Chevrolet

Avalanche

2007

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Product Information

2007 Chevrolet Avalanche Is Redesigned, With More Flexibility, Capability and Refinement

The 2007 Chevy Avalanche is the next generation of the industry's most flexible utility vehicle. It combines the passenger-comfort attributes of an SUV with the cargo capability of a truck. It is based on GM's new, full-size SUV platform, which features more power with segment-leading fuel economy and flex-fuel capability; a sharper, more precise driving feel; increased interior refinement; and improved quietness.

Avalanche delivers a 360-degree safety system of occupant protection and crash-avoidance technology that demonstrates GM's commitment to providing world-class safety, including available head curtain side air bags and standard StabiliTrak stability control system with new rollover mitigation technology.

The 2007 Avalanche is available in LS, LT and LTZ models, with 2WD and 4WD. The standard powertrain includes an efficient 5.3L V-8 with Active Fuel Management technology that seamlessly switches from eight-cylinder to four-cylinder operation to save fuel. Later in the model year, an all-aluminum 6.0L V-8 with Active Fuel Management and variable valve timing (VVT) will be available. Several available engines allow Avalanche to run on E85, a renewable fuel made of 85 percent ethyl alcohol (ethanol) and 15 percent gasoline.

Returning to Avalanche is the popular Z71 Off Road appearance package. This optional package takes the vehicle's aggressive look to the next level, with larger recovery hook openings, larger, more prominent fog lamps and specific grille texture and platinum chrome grille trim. Eighteen-inch wheels and tires also are part of the package.

Enhanced flexibility

Avalanche's unparalleled flexibility enables it to function as an SUV, truck or both, thanks to the unique Midgate. Pioneered on the first-generation Avalanche, the Midgate opens to extend the cargo-carrying capability from the cargo bed's 5.3-foot-long (1.6 m) length to 8.2 feet (2.5 m). The rear seat must be folded to achieve maximum storage capability; with the rear seat up and the Midgate closed, Avalanche has room for up to six passengers.

When the Midgate is open and the rear seat is folded flat, Avalanche can carry 4-foot by 8-foot (1.2 m by 2.4 m) sheets of plywood with the tailgate closed. Storage compartments alongside the cargo box provide ample and lockable storage. The storage compartments also have drains, so they can be filled with ice and used as coolers. A three-piece rigid cargo cover with interlocking panels also is available.

New features on the '07 model enhance Avalanche's flexible attributes and reflect customer feedback, including a central-locking tailgate, remote vehicle starting system and cargo cover retaining straps. Also, the new tailgate is spring-loaded to reduce the effort needed to open or close it.

Avalanche also offers convenient articulating running boards, which blend smoothly with the vehicle's design. They automatically move downward and outward when the doors are opened, providing a lower step-in height.

Efficient performance

Avalanche is powered by a new Gen IV small-block V-8 family that delivers more power than comparable powertrains in previous models. Standard on 2WD models is an iron-block Vortec 5.3L V-8 with 320 horsepower (239 kW)* and 340 lb.-ft. of torque (461 Nm)*, which offers Active Fuel Management. Two versions of the Vortec 5.3L Gen IV V-8 – including an aluminum-block version that is standard in 4WD models – are compatible with E85. The 5.3L aluminum-block V-8, standard on the 4WD Avalanche, delivers an estimated 310 horsepower (224 kW)* and 335 lb.-ft. (454 Nm)* of torque.

An all-aluminum 6.0L V-8 with variable valve timing (VVT), as well as Active Fuel Management is available on 2WD and 4WD models. It is rated at an estimated 366 horsepower (273 kW).* VVT helps optimize camshaft timing to improve low-rpm torque and high-rpm horsepower. The system is enabled by a unique dual-equal cam phaser – the industry's first application of VVT on a mass-produced V-8 cam-in-

block engine. The unique dual-equal phaser adjusts the camshaft timing at the same rate for both the intake and exhaust valves. A Hydra-Matic 4L70 electronically controlled four-speed automatic transmission is paired with the engine.

Contributing to Avalanche's more efficient performance is improved aerodynamics. A more steeply raked windshield and smoother roofline improve airflow over the vehicle, while a dditional contributors to efficiency include a lower, wider front air dam, tighter tolerances and gaps between the fascias, lamps and grille openings, and improved front-end sealing that nearly eliminates air leak paths. These features all contribute to enhanced fuel economy and improved driving quietness, compared with previous models.

Interior refinement and convenience

The interior of the '07 Avalanche represents a new level of refinement, comfort, quality and convenience. It is roomy and airy, thanks to a lower instrument panel and deeper windshield that improve outward visibility. Passenger space also is increased, including more shoulder space for rear passengers, which is packaged with the available roof-mounted head curtain side air bags with rollover protection for both seating rows.

Avalanche's new front seats are designed to provide more comfort and easier entry/egress. Door pillar-mounted first-row three-point safety belts facilitate slimmer seat design, which helps increase cargo space behind the seats. Comfort has been enhanced with firmer foams, including more aggressive bolsters. The front-row seats have one-inch more aft travel than previous models. The rear seat is unique to the Avalanche and enables easy access to the Midgate system. The seat folds flat, allowing longer items to be carried between the cargo bed and into the rear passenger compartment.

Refinements throughout Avalanche's spacious interior create an environment that exudes quality and precision. Flush-mounted accessories and controls, such as the climate control/radio center stack, create a seamless, "single unit" appearance. Also, there are almost no exposed metal hardware or latches, as all models feature enclosing "close-outs" around the seat bottoms and door sill trim plates. New comfort features include an upgraded HVAC system, and storage capability is improved with the segment's largest center console storage bin, a larger glove box and additional new storage compartments. Avalanche also offers a host of available convenience features, including:

- Ultrasonic Rear Parking Assist
- Rearview camera system
- Touch-screen navigation system
- DVD rear-seat entertainment system with larger, 8-inch screen and enhanced features.

Avalanche also features an impressive new audio/navigation lineup, which provides quality entertainment and information. A new family of CD/MP3-compatible radios leads the audio lineup, with an enhanced DVD entertainment system that includes a larger, 8-inch screen (with in-dash loading). A new touch-screen navigation radio is available and incorporates the view monitor for the available rear-camera system.

Distinctive design

Avalanche's all-new exterior, monochromatic design is leaner and more agile looking, with a more steeply raked windshield and smoother roofline accentuating the exterior length. Avalanche wears the new face of Chevrolet, with a large Chevy gold bowtie, centered on a twin-port horizontal grille. The body-colored grille surround is inset with an argent texture mesh. Fog lamps and headlamps feature jewel-like optics.

Avalanche's front end styling reflects its capability. It includes the fast-rake windshield; a bulging power dome hood; a prominent new fender design with integrated wheel flares; a distinctive new grille and headlamps; and a full-wrap fascia. The wraparound fascia eliminates the conventional bumper-to-body gap and is one of the numerous attributes that gives the Avalanche a more refined look. It also enhances aerodynamics. There also is a new family of 17-inch and 20-inch wheels. Seventeen-inch wheels and tires are standard, with 20-inch factory-installed wheels available (standard on LTZ). The larger wheels fill Avalanche's wheel houses, giving the vehicle a confident stance.

Avalanche is offered in nine exterior colors: Greystone Metallic, Dark Blue Metallic, Sport Red Metallic, Bermuda Blue Metallic, Black, Summit White, Gold Mist Metallic, Sunburst Orange Metallic and Silver Birch Metallic.

New full-size SUV foundation

Avalanche is built on GM's new full-size SUV platform, which incorporates features such as a new, fully boxed frame, coil-over-shock front suspension, rack-and-pinion steering and an all-new, premium interior system that bolster the vehicle's comfort, quality and capability. Wider front and rear tracks enhance handling and vehicle stability for a more confident road feel.

Extensive attention to detail was paid by Avalanche's engineers to ensure a quiet driving experience. The new, stiffer frame reduces vibrations transmitted to the passenger cabin, while the strength and accuracy of the fully boxed frame also enable more precise mounting and tuning of chassis and suspension components. This helps reduce vibration – even the tires on the large, 17-inch and 20-inch wheels were designed to reduce noise.

Noise-reducing components and materials are used throughout the body structure, including the headliner material, door seals and front-of-dash area. The engines also feature a quiet-tuned alternator and an acoustically tuned engine cover that reduces engine noise heard inside the vehicle. New door seals help reduce seal "pull-away" at highway speeds, which can cause wind noise.

Avalanche's quietness and smoothness are complemented by the Autoride suspension system, which is standard on LTZ. This segment-exclusive bi-state, real-time damping system provides an extremely refined ride with greatly reduced body motion. The system consists of a semi-active, two-position damping control system that responds in real time to road and driving conditions, based on body and wheel motion sensors.

Avalanche offers up to 8,000 pounds (3,629 kg) of towing capability, when properly equipped, enhancing its flexible, ready-for-anything capability.

Safety story

The '07 Avalanche offers security in the form of a 360-degree safety system of occupant protection and crash-avoidance technologies. New features include roof-mounted head curtain side air bags with rollover protection for both rows and front-seat safety belt pretensioners that are linked to the vehicle's sensing system to provide segment-exclusive deployment in rear-end crashes.

These features are integrated into a stronger vehicle structure that is also designed for improved compatibility with other vehicles. The roof-mounted head curtain air bags include design features that provide increased rollover protection and occupant containment. Sensors located at the front of the vehicle, in the side doors, and within the occupant compartment provide increased and more immediate crash detection. The vehicle's sensing system provides industry-exclusive capability to deploy front seat safety belt pretensioners during certain rear-end collisions, enhancing the belt system's ability to hold the occupants firmly in place.

The roof-mounted head curtain side air bag system incorporates one of the segment's first rollover indication sensors, which is located on the vehicle's center tunnel in the occupant compartment. The sensor monitors the vehicle's accelerations and roll rate. If these signals indicate an impending rollover, the roof-mounted head curtain side air bags deploy to provide an extra measure of occupant protection and containment. These rollover-capable head curtain side air bags stay inflated longer than air bags developed only for side impacts because rollover incidents can last longer. The deployment duration and other design features of the rollover-capable air bags combine to provide increased occupant protection and the ability to help keep occupants inside the vehicle.

Crash avoidance is bolstered through enhanced design and driver control dynamics, such as wider front and rear tracks, as well as more responsive suspensions – including a new coil-over-shock front suspension design and new rack-and-pinion steering. The vehicles are built on a stronger and stiffer, fully-boxed frame that contributes to enhanced crash energy management. The front frame section has been designed to optimize crush progression, resulting in improved energy absorption efficiency. The improved crush performance, enabled by hydroformed frame rails and efficient chassis component

packaging, also comprehends design provisions that help improve vehicle-to-vehicle compatibility in the event of a frontal impact with a smaller vehicle.

- Additional safety features include:
- Standard StabiliTrak stability control system with rollover mitigation technology
- Standard dual-stage driver's front air bag
- Standard dual-stage outboard-front passenger air bag with Passenger
- Sensing System
- Available roof-mounted head curtain side air bags for both seating rows
- Standard front seat safety belt pretensioners with rear impact
- deployment capability
- Standard tire pressure monitoring system
- Available rain-sensing wiper system
- Available Ultrasonic Rear Parking Assist that can detect certain stationary objects in the rearward path of the vehicle and send an audible warning sound and display via three LEDs on the right D-pillar
- Available rearview camera system designed to provide the driver with a view of people or objects in the rearward path of the vehicle
- Standard pull-up/push-down power window switches

All models come with the Generation 6 OnStar system (with a one-year Safe and Sound service plan). The system includes the General Motors Advanced Automatic Crash Notification (AACN) system, making crash data available to emergency services to potentially dispatch the appropriate life-saving personnel and equipment to crash scenes faster. If the vehicle is in a crash that activates an air bag, the OnStar system automatically notifies an OnStar advisor, who will check on the occupants or summon emergency help if necessary. OnStar also can assist authorities in locating a vehicle if it is reported stolen (ability to locate stolen vehicles varies with conditions).

* *SAE certified. A new voluntary power and torque certification procedure developed by the SAE Engine Test Code committee was approved March 31, 2005. This procedure (J2723) ensures fair, accurate ratings for horsepower and torque by allowing manufacturers to certify their engines through third-party witness testing. GM* was the first auto manufacturer to begin using the procedure and expects to use it for all newly rated engines in the future.

New for 2007

- Redesigned exterior with wraparound fascias, improved aerodynamics
- Refined, quiet interior with improved seating comfort
- New, stronger chassis enables smooth ride and handling
- New family of Gen IV small-block V-8 engines

Model Lineup

	Engines			Transmissions	
	Vortec 5.3L V-8 (LY5/LMG)	Vortec 5.3L V-8 (LC9)	Vortec 6.0L V-8 (L76)	4-spd auto (Hydra-Matic 4L60)	4-spd auto (Hydra-Matic 4L70)
Avalanche	s (2WD)	s (4WD)	o	s	o

Key:

Standard s
Optional o

Specifications

Overview

Models:	Chevrolet Avalanche LS, LT and LTZ
Body style / driveline:	4-door sport utility vehicle/pickup, front-engine, 2- or 4-wheel drive, half-ton models
Construction:	body on frame
EPA vehicle class:	half-ton truck
Manufacturing locations:	Silao , Mexico
Key competitors:	Ford Super Crew, Dodge Ram Quad Cab

Engines

	Vortec 5.3L V-8 (LY5, LMG)	**Vortec 5.3L V-8 (LC9)**	**Vortec 6.0L V-8 (L76)**
Type:	5.3L V-8	5.3L V-8	6.0L V-8
Displacement (cu in / cc):	325 / 5328	325 / 5328	364 / 5967
Bore & stroke (in / mm):	3.78 x 3.62 / 96 x 92	3.78 x 3.62 / 96 x 92	4.00 x 3.62 / 101.6 x 92
Block material:	cast iron	cast aluminum	cast aluminum
Cylinder head material:	cast aluminum	cast aluminum	cast aluminum
Valvetrain:	overhead valve, 2 valves per cylinder, hydraulic roller lifters	overhead valve, 2 valves per cylinder, hydraulic roller lifters	overhead valve, 2 valves per cylinder, variable valve timing
Ignition system:	coil-near-plug ignition, iridium electrode tip/ iridium core spark plugs, low resistance spark plug wires	coil-near-plug ignition, iridium electrode tip/ iridium core spark plugs, low resistance spark plug wires	coil-near-plug ignition, iridium electrode tip/ iridium core spark plugs, low resistance spark plug wires
Fuel delivery:	Active Fuel Management; sequential fuel injection	Active Fuel Management; sequential fuel injection	Active Fuel Management; sequential fuel injection
Compression ratio:	9.9:1	9.9:1	9.6:1
Horsepower (hp/ kW @ rpm):	320 / 239 @ 5200*	310 / 231 @ 5200*	366 / 273 @ 5500*
Torque (lb-ft / Nm @ rpm):	340 / 461 @ 4200*	335 / 454 @ 4400*	380 / 515 @ 4300*
Fuel:	regular unleaded, E85-capable (LMG)	regular unleaded, E85-capable	regular unleaded
Maximum engine speed (rpm):	6000	6000	6000
Emissions controls:	close-coupled catalytic converter, Quick Sync 58X ignition, returnless fuel rail, fast-response O^2 sensor	close-coupled catalytic converter, Quick Sync 58X ignition, returnless fuel rail, fast-response O^2 sensor	close-coupled catalytic converter, Quick Sync 58X ignition, returnless fuel rail, fast-response O^2 sensor
Estimated fuel economy:	TBD	TBD	TBD

Transmissions

	Hydra-Matic 4L60-E (5.3L engines)	Hydra-Matic 4L70-E (6.0L engine)
Type:	4-speed electronic automatic	4-speed electronic automatic
Gear ratios (:1):		
First:	3.06	3.06
Second:	1.63	1.63
Third:	1.00	1.00
Fourth:	0.70	0.70
Reverse:	2.29	2.29
Final drive ratio:	3.73 std (4.10 opt);	4.10 std

Chassis/Suspension

Front:	independent, coil over shock; Autoride real-time damping (std. on LTZ and LT with 6.0L)
Rear:	five-link with coil springs; Autoride real-time damping (std. on LTZ and LT with 6.0L)
Traction assist:	all-speed traction control
Steering type:	power-assisted rack-and-pinion
Steering ratio:	17.75:1
Steering wheel turns, lock-to-lock:	3
Turning circle, curb-to-curb (ft / m):	43.0 / 13.1

Brakes

Type:	4-wheel vented disc, 4-wheel ABS
Rotor diameter x thickness (in/mm):	front: 13 x 1.18 / 330.2 x 30 rear: 13.5 x .787 / 345 x 20

Wheels/Tires

Wheel size and type:	17 x 7.5-inch machined cast aluminum, silver sparkle accent (LS, LT)
	18 x 8.0-inch polished aluminum (Z71 package)
	20 x 8.5-inch polished aluminum (opt. LT, std. LTZ)
Tires:	P265/70R17 blackwall Goodyear AL2 (all-season) steel belt radials;
	P265/70R17 white letter Goodyear AL2 (all-season) steel belt radials;
	P265/70R17 blackwall Bridgestone OOR (on-off-road) steel belt radials (export only)
	P265/65R18 blackwall Bridgestone OOR (on-off-road) steel belt radials
	P265/65R18 blackwall Bridgestone AL2 (all-season) steel belt radials (export only)
	P275/55R20 blackwall Bridgestone AL2 (all-season) steel belt radials

Dimensions

Exterior

Wheelbase (in / mm):	130 / 3302
Overall length (in / mm):	221.3 / 5620.8
Overall width (in / mm):	79.1 / 2010.4
Overall height (in / mm):	76.6 / 1944.8
Track (in / mm):	front: 68.2 / 1731.8 rear: 67.0 / 1701.8
Minimum ground clearance (in / mm):	2WD: 9.1 / 230.7 4WD: 9.1 / 230.7
Step-in height (in / mm):	2WD: 21.9 / 555.6 4WD: 22.2 / 562.8
Ground to top of cargo floor (in / mm):	2WD: 32.2 / 818.9 4WD: 32.5 / 824.8
Approach angle (deg):	2WD: 16.78 4WD: 16.64
Departure angle (deg):	2WD: 20.05 4WD: 20.31
Curb weight (lb / kg):	2WD: 5478 / 2485 4WD: 5645 / 2560
Weight distribution (% front / rear):	2WD: 51 / 49 4WD: 52 / 48

Interior

	First Row	Second Row
Seating capacity (5 or 6 total):	2 or 3	3
Headroom (in / mm):	41.1 / 1043.2	40 / 1014.9
Legroom (in / mm):	41.3 / 1048.9	39.1 / 1048.9
Shoulder room (in / mm):	65.3 / 1657.9	65.2 / 1657.3
Hip room (in / mm):	64.4 / 1636.7	61.8 / 1570.1
Cargo length (in / mm) Behind 1st row, Midgate closed:	31.8 / 806.8	
Cargo box volume:		
Behind 1st row, 2nd row folded, Midgate closed	54.3 / 1537.3	
Behind 1st row, 2nd row folded, Midgate open	101 / 2859.1	

Cargo Box

Cargo Length – bed, Midgate closed (in / mm):	63.3 /1609.1
Cargo Length – behind 1 st row, Midgate open (in / mm):	97.6 / 2479
Cargo width at wheelhouse (in / mm):	50.0 / 1270.4
Cargo height – max. inside w/Midgate open (in / mm):	47.4 / 1204.7
Cargo height – open bed (in / mm):	25.0 / 634.7
Cargo height – w/bed cover (in / mm):	22.6 / 574.5
Cargo volume, open bed, Midgate closed (cu ft / L):	45.5 / 1289.1

Capacities

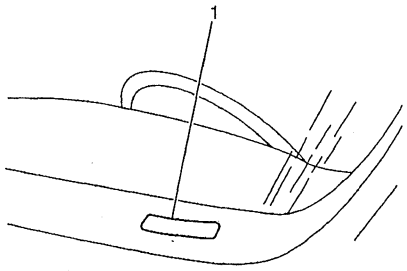
GVWR, standard (lb / kg):	2WD: 6800 / 3084
	4WD: 7000 / 3175
Payload (lb / kg):	base 2WD: 1322 / 600
	base 4WD: 1355 / 615
Trailer towing maximum (lb / kg):	2WD: 8000 / 3628 (5.3L & 6.0L w/ 4.10 axle)
	4WD: 7800 / 3538 (5.3L w/ 4.10 axle)
Fuel tank (gal / L):	31.5 / 119.2
Engine oil (qt / L):	6 / 5.7 (5.3L & 6.0L)
Cooling system (qt / L):	16.8 / 15.9 (5.3L & 6.0L)

* *SAE certified. A new voluntary power and torque certification procedure developed by the SAE Engine Test Code committee was approved March 31, 2005. This procedure (J2723) ensures fair, accurate ratings for horsepower and torque by allowing manufacturers to certify their engines through third-party witness testing. GM was the first auto manufacturer to begin using the procedure and expects to use it for all newly rated engines in the future.*

Note: Information shown is current at time of publication.

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 G	2994/6500 Hydraulic 3175/7000 Hydraulic 3901/8600 Hydraulic
5	Truck Line/Chassis Type	C K	4x2 4x4
6	Series	6	½ Ton Luxury
7	Body Type	3	Four-Door Utility
8	Engine Type	C 3 0 J 3 0 J Y	4.8L V8 MFI (LY2) 5.3L V8 Flex Fuel with DoD - Aluminum 5.3L V8 Flexible Fuel with DoD - Iron 5.3L V8 MFI (LYS) 5.3L V8 MFI (LC9) 5.3L V8 MFI (LMG) 5.3L V8 with DoD 6.0L V8 MFI (L76)
9	Check Digit	--	Check Digit
10	Model Year	7	2007
11	Plant Location	G J R	Silao Janesville Arlington
12-17	Plant Sequence Number	100001	Plant Sequence Number

VIN Derivative

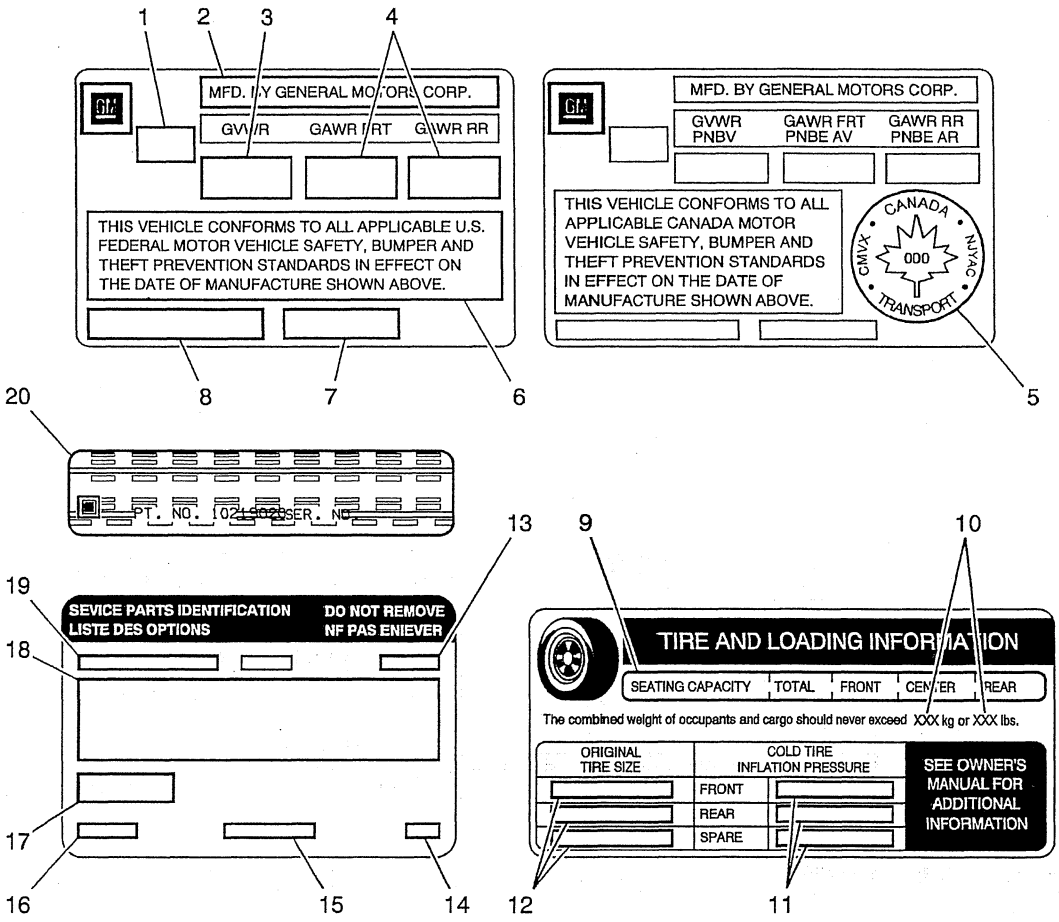
All engines and transmissions are stamped or laser etched with a partial vehicle identification number (VIN), which was derived from the complete VIN. A VIN derivative contains the following nine positions:

Position	Definition	Character	Description
1	Division	C	Chevrolet Truck
2	Model Year	7	2007
3	Plant Location	G J R	Silao Janesville Arlington
4-9	Plant Sequence Number	100001	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	3
2	10
3	11
4-9	12-17

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

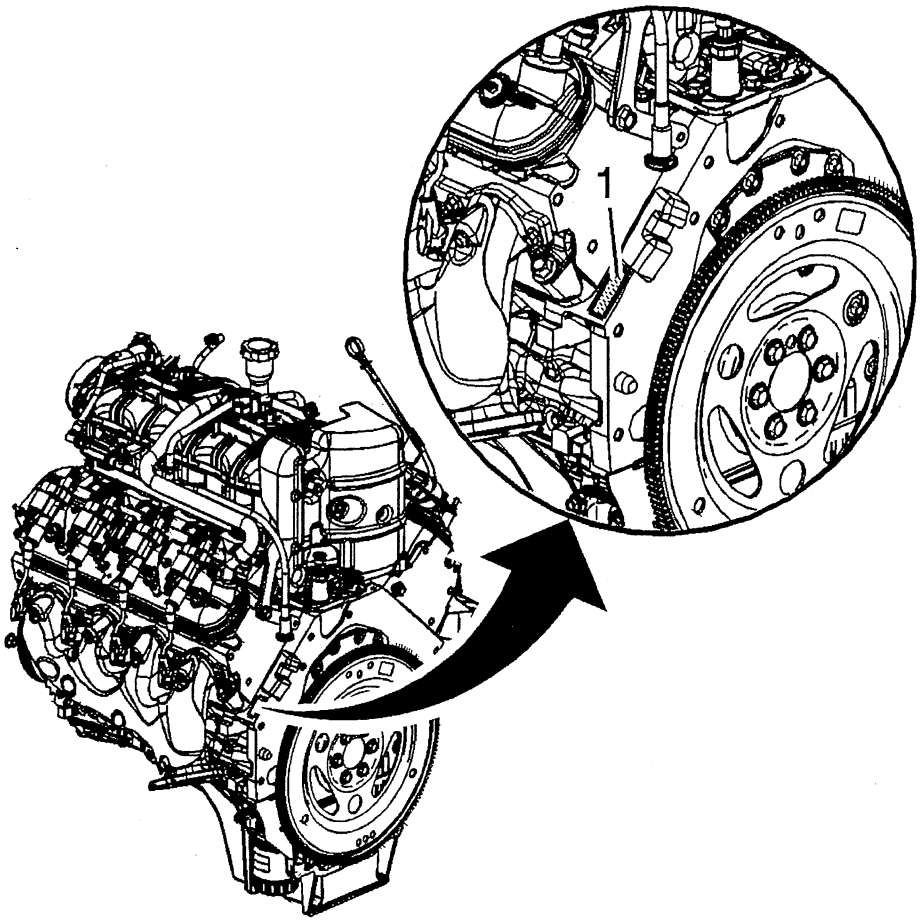


Callout	Description
The **vehicle certification label** is located on the driver door and displays the following assessments: • Gross Vehicle Weight Rating (GVWR) • Gross Axle Weight Rating (GAWR), front and rear • The gross vehicle weight (GVW) is the weight of the vehicle and everything it carries. The gross vehicle weight must not exceed the Gross Vehicle Weight Rating. Include the following items when figuring the GVW: o The base vehicle weight (factory weight) o The weight of all vehicles accessories o The weight of the driver and the passengers o The weight of the cargo	
1	Name of Manufacturer
2	Gross Vehicle Weight Rating
3	Gross Axle Weight Rating (FRONT, REAR)
4	Canadian Safety Mark (w/RPO Z49)
5	Certification Statement
6	Vehicle Class Type (Pass Car, etc.)
7	Vehicle Identification Number
8	Date of Manufacture (Mo/Yr)

Callout	Description
Tire Placard	
The tire placard label is located on the driver door and displays the following assessments:	
9	Specified Occupant Seating Positions
10	Maximum Vehicle Capacity Weight
11	Original equipment tires size
12	Tire pressure, Front, Rear, and Spare (Cold)
Service Parts ID Label	
The vehicle service parts identification label is located on the front passenger door frame. The label is use to help identify the vehicle original parts and options.	
13	Vehicle Identification Number
14	Engineering Model Number (Vehicle Division, Line and Body Style)
15	Interior Trim Level and Decor
16	Exterior (Paint Color) WA Number
17	Paint Technology
18	Special Order Paint Colors and Numbers
19	Vehicle Option Content
Anti-Theft Label	
20	The Federal law requires that General Motors label certain body parts on this vehicle with the vehicle identification number (VIN). The purpose of the law is to reduce the number of motor vehicle thefts by helping in the tracing and recovery of parts from stolen vehicles. Labels are permanently affixed to an interior surface of the part. The label on the replacement part contains the letter R, the manufacture's logo, and the DOT symbol. The anti-theft label must be covered before any painting, and rustproofing procedures, and uncovered after the procedures. Failure to follow the precautionary steps may result in liability for violation of the Federal Vehicle Theft Prevention Standard and possible suspicion to the owner that the part was stolen.

Engine ID and VIN Derivative Location

Engine ID - V-8 Engines



The vehicle identification number (VIN) is located on the left side rear of the engine block (1) and is typically a 9 digit number stamped or laser-etched onto the engine at the vehicle assembly plant.

- The first digit identifies the division.
- The second digit identifies the model year.
- The third digit identifies the assembly plant.
- The fourth through ninth digits are the last 6 digits of the VIN.

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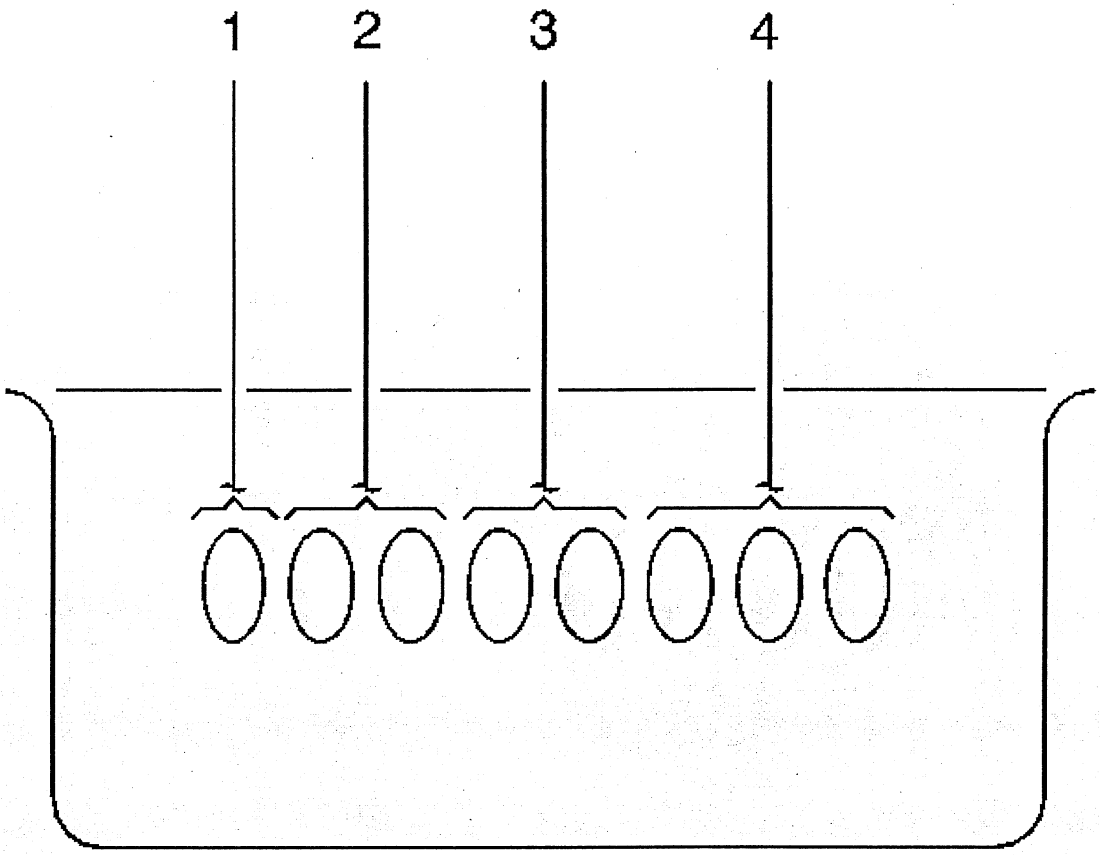
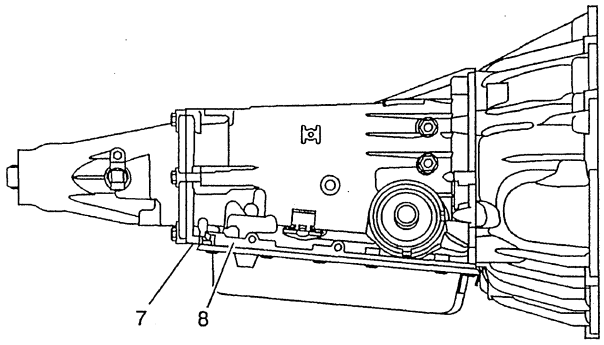
Engine ID Legend

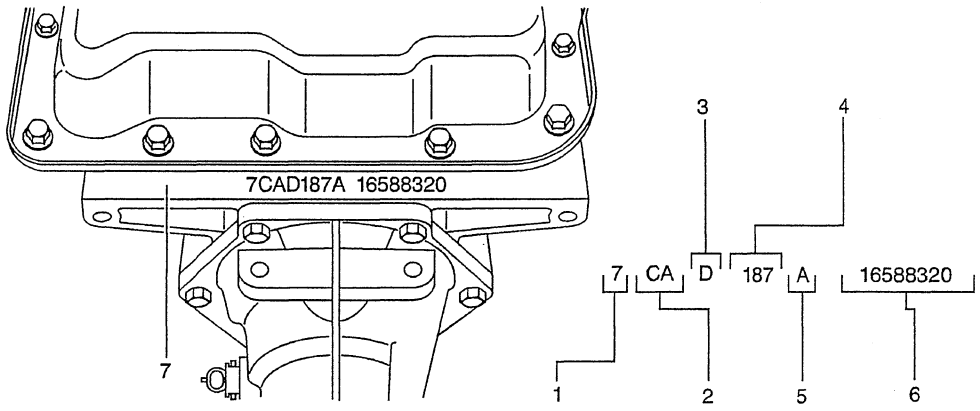


1. Source Code
2. Month of Build
3. Date of Build
4. Broadcast Code

Transmission ID and VIN Derivative Location

4L60/4L70-E Transmission ID Location



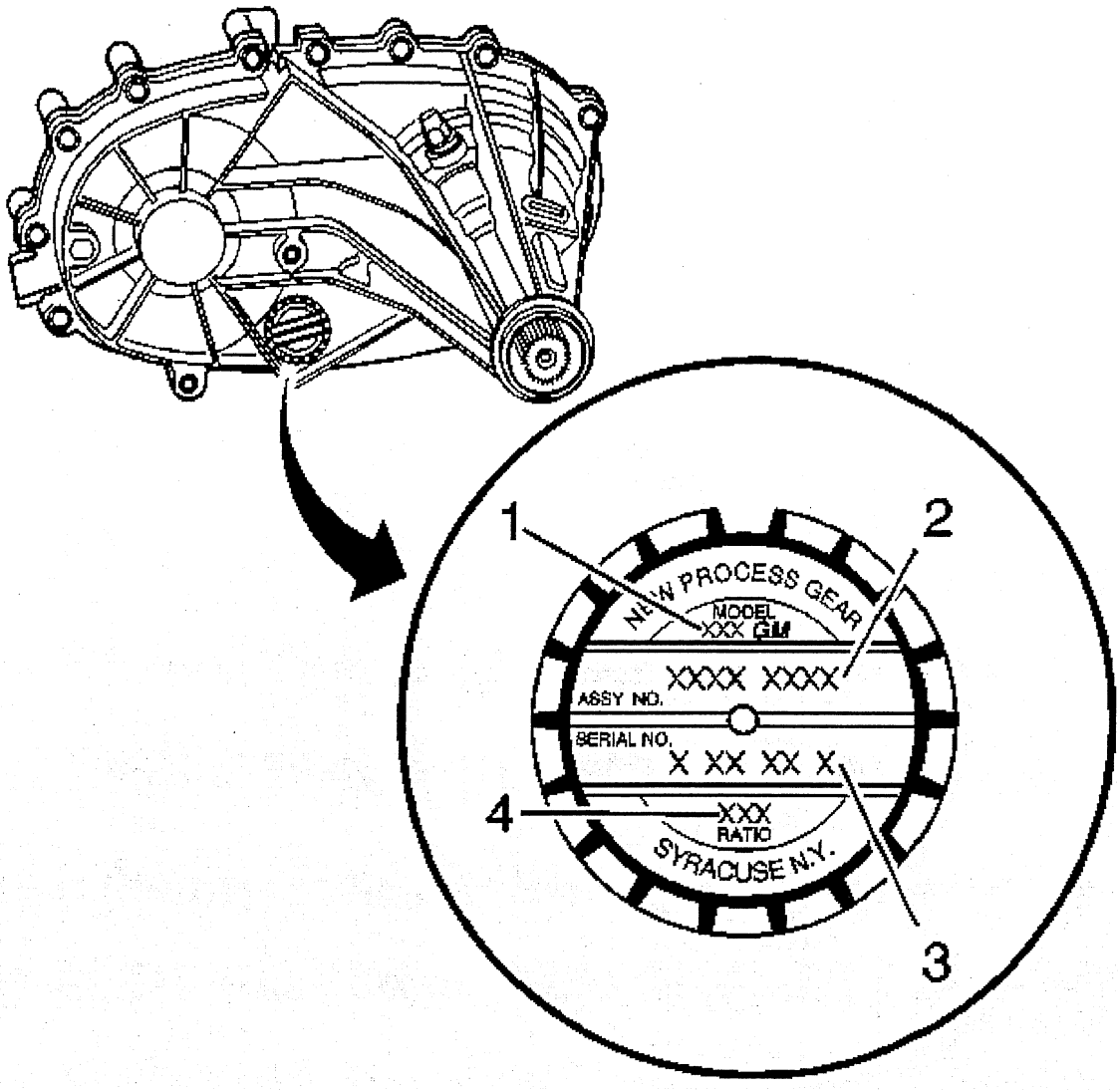


(1) 7 = 2007
(2) Model
(3) Hydra-Matic 4L60-E
(4) Julian Date or Day of the Year
(5) Shift Built, See Shift Build Chart
(6) Serial Number
(7) Case/Pan Frame Rail Location
(7) Case/Pan Frame Rail Location
(8) Optional Transmission ID Location, Tag is Used as a Back-up if Unable to Etch Case/Pan Area and to Bar Code

Plant and Shift Build

Plant	Build Line	1st Shift	2nd Shift	3rd Shift
Toledo, OH	ML1	J	W	X
	ML2	A	C	Not Used
	ML3	B	H	Not Used
	ML4	S	L	V
	ML5	K	E	Z
Romulus, MI	1	A	--	B
Ramos Arizpe, Mexico	1	A	--	--

Transfer Case Identification

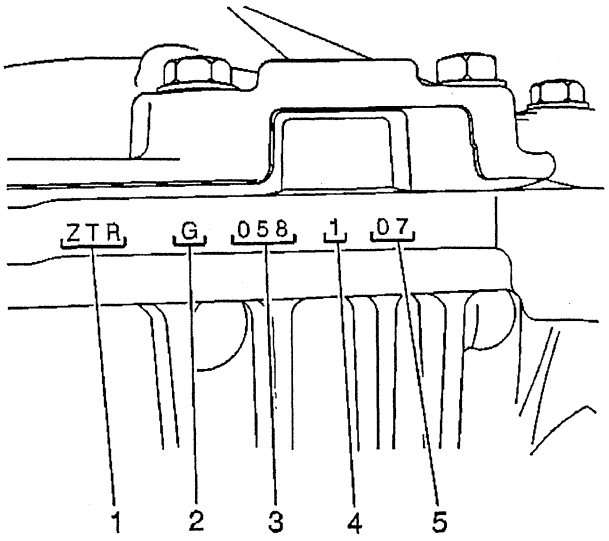


An identification tag is attached to the rear half of the transfer case. The tag provides the following information:

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



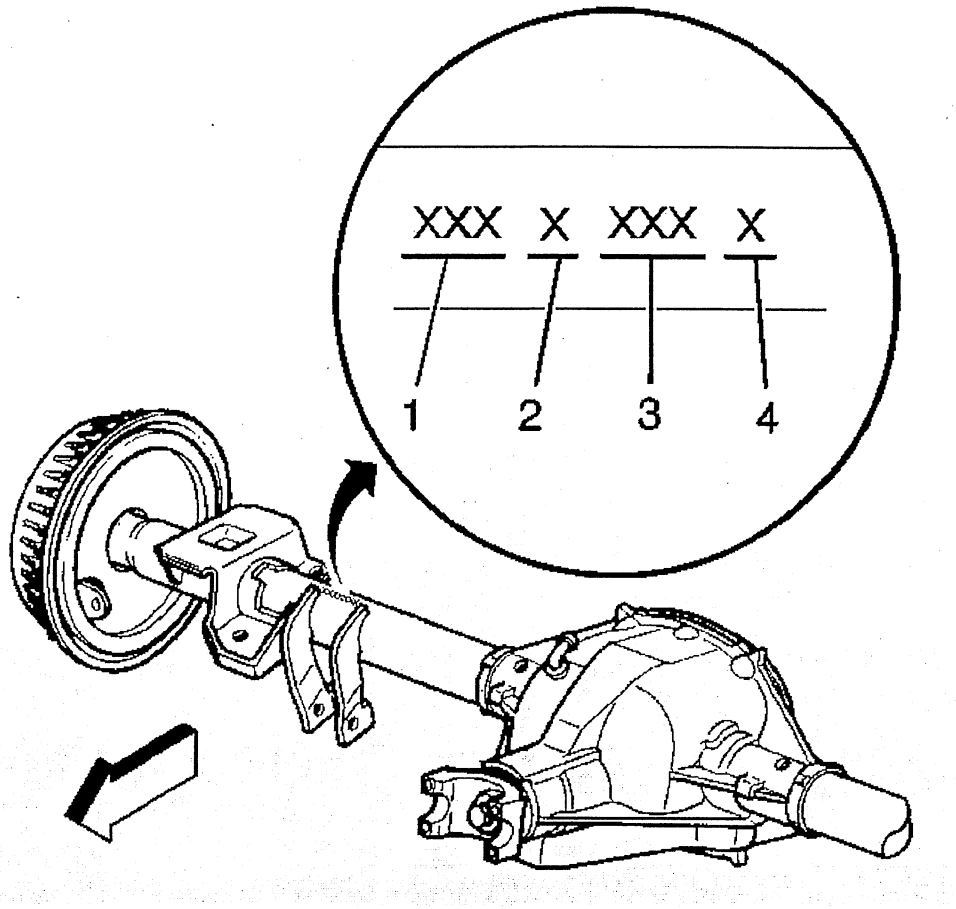
(1) Broadcast Code
(2) Supplier Code (G = American Axle)
(3) Julian Date (Day of Year)
(4) Shift Built (1 = First Shift; 2 = Second Shift) (Optional for 8.25" and 9.25" axles)
(5) Hour Built

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

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.

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
AC6	Window Tinted Deep, Rear, S/D
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
AK5	Restraint System - Seat, Inflatable, Driver and Pass
AL0	Sensor Indicator Inflatable Restraint, Front Passenger/Child Presence Detector
AL6	Restraint - Cargo
ANJ	Window Tinted Export Compliant, Non-Deep
AN3	Seat FRT, Individual (Non BKT)
AP3	Lock Control, Entry - Remote, Keyless Entry, Start
AP8	Lock Control, Entry - Remote Entry, Extended Range
ASF	Restraint-Roof Side, LH and RH, Inflatable
AT5	Seat Rear CTR, Folding
AU0	Lock Control, Entry - Remote Entry
AU3	Lock Control Side Door, Electric
A04	Windshield Tinted, Less Upper Shadeband
A31	Window Power Operated, All Doors
BAG	Parts Package Export
BPH	Appearance Package Chevrolet Off Road
BRS	Steps, Runningboard - Side, Retractable, Power
BS1	Insulation Acoustical PKG
BVE	Side Steps Runningboard
BVU	Steps, Runningboard - Side, Molded, Black
BVV	Steps, Runningboard - Side, Tubular, Black
B30	Floor Covering Carpet
B33	Covering Rear - Floor Mats, Aux
B37	Covering Floor Mat, Front and Rear, Auxiliary
B41	Covering Floor Mat, Load Floor
B58	Covering Floor MAT, FRT And RR, Carpeted Insert
B71	Wheel Opening Flares
B85	Molding - Body Side , Exterior, Bright
CE1	Wiper System - Windshield, Pulse, Moisture Sensitive
CF5	Roof Sun Glass, Sliding, Electric
CJ2	HVAC System Air Conditioner Front, Auto Temperature Control, Auxiliary Temperature Control
CJ3	HVAC System Air Conditioner Front, Manual Temperature Control, Auxiliary Temperature Control
C49	Defogger RR Window, Electric
C5U	GVW Rating 6,800 LBS
C5W	GVW Rating 7,000 LBS
DF5	Mirror, I/S R/V LT Sensitive, Compass, O/S Temp Display
DK8	Console Roof Interior, Deluxe
DL3	Mirror, O/S LH and RH, Remote Control, Electric, Heated, Power Folding, Turn Signal Indicator, Light Sensitive, Color
DL8	Mirror, O/S LH and RH, Remote Control, Electric, Heated
DPN	Mirror O/S - LH and RH, Wide Load, Vertical Glass, Man Extending, Man Folding, Heated, Turn Sig Ind, Remote Control

RPO	Description
DT3	Rear Box Compartment, Stowage
DT4	Ashtray, Cigarette Lighter
D07	Console Front Compartment, Floor, Custom
EN4	Cover, Rear Compartment Hard, Rear Compartment, Cargo
EXP	Export
E95	Cover, RR Compttonneau, RR Compt
FE9	Certification - Emission, Federal
GT4	Axle Rear 3.73 Ratio (DUP With 5 x 1)
GT5	Axle Rear 4.10 Ratio (DUP With GT8)
GU6	Axle Rear 3.42 Ratio
G69	Level Control Auto, Air, HD
G80	Axle Positraction Limited Slip
JD9	Brake - Vac Power, 17" Disc/Disc, W/VSES, 7700 LBS
JF4	Pedals - Adjustable, Power
JH6	Brake Hyd Power, 4-Wheel Disc, 9,900 lb
JL4	Control Active Brake
KA9	Heater - Steering Wheel
KB6	Heater - Seat, Cooling, FRT
KC4	Heavy Duty Engine Oil Cooling
KG3	Generator 145 Amp
KNP	Cooling System Trans, HD
K05	Heater Engine Block
K34	Cruise Control, Automatic, Electronic
K47	Air Cleaner High Capacity
LC9	Engine - Flexible Fuel, (GAS/ALC), 8 CYL, 5.3L, SFI, Alum, CYL Deactivation, GM
LMG	Engine - Flexible Fuel, (GAS/ALC), 8 CYL, 5.3L, SFI, V8, OHV, CYL Deactivation, GM
LY5	Engine - Gas, 8 CYL, 5.3L, SFI, IRON, Cylinder Deactivation GM
L76	Engine - Gas, 8 CYL, 6.0L, SFI, ALUM, Cylinder Deactivation, GM
L92	Engine - Gas, 8 CYL, 6.2L, SFI, ALUM, Cylinder Deactivation, HO GM
MSL	Plant Code, Silao, Mexico
MTF	Provisions, Fire Extinguisher Mounting
MYC	Transmission - Auto 6 SPD, HMD, 6L80-E
M30	Transmission Auto 4 - Speed, HMD, 4L60-E, Electronic
M70	Transmission - Auto 4 SPD, HMD, 4L70-E, Super Duty
NE1	Certification - Emission, Geographically Restricted Registration for Vehicles Up To 14,000 LBS GVW (Use 2003 MDL YR)
NF9	Emission System General Unleaded
NP5	Steering Wheel, Leather Wrapped
NP8	New Venture Gear 246
NR3	Transfer Case - All Wheel Drive (AWD), Open Differential, Single Speed
NT8	Emission System, Federal, Tier 2 A
NU1	Emission System - California, LEV2
NU4	Emission System California LEV2 Plus
NU5	Emission System - California, Bin 4
NX7	Wheel - 17 x 7.5, Steel
NZZ	Skid Plate Off-Road
NZ4	Wheel Spare - Full Size, 17" Steel
N30	Steering Wheel Deluxe
N86	Wheel Spare - Full Size, Low Mass Aluminum
N87	Wheel - 18 x 8, Aluminum
N93	Wheel - New - Aluminum, 17 x 7.5

RPO	Description
PD0	Wheel - 20 x 8.5, Aluminum, Chromed
PD5	Wheel - 18 x 8, Aluminum, Chromed
PW2	Wheel -- 18 x 8, Aluminum, Machined Face
PY0	Wheel - New - Aluminum,16 X 6.5
P46	Wheel - 17 x 7.5, Aluminum, Uplevel
P56	Wheel - 22 x 9.0, Aluminum, Chrome
QAN	Tire All P265/70R 17 - 113S BW R/PE ST TL AL2
QAS	Tire All P265/70R 17 - 113S WOL R/PE ST TL AL2
QJM	Tire All P265/70R17 - 113SWOL R/PE ST TL OOR
QJP	Tire All P265/70R17 - 113S BW R/PE ST TL OOR
QSS	Tire All P275/55R20 - 111S BW TL ST AL2
QST	Tire All P285/45R22 - BW TL AL2
QXK	Tire All P265/65R18 - 109S BW R/PE TL AL2
QXN	Tire All P265/65R18 - 112S BW TL OOR
QXO	Tire All P265/65R18 - 109H BW AL2 Export
RCS	Wheel - 20 x 8.5, Aluminum, Polished Finish (CHEV)
SAF	Lock, Spare Tire, Hoist Shaft
SLT	Equipment Chevrolet LT Sales Package
TL1	Grille Special
TQ5	Control-Intelligent High Beam
T62	Daytime Running Lamp System - Delete
T74	Headlamps Control Automatic, Delay
T78	Headlamps Control - Delete
T96	Fog Lamps - Front
T98	Stamping-Vehicle Identification Number
UC2	Speedometer Instrument, Kilometers and Miles, Kilometer Odometer, Positive Bias
UD4	Alarm, Vehicle Speed, 120 K/H
UD7	Sensor Indicator Rear Parking Assist
UE0	Communication System - Vehicle, G.P.S. - Not Installed
UE1	Communication System Vehicle, G.P.S. 1
UG1	Garage Door Opened, Universal
UG2	Garage Door Opener, Universal - Delete
UJ6	Indicator, Low Tire Pressure
UK3	Control Steering Wheel, Accessory
UK6	Radio Control RR Seat And Earphone Jacks
UL8	Frequencies, Saudi Arabian
UQA	Speaker System - Premium Audio Branded With Amplifier
UQS	Speaker System - Premium Audio Branded With Surround Amplifier
UQ3	Speaker System, Performance Enhanced Audio
US8	Radio - AM/FM Stereo, Seek/Scan, CD, Auto Tone, Clock, ETR, MP3, RDS
US9	Radio - AM/FM Stereo, Seek/Scan, RDS, Multiple Compact Disc, Auto Tone Control, Clock, ETR, MP3
UVA	Radio - AM/FM Stereo, Seek/Scan, Auto Tone, CD, CD-R, MP3, DVD, Clock, ETR, RDS
UVB	Radio - AM/FM Stereo, Seek/Scan, Auto Tone, CD, CD-R, MP3, DVD, NAV, Clock, ETR, RDS
UVC	Camera - Rearview
U19	Speedometer INST, Kilo And Miles, Kilo Odometer
U2K	Digital Audio System S-Band
U3R	Radio - Am/FM Stereo, WX, Seek/Scan, CD, DVD, Nav, Clock, DSP, RDS, W/Voice Rec Micro
U3U	Radio - AM/FM Stereo, Seek/Scan, DVD, CD, Clock, ETR, Navigation, Voice Rec, MP3
U34	Display Celsius Temperature
U42	Entertainment Package Rear Seat

RPO	Description
VBX	Language Label Arabic
VC5	Label - Shipping, Except US, US Possessions, or Japan
VFJ	Video Format Region 2, PAL
VGC	Protector Film, Paint Etch Preventive
VGD	Fascia - FRT, Custom, Body Color
VGE	Fascia - RR, Custom, Body Color
VK3	License Plate, Front Mounting Package
VR4	Trailer Hitch Weight Distributing Platform
VVJ	Calibration - Speedometer (180 KPH/112 MPH)
VVK	Calibration - Speedometer (200 KPH/124 MPH)
VXS	Vehicle Complete
VZ2	Calibration Speedometer A
V1K	Luggage Carrier Bar, Center Cross
V43	Rear Bumper Step, Color
V54	Roof Luggage Carrier, Painted
V73	Vehicle Statement, USA/Canada
V76	Front Towing Hook
V78	Vehicle Statement - Delete
XA7	Washer - Nozzles, Heated, Windshield
X88	Conversion Name Plate Chevrolet
YE9	Convenience Package Comfort and Decor Level #3
YF5	Certification - Emission, California
YQ3	Infotainment System - 011
Y91	Merchandised PKG Luxury Edition
ZBL	Tire Spare - P265/70R17 - 113H BW TL ST OOR
ZVL	Tire Spare - P265/70R17 - 113S BW R/PE ST TL ALS
ZW7	Chassis Package Premium Smooth Ride
ZW9	Base Body or Chassis
Z5X	Mirror Provisions, Arabic Language
Z55	Chassis Package Bi-State, Real Time Damping
Z71	Chassis Package Off Road
Z75	Market Brand - Cadillac
Z82	Trailer Provisions Special Equipment, H. D.

Technical Information

Maintenance and Lubrication

Capacities - Approximate Fluid

Application	Capacities	
	Metric	English
Axle Capacities		
Front Axle 1500 Series (8.25")	1.43 L	1.51 qt
Front Axle 2500 Series (9.25")	1.73 L	1.83 qt
Rear Axle (8.6")	2.03 L	2.15 qt
LD/HD Axle	2.6 L	2.75 qt
Air Conditioning Refrigerant R134a		
Refrigerant Charge	0.7 kg	1.6 lb
Refrigerant Charge Utility with Front and Rear A/C	1.2 kg	2.7 lb
Refrigerant Charge Suburban with Front and Rear A/C	1.4 kg	3.0 lb
Cooling System		
4.8L V8	16.9 L	17.8 qt
5.3L V8	17.3 L	18.3 qt
6.0L V8 1500 Series	16.9 L	17.9 qt
6.0L V8 2500 Series	16.5 L	17.4 qt
Engine Oil with Filter	5.7 L	6.0 qt
Engine Oil without Filter	5.2 L	5.5 qt
Fuel Tank		
Regular	98.4 L	26.0 gal
Extended 1500 Series	119.2 L	31.5 gal
Extended 2500 Series	147.6 L	39.0 gal
Transfer Case Fluid	1.9 L	2.0 qt
Transmission Fluid		
4L60-E/4L65-E/4L70-E Pan Removal	4.7 L	5 qt
4L60-E/4L65-E/4L70-E Overhaul	10.6 L	11 qt
4L80-E/4L85-E Pan Removal	7.3 L	7.7 qt
4L80-E/4L85-E Overhaul	12.8 L	13.5 qt
6L50/6L80/6L90 Pan Removal	5.7 L	6.0 qt
6L50/6L80/6L90 Overhaul	9.9 L	10.5 qt

Maintenance Items

Part	GM Part Number	ACDelco Part Number
Engine Air Cleaner /Filter		
High Capacity Filter	15908915	A1518C
Standard Filter	15908916	A1519C*
Oil Filter		
5.3L V8, 5.3L V8 Flexible Fuel, 6.0L V8	89017524	PF48
Spark Plugs		
5.3L V8, 5.3L V8 Flexible Fuel, 6.0L V8	12571164	41-985
Wiper Blades (ITTA Type)		
Front - 21.6 inches (55.0 cm)	15930910	--
Rear - 11.8 inches (30.0 cm)	15173729	--

Fluid and Lubricant Recommendations

Usage	Fluid/Lubricant
Engine Oil	Engine oil which meets GM Standard GM6094M and displays the American Petroleum Institute Certified for Gasoline Engines starburst symbol. GM Goodwrench® oil meets all the requirements for your vehicle. To determine the proper viscosity for your vehicle's engine, see Engine Oil.
Engine Coolant	50/50 mixture of clean, drinkable water and use only DEX-COOL® Coolant. See Engine Coolant.
Hydraulic Brake System	Delco® Supreme 11 Brake Fluid or equivalent DOT-3 brake fluid.
Windshield Washer	GM Optikleen Washer Solvent.
Power Steering System	GM Power Steering Fluid (GM Part No. U.S. 89021184, in Canada 89021186).
Automatic Transmission	DEXRON®-VI Automatic Transmission Fluid.
Key Lock Cylinders	Multi-Purpose Lubricant, Superlube (GM Part No. U.S. 12346241, in Canada 10953474).
Chassis Lubrication	Chassis Lubricant (GM Part No. U.S. 12377985, in Canada 88901242) or lubricant meeting requirements of NLGI #2, Category LB or GC-LB.
Front Axle	SAE 80W-90 Axle Lubricant (GM Part No. U.S. 1052271, in Canada 10950849).
Rear Axle	SAE 75W-90 Synthetic Axle Lubricant (GM Part No. U.S. 12378261, in Canada 10953455) meeting GM Specification 9986115.
Automatic Transfer Case	AUTO-TRAK II Fluid (GM Part No. U.S. 12378508, in Canada 10953626).
Front Axle Propshaft Spline or One-Piece Propshaft Spline (Two-Wheel Drive with Auto. Trans.)	Spline Lubricant, Special Lubricant (GM Part No. U.S. 12345879, in Canada 10953511) or lubricant meeting requirements of GM 9985830.
Hood Hinges	Multi-Purpose Lubricant, Superlube (GM Part No. U.S. 12346241, in Canada 10953474).
Outer Tailgate Handle Pivot Points	Multi-Purpose Lubricant, Superlube (GM Part No. U.S. 12346241, in Canada 10953474).
Weatherstrip Conditioning	Weatherstrip Lubricant (GM Part No. U.S. 3634770, in Canada 10953518) or Dielectric Silicone Grease (GM Part No. U.S. 12345579, in Canada 992887).
Weatherstrip Squeaks	Synthetic Grease with Teflon, Superlube (GM Part No. U.S. 12371287, in Canada 10953437).

Descriptions and Operations

Power Steering System

The hydraulic power steering pump is a constant displacement vane-type pump that provides hydraulic pressure and flow for the power steering gear. The hydraulic power steering pumps are either belt-driven or direct-drive, cam-driven.

The power steering fluid reservoir holds the power steering fluid and may be integral with the power steering pump or remotely located. The following locations are typical locations for the remote reservoir:

- Mounted to the front of the dash panel
- Mounted to the inner fender
- Mounted to a bracket on the engine

The 2 basic types of power steering gears are listed below:

- A recirculating ball system
- A rack and pinion system

In the recirculating ball system, a worm gear converts steering wheel movement to movement of a sector shaft. A pitman arm attached to the bottom of the sector shaft actually moves one tie rod and an intermediate rod move the other tie rod.

In the rack and pinion system, the rack and the pinion are the 2 components that convert steering wheel rotation to lateral movement. The steering shaft is attached to the pinion in the steering gear. The pinion rotates with the steering wheel. Gear teeth on the pinion mesh with the gear teeth on the rack. The rotating pinion moves the rack from side to side. The lateral action of the rack pushes and pulls the tie rods in order to change the direction of the vehicle's front wheels.

The power steering pressure hose connects the power steering pump union fitting to the power steering gear and allows pressurized power steering fluid to flow from the pump to the gear.

The power steering return hose returns fluid from the power steering gear back to the power steering fluid reservoir. The power steering return line may contain an integral fin-type or line-type power steering fluid cooler.

In a typical power steering system, a pump generates hydraulic pressure, causing fluid to flow, via the pressure hose, to the steering gear valve assembly. The steering gear valve assembly regulates the incoming fluid to the right and left chambers in order to assist in right and left turns.

Turning the steering wheel activates the valve assembly, which applies greater fluid pressure and flow to 1 side of the steering gear piston, and lower pressure and flow to the other side of the piston. The pressure assists the movement of the gear piston. Tie rods transfer this force to the front wheels, which turn the vehicle right or left.

Steering Linkage Description and Operation (Non-Rack and Pinion)

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.

Steering Wheel and Column - Standard Description and Operation

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, Found on Some Vehicle Models

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--location varies
- The steering column lock--content varies
- The ignition cylinder--location varies
- The theft deterrent module--location varies

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 manual/power tilt or tilt/telescoping functions
- The power pedal adjustment control switch
- The navigation/OnStar® features
- The HVAC controls

Driver Safety

The steering wheel and column has safety features to protect the driver. The following components may be mounted on or near the steering column:

Energy-Absorbing Steering Column: The energy-absorbing steering column compresses in the event of a front-end collision, which reduces the chance of injury to the driver. The energy-absorbing feature, collapsible steering shaft, and break away mounting features help reduce the injury in the event of an accident. In addition to these features, the following driver safety features may be on the steering column. To inspect the steering column for damage, refer to Steering Column Accident Damage Inspection .

Electronic Park Lock (EPL)/Ignition Lock Cylinder Control Actuator: If the vehicle is equipped with automatic transmission and a floor mounted console gear shift, it has an ignition lock cylinder control actuator system in the steering column. The ignition lock cylinder control actuator purpose is to prevent the ignition key from being turned to the OFF position when the transmission is in any position other than PARK and the vehicle may still be moving. The column ignition lock system consists of an ignition lock cylinder control actuator, and a park position switch that is located in the automatic transmission shift lock control switch. The ignition lock cylinder control actuator contains a pin that is spring loaded to mechanically prevent the ignition key cylinder from being turned to the lock position when the vehicle transmission is not in the PARK position. If vehicle power is lost, and/or the transmission is not in the

PARK position the operator will not be able to turn the ignition key to the lock position and will not be able to remove the ignition key from the column.

Linear Shift Assembly: If the vehicle is equipped with a column mounted gear shift, it has a linear shift assembly on the steering column. The linear shift assembly has a cable that runs from the linear shift assembly to the ignition lock cylinder case. The purpose of this cable is to prevent the ignition key from being turned to the OFF position when the transmission is in gear and the vehicle may still be moving. The linear shift assembly cable contains a pin that is spring loaded to mechanically prevent the ignition key cylinder from being turned to the lock position when the vehicle transmission is not in the PARK position. If vehicle power is lost, and/or the transmission is not in the PARK position the operator will not be able to turn the ignition key to the lock position and will not be able to remove the ignition key from the column.

SIR Coil and Module: For additional information on the operation of the SIR coil and.

Automatic Transmission Shift Lock Actuator: If the vehicle is equipped with a automatic transmission shift lock actuator, for additional information on it's operation.

Variable Effort Steering Sensor: If the vehicle is equipped with a variable effort steering (VES) sensor, for additional information on its operation.

Steering Wheel Angle Sensor or Steering Wheel Position Sensor : The steering wheel position sensor is located somewhere along the steering shaft assembly. The sensor measures the position of the steering wheel and the speed at which it is rotated. A signal representing this measurement is provided to the vehicle stability enhancement system (VSES) module. The VSES module uses this signal, along with several others representing different vehicle conditions, to monitor the driving behavior of the vehicle and ensure that it stays in control. If the VSES module determines that the vehicle is out of control it provides signals to the powertrain control module (PCM) and the ABS module. These output signals are used to modulate the transmission torque and brake pressure of each of the vehicles wheels in order to regain control of the vehicle.

Suspension Description and Operation

Front Suspension

The front suspension allows each wheel to compensate for changes in the road surface without affecting the opposite wheel. Each wheel independently connects to the frame with a steering knuckle, ball joint assemblies, and upper and lower control arms.

Two tie rods connect to the steering arms on the knuckles and to a steering gear.

Rear wheel drive models have a front suspension that consists of the following components:

- Control arms
- Stabilizer shaft
- Shock/Coil spring modules

The upper part of each Shock/Coil spring module bolts to the frame. Three insulators, a mounting plate and a nut secure the coil spring to the shock housing. Two bolts secure the lower part of the shock module to the lower control arm.

A spring steel stabilizer shaft controls the side roll of the front suspension. This shaft is mounted in rubber insulators that are held by clamps to the frame side rails. The ends of the stabilizer shaft connect to the lower control arms with link assemblies.

The upper ball joint assembly is integrated into the upper control arm. The assembly attaches to the steering knuckle with a prevailing torque nut.

The lower ball joint assembly is integrated into the control arm. The assembly attaches to the steering knuckle with a prevailing torque nut.

The upper and the lower control arms have pressed-in bushings. The bolts pass through the bushings and join the arms to the frame.

Ball joint assemblies have rubber grease seals. These seals prevent the entry of moisture and dirt. This prevents damage to the bearing surfaces.

Four-wheel drive models have a front suspension that consists of the following components:

- Control arms
- Stabilizer shaft
- Shock module/Shock absorbers
- Coil Springs (1500 series)
- Torsion bars (2500, 3500 series)

The upper part of each shock absorber (2500, 3500 series) extends through a frame bracket. Two insulators and a nut secure the upper part of the shock to the frame. A through bolt secures the lower part of the shock to the lower control arm.

The upper part of each shock module (1500 series) attaches to the frame by 3 nuts. The lower part of the shock module attaches to the lower control arm by 2 bolts.

A spring steel stabilizer shaft controls the side roll of the front suspension. This shaft is mounted in rubber insulators that are held by clamps to the frame side rails. The ends of the stabilizer shaft connect to the lower control arms with link assemblies.

The front end of the torsion bar attaches to the lower control arm. The rear of the torsion bar mounts into an adjustable arm at the torsion bar crossmember. This arm adjustment controls the vehicle trim height.

Both RWD and 4WD models have sealed front wheel bearings. These bearings are pre-adjusted and need no lubrication.

Rear Suspension

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.

All 25 series Utility 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.

Automatic Level Control Description and Operation

The automatic level control (ALC) system maintains a desired rear suspension position under all types of towing, hauling and loading conditions. The following components are involved in the operation of the ALC system:

- Air line tubing--Pressurized air from the ALC compressor is pumped to each of the rear shocks via air line tubing.
- Air drier--Pressurized air from the compressor is run through a drier containing a moisture absorbing chemical preventing water accumulation in the rear shocks.
- Compressor--Supplies pressurized air to the rear shocks
- Compressor motor relay--The relay supplies battery positive voltage to the ALC compressor motor.
- Pressure sensor--The electronic suspension control module (ESCM) module provides a 5-volt reference and low reference to the ALC pressure sensor. The module receives the signal voltage that is relative to the air pressure applied to the rear shocks.
- ESCM--Controls the ALC system and electronic suspension control (ESC) system and detects failures in both. The module monitors inputs from the position sensors, and pressure sensor to determine when to raise and lower the vehicle to trim height as the vehicle is loaded or unloaded. The module limits pump activation to 255 seconds to prevent thermal damage.

- Exhaust valve--An electric solenoid activated by the ESCM to vent air pressure from the rear shocks.
- Left and right rear suspension position sensors--The module provides a 5-volt reference and low reference to all 4 of the body-to-wheel suspension position sensors. The sensors send the ESCM a signal voltage that is relative to the rear suspension ride height
- Left and right rear shock absorbers with internal air chambers and dampers--Dampens the rear suspension and maintains trim height depending on the air pressure applied.

Automatic Level Control (ALC) System Operation

The following are functions of the automatic level control (ALC) system:

Ride Height Increase

The ESCM detects a voltage signal from the rear suspension position sensors indicating the suspension height is low. The module grounds the control circuit of the compressor motor relay which in turn supplies battery voltage to the compressor. The exhaust valve is open for 1.5 seconds during compressor pump start up in order to reduce current draw and pump motor wear. Air pressure from the compressor is pumped to the rear shocks through small flexible tubing. The increased pressure inside the rear shocks raises the suspension to trim height.

Ride Height Decrease

The ESCM detects a voltage signal from the rear suspension position sensors indicating the suspension height is high. The module opens the exhaust valve by supplying ground. Air pressure from the rear shocks vent, lowering the suspension to trim height.

Self Pressure Test

Each time the ignition is turned ON the ESCM commands on the ALC relay, activating the compressor for 4 seconds. The ESCM then monitors the air pressure sensor's signal voltage to verify the compressor is functioning and the system is holding air pressure.

Electronic Suspension Control Description and Operation

The electronic suspension control (ESC) is the bi-state system providing optimal suspension damping as road and driving conditions change. The system also allows the driver to select a tow/haul mode to enhance the ride when trailering or with a loaded vehicle.

The following are involved in the operation of the ESC system:

- Electronic suspension control module (ESCM)--Controls and detects failures in the ESC system. The ESCM controls the damping force at all 4 shock absorbers individually for a soft or firm ride. It receives inputs from vehicle speed, steering wheel position, suspension position, and lift/dive status to determine the amount of damper control to the shocks electrical solenoid.
- Front/rear suspension position sensors--The ESC module provides a 5-volt reference and low reference to all 4 of the body-to-wheel suspension position sensors. The sensors send the ESCM a signal voltage that is relative to the suspension ride height used to determine the amount of damper control. The sensors valid range is 0.35-4.75 volts.
- Front/rear shock absorbers with an internal electrical solenoid--The ESCM controls 0-100 percent of the pulse width modulated (PWM) current to the solenoid adjusting the fluid orifice size within the shock. This increases or decreases the suspension damping force in both compression and rebound directions.
- Vehicle speed--The ESCM receives a serial data message for vehicle speed input, and is used to determine the amount of damper control.
- Steering wheel position--The ESCM receives a serial data message for steering wheel position input and uses this as an indication of the position and rotation of the steering wheel to determine the amount of damper control.

The ESCM monitors the inputs from the front/rear suspension position sensors, vehicle speed, and steering wheel position. The ESCM calculates the inputs to control the amount of PWM current to the

solenoid within each shock. This adjusts the fluid orifice size to vary the soft to firm damping force in both compression and rebound direction for the current road and driving conditions.

When the ESCM detects a malfunction and sets a DTC. The system disables, and defaults with a fail-soft action, then sends a serial data message for the driver information center (DIC) to display service suspension system and speed limited to 80 mph warning messages.

The ESC system uses an ignition cycling diagnostic approach in order to reduce the occurrence of false or intermittent DTCs that do not affect the functionality of the ESC system. This allows the fail-soft actions to be taken whenever a malfunction condition is current, but requires the malfunction to be current for 3 consecutive ignition on cycles before the corresponding malfunction code and message will be stored or displayed.

Wheels and Tires

Tire Pressure Monitor Description and Operation

The tire pressure monitor (TPM) system warns the driver when a significant loss of tire pressure occurs in any of the 4 tires, and allows the driver to display the individual tire pressures, and their locations on the driver information center (DIC).

The system uses the powertrain control module (PCM), instrument panel cluster (IPC), DIC, remote control door lock receiver (RCDLR) a radio frequency (RF) transmitting pressure sensor in each wheel/tire assembly, and the serial data circuit to preform the system functions.

When the vehicle is stationary the sensor's internal accelerometer is inactive, which puts the sensors into a stationary state. In this state the sensors sample tire pressure once every 30 seconds and do not transmit at all if the tire pressures do not change. As vehicle speed increases, centrifugal force activates the sensor's internal accelerometer causing the sensors to go into rolling mode. In this mode the sensors sample pressure once every 30 second and transmit in rolling mode once every 60 seconds. The RCDLR receives and translates the data contained in each sensor's RF transmission into sensor presence, sensor mode, and tire pressure. The RCDLR sends the tire pressure and tire location data to the DIC via the serial data circuit where they are displayed as follows:

- LF TIRE XX PSI
- RF TIRE XX PSI
- RR TIRE XX PSI
- LR TIRE XX PSI

The sensors continuously compare their last transmitted pressure to their current pressure sample and will transmit in re-measure mode if a 8 kPa (1.2 psi) change in tire pressure has been detected in either a stationary, or rolling state. When the TPM system detects a significant loss of tire pressure, the CHECK TIRE PRESSURE message is displayed on the DIC and the low tire pressure indicator is displayed on the IPC. Both the message and indicator can be cleared by adjusting the tire pressures to the recommended kPa/psi. The sensor's pressure range is 0-102 psi. The sensors pressure accuracy from--10 to +70 degrees C is +/- 13.7 kPa (2 psi

The RCDLR has the ability to detect malfunctions within the TPM system. Any malfunction detected will cause the DIC to display the SERVICE TIRE MONITOR message.

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Spare Tire Hoist Retaining Bolt	40 N·m	30 lb ft
Wheel Nuts	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.

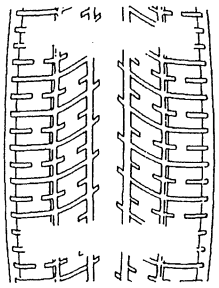
The following factors have an important influence on tire life:

- 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.

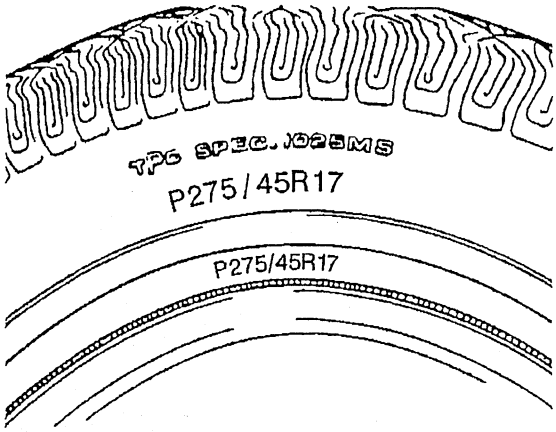
Conditions for Tire Replacement

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.

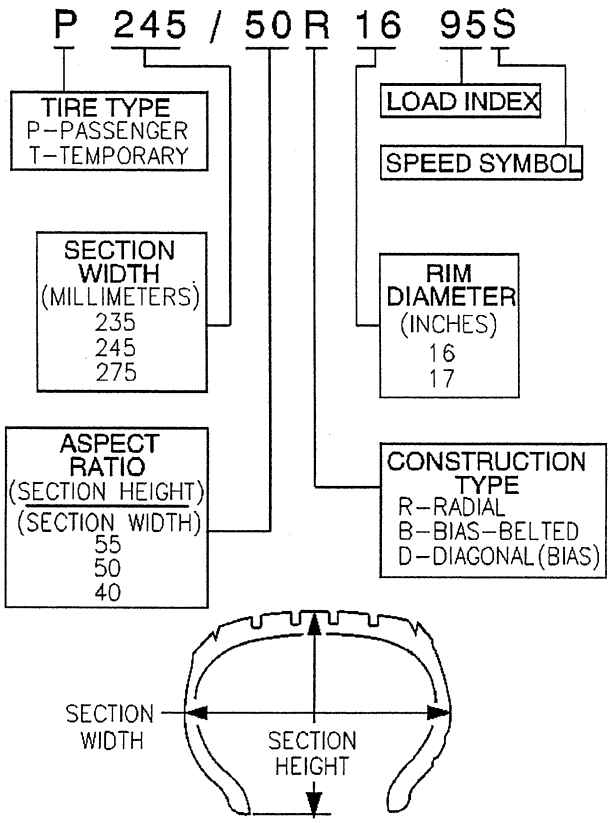
All Seasons Tires Description



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 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.

Propeller Shaft Phasing Description

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. 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

The 800 series utility vehicles use either the 8.60, 9.50 or the 10.50 inch axles. The type of the axle can be identified by the stamping on the right side axle tube. They may also be identified by the ring gear size. The ring gear sizes include the 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.

A open differential has a set of 4 gears. 2 are side gears and 2 are pinion gears. Each side gear is splined to an axle shaft so each axle shaft ; so each axle shaft turns when its 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 which is bolted to the differential case assembly. The differential pinion, as it rotates with 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 2 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. When the vehicle turns a corner the inner wheel turns slower than the outer wheel which slows the rear axles' side gear (as the shaft is splined to the side gear). The rear axle pinion gears will roll around the slower moving 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

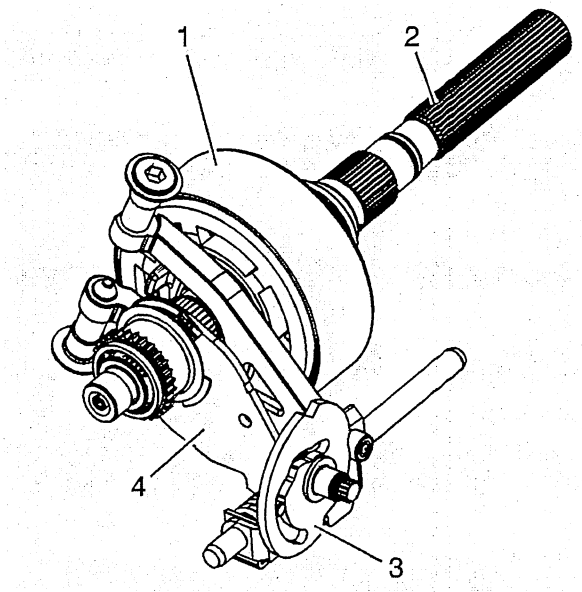
The locking differential design was modified in mid-1986 to include a load-limiting feature to reduce the chance of breaking an axle shaft under abusive driving conditions. The number of tangs on the energizing disc in the left-hand clutch pack was reduced allowing these tangs to shear in the event of 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 246-NP8 (Two Speed Automatic)

General Operation



The New Venture Gear model NVG 246 RPO NP8 transfer case is a two speed automatic, active, transfer case. The NVG 246 transfer case has many changes from prior years. The NVG 246 is now classified as an Electronic Architect Upgrade (EAU). The upgrades to the NVG 246 EAU include some of the following internal changes:

- A new encoder motor for faster operation in the AWD mode.
- The control actuator lever (3) is a new design with different cam angles.
- The shift detent plunger and spring is no longer used.
- The clutch assembly (1) uses a new style return spring and clutch washer.
- A new rear output shaft (2) no longer uses a retaining ring by the oil pump.
- The range shift fork (4) is a newer design.

The NVG 246 EAU provides 5 modes, Auto 4WD, 4HI, 4LO, 2HI and Neutral. The Auto 4WD position allows the capability of an active transfer case, which provides the benefits of on-demand torque biasing wet clutch and easy vehicle tuning through software calibrations. The software calibrations allow more

features such as flexible adapt ready position and clutch preload torque levels. The technology allows for vehicle speed dependent clutch torque levels to enhance the performance of the system. For example, the system is calibrated to provide 0-5 ft lb of clutch torque during low speed, low engine torque operation, and predetermined higher torque for 40 km/h (25 mph) and greater. This prevents crow-hop and binding at low speeds and provides higher torque biases at higher vehicle speeds, in order to enhance stability.

Transfer Case Shift Control Switch

The NVG 246 EAU transfer case features a 4 button shift control switch located on the instrument panel. When the ignition key is in the RUN position, the transfer case shift control module monitors the transfer case shift control switch to determine if the driver desires a new mode/range position. At a single press of the transfer case shift control switch, the lamp of the new desired position will begin flashing to inform the driver that the transfer case shift control module has received the request for a new mode/range position. The lamp will continue to flash until all shifting criteria has been met and the new mode/range position has been reached, or has been engaged. Once the new mode/range position is fully active, the switch indicator lamp for the new position will remain ON constantly.

During normal driving situations, the transfer case can operate in the Auto 4WD mode. In the Auto 4WD mode, the transfer case shift control module monitors rear wheel slip speed, based on the inputs from both the front and rear propshaft speed sensors. When the vehicle experiences a rear wheel slip condition, the transfer case shift control module sends a pulse width modulated (PWM) signal to an electronic motor, which is the transfer case encoder motor. This motor rotates the transfer case control actuator lever shaft, applying a clutch pack. This clutch pack is designed to deliver a variable amount of torque, normally delivered to the rear wheels, and transfers it to the front wheels. Torque is ramped up to the front wheels until the front propshaft speed sensor matches that of the rear propshaft speed sensor. Torque is ramped down to the front wheels. The process would repeat if rear wheel slip is detected again.

The NVG 246 EAU transfer case has the added feature of also providing the driver with 3 manual mode/range positions:

- 4HI - 4 Wheel Drive high range
- 2HI - 2 Wheel Drive high range
- 4LO - 4 Wheel Drive low range

The driver may choose to select any of these mode/range positions while driving the vehicle. However, the transfer case will not allow a shift into or out of 4LO unless the following criteria has been met:

- The engine is running.
- The automatic transmission is in Neutral.
- The vehicle speed is below 5 km/h (3 mph).

This transfer case also has a Neutral position. A shift to the Neutral position allows the vehicle to be towed without rotating the transmission output shaft. Neutral position may be obtained only if the following criteria has been met:

- The engine is running.
- The automatic transmission is in Neutral.
- The vehicle speed is below 5 km/h (3 mph).
- The transfer case is in 2HI mode.

Once these conditions have been met, press and hold both the 2HI and 4LO buttons for 10 seconds. When the system completes the shift to neutral, the red neutral lamp will illuminate.

The NVG 246 EAU case halves are high-pressure die-cast magnesium. Ball bearings support the input shaft, the front output shaft, and the rear output shaft. A thrust bearing is located inside of the input shaft gear to support the front of the rear output shaft. The transfer case requires Auto Trac® II Fluid GM P/N 12378508 (Canadian P/N 10953626) which is blue in color. The fluid is designed for smooth clutch application. An oil pump, driven by the rear output shaft, pumps the fluid through the rear output shaft oil gallery to the clutch and bearings.

There are two versions of the NVG 246 EAU, which depend on the transmission applications and vehicle applications. If the vehicle is equipped with a transmission RPO M30, the transmission splines in the input gear will have 27 teeth. With this application the planetary carrier assembly will have 4 pinion gears. If the vehicle is equipped with transmission RPO MT1 or MN8, the transmission splines in the input gear will have 32 teeth. The planetary carrier assembly on this application will have 6 pinion gears.

Service 4WD Indicator

The Service 4WD indicator is an integral part of the cluster and cannot be serviced separately. This lamp is used to inform the driver of the vehicle that a transfer case system malfunctioned. The Service 4WD indicator is controlled by the transfer case shift control module via Class 2.

Transfer Case Encoder

The encoder is mounted to the transfer case motor/encoder assembly and is replaced as an assembly. The encoder converts the shift detent lever shaft position, representing a mode or range, into an electrical signal input to the transfer case shift control module. The module detects what position the transfer case is in by monitoring the voltage returned on the encoder signal circuit. This voltage translates into AUTO 4WD, 2HI, 4HI, NEUTRAL, and 4LO or in transition between gears.

Transfer Case Motor/Encoder

The transfer case motor/encoder consists of a permanent magnet (PM) DC motor and gear reduction assembly. It is located on the left hand side, driver's side, of the transfer case. When activated, it turns the shift detent lever shaft of the transfer case, clockwise or counterclockwise, to shift the transfer case. The motor/encoder is controlled with a pulse width modulated (PWM) signal by the transfer case shift control module. This circuit consists of a driver on both the Motor A and Motor B circuits. The encoder motor is bi-directional in order to allow the motor to shift the transfer case from 2HI or 4HI to NEUTRAL and 4LO positions.

Transfer Case Motor Lock

The transfer case motor lock is used to provide a 2HI, 4HI, and 4LO lock-up feature. When the lock circuit is energized, the transfer case encoder motor is allowed to turn. When the transfer case is placed 2HI, 4HI, or 4LO the motor lock circuit is de-energized and the lock is applied. This assures that the transfer case remains in the current gear position until a new gear position is requested. When AUTO is selected, the motor lock remains applied until an adaptive mode, torque being 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 or release torque at the front propshaft.

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. When the vehicle is in the AWD mode, the transfer case shift control module monitors the speed of the front and rear propshaft, in order to detect wheel slippage. When wheel slippage is detected, the module applies a clutch pack contained inside the transfer case. This clutch pack is used to lock-in and apply the front propshaft, transferring torque to the front wheels. The clutch pack is applied by a motor/encoder assembly. When slip is no longer detected by the transfer case shift control module, the clutch is no longer applied.

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 speed sensors 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, Adapt, mode 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.

Transfer Case – BW4485-NR3

General Operation

The Borg Warner (BW) model 4485, RPO NR3 transfer case is a one-speed, full time, all wheel drive (AWD), transfer case. The transfer case provides power to both axles, through an external planetary type differential, which has two different sets of pinion gears. The planetary differential provides a 40/60 torque split, front/rear, full time. This means both axles are constantly being driven for maximum traction in all conditions.

The transfer case external type planetary differential functions the same as a typical rear axle differential. The transfer case differential pinion gears function as the spider gears, and the sun gears function as the side gears.

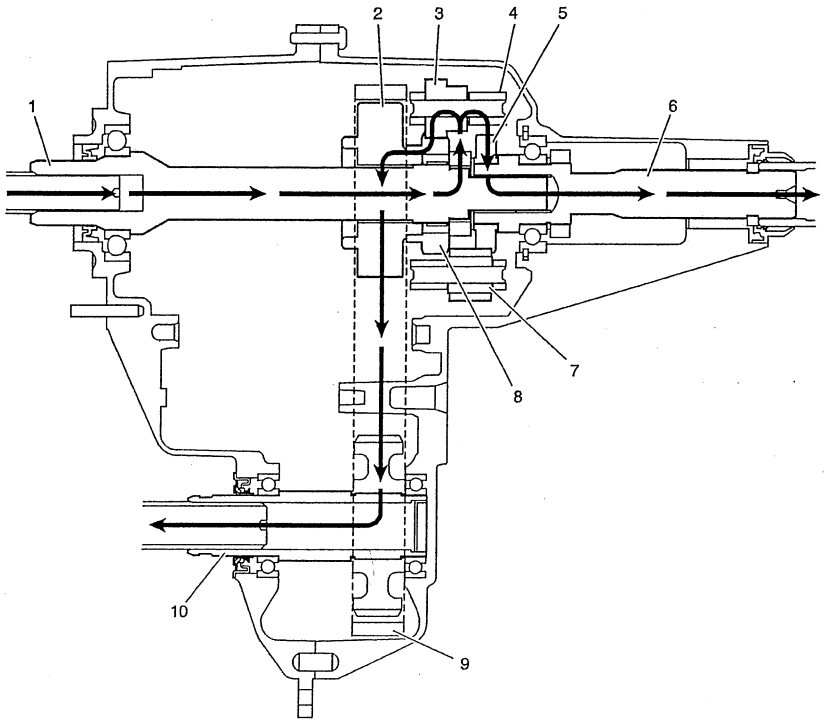
The following actions occur because of the planetary differential:

- If the vehicle is on a hoist, the front propeller shaft can be rotated by hand.
- The vehicle cannot be driven if one propeller shaft is removed.
- Operating the vehicle on the hoist can damage the differential pinion gears, by over-spinning.
- Operating the vehicle with one propeller shaft removed causes over-spinning of the differential pinion gears.

The BW 4485 design of the planetary differential allows the use with the Vehicle Stability Enhancement System (VSES) vehicles. The VSES takes use of the planetary differential, by applying braking to a tire that has less traction and dividing the engine torque to the other axle.

The BW 4485 case halves are high-pressure, die-cast magnesium. Ball bearings support the input shaft, the front output shaft, and the rear output shaft. The transfer case requires DEXRON®III ATF GM P/N 12378470 (Canadian P/N 10952622), which is red in color.

Power Flow



When the BW 4485 is operating in the AWD mode, the power flows from the transmission to the transfer case input shaft (1). The input shaft (1) delivers the power to the planetary differential (4). The case of the planetary differential (4) is splined to the input shaft (1). The planetary differential (4) splits the torque 40

percent through the front differential pinion gears (3) to the front sun gear (8). The front sun gear (8) is engaged with the drive sprocket (2), which drives the chain (9) to the front output shaft (10), and power is delivered to the front propeller shaft. 60 percent of the torque to the rear output shaft (6) goes through the rear differential pinion gears (7) and rear sun gear (5), which is connected to the rear output shaft (6) and to the rear propeller shaft.

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

General Description

The park brake system consists of the following:

Park Brake Pedal Assembly

Receives and transfers park brake system apply input force from driver to park brake cable system.

Park Brake Release Handle Assembly

Releases applied park brake system when pulled.

Park Brake Cables

Transfers input force received from park brake pedal, through park brake cable equalizer, to park brake apply lever.

Park Brake Cable Equalizer

Evenly distributes input force to both the left and right park brake units.

Threaded park brake cable equalizers are also used to remove slack in park brake cables.

Park Brake Apply Lever

Multiplies and transfers input force to park brake actuator.

Park Brake Actuator/Adjuster

Uses multiplied input force from apply lever to expand park brake shoe toward the friction surface of the drum-in-hat portion of the rear brake rotor.

Threaded park brake actuators are also used to control clearance between the park brake shoe and the friction surface of the drum-in-hat portion of the rear brake rotor.

Park Brake Shoe

Applies mechanical output force from park brake actuator to friction surface of the drum-in-hat portion of the rear brake rotor.

System Operation

Park brake apply input force is received by the park brake pedal assembly being depressed, transferred and evenly distributed, through the park brake cables and the park brake cable equalizer, to the left and right park brake apply levers. The park brake apply levers multiply and transfer the apply input force to the park brake actuators which expand the park brake shoe toward the friction surface of the drum-in-hat portion of the rear brake rotor in order to prevent the rotation of the rear tire and wheel assemblies. The park brake release handle assembly releases an applied park brake system when it is pulled rearward.

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

Engine Content Specifications

RPO	VIN	Displacement	Camshaft Position (CMP) Actuator Control System	Active Fuel Management Control System	E85 Capable	Block Material
LC9	3	5.3L	No	Yes	Yes	Aluminum
LY5	J	5.3L	No	Yes	No	Iron
LMG	0	5.3L	No	Yes	Yes	Iron
L76	Y	6.0L	Yes	Yes	No	Aluminum

LY5, LMG, LC9 and L76 Engines

Fastener Tightening Specifications

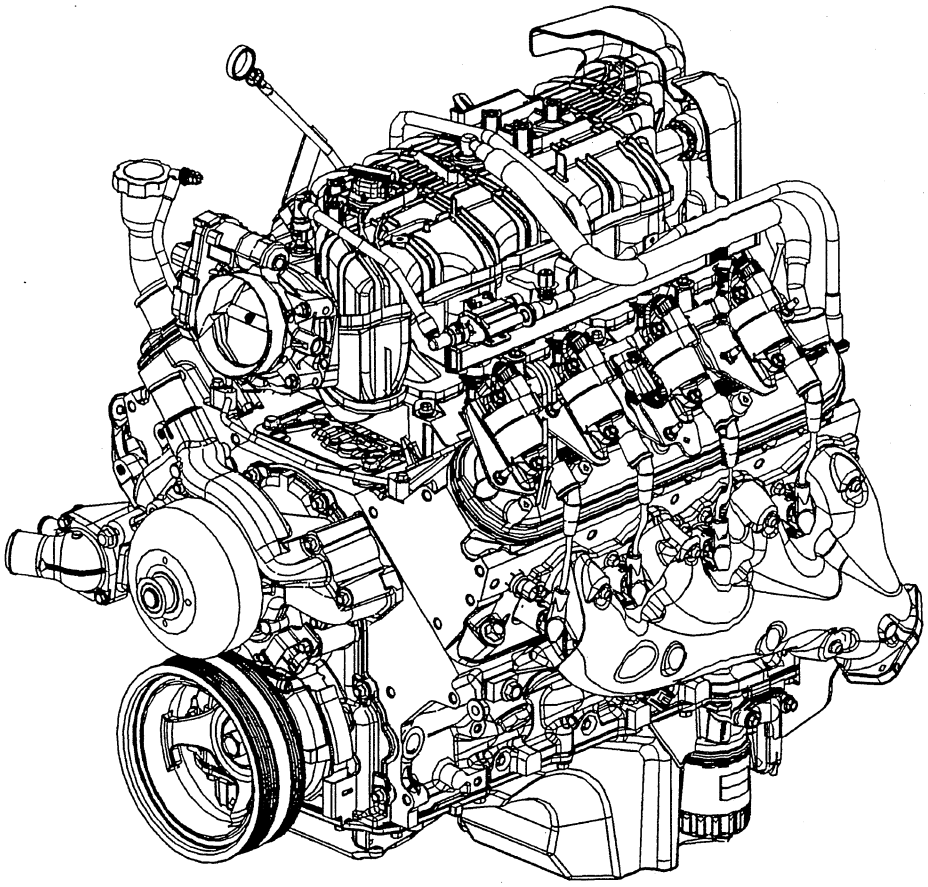
Application	Specification	
	Metric	English
Accessory Drive Belt Idler Pulley Bolt	50 N·m	37 lb ft
Accessory Drive Belt Tensioner Bolts	50 N·m	37 lb ft
Active Fuel Management Oil Pressure Relief Valve	27 N·m	20 lb ft
Air Conditioning Drive Belt Tensioner Bolts	50 N·m	37 lb ft
Automatic Transmission Flex Plate Bolts - First Pass	20 N·m	15 lb ft
Automatic Transmission Flex Plate Bolts - Second Pass	50 N·m	37 lb ft
Automatic Transmission Flex Plate Bolts - Final Pass	100 N·m	74 lb ft
Battery Cable Channel Bolt	12 N·m	106 lb in
Camshaft Position (CMP) Actuator Magnet Bolts	12 N·m	106 lb in
Camshaft Position (CMP) Actuator Solenoid Valve - First Pass	65 N·m	48 lb ft
Camshaft Position (CMP) Actuator Solenoid Valve - Final Pass	90 degrees	
Camshaft Position (CMP) Sensor Bolt	12 N·m	106 lb in
Camshaft Position (CMP) Sensor Wire Harness Bolt	12 N·m	106 lb ft
Camshaft Retainer Bolts - Hex Head Bolts	25 N·m	18 lb ft
Camshaft Retainer Bolts - TORX Head Bolts	15 N·m	11 lb ft
Camshaft Sprocket Bolt - First Pass	90 N·m	66 lb ft
Camshaft Sprocket Bolt - Final Pass	40 degrees	
Connecting Rod Bolts - First Pass	20 N·m	15 lb ft
Connecting Rod Bolts - Final Pass	70 degrees	
Coolant Air Bleed Pipe and Cover Bolts	12 N·m	106 lb in
Coolant Temperature Sensor	20 N·m	15 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 Bearing Cap M8 Bolts	25 N·m	18 lb ft
Crankshaft Bearing Cap M10 Bolts - First Pass in Sequence	20 N·m	15 lb ft
Crankshaft Bearing Cap M10 Bolts - Final Pass in Sequence	80 degrees	
Crankshaft Bearing Cap M10 Studs - First Pass in Sequence	20 N·m	15 lb ft
Crankshaft Bearing Cap M10 Studs - Final Pass in Sequence	51 degrees	
Crankshaft Oil Deflector Nuts	25 N·m	18 lb ft
Crankshaft Position (CKP) Sensor Bolt	25 N·m	18 lb ft
Crankshaft Rear Oil Seal Housing Bolts	30 N·m	22 lb ft
Crossbar Bolts/Nuts - 1500 Series	100 N·m	74 lb ft

Application	Specification	
	Metric	English
Crossbar Bolts/Nuts - 2500 Series	120 N·m	89 lb ft
Cylinder Head M8 Bolts - in Sequence	30 N·m	22 lb ft
Cylinder Head M11 Bolts - First Pass in Sequence	30 N·m	22 lb ft
Cylinder Head M11 Bolts - Second Pass in Sequence	90 degrees	
Cylinder Head M11 Bolts - Final Pass in Sequence	70 degrees	
Cylinder Head Plug	20 N·m	15 lb ft
Differential Carrier-to-Crossbar Nuts	100 N·m	74 lb ft
Engine Block Coolant Drain Hole Plug	60 N·m	44 lb ft
Engine Block Coolant Heater	50 N·m	37 lb ft
Engine Block Oil Gallery Plugs	60 N·m	44 lb ft
Engine Harness Ground Strap Bolt/Stud	16 N·m	12 lb ft
Engine Harness-to-Generator Bracket Bolt	9 N·m	80 lb in
Engine Harness Retainer-to-Intake Manifold Nut	5 N·m	44 lb in
Engine Mount Bracket Through Bolt	100 N·m	74 lb ft
Engine Mount-to-Engine Block Bolts	50 N·m	37 lb ft
Engine Mount-to-Frame Bolts	65 N·m	48 lb ft
Engine Shield-to-Crossbar Bolts	20 N·m	15 lb ft
Evaporative (EVAP) Emission Pipe Bracket Nut	20 N·m	15 lb ft
Exhaust Manifold Bolts - First Pass	15 N·m	11 lb ft
Exhaust Manifold Bolts - Final Pass	20 N·m	15 lb ft
Exhaust Manifold Heat Shield Bolts	9 N·m	80 lb in
Exhaust Manifold Studs	20 N·m	15 lb ft
Flex Plate-to-Torque Converter Bolts - 4L60-E/4L70-E/6L80 Transmission	63 N·m	47 lb ft
Flex Plate-to-Torque Converter Bolts - 4L80-E Transmission	60 N·m	44 lb ft
Front Cover Bolts	25 N·m	18 lb ft
Front Drive Axle Bracket Bolts	90 N·m	67 lb ft
Fuel Injection Fuel Rail Bolts	10 N·m	89 lb in
Fuel Injection Fuel Rail Crossover Tube Bolts	3.8 N·m	34 lb in
Fuel Rail Stop Bracket Bolt	50 N·m	37 lb ft
Generator Bracket Bolts	50 N·m	37 lb ft
Heater Hose Bracket Nut	9 N·m	80 lb in
Ignition Coil Bracket-to-Valve Rocker Arm Cover Studs	12 N·m	106 lb in
Ignition Coil-to-Bracket Bolts	10 N·m	89 lb in
Intake Manifold Bolts - First Pass in Sequence	5 N·m	44 lb in
Intake Manifold Bolts - Final Pass in Sequence	10 N·m	89 lb in
Intake Manifold Sight Shield Retainer Bolts	5 N·m	44 lb in
J 41798 M8 Bolt	25 N·m	18 lb ft
J 41798 M10 Bolts	50 N·m	37 lb ft
Knock Sensor Bolts	25 N·m	18 lb ft
Negative Battery Cable Stud	25 N·m	18 lb ft
Oil Filter	30 N·m	22 lb ft
Oil Filter Fitting	55 N·m	40 lb ft
Oil Level Indicator Switch	20 N·m	15 lb ft
Oil Level Indicator Tube Bolt	25 N·m	18 lb ft
Oil Pan Baffle Bolts	9 N·m	80 lb in
Oil Pan Closeout Cover Bolt - Left Side	9 N·m	80 lb in
Oil Pan Closeout Cover Bolt - Right Side	9 N·m	80 lb in
Oil Pan Cover Bolts	9 N·m	80 lb in
Oil Pan Drain Plug	25 N·m	18 lb ft

Application	Specification	
	Metric	English
Oil Pan M6 Bolts - Oil Pan-to-Rear Housing	12 N·m	106 lb in
Oil Pan M8 Bolts - Oil Pan-to-Engine Block and Oil Pan-to-Front Cover	25 N·m	18 lb ft
Oil Pan Skid Plate Bolts	28 N·m	21 lb ft
Oil Pressure Sensor	35 N·m	26 lb ft
Oil Pump Cover Bolts	12 N·m	106 lb in
Oil Pump Relief Valve Plug	12 N·m	106 lb in
Oil Pump Screen Nuts	25 N·m	18 lb ft
Oil Pump Screen-to-Oil Pump Bolts	12 N·m	106 lb in
Oil Pump-to-Engine Block Bolts	25 N·m	18 lb ft
Power Steering Pump-to-Engine Block Bolts	50 N·m	37 lb ft
Spark Plugs	15 N·m	11 lb ft
Throttle Body Bolts	10 N·m	89 lb in
Throttle Body Nuts	10 N·m	89 lb in
Throttle Body Studs	6 N·m	53 lb in
Timing Chain Tensioner Bolts	25 N·m	18 lb ft
Transfer Case Vent Hose Bracket Nut	20 N·m	15 lb ft
Transmission Housing-to-Engine Bolts/Studs	50 N·m	37 lb ft
Transmission Oil Cooler Line Clip Bolt	9 N·m	80 lb in
Transmission Oil Level Indicator Tube Nut	18 N·m	13 lb ft
Valley Cover Bolts	25 N·m	18 lb ft
Valve Lifter Guide Bolts	12 N·m	106 lb in
Valve Lifter Oil Manifold Bolts	25 N·m	18 lb ft
Valve Rocker Arm Bolts	30 N·m	22 lb ft
Valve Rocker Arm Cover Bolts	12 N·m	106 lb in
Water Inlet Housing Bolts	15 N·m	11 lb ft
Water Pump Bolts - First Pass	15 N·m	11 lb ft
Water Pump Bolts - Final Pass	30 N·m	22 lb ft

Engine Mechanical – 5.3L LY5, LMG and LC9

Engine Component Description



Camshaft and Drive System - RPO LY2/LC9/LY5/LMG

A billet steel 1 piece camshaft is supported by 5 bearings pressed into the engine block. The camshaft timing sprocket is mounted to the front of the camshaft and is driven by the crankshaft sprocket through the camshaft timing chain. The camshaft position (CMP) sensor lobes are incorporated into the front face of the camshaft sprocket with the CMP sensor mounted in the engine front cover. A timing chain tensioner is mounted to the front of the engine block above the crankshaft sprocket. The externally splined crankshaft sprocket is positioned to the crankshaft by a key and keyway. The crankshaft sprocket external splines drive the oil pump drive gear. A retaining plate mounted to the front of the engine block maintains camshaft location.

Camshaft and Drive System - RPO LY6/L76/L92

A billet steel 1 piece camshaft is supported by 5 bearings pressed into the engine block. The camshaft position (CMP) actuator is mounted to the front of the camshaft and retained by the CMP solenoid valve. The CMP actuator is driven by the crankshaft sprocket through the camshaft timing chain. The CMP sensor wheel is incorporated into the front face of the CMP actuator with the CMP sensor and CMP actuator magnet mounted in the engine front cover. A timing chain tensioner is mounted to the front of the engine block above the crankshaft sprocket. The externally splined crankshaft sprocket is positioned to the crankshaft by a key and keyway. The crankshaft sprocket external splines drive the oil pump drive gear. A retaining plate mounted to the front of the engine block maintains camshaft location. Refer to Camshaft Position Actuator and Solenoid Valve Description .

Crankshaft

The crankshaft is cast nodular iron. The crankshaft is supported by 5 crankshaft bearings. The bearings are retained by crankshaft bearing caps which are machined with the engine block for proper alignment and clearance. The crankshaft journals are undercut and rolled. The center main journal is the thrust journal. A crankshaft position (CKP) reluctor ring is press fit mounted at the rear of the crankshaft. The reluctor ring is not serviceable separately.

Cylinder Heads

The cylinder heads are cast aluminum and have pressed in place powdered metal valve guides and valve seats. Passages for the engine coolant air bleed system are at the front of each cylinder head. The valve rocker arm covers are retained to the cylinder head by 4 center mounted rocker arm cover bolts.

Engine Block - RPO LC9/L76/L92

The engine block is a cam-in-block deep skirt 90 degree V configuration with 5 crankshaft bearing caps. The engine block is cast aluminum. The 5 crankshaft bearing caps each have 4 vertical M10 and 2 horizontal M8 mounting bolts. The camshaft is supported by 5 camshaft bearings pressed into the block.

Engine Block - RPO LY2/LY5/LMG/LY6

The engine block is a cam-in-block deep skirt 90 degree V configuration with 5 crankshaft bearing caps. The engine block is cast iron. The 5 crankshaft bearing caps each have 4 vertical M10 and 2 horizontal M8 mounting bolts. The camshaft is supported by 5 camshaft bearings pressed into the block.

Exhaust Manifolds

The exhaust manifolds are a 1 piece cast iron design. The exhaust manifolds direct exhaust gasses from the combustion chambers to the exhaust system. Each manifold also has an externally mounted heat shield that is retained by bolts.

Intake Manifold

The intake manifold is a 1 piece composite design that incorporates brass threaded inserts for mounting the fuel rail, throttle body, and wire harness studs. Each side of the intake manifold is sealed to the cylinder head by a non-reusable silicone sealing gasket/nylon carrier assembly. The electronically actuated throttle body bolts to the front of the intake manifold. The throttle body is sealed by a 1 piece push in place silicone gasket. The fuel rail assembly, with 8 separate fuel injectors, is retained to the intake by 4 bolts. The injectors are seated into their individual manifold bores with O-ring seals to provide sealing. A fuel rail stop bracket is retained to the rear of the left cylinder head by a mounting bolt. The manifold absolute pressure (MAP) sensor is installed and retained to the top front of the intake manifold and sealed by an O-ring seal. The evaporative emission (EVAP) canister purge solenoid valve is mounted to the fuel rail at the left front of the intake manifold. There are no coolant passages within the intake manifold.

Oil Pan

The structural rear-sump oil pan is cast aluminum. Incorporated into the design is the oil filter mounting boss, drain plug opening, baffle, and oil level sensor. The oil filter bypass valve is now incorporated into the new design oil filter assembly and is no longer part of the oil pan assembly as in earlier design applications. The active fuel management oil pressure relief valve is also internal to the oil pan. Alignment of the structural oil pan to the rear of the engine block and transmission housing is critical.

Piston and Connecting Rod Assembly

The pistons are cast aluminum. The pistons use 2 compression rings and 1 oil control ring assembly. The piston is a low friction, lightweight design with a flat or recessed top and barrel shaped skirt. The piston pins are chromium steel and are a full-floating design. The connecting rods are powdered metal. The connecting rods are fractured at the connecting rod journal and then machined for the proper clearance. All applications use a piston with a graphite coated skirt. The piston and pin are to be serviced as an assembly.

Valve Rocker Arm Cover Assemblies

The valve rocker arm covers are cast aluminum and use a pre-molded silicon gasket for sealing. Mounted to each rocker cover are the coil and bracket assemblies. Incorporated into the left cover is the positive crankcase ventilation (PCV) system dirty air passage. Incorporated into the right cover is the oil fill tube and the PCV fresh air passage.

Valve Train - RPO LY2/LY6

Motion is transmitted from the camshaft through the hydraulic roller valve lifters and tubular pushrods to the roller type rocker arms. The nylon valve lifter guides position and retain the valve lifters. The valve rocker arms for each bank of cylinders are mounted on pedestals or pivot supports. Each rocker arm is retained on the pivot support and cylinder head by a bolt. Valve lash is net build.

Valve Train - RPO LC9/LY5/LMG/L76

Motion is transmitted from the camshaft through the hydraulic roller valve lifters and tubular pushrods to the roller type rocker arms. The nylon valve lifter guides position and retain the valve lifters. The valve rocker arms for each bank of cylinders are mounted on pedestals or pivot supports. Each rocker arm is retained on the pivot support and cylinder head by a bolt. Valve lash is net build. Cylinders 1, 4, 6, and 7 are active fuel management. For RPO L92, active fuel management hardware present in the engine system is inactive for the 2007 model year. Refer to Cylinder Deactivation (Active Fuel Management) System Description .

Valve Train - RPO L92

First design engines are built to contain the following active fuel management components:

- Active fuel management valve lifters
- Active fuel management valve lifter guides
- Valve lifter oil manifold assembly
- Camshaft with active fuel management specifications

Second design engines are built to contain the following non-active fuel management components:

- Non-active fuel management valve lifters
- Non-active fuel management valve lifter guides
- Engine valley cover
- Camshaft with non-active fuel management specifications

First design engines with active fuel management components: Motion is transmitted from the camshaft through the hydraulic roller valve lifters and tubular pushrods to the roller type rocker arms. The nylon valve lifter guides position and retain the valve lifters. The valve rocker arms for each bank of cylinders are mounted on pedestals or pivot supports. Each rocker arm is retained on the pivot support and cylinder head by a bolt. Valve lash is net build. Cylinders 1, 4, 6, and 7 contain active fuel management components. For first design RPO L92 engines, active fuel management hardware is present in the engine. The system is inactive for the 2007 model year. Refer to Cylinder Deactivation (Active Fuel Management) System Description .

Second design engines without active fuel management components: Motion is transmitted from the camshaft through the hydraulic roller valve lifters and tubular pushrods to the roller type rocker arms. The nylon valve lifter guides position and retain the valve lifters. The valve rocker arms for each bank of cylinders are mounted on pedestals or pivot supports. Each rocker arm is retained on the pivot support and cylinder head by a bolt. Valve lash is net build. For second design RPO L92 engines, active fuel management hardware is not present in the engine.

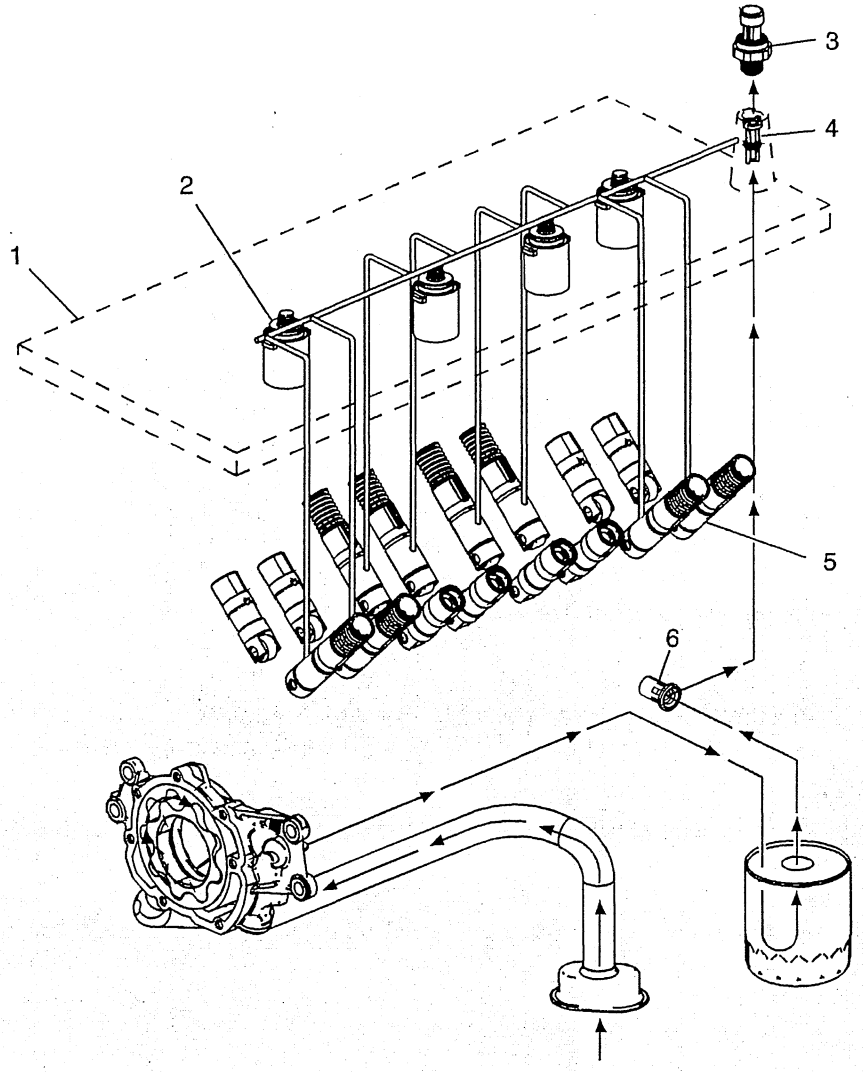
Active Fuel Management System Description

System Operation

General Motors Active Fuel Management (AFM) engine control system has the ability, under certain light load driving conditions, to provide maximum fuel economy by deactivating 4 of the engines 8 cylinders. The engine will normally operate on 8 cylinders in V8 mode during, starting, idling, and medium or heavy throttle conditions. When commanded ON, the powertrain control module (PCM) will direct the AFM

system and deactivate cylinders 1 and 7 on the left bank and cylinders 4 and 6 on the right bank, forcing V4 mode.

Valve Lifter Oil Manifold Assembly

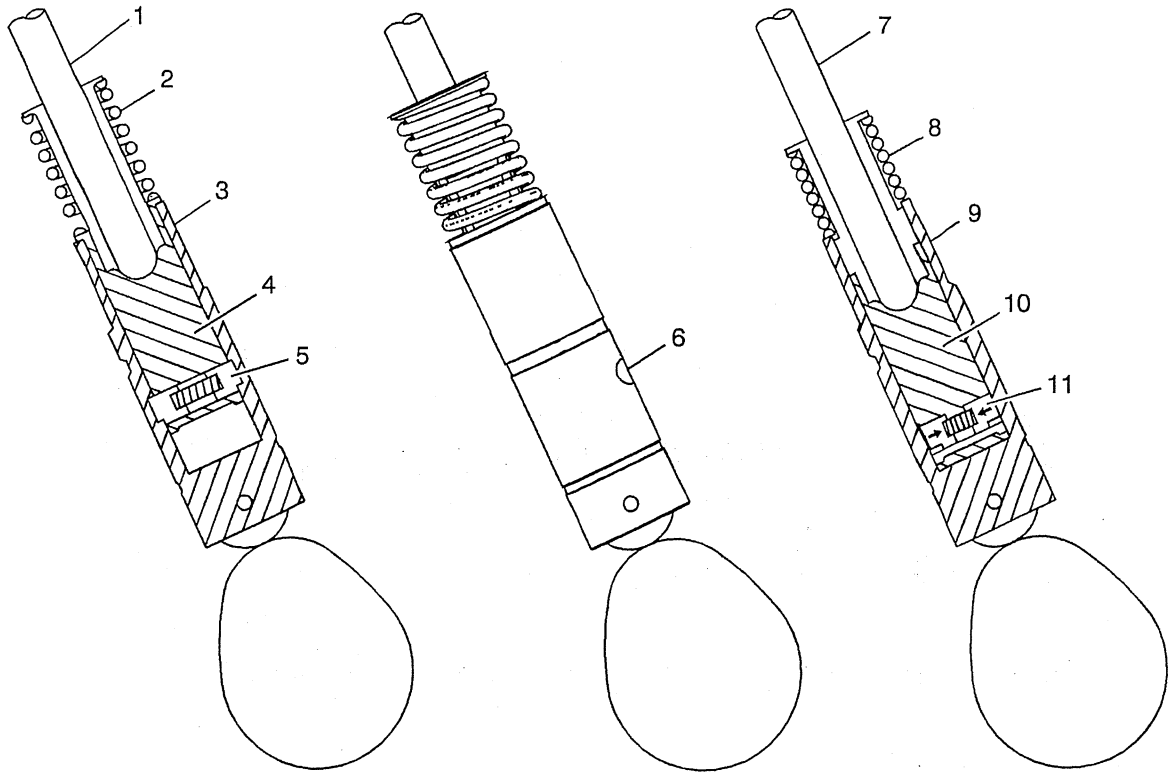


The valve lifter oil manifold (VLOM) assembly (1) is bolted to the top of the engine block beneath the intake manifold assembly. The oil manifold consists of 4 electrically operated and normally-closed solenoids (2). Each solenoid directs the flow of pressurized engine oil to the AFM intake and exhaust valve lifters (5). The oil pressure relief valve (6), located in the left rear area of the oil pan, regulates engine oil pressure to the lubrication system and the oil manifold.

When enabling conditions are met for AFM operation, the ECM will ground each solenoid control circuit in firing order sequence, allowing current to flow through the solenoid windings. With the windings energized, the solenoid valves open and direct pressurized engine oil through the manifold into 8 vertical passages in the engine block lifter valley. The 8 vertical passages, 2 per cylinder, direct pressurized oil to the valve lifter bores of the cylinders to be deactivated. When vehicle operating conditions require a return to V8 mode, the ECM will turn OFF the ground circuit for the solenoids, allowing the solenoid valves to close. When the solenoid valves are closed, remaining oil pressure is exhausted through the bleed passages of the manifold into the engine block lifter valley. The housing of the oil manifold incorporates several oil bleed passages that continually purge trapped air from the manifold and engine block.

To help control contamination within the AFM hydraulic system, a small replaceable oil filter (4) is located in the manifold oil inlet passage. The oil pressure sensor (3) monitors engine oil pressure and provides information to the ECM.

Displacement on Demand Valve Lifters



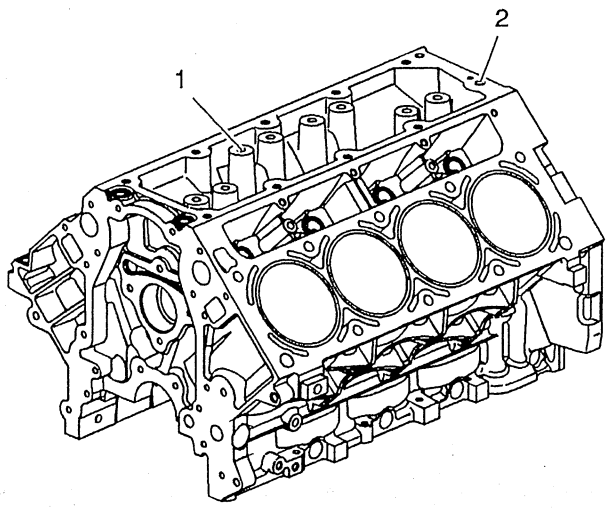
When operating in V8 mode, the AFM valve lifters function similar to the non-AFM valve lifters. The AFM oil manifold solenoids are in the closed position with no pressurized oil directed to the valve lifters. The pushrod (1) travels upward and downward to actuate the rocker arm and valve. The spring loaded locking pins (5) of the lifter are extended outward and mechanically lock the pin housing (4) to the outer body of the valve lifter (3).

When the AFM system is commanded ON, the ECM will direct the solenoids of the oil manifold to open and direct pressurized oil to the valve lifters. Oil travels through the manifold and engine block oil galleries and enters the inlet port (6) of the valve lifter.

When operating in V4 mode, pressurized oil forces the locking pins (11) inward. The pushrod (7) remains in a constant position and does not travel upward and downward. The outer body of the lifter (9) moves upward and downward independently from the pin housing (10). The valve lifter spring (8) retains tension on the valve train components to eliminate valve train noise.

When the AFM system is commanded OFF, the ECM directs the solenoids of the oil manifold to close, stopping the flow of pressurized oil to the valve lifters. The oil pressure within the lifter will decrease and the locking pins will move outward to mechanically lock the pin housing and outer body.

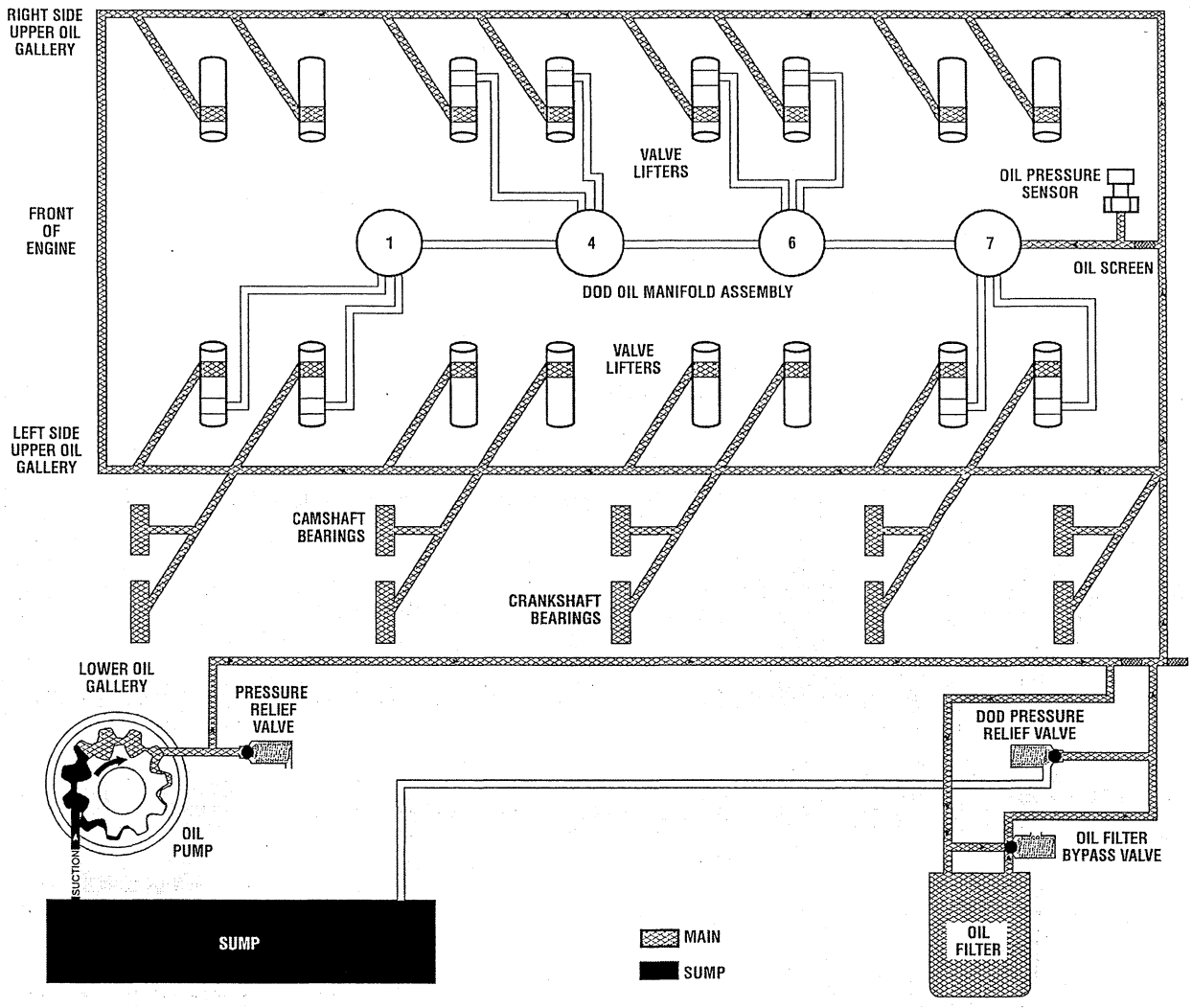
Engine Block



The AFM engine block incorporates additional features to support AFM system operation. Engine oil pressure is routed to the manifold assembly from an oil gallery (2) in the rear of the cylinder block. Cylinders 1, 4, 6, and 7 each have 2 vertical, cast-in-block oil passages (1). The vertical oil passages permit oil flow from the manifold assembly to the valve lifter bores.

Lubrication Description

Lubrication Description (Main Pressure Below 55 psi - AFM Off)



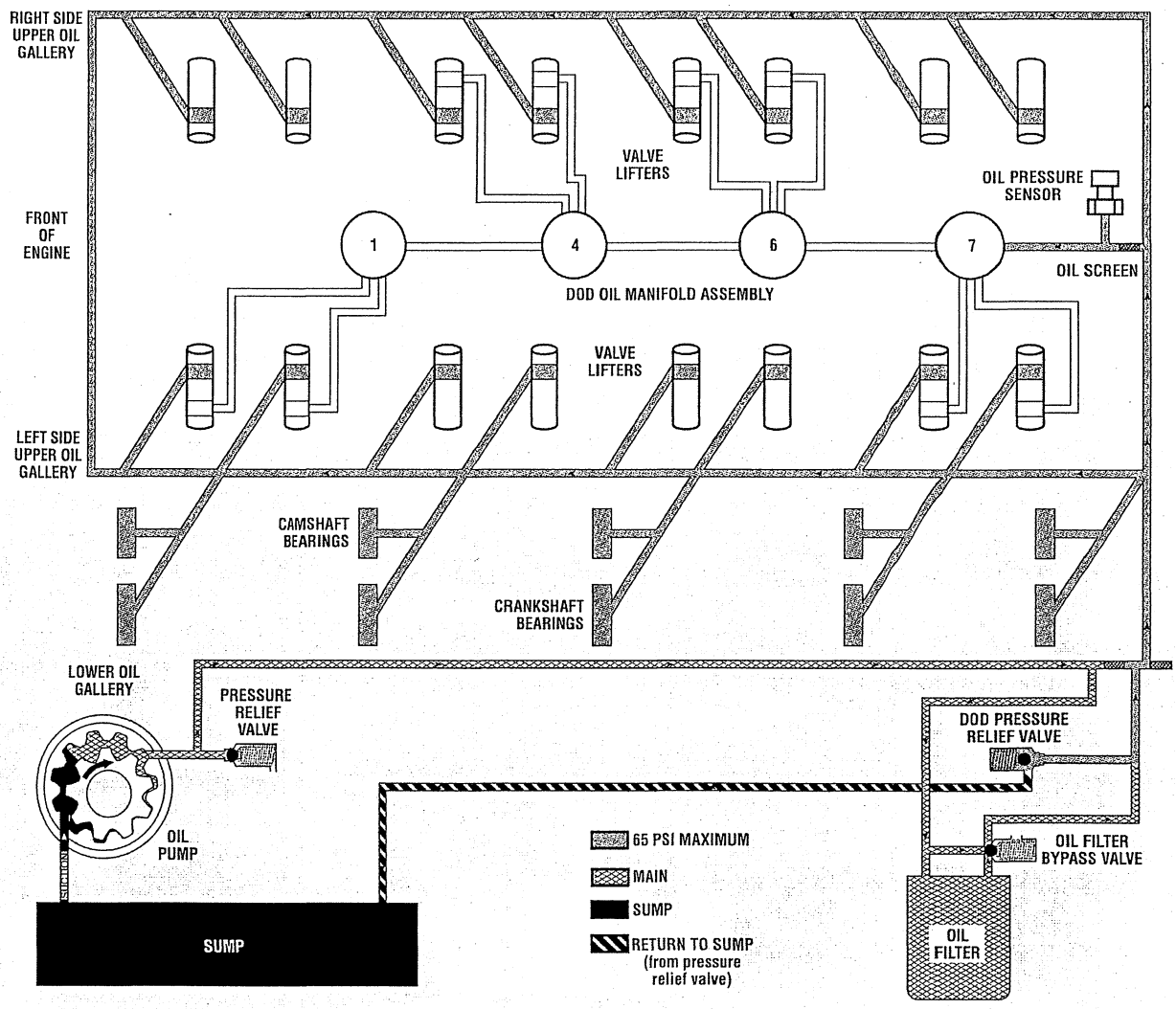
Engine lubrication is supplied by a gerotor type oil pump assembly. The pump is mounted on the front of the engine block and driven directly by the crankshaft sprocket. The pump gears rotate and draw oil from the oil pan sump through a pick-up screen and pipe. The oil is pressurized as it passes through the pump and is sent through the engine block lower oil gallery. Contained within the oil pump assembly is a pressure relief valve that maintains oil pressure within a specified range.

Pressurized oil is directed through the engine block lower oil gallery to the full flow oil filter where harmful contaminants are removed. A bypass valve is incorporated into the oil pan at the oil filter boss, which permits oil flow in the event the filter becomes restricted. A second valve, the displacement on demand (AFM) oil pressure relief valve is incorporated into the left rear side of the oil pan. The AFM oil pressure relief valve limits oil pressure directed to the upper oil galleries and oil manifold assembly to 379 kPa (55 psi) at 3,000 RPM and 21°C (70°F).

Oil is then directed from the filter to the upper main oil galleries and the AFM manifold assembly. Oil from the left upper oil gallery is directed to the crankshaft and camshaft bearings. Oil that has entered both the upper main oil galleries also pressurizes the valve lifter assemblies and is then pumped through the

pushrods to lubricate the valve rocker arms and valve stems. Oil returning to the pan is directed by the crankshaft oil deflector. The oil pressure sensor is located at the top rear of the engine.

Lubrication Description (Main Pressure Above 55 psi - AFM Off)



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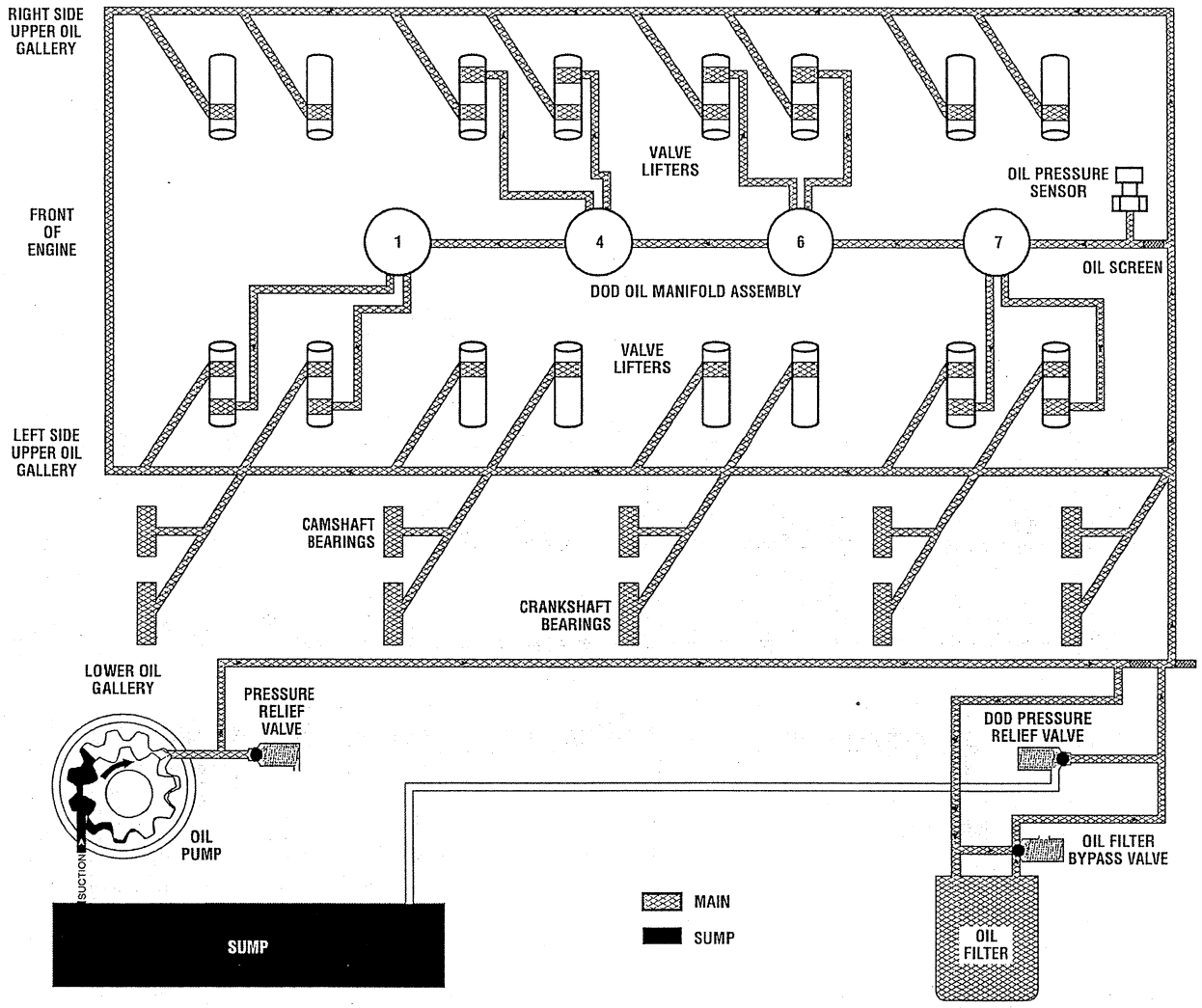
Pressurized oil is directed through the engine block lower oil gallery to the full flow oil filter where harmful contaminants are removed. A bypass valve is incorporated into the oil pan at the oil filter boss, which permits oil flow in the event the filter becomes restricted. A second valve, the displacement on demand (AFM) oil pressure relief valve is incorporated into the left rear side of the oil pan. The AFM oil pressure relief valve limits oil pressure directed to the upper oil galleries and oil manifold assembly to 379 kPa (55 psi) at 3,000 RPM and 21°C (70°F). When main oil pressure exceeds 379 kPa (55 psi), the AFM oil pressure relief valve exhausts excess oil to the sump.

Oil is then directed from the filter to the upper main oil galleries and the AFM manifold assembly. Oil from the left upper oil gallery is directed to the crankshaft and camshaft bearings. Oil that has entered both the

upper main oil galleries also pressurizes the valve lifter assemblies and is then pumped through the pushrods to lubricate the valve rocker arms and valve stems. Oil returning to the pan is directed by the crankshaft oil deflector. The oil pressure sensor is located at the top rear of the engine.

Lubrication Description (Main Pressure Below 55 psi - AFM On)



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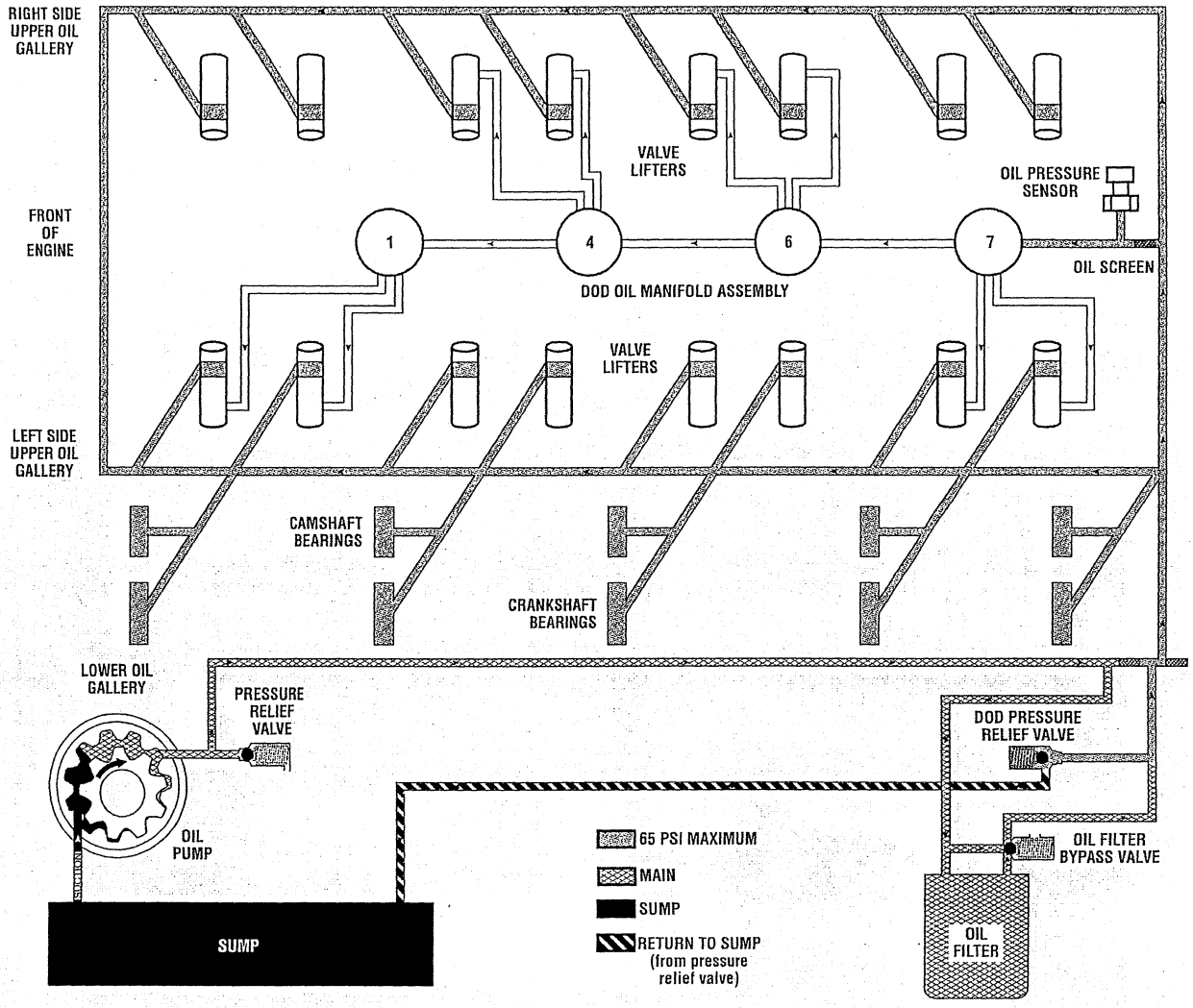
Pressurized oil is directed through the engine block lower oil gallery to the full flow oil filter where harmful contaminants are removed. A bypass valve is incorporated into the oil pan at the oil filter boss, which permits oil flow in the event the filter becomes restricted. A second valve, the displacement on demand (AFM) oil pressure relief valve is incorporated into the left rear side of the oil pan. The AFM oil pressure relief valve limits oil pressure directed to the upper oil galleries and oil manifold assembly to 379 kPa (55 psi) at 3,000 RPM and 21°C (70°F).

Oil is then directed from the filter to the upper main oil galleries and the AFM manifold assembly. Oil from the left upper oil gallery is directed to the crankshaft and camshaft bearings. Oil that has entered both the

upper main oil galleries also pressurizes the valve lifter assemblies and is then pumped through the pushrods to lubricate the valve rocker arms and valve stems. Oil returning to the pan is directed by the crankshaft oil deflector. The oil pressure sensor is located at the top rear of the engine.

With AFM activated, the ECM commands the 4 solenoids to open, directing oil through the engine block oil galleries to the intake and exhaust valve lifters for cylinders 1, 4, 6, and 7.

Lubrication Description (Main Pressure Above 55 psi - AFM On)



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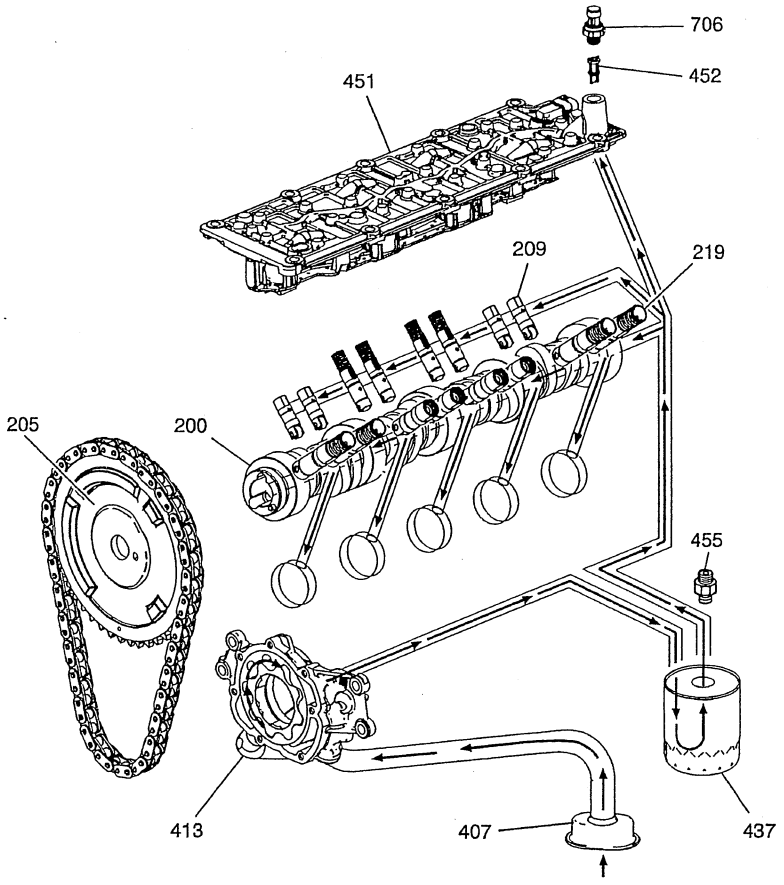
Pressurized oil is directed through the engine block lower oil gallery to the full flow oil filter where harmful contaminants are removed. A bypass valve is incorporated into the oil pan at the oil filter boss, which permits oil flow in the event the filter becomes restricted. A second valve, the displacement on demand (AFM) oil pressure relief valve is incorporated into the left rear side of the oil pan. The AFM oil pressure relief valve limits oil pressure directed to the upper oil galleries and oil manifold assembly to 379 kPa (55

psi) at 3,000 RPM and 21°C (70°F). When main oil pressure exceeds 379 kPa (55 psi), the AFM oil pressure relief valve exhausts excess oil to the sump.

Oil is then directed from the filter to the upper main oil galleries and the AFM manifold assembly. Oil from the left upper oil gallery is directed to the crankshaft and camshaft bearings. Oil that has entered both the upper main oil galleries also pressurizes the valve lifter assemblies and is then pumped through the pushrods to lubricate the valve rocker arms and valve stems. Oil returning to the pan is directed by the crankshaft oil deflector. The oil pressure sensor is located at the top rear of the engine.

With AFM activated, the ECM commands the 4 solenoids to open, directing oil through the engine block oil galleries to the intake and exhaust valve lifters for cylinders 1, 4, 6, and 7.

Lubrication System Description (RPO LC9/LY5/LMG)



(200) Camshaft
(205) Camshaft Sprocket
(209) Valve Lifter - Non-Active Fuel Management
(219) Valve Lifter - Active Fuel Management
(407) Oil Pump Screen
(413) Oil Pump
(437) Oil Filter
(451) Valve Lifter Oil Manifold
(452) Valve Lifter Oil Filter
(455) Active Fuel Management Oil Pressure Relief Valve
(706) Oil Pressure Sensor

Engine lubrication is supplied by a gerotor type oil pump assembly. The oil pump is mounted on the front of the engine block and driven directly by the crankshaft sprocket. The pump gears rotate and draw oil from the oil pan sump through a pick-up screen and pipe. The oil is pressurized as it passes through the pump and is sent through the engine block lower oil gallery. Contained within the oil pump assembly is a pressure relief valve that maintains oil pressure within a specified range.

Pressurized oil is directed through the engine block lower oil gallery to the full flow oil filter where harmful contaminants are removed. A bypass valve is incorporated into the oil filter, which permits oil flow in the event the filter becomes restricted. A second valve, the active fuel management oil pressure relief valve is incorporated into the oil pan. The active fuel management oil pressure relief valve limits oil pressure directed to the upper oil galleries and valve lifter oil manifold assembly to 379-517 kPa (55-75 psi) maximum. When main oil pressure exceeds 379 kPa (55 psi), the oil pressure relief valve exhausts excess oil to the sump.

Oil is then directed from the filter to the upper main oil galleries and the valve lifter oil manifold assembly. Oil from the left upper oil gallery is directed to the crankshaft and camshaft bearings. Oil that has entered both the upper main oil galleries also pressurizes the valve lifter assemblies and is then pumped through the pushrods to lubricate the valve rocker arms and valve stems. Oil returning to the pan is directed by the crankshaft oil deflector. The oil pressure sensor is located at the top rear of the engine.

With active fuel management activated, the engine control module (ECM) commands the 4 solenoids to open, directing oil through the engine block oil galleries to the intake and exhaust valve lifters for cylinders 1, 4, 6, and 7. Refer to Cylinder Deactivation (Active Fuel Management) System Description.

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 1 belt or 2 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.

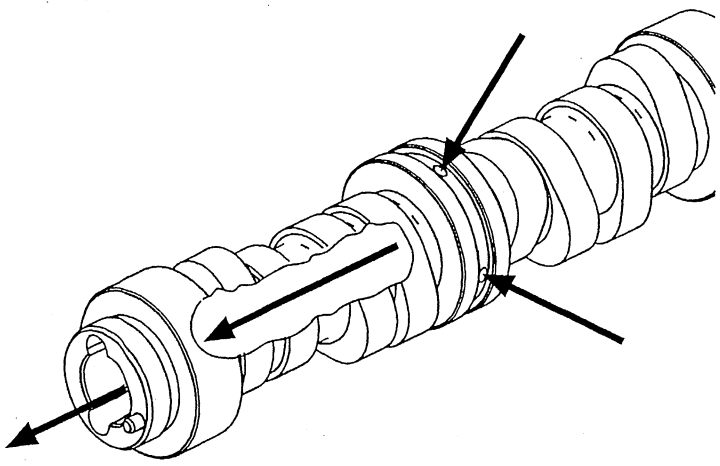
Both sides of the drive belt may be used to drive the different accessory drive components. When the back side of the drive belt is used to drive a pulley, the pulley is smooth.

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.

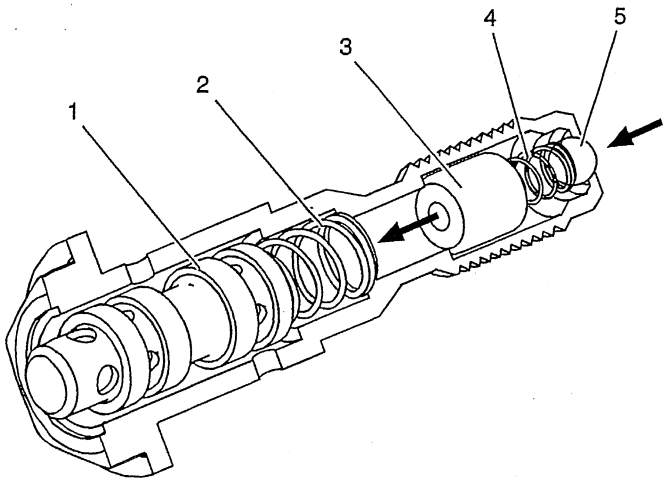
Camshaft Position Actuator and Solenoid Valve Description

Camshaft



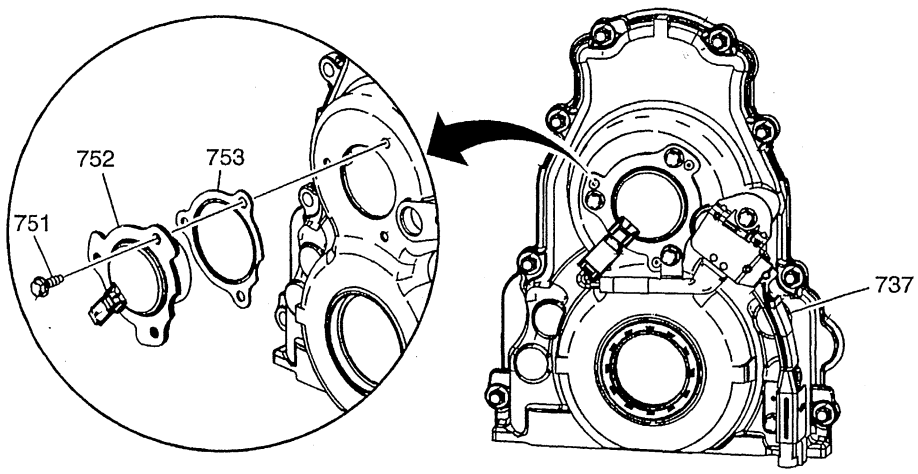
The camshaft is designed to provide a lubrication path for pressurized engine oil to flow to the camshaft position (CMP) actuator. Pressurized engine oil enters the camshaft at bearing journal location number 2. Oil travels through the camshaft, out the front, and into the CMP actuator solenoid valve.

Camshaft Position (CMP) Actuator Solenoid Valve



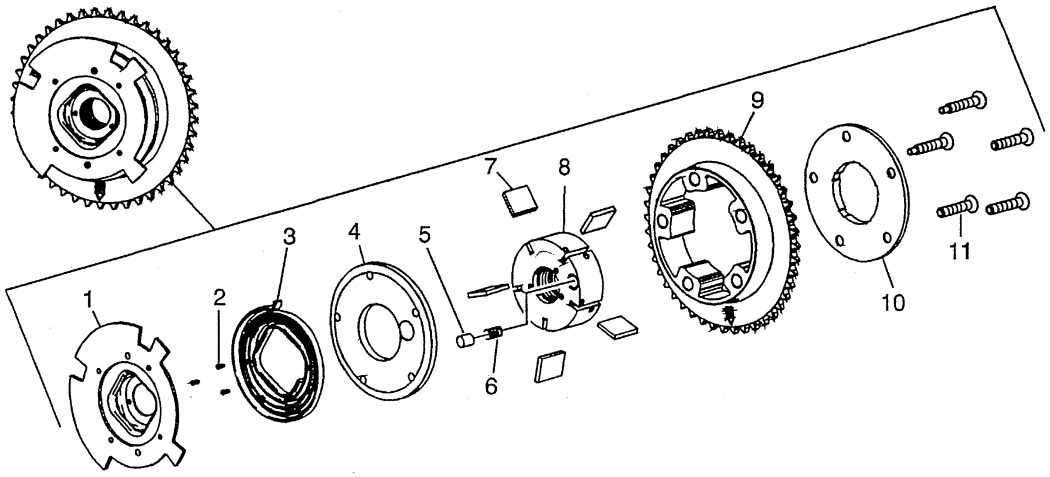
The CMP actuator solenoid valve consists of a housing, spool valve (1), spool return spring (2), oil filter (3), inlet check ball return spring (4), and inlet check ball (5). Pressurized engine oil enters the valve and travels through the filter to the spool. Spool position is controlled by the CMP magnet and engine control module (ECM). When the spool is moved to the proper position, oil flow is directed through the valve and into the CMP actuator assembly. The CMP solenoid valve is a torque-to-yield design and should be replaced each time it is removed.

CMP Actuator Magnet



The CMP actuator magnet (752) is located in the engine front cover and is sealed by a gasket (753). The CMP actuator magnet is controlled by a 12-volt pulse width modulated signal from the ECM. When energized, the solenoid uses electromagnetic force on the magnet pintle to position the spool valve of the CMP solenoid valve.

CMP Actuator



The CMP actuator is a vane type design that hydraulically changes angle or timing of the camshaft relative to crankshaft position. The CMP actuator allows earlier or later intake and exhaust valve opening during the 4-stroke engine cycle. The CMP actuator cannot vary the duration of valve opening or valve lift. The CMP actuator is to be serviced as an assembly

The CMP actuator consists of the CMP reluctor wheel (1), pins (2), return spring (3), front cover (4), locking pin (5), locking pin spring (6), vanes and vane springs (7), rotor (8), stator (9), sealing cover/thrust plate (10), and bolts (11).

Crankcase Ventilation System Description

A closed crankcase ventilation system is used in order to provide a more complete scavenging of the crankcase vapors. Fresh air from the throttle body is supplied to the crankcase, mixed with blow-by gases, and then passed through a crankcase ventilation valve into the intake manifold.

The primary control is through the crankcase ventilation valve which meters the flow at a rate depending on manifold vacuum. To maintain idle quality, the crankcase ventilation valve restricts the flow when

intake manifold vacuum is high. If abnormal operating conditions arise, the system is designed to allow excessive amounts of blow-by gases to back flow through the crankcase vent tube into the engine air inlet to be consumed by normal combustion.

Filtered fresh air is routed from up-stream of the throttle blade to the front of the right rocker arm cover via a formed rubber hose. To reduce the potential of oil pullover into the throttle bore area due to back flow of the ventilation system, the fitting in the right rocker arm cover is shielded from the rocker arms. From there fresh air and gases are routed through the crankcase and up to the opposite rocker arm cover where the positive crankcase ventilation (PCV) valve is located. Gases are then routed through a hose to the intake manifold.

General Specifications 5.3L (LY5 VIN J)

Application	Specification	
	Metric	English
General		
Engine Type	V8	
Displacement	5.3L	325 CID
RPO	LY5	
VIN	J	
Bore	96.0-96.018 mm	3.779-3.78 in
Stroke	92.0 mm	3.622 in
Compression Ratio	9.95:1	
Firing Order	1-8-7-2-6-5-4-3	
Active Fuel Management Cylinders	1-4-6-7	
Spark Plug Gap	1.02 mm	0.04 in
Block		
Camshaft Bearing Bore 1 and 5 Diameter	59.58-59.63 mm	2.345-2.347 in
Camshaft Bearing Bore 2 and 4 Diameter	59.08-59.13 mm	2.325-2.327 in
Camshaft Bearing Bore 3 Diameter	58.58-58.63 mm	2.306-2.308 in
Crankshaft Main Bearing Bore Diameter	69.871-69.889 mm	2.75-2.751 in
Crankshaft Main Bearing Bore Out-of-Round	0.006 mm	0.0002 in
Cylinder Bore Diameter	96.0-96.018 mm	3.779-3.78 in
Cylinder Head Deck Height - Measuring from the Centerline of Crankshaft to the Deck Face	234.57-234.82 mm	9.235-9.245 in
Cylinder Head Deck Surface Flatness - Measured Within a 152.4 mm (6.0 in) Area	0.11 mm	0.004 in
Cylinder Head Deck Surface Flatness - Measuring the Overall Length of the Block Deck	0.22 mm	0.008 in
Valve Lifter Bore Diameter	21.417-21.443 mm	0.843-0.844 in
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 Out-of-Round	0.025 mm	0.001 in
Camshaft Lobe Lift - Exhaust - Non Active Fuel Management Cylinders	7.2 mm	0.283 in
Camshaft Lobe Lift - Exhaust - Active Fuel Management Cylinders	7.33 mm	0.289 in
Camshaft Lobe Lift - Intake - Non Active Fuel Management Cylinders	7.2 mm	0.283 in
Camshaft Lobe Lift - Intake - Active Fuel Management Cylinders	7.33 mm	0.289 in
Camshaft Runout - Measured at the Intermediate Journals	0.05 mm	0.002 in

Application	Specification	
	Metric	English
Connecting Rod		
Connecting Rod Bearing Clearance - Production	0.023-0.065 mm	0.0009-0.0025 in
Connecting Rod Bearing Clearance - Service	0.023-0.076 mm	0.0009-0.003 in
Connecting Rod Bore Diameter - Bearing End	56.505-56.525 mm	2.224-2.225 in
Connecting Rod Bore Out-of-Round - Bearing End - Production	0.004-0.008 mm	0.00015-0.0003 in
Connecting Rod Bore Out-of-Round - Bearing End - Service	0.004-0.008 mm	0.00015-0.0003 in
Connecting Rod Side Clearance	0.11-0.51 mm	0.00433-0.02 in
Crankshaft		
Connecting Rod Journal Diameter - Production	53.318-53.338 mm	2.0991-2.0999 in
Connecting Rod Journal Diameter - Service	53.308 mm	2.0987 in
Connecting Rod Journal Out-of-Round - Production	0.005 mm	0.0002 in
Connecting Rod Journal Out-of-Round - Service	0.01 mm	0.0004 in
Connecting Rod Journal Taper - Maximum for 1/2 of Journal Length - Production	0.005 mm	0.0002 in
Connecting Rod Journal Taper - Maximum for 1/2 of Journal Length - Service	0.02 mm	0.00078 in
Crankshaft End Play	0.04-0.2 mm	0.0015-0.0078 in
Crankshaft Main Bearing Clearance - Production	0.02-0.052 mm	0.0008-0.0021 in
Crankshaft Main Bearing Clearance - Service	0.02-0.065 mm	0.0008-0.0025 in
Crankshaft Main Journal Diameter - Production	64.992-65.008 mm	2.558-2.559 in
Crankshaft Main Journal Diameter - Service	64.992 mm	2.558 in
Crankshaft Main Journal Out-of-Round - Production	0.003 mm	0.000118 in
Crankshaft Main Journal Out-of-Round - Service	0.008 mm	0.0003 in
Crankshaft Main Journal Taper - Production	0.01 mm	0.0004 in
Crankshaft Main Journal Taper - Service	0.02 mm	0.00078 in
Crankshaft Rear Flange Runout	0.05 mm	0.002 in
Crankshaft Reluctor Ring Runout - Measured 1.0 mm (0.04 in) Below Tooth Diameter	0.7 mm	0.028 in
Crankshaft Thrust Surface - Production	26.14-26.22 mm	1.029-1.0315 in
Crankshaft Thrust Surface - Service	26.22 mm	1.0315 in
Crankshaft Thrust Surface Runout	0.025 mm	0.001 in
Cylinder Head		
Cylinder Head Height/Thickness - Measured from the Cylinder Head Deck to the Valve Rocker Arm Cover Seal Surface	120.2 mm	4.732 in
Surface Flatness - Block Deck - Measured Within a 152.4 mm (6.0 in) Area	0.08 mm	0.003 in
Surface Flatness - Block Deck - Measuring the Overall Length of the Cylinder Head	0.1 mm	0.004 in
Surface Flatness - Exhaust Manifold Deck	0.13 mm	0.005 in
Surface Flatness - Intake Manifold Deck	0.08 mm	0.0031 in
Valve Guide Installed Height - Measured from the Spring Seat Surface to the Top of the Guide	17.32 mm	0.682 in
Intake Manifold		
Surface Flatness - Measured at Gasket Sealing Surfaces and Measured Within a 200 mm (7.87 in) Area that Includes 2 Runner Port Openings	0.3 mm	0.118 in

Application	Specification	
	Metric	English
Lubrication System		
Oil Capacity - with Filter	5.68 liters	6.0 quarts
Oil Capacity - without Filter	5.20 liters	5.5 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
Active Fuel Management Relief Valve Oil Pressure - as Measured at Oil Pressure Sensor Location	379-517 kPa Maximum	55-75 psig Maximum
Oil Pan		
Front Cover Alignment - at Oil Pan Surface	0.0-0.5 mm	0.0-0.02 in
Crankshaft Rear Oil Seal Housing Alignment - at Oil Pan Surface	0.0-0.5 mm	0.0-0.02 in
Oil Pan Alignment - to Rear of Engine Block at Transmission Bell Housing Mounting Surface	0.0-0.1 mm	0.0-0.004 in
Piston Rings		
Piston Ring End Gap - First Compression Ring - Measured in Cylinder Bore - Production	0.23-0.44 mm	0.009-0.017 in
Piston Ring End Gap - First Compression Ring - Measured in Cylinder Bore - Service	0.23-0.5 mm	0.009-0.0196 in
Piston Ring End Gap - Second Compression Ring - Measured in Cylinder Bore - Production	0.44-0.7 mm	0.017-0.027 in
Piston Ring End Gap - Second Compression Ring - Measured in Cylinder Bore - Service	0.44-0.76 mm	0.0173-0.03 in
Piston Ring End Gap - Oil Control Ring - Measured in Cylinder Bore - Production	0.18-0.75 mm	0.007-0.029 in
Piston Ring End Gap - Oil Control Ring - Measured in Cylinder Bore - Service	0.18-0.81 mm	0.007-0.032 in
Piston Ring-to-Groove Clearance - First Compression Ring - Production	0.04-0.085 mm	0.00157-0.00335 in
Piston Ring-to-Groove Clearance - First Compression Ring - Service	0.04-0.085 mm	0.00157-0.00335 in
Piston Ring-to-Groove Clearance - Second Compression Ring - Production	0.04-0.078 mm	0.00157-0.0031 in
Piston Ring-to-Groove Clearance - Second Compression Ring - Service	0.04-0.078 mm	0.00157-0.0031 in
Piston Ring-to-Groove Clearance - Oil Control Ring - Production	0.012-0.2 mm	0.0005-0.0078 in
Piston Ring-to-Groove Clearance - Oil Control Ring - Service	0.012-0.2 mm	0.0005-0.0078 in
Pistons and Pins		
Pin - Piston Pin Clearance-to-Piston Pin Bore - Production	0.002-0.01 mm	0.00008-0.0004 in
Pin - Piston Pin Clearance-to-Piston Pin Bore - Service	0.002-0.015 mm	0.00008-0.0006 in
Pin - Piston Pin Diameter	23.952-23.955 mm	0.943-0.943 in
Pin - Piston Pin Fit in Connecting Rod Bore - Production	0.007-0.02 mm	0.00027-0.00078 in
Pin - Piston Pin Fit in Connecting Rod Bore - Service	0.007-0.022 mm	0.00027-0.00086 in
Piston - Piston Diameter - Measured Over Skirt Coating	96.002-96.036 mm	3.779-3.78 in

Application	Specification	
	Metric	English
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	0.071 mm	0.0028 in
Valve System		
Valves - Valve Face Angle	45 degrees	
Valves - Valve Face Width	1.25 mm	0.05 in
Valves - Valve Lash	Net Lash - No Adjustment	
Valve Lift - Exhaust - Non Active Fuel Management	12.24 mm	0.488 in
Valve Lift - Exhaust - Active Fuel Management	12.46 mm	0.491 in
Valve Lift - Intake - Non Active Fuel Management	12.24 mm	0.488 in
Valve Lift - Intake - Active Fuel Management	12.46 mm	0.491 in
Valves - Valve Seat Angle	46 degrees	
Valves - Valve Seat Runout	0.05 mm	0.002 in
Valves - Valve Seat Width - Exhaust	1.78 mm	0.07 in
Valves - Seat Width - Intake	1.02 mm	0.04 in
Valves - Valve Stem Diameter - Production	7.955-7.976 mm	0.313-0.314 in
Valves - Valve Stem Diameter - Service	7.95 mm	0.313 in
Valves - Valve Stem-to-Guide Clearance - Production - Exhaust	0.025-0.066 mm	0.001-0.0026 in
Valves - Valve Stem-to-Guide Clearance - Service - Exhaust	0.093 mm	0.0037 in
Valves - Valve Stem-to-Guide Clearance - Production - Intake	0.025-0.066 mm	0.001-0.0026 in
Valves - Valve Stem-to-Guide Clearance - Service - Intake	0.093 mm	0.0037 in
Rocker Arms - Valve Rocker Arm Ratio	1.70:1	
Valve Springs - Valve Spring Free Length	52.9 mm	2.08 in
Valve Springs - Valve Spring Installed Height	45.75 mm	1.8 in
Valve Springs - Valve Spring Load - Closed	340 N at 45.75 mm	76 lb at 1.8 in
Valve Springs - Valve Spring Load - Open	980 N at 33.55 mm	220 lb at 1.32 in

General Specifications (RPO LMG VIN 0)

Application	Specification	
	Metric	English
General		
Engine Type	V8	
Displacement	5.3L	325 CID
RPO	LMG	
VIN	0	
Bore	96.0-96.018 mm	3.779-3.78 in
Stroke	92.0 mm	3.622 in
Compression Ratio	9.95:1	
Firing Order	1-8-7-2-6-5-4-3	
Active Fuel Management Cylinders	1-4-6-7	
Spark Plug Gap	1.02 mm	0.04 in
Block		
Camshaft Bearing Bore 1 and 5 Diameter	59.58-59.63 mm	2.345-2.347 in
Camshaft Bearing Bore 2 and 4 Diameter	59.08-59.13 mm	2.325-2.327 in
Camshaft Bearing Bore 3 Diameter	58.58-58.63 mm	2.306-2.308 in
Crankshaft Main Bearing Bore Diameter	69.871-69.889 mm	2.75-2.751 in
Crankshaft Main Bearing Bore Out-of-Round	0.006 mm	0.0002 in
Cylinder Bore Diameter	96.0-96.018 mm	3.779-3.78 in
Cylinder Head Deck Height - Measuring from the Centerline of Crankshaft to the Deck Face	234.57-234.82 mm	9.235-9.245 in
Cylinder Head Deck Surface Flatness - Measured Within a 152.4 mm (6.0 in) Area	0.11 mm	0.004 in
Cylinder Head Deck Surface Flatness - Measuring the Overall Length of the Block Deck	0.22 mm	0.008 in
Valve Lifter Bore Diameter	21.417-21.443 mm	0.843-0.844 in
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 Out-of-Round	0.025 mm	0.001 in
Camshaft Lobe Lift - Exhaust - Non Active Fuel Management Cylinders	7.2 mm	0.283 in
Camshaft Lobe Lift - Exhaust - Active Fuel Management Cylinders	7.33 mm	0.289 in
Camshaft Lobe Lift - Intake - Non Active Fuel Management Cylinders	7.2 mm	0.283 in
Camshaft Lobe Lift - Intake - Active Fuel Management Cylinders	7.33 mm	0.289 in
Camshaft Runout - Measured at the Intermediate Journals	0.05 mm	0.002 in
Connecting Rod		
Connecting Rod Bearing Clearance - Production	0.023-0.065 mm	0.0009-0.0025 in
Connecting Rod Bearing Clearance - Service	0.023-0.076 mm	0.0009-0.003 in
Connecting Rod Bore Diameter - Bearing End	56.505-56.525 mm	2.224-2.225 in
Connecting Rod Bore Out-of-Round - Bearing End - Production	0.004-0.008 mm	0.00015-0.0003 in
Connecting Rod Bore Out-of-Round - Bearing End - Service	0.004-0.008 mm	0.00015-0.0003 in
Connecting Rod Side Clearance	0.11-0.51 mm	0.00433-0.02 in

Application	Specification	
	Metric	English
Crankshaft		
Connecting Rod Journal Diameter - Production	53.318-53.338 mm	2.0991-2.0999 in
Connecting Rod Journal Diameter - Service	53.308 mm	2.0987 in
Connecting Rod Journal Out-of-Round - Production	0.005 mm	0.0002 in
Connecting Rod Journal Out-of-Round - Service	0.01 mm	0.0004 in
Connecting Rod Journal Taper - Maximum for 1/2 of Journal Length - Production	0.005 mm	0.0002 in
Connecting Rod Journal Taper - Maximum for 1/2 of Journal Length - Service	0.02 mm	0.00078 in
Crankshaft End Play	0.04-0.2 mm	0.0015-0.0078 in
Crankshaft Main Bearing Clearance - Production	0.02-0.052 mm	0.0008-0.0021 in
Crankshaft Main Bearing Clearance - Service	0.02-0.065 mm	0.0008-0.0025 in
Crankshaft Main Journal Diameter - Production	64.992-65.008 mm	2.558-2.559 in
Crankshaft Main Journal Diameter - Service	64.992 mm	2.558 in
Crankshaft Main Journal Out-of-Round - Production	0.003 mm	0.000118 in
Crankshaft Main Journal Out-of-Round - Service	0.008 mm	0.0003 in
Crankshaft Main Journal Taper - Production	0.01 mm	0.0004 in
Crankshaft Main Journal Taper - Service	0.02 mm	0.00078 in
Crankshaft Rear Flange Runout	0.05 mm	0.002 in
Crankshaft Reluctor Ring Runout - Measured 1.0 mm (0.04 in) Below Tooth Diameter	0.7 mm	0.028 in
Crankshaft Thrust Surface - Production	26.14-26.22 mm	1.029-1.0315 in
Crankshaft Thrust Surface - Service	26.22 mm	1.0315 in
Crankshaft Thrust Surface Runout	0.025 mm	0.001 in
Cylinder Head		
Cylinder Head Height/Thickness - Measured from the Cylinder Head Deck to the Valve Rocker Arm Cover Seal Surface	120.2 mm	4.732 in
Surface Flatness - Block Deck - Measured Within a 152.4 mm (6.0 in) Area	0.08 mm	0.003 in
Surface Flatness - Block Deck - Measuring the Overall Length of the Cylinder Head	0.1 mm	0.004 in
Surface Flatness - Exhaust Manifold Deck	0.13 mm	0.005 in
Surface Flatness - Intake Manifold Deck	0.08 mm	0.0031 in
Valve Guide Installed Height - Measured from the Spring Seat Surface to the Top of the Guide	17.32 mm	0.682 in
Intake Manifold		
Surface Flatness - Measured at Gasket Sealing Surfaces and Measured Within a 200 mm (7.87 in) Area that Includes 2 Runner Port Openings	0.3 mm	0.118 in
Lubrication System		
Oil Capacity - with Filter	5.68 liters	6.0 quarts
Oil Capacity - without Filter	5.2 liters	5.5 quarts

Application	Specification	
	Metric	English
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
Active Fuel Management Relief Valve Oil Pressure - as Measured at Oil Pressure Sensor Location	379-517 kPa Maximum	55-75 psig Maximum
Oil Pan		
Front Cover Alignment - at Oil Pan Surface	**0.0-0.5 mm**	**0.0-0.02 in**
Crankshaft Rear Oil Seal Housing Alignment - at Oil Pan Surface	0.0-0.5 mm	0.0-0.02 in
Oil Pan Alignment - to Rear of Engine Block at Transmission Bell Housing Mounting Surface	0.0-0.1 mm	0.0-0.004 in
Piston Rings		
Piston Ring End Gap - First Compression Ring - Measured in Cylinder Bore - Production	0.23-0.44 mm	0.009-0.017 in
Piston Ring End Gap - First Compression Ring - Measured in Cylinder Bore - Service	0.23-0.5 mm	0.009-0.0196 in
Piston Ring End Gap - Second Compression Ring - Measured in Cylinder Bore - Production	0.44-0.7 mm	0.017-0.027 in
Piston Ring End Gap - Second Compression Ring - Measured in Cylinder Bore - Service	0.44-0.76 mm	0.0173-0.03 in
Piston Ring End Gap - Oil Control Ring - Measured in Cylinder Bore - Production	0.18-0.75 mm	0.007-0.029 in
Piston Ring End Gap - Oil Control Ring - Measured in Cylinder Bore - Service	0.18-0.81 mm	0.007-0.032 in
Piston Ring-to-Groove Clearance - First Compression Ring - Production	0.04-0.085 mm	0.00157-0.00335 in
Piston Ring-to-Groove Clearance - First Compression Ring - Service	0.04-0.085 mm	0.00157-0.00335 in
Piston Ring-to-Groove Clearance - Second Compression Ring - Production	0.04-0.078 mm	0.00157-0.0031 in
Piston Ring-to-Groove Clearance - Second Compression Ring - Service	0.04-0.078 mm	0.00157-0.0031 in
Piston Ring-to-Groove Clearance - Oil Control Ring - Production	0.012-0.2 mm	0.0005-0.0078 in
Piston Ring-to-Groove Clearance - Oil Control Ring - Service	0.012-0.2 mm	0.0005-0.0078 in
Pistons and Pins		
Pin - Piston Pin Clearance-to-Piston Pin Bore - Production	0.002-0.01 mm	0.00008-0.0004 in
Pin - Piston Pin Clearance-to-Piston Pin Bore - Service	0.002-0.015 mm	0.00008-0.0006 in
Pin - Piston Pin Diameter	23.952-23.955 mm	0.943-0.943 in
Pin - Piston Pin Fit in Connecting Rod Bore - Production	0.007-0.02 mm	0.00027-0.00078 in
Pin - Piston Pin Fit in Connecting Rod Bore - Service	0.007-0.022 mm	0.00027-0.00086 in
Piston - Piston Diameter - Measured Over Skirt Coating	96.002-96.036 mm	3.779-3.78 in
Piston - Piston to Bore Clearance - Production	-0.036 to +0.016 mm	-0.0014 to +0.0006 in

Application	Specification	
	Metric	English
Piston - Piston to Bore Clearance - Service Limit with Skirt Coating Worn Off	0.071 mm	0.0028 in
Valve System		
Valves - Valve Face Angle	45 degrees	
Valves - Valve Face Width	1.25 mm	0.05 in
Valves - Valve Lash	Net Lash - No Adjustment	
Valve Lift - Exhaust - Non Active Fuel Management	12.24 mm	0.488 in
Valve Lift - Exhaust - Active Fuel Management	12.46 mm	0.491 in
Valve Lift - Intake - Non Active Fuel Management	12.24 mm	0.488 in
Valve Lift - Intake - Active Fuel Management	12.46 mm	0.491 in
Valves - Valve Seat Angle	46 degrees	
Valves - Valve Seat Runout	0.05 mm	0.002 in
Valves - Valve Seat Width - Exhaust	1.78 mm	0.07 in
Valves - Seat Width - Intake	1.02 mm	0.04 in
Valves - Valve Stem Diameter - Production	7.955-7.976 mm	0.313-0.314 in
Valves - Valve Stem Diameter - Service	7.95 mm	0.313 in
Valves - Valve Stem-to-Guide Clearance - Production - Exhaust	0.025-0.066 mm	0.001-0.0026 in
Valves - Valve Stem-to-Guide Clearance - Service - Exhaust	0.093 mm	0.0037 in
Valves - Valve Stem-to-Guide Clearance - Production - Intake	0.025-0.066 mm	0.001-0.0026 in
Valves - Valve Stem-to-Guide Clearance - Service - Intake	0.093 mm	0.0037 in
Rocker Arms - Valve Rocker Arm Ratio	1.70:1	
Valve Springs - Valve Spring Free Length	52.9 mm	2.08 in
Valve Springs - Valve Spring Installed Height	45.75 mm	1.8 in
Valve Springs - Valve Spring Load - Closed	340 N at 45.75 mm	76 lb at 1.8 in
Valve Springs - Valve Spring Load - Open	980 N at 33.55 mm	220 lb at 1.32 in

General Specifications (RPO LC9 VIN 3)

Application	Specification	
	Metric	English
General		
Engine Type	V8	
Displacement	5.3L	325 CID
RPO	LC9	
VIN	3	
Bore	96.0-96.018 mm	3.779-3.78 in
Stroke	92.0 mm	3.622 in
Compression Ratio	9.95:1	
Firing Order	1-8-7-2-6-5-4-3	
Active Fuel Management Cylinders	1-4-6-7	
Spark Plug Gap	1.02 mm	0.04 in
Block		
Camshaft Bearing Bore 1 and 5 Diameter	59.58-59.63 mm	2.345-2.347 in
Camshaft Bearing Bore 2 and 4 Diameter	59.08-59.13 mm	2.325-2.327 in
Camshaft Bearing Bore 3 Diameter	58.58-58.63 mm	2.306-2.308 in
Crankshaft Main Bearing Bore Diameter	69.871-69.889 mm	2.75-2.751 in
Crankshaft Main Bearing Bore Out-of-Round	0.006 mm	0.0002 in
Cylinder Bore Diameter	96.0-96.018 mm	3.779-3.78 in
Cylinder Head Deck Height - Measuring from the Centerline of Crankshaft to the Deck Face	234.57-234.82 mm	9.235-9.245 in
Cylinder Head Deck Surface Flatness - Measured Within a 152.4 mm (6.0 in) Area	0.11 mm	0.004 in
Cylinder Head Deck Surface Flatness - Measuring the Overall Length of the Block Deck	0.22 mm	0.008 in
Valve Lifter Bore Diameter	21.417-21.443 mm	0.843-0.844 in
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 Out-of-Round	0.025 mm	0.001 in
Camshaft Lobe Lift - Exhaust - Non Active Fuel Management Cylinders	7.2 mm	0.283 in
Camshaft Lobe Lift - Exhaust - Active Fuel Management Cylinders	7.33 mm	0.289 in
Camshaft Lobe Lift - Intake - Non Active Fuel Management Cylinders	7.2 mm	0.283 in
Camshaft Lobe Lift - Intake - Active Fuel Management Cylinders	7.33 mm	0.289 in
Camshaft Runout - Measured at the Intermediate Journals	0.05 mm	0.002 in
Connecting Rod		
Connecting Rod Bearing Clearance - Production	0.023-0.065 mm	0.0009-0.0025 in
Connecting Rod Bearing Clearance - Service	0.023-0.076 mm	0.0009-0.003 in
Connecting Rod Bore Diameter - Bearing End	56.505-56.525 mm	2.224-2.225 in
Connecting Rod Bore Out-of-Round - Bearing End - Production	0.004-0.008 mm	0.00015-0.0003 in
Connecting Rod Bore Out-of-Round - Bearing End - Service	0.004-0.008 mm	0.00015-0.0003 in
Connecting Rod Side Clearance	0.11-0.51 mm	0.00433-0.02 in

Application	Specification	
	Metric	English
Crankshaft		
Connecting Rod Journal Diameter - Production	53.318-53.338 mm	2.0991-2.0999 in
Connecting Rod Journal Diameter - Service	53.308 mm	2.0987 in
Connecting Rod Journal Out-of-Round - Production	0.005 mm	0.0002 in
Connecting Rod Journal Out-of-Round - Service	0.01 mm	0.0004 in
Connecting Rod Journal Taper - Maximum for 1/2 of Journal Length - Production	0.005 mm	0.0002 in
Connecting Rod Journal Taper - Maximum for 1/2 of Journal Length - Service	0.02 mm	0.00078 in
Crankshaft End Play	0.04-0.2 mm	0.0015-0.0078 in
Crankshaft Main Bearing Clearance - Production	0.02-0.052 mm	0.0008-0.0021 in
Crankshaft Main Bearing Clearance - Service	0.02-0.065 mm	0.0008-0.0025 in
Crankshaft Main Journal Diameter - Production	64.992-65.008 mm	2.558-2.559 in
Crankshaft Main Journal Diameter - Service	64.992 mm	2.558 in
Crankshaft Main Journal Out-of-Round - Production	0.003 mm	0.000118 in
Crankshaft Main Journal Out-of-Round - Service	0.008 mm	0.0003 in
Crankshaft Main Journal Taper - Production	0.01 mm	0.0004 in
Crankshaft Main Journal Taper - Service	0.02 mm	0.00078 in
Crankshaft Rear Flange Runout	0.05 mm	0.002 in
Crankshaft Reluctor Ring Runout - Measured 1.0 mm (0.04 in) Below Tooth Diameter	0.7 mm	0.028 in
Crankshaft Thrust Surface - Production	26.14-26.22 mm	1.029-1.0315 in
Crankshaft Thrust Surface - Service	26.22 mm	1.0315 in
Crankshaft Thrust Surface Runout	0.025 mm	0.001 in
Cylinder Head		
Cylinder Head Height/Thickness - Measured from the Cylinder Head Deck to the Valve Rocker Arm Cover Seal Surface	120.2 mm	4.732 in
Surface Flatness - Block Deck - Measured Within a 152.4 mm (6.0 in) Area	0.08 mm	0.003 in
Surface Flatness - Block Deck - Measuring the Overall Length of the Cylinder Head	0.1 mm	0.004 in
Surface Flatness - Exhaust Manifold Deck	0.13 mm	0.005 in
Surface Flatness - Intake Manifold Deck	0.08 mm	0.0031 in
Valve Guide Installed Height - Measured from the Spring Seat Surface to the Top of the Guide	17.32 mm	0.682 in
Intake Manifold		
Surface Flatness - Measured at Gasket Sealing Surfaces and Measured Within a 200 mm (7.87 in) Area that Includes 2 Runner Port Openings	0.3 mm	0.118 in
Lubrication System		
Oil Capacity - with Filter	5.68 liters	6.0 quarts
Oil Capacity - without Filter	5.20 liters	5.5 quarts

Application	Specification	
	Metric	English
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
Active Fuel Management Relief Valve Oil Pressure - as Measured at Oil Pressure Sensor Location	379-517 kPa Maximum	55-75 psig Maximum
Oil Pan		
Front Cover Alignment - at Oil Pan Surface	0.0-0.5 mm	0.0-0.02 in
Crankshaft Rear Oil Seal Housing Alignment - at Oil Pan Surface	0.0-0.5 mm	0.0-0.02 in
Oil Pan Alignment - to Rear of Engine Block at Transmission Bell Housing Mounting Surface	0.0-0.1 mm	0.0-0.004 in
Piston Rings		
Piston Ring End Gap - First Compression Ring - Measured in Cylinder Bore - Production	0.23-0.44 mm	0.009-0.017 in
Piston Ring End Gap - First Compression Ring - Measured in Cylinder Bore - Service	0.23-0.5 mm	0.009-0.0196 in
Piston Ring End Gap - Second Compression Ring - Measured in Cylinder Bore - Production	0.44-0.7 mm	0.017-0.027 in
Piston Ring End Gap - Second Compression Ring - Measured in Cylinder Bore - Service	0.44-0.76 mm	0.0173-0.03 in
Piston Ring End Gap - Oil Control Ring - Measured in Cylinder Bore - Production	0.18-0.75 mm	0.007-0.029 in
Piston Ring End Gap - Oil Control Ring - Measured in Cylinder Bore - Service	0.18-0.81 mm	0.007-0.032 in
Piston Ring-to-Groove Clearance - First Compression Ring - Production	0.04-0.085 mm	0.00157-0.00335 in
Piston Ring-to-Groove Clearance - First Compression Ring - Service	0.04-0.085 mm	0.00157-0.00335 in
Piston Ring-to-Groove Clearance - Second Compression Ring - Production	0.04-0.078 mm	0.00157-0.0031 in
Piston Ring-to-Groove Clearance - Second Compression Ring - Service	0.04-0.078 mm	0.00157-0.0031 in
Piston Ring-to-Groove Clearance - Oil Control Ring - Production	0.012-0.2 mm	0.0005-0.0078 in
Piston Ring-to-Groove Clearance - Oil Control Ring - Service	0.012-0.2 mm	0.0005-0.0078 in
Pistons and Pins		
Pin - Piston Pin Clearance-to-Piston Pin Bore - Production	0.002-0.01 mm	0.00008-0.0004 in
Pin - Piston Pin Clearance-to-Piston Pin Bore - Service	0.002-0.015 mm	0.00008-0.0006 in
Pin - Piston Pin Diameter	23.952-23.955 mm	0.943-0.943 in
Pin - Piston Pin Fit in Connecting Rod Bore - Production	0.007-0.02 mm	0.00027-0.00078 in
Pin - Piston Pin Fit in Connecting Rod Bore - Service	0.007-0.022 mm	0.00027-0.00086 in
Piston - Piston Diameter - Measured Over Skirt Coating	96.002-96.036 mm	3.779-3.78 in
Piston - Piston to Bore Clearance - Production	-0.036 to +0.016 mm	-0.0014 to +0.0006 in

Application	Specification	
	Metric	English
Piston - Piston to Bore Clearance - Service Limit with Skirt Coating Worn Off	0.071 mm	0.0028 in
Valve System		
Valves - Valve Face Angle	45 degrees	
Valves - Valve Face Width	1.25 mm	0.05 in
Valves - Valve Lash	Net Lash - No Adjustment	
Valve Lift - Exhaust - Non Active Fuel Management	12.24 mm	0.488 in
Valve Lift - Exhaust - Active Fuel Management	12.46 mm	0.491 in
Valve Lift - Intake - Non Active Fuel Management	12.24 mm	0.488 in
Valve Lift - Intake - Active Fuel Management	12.46 mm	0.491 in
Valves - Valve Seat Angle	46 degrees	
Valves - Valve Seat Runout	0.05 mm	0.002 in
Valves - Valve Seat Width - Exhaust	1.78 mm	0.07 in
Valves - Seat Width - Intake	1.02 mm	0.04 in
Valves - Valve Stem Diameter - Production	7.955-7.976 mm	0.313-0.314 in
Valves - Valve Stem Diameter - Service	7.95 mm	0.313 in
Valves - Valve Stem-to-Guide Clearance - Production - Exhaust	0.025-0.066 mm	0.001-0.0026 in
Valves - Valve Stem-to-Guide Clearance - Service - Exhaust	0.093 mm	0.0037 in
Valves - Valve Stem-to-Guide Clearance - Production - Intake	0.025-0.066 mm	0.001-0.0026 in
Valves - Valve Stem-to-Guide Clearance - Service - Intake	0.093 mm	0.0037 in
Rocker Arms - Valve Rocker Arm Ratio	1.70:1	
Valve Springs - Valve Spring Free Length	52.9 mm	2.08 in
Valve Springs - Valve Spring Installed Height	45.75 mm	1.8 in
Valve Springs - Valve Spring Load - Closed	340 N at 45.75 mm	76 lb at 1.8 in
Valve Springs - Valve Spring Load - Open	980 N at 33.55 mm	220 lb at 1.32 in

Engine Mechanical – 6.0L

General Specifications (RPO L76 VIN Y)

Application	Specification	
	Metric	English
General		
Engine Type	V8	
Displacement	6.0L	364 CID
RPO	L76	
VIN	Y	
Bore	101.618-101.636 mm	4.0007-4.0017 in
Stroke	92.0 mm	3.622 in
Compression Ratio	9.67:1	
Firing Order	1-8-7-2-6-5-4-3	
Active Fuel Management Cylinders	1-4-6-7	
Spark Plug Gap	1.02 mm	0.04 in
Block		
Camshaft Bearing Bore 1 and 5 Diameter	59.58-59.63 mm	2.345-2.347 in
Camshaft Bearing Bore 2 and 4 Diameter	59.08-59.13 mm	2.325-2.327 in
Camshaft Bearing Bore 3 Diameter	58.58-58.63 mm	2.306-2.308 in
Crankshaft Main Bearing Bore Diameter	69.871-69.889 mm	2.75-2.751 in
Crankshaft Main Bearing Bore Out-of-Round	0.006 mm	0.0002 in
Cylinder Bore Diameter	101.618-101.636 mm	4.0007-4.0017 in
Cylinder Head Deck Height - Measuring from the Centerline of Crankshaft to the Deck Face	234.57-234.82 mm	9.235-9.245 in
Cylinder Head Deck Surface Flatness - Measured Within a 152.4 mm (6.0 in) Area	0.11 mm	0.004 in
Cylinder Head Deck Surface Flatness - Measuring the Overall Length of the Block Deck	0.22 mm	0.008 in
Valve Lifter Bore Diameter	21.417-21.443 mm	0.843-0.844 in
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 Out-of-Round	0.025 mm	0.001 in
Camshaft Lobe Lift - Exhaust - Non Active Fuel Management Cylinders	7.17 mm	0.282 in
Camshaft Lobe Lift - Exhaust - Active Fuel Management Cylinders	7.3 mm	0.287 in
Camshaft Lobe Lift - Intake - Non Active Fuel Management Cylinders	7.08 mm	0.279 in
Camshaft Lobe Lift - Intake - Active Fuel Management Cylinders	7.2 mm	0.283 in
Camshaft Runout - Measured at the Intermediate Journals	0.05 mm	0.002 in
Connecting Rod		
Connecting Rod Bearing Clearance - Production	0.023-0.065 mm	0.0009-0.0025 in
Connecting Rod Bearing Clearance - Service	0.023-0.076 mm	0.0009-0.003 in
Connecting Rod Bore Diameter - Bearing End	56.505-56.525 mm	2.224-2.225 in
Connecting Rod Bore Out-of-Round - Bearing End - Production	0.004-0.008 mm	0.00015-0.0003 in
Connecting Rod Bore Out-of-Round - Bearing End - Service	0.004-0.008 mm	0.00015-0.0003 in
Connecting Rod Side Clearance	0.11-0.51 mm	0.00433-0.02 in

Application	Specification	
	Metric	English
Crankshaft		
Connecting Rod Journal Diameter - Production	53.318-53.338 mm	2.0991-2.0999 in
Connecting Rod Journal Diameter - Service	53.308 mm	2.0987 in
Connecting Rod Journal Out-of-Round - Production	0.005 mm	0.0002 in
Connecting Rod Journal Out-of-Round - Service	0.01 mm	0.0004 in
Connecting Rod Journal Taper - Maximum for 1/2 of Journal Length - Production	0.005 mm	0.0002 in
Connecting Rod Journal Taper - Maximum for 1/2 of Journal Length - Service	0.02 mm	0.00078 in
Crankshaft End Play	0.04-0.2 mm	0.0015-0.0078 in
Crankshaft Main Bearing Clearance - Production	0.02-0.052 mm	0.0008-0.0021 in
Crankshaft Main Bearing Clearance - Service	0.02-0.065 mm	0.0008-0.0025 in
Crankshaft Main Journal Diameter - Production	64.992-65.008 mm	2.558-2.559 in
Crankshaft Main Journal Diameter - Service	64.992 mm	2.558 in
Crankshaft Main Journal Out-of-Round - Production	0.003 mm	0.000118 in
Crankshaft Main Journal Out-of-Round - Service	0.008 mm	0.0003 in
Crankshaft Main Journal Taper - Production	0.01 mm	0.0004 in
Crankshaft Main Journal Taper - Service	0.02 mm	0.00078 in
Crankshaft Rear Flange Runout	0.05 mm	0.002 in
Crankshaft Reluctor Ring Runout - Measured 1.0 mm (0.04 in) Below Tooth Diameter	0.7 mm	0.028 in
Crankshaft Thrust Surface - Production	26.14-26.22 mm	1.029-1.0315 in
Crankshaft Thrust Surface - Service	26.22 mm	1.0315 in
Crankshaft Thrust Surface Runout	0.025 mm	0.001 in
Cylinder Head		
Cylinder Head Height/Thickness - Measured from the Cylinder Head Deck to the Valve Rocker Arm Cover Seal Surface	120.2 mm	4.732 in
Surface Flatness - Block Deck - Measured Within a 152.4 mm (6.0 in) Area	0.08 mm	0.003 in
Surface Flatness - Block Deck - Measuring the Overall Length of the Cylinder Head	0.1 mm	0.004 in
Surface Flatness - Exhaust Manifold Deck	0.13 mm	0.005 in
Surface Flatness - Intake Manifold Deck	0.08 mm	0.0031 in
Valve Guide Installed Height - Measured from the Spring Seat Surface to the Top of the Guide	17.32 mm	0.682 in
Intake Manifold		
Surface Flatness - Measured at Gasket Sealing Surfaces and Measured Within a 200 mm (7.87 in) Area that Includes 2 Runner Port Openings	0.3 mm	0.118 in
Lubrication System		
Oil Capacity - with Filter	5.68 liters	6.0 quarts
Oil Capacity - without Filter	5.20 liters	5.5 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

Application	Specification	
	Metric	English
Active Fuel Management Relief Valve Oil Pressure - as Measured at Oil Pressure Sensor Location	379-517 kPa Maximum	55-75 psig Maximum
Oil Pan		
Front Cover Alignment - at Oil Pan Surface	0.0-0.5 mm	0.0-0.02 in
Crankshaft Rear Oil Seal Housing Alignment - at Oil Pan Surface	0.0-0.5 mm	0.0-0.02 in
Oil Pan Alignment - to Rear of Engine Block at Transmission Bell Housing Mounting Surface	0.0-0.1 mm	0.0-0.004 in
Piston Rings		
Piston Ring End Gap - First Compression Ring - Measured in Cylinder Bore - Production	0.23-0.44 mm	0.009-0.017 in
Piston Ring End Gap - First Compression Ring - Measured in Cylinder Bore - Service	0.23-0.5 mm	0.009-0.0196 in
Piston Ring End Gap - Second Compression Ring - Measured in Cylinder Bore - Production	0.44-0.7 mm	0.017-0.027 in
Piston Ring End Gap - Second Compression Ring - Measured in Cylinder Bore - Service	0.44-0.76 mm	0.0173-0.03 in
Piston Ring End Gap - Oil Control Ring - Measured in Cylinder Bore - Production	0.18-0.75 mm	0.007-0.029 in
Piston Ring End Gap - Oil Control Ring - Measured in Cylinder Bore - Service	0.18-0.81 mm	0.007-0.032 in
Piston Ring-to-Groove Clearance - First Compression Ring - Production	0.04-0.085 mm	0.00157-0.00335 in
Piston Ring-to-Groove Clearance - First Compression Ring - Service	0.04-0.085 mm	0.00157-0.00335 in
Piston Ring-to-Groove Clearance - Second Compression Ring - Production	0.04-0.078 mm	0.00157-0.0031 in
Piston Ring-to-Groove Clearance - Second Compression Ring - Service	0.04-0.078 mm	0.00157-0.0031 in
Piston Ring-to-Groove Clearance - Oil Control Ring - Production	0.012-0.2 mm	0.0005-0.0078 in
Piston Ring-to-Groove Clearance - Oil Control Ring - Service	0.012-0.2 mm	0.0005-0.0078 in
Pistons and Pins		
Pin - Piston Pin Clearance- to-Piston Pin Bore - Production	0.002-0.01 mm	0.00008-0.0004 in
Pin - Piston Pin Clearance-to-Piston Pin Bore - Service	0.002-0.015 mm	0.00008-0.0006 in
Pin - Piston Pin Diameter	23.952-23.955 mm	0.943-0.943 in
Pin - Piston Pin Fit in Connecting Rod Bore - Production	0.007-0.02 mm	0.00027-0.00078 in
Pin - Piston Pin Fit in Connecting Rod Bore - Service	0.007-0.022 mm	0.00027-0.00086 in
Piston - Piston Diameter - Measured Over Coating	96.002-96.036 mm	3.779-3.78 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	0.071 mm	0.0028 in
Valve System		
Valves - Valve Face Angle	45 degrees	
Valves - Valve Face Width	1.25 mm	0.05 in
Valves - Valve Lash	Net Lash - No Adjustment	
Valve Lift - Exhaust - Non Active Fuel Management	12.19 mm	0.480 in
Valve Lift - Exhaust - Active Fuel Management	12.41 mm	0.489 in

Application	Specification	
	Metric	English
Valve Lift - Intake - Non Active Fuel Management	12.04 mm	0.474 in
Valve Lift - Intake - Active Fuel Management	12.24 mm	0.488 in
Valves - Valve Seat Angle	46 degrees	
Valves - Valve Seat Runout	0.05 mm	0.002 in
Valves - Valve Seat Width - Exhaust	1.78 mm	0.07 in
Valves - Valve Seat Width - Intake	1.02 mm	0.04 in
Valves - Valve Stem Diameter - Production	7.955-7.976 mm	0.313-0.314 in
Valves - Valve Stem Diameter - Service	7.95 mm	0.313 in
Valves - Valve Stem-to-Guide Clearance - Production - Exhaust	0.025-0.066 mm	0.001-0.0026 in
Valves - Valve Stem-to-Guide Clearance - Service - Exhaust	0.093 mm	0.0037 in
Valves - Valve Stem-to-Guide Clearance - Production - Intake	0.025-0.066 mm	0.001-0.0026 in
Valves - Valve Stem-to-Guide Clearance - Service - Intake	0.093 mm	0.0037 in
Rocker Arms - Valve Rocker Arm Ratio	1.70:1	
Valve Springs - Valve Spring Free Length	52.9 mm	2.08 in
Valve Springs - Valve Spring Installed Height	45.75 mm	1.8 in
Valve Springs - Valve Spring Load - Closed	340 N at 45.75 mm	76 lb at 1.8 in
Valve Springs - Valve Spring Load - Open	980 N at 33.55 mm	220 lb at 1.32 in

Engine Cooling

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Air Cleaner Outlet Duct Clamp	4 N·m	35 lb in
Coolant Air Bleed Pipe Bolt	12 N·m	106 lb in
Coolant Heater Cord Bolt	8 N·m	71 lb in
Coolant Heater	50 N·m	37 lb ft
Cooling Fan Bolt	10 N·m	89 lb in
Engine Block Coolant Drain Plug	60 N·m	44 lb ft
Fan Shroud Bolt	9 N·m	80 lb in
Front Drive Axle Bolt/Nut	100 N·m	75 lb ft
Oil Cooler Hose Adapter Bolt	12 N·m	106 lb in
Oil Cooler Hose Bracket Bolt	25 N·m	18 lb ft
Oil Pan Skid Plate Bolt	20 N·m	15 lb ft
Radiator Bolt	25 N·m	18 lb ft
Surge Tank Bolt/Nut	10 N·m	89 lb in
Water Pump Bolt		
First Pass	15 N·m	11 lb ft
Final Pass	30 N·m	22 lb ft
Water Pump Inlet Bolt	15 N·m	11 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
Battery Cable Channel Nut	3 N·m	27 lb in
Battery Hold Down Retainer Bolt	25 N·m	18 lb ft
Battery Tray to Battery Tray Bracket Nut	9 N·m	80 lb in
Battery Tray to Front Fender Inner Panel Nut	9 N·m	80 lb in
Battery Tray Front Support Bolt	9 N·m	80 lb in
Engine Ground Strap to Front Plenum Panel Nut	9 N·m	80 lb in
Engine Ground Strap to Left Cylinder Head Bolt	16 N·m	12 lb ft
Engine Wiring Harness Clip to Generator Bracket Bolt	9 N·m	80 lb in
Engine Wiring Harness Lead Nut	3.4 N·m	30 lb in
Forward Lamp Wiring Harness Ground Bolt	25 N·m	18 lb ft
Front Fender Rear Upper Brace Bolt	9 N·m	80 lb in
Generator Battery Jumper Cable to Generator Nut	9 N·m	80 lb in
Generator Battery Jumper Cable to Mega Fuse Nut	9 N·m	80 lb in
Generator Bolt	55 N·m	41 lb ft
Generator Bracket Bolt	50 N·m	37 lb ft
Negative Battery Cable Nut	17 N·m	13 lb ft
Negative Battery Cable Stud	25 N·m	18 lb ft
Oil Pan Skid Plate Bolt	28 N·m	21 lb ft
Starter Bolt	50 N·m	37 lb ft
Starter Solenoid Cable to Battery Nut	17 N·m	13 lb ft
Starter Solenoid Cable to Starter Nut	9 N·m	80 lb in
Transmission Cover Bolt	9 N·m	80 lb in

Battery Usage

GM Part Number	19001810
Cold Cranking Amperage (CCA)	600 A
Reserve Capacity Rating	115 Minutes
Replacement Battery Number	78-6YR

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

Generator Usage

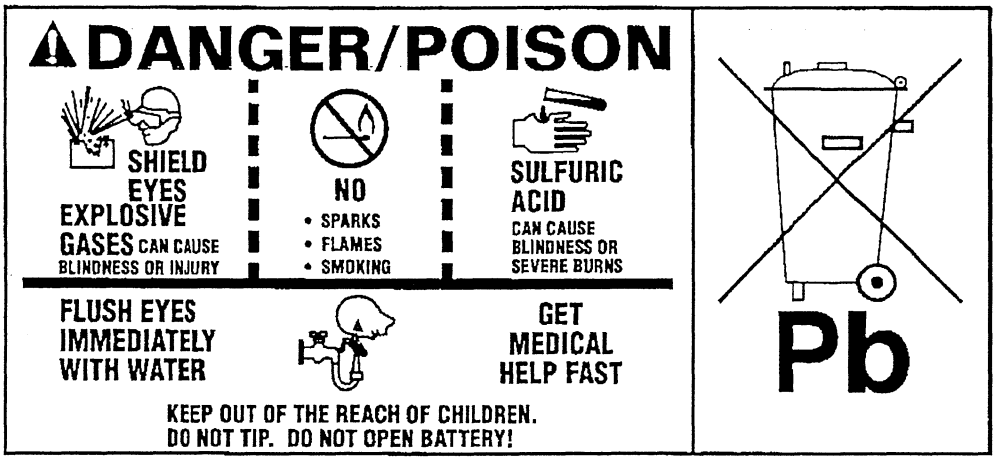
Generator Model	DR44M Remy
Rated Output	160 A
Load Test Output	112 A

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.



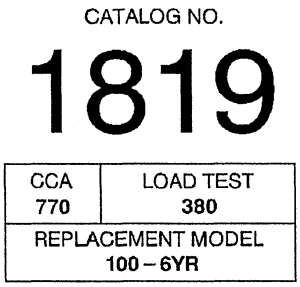
The maintenance free battery is standard. There are no vent plugs in the cover. The battery is completely sealed except for two small vent holes in the side. These vent holes allow the small amount of gas that is produced in the battery to escape.

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

Fuel System Description

Fuel System Overview

The Fuel System is a returnless on-demand design. The fuel pressure regulator is a part of the fuel sender assembly, eliminating the need for a return pipe from the engine. A returnless fuel system reduces the internal temperature of the fuel tank by not returning hot fuel from the engine to the fuel tank. Reducing the internal temperature of the fuel tank results in lower evaporative emissions.

An electric turbine style fuel pump attaches to the fuel sender assembly inside the fuel tank. The fuel pump supplies high pressure fuel through the fuel filter and the fuel feed pipe to the fuel injection system. The fuel pump provides fuel at a higher rate of flow than is needed by the fuel injection system. The fuel pump also supplies fuel to a venturi pump located on the bottom of the fuel sender assembly. The function of the venturi pump is to fill the fuel sender assembly reservoir. The fuel pressure regulator, a part of the fuel sender assembly, maintains the correct fuel pressure to the fuel injection system. The fuel pump and sender assembly contains a reverse flow check valve. The check valve and the fuel pressure regulator maintain fuel pressure in the fuel feed pipe and the fuel rail in order to prevent long cranking times.

E85 Flex Fuel Description

E85 compatible vehicles no longer use an alcohol sensor to determine and adjust for the alcohol content of the fuel in the tank. Instead, the vehicle calculates the alcohol content of the fuel through measured adjustments.

The ethanol calculation occurs with the engine running after a refueling event has been detected via a measured change in the fuel level sender output. The virtual flex fuel sensor (V-FFS) algorithm temporarily closes the canister purge valve for a few seconds and monitors information from the closed loop fuel trim system to calculate the ethanol content. This logic executes several times until the ethanol calculation is deemed to be stable. This may take several minutes under low fuel flow conditions such as idle, or a shorter time during higher fuel flow, off-idle conditions.

Air-fuel ratios and the corresponding ethanol percentage are updated following each purge-off sequence. the fuel alcohol content percentage value can be read on a scan tool.

When an E85 compatible vehicle is built, an ECM or PCM replaced, or if the learned alcohol content has been reset with a scan tool the fuel system will need to contain ASTM gasoline with 10 percent or less ethanol content.

A minimum of 7.5 Liters (2 gallons) must be put in the tank in order for the vehicle to recognize a re-fueling event. It is not necessary to turn the ignition off in order to have the re-fueling event recognized; however local safety regulations should be followed.

After the re-fueling event, the system registers the amount of fuel that was added, relative to the amount that was in the tank. Reading fuel trim and O2 sensor activity, the system determines if the fuel added was either ASTM Gasoline or ASTM E85. Based on that determination, the system adjusts to the expected alcohol mix in the fuel tank, and then the fuel trim and O2 sensor activity fine tunes the adjustments. The system must remain in closed loop in order for this adjustment to occur. Numerous short trips after switching from gasoline to E85, or E85 to gasoline, can result in driveability symptoms due to the inability of the system to adjust for fuel composition by not attaining closed loop operation.

Switching Between Gasoline and E85

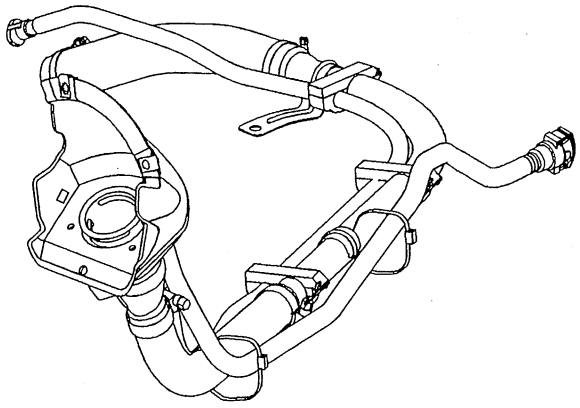
No special precautions need to be taken when switching back and forth between gasoline and E85 other than re-fueling events must be 7.5 Liters (2 gallons) or greater, and the vehicle must remain in closed loop long enough, usually by the time the engine has maintained full operating temperature, to calculate the composition of the new blend in the tank.

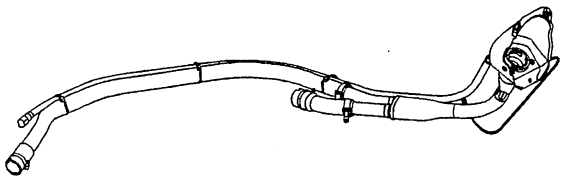
Fuel Tanks

The fuel tanks store the fuel supply. The front fuel tank is located on the left side of the vehicle. On dual-tank applications, the secondary fuel tank is located in the rear of the vehicle above the spare tire. The fuel tanks are each held in place by 2 metal straps that attach to the frame. The fuel tanks are molded from high density polyethylene.

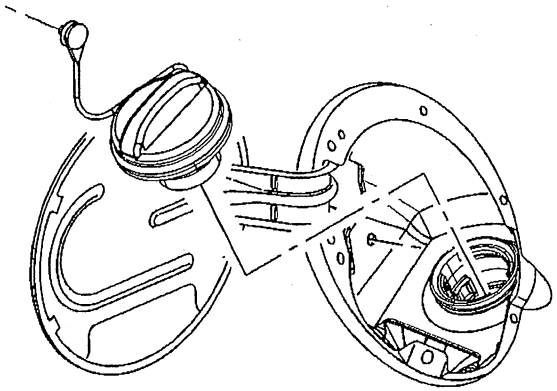
Fuel Fill Pipe

The fuel fill pipe has a built-in restrictor in order to prevent refueling with leaded fuel. When refueling dual tank applications, fuel is dispensed to both the front and rear fuel tanks at the same time. Once the fill vent is obstructed, fuel backs up the fill pipe and trips the dispensing nozzle. The front fuel tank vent runs into the rear tank to the top of the filler pipe assembly, which in turn vents to atmosphere. The fuel tank vent valves are connected and route to the canister to collect hydrocarbon emissions during operation of the vehicle.



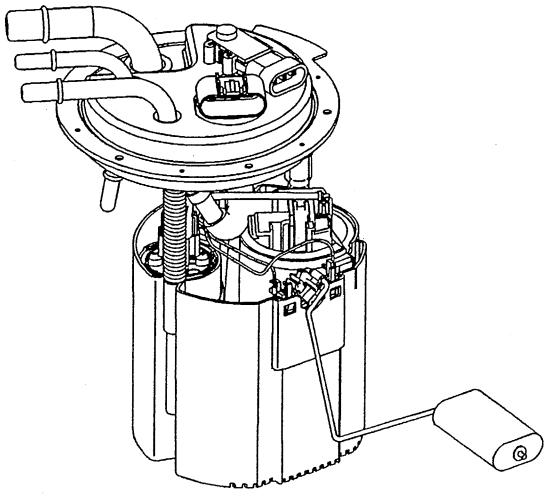


Fuel Filler Cap



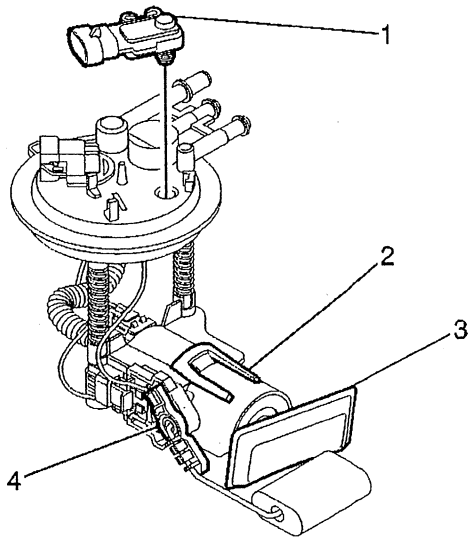
The fuel fill pipe has a tethered fuel filler cap. A torque-limiting device prevents the cap from being over tightened. To install the cap, turn the cap clockwise until you hear clicks. This indicates that the cap is correctly torqued and fully seated. A built-in device indicates that the fuel filler cap is fully seated. A fuel filler cap that is not fully seated may cause a malfunction in the emission system.

Fuel Sender Assembly



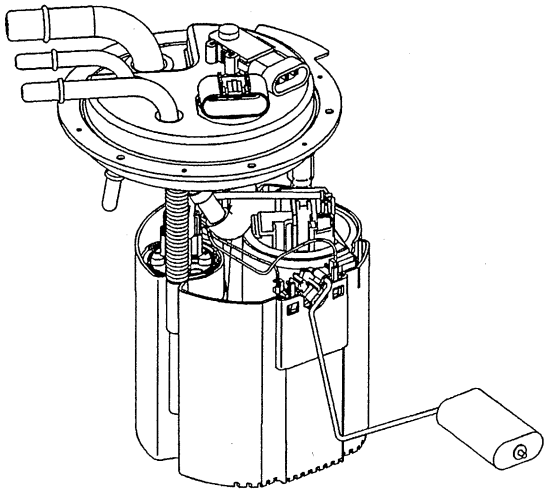
The front fuel sender on dual tank applications consists of the following major components:

- The fuel level sensor
- The fuel tank fuel pump module
- The fuel strainer
- The fuel filter



The rear fuel sender on dual tank applications consists of the following major components:

- The fuel level sensor (4)
- The FTP sensor (1)
- The rear fuel pump (2)



The fuel sender assembly on single tank applications consists of the following major components:

- The fuel level sensor
- The fuel tank pressure (FTP) sensor
- The fuel tank fuel pump module
- The fuel strainer
- The fuel filter

Fuel Level Sensor

The fuel level sensor consists of a float, a wire float arm, and a ceramic resistor cord. The position of the float arm indicates the fuel level. The fuel level sensor contains a variable resistor, which changes resistance in correspondence to the amount of fuel in the fuel tank. The engine control module (ECM) sends the fuel level information via the class 2 circuit to the instrument panel (I/P) cluster. This information is used for the I/P fuel gage and the low fuel warning indicator, if applicable. The ECM also monitors the fuel level input for various diagnostics.

Fuel Pump

The fuel pump is mounted in the fuel sender assembly reservoir. The fuel pump is an electric high pressure pump. Fuel is pumped to the fuel rail at a specified flow and pressure. The fuel pump delivers a constant flow of fuel to the engine during low fuel conditions and aggressive vehicle maneuvers. The engine control module (ECM) controls the electric fuel pump operation through a fuel pump relay. The fuel pump flex pipe acts to dampen the fuel pulses and noise generated by the fuel pump.

Rear Fuel Pump (Dual Tank Applications Only)

On dual tank applications, the rear fuel pump is located in the rear fuel tank. The rear fuel pump is powered by a secondary fuel pump relay when the fuel level drops below a predetermined value. Fuel is transferred from the rear fuel tank to the front fuel tank in order to ensure all of the usable fuel volume is available to the front fuel pump. The secondary fuel pump relay supply voltage is received from the primary fuel pump relay when the front fuel pump is energized.

Fuel Strainer

The fuel strainer attaches to the lower end of the fuel sender. The fuel strainer is made of woven plastic. The functions of the fuel strainer are to filter contaminants and to wick fuel. Fuel stoppage at this point indicates that the fuel tank contains an abnormal amount of sediment.

Fuel Filter

The fuel filter is contained in the fuel sender assembly inside the fuel tank. the paper filter element of the fuel filter traps particles in the fuel that may damage the fuel injection system. The fuel filter housing is made to withstand maximum fuel system pressure, exposure to fuel additives, and changes in temperature. There is no service interval for fuel filter replacement.

Nylon Fuel Pipes

Nylon pipes are constructed to withstand maximum fuel system pressure, exposure to fuel additives, and changes in temperature. There are 3 sizes of nylon pipes used: 9.5 mm (3/8 in) ID for the fuel supply, 7.6 mm (5/16 in) ID for the fuel return, and 12.7 mm (1/2 in) ID for the vent. Heat resistant rubber hose or corrugated plastic conduit protects the sections of the pipes that are exposed to chafing, to high temperatures, or to vibration.

Nylon fuel pipes are somewhat flexible and can be formed around gradual turns under the vehicle. However, if nylon fuel pipes are forced into sharp bends, the pipes kink and restrict the fuel flow. Also, once exposed to fuel, nylon pipes may become stiffer and are more likely to kink if bent too far. Take special care when working on a vehicle with nylon fuel pipes.

Quick-Connect Fittings

Quick-connect fittings provide a simplified means of installing and connecting fuel system components. The fittings consist of a unique female connector and a compatible male pipe end. O-rings, located inside the female connector, provide the fuel seal. Integral locking tabs inside the female connector hold the fittings together.

On-Board Refueling Vapor Recovery System (ORVR)

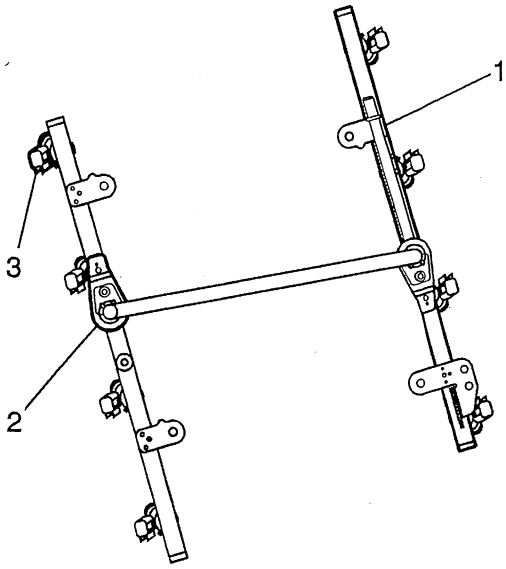
The On-Board Refueling Vapor Recovery System (ORVR) is an on-board vehicle system designed to recover fuel vapors during the vehicle refueling operation. The flow of liquid fuel down the fuel filler pipe

provides a liquid seal which prevents vapor from leaving the fuel filler pipe. An evaporative emission (EVAP) pipe transports the fuel vapor to the EVAP canister for use by the engine.

Fuel Pipe O-Rings

O-rings seal the threaded connections in the fuel system. Fuel system O-ring seals are made of special material. Service the O-ring seals with the correct service part.

Fuel Rail Assembly



The fuel rail assembly attaches to the engine intake manifold. The fuel rail assembly performs the following functions:

- Positions the injectors (3) in the intake manifold
- Distributes fuel evenly to the injectors (2)
- Fuel rail feed pipe (1)

Fuel Injectors

The fuel injector assembly is a solenoid device controlled by the engine control module (ECM) that meters pressurized fuel to a single engine cylinder. The ECM energizes the injector solenoid to open a normally closed ball valve. This allows the fuel to flow into the top of the injector, past the ball valve, and through a director plate at the injector outlet. The director plate has machined holes that control the fuel flow, generating a spray of finely atomized fuel at the injector tip. Fuel from the injector tip is directed at the intake valve, causing the fuel to become further atomized and vaporized before entering the combustion chamber. This fine atomization improves fuel economy and emissions.

Fuel Pressure Regulator

The fuel pressure regulator is contained in the fuel sender assembly.

Fuel Metering Modes of Operation

The engine control module (ECM) monitors voltages from several sensors in order to determine how much fuel to give the engine. The ECM controls the amount of fuel delivered to the engine by changing the fuel injector pulse width. The fuel is delivered under one of several modes.

Starting Mode

When the ignition is first turned ON, the ECM energizes the fuel pump relay for 2 seconds. This allows the fuel pump to build pressure in the fuel system. The ECM calculates the air/fuel ratio based on inputs from

the engine coolant temperature (ECT), mass air flow (MAF), manifold absolute pressure (MAP), and throttle position (TP) sensors. The system stays in starting mode until the engine speed reaches a predetermined RPM.

Clear Flood Mode

If the engine floods, clear the engine by pressing the accelerator pedal down to the floor and then crank the engine. When the TP sensor is at wide open throttle (WOT), the ECM reduces the fuel injector pulse width in order to increase the air to fuel ratio. The ECM holds this injector rate as long as the throttle stays wide open and the engine speed is below a predetermined RPM. If the throttle is not held wide open, the ECM returns to the starting mode.

Run Mode

The run mode has 2 conditions called Open Loop and Closed Loop. When the engine is first started and the engine speed is above a predetermined RPM, the system begins Open Loop operation. The ECM ignores the signal from the heated oxygen sensors (HO2S). The ECM calculates the air/fuel ratio based on inputs from the ECT, MAF, MAP, and TP sensors. The system stays in Open Loop until meeting the following conditions:

- Both front HO2S have varying voltage output, showing that both HO2S are hot enough to operate properly.
- The ECT sensor is above a specified temperature.
- A specific amount of time has elapsed after starting the engine.

Specific values for the above conditions exist for each different engine, and are stored in the electrically erasable programmable read-only memory (EEPROM). The system begins Closed Loop operation after reaching these values. In Closed Loop, the ECM calculates the air/fuel ratio, injector ON time, based upon the signal from various sensors, but mainly from the HO2S. This allows the air/fuel ratio to stay very close to 14.7:1.

Acceleration Mode

When the driver pushes on the accelerator pedal, air flow into the cylinders increases rapidly. To prevent possible hesitation, the ECM increases the pulse width to the injectors to provide extra fuel during acceleration. This is also known as power enrichment. The ECM determines the amount of fuel required based upon the TP, the ECT, the MAP, the MAF, and the engine speed.

Deceleration Mode

When the driver releases the accelerator pedal, air flow into the engine is reduced. The ECM monitors the corresponding changes in the TP, the MAP, and the MAF. The ECM shuts OFF fuel completely if the deceleration is very rapid, or for long periods, such as long, closed-throttle coast-down. The fuel shuts OFF in order to prevent damage to the catalytic converters.

Battery Voltage Correction Mode

When the battery voltage is low, the ECM compensates for the weak spark delivered by the ignition system in the following ways:

- Increasing the amount of fuel delivered
- Increasing the idle RPM
- Increasing the ignition dwell time

Fuel Cutoff Mode

The ECM cuts OFF fuel from the fuel injectors when the following conditions are met in order to protect the powertrain from damage and improve driveability:

- The ignition is OFF. This prevents engine run-on.
- The ignition is ON but there is no ignition reference signal. This prevents flooding or backfiring.

- The engine speed is too high, above red line.
- The vehicle speed is too high, above rated tire speed.
- During an extended, high speed, closed throttle coast down--This reduces emissions and increases engine braking.
- During extended deceleration, in order to prevent damage to the catalytic converters

Fuel Trim

The engine control module (ECM) controls the air/fuel metering system in order to provide the best possible combination of driveability, fuel economy, and emission control. The ECM monitors the heated oxygen sensor (HO2S) signal voltage while in Closed Loop and regulates the fuel delivery by adjusting the pulse width of the fuel injectors based on this signal. The ideal fuel trim values are around 0 percent for both short term and long term fuel trim. A positive fuel trim value indicates the ECM is adding fuel in order to compensate for a lean condition by increasing the pulse width. A negative fuel trim value indicates that the ECM is reducing the amount of fuel in order to compensate for a rich condition by decreasing the pulse width. A change made to the fuel delivery changes the short term and long term fuel trim values. The short term fuel trim values change rapidly in response to the HO2S signal voltage. These changes fine tune the engine fueling. The long term fuel trim makes coarse adjustments to the fueling in order to re-center and restore control to short term fuel trim. A scan tool can be used to monitor the short term and long term fuel trim values. The long term fuel trim diagnostic is based on an average of several of the long term speed load learn cells. The ECM selects the cells based on the engine speed and engine load. If the ECM detects an excessive lean or rich condition, the ECM will set a fuel trim diagnostic trouble code (DTC).

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.

Fuel E85 (85% Ethanol)

The 8th digit of the Vehicle Identification Number (VIN) shows the code letter or number that identifies your vehicle's engine. The VIN is at the top left of the instrument panel. See Vehicle Identification Number (VIN) .

If your vehicle has the 5.3L V8 engine (Code 0) or the 5.3L V8 engine (Code 3), you can use either regular unleaded gasoline or ethanol fuel containing up to 85% ethanol (E85); also see Fuel . In all other engines, use only the unleaded gasoline described under Gasoline Octane .

Only vehicles that have the 5.3L V8 engine (Code 0) or the 5.3L V8 engine (Code 3) can use 85% ethanol fuel (E85). We encourage the use of E85 in vehicles that are designed to use it. The ethanol in E85 is a "renewable" fuel, meaning it is made from renewable sources such as corn and other crops.

Many service stations will not have an 85% ethanol fuel (E85) pump available. The U. S. Department of Energy has an alternative fuels website (www.eere.energy.gov/afdc/infrastructure/locator.html) that can help you find E85 fuel. Those stations that do have E85 should have a label indicating ethanol content. Do not use the fuel if the ethanol content is greater than 85%.

At a minimum, E85 should meet ASTM Specification D 5798. By definition, this means that fuel labeled E85 will have an ethanol content between 70% and 85%. Filling the fuel tank with fuel mixtures that do not meet ASTM specifications can affect driveability and could cause the malfunction indicator lamp to come on.

To ensure quick starts in the wintertime, the E85 fuel must be formulated properly for your climate according to ASTM specification D 5798. If you have trouble starting on E85, it could be because the E85 fuel is not properly formulated for your climate. If this happens, switching to gasoline or adding gasoline to the fuel tank can improve starting. For good starting and heater efficiency below 32°F (0°C), the fuel mix in the fuel tank should contain no more than 70% ethanol. It is best not to alternate repeatedly between gasoline and E85. If you do switch fuels, it is recommended that you add as much fuel as possible -- do not add less than three gallons (11 L) when refueling. You should drive the vehicle immediately after refueling for at least seven miles (11 km) to allow the vehicle to adapt to the change in ethanol concentration.

E85 has less energy per gallon than gasoline, so you will need to refill the fuel tank more often when using E85 than when you are using gasoline.

Notice: Some additives are not compatible with E85 fuel and can harm your vehicle's fuel system. Damage caused by additives would not be covered by your new vehicle warranty.

Engine Controls – LY5, LMG, LC9 and L76

Ignition System Specifications

Application	Specification	
	Metric	English
Firing Order	1-8-7-2-6-5-4-3	
Spark Plug Wire Resistance	397-1,337 ohms per ft	
Spark Plug Torque	15 N·m	11 lb ft
Spark Plug Gap	1.52 mm	0.060 in
Spark Plug Type	GM P/N 12571164 AC Spark Plug P/N 41-985	

Fastener Tightening Specifications

Application	Specifications	
	Metric	English
Accelerator Pedal Bolt	9 N·m	80 lb in
Air Cleaner Housing Screw	3 N·m	27 lb in
Air Cleaner Outlet Duct Clamp	4 N·m	35 lb in
Camshaft Position (CMP) Sensor Wire Harness Bolt	12 N·m	106 lb in
Chassis Wiring Harness Ground Bolt	18 N·m	13 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 Wiring Harness Clip to Generator Bolt	9 N·m	80 lb in
Engine Wiring Harness Bracket Nut	5 N·m	44 lb in
Evaporative Emission (EVAP) Canister Bolt	25 N·m	18 lb ft
Evaporative Emission (EVAP) Canister Bracket Bolt	25 N·m	18 lb ft
Evaporative Emission (EVAP) Canister Bracket Nut	25 N·m	18 lb ft
Fuel Fill Pipe Bracket Bolt	12 N·m	106 lb in
Fuel Line Bracket Bolt	12 N·m	106 lb in
Fuel Line Bracket Nut	18 N·m	13 lb ft
Fuel Pipe Bracket to Bellhousing Stud Nut	20 N·m	15 lb ft
Fuel Rail Bolt	10 N·m	89 lb in
Fuel Rail Crossover Pipe Retainer Screw	3.8 N·m	34 lb in
Fuel Tank Filler Housing to Body Screw	2.3 N·m	20 lb in
Fuel Tank Filler Housing to Fuel Tank Fill Pipe Screw	2.3 N·m	20 lb in
Fuel Tank Fill Hose Clamp	2.5 N·m	22 lb in
Fuel Tank Strap Bolt	40 N·m	30 lb ft
Heated Oxygen Sensor (HO2S)	42 N·m	31 lb ft
Ignition Coil Bolt	10 N·m	89 lb in
Knock Sensor (KS) Bolt	25 N·m	18 lb ft
Mass Air Flow (MAF)/Intake Air Temperature (IAT) Sensor Adapter Clamp	4 N·m	35 lb in
Negative Battery Cable Stud	25 N·m	18 lb ft
Spare Tire Hoist Crossmember Bolt	50 N·m	37 lb ft
Spark Plug	15 N·m	11 lb ft
Throttle Body Bolt/Nut	10 N·m	89 lb in

Exhaust System

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Catalytic Converter to Exhaust Manifold Nut	50 N·m	37 lb ft
Engine Shield Bolt	20 N·m	15 lb ft
Exhaust Heat Shield Nut	9 N·m	80 lb in
Exhaust Manifold Bolt		
First Pass in Sequence	15 N·m	11 lb ft
Final Pass in Sequence	20 N·m	15 lb ft
Exhaust Muffler to Right Catalytic Converter Nut	45 N·m	33 lb ft
Exhaust Pipe Clamp at Left Catalytic Converter	44 N·m	32 lb ft
Exhaust Pipe Hanger Bracket Bolt	25 N·m	18 lb ft
Heated Oxygen Sensor (HO2S)	42 N·m	31 lb ft
Muffler to Catalytic Converter Nut	45 N·m	33 lb ft
Stabilizer Shaft Link to Frame Bolt/Nut	65 N·m	48 lb ft
Oil Pan Skid Plate Bolt	28 N·m	21 lb ft
Rear Axle Tie Rod Bolt/Nut (Left Side)	105 N·m	77 lb ft
Rear Shock Absorber Lower Bolt/Nut	95 N·m	70 lb ft

Exhaust System Description

Important

Use of non-OEM parts may cause driveability concerns.

The exhaust system carries exhaust gases, treated by the catalytic converter, through the muffler and into a resonator, if applicable where exhaust noise is lessened.

In order to secure the exhaust muffler assembly to the exhaust manifold, a flange and seal-joint coupling is utilized. The exhaust system may utilize a slip-joint coupling design with a clamp and a U-bolt or a flange connection with a gasket.

Exhaust hangers and rubber insulators help to support the weight of the exhaust system along with insulating any exhaust system vibration, rattle, or noise.

Exhaust hangers also space the exhaust system away from the underbody of the vehicle and allows the exhaust system to expand as the exhaust system warms up.

Exhaust heat shields are used to protect the underbody and other components from damage due to the heat from the exhaust system.

The exhaust system may be comprised of the following components:

- Catalytic converter
- Exhaust hanger
- Exhaust heat shield
- Exhaust insulator
- Exhaust manifold
- Exhaust muffler
- Exhaust pipe
- Exhaust resonator, if equipped
- Exhaust tail pipe, if equipped

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.

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.

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, 4L65E, 4L70E

Transmission General Specifications

Name	Hydra-matic 4L60-E
RPO Codes	M30, M70
Production Location	Toledo, Ohio
Vehicle Platform (Engine/Transmission) Usage	C/K GMT 900
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® VI
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 lbs)

Fastener Tightening Specifications

Description of Usage	Specification	
	Metric	English
Accumulator Cover to Case	8-14 N·m	71-124 lb in
Accumulator Cover to Case	8-14 N·m	71-124 lb in
Accumulator Cover to Case	8-14 N·m	71-124 lb in
Accumulator Cover to Case	8-14 N·m	71-124 lb in
Converter Cover Bolt	10 N·m	89 lb in
Converter Housing to Case	65-75 N·m	48-55 lb ft
Cooler Pipe Connector	35-41 N·m	26-30 lb ft
Extension Housing to Case	42-48 N·m	31-35 lb ft
Extension Housing to Case (4WD Shipping)	11-23 N·m	8-17 lb in
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	8-14 N·m	71-124 lb in
Heat Shield to Transmission Bolt	17 N·m	13 lb ft
Input Speed Sensor Hole Plug to Pump Cover	9-11 N·m	80-97 lb in
Input Speed Sensor to Pump Cover	9-11 N·m	80-97 lb in
Line Pressure Test Hole Plug	7-14 N·m	62-124 lb in

Description of Usage	Specification	
	Metric	English
Manual Shaft Detent Spring to Valve Body	20-27 N·m	15-20 lb ft
Manual Shaft to Detent Lever Nut	27-34 N·m	20-25 lb ft
Negative Battery Cable Bolt	15 N·m	11 lb ft
Oil Cooler Pipe Fitting	20 +/- 2 N·m	15 lb ft
Oil Level Indicator Bolt	47 N·m	35 lb ft
Oil Pan to Case	9.5-13.6 N·m	84-120 lb in
Oil Pan to Transmission Case Bolt	11 N·m	97 lb in
Oil Passage Cover (Spacer Plate Support) to Case	8-14 N·m	71-124 lb in
Oil Passage Cover (Spacer Plate Support) to Case	8-14 N·m	71-124 lb in
Park Lock Bracket to Case	27-34 N·m	20-25 lb ft
Park/Neutral Position Switch Screw	3 N·m	27 lb in
Plate to Case (Shipping)	27-34 N·m	20-25 lb ft
Plate to Converter (Shipping)	27-34 N·m	20-25 lb ft
Plate to Converter (Shipping)	27-34 N·m	20-25 lb ft
Plug Assembly, Automatic Transmission Oil Pan (C/K)	30-40 N·m	22.1-29.5 lb ft
Pressure Control Solenoid Bracket to Valve Body Bolt	8-14 N·m	71-124 lb in
Pump Assembly to Case	26-32 N·m	19-24 lb ft
Pump Cover to Pump Body	20-27 N·m	15-20 lb ft
Secondary Fluid Pump Assembly to Valve Body	11-14 N·m	97-124 lb in
Secondary Fluid Pump Assembly to Valve Body	11-14 N·m	97-124 lb in
Shift Cable Grommet Screw	1.7 N·m	15 lb in
Shift Control Cable Attachment	20 N·m	15 lb ft
Speed Sensor to Case	10.5-13.5 N·m	92.9-119.4 lb in
TCC Solenoid Assembly to Case	8-14 N·m	71-124 lb in
Transmission Fluid Pressure (TFP) Manual Valve Position Switch to Body	8-14 N·m	71-124 lb in
Transmission Mount to Transmission Bolt	50 N·m	37 lb ft
Transmission Mount Retaining Nut	40 N·m	30 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	8-14 N·m	71-124 lb in
Valve Body to Case	8-14 N·m	71-124 lb in
Valve Body to Case	8-14 N·m	71-124 lb in
Valve Body to Case	8-14 N·m	71-124 lb in
Valve Body to Case	8-14 N·m	71-124 lb in
Valve body to Case	8-14 N·m	71-124 lb in
Valve Body to Case	8-14 N·m	71-124 lb in

Fluid Capacity Specifications

Application	Specification	
	Metric	English
Bottom Pan Removal	4.7 liters	5 quarts
Complete Overhaul	10.6 liters	11 quarts
300 mm Torque Converter Approximate Fluid Capacity Dry Fill	11.50 liters	12.1 quarts

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.

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

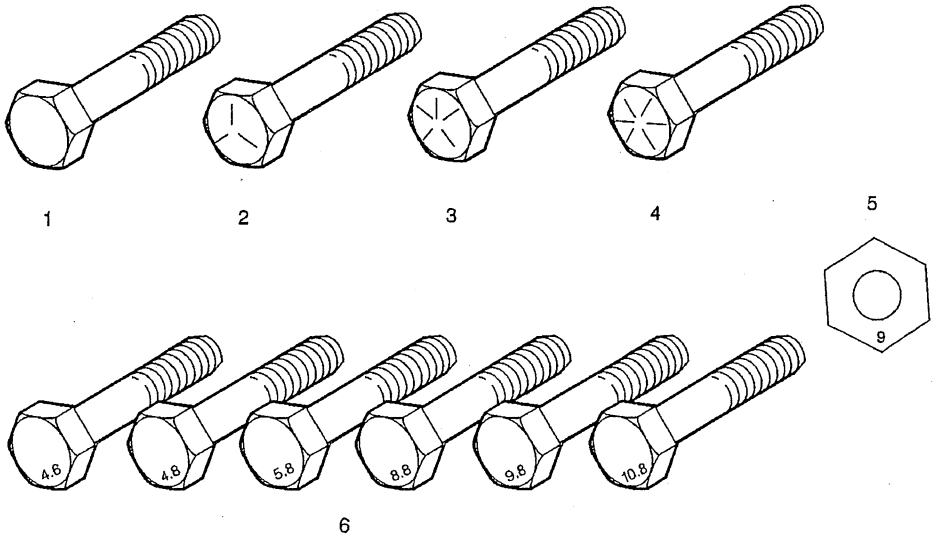
Metric Fasteners

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

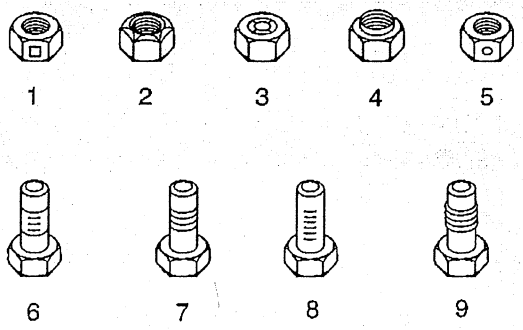
These fasteners accomplish the thread interface by a designed distortion or deformation in the fastener.

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

S = Standard Equipment A = Available -- (dashes) = Not Available D = ADI Available
■ = Included in Equipment Group □ = Included in Equipment Group but upgradeable

*Indicates availability of feature on multiple models. For example, it indicates feature availability on 2WD and 4WD Models or Rear wheel drive and All-wheel drive Models.

Codes listed in the shaded column titled Ref. Only RPO Code are for internal use only and should not be ordered.

Free Flow RPO Code	Ref. Only RPO Code	Description 1 - Equipment Group 1LS, 1LT, 2LT, 3LT, and 1LZ available on C*10936 Models.	LS	LT			LTZ
			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
		Air bags, dual-stage frontal, driver and right-front passenger with Passenger Sensing System (right-front passenger air bag status on inside rearview mirror) **1 - Always use safety belts and proper child restraints, even with air bags. Children are safer when properly secured in a rear seat. See the Owner's Manual for more safety information.**	S[1]	S[1]	S[1]	S[1]	S[1]
	CJ3	**Air conditioning**, dual-zone manual climate control with individual climate settings for driver and right-front passenger. Includes rear air conditioning outlets in center console when bucket seats are ordered **1 - Not available with (CF5) power sunroof.**	S	S[1]	--	--	--
		Assist handles, front passenger and rear outboard	S	S	S	S	S
	US8	NEW! **Audio system**, AM/FM stereo with MP3 compatible CD player, seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), speed-compensated volume and TheftLock	S	S	--	--	--
	UQ3	**Audio system feature**, 6-speaker system	S	S	S	--	--
	DK8	**Console,** overhead mini with map lights **1 - Sunroof controls when (CF5) power sunroof is ordered.**	S	S[1]	S[1]	S[1]	S[1]
	K34	**Cruise control**, electronic with set and resume speed	S	S	S	S	S
	C49	**Defogger**, rear-window electric	S	S	S	S	S
	AU3	**Door locks**, power programmable with lockout protection	S	S	S	S	S
	B30	**Floor covering**, color-keyed carpeting with carpeted floor mats	S	S	S	S	S
		Headliner, cloth	S	S	S	S	S
		Instrumentation, analog with speedometer, fuel level, voltmeter, engine temperature, oil pressure and tachometer	S	S	S	S	S
		Key, single, 2-sided	S	S	S	S	S
		LATCH system (Lower Anchors and Top tethers for CHildren), for child safety seats	S	S	S	S	S
		Lighting, interior with dome light, driver- and passenger-side door switch with delayed entry feature, cargo light, door handle or Remote Keyless Entry-activated illuminated entry and map lights in front and second seat positions	S	S	S	S	S
	DF5	**Mirror**, inside rearview with 8-point compass, right-front passenger air bag status and outside temperature display	S	S	S	S	S

Free Flow RPO Code	Ref. Only RPO Code	Description 1 - Equipment Group 1LS, 1LT, 2LT, 3LT, and 1LZ available on C*10936 Models.	LS	LT			LTZ
			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
	UE1	**OnStar**, 1-year of Safe and Sound plan. Includes Automatic Notification of Air Bag Deployment, Stolen Vehicle Location Assistance, Emergency Services, Roadside Assistance, Remote Door Unlock, OnStar Vehicle Diagnostics, Hands-Free Calling, AccidentAssist and Remote Horn & Lights **1 - OnStar services require vehicle electrical system (including battery), wireless service and GPS satellite signals to be available and operating for features to function properly. OnStar acts as a link to existing emergency service providers. OnStar Vehicle Diagnostics available on most 2004 MY and newer GM vehicles. Diagnostic capability varies by model. Visit onstar.com for system limitations and details. If the order type is FDR, (UE0) OnStar delete will be forced on. Not available with a ship-to of Puerto Rico or the Virgin Islands.**	S[1]	S[1]	S[1]	S[1]	S[1]
		Power outlets, 2 instrument panel-mounted auxiliary with covers, 12-volt **1 - On vehicles equipped with (A95) front bucket seats or (AN3) front leather-appointed bucket seats, also includes 1 outlet inside center console and 1 in rear of console.**	S	S[1]	S[1]	S[1]	S[1]
	AP8	NEW! **Remote vehicle starter prep package**, includes Remote Keyless Entry	S	S	--	--	--
		Safety belts, 3-point, driver and right-front passenger and second row all seating positions, center seating position in first row is lap only	S	S	S	S	S
AE7		**Seats**, front 40/20/40 split-bench with Custom Cloth, 3-passenger, includes 6-way power driver seat adjuster, driver and front passenger manual reclining, outboard head restraints, center fold-down storage armrest and rear storage pockets	S	A	--	--	--
		Seats, cloth rear 60/40 split-bench, 3-passenger, flat folding	S	S	--	--	--
		Steering column, Tilt-Wheel, adjustable with brake/transmission shift interlock	S	S	S	S	S
	NP5	**Steering wheel**, leather-wrapped	S	S	S	S	S
	UK3	**Steering wheel controls**, mounted audio, Driver Information Center and cruise controls, includes Driver Information Center controls on instrument panel to right of steering wheel	S	S	S	S	S
		Theft-deterrent system, PASS-Key III	S	S	S	S	S
	UJ6	**Tire Pressure Monitoring System** (does not apply to spare tire)	S	S	S	S	S
	DH6	**Visors**, driver and front passenger illuminated vanity mirrors, padded with cloth trim, extends on rod	S	S	S	S	S
		Warning tones, headlamp on, key-in-ignition, driver and right-front passenger safety belt unfasten and turn signal on	S	S	S	S	S
	A31	**Windows**, power with driver and front passenger Express-Down and lockout features	S	S	S	S	S
	BVE	**Assist steps**, Dark Charcoal, mounted between front and rear wheels at bottom of rocker panel	S	S	S	S	S
	EN4	**Cargo cover**, rear rigid, 3-piece composite, stowable onboard	S	S	S	S	S

Free Flow RPO Code	Ref. Only RPO Code	Description 1 - Equipment Group 1LS, 1LT, 2LT, 3LT, and 1LZ available on C*10936 Models.	LS	LT			LTZ
			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
		Daytime Running Lamps, with automatic exterior lamp control	S	S	S	S	S
		Door handles, Black	S	--	--	--	--
	V43	**Bumper**, rear color-keyed steel **1 - Not available with (UD7) Rear Parking Assist.**	S[1]	S[1]	S[1]	--	--
	VGD	**Fascia**, front color-keyed	S	S	S	S	S
	T96	**Fog lamps**, front, halogen	S	S	S	S	S
	AJ1	**Glass,** Solar-Ray deep tinted (all windows except light tinted glass on windshield, driver and front passenger)	S	S	S	S	S
	T74	**Headlamps**, dual halogen composite with automatic exterior lamp control and flash-to-pass feature	S	S	S	S	S
		Midgate, foldable door between cargo box and cab with a removable and stowable rear window	S	S	S	S	S
	DL8	**Mirrors**, outside heated power-adjustable, Black, manual-folding **1 - Mirror caps are Black.** **2 - Mirror caps are color-keyed.**	S[1]	S[2]	S[2]	--	--
		Pickup box mat, Black rubber	S	S	S	S	S
	V76	**Recovery hooks**, front, frame-mounted **1 - Standard with 4WD Models only.**	S[1]	S[1]	S[1]	S[1]	S[1]
		Storage box, integrated top box with locks and lights	S	S	S	S	S
	QAN	**Tires**, P265/70R17 touring, all-season, blackwall	S	S	S	S	--
	ZVL	**Tire**, spare P265/70R17 all-season, blackwall	S	S	S	S	S
	SAF	**Tire carrier**, lockable outside spare, winch-type mounted under frame at rear	S	S	S	S	S
	N93	NEW! **Wheels**, 4 - 17" x 7.5" (43.2 cm x 19.1 cm) aluminum, 5-spoke, with radial grooves	S	--	--	--	--
	NZ4	**Wheel**, 17" (43.2 cm) full-size, steel spare **1 - Standard with CC10936 Models only.**	S[1]	S[1]	S[1]	S[1]	S[1]
	N86	**Wheel**, 17" (43.2 cm) full-size, aluminum spare **1 - Standard with 4WD Models only.**	S[1]	S[1]	S[1]	S[1]	S[1]
		Wipers, front intermittent wet-arm with pulse washers	S	S	S	S	S
	KG3	**Alternator**, 145 amps	S	S	S	S	S
		Battery, heavy-duty 600 cold-cranking amps, maintenance-free with rundown protection and retained accessory power	S	S	S	S	S
		Brakes, 4-wheel antilock, 4-wheel disc	S	S	S	S	S
	LY5	NEW! **Engine**, Vortec 5300 V8 SFI with Active Fuel Management (320 hp [238.6 kW] @ 5200 rpm, 340 lb-ft of torque [459.0 N-m] @ 4200 rpm), iron block **1 - Standard with CC10936 Models only.**	S[1]	S[1]	S[1]	S[1]	S[1]

Free Flow RPO Code	Ref. Only RPO Code	Description 1 - Equipment Group 1LS, 1LT, 2LT, 3LT, and 1LZ available on C*10936 Models.	LS	LT			LTZ
			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
	LC9	NEW! **Engine**, Vortec 5300 V8 SFI FlexFuel with Active Fuel Management, capable of running on unleaded or up to 85% ethanol (310 hp [231.1 kW] @ 5200 rpm, 335 lb-ft of torque [452.3 N-m] @ 4400 rpm), aluminum block **1 - Standard with CK10936 models only.**	S[1]	S[1]	S[1]	S[1]	S[1]
	C5W	**GVWR**, 7000 lbs. (3175 kg) **1 - Requires CC10936 models.**	S[1]	S[1]	S[1]	S[1]	S[1]
	C5Z	**GVWR**, 7200 lbs. (3266 kg) **1 - Requires CK10936 models.**	S[1]	S[1]	S[1]	S[1]	S[1]
	GT4	**Rear axle**, 3.73 ratio	S	S	S	S	S
	JL4	**StabiliTrak**, stability control system with Proactive Roll Avoidance	S	S	S	S	S
		Steering, power	S	S	S	S	S
		Suspension, front coil-over-shock with stabilizer bar	S	S	S	S	S
		Suspension, rear multi-link with coil springs	S	S	S	S	S
	ZW7	**Suspension Package**, Premium Smooth Ride	S	S	S	S	--
	Z82	**Trailering equipment**, heavy-duty, includes trailering hitch platform, 7-wire harness with independent fused trailering circuits mated to a 7-way sealed connector and (VR4) 2" trailering receiver	S	S	S	S	S
	NP8	**Transfer case**, electronic Autotrac with rotary controls **1 - Standard with CK10936 models only.**	S[1]	S[1]	S[1]	S[1]	S[1]
	M30	**Transmission**, 4-speed automatic, electronically controlled with overdrive and tow/haul mode	S	S	S	S	S

S = Standard Equipment A = Available -- (dashes) = Not Available D = ADI Available
■ = Included in Equipment Group ◻ = Included in Equipment Group but upgradeable

No deletions allowed to Equipment Groups. Additional options may be added; check ordering information section for compatibility.

*Indicates availability of feature on multiple models. For example, it indicates feature availability on 2WD and 4WD Models or Rear wheel drive and All-wheel drive Models.

Codes listed in the shaded column titled Ref. Only RPO Code are for internal use only and should not be ordered.

Free Flow RPO Code	Ref. Only RPO Code	Description 1 - Equipment Group 1LS, 1LT, 2LT, 3LT, and 1LZ available on C*10936 Models.	LS	LT			LTZ
			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
ASF		NEW! **Air bags**, head curtain side-impact, front and rear outboard seating positions with rollover sensor **1 - Always use safety belts and proper child restraints, even with air bags. Children are safer when properly secured in a rear seat. See the Owner's Manual for more safety information.**	A[1]	A[1]	A[1]	■[1]	■[1]
CJ2		**Air conditioning**, dual-zone automatic climate control with individual climate settings for driver and right-front passenger. Includes rear air conditioning outlets in center console when bucket seats are ordered **1 - Requires (A95) front bucket seats with Custom cloth.**	--	A[1]	■	■	■
US9		NEW! **Audio system**, AM/FM stereo with MP3 compatible 6-disc in-dash CD changer, seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), automatic volume, and TheftLock	A	A	■	■	■
UQA		**Audio system feature**, Bose premium 7-speaker system with subwoofer in center console **1 - Not available with (AE7) front 40/20/40 split-bench with Custom Cloth seats.**	--	A[1]	A	■	■
	UK6	**Audio system controls**, rear with 2 headphone jacks (headphones not included), power outlet and controls for volume, station selection and media **1 - Included and only available with (A95) front bucket seats with Custom Cloth.**	--	A[1]	■	■	■
	D07	**Console**, floor with storage area, cup holders and integrated second row audio controls **1 - Included and only available with (A95) front bucket seats with Custom Cloth.**	--	A[1]	■	■	■
JF4		**Pedals**, power-adjustable for accelerator and brake **1 - Requires (UD7) Rear Parking Assist.** **2 - Requires (UD7) Rear Parking Assist. Required with (UVC) rearview camera system.**	A[1]	A[1]	A[2]	■	■
	AP3	NEW! **Remote vehicle starter system**, includes Remote Keyless Entry	--	--	■	■	■
	A95	**Seats**, front bucket with Custom Cloth, 6-way power driver seat adjuster, outboard adjustable head restraints, floor console and rear storage pockets **1 - May be substituted with (AE7) front 40/20/40 split-bench with Custom Cloth seats**	--	◻[1]	--	--	--

Free Flow RPO Code	Ref. Only RPO Code	Description 1 - Equipment Group 1LS, 1LT, 2LT, 3LT, and 1LZ available on C*10936 Models.	LS	LT			LTZ
			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
	A95	**Seats**, front bucket with leather-appointed seating, 6-way power driver seat adjuster, adjustable outboard head restraints, floor console and rear storage pockets	--	--	■	--	--
	AN3	**Seats**, front bucket with leather-appointed seating 12-way power driver and front passenger seat adjusters, power lumbar control, heated seat cushion and seatbacks, 2-position driver memory, adjustable head restraints, storage pockets and floor console	--	--	--	■	■
		Seats, rear 60/40 split-bench with leather-appointed seating, 3-passenger, flat-folding	--	--	■	■	■
UG1		**Universal Home Remote**, includes garage door opener, programmable **1 - Required and only available with (CF5) power sunroof.**	--	A[1]	■	■	■
U2K		**XM Satellite Radio**. With a wide variety of programming, XM has something to excite any driver. Whether you want to be entertained or informed, to laugh, think, or sing, XM has the perfect channel for you - coast-to-coast, and in digital-quality sound. 3 trial months - no obligation **1 - Available in the 48 contiguous United States. Required $12.95 monthly subscription sold separately. All fees and programming subject to change. Subscription subject to customer agreement. For more information, visit gm.xmradio.com.**	A[1]	A[1]	A[1]	■[1]	■[1]
		Door handles, color-keyed	--	■	■	■	■
	VGE	**Fascia**, rear color-keyed **1 - Included and only available with (UD7) Rear Parking Assist.**	A[1]	A[1]	A[1]	■	■
V54		**Luggage rack side rails**, roof-mounted, Black	A	A	A	A	■
	DL3	**Mirrors**, outside heated power-adjustable, power-folding and driver-side auto-dimming, color-keyed with integrated turn signal indicators, ground illumination and curb-tilt	--	--	--	■	■
	B85	**Moldings**, bodyside, color-keyed	--	■	■	■	■
UD7		NEW! **Rear Parking Assist**, Ultrasonic with rearview LED display and audible warning **1 - Requires (JF4) power-adjustable pedals.** **2 - Requires (JF4) power-adjustable pedals. Required with (UVC) rearview camera system.**	A[1]	A[1]	A[2]	■	■
QSS		**Tires**, P275/55R20, all-season, blackwall **1 - Required with (RCS) 4 - 20" x 8.5" (50.8 cm x 21.6 cm) polished aluminum wheels.**	--	A[1]	A[1]	A[1]	■
	P46	NEW! **Wheels**, 4 - 17" x 7.5" (43.2 cm x 19.1 cm) aluminum, 5-spoke, with smooth surface and rectangular pockets **1 - Requires (QAN) P265/70R17 touring all-season blackwall tires or (QAS) P265/70R17 touring all-season White outlined-letter tires.**	--	■[1]	■[1]	■[1]	--
RCS		**Wheels**, 4 - 20" x 8.5" (50.8 cm x 21.6 cm) polished aluminum **1 - Requires (QSS) P275/55R20 all-season blackwall tires.**	--	A[1]	A[1]	A[1]	■
XA7		NEW! **Windshield washer fluid system**, heated	--	--	--	A	■
CE1		NEW! **Wipers**, front intermittent, RainSense	--	--	--	A	■

Free Flow RPO Code	Ref. Only RPO Code	Description 1 - Equipment Group 1LS, 1LT, 2LT, 3LT, and 1LZ available on C*10936 Models.	LS	LT			LTZ
			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
G80		**Differential**, heavy-duty locking rear **1 - Required with (GT5) 4.10 rear axle ratio.**	A[1]	A[1]	A[1]	A[1]	■
	Z55	**Suspension Package,** Autoride, bi-state variable shock dampening and rear air-assisted load-leveling, includes (G69) Level control, auto air	--	--	--	--	■

S = Standard Equipment A = Available -- (dashes) = Not Available D = ADI Available
■ = Included in Equipment Group □ = Included in Equipment Group but upgradeable

No deletions allowed to Equipment Groups. Additional options may be added; check ordering information section for compatibility.

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Free Flow RPO Code	Ref. Only RPO Code	Description 1 - Equipment Group 1LS, 1LT, 2LT, 3LT, and 1LZ available on C*10936 Models.	LS	LT			LTZ
			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
ASF		NEW! **Air bags**, head curtain side-impact, front and rear outboard seating positions with rollover sensor **1 - Always use safety belts and proper child restraints, even with air bags. Children are safer when properly secured in a rear seat. See the Owner's Manual for more safety information.**	A[1]	A[1]	A[1]	■[1]	■[1]
CJ2		**Air conditioning**, dual-zone automatic climate control with individual climate settings for driver and right-front passenger. Includes rear air conditioning outlets in center console when bucket seats are ordered **1 - Requires (A95) front bucket seats with Custom cloth.**	--	A[1]	■	■	■
US9		NEW! **Audio system**, AM/FM stereo with MP3 compatible 6-disc in-dash CD changer, seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), automatic volume, and TheftLock	A	A	■	■	■
UQA		**Audio system feature**, Bose premium 7-speaker system with subwoofer in center console **1 - Not available with (AE7) front 40/20/40 split-bench with Custom Cloth seats.**	--	A[1]	A	■	■
	UK6	**Audio system controls**, rear with 2 headphone jacks (headphones not included), power outlet and controls for volume, station selection and media **1 - Included and only available with (A95) front bucket seats with Custom Cloth.**	--	A[1]	■	■	■
	D07	**Console**, floor with storage area, cup holders and integrated second row audio controls **1 - Included and only available with (A95) front bucket seats with Custom Cloth.**	--	A[1]	■	■	■
JF4		**Pedals**, power-adjustable for accelerator and brake **1 - Requires (UD7) Rear Parking Assist.** **2 - Requires (UD7) Rear Parking Assist. Required with (UVC) rearview camera system.**	A[1]	A[1]	A[2]	■	■
	AP3	NEW! **Remote vehicle starter system**, includes Remote Keyless Entry	--	--	■	■	■
	A95	**Seats**, front bucket with Custom Cloth, 6-way power driver seat adjuster, outboard adjustable head restraints, floor console and rear storage pockets **1 - May be substituted with (AE7) front 40/20/40 split-bench with Custom Cloth seats**	--	□[1]	--	--	--

Free Flow RPO Code	Ref. Only RPO Code	Description 1 - Equipment Group 1LS, 1LT, 2LT, 3LT, and 1LZ available on C*10936 Models.	LS	LT			LTZ
			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
	A95	**Seats**, front bucket with leather-appointed seating, 6-way power driver seat adjuster, adjustable outboard head restraints, floor console and rear storage pockets	--	--	■	--	--
	AN3	**Seats**, front bucket with leather-appointed seating 12-way power driver and front passenger seat adjusters, power lumbar control, heated seat cushion and seatbacks, 2-position driver memory, adjustable head restraints, storage pockets and floor console	--	--	--	■	■
		Seats, rear 60/40 split-bench with leather-appointed seating, 3-passenger, flat-folding	--	--	■	■	■
UG1		**Universal Home Remote**, includes garage door opener, programmable **1 - Required and only available with (CF5) power sunroof.**	--	A[1]	■	■	■
U2K		**XM Satellite Radio**. With a wide variety of programming, XM has something to excite any driver. Whether you want to be entertained or informed, to laugh, think, or sing, XM has the perfect channel for you - coast-to-coast, and in digital-quality sound. 3 trial months - no obligation **1 - Available in the 48 contiguous United States. Required $12.95 monthly subscription sold separately. All fees and programming subject to change. Subscription subject to customer agreement. For more information, visit gm.xmradio.com.**	A[1]	A[1]	A[1]	■[1]	■[1]
		Door handles, color-keyed	--	■	■	■	■
	VGE	**Fascia**, rear color-keyed **1 - Included and only available with (UD7) Rear Parking Assist.**	A[1]	A[1]	A[1]	■	■
V54		**Luggage rack side rails**, roof-mounted, Black	A	A	A	A	■
	DL3	**Mirrors**, outside heated power-adjustable, power-folding and driver-side auto-dimming, color-keyed with integrated turn signal indicators, ground illumination and curb-tilt	--	--	--	■	■
	B85	**Moldings**, bodyside, color-keyed	--	■	■	■	■
UD7		NEW! **Rear Parking Assist**, Ultrasonic with rearview LED display and audible warning **1 - Requires (JF4) power-adjustable pedals.** **2 - Requires (JF4) power-adjustable pedals. Required with (UVC) rearview camera system.**	A[1]	A[1]	A[2]	■	■
QSS		**Tires**, P275/55R20, all-season, blackwall **1 - Required with (RCS) 4 - 20" x 8.5" (50.8 cm x 21.6 cm) polished aluminum wheels.**	--	A[1]	A[1]	A[1]	■
	P46	NEW! **Wheels**, 4 - 17" x 7.5" (43.2 cm x 19.1 cm) aluminum, 5-spoke, with smooth surface and rectangular pockets **1 - Requires (QAN) P265/70R17 touring all-season blackwall tires or (QAS) P265/70R17 touring all-season White outlined-letter tires.**	--	■[1]	■[1]	■[1]	--
RCS		**Wheels**, 4 - 20" x 8.5" (50.8 cm x 21.6 cm) polished aluminum **1 - Requires (QSS) P275/55R20 all-season blackwall tires.**	--	A[1]	A[1]	A[1]	■
XA7		NEW! **Windshield washer fluid system**, heated	--	--	--	A	■
CE1		NEW! **Wipers**, front intermittent, RainSense	--	--	--	A	■

Free Flow RPO Code	Ref. Only RPO Code	Description 1 - Equipment Group 1LS, 1LT, 2LT, 3LT, and 1LZ available on C*10936 Models.	LS	LT			LTZ
			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
G80		**Differential**, heavy-duty locking rear **1 - Required with (GT5) 4.10 rear axle ratio.**	A[1]	A[1]	A[1]	A[1]	■
	Z55	**Suspension Package,** Autoride, bi-state variable shock dampening and rear air-assisted load-leveling, includes (G69) Level control, auto air	--	--	--	--	■
ADDITIONAL OPTIONS							
Free Flow RPO Code	Ref. Only RPO Code	Description 1 - Equipment Group 1LS, 1LT, 2LT, 3LT, and 1LZ available on C*10936 Models.	LS	LT			LTZ
			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
ASF		NEW! **Air bags**, head curtain side-impact, front and rear outboard seating positions with rollover sensor **1 - Always use safety belts and proper child restraints, even with air bags. Children are safer when properly secured in a rear seat. See the Owner's Manual for more safety information.**	A[1]	A[1]	A[1]	■[1]	■[1]
CJ2		**Air conditioning**, dual-zone automatic climate control with individual climate settings for driver and right-front passenger. Includes rear air conditioning outlets in center console when bucket seats are ordered **1 - Requires (A95) front bucket seats with Custom cloth.**	--	A[1]	■	■	■
US9		NEW! **Audio system**, AM/FM stereo with MP3 compatible 6-disc in-dash CD changer, seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), automatic volume, and TheftLock	A	A	■	■	■
UVA		NEW! **Audio system**, AM/FM stereo with MP3 compatible CD/DVD player, seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), speed-compensated volume, TheftLock and 2 slots, upper slot is for DVD/CD/MP3 and lower slot is for CD/MP3 only **1 - Requires (UQA) Bose premium 7-speaker system and (U42) rear seat DVD player entertainment system. Not available with (AE7) front 40/20/40 split-bench with Custom Cloth seats.**	--	A[1]	A[1]	A[1]	A[1]
U3U		NEW! **Audio system with navigation**, AM/FM stereo with MP3 compatible CD player and DVD-based navigation, seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), speed-compensated volume, TheftLock and voice recognition, plays CD only in upper slot **1 - Requires (UQA) Bose premium 7-speaker system. Not available with (U42) rear seat DVD player entertainment system. Only available in the 48 contiguous United States.**	--	--	A[1]	A[1]	A[1]

ADDITIONAL OPTIONS							
Free Flow RPO Code	Ref. Only RPO Code	Description 1 - Equipment Group 1LS, 1LT, 2LT, 3LT, and 1LZ available on C*10936 Models.	LS	LT			LTZ
			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
UVB		NEW! **Audio system with navigation**, AM/FM stereo with MP3 compatible CD/DVD player and DVD-based navigation, seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), speed-compensated volume, TheftLock and voice recognition, plays CD or DVD in upper slot **1 - Requires (U42) rear seat DVD player entertainment system and (UQA) Bose Premium 7-speaker system. Only available in the 48 contiguous United States.**	--	--	A[1]	A[1]	A[1]
UQA		**Audio system feature**, Bose premium 7-speaker system with subwoofer in center console **1 - Not available with (AE7) front 40/20/40 split-bench with Custom Cloth seats.**	--	A[1]	A	■	■
U42		**Entertainment system**, rear seat DVD player with remote control, overhead display, 2 sets of wireless infrared headphones, auxiliary audio/video jacks, remote game plug-in and mute button in overhead console **1 - Requires (UVA) AM/FM stereo with MP3 compatible CD/DVD player or (UVB) AM/FM stereo with MP3 compatible CD/DVD player with Navigation radio, multimedia with base navigation. Requires (CJ2) dual-zone automatic air conditioning.**	--	A[1]	A[1]	A[1]	A[1]
JF4		**Pedals**, power-adjustable for accelerator and brake **1 - Requires (UD7) Rear Parking Assist.** **2 - Requires (UD7) Rear Parking Assist. Required with (UVC) rearview camera system.**	A[1]	A[1]	A[2]	■	■
UVC		NEW! **Rearview camera system** **1 - Requires (U3U) AM/FM stereo with MP3 compatible CD player and multimedia navigation or (UVB) AM/FM stereo with MP3 compatible CD/DVD player and DVD-based navigation and (ASF) head curtain side-impact air bags. Requires (UD7) Rear Parking Assist and (JF4) power-adjustable pedals.** **2 - Requires (U3U) AM/FM stereo with MP3 compatible CD player and multimedia navigation or (UVB) AM/FM stereo with MP3 compatible CD/DVD player and DVD-based navigation and (ASF) head curtain side-impact air bags.**	--	--	A[1]	A[2]	A[2]
AE7		**Seats**, front 40/20/40 split-bench with Custom Cloth, 3-passenger, includes 6-way power driver seat adjuster, driver and front passenger manual reclining, outboard head restraints, center fold-down storage armrest and rear storage pockets	S	A	--	--	--
CF5		**Sunroof**, power, tilt-sliding with express-open and wind deflector **1 - Requires (CJ2) dual-zone automatic air conditioning and (UG1) Universal Home Remote.**	--	A[1]	A	A	A
UG1		**Universal Home Remote**, includes garage door opener, programmable **1 - Required and only available with (CF5) power sunroof.**	--	A[1]	■	■	■

ADDITIONAL OPTIONS							
Free Flow RPO Code	Ref. Only RPO Code	Description 1 - Equipment Group 1LS, 1LT, 2LT, 3LT, and 1LZ available on C*10936 Models.	LS	LT			LTZ
			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
U2K		**XM Satellite Radio**. With a wide variety of programming, XM has something to excite any driver. Whether you want to be entertained or informed, to laugh, think, or sing, XM has the perfect channel for you - coast-to-coast, and in digital-quality sound. 3 trial months - no obligation **1 - Available in the 48 contiguous United States. Required $12.95 monthly subscription sold separately. All fees and programming subject to change. Subscription subject to customer agreement. For more information, visit gm.xmradio.com.**	A[1]	A[1]	A[1]	■[1]	■[1]
E95		**Cargo cover**, rear, soft	A	--	--	--	--
V54		**Luggage rack side rails**, roof-mounted, Black	A	A	A	A	■
V1K		**Luggage rack center rails**, roof-mounted, Black **1 - Requires (V54) roof-mounted luggage rack side rails.**	A[1]	A[1]	A[1]	A[1]	A
UD7		NEW! **Rear Parking Assist**, Ultrasonic with rearview LED display and audible warning **1 - Requires (JF4) power-adjustable pedals.** **2 - Requires (JF4) power-adjustable pedals. Required with (UVC) rearview camera system.**	A[1]	A[1]	A[2]	■	■
QAS		**Tires**, P265/70R17 touring, all-season, White outlined-letter	A	A	A	A	--
QSS		**Tires,** P275/55R20, all-season, blackwall **1 - Required with (RCS) 4 - 20" x 8.5" (50.8 cm x 21.6 cm) polished aluminum wheels.**	--	A[1]	A[1]	A[1]	■
RCS		**Wheels**, 4 - 20" x 8.5" (50.8 cm x 21.6 cm) polished aluminum **1 - Requires (QSS) P275/55R20 all-season blackwall tires.**	--	A[1]	A[1]	A[1]	■
XA7		NEW! **Windshield washer fluid system**, heated	--	--	--	A	■
CE1		NEW! **Wipers**, front intermittent, RainSense	--	--	--	A	■
KNP		**Cooling**, external transmission oil cooler, heavy-duty air-to-oil **1 - Required when (GT5) 4.10 rear axle ratio is ordered. Not available with (GT4) 3.73 rear axle ratio.**	A[1]	A[1]	A[1]	A[1]	A[1]
G80		**Differential**, heavy-duty locking rear **1 - Required with (GT5) 4.10 rear axle ratio.**	A[1]	A[1]	A[1]	A[1]	■
FE9		**Emissions**, Federal requirements	A	A	A	A	A
YF5		**Emissions**, California state requirements	A	A	A	A	A
NE1		**Emissions**, Maine, Massachusetts, New York or Vermont state requirements	A	A	A	A	A
NB8		**Emissions override**, California, Massachusetts or New York (for vehicles ordered by dealers in states of California, Massachusetts or New York with Federal emissions) **1 - Requires (FE9) Federal emissions requirements.**	A[1]	A[1]	A[1]	A[1]	A[1]

ADDITIONAL OPTIONS							
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			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
NC7		**Emissions override**, Federal (for vehicles ordered by dealers in Federal emission states with California, New York, Vermont, Massachusetts or Maine emissions; may also be used by dealers in states of California, New York, Vermont, Massachusetts or Maine to order different state-specific emissions) **1 - Requires (YF5) California state emissions requirements or (NE1) New York, Vermont, Massachusetts or Maine state emissions requirements.**	A[1]	A[1]	A[1]	A[1]	A[1]
LMG		NEW! **Engine**, Vortec 5300 V8 SFI FlexFuel with Active Fuel Management, capable of running on unleaded or up to 85% ethanol (320 hp [238.6 kW] @ 5200 rpm, 340 lb-ft of torque [459.0 N-m] @ 4200 rpm), iron block **1 - Requires CC10936 models.**	A[1]	A[1]	A[1]	A[1]	A[1]
K05		**Engine block heater**	A	A	A	A	A
GT5		**Rear axle**, 4.10 ratio **1 - Requires (G80) heavy-duty locking rear differential. Requires (KNP) external transmission oil cooler.**	A[1]	A[1]	A[1]	A[1]	A[1]

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			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
		Door handles, color-keyed		■	■	■	■
	B85	**Moldings**, bodyside, color-keyed		■	■	■	■
	P46	NEW! **Wheels**, 4 - 17" x 7.5" (43.2 cm x 19.1 cm) aluminum		■	■	■	
	A95	**Seats**, front bucket with Custom Cloth **1 - May be substituted with (AE7) front 40/20/40 split-bench with Custom Cloth seats**		□[1]			
CJ2		**Air conditioning**, dual-zone automatic climate control			■	■	■
US9		NEW! **Audio system**, AM/FM stereo with MP3 compatible 6-disc in-dash CD changer			■	■	■
	UK6	**Audio system controls**, rear			■	■	■
	D07	**Console**, floor			■	■	■
	AP3	NEW! **Remote vehicle starter system**			■	■	■
		Seats, rear 60/40 split-bench with leather-appointed seating			■	■	■
UG1		**Universal Home Remote**			■	■	■
	A95	**Seats**, front bucket with leather-appointed seating			■		
ASF		NEW! **Air bags**, head curtain side-impact, front and rear outboard seating positions				■	■
UQA		**Audio system feature**, Bose premium 7-speaker system				■	■
	VGE	**Fascia**, rear color-keyed				■	■
	DL3	**Mirrors**, outside heated power-adjustable, power-folding and driver-side auto-dimming				■	■
JF4		**Pedals**, power-adjustable				■	■
UD7		NEW! **Rear Parking Assist**				■	■
	AN3	**Seats**, front bucket with leather-appointed seating				■	■
U2K		**XM Satellite Radio**				■	■
G80		**Differential**, heavy-duty locking rear					■
V54		**Luggage rack side rails**, roof-mounted, Black					■
	Z55	**Suspension Package**, Autoride					■
QSS		**Tires**, P275/55R20, all-season, blackwall					■
RCS		**Wheels**, 4 - 20" x 8.5" (50.8 cm x 21.6 cm) polished aluminum					■
XA7		NEW! **Windshield washer fluid system**, heated					■

Free Flow RPO Code	Ref. Only RPO Code	Description 1 - Equipment Group 1LS, 1LT, 2LT, 3LT, and 1LZ available on C*10936 Models.	LS	LT			LTZ
			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
CE1		NEW! **Wipers**, front intermittent, RainSense					■

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Free Flow RPO Code	Ref. Only RPO Code	Description 1 - Equipment Group 1LS, 1LT, 2LT, 3LT, and 1LZ available on C*10936 Models.	LS	LT			LTZ
			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
		Air bags, dual-stage frontal, driver and right-front passenger with Passenger Sensing System (right-front passenger air bag status on inside rearview mirror) **1 - Always use safety belts and proper child restraints, even with air bags. Children are safer when properly secured in a rear seat. See the Owner's Manual for more safety information.**	S[1]	S[1]	S[1]	S[1]	S[1]
ASF		NEW! **Air bags**, head curtain side-impact, front and rear outboard seating positions with rollover sensor **1 - Always use safety belts and proper child restraints, even with air bags. Children are safer when properly secured in a rear seat. See the Owner's Manual for more safety information.**	A[1]	A[1]	A[1]	■[1]	■[1]
	CJ3	**Air conditioning**, dual-zone manual climate control with individual climate settings for driver and right-front passenger. Includes rear air conditioning outlets in center console when bucket seats are ordered **1 - Not available with (CF5) power sunroof.**	S	S[1]	--	--	--
CJ2		**Air conditioning**, dual-zone automatic climate control with individual climate settings for driver and right-front passenger. Includes rear air conditioning outlets in center console when bucket seats are ordered **1 - Requires (A95) front bucket seats with Custom cloth.**	--	A[1]	■	■	■
		Assist handles, front passenger and rear outboard	S	S	S	S	S
	US8	NEW! **Audio system**, AM/FM stereo with MP3 compatible CD player, seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), speed-compensated volume and TheftLock	S	S	--	--	--
US9		NEW! **Audio system**, AM/FM stereo with MP3 compatible 6-disc in-dash CD changer, seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), automatic volume, and TheftLock	A	A	■	■	■
UVA		NEW! **Audio system**, AM/FM stereo with MP3 compatible CD/DVD player, seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), speed-compensated volume, TheftLock and 2 slots, upper slot is for DVD/CD/MP3 and lower slot is for CD/MP3 only **1 - Requires (UQA) Bose premium 7-speaker system and (U42) rear seat DVD player entertainment system. Not available with (AE7) front 40/20/40 split-bench with Custom Cloth seats.**	--	A[1]	A[1]	A[1]	A[1]

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			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
U3U		NEW! **Audio system with navigation**, AM/FM stereo with MP3 compatible CD player and DVD-based navigation, seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), speed-compensated volume, TheftLock and voice recognition, plays CD only in upper slot **1 - Requires (UQA) Bose premium 7-speaker system. Not available with (U42) rear seat DVD player entertainment system. Only available in the 48 contiguous United States.**	--	--	A[1]	A[1]	A[1]
UVB		NEW! **Audio system with navigation**, AM/FM stereo with MP3 compatible CD/DVD player and DVD-based navigation, seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), speed-compensated volume, TheftLock and voice recognition, plays CD or DVD in upper slot **1 - Requires (U42) rear seat DVD player entertainment system and (UQA) Bose Premium 7-speaker system. Only available in the 48 contiguous United States.**	--	--	A[1]	A[1]	A[1]
	UQ3	**Audio system feature**, 6-speaker system	S	S	S	--	--
UQA		**Audio system feature**, Bose premium 7-speaker system with subwoofer in center console **1 - Not available with (AE7) front 40/20/40 split-bench with Custom Cloth seats.**	--	A[1]	A	■	■
	UK6	**Audio system controls**, rear with 2 headphone jacks (headphones not included), power outlet and controls for volume, station selection and media **1 - Included and only available with (A95) front bucket seats with Custom Cloth.**	--	A[1]	■	■	■
	D07	**Console**, floor with storage area, cup holders and integrated second row audio controls **1 - Included and only available with (A95) front bucket seats with Custom Cloth.**	--	A[1]	■	■	■
	DK8	**Console,** overhead mini with map lights **1 - Sunroof controls when (CF5) power sunroof is ordered.**	S	S[1]	S[1]	S[1]	S[1]
	K34	**Cruise control**, electronic with set and resume speed	S	S	S	S	S
	C49	**Defogger**, rear-window electric	S	S	S	S	S
	AU3	**Door locks**, power programmable with lockout protection	S	S	S	S	S
U42		**Entertainment system**, rear seat DVD player with remote control, overhead display, 2 sets of wireless infrared headphones, auxiliary audio/video jacks, remote game plug-in and mute button in overhead console **1 - Requires (UVA) AM/FM stereo with MP3 compatible CD/DVD player or (UVB) AM/FM stereo with MP3 compatible CD/DVD player with Navigation radio, multimedia with base navigation. Requires (CJ2) dual-zone automatic air conditioning.**	--	A[1]	A[1]	A[1]	A[1]
	B30	**Floor covering**, color-keyed carpeting with carpeted floor mats	S	S	S	S	S
		Headliner, cloth	S	S	S	S	S
		Instrumentation, analog with speedometer, fuel level, voltmeter, engine temperature, oil pressure and tachometer	S	S	S	S	S

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			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
		Key, single, 2-sided	S	S	S	S	S
		LATCH system (Lower Anchors and Top tethers for CHildren), for child safety seats	S	S	S	S	S
		Lighting, interior with dome light, driver- and passenger-side door switch with delayed entry feature, cargo light, door handle or Remote Keyless Entry-activated illuminated entry and map lights in front and second seat positions	S	S	S	S	S
	DF5	**Mirror**, inside rearview with 8-point compass, right-front passenger air bag status and outside temperature display	S	S	S	S	S
	UE1	**OnStar**, 1-year of Safe and Sound plan. Includes Automatic Notification of Air Bag Deployment, Stolen Vehicle Location Assistance, Emergency Services, Roadside Assistance, Remote Door Unlock, OnStar Vehicle Diagnostics, Hands-Free Calling, AccidentAssist and Remote Horn & Lights **1 - OnStar services require vehicle electrical system (including battery), wireless service and GPS satellite signals to be available and operating for features to function properly. OnStar acts as a link to existing emergency service providers. OnStar Vehicle Diagnostics available on most 2004 MY and newer GM vehicles. Diagnostic capability varies by model. Visit onstar.com for system limitations and details. If the order type is FDR, (UE0) OnStar delete will be forced on. Not available with a ship-to of Puerto Rico or the Virgin Islands.**	S[1]	S[1]	S[1]	S[1]	S[1]
JF4		**Pedals**, power-adjustable for accelerator and brake **1 - Requires (UD7) Rear Parking Assist.** **2 - Requires (UD7) Rear Parking Assist. Required with (UVC) rearview camera system.**	A[1]	A[1]	A[2]	■	■
		Power outlets, 2 instrument panel-mounted auxiliary with covers, 12-volt **1 - On vehicles equipped with (A95) front bucket seats or (AN3) front leather-appointed bucket seats, also includes 1 outlet inside center console and 1 in rear of console.**	S	S[1]	S[1]	S[1]	S[1]
UVC		NEW! **Rearview camera system** **1 - Requires (U3U) AM/FM stereo with MP3 compatible CD player and multimedia navigation or (UVB) AM/FM stereo with MP3 compatible CD/DVD player and DVD-based navigation and (ASF) head curtain side-impact air bags. Requires (UD7) Rear Parking Assist and (JF4) power-adjustable pedals.** **2 - Requires (U3U) AM/FM stereo with MP3 compatible CD player and multimedia navigation or (UVB) AM/FM stereo with MP3 compatible CD/DVD player and DVD-based navigation and (ASF) head curtain side-impact air bags.**	--	--	A[1]	A[2]	A[2]
	AP8	NEW! **Remote vehicle starter prep package**, includes Remote Keyless Entry	S	S	--	--	--
	AP3	NEW! **Remote vehicle starter system**, includes Remote Keyless Entry	--	--	■	■	■
		Safety belts, 3-point, driver and right-front passenger and second row all seating positions, center seating position in first row is lap only	S	S	S	S	S

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			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
AE7		**Seats**, front 40/20/40 split-bench with Custom Cloth, 3-passenger, includes 6-way power driver seat adjuster, driver and front passenger manual reclining, outboard head restraints, center fold-down storage armrest and rear storage pockets	S	A	--	--	--
	A95	**Seats**, front bucket with Custom Cloth, 6-way power driver seat adjuster, outboard adjustable head restraints, floor console and rear storage pockets **1 - May be substituted with (AE7) front 40/20/40 split-bench with Custom Cloth seats**	--	□[1]	--	--	--
	A95	**Seats**, front bucket with leather-appointed seating, 6-way power driver seat adjuster, adjustable outboard head restraints, floor console and rear storage pockets	--	--	■	--	--
	AN3	**Seats**, front bucket with leather-appointed seating 12-way power driver and front passenger seat adjusters, power lumbar control, heated seat cushion and seatbacks, 2-position driver memory, adjustable head restraints, storage pockets and floor console	--	--	--	■	■
		Seats, cloth rear 60/40 split-bench, 3-passenger, flat folding	S	S	--	--	--
		Seats, rear 60/40 split-bench with leather-appointed seating, 3-passenger, flat-folding	--	--	■	■	■
		Steering column, Tilt-Wheel, adjustable with brake/transmission shift interlock	S	S	S	S	S
	NP5	**Steering wheel**, leather-wrapped	S	S	S	S	S
	UK3	**Steering wheel controls**, mounted audio, Driver Information Center and cruise controls, includes Driver Information Center controls on instrument panel to right of steering wheel	S	S	S	S	S
CF5		**Sunroof**, power, tilt-sliding with express-open and wind deflector **1 - Requires (CJ2) dual-zone automatic air conditioning and (UG1) Universal Home Remote.**	--	A[1]	A	A	A
		Theft-deterrent system, PASS-Key III	S	S	S	S	S
	UJ6	**Tire Pressure Monitoring System** (does not apply to spare tire)	S	S	S	S	S
UG1		**Universal Home Remote**, includes garage door opener, programmable **1 - Required and only available with (CF5) power sunroof.**	--	A[1]	■	■	■
	DH6	**Visors**, driver and front passenger illuminated vanity mirrors, padded with cloth trim, extends on rod	S	S	S	S	S
		Warning tones, headlamp on, key-in-ignition, driver and right-front passenger safety belt unfasten and turn signal on	S	S	S	S	S
	A31	**Windows**, power with driver and front passenger Express-Down and lockout features	S	S	S	S	S

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			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
U2K		**XM Satellite Radio**. With a wide variety of programming, XM has something to excite any driver. Whether you want to be entertained or informed, to laugh, think, or sing, XM has the perfect channel for you - coast-to-coast, and in digital-quality sound. 3 trial months - no obligation **1 - Available in the 48 contiguous United States. Required $12.95 monthly subscription sold separately. All fees and programming subject to change. Subscription subject to customer agreement. For more information, visit gm.xmradio.com.**	A[1]	A[1]	A[1]	■[1]	■[1]

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			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
	BVE	**Assist steps**, Dark Charcoal, mounted between front and rear wheels at bottom of rocker panel	S	S	S	S	S
	EN4	**Cargo cover**, rear rigid, 3-piece composite, stowable onboard	S	S	S	S	S
E95		**Cargo cover**, rear, soft	A	--	--	--	--
		Daytime Running Lamps, with automatic exterior lamp control	S	S	S	S	S
		Door handles, Black	S	--	--	--	--
		Door handles, color-keyed	--	■	■	■	■
	V43	**Bumper**, rear color-keyed steel **1 - Not available with (UD7) Rear Parking Assist.**	S[1]	S[1]	S[1]	--	--
	VGD	**Fascia**, front color-keyed	S	S	S	S	S
	VGE	**Fascia**, rear color-keyed **1 - Included and only available with (UD7) Rear Parking Assist.**	A[1]	A[1]	A[1]	■	■
	T96	**Fog lamps**, front, halogen	S	S	S	S	S
	AJ1	**Glass,** Solar-Ray deep tinted (all windows except light tinted glass on windshield, driver and front passenger)	S	S	S	S	S
	T74	**Headlamps**, dual halogen composite with automatic exterior lamp control and flash-to-pass feature	S	S	S	S	S
V54		**Luggage rack side rails**, roof-mounted, Black	A	A	A	A	■
V1K		**Luggage rack center rails**, roof-mounted, Black **1 - Requires (V54) roof-mounted luggage rack side rails.**	A[1]	A[1]	A[1]	A[1]	A
		Midgate, foldable door between cargo box and cab with a removable and stowable rear window	S	S	S	S	S
	DL8	**Mirrors**, outside heated power-adjustable, Black, manual-folding **1 - Mirror caps are Black.** **2 - Mirror caps are color-keyed.**	S[1]	S[2]	S[2]	--	--
	DL3	**Mirrors**, outside heated power-adjustable, power-folding and driver-side auto-dimming, color-keyed with integrated turn signal indicators, ground illumination and curb-tilt	--	--	--	■	■
	B85	**Moldings,** bodyside, color-keyed	--	■	■	■	■
		Pickup box mat, Black rubber	S	S	S	S	S

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			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
UD7		NEW! **Rear Parking Assist**, Ultrasonic with rearview LED display and audible warning **1 - Requires (JF4) power-adjustable pedals.** **2 - Requires (JF4) power-adjustable pedals. Required with (UVC) rearview camera system.**	A[1]	A[1]	A[2]	■	■
	V76	**Recovery hooks**, front, frame-mounted **1 - Standard with 4WD Models only.**	S[1]	S[1]	S[1]	S[1]	S[1]
		Storage box, integrated top box with locks and lights	S	S	S	S	S
	QAN	**Tires**, P265/70R17 touring, all-season, blackwall	S	S	S	S	--
QAS		**Tires**, P265/70R17 touring, all-season, White outlined-letter	A	A	A	A	--
QSS		**Tires**, P275/55R20, all-season, blackwall **1 - Required with (RCS) 4 - 20" x 8.5" (50.8 cm x 21.6 cm) polished aluminum wheels.**	--	A[1]	A[1]	A[1]	■
	ZVL	**Tire**, spare P265/70R17 all-season, blackwall	S	S	S	S	S
	SAF	**Tire carrier**, lockable outside spare, winch-type mounted under frame at rear	S	S	S	S	S
	N93	NEW! **Wheels**, 4 - 17" x 7.5" (43.2 cm x 19.1 cm) aluminum, 5-spoke, with radial grooves	S	--	--	--	--
	P46	NEW! **Wheels**, 4 - 17" x 7.5" (43.2 cm x 19.1 cm) aluminum, 5-spoke, with smooth surface and rectangular pockets **1 - Requires (QAN) P265/70R17 touring all-season blackwall tires or (QAS) P265/70R17 touring all-season White outlined-letter tires.**	--	■[1]	■[1]	■[1]	--
RCS		**Wheels**, 4 - 20" x 8.5" (50.8 cm x 21.6 cm) polished aluminum **1 - Requires (QSS) P275/55R20 all-season blackwall tires.**	--	A[1]	A[1]	A[1]	■
	NZ4	**Wheel**, 17" (43.2 cm) full-size, steel spare **1 - Standard with CC10936 Models only.**	S[1]	S[1]	S[1]	S[1]	S[1]
	N86	**Wheel**, 17" (43.2 cm) full-size, aluminum spare **1 - Standard with 4WD Models only.**	S[1]	S[1]	S[1]	S[1]	S[1]
XA7		NEW! **Windshield washer fluid system**, heated	--	--	--	A	■
		Wipers, front intermittent wet-arm with pulse washers	S	S	S	S	S
CE1		NEW! **Wipers**, front intermittent, RainSense	--	--	--	A	■

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			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
	KG3	**Alternator**, 145 amps	S	S	S	S	S
		Battery, heavy-duty 600 cold-cranking amps, maintenance-free with rundown protection and retained accessory power	S	S	S	S	S
		Brakes, 4-wheel antilock, 4-wheel disc	S	S	S	S	S
KNP		**Cooling**, external transmission oil cooler, heavy-duty air-to-oil **1 - Required when (GT5) 4.10 rear axle ratio is ordered. Not available with (GT4) 3.73 rear axle ratio.**	A[1]	A[1]	A[1]	A[1]	A[1]
G80		**Differential**, heavy-duty locking rear **1 - Required with (GT5) 4.10 rear axle ratio.**	A[1]	A[1]	A[1]	A[1]	■
FE9		**Emissions**, Federal requirements	A	A	A	A	A
YF5		**Emissions**, California state requirements	A	A	A	A	A
NE1		**Emissions**, Maine, Massachusetts, New York or Vermont state requirements	A	A	A	A	A
NB8		**Emissions override**, California, Massachusetts or New York (for vehicles ordered by dealers in states of California, Massachusetts or New York with Federal emissions) **1 - Requires (FE9) Federal emissions requirements.**	A[1]	A[1]	A[1]	A[1]	A[1]
NC7		**Emissions override**, Federal (for vehicles ordered by dealers in Federal emission states with California, New York, Vermont, Massachusetts or Maine emissions; may also be used by dealers in states of California, New York, Vermont, Massachusetts or Maine to order different state-specific emissions) **1 - Requires (YF5) California state emissions requirements or (NE1) New York, Vermont, Massachusetts or Maine state emissions requirements.**	A[1]	A[1]	A[1]	A[1]	A[1]
	LY5	NEW! **Engine**, Vortec 5300 V8 SFI with Active Fuel Management (320 hp [238.6 kW] @ 5200 rpm, 340 lb-ft of torque [459.0 N-m] @ 4200 rpm), iron block **1 - Standard with CC10936 Models only.**	S[1]	S[1]	S[1]	S[1]	S[1]
LMG		NEW! **Engine**, Vortec 5300 V8 SFI FlexFuel with Active Fuel Management, capable of running on unleaded or up to 85% ethanol (320 hp [238.6 kW] @ 5200 rpm, 340 lb-ft of torque [459.0 N-m] @ 4200 rpm), iron block **1 - Requires CC10936 models.**	A[1]	A[1]	A[1]	A[1]	A[1]

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			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
	LC9	NEW! **Engine**, Vortec 5300 V8 SFI FlexFuel with Active Fuel Management, capable of running on unleaded or up to 85% ethanol (310 hp [231.1 kW] @ 5200 rpm, 335 lb-ft of torque [452.3 N-m] @ 4400 rpm), aluminum block **1 - Standard with CK10936 models only.**	S[1]	S[1]	S[1]	S[1]	S[1]
K05		**Engine block heater**	A	A	A	A	A
	C5W	**GVWR**, 7000 lbs. (3175 kg) **1 - Requires CC10936 models.**	S[1]	S[1]	S[1]	S[1]	S[1]
	C5Z	**GVWR**, 7200 lbs. (3266 kg) **1 - Requires CK10936 models.**	S[1]	S[1]	S[1]	S[1]	S[1]
	GT4	**Rear axle**, 3.73 ratio	S	S	S	S	S
GT5		**Rear axle**, 4.10 ratio **1 - Requires (G80) heavy-duty locking rear differential. Requires (KNP) external transmission oil cooler.**	A[1]	A[1]	A[1]	A[1]	A[1]
	JL4	**StabiliTrak**, stability control system with Proactive Roll Avoidance	S	S	S	S	S
		Steering, power	S	S	S	S	S
		Suspension, front coil-over-shock with stabilizer bar	S	S	S	S	S
		Suspension, rear multi-link with coil springs	S	S	S	S	S
	ZW7	**Suspension Package**, Premium Smooth Ride	S	S	S	S	--
	Z55	**Suspension Package,** Autoride, bi-state variable shock dampening and rear air-assisted load-leveling, includes (G69) Level control, auto air	--	--	--	--	■
	Z82	**Trailering equipment**, heavy-duty, includes trailering hitch platform, 7-wire harness with independent fused trailering circuits mated to a 7-way sealed connector and (VR4) 2" trailering receiver	S	S	S	S	S
	NP8	**Transfer case**, electronic Autotrac with rotary controls **1 - Standard with CK10936 models only.**	S[1]	S[1]	S[1]	S[1]	S[1]
	M30	**Transmission**, 4-speed automatic, electronically controlled with overdrive and tow/haul mode	S	S	S	S	S

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		Transmissions	Axles		GVWR lbs. (kg)	
Model	Engine	M30 4-Speed Automatic	GT4 3.73	GT5 4.10	C5W 7000 (3175)	C5Z 7200 (3266)
CC10936	LY5 Vortec 5300 V8 gas SFI	S	S	A[1]	S	--
	LMG Vortec 5300 V8 SFI FlexFuel	S	S	A[1]	S	--
CK10936	LC9 Vortec 5300 V8 SFI FlexFuel	S	S	A[1]	--	S

1 - Requires (G80) heavy-duty rear locking differential.

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Decor Level	Seat Type	Seat Code	Seat Trim	Interior		
				Ebony	Ebony / Light Cashmere	Dark Titanium / Light Titanium
LS (1LS) / LT (1LT)	Front reclining split-bench	AE7	Custom Cloth	19D	31D[1]	83D[1]
LT (1LT)	Front high-back reclining bucket	A95	Custom Cloth	19D	31D[1]	83D[1]
LT (2LT)	Front high-back reclining bucket	A95	Custom Leather appointed	193	313[1]	833[1]
LT (3LT) / LTZ (1LZ)	Front full-feature reclining bucket	AN3	Custom Leather appointed	193	313[1]	833[1]

Exterior Solid Paint	Color Code	Touch Up Paint Number	Interior		
			Ebony	Ebony / Light Cashmere	Dark Titanium / Light Titanium
NEW! Graystone Metallic	16U	WA-213M	A	A	A
Dark Blue Metallic	25U	WA-722J	A	A	A
Bermuda Blue Metallic[2]	26U	WA-214M	A	A	A
Black	41U	WA-8555	A	A	A
Summit White	50U	WA-8624	A	A	A
NEW! Gold Mist Metallic	51U	WA-316N	A	A	--
Sunburst Orange II Metallic[3]	56U	WA-913L	A	A	A
Silver Birch Metallic	59U	WA-926L	A	A	A
Sport Red Metallic	63U	WA-817K	A	A	A
Victory Red[4]	74U	WA-9260	A	A	A

1 - Interior color has lighter-darker two-tone effect.
2 - Available at extra charge.
3 - Available for production through December 2006.
4 - Available for production starting January 2007.

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Free Flow RPO Code	Ref. Only RPO Code	Description 1 - Equipment Group 1LS, 1LT, 2LT, 3LT, and 1LZ available on C*10936 Models.	LS	LT			LTZ
			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
R8G		**OnStar, 1-Year Additional Safe and Sound Service**, following the first year of OnStar Safe and Sound Service already included in the price of the vehicle. (RFB) OnStar, 2-Years Business Vehicle Manager Service is compatible **1 - Requires one of the following Fleet or Government order types: FLS, FNR, FRC, FBC, FGO. Not available with (UE0) OnStar not-installed.**	A[1]	A[1]	A[1]	A[1]	A[1]
R8P		**OnStar, 2-Years Additional Safe and Sound Service**, following the first year of OnStar Safe and Sound Service already included in the price of the vehicle. (RFC) OnStar, 3-Years Business Vehicle Manager Service is compatible **1 - Requires one of the following Fleet or Government order types: FLS, FNR, FRC, FBC, FGO. Not available with (UE0) OnStar not-installed.**	A[1]	A[1]	A[1]	A[1]	A[1]
R8U		**OnStar, 2-Years Commercial Premium Service**, in the first year, this is in lieu of the standard OnStar Service included in the price of the vehicle. (RFB) OnStar, 2-Years Business Vehicle Manager Service is compatible **1 - Requires one of the following Fleet or Government order types: FLS, FNR, FRC, FBC, FGO. Not available with (UE0) OnStar not-installed.**	A[1]	A[1]	A[1]	A[1]	A[1]
R8V		**OnStar, 3-Years Commercial Premium Service**, in the first year, this is in lieu of the standard OnStar Service included in the price of the vehicle. (RFC) OnStar, 3-Years Business Vehicle Manager Service is compatible **1 - Requires one of the following Fleet or Government order types: FLS, FNR, FRC, FBC, FGO. Not available with (UE0) OnStar not-installed.**	A[1]	A[1]	A[1]	A[1]	A[1]
R8W		**OnStar, 1-Year Directions and Connections Service**, upgrades the OnStar Safe and Sound Service included in the price of the vehicle in the first year. (RFA) 1-Year OnStar Business Vehicle Manager Service is compatible **1 - Requires one of the following Fleet or Government order types: FLS, FNR, FRC, FBC, FGO. Not available with (UE0) OnStar not-installed.**	A[1]	A[1]	A[1]	A[1]	A[1]
R8Y		**OnStar, 2-Years Directions and Connections Service**, in the first year, this is an upgrade from the OnStar Safe and Sound Service included in the price of the vehicle. (RFB) 2-Years OnStar Business Vehicle Manager Service is compatible **1 - Requires one of the following Fleet or Government order types: FLS, FNR, FRC, FBC, FGO. Not available with (UE0) OnStar not-installed.**	A[1]	A[1]	A[1]	A[1]	A[1]

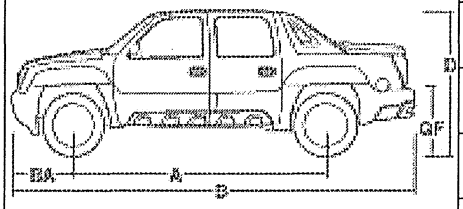
Free Flow RPO Code	Ref. Only RPO Code	Description 1 - Equipment Group 1LS, 1LT, 2LT, 3LT, and 1LZ available on C*10936 Models.	LS	LT			LTZ
			1LS[1]	1LT[1]	2LT[1]	3LT[1]	1LZ[1]
R8Z		**OnStar, 3-Years Directions and Connections Service**, in the first year, this is an upgrade from the OnStar Safe and Sound Service included in the price of the vehicle. (RFC) OnStar, 3-Years Business Vehicle Manager Service is compatible **1 - Requires one of the following Fleet or Government order types: FLS, FNR, FRC, FBC, FGO. Not available with (UE0) OnStar not-installed.**	A[1]	A[1]	A[1]	A[1]	A[1]
RFA		**OnStar, 1-Year Business Vehicle Manager Service** **1 - Requires one of the following Fleet or Government order types: FLS, FNR, FRC, FBC, FGO. Not available with (UE0) OnStar not-installed or with OnStar options (R8G), (R8U), (R8Y), (R8P), (R8V) or (R8Z).**	A[1]	A[1]	A[1]	A[1]	A[1]
RFB		**OnStar, 2-Years Business Vehicle Manager Service** **1 - Requires one of the following Fleet or Government order types: FLS, FNR, FRC, FBC, FGO and either (R8G), (R8U), or (R8Y) which provide for a total of 2-years of OnStar service. Not available with (UE0) OnStar, not-installed.**	A[1]	A[1]	A[1]	A[1]	A[1]
RFC		**OnStar, 3-Years Business Vehicle Manager Service** **1 - Requires one of the following Fleet or Government order types: FLS, FNR, FRC, FBC, FGO and either (R8P), (R8V), or (R8Z) which provide for a total of 3-years of OnStar service. Not available with (UE0) OnStar, not-installed.**	A[1]	A[1]	A[1]	A[1]	A[1]

Bed Products
Bed Extender
Bed Rug - With Bowtie Logo
Bed Web Net - Black
Cargo Management
Bicycle and Ski Carrier Wall Storage Unit
Bicycle/Ski Carrier Lock Package - Includes 2 keys
Convenience Net - Tailgate
Hitch Mounted Bicycle Carrier - Carries 4 Bikes
Hitch-Mounted Ski Carrier carries 5 pair of skis or 4 snowboards and 1 pair of skis
Roof Mounted Soft Cargo Carrier - Black with Bowtie Logo
Roof-Mounted Hard Cargo Carrier - Long 89"LX21"WX15"H, Black
Roof-Mounted Hard Cargo Carrier - Short 56"LX36"WX15"H, Black
Roof-Mounted Luggage Carrier Cross Rail Package
Second Row Seat Liner - With Gold Bowtie Logo, Black
Electronics
Audio and Video Remote Control
Dual Player Headrest DVD System - Cashmere (313, 333)
Dual Player Headrest DVD System - Cloth Cashmere (33D, 31i)
Dual Player Headrest DVD System - Cloth Ebony (19D, 19i)
Dual Player Headrest DVD System - Cloth Titanium (83D, 83i)
Dual Player Headrest DVD System - Ebony (193)
Dual Player Headrest DVD System - Titanium (833)
XM Satellite Radio
Exterior
Air Mattress - 75 inch x 74 inch
Auxilliary Transmission Cooler
Bodyside Molding Package - Includes 2 Front and 2 Rear
Brush Grille Guard - Composite Black with Chrome
Contour Splash Guards - Front and Rear, with Gold Bowtie Logo, 11.1" Wide
Door Sill Plate - Brushed Aluminum
Fuel Tank Door Package - Chrome
Grille - Includes Upper and Lower - Blue (25U)
Grille - Includes Upper and Lower - Graystone (16U)
Grille - Includes Upper and Lower - Red (63U)
Grille - Includes Upper and Lower - Silver (59U)
Grille - Includes Upper and Lower - White (50U)
Molded Hood Protector - Chrome
Molded Hood Protector - No Logo, Blue (25U)
Molded Hood Protector - No Logo, Greystone (16U)
Molded Hood Protector - No Logo, Red (63U)
Molded Hood Protector - No Logo, Silver (59U)
Molded Hood Protector - No Logo, White (50U)
Molded Hood Protector - Smoke
Molded Splash Guards - Front with No Logo, Black
Molded Splash Guards - Front, No Logo, Black, Without Cladding and Tubular Assist Steps
Molded Splash Guards - Rear, with Chevrolet Bowtie Logo, Black
Reflective Triangle
Side Window Weather Deflector - Front and Rear, No Logo, Blue (25U)
Side Window Weather Deflector - Front and Rear, No Logo, Graystone (16U)

Side Window Weather Deflector - Front and Rear, No Logo, Red (63U)
Side Window Weather Deflector - Front and Rear, No Logo, Silver (59U)
Side Window Weather Deflector - Front and Rear, No Logo, White (50U)
Side Window Weather Deflector - Front and Rear,No Logo. Smoke
Sport Tent - With Awning and Bowtie Logo, Black
Tow Hooks - Black
Tow Hooks - Chrome
Tubular Assist Steps - Oval, Chrome
Interior
First Aid Kit - Black with White GM Logo
Floor Mats - Front Carpet Replacements - No Logo, Cashmere (31i, 33i, 39i)
Floor Mats - Front Carpet Replacements - No Logo, Ebony (19i, 22i, 84i)
Floor Mats - Front Carpet Replacements - No Logo, Titanium (93i)
Floor Mats - Front Molded Carpet - With Bowtie Logo, Cashmere
Floor Mats - Front Molded Carpet - With Bowtie Logo, Ebony
Floor Mats - Front Molded Carpet - With Bowtie Logo, Titanium
Floor Mats - Front Premium All Weather - With Bowtie Logo, Ebony
Floor Mats - Rear Carpet Replacements - No Logo, Cashmere (33i, 31i)
Floor Mats - Rear Carpet Replacements - No Logo, Ebony (19i, 22i, 84i)
Floor Mats - Rear Carpet Replacements - No Logo, Titanium (83i)
Floor Mats - Rear Molded Carpet - Cashmere
Floor Mats - Rear Molded Carpet - Ebony
Floor Mats - Rear Molded Carpet - Titanium
Floor Mats - Rear Premium All Weather - No Logo, With Gold Border, Ebony
Highway Emergency Kit with GM Accessory Logo
Roadside Assistance Package
Performance
Cat-Back Exhaust System - Performance System, Semi-Polished
Cat-Back Exhaust System - Touring System, Semi-Polished
Exhaust Tip - With Bowtie Logo, Dual Wall, Angle Cut, Highly Polished
Exhaust Tip - With Bowtie Logo, Dual Wall, Straight Cut, Highly Polished
Exhaust Tip - With Bowtie Logo, Single Wall, Angle Cut, Chrome
Trailering
Hitch Ball Assembly - 1-7/8 inch Ball, 1"x2-7/8 inch Shank, 2000 lb Gross
Hitch Ball Assembly - 2" Ball, 1"x2-7/8 inch Shank for Flange Thickness between 3/4 inch to 1-7/8 inch, 5000lb Gross
Hitch Ball Assembly - 2-5/16" Ball, 1"x2-7/8" Shank for Flange Thickness between 3/4" to 1-7/8", 6000lb Gross
Hitch Ball Mount Assembly - 2" Rise, 3-1/4" Drop, 5000lb Max Load, 500lb Tongue Weight
Hitch Ball Mount Assembly - 3/4" Rise, 2"" Drop, 5000lb Max Load, 500lb Tongue Weight
Hitch Ball Mount Assembly - 4" Rise, 5-1/4" Drop, 5000lb Max Load, 500lb Tongue Weight
Hitch Receiver Cover with GM Logo for 2 inch Hitch
Locking Hitch Pin
Trailer Wire Harness Adapater - Converts 7-Pin to Accessory Power Outlet
Trailer Wire Harness Adapater - Converts Heavy Duty 7 Pin Round to Light Duty 4 Pin Flat
Wheels
20 inch Wheel - CK951 Chrome
Center Cap - With Embossed Bowtie Logo, Chrome
Center Cap - With Gold Bowtie Logo, Polished
Lug Nut - Requires Lug Nut Cap
Lug Nut Cap - Chrome

Valve Stem Cap - Chrome
Wheel Lock Kit - Chrome (4 Nuts, 1 Key)
Wheel Lock Kit - Requires Lug Nut Cap (4 Nuts, 1 Key)
Wheel Lock Package - Multipack (10pc)
Wheel Lock and Nut Package - Includes 20 Nuts, 4 Locks and 1 Key

All dimensions in inches (mm) unless otherwise stated.

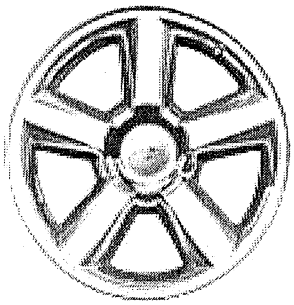
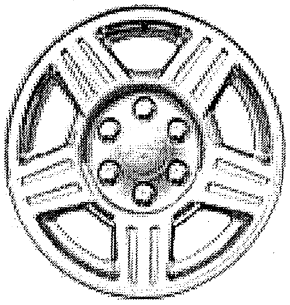
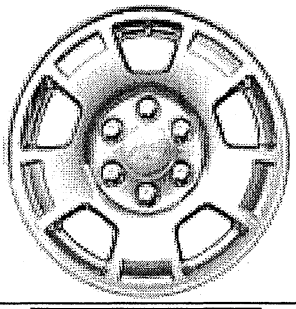
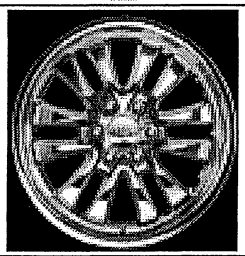
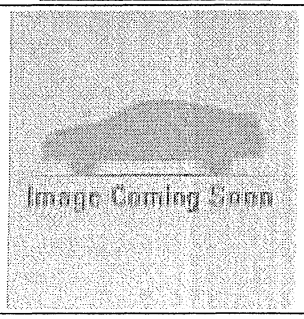


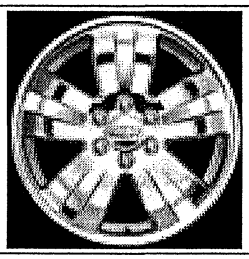
	Specifications	CC10936 2WD 1/2 Ton	CK10936 4WD 1/2 Ton
A	**Wheelbase**	130.00 (3302)	130.00 (3302)
B	**Overall length,** without rear bumper	221.30 (5621)	221.30 (5621)
	Body width	79.10 (2009)	79.10 (2009)
D	**Overall height**	76.60 (1946)	76.60 (1946)
	Head room, front	41.10 (1044)	41.10 (1044)
	Head room, rear	40.00 (1016)	40.00 (1016)
	Shoulder room, front	65.30 (1659)	65.30 (1659)
	Shoulder room, rear	65.20 (1656)	65.20 (1656)
	Hip room, front	64.40 (1636)	64.40 (1636)
	Hip room, rear	62.30 (1582)	62.30 (1582)
	Leg room, front	41.30 (1049)	41.30 (1049)
	Leg room, rear	39.10 (993)	39.10 (993)
BA	**Front bumper to axle**	38.80 (986)	38.80 (986)
	Rear bumper to axle	52.90 (1344)	52.90 (1344)
	Inside height	22.50 (572)	22.50 (572)
GF	**Ground to top of rear load floor**	31.00 (787)	31.00 (787)
	Inside width, at floor	50.00 (1270)	50.00 (1270)
	Inside length, at floor, with Midgate Closed	63.30 (1608)	63.30 (1608)
	Inside length, at floor, with Midgate Open	98.20 (2494)	98.20 (2494)
	Inside width, between wheelhousing	50.00 (1270)	50.00 (1270)

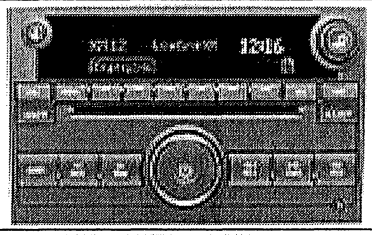
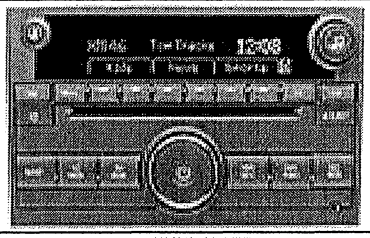
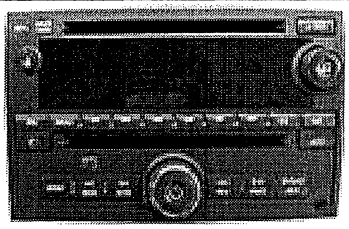
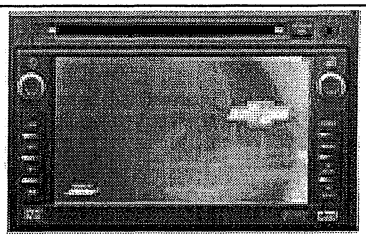
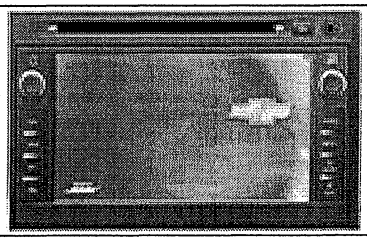
Published dimensions indicated are without optional equipment or accessories. Additional accessories or equipment ordered at the customer's request can result in a minor change in these dimensions.

	CC10936 2WD 1/2 Ton	CK10936 4WD 1/2 Ton
Specifications		
Front shock absorber diameter, in. (mm)	1.26 (32)	1.26 (32)
Front stabilizer bar diameter, in. (mm)	1.42 (36)	1.12 (28)
Rear shock absorber diameter, in. (mm)	1.26 (32)	1.26 (32)
Rear stabilizer bar diameter, in. (mm)	1.12 (28)	1.12 (28)
Turning diameter, curb-to-curb, ft. (m)	43.0 (13.1)	43.0 (13.1)
Capacities		
Front axle, lbs. (kg)	3400 (1542)	3925 (1780)
Front spring capacity, lbs. (kg)	3400 (1542)	3800 (1724)
Rear axle, lbs. (kg)	4000 (1814)	4000 (1814)
Rear spring capacity, lbs. (kg)	4000 (1814)	4000 (1814)
Top box storage volume, cu. ft. (liters)	1.7 (48.1)	1.7 (48.1)
Curb weight, lbs. (kg)	5742 (2605)	5863 (2659)
Cargo volume, cargo box, cu. ft. (liters)	45.5 (1288.6)	45.5 (1288.6)
Payload[1], lbs. (kg)	1258 (571)	1337 (606)
Gross Vehicle Weight Rating, lbs. (kg)	7000 (3175)	7200 (3266)
Front Gross Axle Weight Rating, lbs. (kg)	3400 (1542)	3800 (1724)
Rear Gross Axle Weight Rating, lbs. (kg)	4100 (1860)	4100 (1860)
Fuel capacity, approximate, gallon (liters)	31 (117)	31 (117)
Seating capacity, max. (front/rear)	3/3	3/3

1. Maximum payload capacity includes weight of driver, passengers, optional equipment and cargo.

	RCS **Wheels**, 4 - 20" x 8.5" (50.8 cm x 21.6 cm) polished aluminum
	N93 **Wheels**, 4 - 17" x 7.5" (43.2 cm x 19.1 cm) aluminum, 5-spoke, with radial grooves
	P46 **Wheels**, 4 - 17" x 7.5" (43.2 cm x 19.1 cm) aluminum, 5-spoke, with smooth surface and rectangular pockets
	ADI Available **CK945**, 20 inch Wheel - CK945 Chrome
	ADI Available **CK948**, 20 inch Wheel - CK948 Chrome

	ADI Available **CK951**, 20 inch Wheel - CK951 Chrome

	US9 **Audio system**, AM/FM stereo with MP3 compatible 6-disc in-dash CD changer, seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), automatic volume, and TheftLock
	US8 **Audio system**, AM/FM stereo with MP3 compatible CD player, seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), speed-compensated volume and TheftLock
	UVA **Audio system**, AM/FM stereo with MP3 compatible CD/DVD player, seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), speed-compensated volume, TheftLock and 2 slots, upper slot is for DVD/CD/MP3 and lower slot is for CD/MP3 only
	UVB **Audio system with navigation**, AM/FM stereo with MP3 compatible CD/DVD player and DVD-based navigation, seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), speed-compensated volume, TheftLock and voice recognition, plays CD or DVD in upper slot
	U3U **Audio system with navigation**, AM/FM stereo with MP3 compatible CD player and DVD-based navigation, seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), speed-compensated volume, TheftLock and voice recognition, plays CD only in upper slot

Maximum trailer ratings are calculated assuming standard equipped vehicle, driver and required trailering equipment. The weight of optional equipment, passengers and cargo will reduce the maximum trailer weight your vehicle can tow. 10 to 15% of the trailer weight is the recommended trailer tongue load.

Automatic Transmission Ratings with Ball Hitch

Model	(LY5) Vortec 5300 V8 gas SFI		(LC9) Vortec 5300 V8 SFI FlexFuel	
	Axle Ratio	Maximum Trailer Weight lbs. (kg)	Axle Ratio	Maximum Trailer Weight lbs. (kg)
CC10936	3.73	7200 (3266)		
	4.10	8200 (3720)		
CK10936			3.73	7000 (3175)
			4.10	8000 (3629)

Weight carrying hitch limit: 5000-lb. trailer with 600-lb. tongue weight. Weight distributing hitch sway control required over 5000 lb. Trailer weight.

Avalanche is not designed to tow 5th wheel or gooseneck trailers.

Addition of trailer tongue weight cannot cause vehicle weights to exceed Rear Gross Axle Weight Rating (RGAWR) of Gross Vehicle Weight Rating (GVWR).

Z82 Heavy-Duty Trailering Equipment Package including trailer hitch platform and trailer electrical connector must be ordered in order to achieve maximum trailer ratings.

Option Code	Description
A31	Windows, power
A95	Seats, front bucket with Custom Cloth
A95	Seats, front bucket with leather-appointed seating
AE7	Seats, front 40/20/40 split-bench with Custom Cloth
AJ1	Glass, Solar-Ray deep tinted
AN3	Seats, front bucket with leather-appointed seating
AP3	Remote vehicle starter system
AP8	Remote vehicle starter prep package
ASF	Air bags, head curtain side-impact, front and rear outboard seating positions
AU3	Door locks, power programmable
B30	Floor covering, color-keyed carpeting
B85	Moldings, bodyside, color-keyed
BVE	Assist steps, Dark Charcoal
C49	Defogger, rear-window
C5W	GVWR, 7000 lbs. (3175 kg)
C5Z	GVWR, 7200 lbs. (3266 kg)
CE1	Wipers, front intermittent, RainSense
CF5	Sunroof, power
CJ2	Air conditioning, dual-zone automatic climate control
CJ3	Air conditioning, dual-zone manual climate control
D07	Console, floor
DF5	Mirror, inside rearview
DH6	Visors, driver and front passenger illuminated vanity mirrors
DK8	Console, overhead mini
DL3	Mirrors, outside heated power-adjustable, power-folding and driver-side auto-dimming
DL8	Mirrors, outside heated power-adjustable, Black
E95	Cargo cover, rear, soft
EN4	Cargo cover, rear rigid, 3-piece composite
FE9	Emissions, Federal requirements
G80	Differential, heavy-duty locking rear
GT4	Rear axle, 3.73 ratio
GT5	Rear axle, 4.10 ratio
JF4	Pedals, power-adjustable
JL4	StabiliTrak, stability control system
K05	Engine block heater
K34	Cruise control
KG3	Alternator, 145 amps
KNP	Cooling, external transmission oil cooler
LC9	Engine, Vortec 5300 V8 SFI FlexFuel
LMG	Engine, Vortec 5300 V8 SFI FlexFuel
LY5	Engine, Vortec 5300 V8 SFI
M30	Transmission, 4-speed automatic
N86	Wheel, 17" (43.2 cm) full-size, aluminum spare
N93	Wheels, 4 - 17" x 7.5" (43.2 cm x 19.1 cm) aluminum
NB8	Emissions override
NC7	Emissions override, Federal
NE1	Emissions, Maine, Massachusetts, New York or Vermont state requirements
NP5	Steering wheel, leather-wrapped
NP8	Transfer case, electronic Autotrac

Option Code	Description
NZ4	Wheel, 17" (43.2 cm) full-size, steel spare
P46	Wheels, 4 - 17" x 7.5" (43.2 cm x 19.1 cm) aluminum
QAN	Tires, P265/70R17 touring, all-season, blackwall
QAS	Tires, P265/70R17 touring, all-season, White outlined-letter
QSS	Tires, P275/55R20, all-season, blackwall
R8G	OnStar, 1-Year Additional Safe and Sound Service
R8P	OnStar, 2-Years Additional Safe and Sound Service
R8U	OnStar, 2-Years Commercial Premium Service
R8V	OnStar, 3-Years Commercial Premium Service
R8W	OnStar, 1-Year Directions and Connections Service
R8Y	OnStar, 2-Years Directions and Connections Service
R8Z	OnStar, 3-Years Directions and Connections Service
RCS	Wheels, 4 - 20" x 8.5" (50.8 cm x 21.6 cm) polished aluminum
RFA	OnStar, 1-Year Business Vehicle Manager Service
RFB	OnStar, 2-Years Business Vehicle Manager Service
RFC	OnStar, 3-Years Business Vehicle Manager Service
SAF	Tire carrier, lockable outside spare
T74	Headlamps, dual halogen composite
T96	Fog lamps, front
U2K	XM Satellite Radio
U3U	Audio system with navigation, AM/FM stereo with MP3 compatible CD player and DVD-based navigation
U42	Entertainment system, rear seat DVD player
UD7	Rear Parking Assist
UE1	OnStar, 1-year of Safe and Sound plan
UG1	Universal Home Remote
UJ6	Tire Pressure Monitoring System
UK3	Steering wheel controls, mounted audio, Driver Information Center and cruise controls
UK6	Audio system controls, rear
UQ3	Audio system feature, 6-speaker system
UQA	Audio system feature, Bose premium 7-speaker system
US8	Audio system, AM/FM stereo with MP3 compatible CD player
US9	Audio system, AM/FM stereo with MP3 compatible 6-disc in-dash CD changer
UVA	Audio system, AM/FM stereo with MP3 compatible CD/DVD player
UVB	Audio system with navigation, AM/FM stereo with MP3 compatible CD/DVD player and DVD-based navigation
UVC	Rearview camera system
V1K	Luggage rack center rails
V43	Bumper, rear color-keyed steel
V54	Luggage rack side rails, roof-mounted, Black
V76	Recovery hooks, front, frame-mounted
VGD	Fascia, front color-keyed
VGE	Fascia, rear color-keyed
XA7	Windshield washer fluid system, heated
YF5	Emissions, California state requirements
Z55	Suspension Package, Autoride
Z82	Trailering equipment, heavy-duty
ZVL	Tire, spare P265/70R17 all-season, blackwall
ZW7	Suspension Package, Premium Smooth Ride

Updates for Avalanche

Week of 5/8/2006

Effective 5/8/2006, the following changes will be made to the Vehicle Order Guide:

- Interior section-(JF4) Pedals, power-adjustable, changed symbol from "solid box" to "A2". Also, added footnote #2 that reads "Requires (UD7) Rear Parking Assist. Required with (UVC) rearview camera system.".
- Interior section-(UVC) Rearview camera system, changed footnote #1 to read "Requires (U3U) AM/FM stereo with MP3 compatible CD player and multimedia navigation or (UVB) AM/FM stereo with MP3 compatible CD/DVD player and DVD-based navigation and (ASF) head curtain side-impact air bags. Requires (UD7) Rear Parking Assist and (JF4) power-adjustable pedals". Also, added footnote #2 that reads "Requires (U3U) AM/FM stereo with MP3 compatible CD player and multimedia navigation or (UVB) AM/FM stereo with MP3 compatible CD/DVD player and DVD-based navigation and (ASF) head curtain side-impact air bags." and applies to 3LT and 1LZ columns.
- Exterior section-(V43) Bumper, rear color-keyed steel, changed symbol from "--" to "S1" on 2LT column.
- Exterior section-(VGE) Fascia, rear color-keyed, changed symbol from "solid box" to "A1" on 2LT column.
- Exterior section-(UD7) Rear Parking Assist, changed symbol from "solid box" to "A2". Also, added footnote #2 that reads "Requires (JF4) power-adjustable pedals. Required with (UVC) rearview camera system.".

Week of 5/1/2006

Effective 5/1/2006, the following changes will be made to the Vehicle Order Guide:

- Mechanical section-(LC9) Engine, Vortec 5300 V8 SFI FlexFuel with Active Fuel Management, changed extended description to read "capable of running on unleaded or up to 85% ethanol (310 hp [231.1 kW] @ 5200 rpm, 335 lb-ft of torque [452.3 N-m] @ 4400 rpm), aluminum block".
- Specifications section-CC10936, Curb weight, lbs. changed value to 5742.
- Specifications section-CK10936, Curb weight, lbs. changed value to 5863.
- Specifications section-CC10936, Payload, lbs. changed value to 1258.
- Specifications section-CK10936, Payload, lbs. changed value to 1337.
- Specifications section-CC10936, Gross Vehicle Weight Rating, lbs. changed value to 7000.
- Specifications section-CK10936, Gross Vehicle Weight Rating, lbs. changed value to 7200.
- Specifications section-CC10936, Rear Gross Axle Weight Rating, lbs. changed value to 4100.
- Specifications section-CK10936, Rear Gross Axle Weight Rating, lbs. changed value to 4100.
- Trailering section-CC10936 with LY5 engine and 4.10 axle ratio, changed value to 8200.
- Trailering section-CK10936 with LC9 engine and 3.73 axle ratio, changed value to 7000.
- Trailering section-CK10936 with LC9 engine and 4.10 axle ratio, changed value to 8000.

Week of 4/24/2006

Effective 4/24/2006, the following changes will be made to the Vehicle Order Guide:

- Interior section-(U2K) XM Satellite Radio, changed extended description to read " With a wide variety of programming, XM has something to excite any driver. Whether you want to be entertained or informed, to laugh, think, or sing, XM has the perfect channel for you - coast-to-coast, and in digital-quality sound. 3 trial months - no obligation". Also, changed footnote to read "Available in the 48 contiguous United States. Required $12.95 monthly subscription sold separately. All fees and programming subject to change. Subscription subject to customer agreement. For more information, visit gm.xmradio.com.".

Week of 4/17/2006

Effective 4/17/2006, the following changes will be made to the Vehicle Order Guide:

- Interior section-(CF5) Sunroof, power, tilt-sliding, changed footnote #1 to read "Requires (CJ2) dual-zone automatic air conditioning and (UG1) Universal Home Remote.". Also, changed symbol from "A1" to "A" in 2LT, 3LT and 1LZ columns.
- Interior section-(UG1) Universal Home Remote, changed footnote #1 to read "Required and only available with (CF5)

navigation, changed footnote to read "Includes (UQA) Bose premium 7-speaker system. Not available with (U42) rear seat DVD player entertainment system. Only available in the 48 contiguous United States.".

- Interior section-(UVB) Audio system with navigation, AM/FM stereo with MP3 compatible CD/DVD player and DVD-based navigation, changed footnote to read "Requires (U42) rear seat DVD player entertainment system. Includes (UQA) Bose Premium 7-speaker system. Only available in the 48 contiguous United States.".

Week of 2/27/2006

Effective 2/27/2006, the following changes will be made to the Vehicle Order Guide:

- Interior section-(US9) Audio system, AM/FM stereo with MP3 compatible 6-disc in-dash CD changer, changed extended description to read " seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), automatic volume, and TheftLock".
- Interior section-(UQ3) Audio system feature, changed extended description to read "6-speaker system".
- Interior section-(UQA) Audio system feature, Bose, changed extended description to read "premium 7-speaker system with subwoofer in center console".
- Interior section-(UVA) Audio system, AM/FM stereo with MP3 compatible CD/DVD player, changed description to read "Audio system, AM/FM stereo with MP3 compatible CD/DVD player, seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), speed-compensated volume, TheftLock and 2 slots, Upper slot is for DVD/CD/MP3 and lower slot is for CD/MP3 only". Also, changed footnote to read "Requires (UQA) Bose premium 7-speaker system and (U42) rear seat DVD player entertainment system. Not available with (AE7) front 40/20/40 split-bench with Custom Cloth seats.".
- Interior section-(U3U) Audio system with navigation, AM/FM stereo with MP3 compatible CD player and multimedia navigation, changed description to read "Audio system with navigation, AM/FM stereo with MP3 compatible CD player and DVD-based navigation, seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), speed-compensated volume, TheftLock and voice recognition, plays CD only in upper slot". Also, changed footnote to read "Includes (UQA) Bose premium 7-speaker system. Not available with (U42) rear seat DVD player entertainment system.".
- Interior section-(UVB) Audio system with navigation, AM/FM stereo with MP3 compatible CD/DVD player and DVD-based navigation, changed extended description to read ", seek-and-scan, digital clock, auto-tone control, Radio Data System (RDS), speed-compensated volume, TheftLock and voice recognition, plays CD or DVD in upper slot". Also, changed footnote to read "Requires (U42) rear seat DVD player entertainment system. Includes (UQA) Bose Premium 7-speaker system.".
- Interior section-(D07) Console, floor with storage area, changed extended description to read "cup holders and integrated second row audio controls".
- Interior section-(DK8) Console, overhead mini with map lights and rear seat HVAC controls, changed description to read "Console, overhead mini with map lights".
- Interior section-(UK3) Steering wheel controls, mounted audio and Driver Information Center controls, changed description to read "Steering wheel controls, mounted audio, Driver Information Center, and cruise controls, includes Driver Information Center controls on instrument panel to right of steering wheel".
- Exterior section-(DL8) Mirrors, outside heated power-adjustable, Black, changed footnote #1 to read "Mirror caps are Black.". Also, changed footnote #2 to read "Mirror caps are color-keyed.".
- Exterior section-(DL3) Mirrors, outside heated power-adjustable, changed extended description to read "power-folding and driver-side auto-dimming, color-keyed with integrated turn signal indicators, ground illumination and curb-tilt".
- Exterior section-(N93) Wheels, 4 - 17" x 7.5" (43.2 cm x 19.1 cm) bright aluminum, changed description to read "Wheels, 4 - 17" x 7.5" (43.2 cm x 19.1 cm) aluminum, 5-spoke with radial grooves".
- Exterior section-(P46) Wheels, 4 - 17" x 7.5" (43.2 cm x 19.1 cm) bright aluminum, changed description to read "Wheels, 4 - 17" x 7.5" (43.2 cm x 19.1 cm) aluminum 5-spoke, with smooth surface and rectangular pockets".
- Mechanical section-(Z82) Trailering equipment, heavy-duty, changed extended description to read "includes trailering hitch platform, 7-wire harness with independent fused trailering circuits mated to a 7-way sealed connector, and (VR4) 2" trailering receiver".

Week of 2/27/2006

Effective 2/27/2006, the following changes will be made to the Vehicle Order Guide:

power sunroof.". Also, moved RPO from Reference Only column to Free Flow Column.

- Mechanical section-Deleted (C5U) 6800 lbs. GVWR entirely from Order Guide.
- Mechanical section-(C5W) 7000 lbs. GVWR, changed footnote to read "Requires CC10936 models.".
- Mechanical section-Added (C5Z) GVWR, 7200 lbs. (3266 kg). It is standard on all columns with a footnote that reads "Requires CK10936 models.".
- Engine-Axle section-Deleted (C5U) 6800 lbs. GVWR entirely from Order Guide.
- Engine-Axle section-CC10936 with (LY5) Engine and (C5W) 7000 lb. GVWR, changed symbol from "--" to "S".
- Engine-Axle section-CC10936 with (LMG) Engine and (C5W) 7000 lb. GVWR, changed symbol from "--" to "S".
- Engine-Axle section-CK10936 with (LC9) Engine and (C5W) 7000 lb. GVWR, changed symbol from "S" to "--".
- Engine-Axle section-Added (C5Z) 7200 lb. GVWR. It is not available on CC10936 models and standard on CK10936 models.

Week of 4/10/2006

Effective 4/10/2006, the following changes will be made to the Vehicle Order Guide:

- Mechanical section-(LY5) Engine, Vortec 5300 V8 SFI with Active Fuel Management, changed extended description to read "(320 hp [238.6 kW] @ 5200 rpm, 340 lb-ft of torque [459.0 N-m] @ 4200 rpm), iron block".
- Mechanical section-(LMG) Vortec 5300 V8 SFI FlexFuel with Active Fuel Management, changed extended description to read "capable of running on unleaded or up to 85% ethanol (320 hp [238.6 kW] @ 5200 rpm, 340 lb-ft of torque [459.0 N-m] @ 4200 rpm), iron block".

Week of 4/3/2006

Effective 4/3/2006, the following changes will be made to the Vehicle Order Guide:

- Mechanical section-(KNP) Cooling, external transmission oil cooler, changed footnote to read "Required when (GT5) 4.10 rear axle ratio is ordered. Not available with (GT4) 3.73 rear axle ratio.".

Week of 3/27/2006

Effective 3/27/2006, the following changes will be made to the Vehicle Order Guide:

- Interior section-(U42) Entertainment system, changed footnote to read "Requires (UVA) AM/FM stereo with MP3 compatible CD/DVD player or (UVB) AM/FM stereo with MP3 compatible CD/DVD player with Navigation radio, multimedia with base navigation. Requires (CJ2) dual-zone automatic air conditioning. Also, moved RPO from Reference only column to Free Flow column.
- Interior section-(U3U) Audio system with navigation, AM/FM stereo with MP3 compatible CD player, changed footnote to read "Requires (UQA) Bose premium 7-speaker system. Not available with (U42) rear seat DVD player entertainment system. Only available in the 48 contiguous United States.".
- Interior section-(UVB) Audio system with navigation, AM/FM stereo with MP3 compatible CD/DVD player, changed footnote to read "Requires (U42) rear seat DVD player entertainment system and (UQA) Bose Premium 7-speaker system. Only available in the 48 contiguous United States.".
- Mechanical section-(KNP) Cooling, external transmission oil cooler, changed footnote to read "Required when (GT5) 4.10 rear axle ratio is ordered. Also, moved RPO from Reference only column to Free Flow column.
- Mechanical section-(GT5) Rear axle, 4.10 ratio, changed footnote to read "Requires (G80) heavy-duty locking rear differential. Requires (KNP) external transmission oil cooler.".
- Exterior section-Added (V43) Bumper, rear color-keyed steel. It is standard on 1LS and 1LT only with a footnote that reads "Not available with (UD7) Rear Parking Assist.".
- Exterior section-(VGE) Fascia, rear color-keyed, changed symbol from "S" to "solid box" on 2LT, 3LT and 1LZ columns.

Week of 3/6/2006

Effective 3/6/2006, the following changes will be made to the Vehicle Order Guide:

- Interior section-(U3U) Audio system with navigation, AM/FM stereo with MP3 compatible CD player and multimedia

- Mechanical section-(NP8) Transfer case, electronic Autotrac with push-button controls, changed description to read "Transfer case, electronic Autotrac with rotary control".
- Color and Trim section-Changed footnote #4 to read "Available for production starting January 2007.".

Week of 2/20/2006

Effective 2/20/2006, the following changes will be made to the Vehicle Order Guide:

- Exterior section-(BVE) Assist steps, Dark Charcoal, changed symbol from "A" to "S" in all columns. Also, moved RPO from Free Flow to Reference Only column.