing Bore Out-of-Round - LQ9	0.006 mm	0.00023 in
• Connecting Rod Bearing Clearance (Production)	0.023-0.065 mm	0.0009-0.0025 in
• Connecting Rod Bearing Clearance (Service Limit)	0.023-0.076 mm	0.0009-0.003 in
• Connecting Rod Side Clearance	0.11-0.51 mm	0.00433-0.02 in
Crankshaft		
• Crankshaft Bearing Clearance (Production)	0.020-0.052 mm	0.0008-0.0021 in
• Crankshaft Bearing Clearance (Service)	0.020-0.065 mm	0.0008-0.0025 in
• Crankshaft Connecting Rod Journal Diameter (Production)	53.318-53.338 mm	2.099-2.1 in
• Crankshaft Connecting Rod Journal Diameter (Service Limit)	53.308 mm (Minimum)	2.0987 in (Minimum)
• Crankshaft Connecting Rod Journal Taper (Production)	0.005 mm (Maximum for one half of the Journal Length)	0.0002 in (Maximum for one half of the Journal Length)
• Crankshaft Connecting Rod Journal Taper (Service Limit)	0.02 mm (Maximum)	0.00078 in (Maximum)

• Crankshaft Connecting Rod Journal Out-of-Round (Production)	0.005 mm	0.0002 in
• Crankshaft Connecting Rod Journal Out-of-Round (Service Limit)	0.01 mm	0.0004 in
• Crankshaft End Play	0.04-0.2 mm	0.0015-0.0078 in
• Crankshaft Main Journal Diameter (Production)	64.993-65.007 mm	2.558-2.5593 in
• Crankshaft Main Journal Diameter (Service Limit)	64.993 mm	2.558 in
• Crankshaft Main Journal Out-of-Round (Production)	0.003 mm	0.0001 in
• Crankshaft Main Journal Out of Round (Service Limit)	0.008 mm	0.0003 in
• Crankshaft Main Journal Taper (Production)	0.01 mm	0.0004 in
• Crankshaft Main Journal Taper (Service Limit)	0.02 mm	0.00078 in
• Crankshaft Reluctor Ring Runout (Measured 1.0 mm (0.04 in) Below the Tooth Diameter)	0.7 mm (Maximum)	0.028 in (Maximum)
• Crankshaft Runout (at Rear Flange)	0.05 mm (Maximum)	0.02 in (Maximum)
• Crankshaft Thrust Wall Runout	0.025 mm	0.001 in
• Crankshaft Thrust Wall Width (Production)	26.14-26.22 mm	1.029-1.0315 in
• Crankshaft Thrust Wall Width (Service)	26.2 mm (Maximum)	1.0315 in (Maximum)
Cylinder Bore		
• Cylinder Bore Diameter (Production)	101.618-101.636 mm	4.0007-4.0014 in
Cylinder Head		
• Cylinder Head Engine Block Deck Flatness (Measured within a 156 mm (6.1 in) area)	0.08 mm	0.003 in
• Cylinder Head Engine Block Deck Flatness (Measuring the Overall Length of the Cylinder Head)	0.1 mm	0.004 in
• Cylinder Head Exhaust Manifold Deck Flatness	0.13 mm	0.005 in
• Cylinder Head Height (Measured from the Head Deck to the Valve Rocker Arm Cover Seal Surface)	120.2 mm (Minimum)	4.732 in (Minimum)
• Cylinder Head Intake Manifold Deck Flatness	0.08 mm	0.003 in
Engine Block		
• Camshaft Bearing Bore 1 and 5 Diameter	59.12-59.17 mm	2.327-2.329 in
• Camshaft Bearing Bore 2 and 4 Diameter	58.87-58.92 mm	2.317-2.319 in
• Camshaft Bearing Bore 3 Diameter	58.62-58.67 mm	2.307-2.309 in
• Engine Block Cylinder Head Deck Surface Flatness (Measured within a 156 mm (6.1 in) area)	0.11 mm	0.004 in
• Engine Block Cylinder Head Deck Surface Flatness (Measuring the Overall Length of the Block Deck)	0.22 mm	0.008 in
• Engine Block Cylinder Head Deck Height (Measuring from the Centerline of Crankshaft to the Head Deck)	234.57-234.82 mm	9.235-9.245 in
• Main Bearing Bore Diameter (Production)	69.871-69.889 mm	2.750-2.751 in
• Main Bearing Bore Diameter Out-of-Round	0.006 mm	0.0002 in
• Valve Lifter Bore Diameter (Production)	21.417-21.443 mm	0.843-0.844 in
Intake Manifold		
• Intake Manifold Cylinder Head Deck Flatness (Measured within a 200 mm Area that Includes Two Runner Port Openings)	0.3 mm	0.118 in
Oil Pan and Front/Rear Cover Alignment		
• Oil Pan to Rear of Engine Block Alignment (at Transmission Bellhousing Mounting Surface)	0.0-0.25 mm (Maximum)	0.0-0.01 in (Maximum)
• Front Cover Alignment (at Oil Pan Surface)	0.0-0.5 mm	0.0-0.02 in
• Rear Cover Alignment (at Oil Pan Surface)	0.0-0.5 mm	0.0-0.02 in

Piston		
• Piston - Piston Diameter - LQ4 Measured Over Skirt Coating	101.606-101.640 mm	4.0002-4.0016 in
• Piston - Piston Diameter - LQ9 Measured Over Skirt Coating	101.611-101.642 mm	4.0-4.001 in
• Piston - Piston-to-Bore Clearance - LQ4 Production	-0.022 to +0.03 mm	-0.0009 to +0.0012 in
• Piston - Piston-to-Bore Clearance - LQ9 Production	-0.022 to +0.030 mm	-0.009 to +0.0012 in
• Piston - Piston-to-Bore Clearance - LQ4 Service Limit with Skirt Coating Worn Off	0.07 mm	0.0028 in
• Piston - Piston-to-Bore Clearance -LQ9 Service Limit with Skirt Coating Worn Off	0.08 mm	0.0031 in
Piston Pin		
• Piston Pin Diameter - Press Fit Pin	23.997-24.0 mm	0.9447-0.9448 in
• Piston Pin Diameter - Full-Floating Pin	23.952-23.955 mm	0.943-0.943 in
• Piston Pin Fit in Connecting Rod - Press Fit Pin	0.020-0.043 mm (Interference)	0.00078-0.00169 in (Interference)
• Piston Pin Fit in Connecting Rod - Full-Floating Pin Production	0.007-0.020 mm	0.00027-0.00078 in
• Piston Pin Fit in Connecting Rod - Full-Floating Pin Service Limit	0.007-0.022 mm	0.00027-0.00086 in
• Piston Pin to Piston Bore Clearance - LQ4 Production	0.007-0.020 mm	0.00027-0.00078 in
• Piston Pin to Piston Bore Clearance - LQ4 Service Limit	0.007-0.021 mm	0.00027-0.00082 in
• Piston Pin to Piston Bore Clearance - LQ9 Production Measured at Pin End	0.002-0.010 mm	0.00008-0.0004 in
• Piston Pin to Piston Bore Clearance - LQ9 Service Limit Measured at Pin End	0.002-0.015 mm	0.00008-0.0006 in
Piston Rings		
• Piston Compression Ring End Gap - LQ4 Production - Top Measured in Cylinder Bore	0.31-0.52 mm	0.0122-0.02 in
• Piston Compression Ring End Gap - LQ4 Production - 2nd Measured in Cylinder Bore	0.51-0.77 mm	0.02-0.03 in
• Piston Oil Ring End Gap - LQ4 Production Measured in Cylinder Bore	0.31-0.87 mm	0.0122-0.034 in
• Piston Compression Ring End Gap - LQ4 Service - Top Measured in Cylinder Bore	0.31-0.59 mm	0.0122-0.023 in
• Piston Compression Ring End Gap - LQ4 Service - 2nd Measured in Cylinder Bore	0.51-0.84 mm	0.02-0.033 in
• Piston Oil Ring End Gap - LQ4 Service Measured in Cylinder Bore	0.31-0.94 mm	0.0122-0.037 in
• Piston Compression Ring End Gap - LQ9 Production - Top Measured in Cylinder Bore	0.31-0.52 mm	0.0122-0.020 in
• Piston Compression Ring End Gap - LQ9 Production - 2nd Measured in Cylinder Bore	0.51-0.77 mm	0.020-0.030 in
• Piston Oil Ring End Gap - LQ9 Production Measured in Cylinder Bore	0.31-0.87 mm	0.0122-0.034 in
• Piston Compression Ring End Gap - LQ9 Service - Top Measured in Cylinder Bore	0.31-0.59 mm	0.0122-0.023 in
• Piston Compression Ring End Gap - LQ9 Service - 2nd Measured in Cylinder Bore	0.51-0.84 mm	0.020-0.033 in

• Piston Oil Ring End Gap - LQ9 Service Measured in Cylinder Bore	0.31-0.94 mm	0.0122-0.037 in
• Piston Compression Ring Groove Clearance - LQ4 Production - Top	0.04-0.08 mm	0.00157-0.0031 in
• Piston Compression Ring Groove Clearance - LQ4 Production - 2nd	0.039-0.079 mm	0.0015-0.0031 in
• Piston Oil Ring Groove Clearance - LQ4 Production	0.015-0.2 mm	0.0006-0.0079 in
• Piston Compression Ring Groove Clearance - LQ4 Service - Top	0.04-0.08 mm	0.00157-0.0031 in
• Piston Compression Ring Groove Clearance - LQ4 Service - 2nd	0.039-0.079 mm	0.0015-0.0031 in
• Piston Oil Ring Groove Clearance - LQ4 Service	0.015-0.2 mm	0.0006-0.0079 in
• Piston Compression Ring Groove Clearance - LQ9 Production - Top	0.035-0.080 mm	0.0014-0.0031 in
• Piston Compression Ring Groove Clearance - LQ9 Production - 2nd	0.034-0.079 mm	0.0013-0.0030 in
• Piston Oil Ring Groove Clearance - LQ9 Production	0.012-0.20 mm	0.00047-0.00078 in
• Piston Compression Ring Groove Clearance - LQ9 Service - Top	0.035-0.080 mm	0.0014-0.0031 in
• Piston Compression Ring Groove Clearance - LQ9 Service - 2nd	0.034-0.079 mm	0.0013-0.0030 in
• Piston Oil Ring Groove Clearance - LQ9 Service	0.012-0.20 mm	0.00047-0.0078 in
Valve System		
• Valve Face Angle	45 degrees	
• Valve Lash	Net Lash-No Adjustment	
• Valve Lift (Exhaust)	12.16 mm	0.479 in
• Valve Lift (Intake)	11.79 mm	0.464 in
• Valve Lifter	Hydraulic Roller	
• Valve Margin	1.25 mm	0.05 in
• Valve Rocker Arm Ratio	1.70:1	
• Valve Seat Angle	46 degrees	
• Valve Seat Runout	0.05 mm (Maximum)	0.002 in (Maximum)
• Valve Seat Width (Exhaust)	1.78 mm	0.07 in
• Valve Seat Width (Intake)	1.02 mm	0.04 in
• Valve Spring Free Length	52.9 mm	2.08 in
• Valve Spring Installed Height (Exhaust)	45.75 mm	1.8 in
• Valve Spring Installed Height (Intake)	45.75 mm	1.8 in
• Valve Spring Pressure (Closed)	340 N at 45.75 mm	76 lb at 1.8 in
• Valve Spring Pressure (Open)	980 N at 33.55 mm	220 lb at 1.32 in
• Valve Stem Clearance (Production--Exhaust)	0.025-0.066 mm	0.001-0.0026 in
• Valve Stem Clearance (Production--Intake)	0.025-0.066 mm	0.001-0.0026 in
• Valve Stem Clearance (Service--Exhaust)	0.093 mm (Maximum)	0.0037 in (Maximum)
• Valve Stem Clearance (Service--Intake)	0.093 mm (Maximum)	0.0037 in (Maximum)
• Valve Stem Diameter (Production--Exhaust)	7.955-7.976 mm	0.3132-0.314 in
• Valve Stem Diameter (Production--Intake)	7.955-7.976 mm	0.3132-0.314 in
• Valve Stem Diameter (Service--Exhaust)	7.95 mm (Minimum)	0.313 in (Minimum)
• Valve Stem Diameter (Service--Intake)	7.95 mm (Minimum)	0.313 in (Minimum)

• Valve Stem Oil Seal Installed Height (Measured from the Valve Spring Seat to Top Edge of Seal Body - First Design Seal)	18.1-19.1 mm	0.712-0.752 in

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Accelerator Control Cable Bracket Bolt	10 N·m	89 lb in
Accessory Drive Belt Tensioner Bolt	50 N·m	37 lb ft
Air Conditioning (A/C) Belt Tensioner Bolt	50 N·m	37 lb ft
Automatic Transmission Oil Level Indicator Tube Nut	18 N·m	13 lb ft
Battery Cable Channel Bolt	12 N·m	106 lb in
Camshaft Retainer Bolt	25 N·m	18 lb ft
Camshaft Sensor Bolt	25 N·m	18 lb ft
Camshaft Sprocket Bolt	35 N·m	26 lb ft
Clutch Pressure Plate Bolt	70 N·m	52 lb ft
Crankshaft Balancer Bolt (Installation Pass-to Ensure the Balancer is Completely Installed)	330 N·m	240 lb ft
Crankshaft Balancer Bolt (First Pass-Install a NEW Bolt After the Installation Pass and Tighten as Described in the First and Final Passes)	50 N·m	37 lb ft
Crankshaft Balancer Bolt (Final Pass)	140 degrees	
Crankshaft Oil Deflector Nut	25 N·m	18 lb ft
Crossbar Bolt	100 N·m	74 lb ft
Cylinder Head Bolt (First Pass all M11 Bolts in Sequence)	30 N·m	22 lb ft
Cylinder Head Bolt (Second Pass all M11 Bolts in Sequence)	90 degrees	
Cylinder Head Bolt (Final Pass all M11 Bolts in Sequence-Excluding the Medium Length Bolts at the Front and Rear of Each Cylinder Head)	90 degrees	
Cylinder Head Bolt (Final Pass M11 Medium Length Bolts at the Front and Rear of Each Cylinder Head in Sequence)	50 degrees	
Cylinder Head Bolt (M8 Inner Bolts in Sequence)	30 N·m	22 lb ft
Drive Belt Idler Pulley Bolt	50 N·m	37 lb ft
Engine Flywheel Bolt (First Pass)	20 N·m	15 lb ft
Engine Flywheel Bolt (Second Pass)	50 N·m	37 lb ft
Engine Flywheel Bolt (Final Pass)	100 N·m	74 lb ft
Engine Front Cover Bolt	25 N·m	18 lb ft
Engine Mount Bolt	50 N·m	37 lb ft
Engine Mount Bracket Bolt	75 N·m	55 lb ft
Engine Mount-to-Engine Mount Bracket Bolt	50 N·m	37 lb ft
Engine Rear Cover Bolt	25 N·m	18 lb ft
Engine Service Lift Bracket (M10 Bolt)	50 N·m	37 lb ft
Engine Service Lift Bracket (M8 Bolt)	25 N·m	18 lb ft
Engine Shield Bolt	20 N·m	15 lb ft
Engine Sight Shield Bolt (5.3 L, and 6.0 L without RPO's Y91 and Z88)	10 N·m	89 lb in
Engine Sight Shield Bolt (6.0 L with RPO's Y91 and Z88)	9 N·m	80 lb in
Engine Sight Shield Retainer Bolt	5 N·m	44 lb in
Engine Wiring Harness Bracket Nut	5 N·m	44 lb in
Engine Valley Cover Bolt	25 N·m	18 lb ft
EGR Valve Pipe-to-Cylinder Head Bolt	50 N·m	37 lb ft
EGR Valve Pipe-to-Exhaust Manifold Bolt	30 N·m	22 lb ft
EGR Valve Pipe-to-Intake Manifold Bolt	10 N·m	89 lb in

Evaporative Emission (EVAP) Purge Solenoid Bolt	10 N·m	89 lb in
Fuel Rail Cover Bolt	9 N·m	80 lb in
Generator Bracket Bolt	50 N·m	37 lb ft
Generator Output Terminal Nut	9 N·m	80 lb in
Harness Ground Bolt	25 N·m	18 lb ft
Harness Ground Bolt (ar Rear of Block)	16 N·m	12 lb ft
Hood Hinge Bolt	25 N·m	18 lb ft
Ignition Coil Bracket Stud	12 N·m	106 lb in
Intake Manifold Bolt (First Pass in Sequence)	5 N·m	44 lb in
Intake Manifold Bolt (Final Pass in Sequence)	10 N·m	89 lb in
Knock Sensor	20 N·m	15 lb ft
Oil Filter	30 N·m	22 lb ft
Oil Level Indicator Tube Bolt	25 N·m	18 lb ft
Oil Level Sensor	13 N·m	115 lb in
Oil Pan Drain Plug	25 N·m	18 lb ft
Oil Pan Bolt	25 N·m	18 lb ft
Oil Pan (to Front Cover)	25 N·m	18 lb ft
Oil Pan (to Rear Cover)	12 N·m	106 lb in
Oil Pan Skid Plate Bolt	20 N·m	15 lb ft
Oil Pump Bolt	25 N·m	18 lb ft
Oil Pump Screen Nut	25 N·m	18 lb ft
Oil Pump Screen Bolt	12 N·m	106 lb in
Positive Battery Cable Clip Bolt	9 N·m	80 lb in
Power Steering Pump Rear Bolt	50 N·m	37 lb ft
Secondary Air Injection (AIR) Pipe Bolt	25 N·m	18 lb ft
Spark Plug	15 N·m	11 lb ft
Transmission Bolt/Stud	50 N·m	37 lb ft
Transmission Cover Bolt	12 N·m	106 lb in
Valve Lifter Guide Bolt	12 N·m	106 lb in
Valve Rocker Arm Bolt	30 N·m	22 lb ft
Valve Rocker Arm Cover Bolt	12 N·m	106 lb in

Drive Belt System Description

See Drive Belt System Description above.

Engine Mechanical – 8.1L

General Specifications

Application	Specification	
	Metric	English
General Data		
• Engine Type	V8	
• Regular Production Option (RPO)	L18	
• Displacement	8.1 Liter	496 CID
• Bore	107.950 mm	4.250 in
• Stroke	111.00 mm	4.370 in
• Compression Ratio	9.1:1	
• Firing Order	1-8-7-2-6-5-4-3	
Lubrication System		
Oil Filter Type	PF454	
Oil Type	5W-30	
Oil Capacity		
• With Filter Change	6.1 Liters	6.5 Quarts
• Without Filter Change	5.7 Liters	6.0 Quarts
Oil Pressure - Hot		
• Minimum	34 kPa @ 1,000 RPM	5 psi @ 1,000 RPM
• Minimum	69 kPa @ 2,000 RPM	10 psi @ 2,000 RPM

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Accessory Drive Belt Tensioner Bolt	50 N·m	37 lb ft
Air Cleaner Outlet Duct Clamp	4 N·m	35 lb in
Air Conditioning (A/C) Belt Tensioner Bolt	50 N·m	37 lb ft
Battery Cable Channel Bolt	9 N·m	80 lb in
Camshaft Position (CMP) Sensor Bolt	12 N·m	106 lb in
Camshaft Retainer Bolt	12 N·m	106 lb in
Camshaft Sprocket Bolt		
• First Pass	30 N·m	22 lb ft
• Final Pass	30 N·m	22 lb ft
Crankshaft Balancer Bolt	255 N·m	189 lb ft
Crankshaft Oil Deflector Nut	50 N·m	37 lb ft
Crossbar Bolt	100 N·m	74 lb ft
Cylinder Head Bolt		
• First Pass	30 N·m	22 lb ft
• Second Pass	30 N·m + additional 120 degrees	22 lb ft + additional 120 degrees
• Final Pass		
• Bolts 1, 2, 3, 6, 7, 8, 9, 10, 11, 14, 16, and 17	+ additional 60 degrees	
• Bolts 15 and 18	+ additional 45 degrees	
• Bolts 4, 5, 12, and 13	+ additional 30 degrees	
Drive Belt Idler Pulley Bolt	50 N·m	37 lb ft
Engine Coolant Temperature (ECT) Sensor Bracket Bolt	50 N·m	37 lb ft
Engine Coolant Temperature (ECT) Sensor	20 N·m	15 lb ft

Engine Front Cover Bolt		
• First Pass	6 N·m	53 lb in
• Final Pass	12 N·m	106 lb in
Engine Harness Bolt	5 N·m	44 lb in
Engine Harness Ground Bolt	16 N·m	12 lb ft
Engine Harness Stud	10 N·m	89 lb in
Engine Mount Bracket Through Bolt	75 N·m	55 lb ft
Engine Mount-to-Engine Bolt	50 N·m	37 lb ft
Engine Mount-to-Engine Mount Bracket Bolt	65 N·m	48 lb ft
Engine Shield Bolt	20 N·m	15 lb ft
Engine Wiring Harness Bolt	16 N·m	12 lb ft
Exhaust Gas Recirculation (EGR) Pipe Bolt	30 N·m	22 lb ft
Fuel Rail Stud	12 N·m	106 lb in
Flywheel Bolt		
• First Pass	80 N·m	59 lb ft
• Final Pass	100 N·m	74 lb ft
Heater Hose Bracket Bolt	50 N·m	37 lb ft
Hood Hinge Bolt	25 N·m	18 lb ft
Ignition Coil Harness Bolt	12 N·m	106 lb in
Intake Manifold Bolt		
• First Pass	5 N·m	44 lb in
• Second Pass	5 N·m	44 lb in
• Third Pass	10 N·m	89 lb in
• Final Pass	12 N·m	106 lb in
Intake Manifold Sight Shield Bolt	10 N·m	89 lb in
Intake Manifold Sight Shield Bracket Nut	5 N·m	44 lb in
J 42847 Flywheel Holding Tool Bolt	50 N·m	37 lb ft
Lift Bracket Bolt	40 N·m	30 lb ft
Oil Filter Fitting	66 N·m	49 lb ft
Oil Level Indicator Tube Nut	18 N·m	13 lb ft
Oil Level Sensor	20 N·m	15 lb ft
Oil Pan Bolt		
• First Pass	10 N·m	89 lb in
• Final Pass	25 N·m	18 lb ft
Oil Pan Drain Plug	28 N·m	21 lb ft
Oil Pan Skid Plate Bolt	20 N·m	15 lb ft
Oil Pump Bolt	75 N·m	56 lb ft
Oil Pump Drive Bolt	25 N·m	18 lb ft
Power Steering Pump Bracket Bolt/Nut	50 N·m	37 lb ft
Secondary Air Injection (AIR) Pipe Bolt	25 N·m	18 lb ft
Secondary Air Injection Pump Pipe Bolt	50 N·m	37 lb ft
Secondary Air Injection Pipe Nut	12 N·m	106 lb in
Valve Lifter Guide Retainer Bolt	25 N·m	18 lb ft
Valve Rocker Arm Cover Bolt		
• First Pass	6 N·m	53 lb in
• Final Pass	12 N·m	106 lb in
Valve Rocker Arm Nut	25 N·m	18 lb ft
Valve Rocker Arm Stud	50 N·m	37 lb ft

Drive Belt System Description

See Drive Belt System Description above.

Engine Cooling

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Air Cleaner Outlet Duct Clamp Screw (5.3 L, and 6.0 L Engines)	7 N·m	62 lb in
Coolant Air Bleed Pipe Stud/Bolt (5.3 L, and 6.0 L Engines)	12 N·m	106 lb in
Coolant Heater Cord Bolt	8 N·m	71 lb in
Coolant Heater (5.3 L, 6.0 L)	50 N·m	37 lb ft
Engine Block Coolant Drain Plug (5.3 L, 6.0 L, and 8.1 L Engines)	60 N·m	44 lb ft
Engine Block Heater (8.1 L Engine)	60 N·m	40 lb ft)
Engine Sight Shield Bolt	20 N·m	15 lb ft
Fan Clutch Bolt	23 N·m	17 lb ft
Fan Clutch Nut	56 N·m	41 lb ft
Fan Shroud Bolt	9 N·m	80 lb in
Generator Bracket Bolt/Nut (8.1 L Engine)	50 N·m	37 lb ft
Generator Bracket Stud (8.1 L Engine)	20 N·m	15 lb ft
Oil Cooler Hose Adapter Bolt (6.0 L Engine)	12 N·m	106 lb in
Oil Cooler Hose Bracket Bolt (6.0 L Engine)	25 N·m	18 lb ft
Oil Cooler Pipe Clip Bolt (8.1 L Engine)	50 N·m	37 lb ft
Radiator Bolt	25 N·m	18 lb ft
Surge Tank Bolt/Nut	9 N·m	80 lb in
Thermostat Housing Bolt (5.3 L, and 6.0 L Engines)	15 N·m	11 lb ft
Thermostat Housing Bolt (8.1 L Engine)	37 N·m	27 lb ft
Transmission Control Module (TCM) Cover Bolt	9 N·m	80 lb in
Transmission Control Module (TCM) Electrical Connector Bolt	8 N·m	71 lb in
Water Crossover Bolt (8.1 L Engine)	50 N·m	37 lb ft
Water Outlet Bolt (8.1 L Engine)	30 N·m	22 lb ft
Water Pump Bolt (8.1 L Engine)	50 N·m	37 lb ft
Water Pump Pulley Bolt (First Pass) (5.3 L, and 6.0 L Engines)	10 N·m	89 lb in
Water Pump Pulley Bolt (Final Pass) (5.3 L, and 6.0 L Engines)	25 N·m	18 lb ft

Cooling System Description and Operation

Coolant Heater

The optional engine coolant heater (RPO K05) operates using 110-volt AC external power and is designed to warm the coolant in the engine block area for improved starting in very cold weather -29°C (-20°F). The coolant heater helps reduce fuel consumption when a cold engine is warming up. The unit is equipped with a detachable AC power cord. A weather shield on the cord is provided to protect the plug when not in use.

Cooling System

The cooling system's function is to maintain an efficient engine operating temperature during all engine speeds and operating conditions. The cooling system is designed to remove approximately one-third of the heat produced by the burning of the air-fuel mixture. When the engine is cold, the coolant does not flow to the radiator until the thermostat opens. This allows the engine to warm quickly.

Cooling Cycle

Coolant flows from the radiator outlet and into the water pump inlet. Some coolant flows from the water pump, to the heater core, then back to the water pump. This provides the passenger compartment with heat and defrost capability as the coolant warms up.

Coolant also flows from the water pump outlet and into the engine block. In the engine block, the coolant circulates through the water jackets surrounding the cylinders where it absorbs heat.

The coolant then flows through the cylinder head gasket openings and into the cylinder heads. In the cylinder heads, the coolant flows through the water jackets surrounding the combustion chambers and valve seats, where it absorbs additional heat.

From the cylinder heads, the coolant flows to the thermostat. The flow of coolant will either be stopped at the thermostat until the engine reaches normal operating temperature, or it will flow through the thermostat and into the radiator where it is cooled. At this point, the coolant flow cycle is completed.

Efficient operation of the cooling system requires proper functioning of all cooling system components. The cooling system consists of the following components:

Coolant

The engine coolant is a solution made up of a 50-50 mixture of DEX-COOL and suitable drinking water. The coolant solution carries excess heat away from the engine to the radiator, where the heat is dissipated to the atmosphere.

Radiator

The radiator is a heat exchanger. It consists of a core and two tanks. The aluminum core is a tube and fin crossflow design that extends from the inlet tank to the outlet tank. Fins are placed around the outside of the tubes to improve heat transfer to the atmosphere.

The inlet and outlet tanks are a molded, high temperature, nylon reinforced plastic material. A high temperature rubber gasket seals the tank flange edge to the aluminum core. The tanks are clamped to the core with clinch tabs. The tabs are part of the aluminum header at each end of the core.

The radiator also has a drain cock located in the bottom of the left hand tank. The drain cock unit includes the drain cock and drain cock seal.

The radiator removes heat from the coolant passing through it. The fins on the core transfer heat from the coolant passing through the tubes. As air passes between the fins, it absorbs heat and cools the coolant.

Pressure Cap

The pressure cap seals the cooling system. It contains a blow off or pressure valve and a vacuum or atmospheric valve. The pressure valve is held against its seat by a spring, which protects the radiator from excessive cooling system pressure. The vacuum valve is held against its seat by a spring, which permits opening of the valve to relieve vacuum created in the cooling system as it cools off. The vacuum, if not relieved, might cause the radiator and/or coolant hoses to collapse.

The pressure cap allows cooling system pressure to build up as the temperature increases. As the pressure builds, the boiling point of the coolant increases. Engine coolant can be safely run at a temperature much higher than the boiling point of the coolant at atmospheric pressure. The hotter the coolant is, the faster the heat transfers from the radiator to the cooler, passing air.

The pressure in the cooling system can get too high. When the cooling system pressure exceeds the rating of the pressure cap, it raises the pressure valve, venting the excess pressure.

As the engine cools down, the temperature of the coolant drops and a vacuum is created in the cooling system. This vacuum causes the vacuum valve to open, allowing outside air into the surge tank. This equalizes the pressure in the cooling system with atmospheric pressure, preventing the radiator and coolant hoses from collapsing.

Coolant Recovery System

The coolant recovery system consists of a plastic coolant recovery reservoir and overflow tube. The recovery reservoir is also called a recovery tank or expansion tank. It is partially filled with coolant and is connected to the radiator fill neck with the overflow tube. Coolant can flow back and forth between the radiator and the reservoir.

In effect, a cooling system with a coolant recovery reservoir is a closed system. When the pressure in the cooling system gets too high, it will open the pressure valve in the pressure cap. This allows the coolant, which has expanded due to being heated, is allowed to flow through the overflow tube and into the

recovery reservoir. As the engine cools down, the temperature of the coolant drops and a vacuum is created in the cooling system. This vacuum opens the vacuum valve in the pressure cap, allowing some of the coolant in the reservoir to be siphoned back into the radiator. Under normal operating conditions, no coolant is lost. Although the coolant level in the recovery reservoir goes up and down, the radiator and cooling system are kept full. An advantage to using a coolant recovery reservoir is that it eliminates almost all air bubbles from the cooling system. Coolant without bubbles absorbs heat much better than coolant with bubbles.

Air Baffles and Seals

The cooling system uses deflectors, air baffles and air seals to increase cooling system capability. Deflectors are installed under the vehicle to redirect airflow beneath the vehicle and through the radiator to increase engine cooling. Air baffles are also used to direct airflow through the radiator and increase cooling capability. Air seals prevent air from bypassing the radiator and A/C condenser, and prevent recirculation of hot air for better hot weather cooling and A/C condenser performance.

Water Pump

The water pump is a centrifugal vane impeller type pump. The pump consists of a housing with coolant inlet and outlet passages and an impeller. The impeller is mounted on the pump shaft and consists of a series of flat or curved blades or vanes on a flat plate. When the impeller rotates, the coolant between the vanes is thrown outward by centrifugal force.

The impeller shaft is supported by one or more sealed bearings. The sealed bearings never need to be lubricated. Grease cannot leak out, dirt and water cannot get in as long as the seal is not damaged or worn.

The purpose of the water pump is to circulate coolant throughout the cooling system. The water pump is driven by the crankshaft via the drive belt.

Thermostat

The thermostat is a coolant flow control component. It's purpose is to help regulate the operating temperature of the engine. It utilizes a temperature sensitive wax-pellet element. The element connects to a valve through a small piston. When the element is heated, it expands and exerts pressure against the small piston. This pressure forces the valve to open. As the element is cooled, it contracts. This contraction allows a spring to push the valve closed.

When the coolant temperature is below the rated thermostat opening temperature, the thermostat valve remains closed. This prevents circulation of the coolant to the radiator and allows the engine to warm up. After the coolant temperature reaches the rated thermostat opening temperature, the thermostat valve will open. The coolant is then allowed to circulate through the thermostat to the radiator where the engine heat is dissipated to the atmosphere. The thermostat also provides a restriction in the cooling system, after it has opened. This restriction creates a pressure difference which prevents cavitation at the water pump and forces coolant to circulate through the engine block.

Engine Oil Cooler

The engine oil cooler is a heat exchanger. It is located inside the left side end tank of the radiator. The engine oil temperature is controlled by the temperature of the engine coolant that surrounds the oil cooler in the radiator.

The engine oil pump, pumps the oil through the engine oil cooler line to the oil cooler. The oil then flows through the cooler where the engine coolant absorbs heat from the oil. The oil is then pumped through the oil cooler return line, to the oil filter, to the engine block oil system.

Transmission Oil Cooler

The transmission oil cooler is a heat exchanger. It is located inside the right side end tank of the radiator. The transmission fluid temperature is regulated by the temperature of the engine coolant in the radiator.

The transmission oil pump, pumps the fluid through the transmission oil cooler line to the transmission oil cooler. The fluid then flows through the cooler where the engine coolant absorbs heat from the fluid. The fluid is then pumped through the transmission oil cooler return line, to the transmission.

Engine Electrical

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Auxiliary Battery Cable Clip Bolt	10 N·m	89 lb in
Auxiliary Battery Relay Nut	9 N·m	80 lb in
Auxiliary Negative Battery Cable Bolt	17 N·m	13 lb ft
Auxiliary Positive Battery Cable Bolt	17 N·m	13 lb ft
Auxiliary Positive Battery Cable Nut	8 N·m	71 lb in
Auxiliary Positive Cable to Relay Nut	9 N·m	80 lb in
Battery Cable Bracket Bolt	25 N·m	18 lb ft
Battery Cable Channel Bolt	12 N·m	106 lb in
Battery Cable Junction Block Bracket Bolt	9 N·m	80 lb in
Battery Hold Down Retainer Bolt	25 N·m	18 lb ft
Battery Positive Cable Nut (8.1 L Engine)	10 N·m	89 lb in
Battery Terminal Nut (8.1 L Engine)	8 N·m	71 lb in
Battery Tray Bolt	9 N·m	80 lb in
Battery Tray Nut	25 N·m	18 lb ft
Engine Harness Ground Nut (8.1 L Engine)	3.4 N·m	30 lb in
Engine Wiring Harness Auxiliary Negative Battery Cable Bolt	16 N·m	12 lb ft
Engine Wiring Harness Ground Bolt	16 N·m	12 lb ft
Engine Wiring Harness Ground/Negative Cable Bolt	25 N·m	18 lb ft
Front Axle Mounting Bracket Nut	95 N·m	70 lb ft
Forward Lamp Wiring Harness Ground/Negative Cable Bolt	9 N·m	80 lb in
Front End Diagonal Brace Bolt	9 N·m	80 lb in
Generator Bracket Bolt (5.3 L, and 6.0 L Engines)	50 N·m	37 lb ft
Generator Bracket Bolt/Nut (8.1 L Engine)	50 N·m	37 lb ft
Generator Bracket Stud (8.1 L Engine)	20 N·m	15 lb ft
Generator Bolt (5.3 L, 6.0 L, 6.6 L, and 8.1 L, Engines)	50 N·m	37 lb ft
Generator Cable Nut	9 N·m	80 lb in
Ground Strap Nut	9 N·m	80 lb in
Ignition Switch Wires to Solenoid (8.1 L Engine)	2 N·m	18 lb in
Negative Battery Cable Bolt	17 N·m	13 lb ft
Positive Battery Cable Bolt	17 N·m	13 lb ft
Positive Battery Cable Nut (8.1 L Engine)	9 N·m	80 lb in
Positive Battery Cable to Engine Wiring Harness Junction Block Bolt (4.3 L Engine)	9 N·m	80 lb in
Positive Cable Clip Nut (8.1 L Engine)	8 N·m	71 lb in).
Positive Cable at Underhood Bussed Electrical Center (UBEC) Bolt	9 N·m	80 lb in
Starter Bolt (5.3 L, 6.0 L, and 8.1 L Engines)	50 N·m	37 lb ft
Starter Heat Shield Bolt (8.1 L Engine)	3 N·m	35 lb in
Starter Heat Shield Nut (8.1 L Engine)	5 N·m	44 lb in
Starter Lead Nut	9 N·m	80 lb in
Starter Solenoid Nut	3.4 N·m	30 lb in
Surge Tank Bolt/Nut	9 N·m	80 lb in
Transmission Cover Bolt	9 N·m	80 lb in

Battery Usage

Base	
GM Part Number	19001810
Cold Cranking Amperage (CCA)	600 A
Reserve Capacity Rating	115 Minutes
Replacement Battery Number	78-6YR
Optional (Dual)	
GM Part Number	19001814
Cold Cranking Amperage (CCA)	770 A
Reserve Capacity Rating	115 Minutes
Replacement Battery Number	78-7YR

Battery Temperature vs Minimum Voltage

Estimated Temperature °F	Estimated Temperature °C	Minimum Voltage
70 or above	21 or above	9.6
50	10	9.4
32	0	9.1
15	-10	8.8
0	-18	8.5
Below 0	Below -18	8.0

Starter Motor Usage

Applications	Starter Model
5.3L (LM7)	PG-260F2
6.0L (LQ4) 8.1L (L18)	PG-260M

Generator Usage

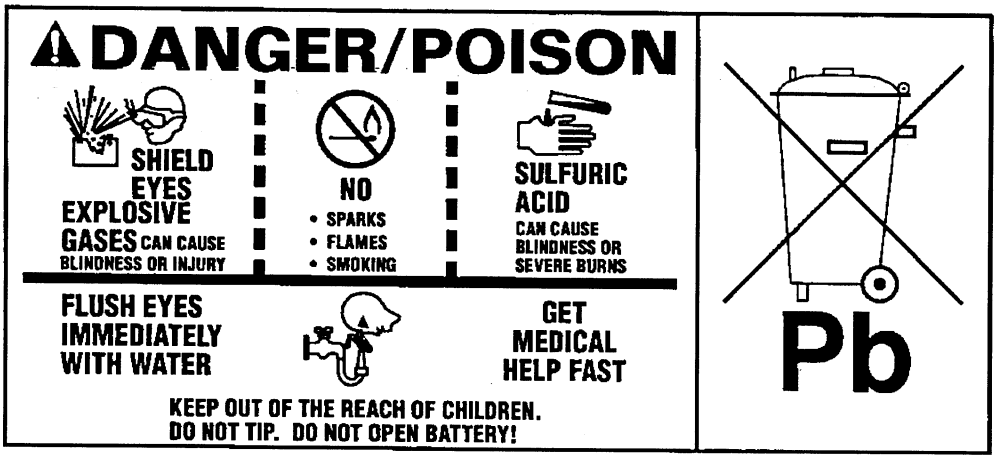
Base	
Generator Model	Delphi AD230
Rated Output	102 A
Load Test Output	71 A
Optional (Dual)	
Generator Model	Delphi AD244
Rated Output	130 A
Load Test Output	91 A
Bosch® Generator	
Generator Model	Bosch® 15755900
Rated Output	130 A
Load Test Output	91 A

Battery Description and Operation

Caution

Batteries produce explosive gases, contain corrosive acid, and supply levels of electrical current high enough to cause burns. Therefore, to reduce the risk of personal injury when working near a battery:

- **Always shield your eyes and avoid leaning over the battery whenever possible.**
- **Do not expose the battery to open flames or sparks.**
- **Do not allow the battery electrolyte to contact the eyes or the skin. Flush immediately and thoroughly any contacted areas with water and get medical help.**
- **Follow each step of the jump starting procedure in order.**
- **Treat both the booster and the discharged batteries carefully when using the jumper cables.**



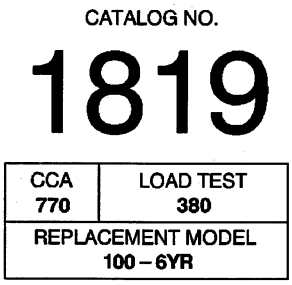
The maintenance free battery is standard. There are no vent plugs in the cover. The battery is completely sealed except for two small vent holes in the side. These vent holes allow the small amount of gas that is produced in the battery to escape.

The battery has three functions as a major source of energy:

- Engine cranking
- Voltage stabilizer
- Alternate source of energy with generator overload.

The battery specification label (example below) contains information about the following:

- The test ratings
- The original equipment catalog number
- The recommended replacement model number



A battery has 2 ratings:

- Reserve capacity
- Cold cranking amperage

When a battery is replaced use a battery with similar ratings. Refer to the battery specification label on the original battery or refer to Battery Usage .

Reserve Capacity

Reserve capacity is the amount of time in minutes it takes a fully charged battery, being discharged at a constant rate of 25 amperes and a constant temperature of 27°C (80°F) to reach a terminal voltage of 10.5 V. Refer to Battery Usage for the reserve capacity rating of the original equipment battery.

Cold Cranking Amperage

The cold cranking amperage is an indication of the ability of the battery to crank the engine at cold temperatures. The cold cranking amperage rating is the minimum amperage the battery must maintain for 30 seconds at -18°C (0°F) while maintaining at least 7.2 volts. Refer to Battery Usage for the cold cranking amperage rating for this vehicle.

Circuit Description

The battery positive terminal supplies Battery Positive voltage to the under hood fuse block and the rear fuse block. The under hood fuse block provides a cable connection for the generator and a cable connection for the starter.

The battery negative terminal is connected to chassis ground G305 and supplies ground for the AD converter in the DIM.

Starting System Description and Operation

The PG-260M and Hitachi-S14-100B are non-repairable starter motors. It has pole pieces that are arranged around the armature within the starter housing. When the solenoid windings are energized, the pull-in winding circuit is completed to ground through the starter motor. The hold-in winding circuit is completed to ground through the solenoid. The windings work together magnetically to pull in and hold in the plunger. The plunger moves the shift lever. This action causes the starter drive assembly to rotate on the armature shaft spline as it engages with the flywheel ring gear on the engine. At the same time, the plunger closes the solenoid switch contacts in the starter solenoid. Full battery voltage is then applied directly to the starter motor and it cranks the engine.

As soon as the solenoid switch contacts close, current stops flowing thorough the pull-in winding as battery voltage is now applied to both ends of the windings. The hold-in winding remains energized; its magnetic field is strong enough to hold the plunger, shift lever, starter drive assembly, and solenoid switch contacts in place to continue cranking the engine. When the engine starts, the pinion gear overrun sprag protects the armature from excessive speed until the switch is opened.

When the ignition switch is released from the CRANK position, voltage is removed from the starter solenoid S terminal. Current flows from the motor contacts through both windings to ground at the end of the hold-in winding. However, the direction of the current flow through the pull-in winding is now in the opposite direction of the current flow when the winding was first energized.

The magnetic fields of the pull-in and hold-in windings now oppose one another. This action of the windings, along with the help of the return spring, cause the starter drive assembly to disengage and the solenoid switch contacts to open simultaneously. As soon as the contacts open, the starter motor is turned off.

Charging System Description and Operation

Generator

The AD-230 and AD-244 generators are non-repairable. They are electrically similar to earlier models. The generators feature the following major components:

- The delta stator
- The rectifier bridge
- The rotor with slip rings and brushes
- A conventional pulley
- Dual internal fans
- A voltage regulator

The pulley and the fan cool the slip ring and the frame.

The AD stands for Air-cooled Dual internal fan; the 2 is an electrical design designator; the 30/44 denotes the outside diameter of the stator laminations in millimeters, over 100 millimeters. The generators is rated at 102 and 130 amperes respectively.

The generator features permanently lubricated bearings. Service should only include the tightening of mounting components. Otherwise, the generator is replaced as a complete unit.

Regulator

The voltage regulator controls the field current of the rotor in order to limit system voltage. The regulator switches the current on and off at a rate of 400 cycles per second in order to perform the following functions:

- Radio noise control
- Obtain the correct average current needed for proper system voltage control

At high speeds, the on-time may be 10 percent with the off-time at 90 percent. At low speeds, the on-time may be 90 percent and the off-time 10 percent.

Auxiliary Battery Charging

The auxiliary battery is charged in the same manner as the primary battery with the ignition switch in the run position and the engine running. The system contains the following components:

- Auxiliary battery.
- Auxiliary battery relay.
- Mega fuse.
- Junction block battery cable.
- Associated wiring.

The auxiliary battery relay coil is energized with the engine running through the fuse block and wiring, thus closing the relay contacts which allow the battery to be charged from the vehicle's generator via the

battery junction block. The auxiliary battery relay is permanently grounded so any time the ignition switch is in the run position the relay will be energized.

The auxiliary battery is only used for accessories and is not part of the vehicle starting system. However if the primary battery fails and in need of an jump start, follow the service information for Jump Starting In Case Of Emergency using appropriate battery jumper cables.

Engine Controls

Engine Controls – 5.3 & 6.0L

Ignition System Specifications

Application	Specification	
	Metric	English
Firing Order	1-8-7-2-6-5-4-3	
Spark Plug Wire Resistance	1000 ohms per ft	
Spark Plug Torque	15 N·m	11 lb ft
Spark Plug Gap	1.52 mm	0.060 in
Spark Plug Type	25171803 [AC plug type] 12567759 [NGK plug type]	

Fastener Tightening Specifications

Application	Specifications	
	Metric	English
Accelerator Control Cable Bracket Bolts	10 N·m	89 lb in
Accelerator Pedal Mounting Bolts	20 N·m	15 lb ft
Camshaft Position (CMP) Sensor Bolt	25 N·m	18 lb ft
Crankshaft Position (CKP) Sensor Bolt	25 N·m	18 lb ft
Engine Coolant Temperature (ECT) Sensor	20 N·m	15 lb ft
Engine Sight Shield Bolts	10 N·m	89 lb in
Engine Sight Shield Bracket Bolts	10 N·m	89 lb in
EGR (Exhaust Gas Recirculation) Valve Bolts (First Pass)	10 N·m	89 lb in
EGR Valve Bolts (Final Pass)	25 N·m	18 lb ft
EGR Valve Pipe-to-Cylinder Head Bolts	50 N·m	37 lb ft
EGR Valve Pipe-to-Exhaust Manifold Bolts	25 N·m	18 lb ft
EGR Valve Pipe-to-Intake Manifold	12 N·m	106 lb in
Engine Wiring Harness Retaining Nut	5.5 N·m	49 lb in
EVAP Canister Bracket Bolt	25 N·m	18 lb ft
EVAP Canister Mounting Bolt	25 N·m	18 lb ft
EVAP Canister Mounting Nuts	10 N·m	89 lb in
EVAP Canister Purge Valve Shoulder Bolt	10.5 N·m	93 lb in
EVAP Canister Vent Valve Bracket Mount Bolt	12 N·m	106 lb in
Fuel Fill Hose Clamp	2.5 N·m	22 lb in
Fuel Fill Pipe Bracket Bolt	12 N·m	106 lb in
Fuel Fill Pipe Ground Strap Bolt	9 N·m	80 lb in
Fuel Fill Pipe Housing to Fill Pipe Bolts	2.3 N·m	20 lb in
Fuel Fill Vent Hose Clamps	2.5 N·m	22 lb in
Fuel Filler Bracket Bolt	12 N·m	106 lb in
Fuel Filter Bracket Bolt	12 N·m	106 lb in
Fuel Filter Fitting	25 N·m	18 lb ft
Fuel Rail Attaching Bolts	10 N·m	89 lb in
Fuel Rail Crossover Pipe Retainer Clip Attaching Screw	3.8 N·m	34 lb in
Fuel Return Pipe Attaching Screw	5 N·m	44 lb in
Fuel Tank Shield-to-Frame Bolts	18 N·m	13 lb ft
Fuel Tank Strap Bolts	40 N·m	30 lb ft
Heated Oxygen Sensor (HO2S)	42 N·m	31 lb ft
Idle Air Control (IAC) Valve Attaching Screws	3 N·m	27 lb in
Ignition Coil Mounting Bolts	8 N·m	71 lb in
Intake Manifold Sight Shield Fasteners	10 N·m	89 lb in
Knock Sensor (KS)	20 N·m	15 lb ft
Powertrain Control Module (PCM) Connector End Bolts	8 N·m	71 lb in

Throttle Body Attaching Bolts and Nuts	10 N·m	89 lb in
Throttle Position (TP) Sensor Attaching Screws	2 N·m	18 lb in
Upper Engine Wiring Harness Nut	5.5 N·m	49 lb in

Fuel System Specifications

Use regular unleaded gasoline rated at 87 octane or higher. It is recommended that the gasoline meet specifications which have been developed by the American Automobile Manufacturers Association (AAMA) and endorsed by the Canadian Motor Vehicle Manufacturers Association for better vehicle performance and engine protection. Gasoline meeting the AAMA specification could provide improved driveability and emission control system performance compared to other gasoline. For more information, write to: American Automobile Manufacturer's Association, 7430 Second Ave, Suite 300, Detroit MI 48202.

Be sure the posted octane is at least 87. If the octane is less than 87, you may get a heavy knocking noise when you drive. If it is bad enough, it can damage your engine.

If you're using fuel rated at 87 octane or higher and you hear heavy knocking, your engine needs service. Don't worry if you hear a little pinging noise when you're accelerating or driving up a hill. That is normal and you don't have to buy a higher octane fuel to get rid of pinging. It is the heavy, constant knock that means you have a problem.

Notice

Your vehicle was not designed for fuel that contains methanol. Do not use methanol fuel which can corrode metal parts in your fuel system and also damage plastic and rubber parts. This kind of damage would not be covered under your warranty.

If your vehicle is certified to meet California Emission Standards, indicated on the under hood emission control label, your vehicle is designed to operate on fuels that meet California specifications. If such fuels are not available in states adopting California emissions standards, your vehicle will operate satisfactorily on fuels meeting federal specifications, but emission control system performance may be affected. The malfunction indicator lamp on your instrument panel may turn ON and/or your vehicle may fail a smog-check test. If this occurs, return to your authorized dealer for diagnosis to determine the cause of failure. In the event there is a determination that the cause of the condition is the type of fuels used, repairs may not be covered by your warranty.

Some gasolines that are not reformulated for low emissions may contain an octane-enhancing additive called methylcyclopentadienyl manganese tricarbonyl (MMT). Ask your service station operator whether or not the fuel contains MMT.

Engine Controls – 8.1L

Ignition System Specifications

Application	Specification	
	Metric	English
Firing Order	1-8-7-2-6-5-4-3	
Spark Plug Wire Resistance	1,000 ohms per ft	
Spark Plug Torque	20 N·m	15 lb ft
Spark Plug Gap	1.52 mm	0.060 in
Spark Plug Type	TJ14R-P15 Denso plug type	

Fastener Tightening Specifications

Application	Specifications	
	Metric	English
Accelerator Control Assembly to Floor Fasteners	20 N·m	15 lb ft
Camshaft Position (CMP) Sensor Bolt	12 N·m	106 lb in
Crankshaft Position (CKP) Sensor Bolt	12 N·m	106 lb in
Engine Coolant Temperature (ECT) Sensor	20 N·m	15 lb ft
Engine Sight Shield Bolts	10 N·m	89 lb in
Engine Sight Shield Bracket Bolts	10 N·m	89 lb in
Exhaust Gas Recirculation (EGR) Valve Bolts (First Pass)	10 N·m	89 lb in
Exhaust Gas Recirculation (EGR) Valve Bolts (Final Pass)	25 N·m	18 lb ft
Exhaust Gas Recirculation (EGR) Valve Bracket Nuts	22 N·m	16 lb ft
Exhaust Gas Recirculation (EGR) Valve Pipe-to-Cylinder Head Bolts	50 N·m	37 lb ft
Exhaust Gas Recirculation (EGR) Valve Pipe-to-Exhaust Manifold Nuts	30 N·m	22 lb ft
Exhaust Gas Recirculation (EGR) Valve Pipe-to-Intake Manifold	12 N·m	106 lb in
Evaporative Emission (EVAP) Canister Purge Valve Shoulder Bolt	10 N·m	89 lb in
Evaporative Emission (EVAP) Canister Vent Bracket Retaining Bolt	12 N·m	106 lb in
Evaporative Emission (EVAP) Canister Vent Valve bracket mount bolt	12 N·m	106 lb in
Evaporative Emission (EVAP) Canister Vent Valve Retaining Bolt	10 N·m	89 lb in
Fuel Fill Hose Clamp	2.5 N·m	22 lb in
Fuel Fill Pipe Ground Strap Bolt	9 N·m	80 lb in
Fuel Fill Pipe Housing to Fill Pipe Bolts	2.3 N·m	20 lb in
Fuel Filter Bracket Bolt	12 N·m	106 lb in
Fuel Filter Fitting	25 N·m	18 lb ft
Fuel Injection Sight Shield Retaining Bolt	10 N·m	89 lb in
Fuel Rail Attaching Bolts	12 N·m	106 lb in
Fuel Tank Shield to Flame Bolt	18 N·m	13 lb ft
Fuel Tank Strap Bolts	40 N·m	30 lb ft
Fuel Tank Vent Hose Clamp	2.5 N·m	22 lb in
Heated Oxygen Sensor (HO2S)	41 N·m	30 lb ft
Ignition Coil Attaching Bolts	10 N·m	89 lb in
Intake Manifold Sight Shield Bolt	12 N·m	106 lb in
Knock Sensor (KS)	19 N·m	14 lb ft
Manifold Pipe Fastener to Exhaust Manifold	25 N·m	18 lb ft
Manifold Absolute Pressure (MAP) Sensor Retaining Bolt	12 N·m	106 lb in
Manifold Pipe Fastener to Fuel Rail Stud	12 N·m	106 lb in
Powertrain Control Module (PCM) Connector End Bolts	8 N·m	71 lb in
Spark Plug Existing Iron Head	20 N·m	15 lb ft
Spark Plug New Iron Head	30 N·m	22 lb ft
Throttle Body Attaching Bolts	10 N·m	89 lb in
Upper Engine Wire Harness Retainer Stud	10 N·m	89 lb in

Fuel System Specifications

See Fuel System Specifications above.

Exhaust System

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Engine Shield Bolt	20 N·m	15 lb ft
Exhaust Gas Recirculation (EGR) Pipe Bolt (8.1L Engine)	30 N·m	22 lb ft
Exhaust Gas Recirculation (EGR) Pipe Bracket Bolt (8.1L Engine)	50 N·m	37 lb ft
Exhaust Gas Recirculation (EGR) Pipe Nut (8.1L Engine)	30 N·m	22 lb ft
Exhaust Gas Recirculation (EGR) Valve Pipe to Cylinder Head Bolt	50 N·m	37 lb ft
Exhaust Gas Recirculation (EGR) Valve Pipe to Exhaust Manifold Bolt	30 N·m	22 lb ft
Exhaust Gas Recirculation (EGR) Valve Pipe to Intake Manifold Bolt	10 N·m	89 lb in
Exhaust Heat Shield Bolt	9 N·m	80 lb in
Exhaust Heat Shield Nut (Body Panel)	9 N·m	80 lb in
Exhaust Manifold Bolts (First Pass in Sequence) (5.3L, and 6.0L Engines)	15 N·m	11 lb ft
Exhaust Manifold Bolts (Final Pass in Sequence) (5.3L, and 6.0L Engines)	25 N·m	18 lb ft
Exhaust Manifold Bolt (8.1L Engine)	35 N·m	26 lb ft
Exhaust Manifold Heat Shield Bolt (5.3L, and 6.0L Engines)	9 N·m	80 lb in
Exhaust Manifold Heat Shield Bolt/Nut (8.1L Engine)	25 N·m	18 lb ft
Exhaust Manifold Nut (8.1L Engine)	16 N·m	12 lb ft
Exhaust Manifold Pipe Nut	50 N·m	37 lb ft
Exhaust Muffler Clamp Bolt	30 N·m	22 lb ft
Exhaust Muffler Hanger Nut	50 N·m	39 lb ft
Exhaust Muffler Nut	40 N·m	30 lb ft
Exhaust Pipe Clamp	40 N·m	30 lb ft
Exhaust Pipe Hanger Bracket Bolt	12 N·m	106 lb in
Hood Hinge Bolts	25 N·m	18 lb ft
Oxygen Sensor	42 N·m	31 lb ft
Rear Shock Absorber Lower Bolt	95 N·m	70 lb ft
Secondary Air Injection (AIR) Check Valve Pipe (Crossover) Bolt	50 N·m	37 lb ft
Secondary Air Injection (AIR) Check Valve Pipe Nut	25 N·m	18 lb ft
Secondary Air Injection (AIR) Pipe Bolt (8.1L Engine)	25 N·m	18 lb ft
Secondary Air Injection (AIR) Pipe Nut (8.1L Engine)	12 N·m	106 lb in
Secondary Air Injection (AIR) Pump Pipe Bolt (8.1L Engine)	25 N·m	18 lb ft
Transmission Bolt	100 N·m	74 lb ft
Transmission Mount Nut	40 N·m	30 lb ft
Transmission Support Crossmember Bolt	70 N·m	52 lb ft

Exhaust System Description

Important

Use of non-OEM parts may cause driveability concerns.

The exhaust system design varies according to the model designation and the intended use of the vehicle.

In order to secure the exhaust pipe to the exhaust manifold, the exhaust system utilizes a flange and seal joint coupling. A flange and gasket coupling secures the catalytic converter assembly to the muffler assembly.

Hangers suspend the exhaust system from the underbody, allowing some movement of the exhaust system and disallowing the transfer of noise and vibration into the vehicle.

Heat shields protect the vehicle from the high temperatures generated by the exhaust system.

Resonator

Some exhaust systems are equipped with a resonator. The resonator, located either before or after the muffler, allows the use of mufflers with less back pressure. Resonators are used when vehicle characteristics require specific exhaust tuning.

Catalytic Converter

The catalytic converter is an emission control device added to the engine exhaust system in order to reduce hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) pollutants from the exhaust gas.

The catalytic converter is comprised of a ceramic monolith substrate, supported in insulation and housed within a sheet metal shell. The substrate may be washcoated with 3 noble metals:

- Platium (Pt)
- Palladium (Pd)
- Rhodium (Rh)

The catalyst in the converter is not serviceable.

Muffler

The exhaust muffler reduces the noise levels of the engine exhaust by the use of tuning tubes. The tuning tubes create channels inside the exhaust muffler that lower the sound levels created by the combustion of the engine.

Transmission/Transaxle Description and Operation

Automatic Transmission – 4L60E

Transmission General Specifications

Name	Hydra-matic 4L60-E
RPO Codes	M30, M32
Production Location	Toledo, Ohio Romulus, MI
Vehicle Platform (Engine/Transmission) Usage	C/K 800
Transmission Drive	Longitudinally-Mounted Rear Wheel Drive
1st Gear Ratio	3.059:1
2nd Gear Ratio	1.625:1
3rd Gear Ratio	1.000:1
4th Gear Ratio	0.696:1
Reverse	2.294:1
Torque Converter Size (Diameter of Torque Converter Turbine)	300 mm
Pressure Taps	Line Pressure
Transmission Fluid Type	DEXRON® III
Transmission Fluid Capacity (Approximate)	300 mm Converter Dry: 11.50 l (12.1 qt)
Transmission Type: 4	Four Forward Gears
Transmission Type: L	Longitudinal Mount
Transmission Type: 60	Product Series
Transmission Type: E	Electronic Controls
Position Quadrant	P, R, N, Overdrive, D, 2, 1 P, R, N, Overdrive, 3, 2, 1
Case Material	Die Cast Aluminum
Transmission Weight Dry (Approximate)	300 mm Converter 86.17 kg (190.5 lb)
Transmission Weight Wet (Approximate)	300 mm Converter 98.4 kg (218.0 lb)
Maximum Trailer Towing Capacity	6 130 kg (13,500 lb)
Maximum Gross Vehicle Weight (GVW)	3 900 kg (8,600 lb)

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Accumulator Cover to Case Bolt	8.0-14.0 N·m	6-10 lb ft
Case Extension to Case Bolt	42.0-48.0 N·m	31-35 lb ft
Case Extension to Case Bolt (4WD Shipping)	11.2-22.6 N·m	8.3-16.7 lb ft
Converter Cover Bolt	10 N·m	89 lb in
Converter Housing to Case Screw	65.0-75.0 N·m	48-55 lb ft
Cooler Pipe Connector	35.0-41.0 N·m	26-30 lb ft
Detent Spring to Valve Body Bolt	20.0-27.0 N·m	15-20 lb ft
Floorshift Control Bolt	10 N·m	89 lb in
Flywheel to Torque Converter Bolt	63 N·m	46 lb ft
Forward Accumulator Cover to Valve Body Bolt	8.0-14.0 N·m	6-10 lb ft
Heat Shield to Transmission Bolt	17 N·m	13 lb ft
Line Pressure Plug	8.0-14.0 N·m	6-10 lb ft
Manual Shaft to Inside Detent Lever Nut	27.0-34.0 N·m	20-25 lb ft
Negative Battery Cable Bolt	15 N·m	11 lb ft
Oil Level Indicator Bolt	47 N·m	35 lb ft
Oil Pan to Transmission Case Bolt	11 N·m	97 lb in

Oil Passage Cover to Case Bolt	8-14.0 N·m	6-10 lb ft
Park Brake Bracket to Case Bolt	27.0-34.0 N·m	20-25 lb ft
Park/Neutral Position Switch Screw	3 N·m	27 lb in
Plate to Case Bolt (Shipping)	27.0-34.0 N·m	20-25 lb ft
Plate to Converter Bolt (Shipping)	27.0-34.0 N·m	20-25 lb ft
Plug Assembly, Automatic Transmission Oil Pan (C/K)	30-40 N·m	22.1-29.5 lb ft
Plug Assembly, Automatic Transmission Oil Pan (Y)	28-32 N·m	20.7-23.6 lb ft
Pressure Control Solenoid Bracket to Valve Body Bolt	8.0-14.0 N·m	6-10 lb ft
Pump Assembly to Case Bolt	26.0-32.0 N·m	19-24 lb ft
Pump Cover to Pump Body Bolt	20.0-27.0 N·m	15-20 lb ft
Shift Cable Grommet Screw	1.7 N·m	15 lb in
Shift Control Cable Attachment	20 N·m	15 lb ft
Speed Sensor Retainer Bolt	10.5-13.5 N·m	7.7-10 lb ft
Stud, Automatic Transmission Case Extension (Y-car)	18.0-22.0 N·m	13-16 lb ft
TCC Solenoid Assembly to Case Bolt	8.0-14.0 N·m	6-10 lb ft
Trans Mount to Transmission Bolt	25 N·m	18 lb ft
Transmission Fluid Pressure Manual Valve Position Switch to Valve Body Bolt	8.0-14.0 N·m	6-10 lb ft
Transmission Oil Cooler Pipe Fitting	35.0-41.0 N·m	26-30 lb ft
Transmission Oil Pan to Case Bolt	9.5-13.8 N·m	7-10 lb ft
Transmission to Engine Bolt	47 N·m	35 lb ft
Valve Body to Case Bolt	8.0-14.0 N·m	6-10 lb ft

Fluid Capacity Specifications

Application	Specification	
	Metric	English
Bottom Pan Removal	4.7 liters	5 quarts
Complete Overhaul	10.6 liters	11 quarts
(measurements are approximate)		

Transmission Component and System Description

The 4L60E transmission consists primarily of the following components:

- Torque converter assembly
- Servo assembly and 2-4 band assembly
- Reverse input clutch and housing
- Overrun clutch
- Forward clutch
- 3-4 clutch
- Forward sprag clutch assembly
- Lo and reverse roller clutch assembly
- Lo and reverse clutch assembly
- Two planetary gear sets: Input and Reaction
- Oil pump assembly
- Control valve body assembly

The electrical components of the 4L60-E are as follows:

- 1-2 and 2-3 shift solenoid valves
- 3-2 shift solenoid valve assembly
- Transmission pressure control (PC) solenoid
- Torque converter clutch (TCC) solenoid valve
- TCC pulse width modulation (PWM) solenoid valve

- Automatic transmission fluid pressure (TFP) manual valve position switch
- Automatic transmission fluid temperature (TFT) sensor
- Vehicle speed sensor assembly

Adapt Function

Transmission Adapt Function

The 4L60-E transmission uses a line pressure control system, which has the ability to continuously adapt the system's line pressure. This compensates for normal wear of the following parts:

- The clutch fiber plates
- The seals
- The springs

The PCM maintains the Upshift Adapt parameters for the transmission The PCM monitors the AT ISS sensor and the AT OSS during commanded shifts in order to determine if a shift is occurring too fast or too slow. The PCM adjusts the signal from the transmission pressure control solenoid in order to maintain a set shift feel.

Transmission adapts must be reset whenever the transmission is overhauled or replaced.

Automatic Transmission Shift Lock Control Description

The automatic transmission shift lock control is a safety device that prevents an inadvertent shift out of PARK when the ignition is ON. The driver must press the brake pedal before moving the shift lever out of the PARK position. The system consist of the following components:

- The automatic transmission shift lock control solenoid.
- The automatic transmission shift lock control switch.
- The park/neutral position switch.

With the ignition in the ON position battery positive voltage is supplied to the park/neutral position switch. With the transmission in the PARK position the contacts in the park/neutral position switch are closed. This allows current to flow through the switch to the automatic transmission shift lock control switch. The circuit continues through the normally-closed switch to the automatic transmission shift lock control solenoid. The automatic transmssion shift lock control soleniod is permanently grounded. This energizes the automatic transmission shift lock control solenoid, locking the shift linkage in the PARK position. When the driver presses the brake pedal the contacts in the automatic transmission shift lock control switch open, causing the automatic transmission shift lock control solenoid to release. This allows the shift lever to move from the PARK position.

Automatic Transmission – 4L80E

Transmission General Specifications

Name	Hydra-matic 4L80-E
RPO Codes	MT1
Production Location	Ypsilanti, MI
Vehicle Platform (Engine/Transmission) Usage	C/K, C/K 800, G, P32/42
Transmission Drive	Longitudinally Mounted Rear Wheel Drive
1st Gear Ratio	2.482:1
2nd Gear Ratio	1.482:1
3rd Gear Ratio	1.000:1
4th Gear Ratio	0.750:1
Reverse	2.077:1
Torque Converter Size (Diameter of Torque Converter Turbine)	310 mm
Pressure Taps	Line Pressure
Transmission Fluid Type	DEXRON® III
Transmission Fluid Capacity (Approximate)	Bottom Pan Removal: 7.3L (7.7 qts) Dry: 12.8L (13.5 qts)
Transmission Type: 4	Four Forward Gears
Transmission Type: L	Longitudinal Mount
Transmission Type: 80	Product Series
Transmission Type: E	Electronic Controls
Position Quadrant	P, R, N, Overdrive, D, 2, 1
Case Material	Die Cast Aluminum
Transmission Weight Dry	107 kg (236 lbs)
Transmission Weight Wet	118 kg (260 lbs)
Maximum Trailer Towing Capacity	9,525 kg (21,000 lbs)
Maximum Gross Vehicle Weight (GVW)	7,258 kg (16,000 lbs)

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Accumulator Housing to Valve Body	11 N·m	97 lb in
Case Center Support	44 N·m	32 lb ft
Control Valve Assembly to Case	11 N·m	97 lb in
Cooler Pipe Connector Nut at Case and Radiator	38 N·m	28 lb ft
Engine Rear Mount to Transmission Bolt	44 N·m	32 lb ft
Engine Rear Support Bracket to Frame Nut	44 N·m	32 lb ft
Extension Housing to Case	34 N·m	25 lb ft
Flywheel Housing Cover to Transmission	7 N·m	62 lb in
Flywheel to Converter	44 N·m	32 lb ft
Fourth Clutch	23 N·m	17 lb ft
Manual Shaft to Detent Lever Nut	24 N·m	18 lb ft
Oil Pan Drain Plug	34 N·m	25 lb ft
Oil Pan to Case	24 N·m	18 lb ft
Oil Test Hole Plug	11 N·m	97 lb in
Parking Pawl Bracket to Case	24 N·m	18 lb ft
Pressure Control Solenoid Bracket to Valve Body	8 N·m	71 lb in
Pump Assembly to Case	24 N·m	18 lb ft
Pump Body to Cover	24 N·m	18 lb ft
Rear Servo Cover to Case	24 N·m	18 lb ft
Solenoid to Valve Body	8 N·m	71 lb in

Speed Sensor and Bracket Assembly to Case	11 N·m	97 lb in
Transmission Case to Engine	44 N·m	32 lb ft
Valve Body to Case/Lube Pipe	11 N·m	97 lb in
Valve Body to Case/PSM	11 N·m	97 lb in

Fluid Capacity Specifications Overhaul

Application	Specification	
	Metric	English
Oil Pan Removal	7.3 liters	7.7 quarts
Overhaul	12.8 liters	13.5 quarts

Transmission General Description

The 4L80-E is a fully automatic rear wheel drive electronically controlled transmission. The 4L80-E provides four forward ranges including overdrive and reverse. A gear type of oil pump controls shift points. The VCM/PCM and the pressure control (PC) solenoid (force motor) regulate these shift points. The VCM/PCM also controls shift schedules and TCC apply rates. Transmission temperature also influences shift schedules and TCC apply rates.

You can operate the transmission in any one of the following seven modes:

- P - PARK position prevents the vehicle from rolling either forward or backward on vehicles less than 15,000 G.V.W. For safety reasons, use the parking brake in addition to the park position.
- R - REVERSE allows the vehicle to be operated in a rearward direction.
- N - NEUTRAL allows the engine to be started and operated while driving the vehicle. If necessary, you may select this position in order to restart the engine with the vehicle moving.
- OD - OVERDRIVE is used for all normal driving conditions. Overdrive provides four gear ratios plus a converter clutch operation. Depress the accelerator in order to downshift for safe passing.
- D - DRIVE position is used for city traffic, and hilly terrain. Drive provides three gear ranges. Depress the accelerator in order to downshift.
- 2 - Manual SECOND provides acceleration and engine braking or greater traction from a stop. When you choose manual SECOND, the vehicle will start out in first gear and upshift to second gear. You may select this gear at a vehicle speed of up to 22 km/h (35 mph).
- 1 - Manual LOW provides maximum engine braking. You may select this gear at a vehicle speed of up to 13 km/h (20 mph).

Abbreviations and Meanings

Abbreviation	Meaning
A	
A	Ampere(s)
ABS	Antilock Brake System
A/C	Air Conditioning
AC	Alternating Current
ACC	Accessory, Automatic Climate Control
ACL	Air Cleaner
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+	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
BPP	Brake Pedal Position
BRN	Brown

BTDC	Before Top Dead Center
BTM	Battery Thermal Module
BTSI	Brake Transmission Shift Interlock
Btu	British Thermal Units
	C
°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^3	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
CO2	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

Cyl	Cylinder(s)
D	
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
DR, Drvr	Driver
DRL	Daytime Running Lamps
DTC	Diagnostic Trouble Code
E	
EBCM	Electronic Brake Control Module
EBTCM	Electronic Brake and Traction Control Module
EC	Electrical Center, Engine Control
ECC	Electronic Climate Control
ECI	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
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
F	
°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
G	
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

H	
H	Hydrogen
H2O	Water
Harn	Harness
HC	Hydrocarbons
H/CMPR	High Compression
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
I	
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
K	
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
L	
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
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
M	
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
N	
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
O	
O2	Oxygen
O2S	Oxygen Sensor
OBD	On-Board Diagnostics
OBD II	On-Board Diagnostics Second Generation
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
ohms	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)
P	
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
	Q
QDM	Quad Driver Module
qt	Quart(s)
	R
R-12	Refrigerant-12
R-134a	Refrigerant-134a
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
S	
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, ft^2	Square Foot/Feet
sq in, in^2	Square Inch/Inches
SRC	Service Ride Control
SRI	Service Reminder Indicator
SRS	Supplemental Restraint System
SS	Shift Solenoid
ST	Scan Tool
STID	Station Identification Station ID
S4WD	Selectable Four-Wheel Drive
Sw	Switch
SWPS	Steering Wheel Position Sensor
syn	Synchronizer
T	
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
U	
UART	Universal Asynchronous Receiver Transmitter
U/H	Underhood
U/HEC	Underhood Electrical Center
U-joint	Universal Joint
UTD	Universal Theft Deterrent
UV	Ultraviolet
V	
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
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
W	
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
X	
X-valve	Expansion Valve
Y	
yd	Yard(s)
YEL	Yellow

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Conversion - English/Metric

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.		
Length		
in	25.4	mm
ft	0.3048	m
yd	0.9144	
mi	1.609	km
Area		
sq in	645.2	sq mm
	6.45	sq cm
sq ft	0.0929	sq m
sq yd	0.8361	
Volume		
cu in	16,387.00	cu mm
	16.387	cu cm
	0.0164	L
qt	0.9464	
gal	3.7854	
cu yd	0.764	cu m
Mass		
lb	0.4536	kg
ton	907.18	
	0.907	tonne (t)
Force		
Kg F	9.807	newtons (N)
oz F	0.278	
lb F	4.448	
Acceleration		
ft/s²	0.3048	m/s²
In/s²	0.0254	
Torque		
Lb in	0.11298	N·m
lb ft	1.3558	
Power		
hp	0.745	kW
Pressure (Stress)		
inches of H2O	0.2488	kPa
lb/sq in	6.895	
Energy (Work)		
Btu	1055	J (J= one Ws)
lb ft	1.3558	
kW hour	3,600,000.00	
Light		
Foot Candle	10.764	lm/m²

Velocity		
mph	1.6093	km/h
Temperature		
(°F - 32) 5/9	=	°C
°F	=	(9/5 °C + 32)
Fuel Performance		
235.215/mpg	=	100 km/L

Equivalents - Decimal and Metric

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

Fraction (in)	Decimal (in)	Metric (mm)
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
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

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Fasteners

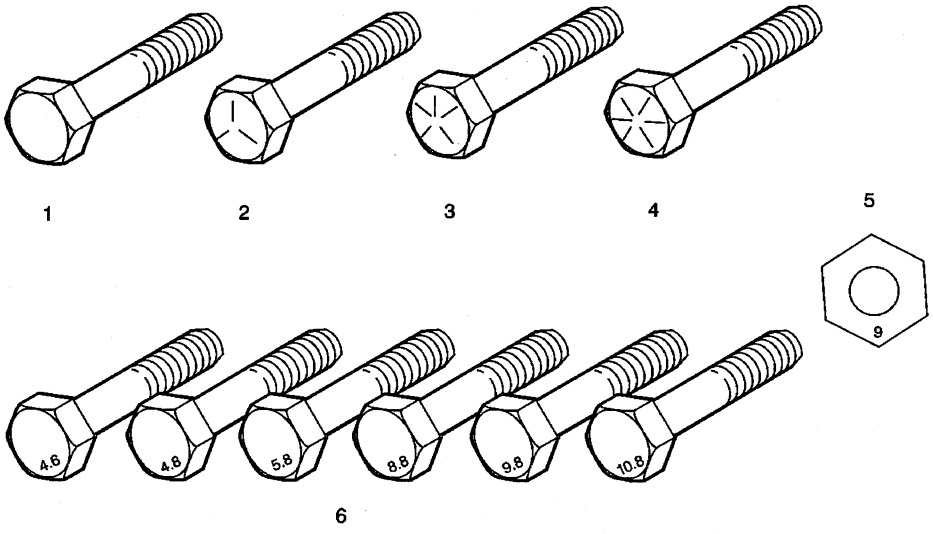
Metric Fasteners

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



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

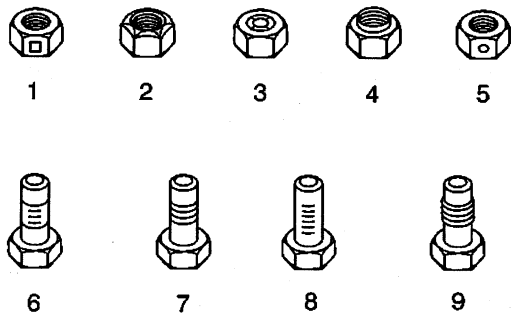
These fasteners accomplish the thread interface by a designed distortion or deformation in the fastener.

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.



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