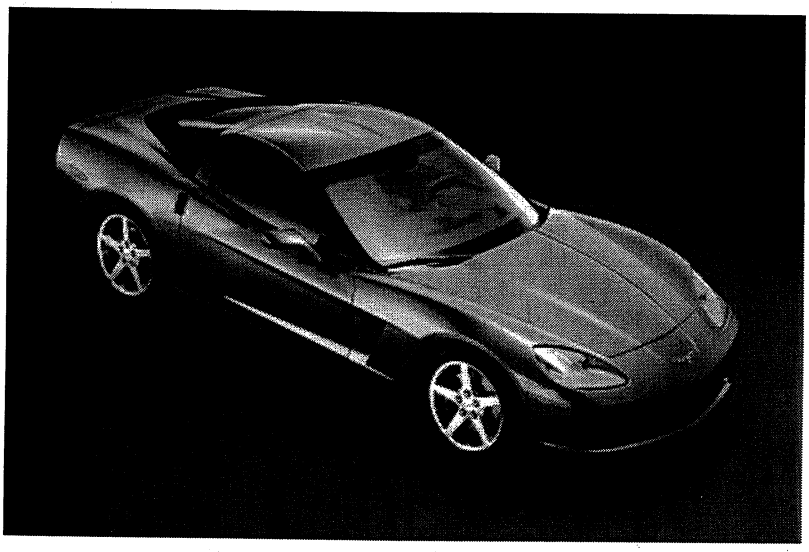
Chevrolet

Corvette



2005

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Product Information

Sixth-Generation Corvette Melds Power, Passion, Precision

Marking the sixth generation of its legacy, the 2005 Chevrolet Corvette delivers more power, passion and precision to reach a new standard of performance car excellence.

The 2005 Corvette is more competition-influenced than any previous Corvette. The goal was a performance car that would be at home in virtually any environment. That means raw performance, improved ride comfort, a precisely built and technically sophisticated interior and contemporary new body.

"The sixth generation represents a comprehensive upgrade to the Corvette," said Dave Hill, Corvette chief engineer and GM Performance Cars vehicle line executive. "Our goal was to create a Corvette that does more things well than any other performance car."

The car features dramatic new styling, the new 6.0L V-8 engine that produces 400 horsepower and 400 lb.-ft. of torque (298 kw and 542 Nm), a revised suspension and more powerful brakes. It delivers extreme performance capabilities and offers value, style, quality and comfort.

The 2005 Coupe production begins in the summer of 2004, with the Convertible following in the fall of 2004. European sales begin in October, and other regions by early 2005. All models will be built in Bowling Green, Ky.

Exterior styling

The Corvette combines classic cues with an expressive new design. While the styling team used the latest advanced computer-aided design techniques, they relied heavily on traditional hand sculpting. Sculptors pored over every millimeter of the car's surface. The aerodynamic development combined digital simulations, Corvette Racing experience and more than 400 hours of wind tunnel testing.

The driving force behind the exterior was to keep it fresh, yet distill the passion exemplified by the classic mid-year Corvettes of 1963-1967.

The new Corvette is 5 inches (127 mm) shorter and about 1 inch (25 mm) narrower than its predecessor. Larger wheels (18-inch in front, 19-inch in rear) are topped by dramatic fender forms. Exposed headlamps (not seen on Corvettes since 1962) combine with the grille to create a stronger "face" on the car. The fixed Xenon High-Intensity Discharge lamps provide superior lighting performance.

The Coupe's removable-roof panel is 15 percent larger, yet offers the same structural stiffness as C5's while weighing just 1 pound (0.45 kg) more. The tapered rear deck and fascia improve high-speed performance. The lean rear design sports round taillamps and center-exit exhaust.

The ability to keep lines and surfaces smooth was supported by technology. For example, the Keyless Access system replaces traditional mechanical door and hatch handles with solenoids and electronic actuators.

At 0.28 coefficient of drag, the C6 is the most aerodynamic Corvette ever, and has improved anti-lift characteristics that improve high-speed stability.

The Corvette Convertible

The 2005 Corvette features an optional power-operated soft top. An easy-to-operate manual top remains standard. Both configurations use a five-layer fabric that conceals the underlying structure for a good top-up appearance, plus it helps preserve the car's excellent aerodynamics and reduces road noise.

Every option available on the Coupe can be had on the Convertible, including features new to the Corvette such as OnStar, XM Satellite Radio (continental U.S. only) and DVD navigation system.

OnStar is the leading provider of in-vehicle safety, security and information services in the United States and Canada. Using the GPS satellite network and wireless technology, OnStar features core safety services and OnStar Personal Calling that allows drivers to make and receive hands-free, voice-activated phone calls using a powerful three-watt analog system and external antenna for greater reception.

Power

The 2005 Corvette features the new 6.0L V-8 LS2 engine based on GM's Gen IV small-block family. The LS2 is the most powerful standard small-block engine ever offered in Corvette, and features:

- All-new 319-T5 aluminum deep-skirt block casting with cast-in-place iron cylinder bore liners and cross-bolted main caps
- Cylinder head design derived from the C5 Z06
- Camshaft lift increased to take advantage of increased head flow
- Revised exhaust manifolds are 34 percent lighter
- Compression raised to 10.9:1
- More powerful engine controller incorporates all electronic throttle control (ETC) functions

With base curb weight starting at 3,179 pounds/1,442 kg (Coupe) and 3,199 pounds/1,451 kg (Convertible) the new Corvette is significantly lighter than its predecessor.

The car is capable of 186 mph (300 km/h), faster than any production Corvette in history. It reaches zero to 100 km/h (62 mph) in 4.2 seconds, and in 4.1 seconds with the optional Z51 Performance Package, and covers the quarter-mile in 12.6 seconds at 114 mph (183 km/h).

Shifting gears

The Tremec six-speed manual features improved shifting characteristics thanks to numerous upgrades, including new synchronizers that reduce travel by 10 percent, and a redesigned shifter lever.

The Tremec is available with two sets of ratios. The more aggressive gear set is reserved for Corvette's Z51 Performance Package and is tailored with numerically higher gears to improve acceleration. Also, a numerically lower fifth gear gives the Z51 better fuel efficiency and a higher top speed than base models. To increase durability in sustained high-speed situations, the Z51 and the base European manual-transmission models have a transmission cooler.

The Hydra-Matic 4L65-E automatic transmission is an upgraded version of the C5's 4L60-E, strengthened and revised to accommodate the LS2's torque. It includes GM's advanced Performance Algorithm Shifting, which automatically selects the optimal gear for a given driving condition.

To beef up the internals, a five-pinion planetary gear set was added – replacing a four-pinion gear set. The extra gear reduces friction and loads carried by all the gears. For protection from the high temperatures that are generated by high speed, a four-plate oil cooler has been added.

Settle inside

The passion of the exterior's design is reflected in an all-new interior. Even with the car's more compact exterior dimensions, the new interior has just as much usable room – including class-leading cargo space that can swallow two golf bags. Greatly improved materials, craftsmanship and functionality help deliver premium quality meant to enhance performance driving.

The theme was inspired by Corvette's dual-cockpit heritage, with a flowing, wraparound upper feature line. The result lends spaciousness to the passenger and a nestled cluster pod for the driver.

The instrument panel and doors are covered with cast-skin foam-in-place trim that looks like a leather-wrapped, padded panel. It is warm and inviting and has double the life of conventional trim materials. Aluminum trim adds richness.

An AM/FM radio with CD player and MP3 capability is standard. New technology enhances conventional radio reception. An improved optional Bose audio system with an in-dash six-disc changer and XM Satellite Radio (continental U.S. only) add to the choices available to the audiophile owner.

A full-function OnStar system is available, and for the first time, Corvette offers onboard navigation as an option. Using a 6.5-inch (165 mm) color touch-screen display, the DVD-based system contains all the map data for the United States and Canada on one disc.

Chassis

Overall vehicle weight is significantly reduced, despite mass-increasing features such as larger wheels and tires, more robust brakes and increased body acoustics. It also delivers a quieter, more pleasing ride.

The car retains the hydroformed steel rail backbone structure, which features cored composite floors, an enclosed center tunnel, rear-mounted transmission and aluminum cockpit structure

Suspension cradles, control arms, knuckles, springs, dampers, bushings, stabilizer bars and steering gear have all been redesigned. New Goodyear Extended Mobility Tires (EMT) take advantage of the latest sidewall design and compound technology for run-flat capabilitie

Three suspension choices allow drivers to choose the setup that best suits their driving style. The standard suspension is tuned for a balance of ride comfort and precise handling. Corvette is now more poised at even higher handling levels, yet easier to driv

The optional F55 Magnetic Selective Ride Control suspension features magneto-rheological dampers able to detect road surfaces and adjust the damping rates to those surfaces almost instantly for optimal ride control. The system has been improved to deliver more differentiation between the system's "Tour" and "Sport" settings.

The Z51 Performance Package brings Coupe performance very close to the widely admired C5 Z06. The Z51 offers more aggressive dampers and springs, larger stabilizer bars, and larger cross-drilled brake rotors (13.4 inches/340 mm in front and 13 inches/330 mm in rear) for optimum track performance while still providing a comfortable ride.

With each suspension, three standard dynamic chassis control systems – anti-lock braking, traction control, and Active Handling – operate in concert. In all, the new dynamic chassis control systems are smarter, less intrusive and more adept at making the total driving experience precisely what drivers have come to expect from their Corvette.

The Next Generation of Corvette Accessories

DETROIT – The sixth-generation 2005 Chevrolet Corvette can turn heads by simply standing still. Add to that an all-new generation of accessories and the result is a Corvette enthusiast's dream.

While designing the 2005 Corvette's expressive new muscular form, GM took it one step further and integrated accessories into the vehicle development. Corvette Chief Engineer and Vehicle Line Executive David Hill worked with the accessories team at the onset of the Corvette design process. "All Genuine Corvette Accessories are engineered to meet strict OEM quality standards," said Hill. "The result is an array of accessories with the best fit, best function and most tailored appearance for the Corvette." GM's design studio created a genuine Corvette accessory logo that will be featured on many of the new accessories.

It's all about personalization. Corvette owners can customize the appearance of their vehicles by alternating the standard ebony pieces with body-color trim pieces. Body-color accessories, including interior trim, a center high mounted stop lamp, license plate holders and exterior door handles, offer 2005 Corvette owners an extra dose of vehicle personalization. There are also color-keyed interior options for the shift knob and boot, and park brake handle and boot. A 10-spoke wheel will be offered in multiple finishes and aluminum sill plates coordinate with the standard metal interior accents. "Such high-level integration with the vehicle ensures harmony between the vehicle and the accessories," said Vicki DeGrace, Corvette Accessory Program manager. "Genuine Corvette Accessories were designed to enhance the appearance and meet customer needs."

To increase storage space, GM has designed a storage tray for the coupe and a storage pouch that works in both the coupe and convertible. A windbreak reduces air turbulence when the Corvette is in top-down cruising mode.

"Genuine Corvette Accessories offer the peace of mind of a GM warranty – either 36 months/36,000 miles on installed parts, or 12 months/12,000 miles on over-the-counter sales," said DeGrace. "The

advantages of Genuine Corvette Accessories are clear: most tailored appearance, OEM quality, and the GM warranty."

Available at Chevrolet dealers

For a complete list of Chevy Accessories and to find out about more ways to personalize the 2005 Corvette , please visit www.chevyaccessories.com or call toll-free 866-901-9001 to speak to one of GM's knowledgeable accessory agents. All Chevrolet accessories can be purchased through Chevrolet dealerships.

GM parts and accessories are sold under the GM, GM Goodwrench, GM Performance Parts and ACDelco brands through GM Service and Parts Operations. GM engines and transmissions are marketed through GM Powertrain.

New For 2005

- All-new performance car in coupe and convertible body styles
- Standard: 6.0-L V-8 LS2 engine producing 400 horsepower and 400 lb.-ft. of torque (298 kw and 542 Nm)
- Three suspension systems, available F55 Magnetic Selective Ride Control, and Z51 Performance Package
- Anti-lock braking system, traction control, Active Handling System
- Extended mobility tires (run flat), Keyless Access and Start system, AM/FM/CD/MP3 audio system
- New options: OnStar, DVD-based navigation system, dual-mode head up display
- Rigid body structure provides exceptional handling and interior quietness
- Fresh design inside and out

Model Lineup

	Engine	Transmissions		
	LS2 6.0L V-8	4-spd auto (Hydra-Matic 4L65-E)	6-spd man Tremec T56	6-spd man Tremec T56 with Z51
Corvette Coupe	s	o	s	o
Corvette Convertible	s	o	s	o

Standard s
Optional o
Not available –

Specifications

Overview			
Models:	Chevrolet Corvette – Coupe and Convertible		
Body styles / driveline:	two-door hatchback coupe with removable roof and soft-top convertible rear-drive, front-engine		
Construction:	composite body panels, hydroformed steel frame with aluminum and magnesium structural and chassis components		
Manufacturing location:	Bowling Green, Kentucky		
Engine	**6.0L V-8 LS2**		
Displacement (cu in / cc):	364 / 5967		
Bore & stroke (in / mm):	4 x 3.62 / 101.6 x 92		
Block material:	cast aluminum		
Cylinder head material:	cast aluminum		
Valvetrain:	OHV, 2 valves per cylinder		
Fuel delivery:	SFI (sequential fuel injection)		
Compression ratio:	10.9:1		
Horsepower (hp / kw @ rpm):	400 / 298 @ 6000		
Torque (lb-ft / Nm @ rpm):	400 / 542 @ 4400		
Recommended fuel:	93 octane recommended, not required		
Maximum engine speed (rpm):	6500		
Estimated fuel economy:			
MPG (city / hwy / combined)	automatic: 18 / 25 / 21 manual: 19 / 28 / 23		
MPIG (city / hwy / combined)	automatic: 22 / 35 / 26 manual: 21 / 37 / 26		
L/100km (city / hwy / combined)	automatic: 12.8 / 8.1 / 10.7 manual: 13.2 / 7.6 / 10.7		
Transmissions	**Hydra-Matic 4L65-E**	**Tremec T56 6-speed manual**	**Tremec T56 6-speed manual, w/ optional Z51 Sport Package**
Type:	four-speed automatic, with Performance Algorithm Shifting	6-speed manual	6-speed manual
Gear ratios (:1):			
First:	3.06	2.66	2.97
Second:	1.63	1.78	2.07
Third:	1.00	1.30	1.43
Fourth:	0.70	1.00	1.00
Fifth:	-	0.74	0.71
Sixth:	-	0.50	0.57
Reverse:	2.29	2.90	3.28
Final drive ratio:	std: 2.73; opt: 3.15	3.42	3.42

Chassis/Suspension		
Front:	short/long arm (SLA) double wishbone, cast aluminum upper & lower control arms, transverse-mounted composite leaf spring, monotube shock absorber	
Rear:	short/long arm (SLA) double wishbone, cast aluminum upper & lower control arms, transverse-mounted composite leaf spring, monotube shock absorber	
Traction control:	electronic traction control, Active Handling	
Steering type:	speed sensitive, magnetic power-assisted rack-and-pinion	
Steering ratio:	16.1:1	
Steering wheel turns, lock-to-lock:	TBD	
Turning circle, curb-to-curb (ft/m):	39 / 12	
Brakes		
Type:	power-assisted disc with ABS, front and rear	
Rotor diameter x thickness (in / mm):	front: 12.8 x 1.26 / 325 x 32 rear: 12 x 1 / 305 x 26 Z51 Performance Package: front: 13.4 x 1.26 / 340 x 32 rear: 13 x 1 / 330 x 26	
Wheels/Tires	**Std. & Magnetic Selective Ride Control**	**Z51 Sport Package**
Wheel size:	front: 18 inch x 8.5 inch rear: 19 inch x 10 inch	front: 18 inch x 8.5 inch rear: 19 inch x 10 inch
Tires:	Goodyear Eagle F1 GS Extended Mobility front: P245/40ZR18 rear: P285/35ZR19	Goodyear Eagle F1 SC Extended Mobility Asymmetric Tread front: P245/40ZR18 rear: P285/35ZR19

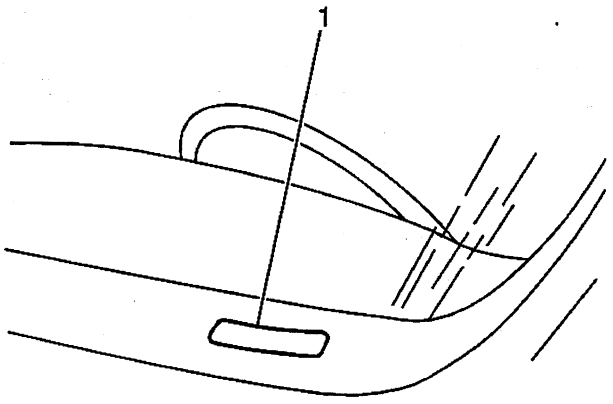
Dimensions

Exterior	
Wheelbase (in / mm):	106 / 2686
Overall length (in / mm):	175 / 4435
Overall width (in / mm):	73 / 1844
Overall height (in / mm):	49 / 1246
Track (in / mm):	front: 62 / 1577 rear: 61 / 1542
Base curb weight (lbs / kg):	Coupe: 3179 / 1442 Convertible: 3199 / 1451
Weight distribution (% frnt / rear):	51 / 49
Interior	
Seating capacity (front / rear):	2 / 0
Interior volume (cu ft / L)	52 / 1475
Head room (in / mm):	38 / 962
Leg room (in / mm):	43 / 1093
Shoulder room (in / mm):	55 / 1403
Hip room (in / mm):	54 / 1363

Capacities	
Cargo volume (hatchback/trunk area) (cu ft / L):	Coupe: 22 / 634 Convertible top up: 11 / 295 top down: 5 / 144
Fuel tank (gal / L):	18 / 68.1
Engine oil (qt / L):	5.5 / 5.2

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 (I/P) and can be seen through the windshield from the outside of the vehicle.

The last five digits of the assembly plant sequential number are stamped onto the rear side of the front sill (tie bar). This number is the same as the last five digits on the VIN plate. The VIN plate also has bar code characteristics.

Position	Definition	Character	Description
1	Country of Origin	1	United States
2	Manufacturer	G	General Motors
3	Division	1	Chevrolet
4-5	Carline/Series	Y/Y	Corvette
6	Body Type	1 2 3	37 - Coupe, Two Door Northback, Special 07 - Coupe, Two Door Plainback 67 - Coupe, Two Door Convertible
7	Restraint System	2	Active (Manual) Belts with Driver and Passenger Inflatable Restraint System
		4	Active (Manual) Belts with Driver and Pass Inflatable Restraints (Frontal & Side)
8	Engine	U	RPO LS2, V8, 6.0L, aluminum, SFI
9	Check Digit	--	Check Digit
10	Model Year	5	2005
11	Assembly Plant	5	Bowling Green
12-17	Plant Sequence Number	100001	Plant Sequence Number

VIN Derivative

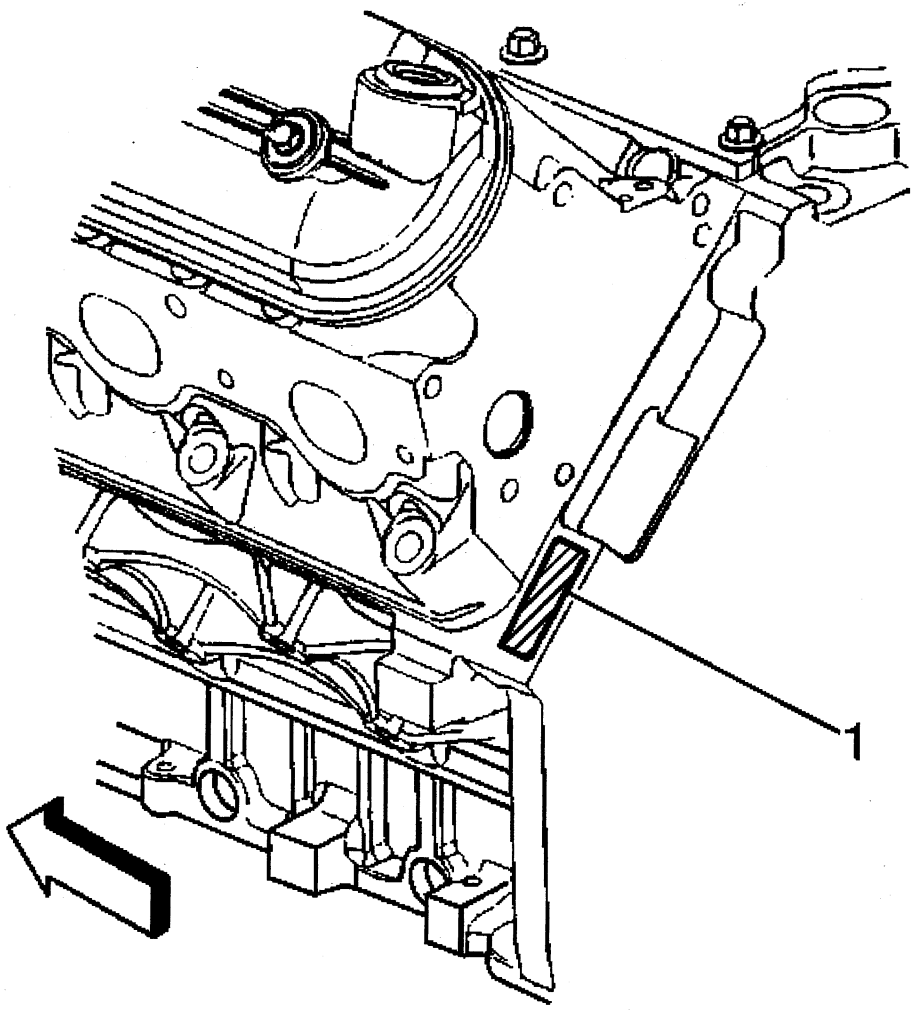
All engines and transmissions are stamped or laser etched with a partial vehicle identification number (VIN), which was derived from the complete VIN. A VIN derivative contains the following nine positions:

Position	Definition	Character	Description
1	GM Division Identifier	1	Chevrolet
2	Model Year	5	2005
3	Assembly Plant	5	Bowling Green, KY
4-9	Plant Sequence Number	100001	--

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

Engine ID and VIN Derivative Location 6.0L

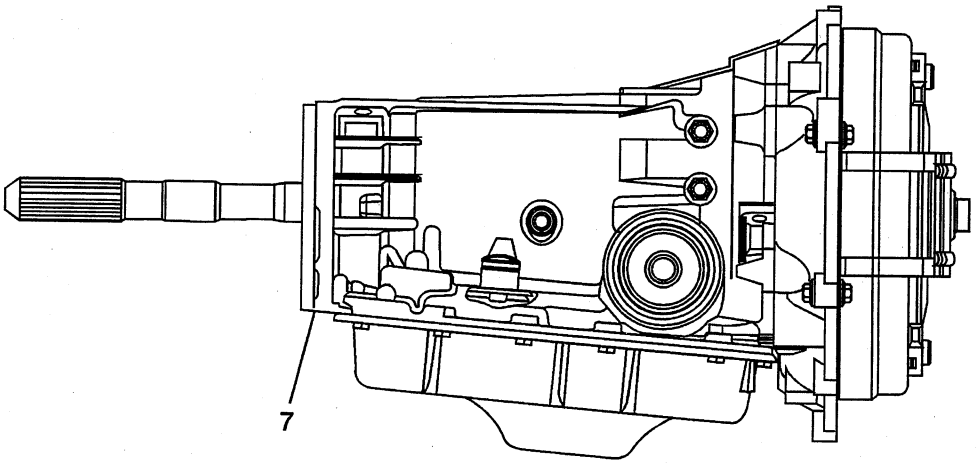


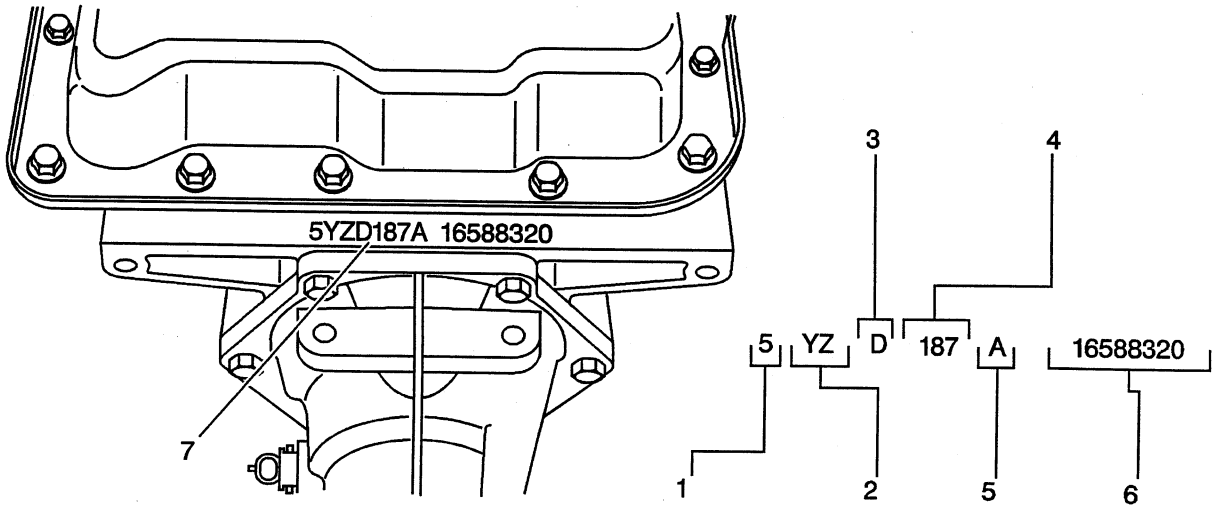
The vehicle identification number (VIN) is located on the left side rear of the engine block (1) and is typically a nine digit number stamped or laser-etched onto the engine at the vehicle assembly plant.

- 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 six digits of the VIN.

Transmission ID and VIN Derivative Location

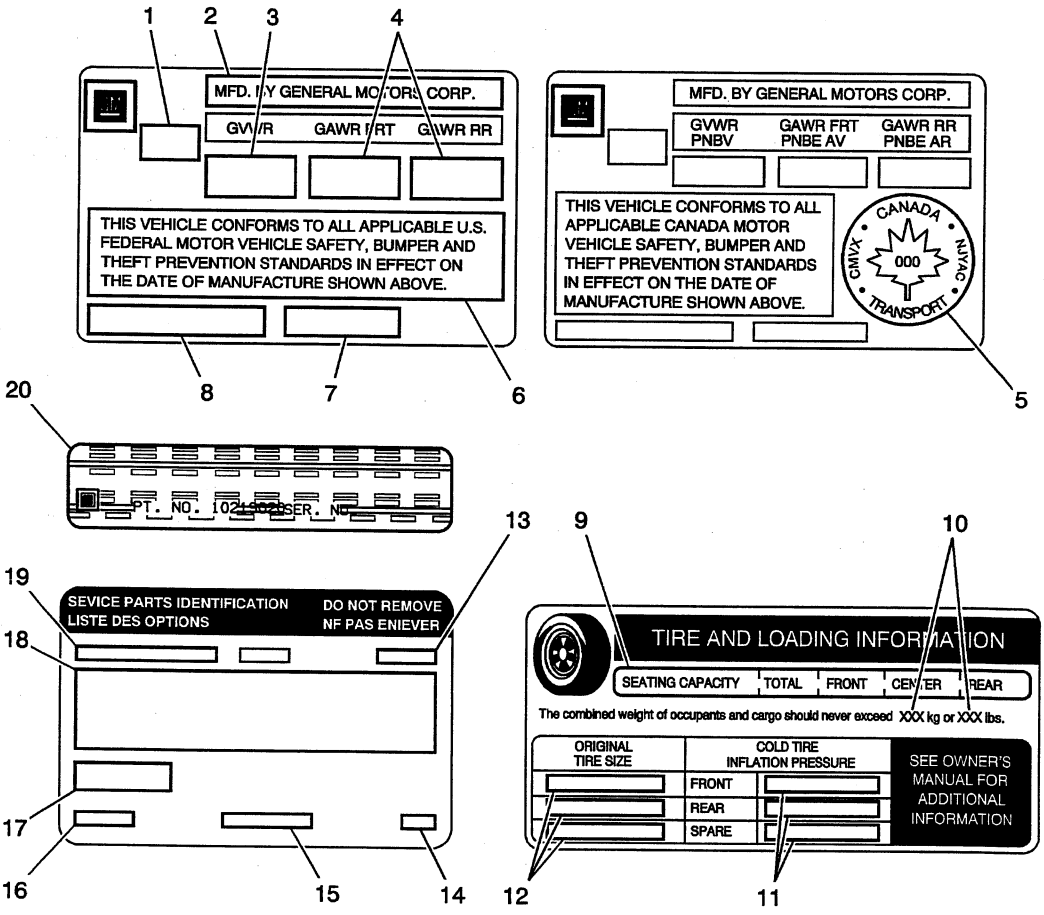
4L60-E Automatic Transmission ID Number Location





(1) 5 = 2005
(2) Model
(3) Hydra-Matic 4L60-E
(4) Julian Date or Day of the Year
(5) Shift Built, A, B, J = First Shift; C, H, W = Second Shift
(6) Serial No.
(7) Transmission ID Location
(7) Transmission ID Location

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



Callout	Description
Vehicle Certification Label	
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 GVW must not exceed the GVWR. Include the following items when figuring the GVW: The base vehicle weight (factory weight) The weight of all vehicle accessories The weight of the driver and the passengers 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 in the rear compartment under the spare tire cover. 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 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 manufacturer'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.

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
AAB	Memory, Driver Convenience Package
AG2	Adjuster Passenger ST, Power Multi-Directional
AJ7	Restraint System Seat, Inflatable, Driver and PASS, FRT and Side
AK5	Restraint System Seat, Inflatable, Driver and PASS
AQ9	Seat, FRT BKT, Luxury
AR9	Seat, FRT BKT, Deluxe
AU5	Lock Control, Entry Remote Entry, Low Power
AU8	Lock Control, Entry Remote Entry, Specific Frequency
AX4	Restraint Conversion, Seat Belt, Manual, European
BGR	Plant Code, Bowling Green, KY, USA
BV7	Bumper Provisions Front and Rear, Canadian Requirements
B4H	Modification, Noise Control, Export
CC3	Roof, Hatch, Removable Panels, Plastic
CE4	Washer, Headlamp, High Pressure
CF7	Roof, Sun, Removable, Non-Transparent
CJ2	HVAC System, Air Conditioner, FRT, Automatic Temperature Control, Auxiliary Temperature Control
CM7	Roof, Convertible, Folding, Power
C2L	Roof, Package, Dual Removable
DD0	Mirror, Outside, LH & RH, Remote Control, Electric, Heated, Light Sensitive
DD8	Mirror, Inside, R/V Light Sensitive
DL5	Decal Roadside Service Information
DL8	Mirror Outside, LH & RH, Remote Control, Electric, Heated
D42	Shade, RR Compartment
FE1	Suspension System, Soft Ride
FE2	Suspension System Ride, Handling
FE3	Suspension System, Sport
FE9	Certification, Emission, Federal
GB9	Label, Limited, Consignment-Delete
GU2	Axle Rear-2.73 Ratio
GU6	Axle Rear-3.42 Ratio
G90	Axle Rear-3.15 Ratio
JL5	Control, Manual Transmission, First To Fourth Gear Skip Shift
JL9	Brake System, Power, Front and Rear Disc, Antilock, 4-Wheel
J55	Brake system, Heavy Duty
KA1	Heater, Seat, FRT
KNP	Cooling System, Transmission, HD
KNR	Cooling System, Axle-Limited Slip Differential
K05	Heater, Engine Block
KPS	Cooler, Oil, Engine
K63	Generator-110 AMP
LS2	Engine, Gas, 8 CYL, 6.0L, SFI, Aluminum, GM
MM6	Transmission, Manual 6 SP, Tremec, 85 MM, 2.66 1st, 0.05 6th O/D
MN6	Merchandised Transmission, Manual 6 SPD Provisions
MX0	Merchandised Transmission, Automatic Provisions O/D
MZ6	Transmission, Manual 6 SPD, Tremec, 85MM, 2.97 1st, 0.71 5th, 0.57 6th O/D
M32	Transmission, Auto 4 SPD, HMD, 4L60-E, Electronic, HD

RPO	Description
NA3	Emission System, Japan
NE1	Certification-Emission, Geographically Restricted Registration For Vehicles Up To 14,000 GVW (Use 2003 MDL YR)
NF9	Emission System General OBD MIL Suppression
NG1	Certification-Emission, Geographically Restricted Registration For Vehicles Up To 6,000 LBS GVW
NK4	Steering Wheel-Sport Leather
NP7	Steering Column, EEC Approved
NT4	Emission System-EEC 05
NT9	Emission System- Federal, Tier 2 Phase Out
NU4	Emission System-California LEV2 Plus
N37	Steering Wheel-Tilt, Telescoping
QG6	Wheel-18 x 8.5 FRT & 19 x 10 RR, Aluminum, Styled
QG7	Wheel-18 x 8.5 FRT & 19 x 10 RR, Polished
T62	Lamp System-Daytime Running -Delete
T79	Lamp-FOG, RR, CHMSL-LED, Rear Lamps-Incandescent
T84	Head Lamps RH Rule of the Road, E Mark
T85	Headlamps, LH Rule of the Road, E Mark
T90	Lamps, Signaling & Marker, Front, Export
T93	Lamp-Tail & Stop, Special
UA2	Theft Deterrent System Export Specific
UD4	Alarm, Vehicle Speed, 120 km/h
UE1	Communication System Vehicle, G.P.S. 1
UG1	Opener- Garage Door Universal
UH3	Indicator-Low Tire Pressure , VAR 2
UJ6	Indicator-Low Tire Pressure
UJ9	Indicator-Low Tire Pressure , VAR 1
UK1	Frequencies-Japanese
UL2	Frequencies-European
US3	Antenna-Diversity
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, CD, AUTO TONE Control, CLOCK, ETR, MP3
UV6	Display Head Up
U19	Speedometer-Instrument Cluster, KILO & Miles, KILO Odometer
U2K	Digital Audio System S-Band
U3U	Radio-AM/FM Stereo, Seek/Scan, DVD, CD, CLOCK, ETR, Navigation, Voice REC, MP3
U3Z	Radio-AM/FM Stereo, Seek/Scan, DVD, CD, CLOCK, ETR, Navigation, Voice REC, MP3, VICS
U52	Cluster-Instrument , Electronic
U65	Speaker System-7, Premium
U66	Speaker System-7, Custom
VA5	Language Label-English
VBX	Language Label-Arabic
VB1	Language Label-Japan
VC4	Label-Price/Fuel ECON, Puerto Rico & Virgin Islands
VC5	Label-Shipping, Except US, US Possessions, or Japan
VDD	Vehicle Information-DVD, Customer Orientation
VG8	Vehicle Label-Notice to Buyer
VJ4	Label, Export-Child Seat Location
VH5	Plate-Vehicle Identification
VK3	License Plate Front-FRT Mounting Package
VL4	License Plate Front- FRT Mounting Package, EEC

RPO	Description
VL6	License Plate Front- FRT Mounting Package, Japanese
VZ3	Label-Mercury Disposal Notification
V73	Vehicle Statement-USA/Canada
V76	Hook-Tow
V78	Vehicle Statement-Delete
V87	Vehicle Statement-Gulf States Organization
XFV	Tire Front-P245/40ZR18-88Y BW HW4 (EMT)
XGN	Tire Front-P245/40ZR18-88Y BW HW4 HI-Performance
YFX	Tire Rear-P285/35ZR19-90Y BW HW4 (EMT)
YGJ	Tire Rear-P285/35ZR19-90Y BW HW4 HI-Performance
Z5X	Mirror Provisions, Arabic Language
Z49	Modifications, Canadian, Mandatory Base Equipment
Z51	Performance Package-Handling

Technical Information

Maintenance and Lubrication

Capacities - Approximate Fluid

Application	Specification	
	Metric	English
Cooling System	10.8 liters	12.6 quarts
Engine Oil with Filter		
6.0L Engine	5.2 liters	5.5 quarts
Engine without Oil Filter		
6.0L Engine	4.7 liters	5.0 quarts
Fuel Tank	68.0 liters	18.0 gal
Automatic Transmission - 4L60-E/4L65-E		
Automatic Dry - 300 mm Converter	11.50 liters	12.1 quarts
Manual Transmission - Tremec 6-Speed	3.9 liters	4.1 quarts
Rear Axle	1.7 liters	1.8 quarts

Maintenance Items

Part	GM Part Number	AC Delco® Part Number
Engine Air Cleaner/Filter	10342024	A2945C
Engine Oil Filter	88984215	PF46
Passenger Compartment Air Filter Element	10345066	--
Spark Plug	12571164	41-985
Windshield Wiper Blade (Shepherd's Hook Type) 22 inches (55.9 cm)	22143943	--

Tire Inflation Pressure Specifications

Application	Specification	
	Metric	English
Tires, Front and Rear	210 kPa	30 psi
Compact Spare	420 kPa	60 psi

Fluid and Lubricant Recommendations

Usage	Fluid/Lubricant
Engine Oil	The engine requires a special engine oil meeting GM Standard GM4718M. Oils meeting this standard may be identified as synthetic, and should also be identified with the American Petroleum Institute Certified for Gasoline Engines starburst symbol. However, not all synthetic API oils with the starburst symbol will meet this GM standard. You should look for and use only an oil that meets GM Standard GM4718M. GM Goodwrench® oil meets all the requirements for your vehicle.
Engine Coolant	50/50 mixture of clean, drinkable water and use only DEX-COOL® Coolant.
Hydraulic Brake System	Delco® Supreme 11 Brake Fluid or equivalent DOT-3 brake fluid.
Windshield Washer	GM Optikleen Washer Solvent.
Hydraulic Clutch System	Hydraulic Clutch Fluid. Use only GM Part No. U.S. 88958860, in Canada 88901244, Super DOT-4 brake fluid.
Power Steering System	GM Power Steering Fluid (GM Part No. U.S. 89021184, in Canada 89021186).
Chassis Lubrication (Rear Toe-Link Outer Ends with Z51 Option)	Chassis Lubricant (GM Part No. U.S. 12377985, in Canada 88901242) or lubricant meeting requirements of NLGI #2, Category LB or GC-LB.
Manual Transmission	DEXRON®-III Automatic Transmission Fluid. Look for "Approved for the H-Specification" on the label.
Automatic Transmission	DEXRON®-III Automatic Transmission Fluid. Look for "Approved for the H-Specification" on the label.
Key Lock Cylinders	Multi-Purpose Lubricant, Superlube (GM Part No. U.S. 12346241, in Canada 10953474).
Rear Axle (Limited-Slip Differential)	SAE 75W-90 Synthetic Axle Lubricant (GM Part No. U.S. 12378261, in Canada 10953455) meeting GM Specification 9986115. With a complete drain and refill add 4 ounces (118 ml) of Limited-Slip Axle Lubricant Additive (GM Part No. U.S. 1052358, in Canada 992694) where required.
Hood Latch Assembly, Secondary Latch, Pivots, Spring Anchor, and Release Pawl	Lubriplate Lubricant Aerosol (GM Part No. U.S. 12346293, in Canada 992723) or lubricant meeting requirements of NLGI #2, Category LB or GC-LB.
Hood and Door Hinges	Multi-Purpose Lubricant, Superlube (GM Part No. U.S. 12346241, in Canada 10953474).
Weatherstrip Conditioning	Dielectric Silicone Grease (GM Part No. U.S. 12345579, in Canada 992887).

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.

Variable Effort Steering System Description and Operation

The Variable Effort Steering (VES) system, or MAGNASTEER II® varies the amount of effort required to steer the vehicle as vehicle speed changes or lateral acceleration occurs. At low speeds, the system provides minimal steering effort for easy turning and parking maneuvers. At high speeds, the system provides firmer steering (road feel) and directional stability. When the system senses lateral acceleration, steering becomes firmer to reduce oversteering. The Electronic Brake Control Module (EBCM) controls a bi-directional magnetic rotary actuator located in the steering rack and pinion. The EBCM varies the steering assist by adjusting the current flow through the actuator. The actuator adjusts the amount of power steering assist to achieve a given level of effort to steer the vehicle. The VES system accomplishes this by adding or subtracting torque on the input shaft to the rack and pinion. The main component of the system is an electromagnetic actuator, which consists of a multiple-pole ring-style permanent magnet, a pole piece, and an electromagnetic coil assembly. The VES system uses the Antilock Brake System (ABS) wheel speed sensor inputs to determine vehicle speed. When the EBCM senses vehicle speed, it commands a current to the actuator that is most appropriate for each speed. The system also uses inputs

such as Handwheel position, wheelbase, understeer coefficient and steering ratio to calculate lateral acceleration.

Steering Wheel and Column

The steering wheel and column has 4 primary functions:

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

Vehicle Steering

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

Vehicle Security

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

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

Driver Convenience

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

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

Driver Safety

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

Telescoping Description

The telescoping function of this column consists of the telescoping motor, the telescoping motor position sensor and the telescoping switch. The telescoping motor position sensor is an internal part of the telescoping steering motor. The telescoping switch operates the inward and outward movement of the steering wheel.

The energy absorbing and locking steering column includes three important features in addition to the steering function.

The steering column is energy absorbing and is designed to compress in a front-end collision which will lessen the chance of injury to the driver.

The steering column has a telescoping control system that consists of an electronic control module capable of class 2 serial data communication, a steering column power assembly with positioning motor and sensor, and a steering column control switch.

The multi-function lever provides for the control of the headlamp high beams, and the windshield washer and wiper.

The steering column may be removed, disassembled and reassembled with relative ease. It is important to use only the specified screws, bolts and nuts and to tighten them to the specified torque in order to ensure the proper energy absorbing functions. When the steering column assembly is removed from the vehicle, special care must be taken in handling it. Avoid the use of a steering wheel puller other than the special one recommended in this manual. Sharply striking the end of the steering shaft, leaning on the assembly or dropping the assembly could shear off or loosen the plastic fasteners which maintain the steering column rigidity.

Telescoping Operation

The telescoping steering column in/out switch is an input to the driver position module (DPM). The telescoping drive motor is an output function of the DPM.

Steering column memory settings are stored in the DPM. The steering column position sensor is an internal part of the telescoping motor assemblies, and is an input to the DPM. The DPM uses the position sensor input when storing and recalling memory settings.

Memory steering column, and the easy enter/exit operations are performed by the DPM. Commands for memory operations are sent to the DPM as class 2 messages by the driver door switch module (DDS).

Steering Wheel Theft Deterrent Lock Operation

The steering column lock control module (SCLCM) controls the steering wheel theft deterrent lock function, which allows the column to be electronically locked. The SCLCM controls the column lock motor using an internal lock relay, an internal unlock relay, and an internal lock enable relay. The lock and unlock relays provide a low input to the column lock motor. When the column needs to be locked the lock enable relay will energize the lock relay, which provides a high input to the lock side of the motor, energizing the motor to lock the steering column.

Suspension Description and Operation

Front Suspension

The front suspension uses a single lightweight fiberglass transverse spring mounted to the lower control arms.

The upper control arms are made of high-strength forged aluminum. The lower control arms, the crossmember and the steering knuckles are made of cast aluminum.

The hub and bearing assembly is a sealed unit. The hub and bearing assembly eliminates the need for wheel bearing adjustment. The hub and bearing assembly requires no maintenance.

The high-strength tubular steel stabilizer shaft provides stability.

The shock absorbers attach at the upper end to the frame and attach at the lower control arm. The shock absorber helps keep the wheel in contact with the road surface under most road conditions. The shock absorber reduces crash-through at full jounce and rebound.

The standard gas shocks and the optional Electronic Suspension Control (ESC) shock absorbers are gas charged to reduce aeration (foaming) of the shock fluid. Aeration of the shock fluid results in unlimited damping control.

Rear Suspension

The rear suspension uses a single lightweight fiberglass transverse spring mounted to the crossmember and lower control arms. The following lightweight aluminum components are used throughout the rear suspension:

- Rear suspension knuckles
- Upper control arms
- Lower control arms
- Rear suspension toe links
- Crossmember
- Drive shaft support tube

The shock absorbers attach at the upper end to the frame and at the lower end, to the lower control arm. Shock absorbers help keep the wheels in contact with the road surface under most road conditions. Shock absorbers reduce crash-through at full jounce and rebound.

The electronically controlled shock absorbers are gas charged to reduce aeration (foaming) of the shock fluid. Aeration of the shock fluid results in poor damping control.

Tire Pressure Monitor System Description

The tire pressure monitor (TPM) system allows the driver to display all 4 tire pressures on the driver information center (DIC) while the vehicle is being driven. The system uses the remote control door lock receiver (RCDLR), body control module (BCM), powertrain control module (PCM), 4 radio frequency transmitting pressure sensors inside each wheel/tire assembly, and a class 2 serial data circuit to perform the system functions. When the vehicle is stationary for more than 20 minutes, the sensors go into power down mode. In this mode the sensors transmit tire pressure data once every 60 minutes. This minimizes sensor battery consumption. These batteries are not serviceable and require sensor replacement if low. As vehicle speed increases to 32 km/h (20 mph), the sensor's internal roll switches turn the sensors ON and they will each begin to transmit a unique identification code and a radio frequency signal. The RCDLR receives and translates this data in to tire location and tire pressure. The RCDLR sends this data to the DIC via a class 2 serial data circuit where the tire pressures are displayed. If the TPM system detects a tire pressure above 289 kPa (42 psi), the HIGH TIRE PRESSURE warning message is displayed. If the system senses a tire pressure between 34-172 kPa (5-25 psi), the LOW TIRE PRESSURE warning message is displayed. And if the system senses below 34 kPa (5 psi), the FLAT TIRE warning message is displayed. After this message, 2 chimes will sound followed by the message MAX SPEED 55 MPH. The next message to appear is REDUCED HANDLING. The TPM system can also compensate for high and low altitudes using the PCM's barometric pressure sensor via a class 2 serial data circuit. The RCDLR has the ability to detect malfunctions within the TPM system. Any malfunctions detected will cause the DIC to display the SERVICE TIRE MONITOR warning message.

Electronic Suspension Control Description

The Electronic Suspension Control system, also known as the Magneto-Rheological Real Time Damping (MRRTD) system independently controls the fluid viscosity in each of the four shock absorbers in order to control the vehicle ride characteristics. The ESC system is capable of making these changes within milliseconds. The ESC system consists of the following major components:

- The electronic suspension (ESC) module
- The front/rear position sensors
- The front/rear adjustable shock absorbers
- The shock absorber electrical actuators, which are integrated within the shock absorbers.

The ESC controls the damping mode selection according to the following factors:

- The vehicle speed
- The chassis pitch input
- The steering position
- The body to wheel displacement

The ESC module evaluates these inputs in order to separately control the shock absorbers, providing an enhanced ride and comfort level over the widest possible range of operating conditions.

Electronic Suspension Control Module

The ESC module provides electronic control logic and output drive for each shock absorber. The ESC module makes decisions due to road and driving conditions based on various inputs. The ESC module receives input information by sensors that are directly connected to the ESC module or by other systems through the serial data line.

The ESC module uses these inputs in order to independently control the shock absorbers at each corner. The ESC module is located in the LH rear storage.

Electronic Suspension Control Position Sensors

The ESC position sensors provide the ESC module with the body to wheel displacement input. The ESC module uses this and other inputs in order to control the position of the shock absorber. If any body or wheel motion is detected, the ESC module will determine how soft or firm each shock absorber should be to provide the best ride. The ESC position sensors are mounted at each corner of the vehicle between the control arm and the body.

Electronic Suspension Control Shock Absorber or Strut

The ESC shock absorbers are monotube type which provide damping by increasing magnetic flux to magnetic particles to resist suspension movement. The ESC shock absorber has the capability of providing multiple modes or values of damping forces, in both compression and rebound direction. The damping forces are achieved by increasing or decreasing the magnetic flux to shock absorbers.

The front ESC actuator connector is located at the base of the shock absorber. The rear ESC actuator connector is at the top of the shock absorber. Both front and rear shock absorbers have jumper harnesses for ease of maintenance.

Electronic Suspension Control Operation

The ESC system uses the information from other systems in order to execute certain functions.

The ESC system does not have a malfunction indicator lamp, but instead uses the Instrument Panel Cluster (IPC) for the display functions. When the ESC system detects a malfunction that sets a DTC, the ESC system sends a message on the serial data line directly or through the PCM to the IPC, which will display one of the following messages:

- SHOCKS INOPERATIVE
- SERVICE RIDE CONTROL
- MAXIMUM SPEED

The SHOCKS INOPERATIVE message will only be displayed if the ESC system detects a malfunction that sets a DTC and causes the ESC system to disable all four shock absorbers. The ESC system will send a message on the serial data line to the IPC to display this message.

The SERVICE RIDE CONTROL message will only be displayed if the ESC system detects any malfunction that sets a DTC. The ESC system will send a message on the serial data line to the IPC to display this message.

The MAXIMUM SPEED message will only be displayed if the ESC system detects a malfunction that sets a DTC and causes the ESC system to disable all four shock absorbers. The ESC system will send a message on the serial data line to the PCM indicating that all four shock absorbers were disabled. The PCM then sends a message to the IPC to display this message.

The ESC module has the ability to store Diagnostic Trouble Codes (DTCs) as current or history codes. Most ESC system malfunctions will display a message in the IPC and set a DTC. The message will remain ON until the RESET button is pressed on the Driver Information Center (DIC). As long as the DTC is current, the message will be displayed after every ignition cycle and the RESET button must be pressed to bypass the message.

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 for the fail-soft actions to be taken whenever a malfunction condition is current, but requires the malfunction to be current for a certain number of ignition cycles before the corresponding malfunction code and message will be stored or displayed.

If the ESC detects a malfunction, the ESC system defaults with a fail-soft action. A fail-soft action refers to any specific action the ESC system takes in order to compensate for a detected malfunction. A typical ESC fail-soft action would be if the ESC system detects a malfunction with the ride control switch, the ESC system will ignore this input and fail-soft to the TOUR ride setting.

Wheels and Tires

General Description

Factory installed tires and wheels are designed to operate satisfactorily with loads up to and including the full load capacity when inflated to the recommended tire pressures. Correct tire pressure and correct driving techniques have an important influence on tire life. Heavy cornerings, excessively rapid accelerations, and unnecessary sharp braking increase tire wear.

The Tire Pressure Monitoring system (TPM), required with extended mobility tires (EMT), continuously monitors system components and air pressure in each road tire while the vehicle is being driven. When the vehicle is being driven the system notifies the driver through the digital display message in the instrument cluster of system failure or low tire pressure.

Passenger Tire Service Description

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

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

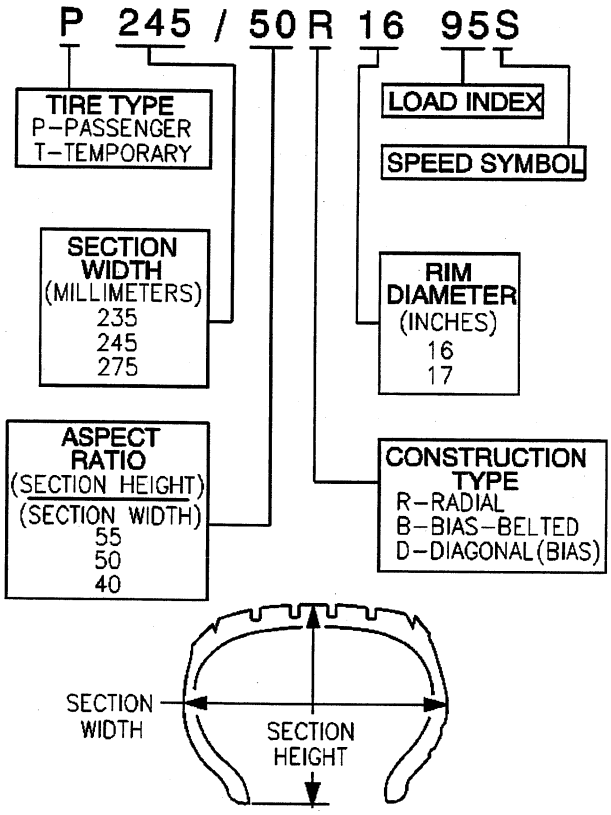
Tires with a lower than recommended pressure can cause the following conditions:

- 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

P-Metric Sized Tires Description

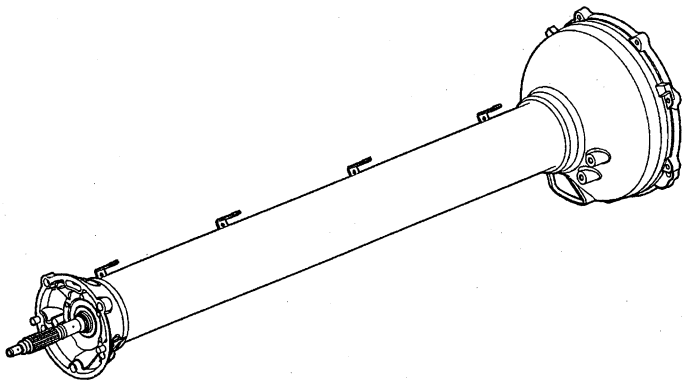


Most P-metric tire sizes do not have exact corresponding alphanumeric tire sizes. Replacement tires should be of the same tire performance criteria (TPC) specification number including the same size, the same load range, and the same construction as those originally installed on the vehicle. Consult 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

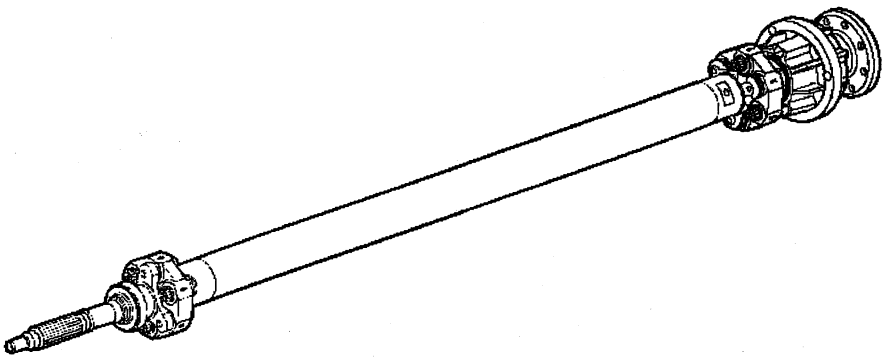
Driveline/Axle – Propeller Shaft

Driveline Support Assembly Description



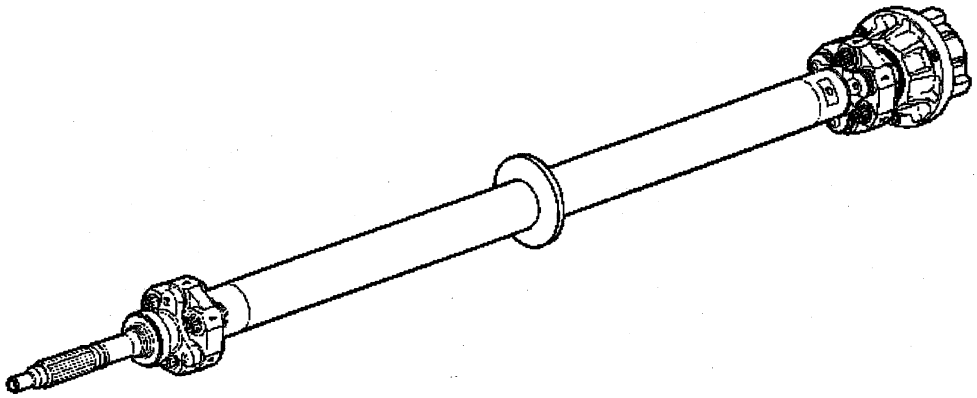
The driveline support assembly consists of a driveline support tube (with rear bell housing) and an internal propeller shaft assembly. The front of the driveline assembly mounts to the engine bellhousing. In manual transmission applications, the clutch actuator is retained to the front of the tube and the shifter linkage is mounted to brackets at the top center area. The driveline support assembly is specific for each vehicle as equipped (either automatic or manual transmission applications).

Propeller Shaft Assembly (Automatic Transmission)(c)



The automatic transmission propeller shaft assembly consists of a splined front input shaft, front coupling, propeller shaft, rear coupling, and bearing and housing assembly. The input shaft, propeller shaft, couplings and bearing and housing assembly are balanced as an assembly. The front of the propeller shaft assembly is supported (at the input shaft) by a ball type bearing. An O-ring, located in the front of the driveline support tube, prevents the front bearing outer race from spinning. The rear of the propeller shaft assembly is supported by a bearing and housing assembly. The bearing and housing assembly consists of a housing, internally splined input hub, externally splined flexplate spindle, O-rings, snap rings, and two ball type bearings. The propeller shaft assembly is retained in the driveline tube by an internal snap ring. The torque converter flex plate is retained to the flexplate spindle by bolts and is mated to the torque converter.

Propeller Shaft Assembly (Manual Transmission)(c)



The manual transmission propeller shaft assembly consists of a splined front input shaft, front coupling, propeller shaft, rear coupling, and bearing and housing assembly. The input shaft, propeller shaft, couplings and bearing and housing assembly are balanced as an assembly. The front of the propeller shaft assembly is supported (at the input shaft) by a ball type bearing. An O-ring, located in the front of the driveline support tube, prevents the front bearing outer race from spinning. The rear bearing of the propeller shaft assembly is supported by a bearing and housing assembly. The bearing and housing assembly consists of a housing, internally splined hub, pilot bushings, O-rings, snap rings, a wave washer, and two ball type bearings. The bearing housing hub internal splines couple to the manual transmission splined input shaft. The propeller shaft assembly is retained in the driveline tube by an internal snap ring. The propeller shaft tube has an overspeed limiter (snubber) that prevents permanent propeller shaft damage as a result of a downshift above recommended speeds.

Important

Disassembly and improper reassembly of the propeller shaft components may result in driveline vibration. The propeller shaft and components should be kept free of any foreign material which could upset balance and also produce driveline vibration.

When servicing the engine, transaxle, or driveline support assembly, the proper installation procedure must be followed. Automatic transmission applications have a specific installation procedure and sequence of installation steps. Failure to follow proper procedures may cause damage to other vehicle driveline components.

Wheel Drive Shafts Description and Operation

Drive axles are flexible assemblies consisting of an inner and outer constant velocity (CV) joint connected by an axle shaft. The inner joint is completely flexible, and can move in and out. The outer joint is also flexible, but cannot move in and out. These drive axles are used to transmit rotational force from the rear axle differential to the rear tire and wheel assemblies.

Seal and Clamp

The drive axle assemblies use inboard and outboard joint seals made of thermoplastic material, and clamps made of stainless steel. The functions of the seals are as follows:

- The seals protect the internal parts of the inboard and outboard joints.
  - They protect the joint lubricating grease from surrounding detrimental atmospheric conditions (such as extreme temperatures, ozone gas, etc.).
  - They protect the joint lubricating grease from foreign materials (such as stones, dirt, water, salt, etc.).
- The seals facilitate angular and axial movement of the inboard joint.
- The seals facilitate angular movement of the outboard joint.

The function of the clamps is as follows:

Provide a leak proof connection at both the housing and the axle shaft for the inboard and outboard joints.

The thermoplastic material performs well against normal handing, operational wear and conditions. This material however, is not strong enough to withstand abusive handling or damage due to objects such as sharp tools or the sharp edge of any other surrounding component on the vehicle.

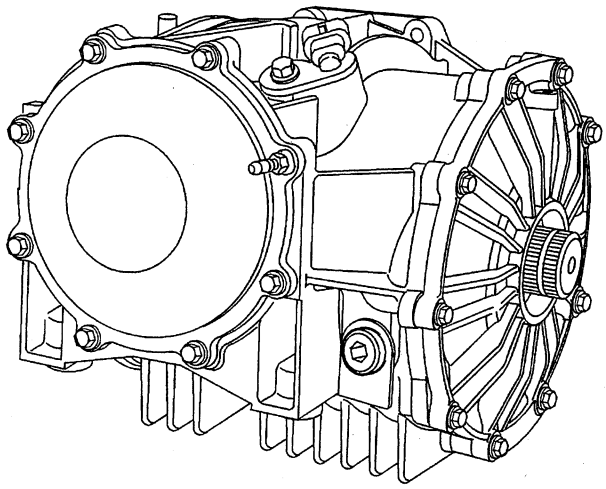
Inner Joint

The inner joints are of the enhanced double offset design. The inner joints use a female spline which is installed over a stub shaft protruding from the rear axle differential.

Outer Joint

The outer joints are of the Rzeppa joint design. The splined shaft end which mates with the knuckle and hub assembly, incorporates a helical spline to assure a tight, press-type fit. This design assures that no end play will exist between the hub bearing and the drive shaft assembly for added durability and reduced bearing noise.

Rear Drive Axle Description and Operation



The vehicle is powered by either the LS2 or 6 liter V8 engine. Motion is transferred from the engine crankshaft/flywheel through the driveline support, propeller shaft, assembly to either the 4L60-E (M32) automatic transmission or the Tremec 6-speed manual transmission. The splined output shaft of the transmission drives the pinion, which in turn, rotates the ring gear and differential case assembly. The limited slip differential distributes torque/power to the rear wheels via individual axle shaft assemblies. The limited-slip differential is of a conventional separator plate and friction disc type design.

The differential housing, side covers, pinion housing, and differential case halves are constructed of cast aluminum. The internal components incorporate a hypoid gear set, ring and pinion, carrier assembly, and pinion housing assembly. The pinion is supported in a pinion housing by tapered roller bearings. The pinion is positioned rearward of the ring gear centerline.

Pinion position, ring gear position, and carrier bearing preload are determined by shimming procedures.

All models have an 8 inch ring gear. Each ring gear has specific setup dimensions, A1 and A2 values, stamped onto the side area of the gear. The A1 and A2 values are unique to each ring gear/pinion and are determined during the manufacturers gear/pinion noise and vibration setup and testing. The vehicle speed sensor reluctor ring is incorporated into the outside area of the ring gear. The vehicle speed sensor

detects the rotational pulses produced by the reluctor ring and send the signal to the vehicle control module (VCM).

The differential assembly is available in three gear ratios. The 3.42 ratio axle is used in all manual transmission applications. The 2.73 ratio axle is standard equipment for automatic transmission applications with an optional 3.15 ratio axle available.

Some models have a differential lubricant pump and cooler. Oil is pulled from the sump through an external oil pipe into the pump. Oil is pumped through an external oil pipe to the cooler. The oil is cooled by dissipating heat with transmission oil returning from radiator mounted cooler.

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

System Component Description

The park brake system consists of the following:

Park Brake Lever Assembly

Receives, multiplies, and transfers park brake system apply input force from operator to park brake cable system.

Releases applied park brake system when lever is returned to at-rest, lowered, position.

Park Brake Cables

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

Park Brake Cable Equalizer

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

Park Brake Apply Lever

Multiplies and transfers input force to park brake actuator/adjuster.

Park Brake Actuator/Adjuster

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

Threaded park brake actuators/adjusters 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 (Rear Disc, Drum-In-Hat System)

Applies mechanical output force from park brake actuator/adjuster 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 lever assembly being applied. The input force is multiplied by the lever assembly, 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. The park brake lever assembly releases an applied park brake system when it is returned to the at-rest, lowered, position.

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.

The Traction Control System (TCS) also monitors rear wheel speed and compares the speed to the speed of the front wheel. If excessive rear wheel speed is detected in either rear wheels the TCS will be activated. The TCS uses the following to improved traction and vehicle stability:

- Throttle Shutdown
- Timing control
- Rear brake intervention

Engine Description and Operation

Engine Mechanical – LS2 6.0L

General Specifications

Application	Specification	
	Metric	English
General		
Engine Type	V8	
Displacement	6.0L	364 CID
RPO	LS2	
VIN	U	
Bore	101.618-101.636 mm	4.0007-4.0017 in
Stroke	92.0 mm	3.622 in
Compression Ratio	10.9:1	
Firing Order	1-8-7-2-6-5-4-3	
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 - Intake	7.81 mm	0.307 in
Camshaft Lobe Lift - Exhaust	7.77 mm	0.306 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 Two Runner Port Openings	0.3 mm	0.118 in
Lubrication System		
Oil Capacity - with Filter	5.2 liters	5.5 quarts
Oil Capacity - without Filter	4.7 liters	5.0 quarts
Oil Pressure - Minimum - Hot	41 kPa at 1,000 engine RPM 124 kPa at 2,000 engine RPM 165 kPa at 4,000 engine RPM	6 psig at 1,000 engine RPM 18 psig at 2,000 engine RPM 24 psig at 4,000 engine RPM

Application	Specification	
	Metric	English
Oil Pan		
Front Cover Alignment - at Oil Pan Surface	0.0-0.5 mm	0.0-0.02 in
Rear Cover Alignment - at Oil Pan Surface	0.0-0.5 mm	0.0-0.02 in
Oil Pan Alignment - to Rear of Engine Block at Transmission Bell Housing Mounting Surface	0.0-0.25 mm	0.0-0.01 in
Piston Rings		
Piston Ring End Gap - First Compression Ring - Measured in Cylinder Bore - Production	0.20-0.41 mm	0.008-0.016 in
Piston Ring End Gap - First Compression Ring - Measured in Cylinder Bore - Service	0.20-0.41 mm	0.008-0.016 in
Piston Ring End Gap - Second Compression Ring - Measured in Cylinder Bore - Production	0.37-0.69 mm	0.015-0.027 in
Piston Ring End Gap - Second Compression Ring - Measured in Cylinder Bore - Service	0.37-0.69 mm	0.015-0.027 in
Piston Ring End Gap - Oil Control Ring - Measured in Cylinder Bore - Production	0.22-0.79 mm	0.009-0.031 in
Piston Ring End Gap - Oil Control Ring - Measured in Cylinder Bore - Service	0.22-0.79 mm	0.009-0.031 in
Piston Ring to Groove Clearance - First Compression Ring - Production	0.030-0.10 mm	0.0012-0.0040 in
Piston Ring to Groove Clearance - First Compression Ring - Service	0.030-0.10 mm	0.0012-0.0040 in
Piston Ring to Groove Clearance - Second Compression Ring - Production	0.035-0.078 mm	0.0014-0.0031 in
Piston Ring to Groove Clearance - Second Compression Ring - Service	0.035-0.078 mm	0.0014-0.0031 in
Piston Ring to Groove Clearance - Oil Control Ring - Production	0.013-0.201 mm	0.0005-0.0079 in
Piston Ring to Groove Clearance - Oil Control Ring - Service	0.013-0.201 mm	0.0005-0.0079 in
Pistons and Pins		
Pin - Piston Pin Clearance to Piston Pin Bore - Production	0.002-0.01 mm	0.0008-0.0004 in
Pin - Piston Pin Clearance to Piston Pin Bore - Service	0.002-0.015 mm	0.0008-0.0006 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	0.007-0.0022 mm	0.00027-0.00086 in
Piston - Piston Diameter - Measured Over Skirt Coating	101.611-101.642 mm	4.0-4.001 in
Piston - Piston to Bore Clearance - Production	-0.022-0.08 mm	-0.0009-0.0012 in
Piston - Piston to Bore Clearance - Service Limit with Skirt Coating Worn Off	0.024-0.08 mm	0.00094-0.0031 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	
Valves - Valve Lift - Intake	13.27 mm	0.522 in
Valves - Valve Lift - Exhaust	13.25 mm	0.521 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

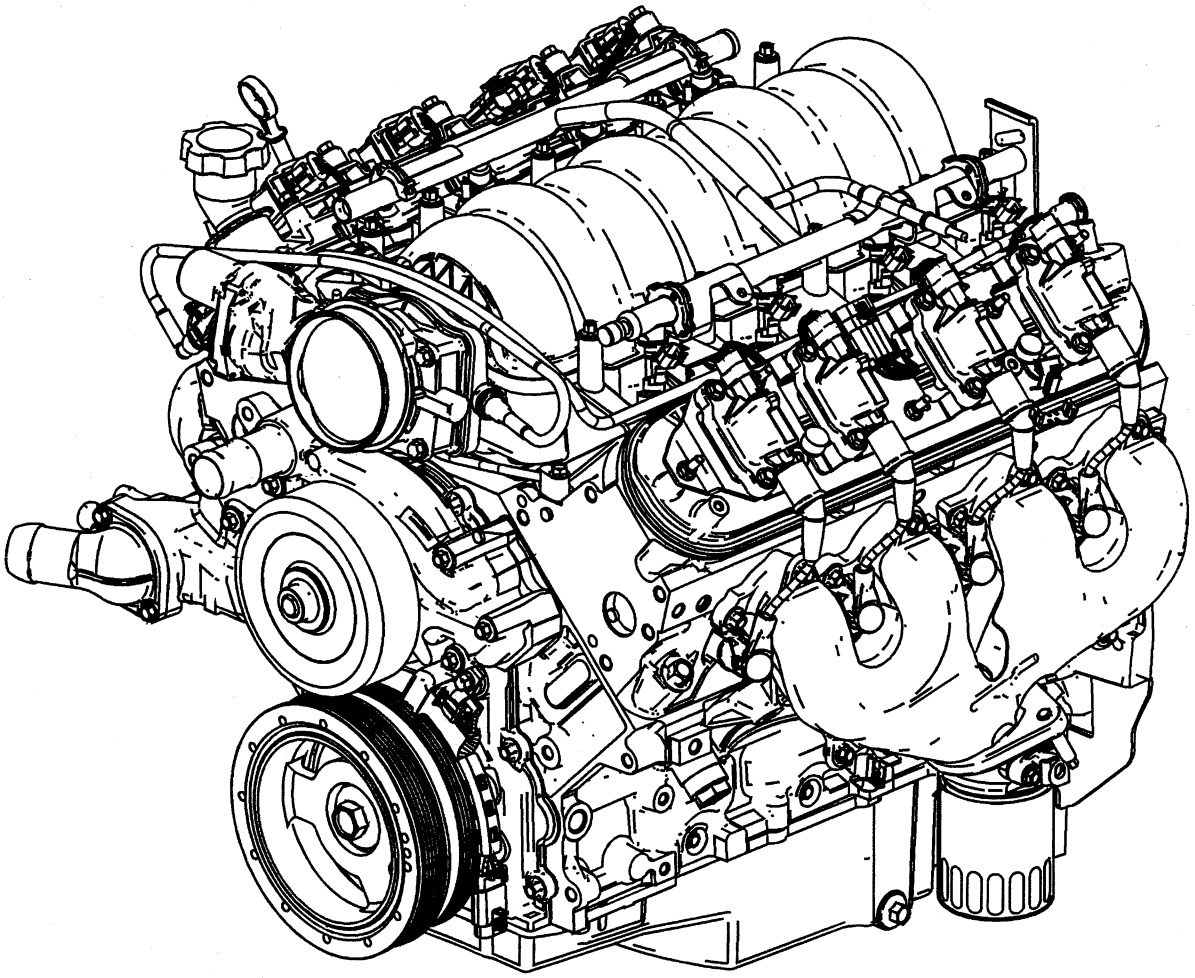
Application	Specification	
	Metric	English
Valves - Seat Width - Intake	1.02 mm	0.04 in
Valves - Valve Stem Diameter - Production	7.955-7.976 mm	0.313-0.314 in
Valves - Valve Stem Diameter - Service	7.95 mm	0.313 in
Valves - Valve Stem-to-Guide Clearance - Production - Intake	0.025-0.066 mm	0.001-0.0026 in
Valves - Valve Stem-to-Guide Clearance - Service - Intake	0.093 mm	0.0037 in
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
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

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Camshaft Position (CMP) Sensor Bolt	12 N·m	106 lb in
CMP Sensor Wire Harness Bolt	12 N·m	106 lb in
Camshaft Retainer Bolts	25 N·m	18 lb ft
Camshaft Sprocket Bolts	25 N·m	18 lb ft
Clutch Pressure Plate Bolts	70 N·m	52 lb ft
Connecting Rod Bolts - First Pass	20 N·m	15 lb ft
Connecting Rod Bolts - Final Pass	75 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 Bolts - Inner Bolts - First Pass in Sequence	20 N·m	15 lb ft
Crankshaft Bearing Cap Bolts - Inner Bolts - Final Pass in Sequence	80 degrees	
Crankshaft Bearing Cap Bolts - Outer Bolt/Studs - First Pass in Sequence	20 N·m	15 lb ft
Crankshaft Bearing Cap Bolts - Outer Bolt/Studs - Final Pass in Sequence	51 degrees	
Crankshaft Bearing Cap Side Bolts	25 N·m	18 lb ft
Crankshaft Oil Deflector Nuts	25 N·m	18 lb ft
Crankshaft Position (CKP) Sensor Bolt	25 N·m	18 lb ft
Cylinder Head Bolts - First Pass all M11 Bolts in Sequence	30 N·m	22 lb ft
Cylinder Head Bolts - Second Pass all M11 Bolts in Sequence	90 degrees	
Cylinder Head Bolts - Final Pass all M11 Bolts in Sequence	70 degrees	
Cylinder Head Bolts - M8 Inner Bolts in Sequence	30 N·m	22 lb ft
Cylinder Head Coolant Plug	20 N·m	15 lb ft
Engine Block Coolant Heater	40 N·m	30 lb ft
Engine Block Oil Gallery/Coolant Plugs	60 N·m	44 lb ft
Evaporative Emission (EVAP) Purge Valve Bracket Bolt	50 N·m	37 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

Application	Specification	
	Metric	English
Flywheel Bolts - First Pass	20 N·m	15 lb ft
Flywheel Bolts - Second Pass	50 N·m	37 lb ft
Flywheel Bolts - Final Pass	100 N·m	74 lb ft
Front Cover Bolts	25 N·m	18 lb ft
Fuel Rail Bolts	10 N·m	89 lb in
Ignition Coil Bracket-to-Valve Rocker Arm Cover Bolts	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
Knock Sensor Bolts	20 N·m	15 lb ft
Motor Mount Bracket Bolts	50 N·m	37 lb ft
Oil Filter	30 N·m	22 lb ft
Oil Filter Fitting	55 N·m	40 lb ft
Oil Level Indicator Tube Bolt	25 N·m	18 lb ft
Oil Level Sensor	20 N·m	15 lb ft
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	12 N·m	106 lb in
Oil Pan Drain Plug	25 N·m	18 lb ft
Oil Pan M6 Bolts - Oil Pan-to-Rear Cover	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 Pressure Sensor	20 N·m	15 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 Bolt	12 N·m	106 lb in
Oil Pump-to-Engine Block Bolts	25 N·m	18 lb ft
Rear Cover Bolts	25 N·m	18 lb ft
Service Lift Bracket M8 Bolt	25 N·m	18 lb ft
Service Lift Bracket M10 Bolts	50 N·m	37 lb ft
Spark Plugs - New Cylinder Heads	20 N·m	15 lb ft
Spark Plugs - All Subsequent Installations	15 N·m	11 lb ft
Throttle Body Bolts	10 N·m	89 lb in
Timing Chain Dampener Bolts	25 N·m	18 lb ft
Valley Cover Bolts	25 N·m	18 lb ft
Valve Lifter Guide Bolts	10 N·m	89 lb in
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 Component Description



The 6.0 Liter V8 engine is identified as RPO LS2 VIN U.

Camshaft and Drive System

A billet steel one piece camshaft is supported by five 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 sensor lobes are incorporated into the front face of the camshaft sprocket with the camshaft position sensor mounted in the engine front cover. A timing chain guide 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.

Crankshaft

The crankshaft is cast nodular iron. The crankshaft is supported by five 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 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 heads by four center mounted rocker arm cover bolts.

Engine Block

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

Exhaust Manifolds

The exhaust manifolds are a one-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 one-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 push-in-place silicone sealing gasket. The electronically actuated throttle body bolts to the front of the intake manifold. The throttle body is sealed by a one-piece push-in-place silicone gasket. The fuel rail assembly, with eight separate fuel injectors, is retained to the intake by four 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 left of the intake manifold by mounting bolts. 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) solenoid valve is mounted to the front of the right cylinder head. 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 and oil level indicator tube opening. The alignment of the structural oil pan to the rear of the engine block and transmission bell housing is critical.

Piston and Connecting Rod Assembly

The pistons are cast aluminum. The pistons use two compression rings and one 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 right cover is the oil fill tube and the positive crankcase ventilation (PCV) fresh air passage.

Valve Train

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.

Drive Belt System Description

The drive belt system consists of the following components:

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

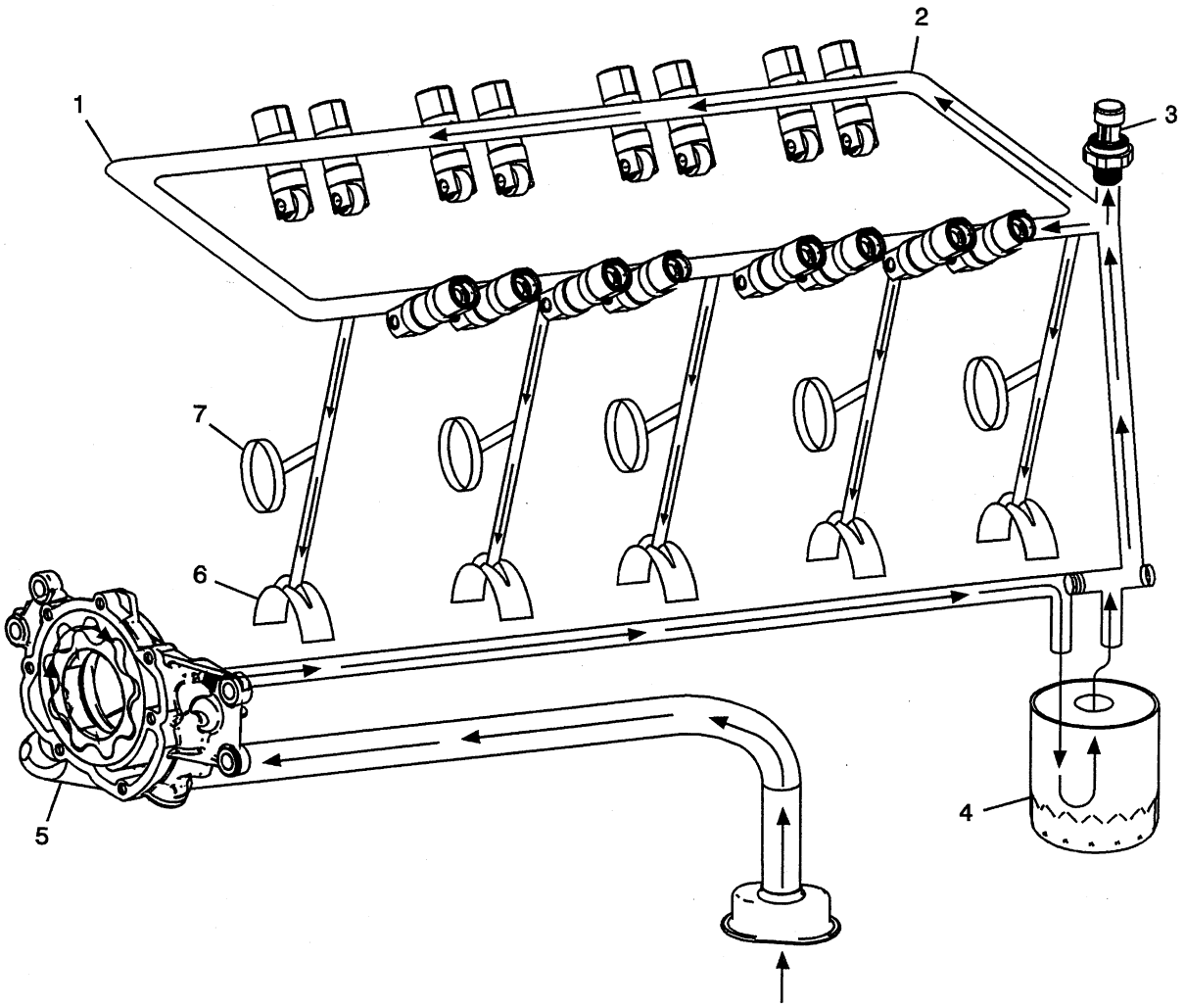
The drive belt system may use one belt or two belts. The drive belt is thin so that it can bend backwards and has several ribs to match the grooves in the pulleys. There also may be a V-belt style belt used to drive certain accessory drive components. The drive belts are made of different types of rubbers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

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

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

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

Lubrication



Engine lubrication is supplied by a gerotor type oil pump assembly (5). 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 regulator 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 (4) 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.

Oil is then directed from the filter to the upper main oil galleries (1). Oil from the left upper oil gallery is directed to the crankshaft bearings (6) and camshaft bearings (7). Oil that has entered both the upper main oil galleries also pressurizes the valve lifter assemblies (2) 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 (3) is located at the top rear of the engine.

Crankcase Ventilation System Description

A closed crankcase ventilation system is used in order to provide a more complete scavenging of crankcase vapors. Filtered air from the air induction system duct is supplied to the crankcase, mixed with blow-by vapors, and passes through a crankcase ventilation metering device before entering the intake manifold. The primary component in the positive crankcase ventilation (PCV) system is the PCV flow metering device (valve or orifice) . Vacuum changes within the intake manifold result in flow variations of the blow-by vapors. If abnormal operating conditions occur, the design of the PCV system permits excessive amounts of blow-by vapors to back flow through the crankcase vent tube and into the engine induction system to be consumed during normal combustion. This engine ventilation system design minimizes oil consumption and significantly reduces the potential for oil ingestion during vehicle limit handling maneuvers.

LS2 Engine

The LS2 engine utilizes an integral PCV system which is located in the engines valley cover beneath the intake manifold. The engine valley cover contains composite oil separating baffles and PCV plumbing. Filtered fresh air is routed from up stream of the throttle plate to the front of the right valve rocker arm cover through a formed nylon tube. The design of the rocker cover shields rocker arm oil spray thereby reducing the potential for oil being drawn into the throttle bore area during back flow of the ventilation system. Blow-by vapors are routed from the valley cover through a fixed orifice (2.5 mm) within a steel PCV tube, then through a formed rubber hose before entering the intake manifold behind the throttle body.

Engine Cooling

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Automatic Transmission Oil Cooler Line Fitting	25 N·m	18 lb ft
Coolant Air Bleed Bolt/Stud	12 N·m	106 lb in
Cooling Fan Motor Bolt	6 N·m	53 lb in
Engine Cooling Fan Module Screw	6 N·m	53 lb in
Engine Coolant Heater	40 N·m	30 lb ft
Engine Coolant Heater Cord Clip Bolt	32 N·m	24 lb ft
Fan Blade Nut	6 N·m	53 lb in
Fan Shroud to Radiator Bolts	5 N·m	44 lb in
Radiator Baffle Bolt	10 N·m	89 lb in
Radiator Support Bolt	8 N·m	71 lb in
Radiator Surge Tank Nut	10 N·m	89 lb in
Stabilizer Shaft Bracket Bolt	58 N·m	43 lb ft
Water Pump Bolt (First Pass)	15 N·m	11 lb ft
Water Pump Bolt (Final Pass)	30 N·m	22 lb ft
Water Pump Inlet	15 N·m	11 lb ft

Cooling System Description and Operation

General Description

The cooling system consists of the following major components:

- The radiator
- The radiator surge tank
- The cooling fans
- The thermostat
- The water pump
- The coolant air bleed pipe
- The heater pipe assembly
- The ECT sensor
- The transmission oil cooler
- All related coolant hoses
- The fan shroud
- The fan motor/blade
- Coolant Heater (optional)

The cooling system functions to maintain an efficient engine temperature during all engine operating conditions. The thermostat remains closed until the engine reaches the proper operating temperatures. When the engine is cold, the coolant does not circulate through the radiator, allowing the engine to warm up faster. When the engine reaches the normal operating temperatures, the thermostat opens and the coolant begins to circulate through the radiator in order to keep the engine from overheating.

The water pump draws the coolant from the radiator. The coolant is then circulated through the cooling jackets in the following components, then back to the radiator to be cooled:

- The cylinder heads
- The engine block
- The throttle body

The engine coolant is drawn from the water pump and circulated through internal passages in the cylinder heads and engine block. Vapor is vented off through the coolant air bleed pipe. The heated coolant is then directed back to the radiator. A separate coolant flow loop is available from the coolant pump to the heater core and back to the coolant pump to provide passenger compartment heat and defrost.

The radiator surge tank provides a coolant fill point and a central cooling system air bleed location. The tank is translucent on the lower half for coolant level viewing.

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 Hold Down Retainer Bolt	18 N·m	13 lb ft
Battery Tray Bolt	12 N·m	106 lb in
Engine Harness Cable Nut	13 N·m	10 lb ft
Generator Bolt	50 N·m	37 lb ft
Generator Bracket Bolt	50 N·m	37 lb ft
Generator Shaft Nut	75 N·m	55 lb ft
Ground Strap Bolt	32 N·m	24 lb ft
Ground Strap Nut	8 N·m	71 lb in
Instrument Panel (IP) Wiring Harness Junction Block Nut	10 N·m	89 lb in
Negative Battery Cable to Battery Bolt	15 N·m	11 lb ft
Negative Battery Cable Ground Nut	8 N·m	71 lb in
Negative Battery Cable Terminal Bolt	8 N·m	71 lb in
Positive Battery Cable Bolt	15 N·m	11 lb ft
Positive Battery Cable Nut (at solenoid)	10 N·m	89 lb in
Positive Battery Cable Nut (at fuse/relay center)	8 N·m	71 lb in
Positive Battery Cable to Starter Motor Stud Nut	15 N·m	11 lb ft
S Terminal Nut	4 N·m	35 lb in
Starter Motor Bolt	50 N·m	37 lb ft

Battery Usage

Application	Specification
Cold Cranking Amperage (CCA)	590 A
Reserve Capacity	110 minutes
Replacement Model Number	86-3YR

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

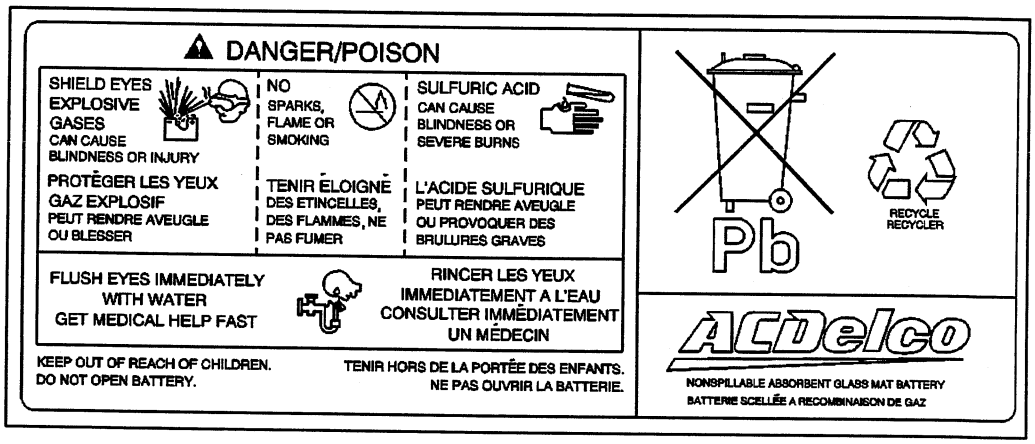
Engine	Generator Model	Rated Output AMPS	Load Test Output AMPS
LS2	Valeo TG15	140	98

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.**



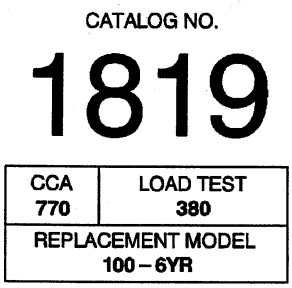
The maintenance free battery is standard. There are no vent plugs in the cover. The battery is completely sealed except for two small vent holes in the side. These vent holes allow the small amount of gas that is produced in the battery to escape.

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 starter motors are non-repairable starter motors. They have 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 protects the armature from excessive speed until the switch is opened.

When the ignition switch is released from the START position, crank 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 generator features the following major components:

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

The slip ring and the frame are liquid cooled.

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

Regulator

The voltage regulator controls the rotor field current in order to limit the system voltage. When the field current is on, 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.

Circuit Description

The generator provides voltage to operate the vehicle's electrical system and to charge its battery. A magnetic field is created when current flows through the rotor. This field rotates as the rotor is driven by the engine, creating an AC voltage in the stator windings. The AC voltage is converted to DC by the rectifier bridge and is supplied to the electrical system at the battery terminal.

When the engine is running, the generator turn-on signal is sent to the generator from the ECM, turning on the regulator. The generator's voltage regulator controls current to the rotor, thereby controlling the output voltage. The rotor current is proportional to the electrical pulse width supplied by the regulator. When the engine is started, the regulator senses generator rotation by detecting AC voltage at the stator through an internal wire. Once the engine is running, the regulator varies the field current by controlling the pulse width. This regulates the generator output voltage for proper battery charging and electrical system operation. The generator F terminal is connected internally to the voltage regulator and externally to the ECM. When the voltage regulator detects a charging system problem, it grounds this circuit to signal the ECM that a problem exists. The ECM monitors the generator field duty cycle signal circuit. The system voltage sense circuit receives B+ voltage that is Hot At All Times through the GEN BAT fuse in

the underhood junction block. This voltage is used by the regulator as the reference for system voltage control.

Engine Controls

Ignition System Specifications

Application	Specification	
	Metric	English
Firing Order	1-8-7-2-6-5-4-3	
Spark Plug Wire Resistance	188-312 ohms	
Spark Plug Torque	15 N·m	11 lb ft
Spark Plug Gap	1.02 mm	0.040 in
Spark Plug Type	GM P/N 12571164 AC Spark Plug P/N 41-985	

Fastener Tightening Specifications

Application	Specifications	
	Metric	English
Accelerator Control Assembly to Floor Fasteners	20 N·m	15 lb ft
Camshaft Position (CMP) Sensor Bolt	25 N·m	18 lb ft
Crankshaft Position (CKP) Sensor Bolt	25 N·m	18 lb ft
Engine Coolant Temperature (ECT) Sensor	20 N·m	15 lb ft
EVAP Canister Bracket Bolt	7 N·m	62 lb in
Fuel and EVAP Pipe Retainer Nut	6 N·m	53 lb in
Fuel Crossover Hose Clamps	4 N·m	35 lb in
Fuel Filter and Fuel Pressure Regulator Bracket Nut	5 N·m	44 lb in
Fuel Pipe Assembly Clip Nuts	3 N·m	27 lb in
Fuel Rail Attaching Bolts	10 N·m	89 lb in
Fuel Tank Fill and Vent Pipe Bolts	3 N·m	22 lb in
Fuel Tank Fill Hose Clamp	4 N·m	35 lb in
Fuel Tank Fill Pipe Ground Strap Bolt	8 N·m	71 lb in
Fuel Tank Strap and Shield Bolts	25 N·m	18 lb ft
Fuel Tank Shield Mount Bolt	25 N·m	18 lb in
Fuel Tank Shield Nut	12 N·m	106 lb in
Heated Oxygen Sensor (HO2S)	41 N·m	30 lb ft
Ignition Coil Harness Mounting Bolt	12 N·m	106 lb in
Ignition Coil Mounting Bolts	12 N·m	106 lb in
Knock Sensor (KS)	20 N·m	15 lb ft
Powertrain Control Module (PCM) Electrical Connector Fasteners	8 N·m	70 lb in
Powertrain Control Module (PCM) Retaining Fastener	2N·m	17 lb in
PCV Hose Assembly Mounting Cable Nut	12 N·m	106 lb in
Secondary Air Injection (AIR) Check Valves	23 N·m	17 lb ft
Secondary Air Injection (AIR) Pipe To Exhaust Manifold Bolts	20 N·m	15 lb ft
Secondary Air Injection (AIR) Pump to Bracket	9 N·m	80 lb in
Secondary Air Injection (AIR) Solenoid Valve Retaining Nut	7 N·m	62 lb in
Secondary Air Injection (AIR) Check Valve to the AIR Pipe	23 N·m	17 lb ft
Spark Plug	15 N·m	11 lb ft
Spark Plug in New Cylinder Head	20 N·m	15 lb ft
Tank Crossover Hose Clamp	4 N·m	35 lb in
Throttle Actuator Control (TAC) Module to PCM Bracket	2 N·m	17 lb in
Throttle Actuator Control (TAC) Module to PCM Bracket Fasteners	2 N·m	17 lb in
Throttle Body Attaching Bolts	10 N·m	189 lb in

Fuel System Specifications

Use premium unleaded gasoline rated at 91 octane or higher for best performance. You may use middle grade or regular unleaded gasolines, but your vehicle may not accelerate as well.

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

Be sure the posted octane for premium is at least 91 (at least 89 for middle grade and 87 for regular). If the octane is less than 87, you may get a heavy knocking noise when you drive. If it's bad enough, it can damage your engine.

If you're using fuel rated at the recommended octane or higher and you hear heavy knocking, your engine needs service. But don't worry if you hear a little pinging noise when you're accelerating or driving up a hill. That's normal, and you don't have to buy a higher octane fuel to get rid of pinging. It's 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 to meet California Emission Standards (indicated on the under hood emission control label), it 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 it is determined 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.

Exhaust System

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Exhaust Clamp Bolts	44 N·m	32 lb in
Exhaust Manifold Bolt (First Pass)	15 N·m	11 lb ft
Final Pass	25 N·m	18 lb ft
Exhaust Manifold Heat Shield Bolt	9 N·m	80 lb in
Exhaust Manifold Nut	20 N·m	15 lb ft
Exhaust Muffler Bolt	50 N·m	37 lb ft
Exhaust Muffler Hanger Nut	16 N·m	12 lb ft
Exhaust Pipe Brace Lower Bolt	50 N·m	37 lb ft
Exhaust Pipe Hanger Bolt	50 N·m	37 lb ft
Ignition Coil Bracket Stud	12 N·m	106 lb in
Oxygen Sensor	42 N·m	30 lb ft

Exhaust System Description

Important

Use of non-OEM parts may cause driveability concerns.

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

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

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

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

Resonator

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

Catalytic Converter

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

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

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

The catalyst in the converter is not serviceable.

Muffler

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

Transmission/Transaxle Description and Operation

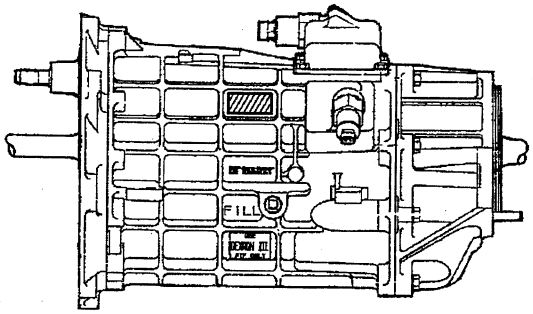
Manual Transmission – MM6/M12

Application	Specification	
	Metric	English
Backup Lamp Switch	20 N·m	15 lb ft
Differential to Transmission Bolts and Nuts	50 N·m	37 lb ft
Differential to Transmission Lower Nut	50 N·m	37 lb ft
Driveline Support Assembly to Engine Flywheel Housing Bolts	50 N·m	37 lb ft
EBTCM LH Mounting Bracket Mounting Bolts	50 N·m	37 lb ft
Gear Select/Skip Shift Solenoid	40 N·m	30 lb ft
Intermediate Exhaust Pipe to Muffler Bolts	50 N·m	37 lb ft
Negative Battery Cable Bolt	15 N·m	11 lb ft
Rear Shock Absorber Lower Mounting Bolt	220 N·m	162 lb ft
Rear Suspension Crossmember Mounting Nuts	110 N·m	81 lb ft
Reverse Lockout Solenoid	40 N·m	30 lb ft
Shift Control Mounting Bolts	30 N·m	22 lb ft
Shift Control Closeout Boot Retaining Nuts	12 N·m	106 lb in
Transaxle Mount Bracket to Differental Bolts	50 N·m	37 lb ft
Transaxle Mount to Rear Suspension Crossmember Nuts	50 N·m	37 lb ft
Transmission to Driveline Support Assembly Bolts/Studs	50 N·m	37 lb ft
Transmission Fluid Drain Plug	27 N·m	20 lb ft
Transmission Fluid Fill Plug	27 N·m	20 lb ft
Transmission Fluid Temperature Sensor	27 N·m	20 lb ft
Transmission Shift Rod Clamp Bolt	30 N·m	22 lb ft
Transmission Vent Tube Retaining Bolt	20 N·m	15 lb ft

Lubrication Specifications

Application	Metric	English
DEXRON® - III	3.9 liters	4.1 quarts

Manual Transmission Description and Operation



Manual transmissions are identified by the number of forward gears and the measured distance between the centerline of the output shaft and the counter gear.

The 6-speed, manual transmission (RPO MM6/M12), used in Corvettes, incorporates the following features:

- An aluminum case.
- Fully synchronized gearing with an enhanced synchronizer cone arrangement:
  - Tripple-cone: FIRST, SECOND
  - Double-cone: THIRD, FOURTH, FIFTH, SIXTH
  - Single-cone: REVERSE
- An internal shift rail mechanism.
- A remote transmission shift control mounted forward of the transmission.
- An external transmission shift rod enabling the forward mount location of the transmission shift control.
- An extended-length transmission output shaft mating directly to the rear axle drive pinion (in the rear of the differential housing).
- Tapered roller bearings supporting the mainshaft and countershaft.
- Caged roller bearings under all speed gears.
- Solenoid inhibit of SECOND and THIRD gears.
- Solenoid inhibit of REVERSE gear during predefined forward motion.

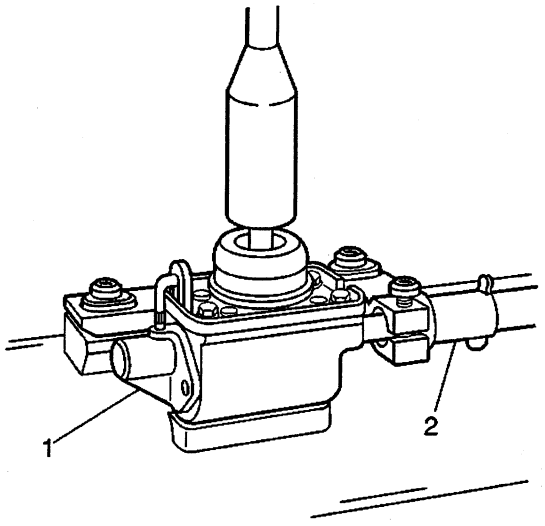
These features combine to yield a rugged, reliable system capable of handling input torques of up to 610 N·m (450 lb ft) for the MM6 and 540 N·m (400 lb ft) for the M12.

The gear ratios used in this transmission offer a wide operating range providing excellent acceleration and fuel economy.

The gear ratios are as follows:

Gear	MM6 Ratio (:1)	M12 Ratio (:1)
FIRST	2.66	2.97
SECOND	1.78	2.07
THIRD	1.30	1.43
FOURTH	1.00	1.00
FIFTH	0.74	0.84
SIXTH	0.50	0.57
REVERSE	2.90	3.28

Shift Control and Shift Rod



To allow the rear-of-vehicle transmission location, the transmission shift shaft has been relocated to the front of the transmission. The shift shaft is connected to a transmission shift rod (2) which contains two

sealed universal-style joints, enabling the range of motion necessary in order to shift gears. The shift rod (2) is connected to the transmission shift control (1) which is a lubricated and sealed unit, mounted to the driveline support assembly. The mounting system utilized for the shift control (1) incorporates rubber insulators. The cockpit of the vehicle is isolated from the driveline through the use of a shift control closeout boot which seals off the shift control and the driveline tunnel shift control opening.

Gear Select (Skip Shift)

To ensure good fuel economy and compliance with federal fuel economy standards, SECOND and THIRD gears are inhibited when shifting out of FIRST gear under the following conditions:

- Coolant temperature is above 50°C (122°F).
- Vehicle speed is between 20 and 29 km/h (12 and 19 mph).
- Throttle is opened 35 percent or less.

Reverse Lockout

A reverse lockout system (consisting of a reverse lockout solenoid which operates a reverse lockout mechanism) is utilized to prevent shifting into REVERSE gear when the vehicle is moving forward at a speed of 5 km/h (3 mph) or more.

Skip Shift Description and Operation

The skip shift solenoid is a performance feature which forces the driver to shift from first gear to fourth gear during light acceleration and low engine load conditions. This feature is used to ensure good fuel economy and compliance with federal economy standards. The skip shift system consist of the following components:

- The powertrain control module (PCM).
- The skip shift solenoid.
- The skip shift lamp.

With the ignition ON, battery voltage is supplied directly to the skip shift solenoid. The powertrain control module (PCM) controls the solenoid by grounding the control circuit. When the skip shift system is active the PCM also grounds the control circuit of the skip shift lamp. The lamp illuminates to inform the driver that the 1-4 skip shift is engaged. The PCM determines when the skip shift system is active when the following parameters are met:

- The vehicle speed is between 24-31 km/h (15-19 mph).
- The engine coolant temperature (ECT) is greater than 77°C (171°F).
- The BARO is greater than 76 kPa.
- The accelerator pedal position (APP) is less than 26 percent.

When the conditions are met the powertrain control module (PCM) grounds the skip shift solenoid control circuit. This energizes the skip shift solenoid and mechanically blocks the gear shift lever from going into the second or third gear positions. When the drivers pulls back on the shift lever with the system enabled the transmission will go into fourth gear.

When the conditions for skip shift engagement are no longer met the powertrain control module (PCM) disables the skip shift solenoid, allowing the driver to use second and third gears.

Once the skip shift solenoid is enabled the system will not be re-enabled until the vehicle speed returns to 0 km/h (0 mph) and the conditions for enabling skip shift solenoid are met.

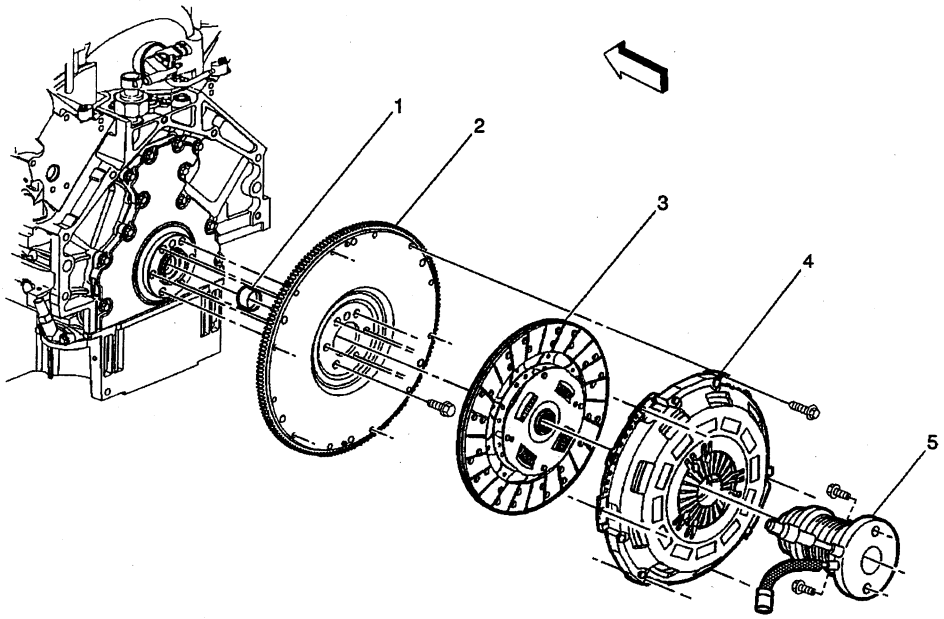
Clutch

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Clutch Actuator Cylinder Mounting Bolts	12 N·m	106 lb in
Clutch Pedal Bracket Mounting Nuts	27 N·m	20 lb ft
Clutch Pedal Nut	50 N·m	37 lb ft
Clutch Pressure Plate Bolts[1]	70 N·m	52 lb ft
Cruise Control Release Switch Bracket Retaining Bolts	12 N·m	106 lb in
Driver Foot Rest Bracket Retaining Bolt	8 N·m	71 lb in
Driver Foot Rest Bracket Retaining Nut	10 N·m	89 lb in
Engine Flywheel Inspection Cover Retaining Bolts	25 N·m	18 lb ft
Negative Battery Cable Bolt	15 N·m	11 lb ft

1 Clutch pressure plate bolts must be tightened in sequence and in even increments over three passes, then tightened to final specification on the fourth pass.

Hydraulic Clutch System Description and Operation



(1) Clutch Pilot Bearing
(2) Engine Flywheel
(3) Clutch Driven Plate
(4) Clutch Pressure Plate
(5) Clutch Actuator Cylinder

The following are the principal components of the clutch system:

- The driving members; attached to the engine and turning with the engine.
- The driven member; attached to the driveline and transmission and turning with the driveline and transmission.
- The operating members; including the spring, the clutch hydraulic system, and the clutch pedal linkages, required to apply and release the pressure, which holds the driving and driven members in contact with each other.

Clutch Driving Members

The clutch driving members consist of two, flat surfaced, iron plates, machined to a smooth finish. One of these surfaces is the rear face of the engine flywheel and the other is a comparatively heavy flat ring, with one side machined, known as the clutch pressure plate.

Clutch Driven Members

The driven member (clutch disc) has a splined hub that freely slides lengthwise along the splines of the input shaft, which also drives the shaft through these same splines. Suitable friction facings are attached to each side of the plate by rivets.

In order to make the clutch engagement as smooth as possible and eliminate chatter; the steel segments driving the splined hub are slightly waved, which causes the contact pressure on the facings to rise gradually as the waved springs flatten out.

Clutch Operating Members

The driving member and the driven member are held in contact by spring pressure. This pressure is exerted by a one-piece conical or diaphragm spring.

A diaphragm spring is a conical piece of spring steel that has been specially stamped to give it greater flexibility. The diaphragm is positioned between the cover and the pressure plate so that the diaphragm spring is nearly flat when the clutch is in the engaged position. The action of this type of spring is similar to that of an ordinary oil can.

The pressure of the inner rim of the spring on the pressure plate decreases as the flat position is passed. The inner rim of the diaphragm bears on the pressure plate and is pivoted on a ring on the outer edge of the pressure plate. The application of a pulling load on the inner section of the pressure plate will cause the inner rim to move away from the flywheel and allow the pressure plate to move away from the clutch disc, thereby releasing or disengaging the clutch. When the pressure is released from the inner section, the OIL CAN action of the diaphragm causes the inner section to move in, and the movement of the inner rim forces the pressure plate against the clutch disc, thus engaging the clutch.

The clutch release bearing is moved by the actuator assembly to move the release levers which move the pressure plate to the rear, thus separating the clutch disc from the flywheel when the clutch pedal is depressed by the driver. A piston return spring in the actuator cylinder preloads the clutch linkage and assures a small load on the release bearing with the actuator assembly at all times. As the clutch disc wears, the diaphragm spring fingers move forward forcing the release bearing, actuator assembly, and pushrod to move. This movement forces the actuator cylinder piston to move forward in its bore, consuming hydraulic fluid from the master cylinder reservoir, thereby providing the SELF-ADJUSTING feature of the hydraulic clutch linkage system.

Hydraulic Clutch Description

The clutch hydraulic system consists of a master cylinder and an actuator cylinder. When pressure is applied to the clutch pedal (pedal depressed), the pushrod contacts the plunger and pushes it down the bore of the master cylinder. In the first 0.8 mm (0.031 in) of movement, the recuperation seal closes the port to the fluid reservoir tank, and as the plunger continues to move down the bore of the cylinder, the fluid is forced through the outlet line to the actuator cylinder mounted to the driveline support assembly. As fluid is pushed down the pipe from the master cylinder, this in turn forces the piston in the actuator cylinder outward. As the actuator cylinder piston moves forward, it forces the release bearing to disengage the clutch pressure plate from the clutch disc. On the return stroke (pedal released), the

plunger moves back as a result of the return pressure of the clutch. Fluid returns to the master cylinder and the final movement of the plunger opens the port to the fluid reservoir, allowing an unrestricted flow of fluid between system and reservoir.

Automatic Transmission – 4L60E

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Accumulator Cover to Case Bolt	8.0-14.0 N·m	6-10 lb ft
Case Extension to Case Bolt	42.0-48.0 N·m	31-35 lb ft
Case Extension to Case Bolt (4WD Shipping)	11.2-22.6 N·m	8.3-16.7 lb ft
Converter Cover Bolt	10 N·m	89 lb in
Converter Housing to Case Screw	65.0-75.0 N·m	48-55 lb ft
Cooler Pipe Connector	35.0-41.0 N·m	26-30 lb ft
Detent Spring to Valve Body Bolt	20.0-27.0 N·m	15-20 lb ft
Differential to Transmission Bolts and Nuts	50 N·m	37 lb ft
Driveline Support Assembly to Engine Flywheel Housing Bolts	50 N·m	37 lb ft
Driveline Support Assembly Front Plug Bolts	50 N·m	37 lb ft
Floorshift Control Bolt	10 N·m	89 lb in
Flywheel to Torque Converter Bolt	63 N·m	46 lb ft
Forward Accumulator Cover to Valve Body Bolt	8.0-14.0 N·m	6-10 lb ft
Heat Shield to Transmission Bolt	17 N·m	13 lb ft
Line Pressure Plug	8.0-14.0 N·m	6-10 lb ft
Manual Shaft to Inside Detent Lever Nut	27.0-34.0 N·m	20-25 lb ft
Negative Battery Cable Bolt	15 N·m	11 lb ft
Oil Level Indicator Bolt	47 N·m	35 lb ft
Oil Pan to Transmission Case Bolt	11 N·m	97 lb in
Oil Passage Cover to Case Bolt	8-14.0 N·m	6-10 lb ft
Park Brake Bracket to Case Bolt	27.0-34.0 N·m	20-25 lb ft
Park/Neutral Position Switch Mounting Bolts	27 N·m	20 lb ft
Park/Neutral Position Switch Screw	3 N·m	27 lb in
Plate to Case Bolt (Shipping)	27.0-34.0 N·m	20-25 lb ft
Plate to Converter Bolt (Shipping)	27.0-34.0 N·m	20-25 lb ft
Plug Assembly, Automatic Transmission Oil Pan (C/K-truck)	30-40 N·m	22.1-29.5 lb ft
Plug Assembly, Automatic Transmission Oil Pan (Y-car)	28-32 N·m	20.7-23.6 lb ft
Pressure Control Solenoid Bracket to Valve Body Bolt	8.0-14.0 N·m	6-10 lb ft
Propeller Input Shaft Front Bearing Positioning Bolts	35 N·m	26 lb ft
Propeller Shaft Hub Clamp Bolt	130 N·m	96 lb ft
Pump Assembly to Case Bolt	26.0-32.0 N·m	19-24 lb ft
Pump Cover to Pump Body Bolt	20.0-27.0 N·m	15-20 lb ft
Rear Shock Absorber Lower Mounting Bolt	220 N·m	162 lb ft
Shift Cable Grommet Screw	1.7 N·m	15 lb in
Shift Control Cable Attachment	20 N·m	15 lb ft
Spacer Plate Support Retaining Bolts	11 N·m	97 lb in
Speed Sensor Retainer Bolt	10.5-13.5 N·m	7.7-10 lb ft
Stud, Automatic Transmission Case Extension (Y-car)	18.0-22.0 N·m	13-16 lb ft
TCC Solenoid Assembly to Case Bolt	8.0-14.0 N·m	6-10 lb ft
Transaxle Mount Bracket to Differential Bolts	50 N·m	37 lb ft
Transmission to Driveline Support Assembly Bolts/Studs	50 N·m	37 lb ft
Transmission to Engine Bolt	47 N·m	35 lb ft
Transmission Fluid Check/Fill Plug	30 N·m	22 lb ft
Transmission Fluid Pressure Manual Valve Position Switch to Valve Body Bolt	8.0-14.0 N·m	6-10 lb ft

Application	Specification	
	Metric	English
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 Cooler Rear Pipes to Junction Fittings at Engine Flywheel Housing	27 N·m	20 lb ft
Transmission Oil Pan to Case Bolt	9.5-13.8 N·m	7-10 lb ft
Transmission Range Selector Lever Nut	20 N·m	15 lb ft
Transmission Shift Cable Bracket Retaining Nuts	20 N·m	15 lb ft
Transmission Wiring Harness to LH Side of Transmission Case Retaining Bolt	2.5 N·m	22 lb in
Valve Body to Case Bolt	8.0-14.0 N·m	6-10 lb ft

Transmission General Specifications

Name	Hydra-Matic 4L60-E/4L65-E
RPO Codes	M32
Production Location	Toledo, Ohio
Vehicle Platform (Engine/Transmission) Usage	Y/LS2/M32
Transmission Drive	Longitudinally-Mounted Rear Wheel Drive
1st Gear Ratio	3.059:1
2nd Gear Ratio	1.625:1
3rd Gear Ratio	1.000:1
4th Gear Ratio	0.696:1
Reverse	2.294:1
Torque Converter Size (Diameter of Torque Converter Turbine)	300 mm
Pressure Taps	Line Pressure
Transmission Fluid Type	DEXRON® III
Transmission Fluid Capacity (Approximate)	300 mm Converter Dry: 11.50 l (12.1 qt)
Transmission Type: 4	Four Forward Gears
Transmission Type: L	Longitudinal Mount
Transmission Type: 65	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 73.00 kg (161 lb)
Transmission Weight Wet (Approximate)	300 mm Converter 83.00 kg (183.6 lb)

Fluid Capacity Specifications

Application	Specification	
	Metric	English
Bottom Pan Removal	4.7 liters	5 quarts
Complete Overhaul	10.2 liters	10.8 quarts
(measurements are approximate)		

Transmission Component and System Description

The 4L60E transmission consists primarily of the following components:

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

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

- 1-2 and 2-3 shift solenoid valves
- 3-2 shift solenoid valve assembly
- Transmission pressure control (PC) solenoid
- Torque converter clutch (TCC) solenoid valve
- TCC pulse width modulation (PWM) solenoid valve
- Automatic transmission fluid pressure (TFP) manual valve position switch
- Automatic transmission fluid temperature (TFT) sensor
- Vehicle speed sensor assembly

Adapt Function

Transmission Adapt Function

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

- The clutch fiber plates
- The seals
- The springs

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

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

Automatic Transmission Shift Lock Control Description

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

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

With the ignition in the ON position battery positive voltage is supplied to the park/neutral position switch. With the transmission in the PARK position the contacts in the park/neutral position switch are closed. This allows current to flow through the switch to the automatic transmission shift lock control switch. The circuit continues through the normally-closed switch to the automatic transmission shift lock control solenoid. The automatic transmssion shift lock control soleniod is permanently grounded. This energizes

the automatic transmission shift lock control solenoid, locking the shift linkage in the PARK position. When the driver presses the brake pedal the contacts in the automatic transmission shift lock control switch open, causing the automatic transmission shift lock control solenoid to release. This allows the shift lever to move from the PARK position.

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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

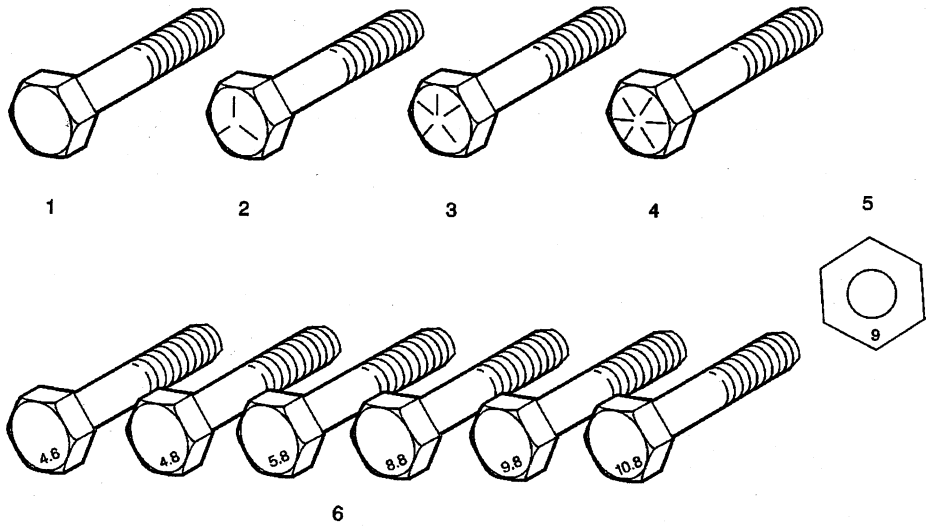
Metric Fasteners

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

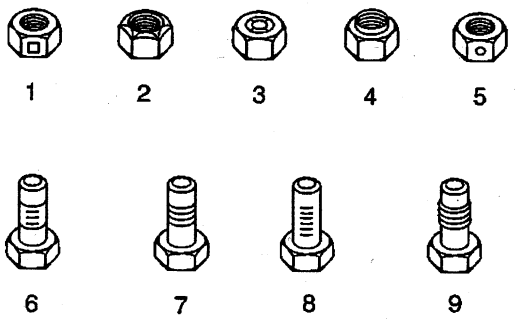
These fasteners accomplish the thread interface by a designed distortion or deformation in the fastener.

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
■ = Included in Equipment Group □ = Included in Equipment Group but upgradeable

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	Coupe 1YY07			Convertible 1YY67	
			Base 1SX	1SA	1SB	1SA	1SB
	AK5	**Air bags,** dual-stage, frontal, driver and front passenger **1 - Always use safety belts and proper child restraints, even with air bags. See the Owner's Manual for more safety information.**	S[1]	–	–	–	–
	AJ7	NEW! **Air bags,** frontal and side impact, driver and front passenger **1 - Always use safety belts and proper child restraints, even with air bags. See the Owner's Manual for more safety information.**	–	■[1]	■[1]	S[1]	S[1]
		Air bag, shut-off switch, front passenger	S	S	S	S	S
	CJ2	**Air conditioning,** dual-zone, automatic, includes individual climate settings for driver and right front passenger, automatic climate control and outside temperature display	S	S	S	S	S
		NEW! **Air filtration,** includes pollen filter	S	S	S	S	S
		Cargo convenience net, in rear compartment area	–	■	■	S	S
		Console, floor, lockable, includes 2 covered cupholders, ashtray with cigar lighter, auxiliary power outlet and CD storage	S	S	S	S	S
		Cruise control, electronic with set and resume speed	S	S	S	S	S
		Defogger, rear-window, electric	S	S	S	S	S
		Door locks, power, programmable, includes lockout protection	S	S	S	S	S
		Floormats, carpeted	S	S	S	S	S
		NEW! **Hatch release,** push button open, includes power hatch pulldown	S	S	S	–	–
		NEW! **Ignition,** keyless, engaged with push button start	S	S	S	S	S
	U52	**Instrumentation,** analog, electronic, includes Driver Information Center with 2 line display	S	S	S	S	S
		NEW! **Keyless Access,** with push-button start, includes 2 remote transmitters which enable automatic door unlock and open by touching door switch	S	S	S	S	S
		Lighting, interior, courtesy, cargo and glovebox	S	S	S	S	S
		Lower anchors, for child safety seat	S	S	S	S	S
		Mirror, inside rearview, manual day/night, includes dual reading lights	S	S	–	S	–
		Seat adjuster, power, driver 6-way	S	S	S	S	S
	AG2	**Seat adjuster,** power, front passenger 6-way	–	■	■	S	S
	AR9	**Seats,** front bucket with leather seating surfaces, includes back angle adjustment	S	–	–	–	–

Free Flow RPO Code	Ref. Only RPO Code	Description	Coupe 1YY07			Convertible 1YY67	
			Base 1SX	1SA	1SB	1SA	1SB
	AQ9	**Seats,** front Sport bucket with perforated leather seating surfaces, includes back angle adjustment, adjustable lumbar and side bolsters **1 - Includes (AJ7) Air bags, frontal and side-impact, driver and front passenger.**	–	■[1]	■[1]	S[1]	S[1]
	US8	NEW! **Sound system,** ETR AM/FM stereo with CD player and MP3 playback, includes Radio Data System, seek-and-scan, digital clock, auto-tone control, automatic volume, TheftLock and (U66) Sound system feature, 7-speaker system	S	S	–	S	–
		Steering column, manual, Tilt-Wheel	S	S	S	S	S
	NK4	**Steering wheel,** leather-wrapped	S	S	S	S	S
		Storage, includes lockable glovebox, center console and 2 rear compartments with covers	S	S	S	S	S
		Theft-deterrent system, push button start, immobilizer and audible visual alarm	S	S	S	S	S
		Tire Pressure Monitor System, air pressure sensors in each tire, pressure display in Driver Information Center	S	S	S	S	S
		Trunk release, push button open	–	–	–	S	S
		Visors, illuminated vanity mirrors, driver and front passenger	S	S	S	S	S
		Windows, power, includes driver and passenger express-down	S	S	S	S	S
		NEW! **Antenna,** integral, hidden	S	S	S	S	S
		Convertible top, manual folding, includes glass rear window with integral defogger	–	–	–	S	S
		Daytime running lamps	S	S	S	S	S
		Engine access, rear opening hood, includes underhood lamp	S	S	S	S	S
		Fog lamps, front, integral in fascia	S	S	S	S	S
		Glass, Solar-Ray light tinted	S	S	S	S	S
		NEW! **Headlamps**, bi-functional, Xenon, high-intensity discharge, includes automatic exterior lamp control	S	S	S	S	S
	DL8	**Mirrors,** outside rearview, power, heated, body-color	S	S	S	S	S
	CF7	**Roof panel,** removable, 1-piece, body-color	S	S	S	–	–
		NEW! **Tires,** front P245/40ZR18, extended mobility, Eagle F1	S	S	S	S	S
		NEW! **Tires,** rear P285/35ZR19, extended mobility, Eagle F1	S	S	S	S	S
		Trunk, rear, includes remote release	–	–	–	S	S
	QG6	NEW! **Wheels,** 5-spoke painted aluminum, 18" x 8.5" (45.7 cm x 21.6 cm), front and 19" x 10.0" (48.3 cm x 25.4 cm), rear	S	S	S	S	S
		Wipers, intermittent, front	S	S	S	S	S
		Active handling, improves traction and enhances vehicle stability	S	S	S	S	S

Free Flow RPO Code	Ref. Only RPO Code	Description	Coupe 1YY07			Convertible 1YY67	
			Base 1SX	1SA	1SB	1SA	1SB
	GU6	**Axle,** 3.42 ratio, limited slip **1 - Included and only available with (MN6) Transmission, 6-speed manual.**	S[1]	S[1]	S[1]	S[1]	S[1]
		Brakes, 4-wheel antilock, 4-wheel disc	S	S	S	S	S
	LS2	NEW! **Engine,** 6.0L V8 SFI (400 HP [298.3kW] @ 6000 rpm, 400 lb.-ft. [542.8 N-m] @ 4400 rpm)	S	S	S	S	S
		Exhaust, aluminized stainless-steel with polished 3" stainless-steel tips	S	S	S	S	S
		Oil life monitoring system	S	S	S	S	S
		Steering, power, speed-sensitive, rack and pinion	S	S	S	S	S
	FE1	**Suspension,** 4-wheel independent, includes transverse fiberglass leaf springs	S	S	S	S	S
		Traction control, all-speed	S	S	S	S	S
	MN6	**Transmission,** 6-speed manual, short-throw **1 - Includes (GU6) Axle, 3.42 ratio.**	S[1]	S[1]	S[1]	S[1]	S[1]

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Free Flow RPO Code	Ref. Only RPO Code	Description	Coupe 1YY07			Convertible 1YY67	
			Base 1SX	1SA	1SB	1SA	1SB
	AJ7	NEW! **Air bags,** frontal and side impact, driver and front passenger **1 - Always use safety belts and proper child restraints, even with air bags. See the Owner's Manual for more safety information.**	--	■[1]	■[1]	S[1]	S[1]
		Cargo convenience net, in rear compartment area	--	■	■	S	S
	UV6	**Head-Up Display**, includes dot-matrix readouts for street mode, track mode with g-meter, vehicle speed, engine rpm, and readings from key gauges including water temperature and oil pressure	--	--	■	--	■
	UG1	NEW! **Homelink transmitter,** includes garage door opener, 3-channel programmable, located on driver visor	--	--	■	--	■
	D42	**Luggage shade**	--	■	■	--	--
	AAB	**Memory Package**, 2 driver settings, remembers "presets" for 6-way power seat, outside mirrors, climate control, radio presets and telescoping steering column	--	--	■	--	■
	DD0	**Mirrors,** inside rearview with compass and driver outside rearview, auto-dimming	--	--	■	--	■
	AG2	**Seat adjuster,** power, front passenger 6-way	--	■	■	S	S
	AQ9	**Seats,** front Sport bucket with perforated leather seating surfaces, includes back angle adjustment, adjustable lumbar and side bolsters **1 - Includes (AJ7) Air bags, frontal and side-impact, driver and front passenger.**	--	■[1]	■[1]	S[1]	S[1]
	KA1	NEW! **Seats,** heated, driver and passenger	--	--	■	--	■
	US9	NEW! **Sound system,** ETR AM/FM stereo with 6-disc, in dash CD changer, MP3 playback and (U65) Sound system feature, Bose premium 7-speaker system, includes Radio Data System, seek-and-scan, digital clock, auto-tone control, automatic volume and TheftLock	--	--	■	--	■
	N37	**Steering column,** power telescopic, includes manual tilt	--	--	■	--	■

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Free Flow RPO Code	Ref. Only RPO Code	Description	Coupe 1YY07			Convertible 1YY67	
			Base 1SX	1SA	1SB	1SA	1SB
	AJ7	NEW! **Air bags,** frontal and side impact, driver and front passenger **1 - Always use safety belts and proper child restraints, even with air bags. See the Owner's Manual for more safety information.**	–	■[1]	■[1]	S[1]	S[1]
		Cargo convenience net, in rear compartment area	–	■	■	S	S
	UV6	**Head-Up Display**, includes dot-matrix readouts for street mode, track mode with g-meter, vehicle speed, engine rpm, and readings from key gauges including water temperature and oil pressure	–	–	■	–	■
	UG1	NEW! **Homelink transmitter,** includes garage door opener, 3-channel programmable, located on driver visor	–	–	■	–	■
	D42	**Luggage shade**	–	■	■	–	–
	AAB	**Memory Package**, 2 driver settings, remembers "presets" for 6-way power seat, outside mirrors, climate control, radio presets and telescoping steering column	–	–	■	–	■
	DD0	**Mirrors,** inside rearview with compass and driver outside rearview, auto-dimming	–	–	■	–	■
	AG2	**Seat adjuster,** power, front passenger 6-way	–	■	■	S	S
	AQ9	**Seats,** front Sport bucket with perforated leather seating surfaces, includes back angle adjustment, adjustable lumbar and side bolsters **1 - Includes (AJ7) Air bags, frontal and side-impact, driver and front passenger.**	–	■[1]	■[1]	S[1]	S[1]
	KA1	NEW! **Seats,** heated, driver and passenger	–	–	■	–	■
	US9	NEW! **Sound system,** ETR AM/FM stereo with 6-disc, in dash CD changer, MP3 playback and (U65) Sound system feature, Bose premium 7-speaker system, includes Radio Data System, seek-and-scan, digital clock, auto-tone control, automatic volume and TheftLock	–	–	■	–	■
	N37	**Steering column,** power telescopic, includes manual tilt	–	–	■	–	■

ADDITIONAL OPTIONS								
Free Flow RPO Code	Ref. Only RPO Code	Description	Coupe 1YY07			Convertible 1YY67	
			Base 1SX	1SA	1SB	1SA	1SB
UE1		NEW! **OnStar**, 1-year Safe and Sound Service, includes automatic notification of air bag deployment, emergency services, roadside assistance, stolen-vehicle tracking, AccidentAssist, remote door unlock, remote diagnostics, online concierge and remote horn and lights. Drivers can also opt for other available OnStar services, including making and receiving voice-activated, hands-free phone calls with Personal Calling and getting location-based traffic and weather reports with Virtual Advisor. **1 - Visit www.onstar.com for system information and details. Not available with a ship-to of Puerto Rico or the Virgin Islands.**	–	–	A[1]	–	A[1]
URB		NEW! **Sound system with Navigation**, ETR AM/FM stereo with CD player, (U65) Sound system feature, Bose premium 7-speaker system, DVD navigation with GPS, 6.5" LCD color display touch screen, voice recognition, includes Radio Data System, seek-and-scan, digital clock, auto-tone control, automatic volume and TheftLock **1 - Deletes 6-disc, in dash CD changer and MP3 playback.**	–	–	A[1]	–	A[1]
U2K		NEW! **Sound system feature,** XM Satellite Radio. 100% commercial-free music. Over 120 channels. In-depth local traffic and weather in major metro markets. Digital quality sound with coast-to-coast signal coverage. 3-month trial - no charge and no obligation. **1 - Includes black external antenna. Subscription fees apply. Available only in the 48 contiguous U.S.** **2 - Includes body-color external antenna. Subscription fees apply. Available only in the 48 contiguous U.S.**	–	–	A[1]	–	A[2]
CM7		NEW! **Convertible top,** power folding, includes glass rear window with integral defogger	–	–	–	–	A
R8C		**Corvette Museum Delivery**, acknowledgement form required	A	A	A	A	A
VK3		**License plate bracket,** front	A	A	A	A	A
CC3		**Roof panel,** removable, 1-piece, transparent **1 - Included with (C2L) Roof Package.**	A[1]	A[1]	A[1]	–	–
C2L		**Roof Package**, includes (CF7) Roof panel, 1-piece, body-color and (CC3) Roof panel, 1-piece, transparent	A	A	A	–	–
QX1		NEW! **Wheels**, 5-spoke, Competition Gray painted aluminum, 18" x 8.5" (45.7 cm x 21.6 cm) , front and 19" x 10" (48.3 cm x 25.4 cm), rear	A	A	A	A	A
QG7		NEW! **Wheels,** polished, 5-spoke aluminum, 18" x 8.5" (45.7 cm x 21.6 cm), front and 19" x 10.0" (48.3 cm x 25.4 cm), rear	A	A	A	A	A

ADDITIONAL OPTIONS								
Free Flow RPO Code	Ref. Only RPO Code	Description	Coupe 1YY07			Convertible 1YY67	
			Base 1SX	1SA	1SB	1SA	1SB
G90		**Axle,** 3.15 performance ratio **1 - Only available with (MX0) Transmission, 4-speed automatic. Included with (Z51) Performance Handling Package with (MX0) Transmission, 4-speed automatic.**	A[1]	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) Emissions, Federal 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) Emissions, California state requirements or (NE1) Emissions, New York, Vermont, Massachusetts or Maine state requirements.**	A[1]	A[1]	A[1]	A[1]	A[1]
Z51		**Performance Handling Package**, performance-oriented package for the Gymkhana/Autocross enthusiast, includes power steering, engine oil and transmission coolers, stiffer springs and stabilizer bars, specific shock absorbers, larger brakes with cross-drilled rotors, specific tires and performance gearing, Z51-specific, 6-speed manual transmission or performance axle ratio with automatic transmission **1 - Not available with (F55) Magnetic Selective Ride Control. Includes (G90) Axle, 3.15 performance ratio when (MX0) Transmission, 4-speed automatic is specified.**	A[1]	A[1]	A[1]	A[1]	A[1]
F55		**Magnetic Selective Ride Control**, for ultimate driver control and comfort through the use of a driver adjustable ride control system **1 - Not available with (Z51) Performance Handling Package.**	A[1]	A[1]	A[1]	A[1]	A[1]
MX0		**Transmission,** 4-speed automatic, electronically controlled with overdrive **1 - Includes (GU2) Axle, 2.73 ratio.**	A[1]	A[1]	A[1]	A[1]	A[1]

S = Standard Equipment A = Available – (dashes) = Not 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.

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	Coupe 1YY07			Convertible 1YY67	
			Base 1SX	1SA	1SB	1SA	1SB
	AJ7	NEW! **Air bags,** frontal and side impact, driver and front passenger		■	■		
		Cargo convenience net		■	■		
	D42	**Luggage shade**		■	■		
	AG2	**Seat adjuster,** power, front passenger 6-way		■	■		
	AQ9	**Seats,** front Sport bucket		■	■		
	UV6	**Head-Up Display**			■		■
	UG1	NEW! **Homelink transmitter,**			■		■
	AAB	**Memory Package**			■		■
	DD0	**Mirrors,** inside rearview with compass and driver outside rearview			■		■
	KA1	NEW! **Seats,** heated			■		■
	US9	NEW! **Sound system,** ETR AM/FM stereo with 6-disc			■		■
	N37	**Steering column,** power telescopic			■		■

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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	Coupe 1YY07			Convertible 1YY67	
			Base 1SX	1SA	1SB	1SA	1SB
	AK5	**Air bags,** dual-stage, frontal, driver and front passenger **1 - Always use safety belts and proper child restraints, even with air bags. See the Owner's Manual for more safety information.**	S[1]	–	–	–	–
	AJ7	NEW! **Air bags,** frontal and side impact, driver and front passenger **1 - Always use safety belts and proper child restraints, even with air bags. See the Owner's Manual for more safety information.**	–	■[1]	■[1]	S[1]	S[1]
		Air bag, shut-off switch, front passenger	S	S	S	S	S
	CJ2	**Air conditioning,** dual-zone, automatic, includes individual climate settings for driver and right front passenger, automatic climate control and outside temperature display	S	S	S	S	S
		NEW! **Air filtration,** includes pollen filter	S	S	S	S	S
		Cargo convenience net, in rear compartment area	–	■	■	S	S
		Console, floor, lockable, includes 2 covered cupholders, ashtray with cigar lighter, auxiliary power outlet and CD storage	S	S	S	S	S
		Cruise control, electronic with set and resume speed	S	S	S	S	S
		Defogger, rear-window, electric	S	S	S	S	S
		Door locks, power, programmable, includes lockout protection	S	S	S	S	S
		Floormats, carpeted	S	S	S	S	S
		NEW! **Hatch release,** push button open, includes power hatch pulldown	S	S	S	–	–
	UV6	**Head-Up Display,** includes dot-matrix readouts for street mode, track mode with g-meter, vehicle speed, engine rpm, and readings from key gauges including water temperature and oil pressure	–	–	■	–	■
	UG1	NEW! **Homelink transmitter,** includes garage door opener, 3-channel programmable, located on driver visor	–	–	■	–	■
		NEW! **Ignition,** keyless, engaged with push button start	S	S	S	S	S
	U52	**Instrumentation,** analog, electronic, includes Driver Information Center with 2 line display	S	S	S	S	S
		NEW! **Keyless Access,** with push-button start, includes 2 remote transmitters which enable automatic door unlock and open by touching door switch	S	S	S	S	S
		Lighting, interior, courtesy, cargo and glovebox	S	S	S	S	S
		Lower anchors, for child safety seat	S	S	S	S	S
	D42	**Luggage shade**	–	■	■	–	–

Free Flow RPO Code	Ref. Only RPO Code	Description	Coupe 1YY07			Convertible 1YY67	
			Base 1SX	1SA	1SB	1SA	1SB
	AAB	**Memory Package**, 2 driver settings, remembers "presets" for 6-way power seat, outside mirrors, climate control, radio presets and telescoping steering column	–	–	■	–	■
		Mirror, inside rearview, manual day/night, includes dual reading lights	S	S	–	S	–
	DD0	**Mirrors,** inside rearview with compass and driver outside rearview, auto-dimming	–	–	■	–	■
UE1		NEW! **OnStar**, 1-year Safe and Sound Service, includes automatic notification of air bag deployment, emergency services, roadside assistance, stolen-vehicle tracking, AccidentAssist, remote door unlock, remote diagnostics, online concierge and remote horn and lights. Drivers can also opt for other available OnStar services, including making and receiving voice-activated, hands-free phone calls with Personal Calling and getting location-based traffic and weather reports with Virtual Advisor. **1 - Visit www.onstar.com for system information and details. Not available with a ship-to of Puerto Rico or the Virgin Islands.**	–	–	A[1]	–	A[1]
		Seat adjuster, power, driver 6-way	S	S	S	S	S
	AG2	**Seat adjuster,** power, front passenger 6-way	–	■	■	S	S
	AR9	**Seats,** front bucket with leather seating surfaces, includes back angle adjustment	S	–	–	–	–
	AQ9	**Seats,** front Sport bucket with perforated leather seating surfaces, includes back angle adjustment, adjustable lumbar and side bolsters **1 - Includes (AJ7) Air bags, frontal and side-impact, driver and front passenger.**	–	■[1]	■[1]	S[1]	S[1]
	KA1	NEW! **Seats,** heated, driver and passenger	–	–	■	–	■
	US8	NEW! **Sound system,** ETR AM/FM stereo with CD player and MP3 playback, includes Radio Data System, seek-and-scan, digital clock, auto-tone control, automatic volume, TheftLock and (U66) Sound system feature, 7-speaker system	S	S	–	S	–
	US9	NEW! **Sound system,** ETR AM/FM stereo with 6-disc, in dash CD changer, MP3 playback and (U65) Sound system feature, Bose premium 7-speaker system, includes Radio Data System, seek-and-scan, digital clock, auto-tone control, automatic volume and TheftLock	–	–	■	–	■

Free Flow RPO Code	Ref. Only RPO Code	Description	Coupe 1YY07			Convertible 1YY67	
			Base 1SX	1SA	1SB	1SA	1SB
URB		NEW! **Sound system with Navigation**, ETR AM/FM stereo with CD player, (U65) Sound system feature, Bose premium 7-speaker system, DVD navigation with GPS, 6.5" LCD color display touch screen, voice recognition, includes Radio Data System, seek-and-scan, digital clock, auto-tone control, automatic volume and TheftLock **1 - Deletes 6-disc, in dash CD changer and MP3 playback.**	--	--	A[1]	--	A[1]
U2K		NEW! **Sound system feature,** XM Satellite Radio. 100% commercial-free music. Over 120 channels. In-depth local traffic and weather in major metro markets. Digital quality sound with coast-to-coast signal coverage. 3-month trial - no charge and no obligation. **1 - Includes black external antenna. Subscription fees apply. Available only in the 48 contiguous U.S.** **2 - Includes body-color external antenna. Subscription fees apply. Available only in the 48 contiguous U.S.**	--	--	A[1]	--	A[2]
		Steering column, manual, Tilt-Wheel	S	S	S	S	S
	N37	**Steering column,** power telescopic, includes manual tilt	--	--	■	--	■
	NK4	**Steering wheel,** leather-wrapped	S	S	S	S	S
		Storage, includes lockable glovebox, center console and 2 rear compartments with covers	S	S	S	S	S
		Theft-deterrent system, push button start, immobilizer and audible visual alarm	S	S	S	S	S
		Tire Pressure Monitor System, air pressure sensors in each tire, pressure display in Driver Information Center	S	S	S	S	S
		Trunk release, push button open	--	--	--	S	S
		Visors, illuminated vanity mirrors, driver and front passenger	S	S	S	S	S
		Windows, power, includes driver and passenger express-down	S	S	S	S	S

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Free Flow RPO Code	Ref. Only RPO Code	Description	Coupe 1YY07			Convertible 1YY67	
			Base 1SX	1SA	1SB	1SA	1SB
		NEW! **Antenna,** integral, hidden	S	S	S	S	S
		Convertible top, manual folding, includes glass rear window with integral defogger	–	–	–	S	S
CM7		NEW! **Convertible top,** power folding, includes glass rear window with integral defogger	–	–	–	–	A
R8C		**Corvette Museum Delivery**, acknowledgement form required	A	A	A	A	A
		Daytime running lamps	S	S	S	S	S
		Engine access, rear opening hood, includes underhood lamp	S	S	S	S	S
		Fog lamps, front, integral in fascia	S	S	S	S	S
		Glass, Solar-Ray light tinted	S	S	S	S	S
		NEW! **Headlamps**, bi-functional, Xenon, high-intensity discharge, includes automatic exterior lamp control	S	S	S	S	S
VK3		**License plate bracket,** front	A	A	A	A	A
	DL8	**Mirrors,** outside rearview, power, heated, body-color	S	S	S	S	S
	CF7	**Roof panel,** removable, 1-piece, body-color	S	S	S	–	–
CC3		**Roof panel,** removable, 1-piece, transparent **1 - Included with (C2L) Roof Package.**	A[1]	A[1]	A[1]	–	–
C2L		**Roof Package**, includes (CF7) Roof panel, 1-piece, body-color and (CC3) Roof panel, 1-piece, transparent	A	A	A	–	–
		NEW! **Tires,** front P245/40ZR18, extended mobility, Eagle F1	S	S	S	S	S
		NEW! **Tires,** rear P285/35ZR19, extended mobility, Eagle F1	S	S	S	S	S
		Trunk, rear, includes remote release	–	–	–	S	S
	QG6	NEW! **Wheels,** 5-spoke painted aluminum, 18" x 8.5" (45.7 cm x 21.6 cm), front and 19" x 10.0" (48.3 cm x 25.4 cm), rear	S	S	S	S	S
QX1		NEW! **Wheels**, 5-spoke, Competition Gray painted aluminum, 18" x 8.5" (45.7 cm x 21.6 cm) , front and 19" x 10" (48.3 cm x 25.4 cm), rear	A	A	A	A	A
QG7		NEW! **Wheels,** polished, 5-spoke aluminum, 18" x 8.5" (45.7 cm x 21.6 cm), front and 19" x 10.0" (48.3 cm x 25.4 cm), rear	A	A	A	A	A
		Wipers, intermittent, front	S	S	S	S	S

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Free Flow RPO Code	Ref. Only RPO Code	Description	Coupe 1YY07			Convertible 1YY67	
			Base 1SX	1SA	1SB	1SA	1SB
		Active handling, improves traction and enhances vehicle stability	S	S	S	S	S
	GU2	**Axle,** 2.73 ratio, limited slip **1 - Included and only available with (MX0) Transmission, 4-speed automatic. Upgradeable to (G90) Axle, 3.15 performance ratio.**	A[1]	A[1]	A[1]	A[1]	A[1]
G90		**Axle,** 3.15 performance ratio **1 - Only available with (MX0) Transmission, 4-speed automatic. Included with (Z51) Performance Handling Package with (MX0) Transmission, 4-speed automatic.**	A[1]	A[1]	A[1]	A[1]	A[1]
	GU6	**Axle,** 3.42 ratio, limited slip **1 - Included and only available with (MN6) Transmission, 6-speed manual.**	S[1]	S[1]	S[1]	S[1]	S[1]
		Brakes, 4-wheel antilock, 4-wheel disc	S	S	S	S	S
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) Emissions, Federal 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) Emissions, California state requirements or (NE1) Emissions, New York, Vermont, Massachusetts or Maine state requirements.**	A[1]	A[1]	A[1]	A[1]	A[1]
	LS2	NEW! **Engine,** 6.0L V8 SFI (400 HP [298.3kW] @ 6000 rpm, 400 lb.-ft. [542.8 N-m] @ 4400 rpm)	S	S	S	S	S
		Exhaust, aluminized stainless-steel with polished 3" stainless-steel tips	S	S	S	S	S

Free Flow RPO Code	Ref. Only RPO Code	Description	Coupe 1YY07			Convertible 1YY67	
			Base 1SX	1SA	1SB	1SA	1SB
Z51		**Performance Handling Package**, performance-oriented package for the Gymkhana/Autocross enthusiast, includes power steering, engine oil and transmission coolers, stiffer springs and stabilizer bars, specific shock absorbers, larger brakes with cross-drilled rotors, specific tires and performance gearing, Z51-specific, 6-speed manual transmission or performance axle ratio with automatic transmission **1 - Not available with (F55) Magnetic Selective Ride Control. Includes (G90) Axle, 3.15 performance ratio when (MX0) Transmission, 4-speed automatic is specified.**	A[1]	A[1]	A[1]	A[1]	A[1]
F55		**Magnetic Selective Ride Control**, for ultimate driver control and comfort through the use of a driver adjustable ride control system **1 - Not available with (Z51) Performance Handling Package.**	A[1]	A[1]	A[1]	A[1]	A[1]
		Oil life monitoring system	S	S	S	S	S
		Steering, power, speed-sensitive, rack and pinion	S	S	S	S	S
	FE1	**Suspension,** 4-wheel independent, includes transverse fiberglass leaf springs	S	S	S	S	S
		Traction control, all-speed	S	S	S	S	S
MX0		**Transmission,** 4-speed automatic, electronically controlled with overdrive **1 - Includes (GU2) Axle, 2.73 ratio.**	A[1]	A[1]	A[1]	A[1]	A[1]
	MN6	**Transmission,** 6-speed manual, short-throw **1 - Includes (GU6) Axle, 3.42 ratio.**	S[1]	S[1]	S[1]	S[1]	S[1]

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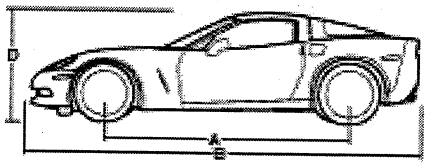
Model	Seat Type	Seat Code	Seat Trim	Interior			
				Red	Ebony	Cashmere	Steel Gray
Coupe (Base 1SX only)	Front bucket	AR9	Highwear Nuance Leather	--	193	--	--
Coupe and Convertible (1SA and 1SB only)	Sport bucket	AQ9	Highwear Nuance Leather	023	193	313	363

Exterior Solid Paint	Color Code	Touch Up Paint Number	Interior			
			Red	Ebony	Cashmere	Steel Gray
Arctic White Convertible top color	10U	WA-9567	A 41T	A 37T/ 41T	A 35T/ 41T	A 37T/ 41T
LeMans Blue Metallic[1] Convertible top color	19U	WA-933L	--	A 41T	A 35T/ 41T	A 37T/ 41T
Black Convertible top color	41U	WA-8555	A 41T	A 35T/ 37T/ 41T	A 35T/ 41T	A 37T/ 41T
Machine Silver Metallic Convertible top color	67U	WA-994L	A 41T	A 37T/ 41T	A 35T/ 41T	A 37T/ 41T
NEW! Daytona Sunset Orange Metallic Convertible top color	71U	WA-633H	--	A 41T	A 35T/ 41T	--
NEW! Victory Red Convertible top color	74U	WA-9260	A 41T	A 41T	A 35T/ 41T	A 37T/ 41T
Millennium Yellow[2] Convertible top color	79U	WA-423G	--	A 41T	A 35T/ 41T	--
Magnetic Red Metallic[2] Convertible top color	86U	WA-379E	A 41T	A 41T	A 35T/ 41T	A 37T/41T

Convertible top colors: 35T = Beige, 37T = Gray, 41T = Black.
Convertible top must be specified in "Plus" (+) option section of order worksheet.
1 - Additional charge - premium paint.
2 - Additional charge - premium tint coat color.

All dimensions in inches (mm) unless otherwise stated.



	Specifications	Coupe	Convertible
A	**Wheelbase**	105.75 (2686)	105.75 (2686)
B	**Overall length**	174.60 (4435)	174.60 (4435)
	Body width, without mirrors	72.60 (1844)	72.60 (1844)
D	**Overall height**	49.00 (1245)	49.15 (1248)
	Front track width	62.10 (1577)	62.10 (1577)
	Rear track width	60.70 (1542)	60.70 (1542)
	Head room, front	37.89 (962)	37.89 (962)
	Shoulder room, front	55.25 (1403)	55.25 (1403)
	Hip room, front	53.65 (1363)	53.65 (1363)
	Leg room, front	43.05 (1093)	43.05 (1093)

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.

	Coupe	Convertible
Capacities		
Curb weight, lbs. (kg)	3179 (1442)	3199 (1451)
Cargo volume, cu. ft. (liters)	22.4 (634.4)	10.4 (294.5)
Fuel capacity, approximate, gallon (liters)	18 (68)	18 (68)

Option Code	Description
AAB	Memory Package
AG2	Seat adjuster, power, front passenger 6-way
AJ7	Air bags, frontal and side impact, driver and front passenger
AK5	Air bags, dual-stage, frontal
AQ9	Seats, front Sport bucket
AR9	Seats, front bucket
C2L	Roof Package
CC3	Roof panel, removable
CF7	Roof panel, removable, 1-piece, body-color
CJ2	Air conditioning, dual-zone, automatic
CM7	Convertible top, power folding
D42	Luggage shade
DD0	Mirrors, inside rearview with compass and driver outside rearview
DL8	Mirrors, outside rearview, power, heated, body-color
F55	Magnetic Selective Ride Control
FE1	Suspension, 4-wheel independent
FE9	Emissions, Federal requirements
G90	Axle, 3.15 performance ratio
GU2	Axle, 2.73 ratio
GU6	Axle, 3.42 ratio
KA1	Seats, heated
LS2	Engine, 6.0L V8 SFI
MN6	Transmission, 6-speed manual
MX0	Transmission, 4-speed automatic
N37	Steering column, power telescopic
NB8	Emissions override
NC7	Emissions override, Federal
NE1	Emissions, Maine, Massachusetts, New York or Vermont state requirements
NK4	Steering wheel, leather-wrapped
QG6	Wheels, 5-spoke painted aluminum
QG7	Wheels, polished
QX1	Wheels, 5-spoke, Competition Gray painted aluminum
R8C	Corvette Museum Delivery
U2K	Sound system feature, XM Satellite Radio
U52	Instrumentation, analog
UE1	OnStar
UG1	Homelink transmitter,
URB	Sound system with Navigation, ETR AM/FM stereo with CD player
US8	Sound system, ETR AM/FM stereo with CD player and MP3 playback
US9	Sound system, ETR AM/FM stereo with 6-disc
UV6	Head-Up Display
VK3	License plate bracket, front
YF5	Emissions, California state requirements
Z51	Performance Handling Package