Chevrolet

TrailBlazer

2002

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Product Information

The All-New Midsize 2002 Chevrolet TrailBlazer Offers Unequaled Power, Strength

The all-new 2002 Chevy TrailBlazer sport utility vehicle (SUV) offers an unequaled combination of strength, power and high-tech precision, wrapped in a design that evokes patented Chevy Truck toughness. Bigger than a Blazer and smaller than a Tahoe, the TrailBlazer completes the Chevy Truck SUV family, giving Chevy the most competitive SUV lineup in the industry, from Tracker to Suburban.

Later in 2002 Chevy will introduce an extended TrailBlazer with a third row seat.

Powered by the all-new Vortec 4200, an inline-six configured engine, the TrailBlazer offers the power of a V8 engine with the fuel efficiency of a six-cylinder. It is the most technologically advanced engine in its class and delivers the most horsepower in its segment, at 270 hp with 275 lb-ft of torque.

"The 2002 TrailBlazer is designed to deliver a new level of strength, power, security, ride and handling, and true SUV toughness," said Russ Clark, TrailBlazer brand manager. "It starts with the Vortec 4200 engine, which combines new technology with the proven balance of an inline-six engine to challenge the best of the best. The TrailBlazer will offer unequaled power and smoothness, while providing excellent fuel efficiency."

Yet the TrailBlazer doesn't sacrifice refined ride and handling, ample cargo and passenger space, or long-lasting dependability. It offers a complete package of performance, features and attributes specially tuned for the unique demands of SUV customers.

Engine And Transmission Smoothness

The Vortec 4200 is mated to a next-generation four-speed automatic transmission (4L60-E), and is expected to set industry benchmarks for smoothness and quietness while providing a strong, flat torque curve. And TrailBlazer provides that power with good fuel economy, strong trailer towing capacity and an inherently balanced inline-six engine.

The engine meets or exceeds all sound requirements while providing outstanding horsepower, 0 to 60-mph performance, and 50 to 70 mph performance. Its naturally balanced configuration virtually eliminates shake and idle roll.

A racing version of the powerful inline-six has won both the Baja 500 and the Nevada 2000 "best of the desert" races, competing against V8 engines.

Superior Ride And Handling

TrailBlazer's world-class ride and handling attributes combine Chevy-Truck toughness and unprecedented precision. Its hydroformed steel frame side rails form a strong foundation for the truck's overall strength and ride quality. The frame dramatically increases torsional stiffness, an important enabler in the performance of suspension components.

A five-link rear suspension — similar to the system pioneered by Chevy's award winning Tahoe and Suburban — combines with a double-A arm front suspension and one of the SUV-market's first applications of rack-and-pinion steering for superior responsiveness, quietness and performance.

The hydraulically assisted rack-and-pinion steering system provides a precise steering response and tight turning radius. Braking also is at world-class levels in terms of noise, wear and brake feel. An advanced system of 12 specially tuned body mounts use hydraulics and rubber pads to isolate road inputs and noise, limiting vibration and harshness dramatically on any kind of road or trail.

All-New Platform

TrailBlazer is built on an all-new GM vehicle platform that establishes a new standard for technology in the midsize SUV world. With features such as next-generation OnStar, the industry's first fully hydroformed frame, dual-stage air bags and a five-link rear suspension, TrailBlazer brings a host of innovative technologies to the midsize truck arena. TrailBlazer also has all-new sheet metal and a body-

on-frame architecture. It will only be offered in a four-door configuration. TrailBlazer is one of a new generation of midsize SUVs that is part of GM's strategy to be the industry's truck leader.

"This vehicle defines what Chevy Trucks are all about," added Clark. "The TrailBlazer is bigger, quieter and more powerful than the Blazer, and will match up against any competition on the market."

Safe Driver Environment

TrailBlazer provides a strong safety package. It comes equipped with standard dual-stage air bags, side impact air bags for front seating positions, and three-point restraint systems for all seating positions (including the middle rear). New four-wheel vented disc anti-lock brakes (ABS) are also standard.

The vehicle's styling offers dramatically improved visibility and a commanding view of the road. TrailBlazer's enhanced driver information center (DIC) has a 22-character message display, giving drivers feedback on dozens of vehicle systems and conditions. The next-generation OnStar system provides hands-free calling, information services, and many other features.

Chassis

The chassis system was designed to achieve new levels of comfort, safety and performance in a midsize SUV. TrailBlazer has a stiffer frame, which achieves an optimum structural feel for precise ride and handling. Responsive steering from a hydraulic power-assist rack-and-pinion system provides precise steering response and a world-class tight turning radius. A five-link rear suspension system provides the ride and handling more like a European sport sedan than a traditional truck.

Four-wheel vented disc brakes with standard ABS achieve high levels of wear resistance, noise reduction and brake feel. Traction control is available as an option for two-wheel drive models.

Technology

Technologies such as electronic throttle control, variable valve timing (cam phasing), OnStar, a hydroformed frame, a five-link rear suspension, and many others make TrailBlazer a true competitor in the growing midsize SUV segment.

The vehicle also has an all-new heating/ventilation/air conditioning system (HVAC) which has been rated one of the best against "Best in Class" competitors, both car and truck. It is the first system in a GM truck to offer dual zones and its high-airflow system warms up and cools down faster than virtually any other system in the segment or price range.

To keep all these technologies running, the TrailBlazer incorporates the most advanced electrical system ever used in a truck. The electrical architecture is a major enabler of the advanced segment-defining features of the vehicle — most notably the next-generation OnStar — and will set the standard for all GM truck electrical systems. The system is highly integrated with distributed computing and 17 zone modules, all connected by a serial data network.

GM Accessories Help Gear Up TrailBlazer For Adventure

A complete line of GM Accessories help Chevy TrailBlazer customers get geared up for adventure. From a hitch-mounted bike or ski rack to interior amenities, GM Accessories are engineered to provide ideal fit, style, and performance for the active lifestyles of TrailBlazer owners.

The trailer hitch, built for convenience and long-lasting durability, allows customers numerous hauling applications. Once the hitch is in place, the sky's the limit with either bikes, skis or snowboards.

The hitch system features a sturdy connection to the truck's two-inch receiver. The entire unit tilts down with a hand-operated lever so the cargo area is easy to access. The ski package allows customers to carry up to six pairs of skis or four snowboards. Quick release attachments make loading and unloading a snap.

Optional Carriers

Canoe/Load-Stop and Kayak/Windsurfer Carriers are also options for customers who yearn for the water. The Canoe/Load-Stop Carrier attaches to the GM Accessories roof rack and secures everything from

canoes to ladders. The Kayak/Windsurfer Carrier is designed to safely secure kayaks or windsurfer boards for the long haul.

If additional storage is the key, then GM Accessories has the long and the short of it with a hard cargo carrier for storage and cargo protection. The carrier is lockable.

Assist steps help ensure easy access to the roof area. The extruded aluminum step with extruded plastic step pads and injected molded plastic end caps is available in black or clear anodized aluminum.

Customized Appearance

A stylish brush/grille guard wraps around the front grille and headlamps for a customized appearance. Whether on city streets or on off-road terrain, the guard offers maximum protection.

Give the interior a twist with a food and beverage warmer/cooler for road trips and tailgate parties. This handy unit plugs into the cigarette lighter. Vinyl or carpet floor mats are also available. For the cargo area, a vinyl liner will shield the cargo area and rear seat back (when in the down position) from scratches and stains. The liner folds neatly into a pouch for compact storage.

Also available is a cargo area tray that makes transporting messy items, supplies or anything else a snap. If organization is paramount, then the cargo area organizer is a must. The organizer features an adjustable, dual-divider system allowing a variety of items to be secured.

All accessories will be available for purchase through Chevrolet dealerships.

Warranty Coverage

"GM accessories permanently installed on a new GM vehicle at the time of delivery are covered under the GM New Vehicle Limited Bumper-to-Bumper Warranty," said Jim Kornas, director-sales and marketing, GM Accessories. "GM Parts and Accessories permanently installed by a GM dealer after vehicle purchase are covered for the balance of the New Vehicle Warranty, but in any event no less than 12 months or 12,000 miles."

SPO, headquartered in Grand Blanc, Mich., markets automotive replacement parts and accessories worldwide under the GM and ACDelco brand names. For more information, visit the GM Goodwrench Service Plus Web site at http://www.GMGoodwrench.com.

New For 2002

- All-new inline six-cylinder Vortec 4200 engine with variable valve timing and the most power in its class, at 270 hp @ 6000 rpm and 275 lb-ft of torque at 3600 rpm
- Smooth, quiet next-generation 4L60-E four-speed electronic automatic transmission
- All-new sheet metal and vehicle platform
- The industry's first fully hydroformed SUV frame
- Standard dual-stage air bags, four-wheel vented disc brakes with standard ABS
- Five-link rear suspension for smooth, luxury sedan-like ride
- Next-generation OnStar

Model Lineup

	Engine Vortec 4200 I6	Transmission 4L60-E 4-speed auto
LS	S	S
LT	S	S
LTZ	S	S

Standard S

Specifications

Overview

Model:	Chevrolet TrailBlazer
Body style / driveline:	front-engine, two- and four-wheel-drive mid-size utility
Manufacturing location:	Moraine, Ohio
Key competitors:	Ford Explorer, Jeep Grand Cherokee, Dodge Durango, Toyota 4-Runner

Engine

Type:	Vortec 4200, 4.2-liter, inline six-cylinder, dual overhead cam, LL8
Displacement (cu in / cc):	256 / 4195
Bore & stroke (in / mm):	3.66 x 4.01 / 93 x 102
Cylinder head material:	cast aluminum
Valvetrain:	dual overhead camshafts, variable cam phasing – exhaust cams
Ignition system:	coil-on-plug, dual platinum electronics
Fuel delivery:	sequential fuel injection, electronic throttle control
Compression ratio:	10.1:1
Horsepower (hp / kw @ rpm):	270 / 201 @ 6000
Torque (lb-ft / Nm @ rpm):	275 / 372 @ 3600
Recommended fuel:	unleaded regular
Maximum engine speed (rpm):	6300
Emissions controls:	NLEV
Estimated fuel economy (mpg city / hwy / combined):	2WD: 16 / 22 / 19; 4WD: 15 / 21 / 18

Transmission

4L60-E	
Type:	four-speed automatic transmission, rear-wheel-drive, electronically controlled automatic overdrive with torque converter clutch
Gear ratios (:1):	
First:	3.059
Second:	1.625
Third:	1.000
Fourth:	0.696
Reverse:	2.294
Final drive ratio:	3.42:1 standard; 3.73:1 and 4.10:1 are Optional

Chassis/Suspension

Front:	double A-arm
Rear:	five-link solid axle
Shock size (front / rear):	46 / 36
Stabilizer bar diameter (front / rear):	44 / 24
Traction control system:	Autotrac (standard. on 4WD)
Type:	rack-and-pinion (hydraulically assisted)
Overall ratio:	20.4:1
Turning diameter, curb-to-curb:	36.4 / 11

Brakes

Type:	four-wheel vented disc with front aluminum dual piston calipers, standard four-wheel ABS
Rotor diameter x thickness (in / mm):	front: 12.0 x 1.14 / 305 x 29; rear: 12.8 x 0.78 / 325 x 20
Swept area (sq in / sq cm):	front: 207 / 217; rear: 1340 / 1397

Wheels/Tires

Wheel size & type:	cast aluminum, 16-inch standard, 17-inch Optional
Tire size & type:	standard: P245/70R16; Optional: P245/65R17

Dimensions

Exterior

Wheelbase (in / mm):	113 / 2869
Overall length (in / mm):	191.8 / 4871
Overall width (in / mm):	74.6 / 1894
Overall height (in / mm):	71.9 / 1826 (without luggage rack)
Track (in / mm):	
Front:	63.1 / 1603
Rear:	62.1 / 1577
Min. ground clearance (in / mm):	8 / 203
Ground to top of load floor (in / mm):	32.1 / 816
Step-in height (in / mm):	18.1 / 481.3
Approach angle:	29°
Departure angle:	23°
Base curb weight (lbs / kg):	2WD: 4417 / 2004; 4WD: 4600 / 2087
Weight distribution percentage (front / rear):	2WD: 53 / 47; 4WD: 54 / 46

Interior

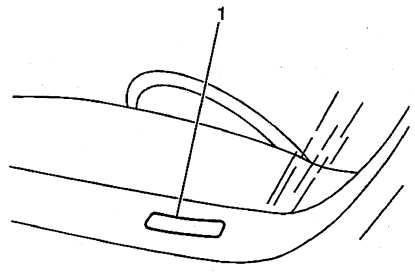
Seating capacity:	5
Head room (in / mm):	front: 40.2 / 1021; rear: 39.6 / 1006
Leg room (in / mm):	front: 44.6 / 1133; rear: 37.1 / 942
Shoulder room (in / mm):	front: 58.5 / 1485; rear: 58.5 / 1485
Hip room (in / mm):	front: 55.5 / 1410; rear: 58.1 / 1476
Cargo volume (cu ft / liters):	interior: 83.3 / 2358; rear seat up: 41 / 1162; folded: 80.1 / 2268

Capacities

GVWR, standard (lbs / kg):	2WD: 5550 / 2517; 4WD: 5750 / 2608
Payload, base (lbs / kg):	2WD: 1133 / 514; 4WD: 1150 / 523
Trailer towing maximum (lbs / kg):	2WD: 6400 / 2858; 4WD: 6200 / 2767
Maximum tongue weight (lbs / kg):	400 / 181 (without sway control)
Fuel tank (gal / liters):	18.7 / 71.5

Vehicle Identification

Vehicle Identification Number (VIN)



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

Position	Definition	Character	Description
1	Country of Origin	1,4	U.S. Built
2	Manufacturer	G	General Motors
3	Make	C H K N T	Chevrolet Truck Oldsmobile MPV GMC MPV Chevrolet MPV GMC Truck
4	GVWR/Brake System	D E	5001-6000/Hydraulic 6001-7000/Hydraulic
5	Truck Line/Chassis Type	S T	Sm Conventional Cab--4x2 Sm Conventional Cab--4x4
6	Series	1	½ Ton Nominal
7	Body Type	3 6	GMT 360 GMT 370
8	Engine Type	S	GM 4.2L L6 MFI (LL8)
9	Check Digit	--	Check Digit
10	Model Year	2	2002
11	Plant Location	K 2 X 6	Linden, NJ Moraine E.E.M.S. Oklahoma City
12-17	Plant Sequence Number	--	Plant Sequence Number

VIN Derivative

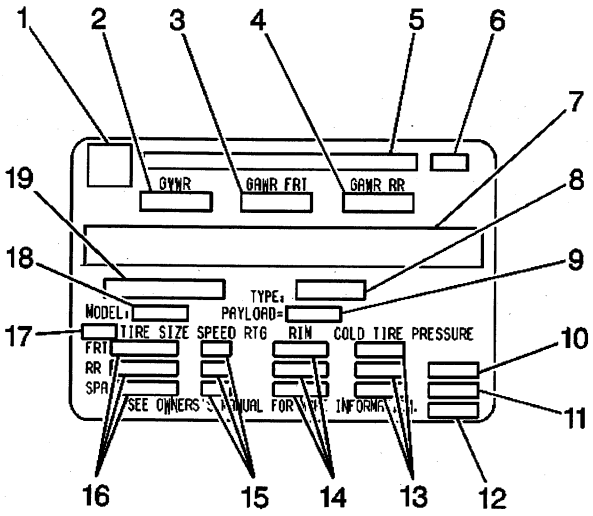
All engines and transmissions are stamped or laser etched with a partial vehicle identification number (VIN), which was derived from the complete VIN. A VIN derivative contains the following nine positions:

Position	Definition	Character	Description
1	GM Division Identifier	C H K N T	Chevrolet Truck Oldsmobile MPV GMC MPV Chevrolet MPV GMC Truck
2	Model Year	2	2002
3	Assembly Plant	K 8 2 X	Linden, NJ Shreveport, LA Moraine, OH E.E.M.S
4-9	Plant Sequence Number	--	Plant Sequence Number

A VIN derivative can be used to determine if a vehicle contains the original engine or transmission, by matching the VIN derivative positions to their accompanying positions in the complete VIN:

VIN Derivative Position	Equivalent VIN Position
1	3
2	10
3	11
4-9	12-17

Label Certification w/o RPO Z49



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

The vehicle certification label displays the following assessments:

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

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

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

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

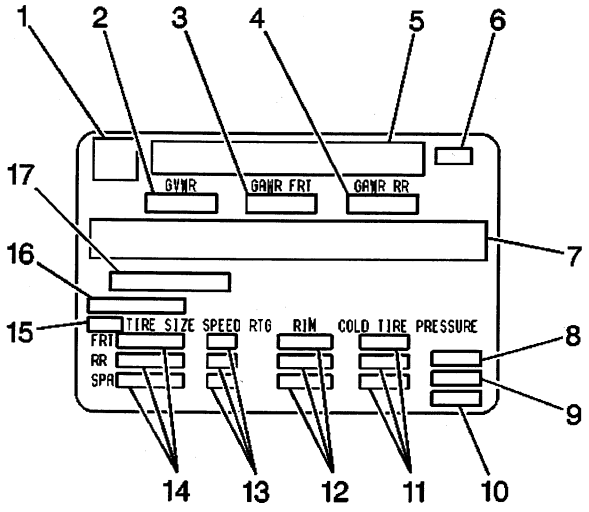
The front gross axle weight rating (GAWR FRT) is the weight exerted on the front axle. The rear gross axle weight rating (GAW RR) is the weight exerted on the rear axle. The front and rear gross axle weights must not exceed the front and rear gross axle weight ratings.

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

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

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

Label Certification w/o RPO Z49 – Incomplete Vehicle



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

The vehicle certification label displays the following assessments:

- The Gross Vehicle Weight Rating (GVWR)
- The Gross Axle Weight Rating (GAWR) -- Front and Rear

- The vehicle's payload rating
- The original equipment tire sizes and the recommended tire pressures

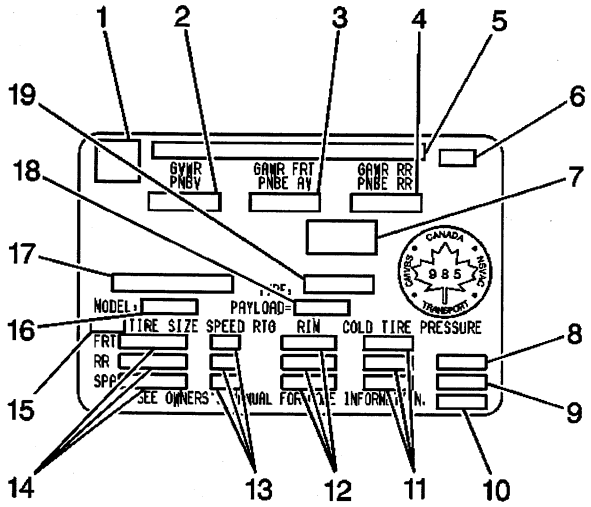
Gross vehicle weight (GVW) is the weight of the vehicle and everything it carries. Include the following items when figuring the GVW:

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

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

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

Label Certification with RPO Z49



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

The vehicle certification label displays the following assessments:

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

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

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

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

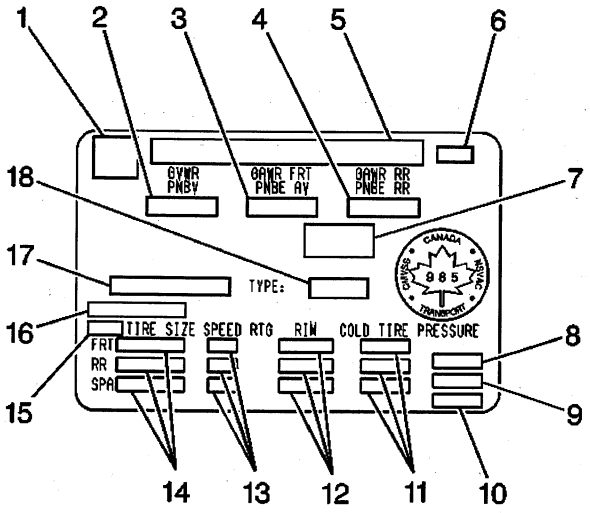
The front gross axle weight rating (GAWR FRT) is the weight exerted on the front axle. The rear gross axle weight rating (GAW RR) is the weight exerted on the rear axle. The front and rear gross axle weights must not exceed the front and rear gross axle weight ratings.

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

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

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

Label Certification with RPO Z49 – Incomplete Vehicle



(1) Logo
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(5) Name Of Manufacturer
(6) Manufacturer's Date
(7) RFI Statement - Canada Only
(8) DUAL - When Equipped
(9) Front Axle Reserve - When Required
(10) Total Capacity - When Required
(11) Tire Pressure - Spare Optional
(12) Rim Size - Spare Optional
(13) Speed Rating - When Required - Spare Optional
(14) Tire Size - Spare Optional
(15) GVW Rating Code
(16) Engineering Model
(17) Vehicle Identification Number
(18) Model Designation

The vehicle certification label displays the following assessments:

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

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

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- The weight of the cargo

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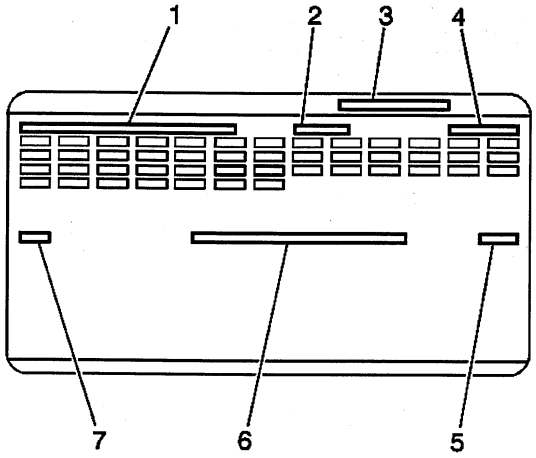
The front gross axle weight rating (GAWR FRT) is the weight exerted on the front axle. The rear gross axle weight rating (GAW RR) is the weight exerted on the rear axle. The front and rear gross axle weights must not exceed the front and rear gross axle weight ratings.

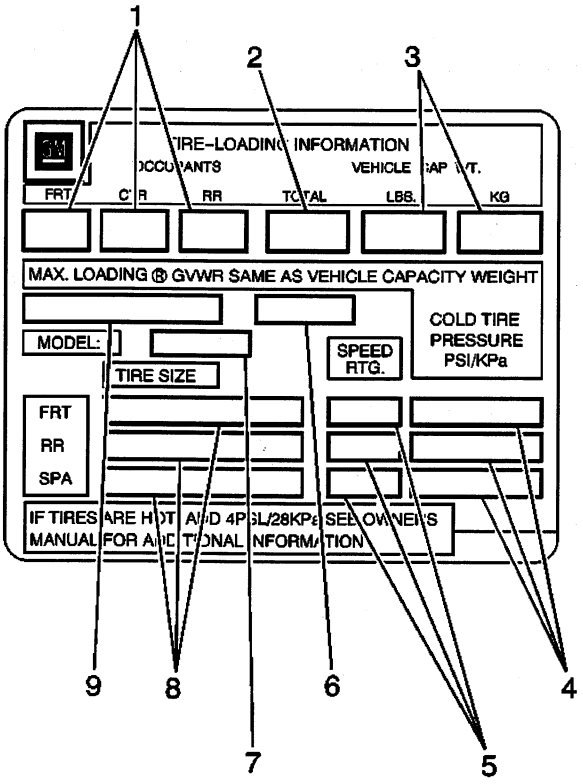
Service Parts Identification Label (SPID)



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

The service parts identification label is located on the instrument panel storage compartment door in order to help service and parts personnel identify the vehicle's original parts and the vehicle's original options.

Tire Placard

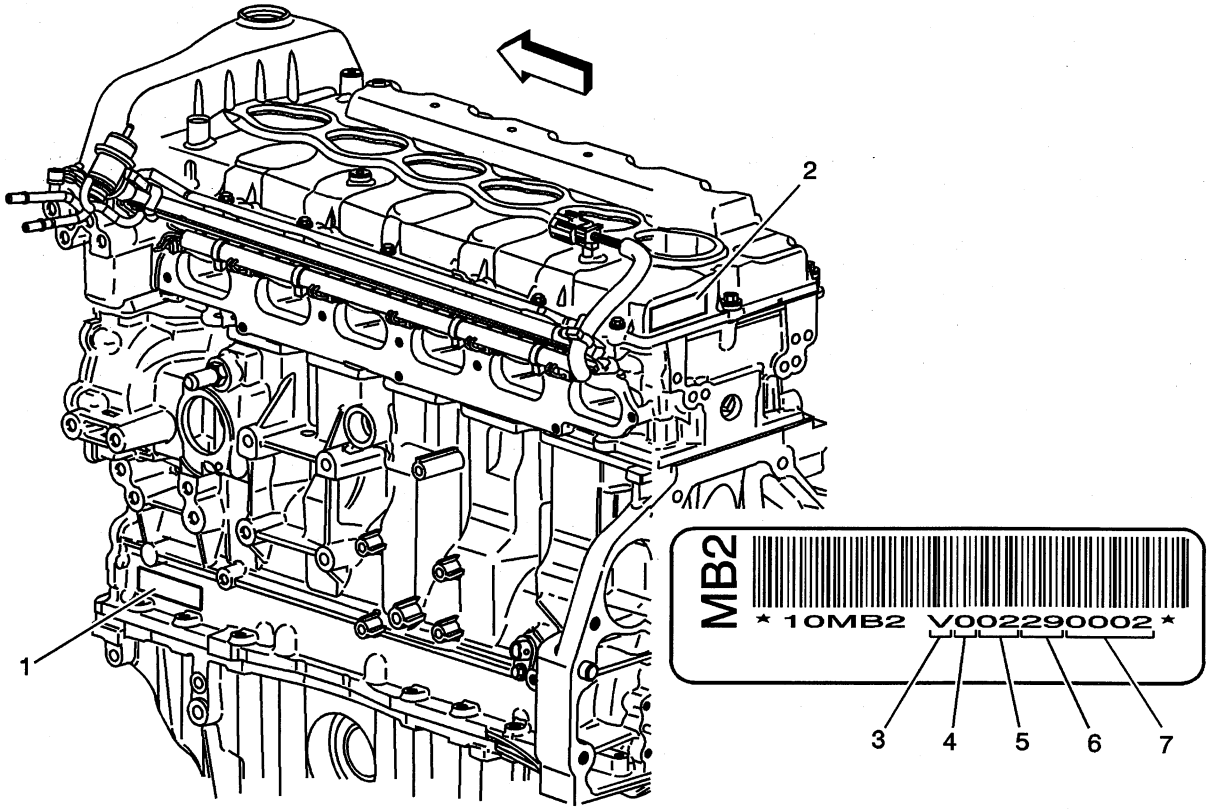


(1) Specified Occupant Seating Positions
(2) Total Occupant Seating
(3) Maximum Vehicle Capacity Weight
(4) Tire Pressures, Front, Rear, and Spare
(5) Tire Speed Rating, Front, Rear, and Spare
(6) Tire Label Code
(7) Engineering Model Minus First Character
(8) Tire Sizes, Front, Rear, and Spare
(9) Vehicle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

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

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

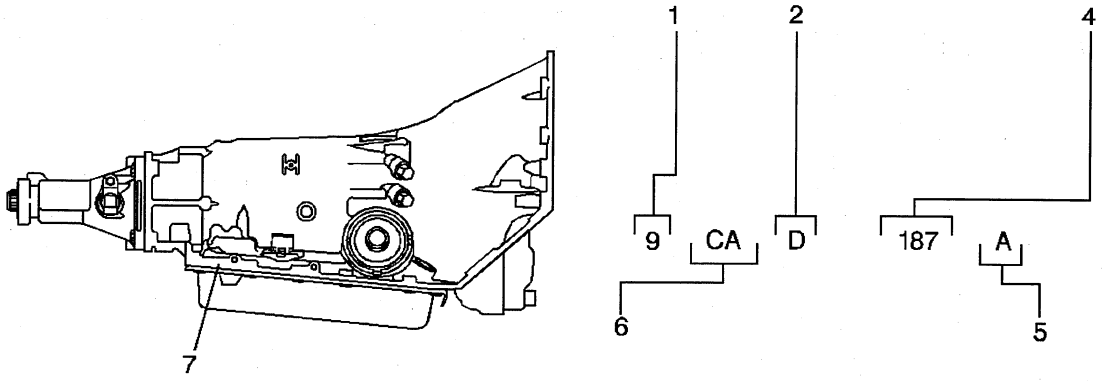
Engine ID and VIN Derivative Location 4.2L L6

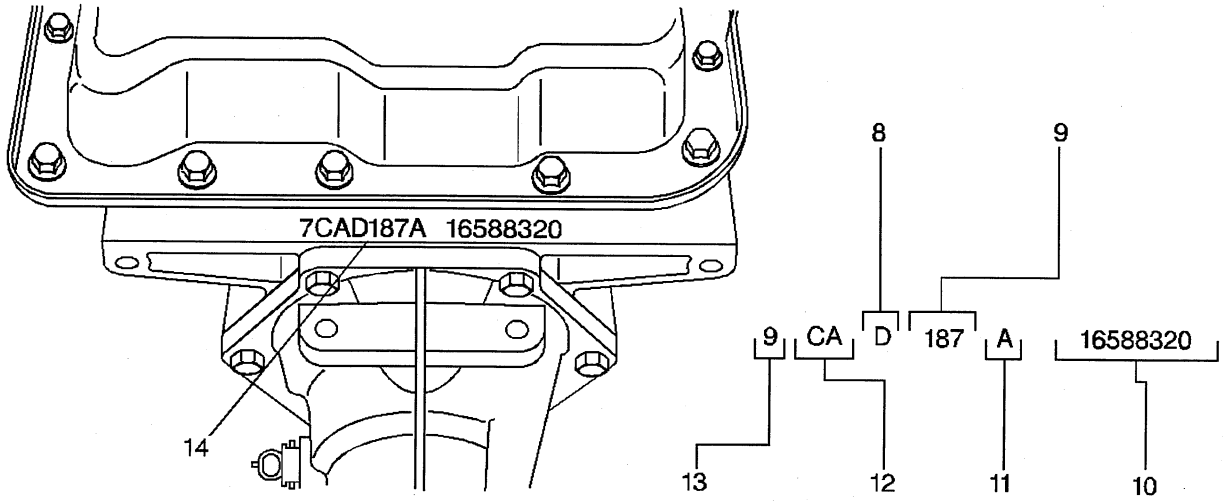


(1) Transmission ID Location
(2) Engine ID Location
(3) The first digit identifies the engine build location - All first digits will be a V, this engine is only being built at Flint Engine South
(4) The second digit identifies the build year
(5) The third and fourth digits identify the build month
(6) The fifth and sixth digits identify the build date
(7) The seventh through tenth digits identify the engine build sequence

Transmission ID and VIN Derivative Location

4L60-E Transmission ID Location



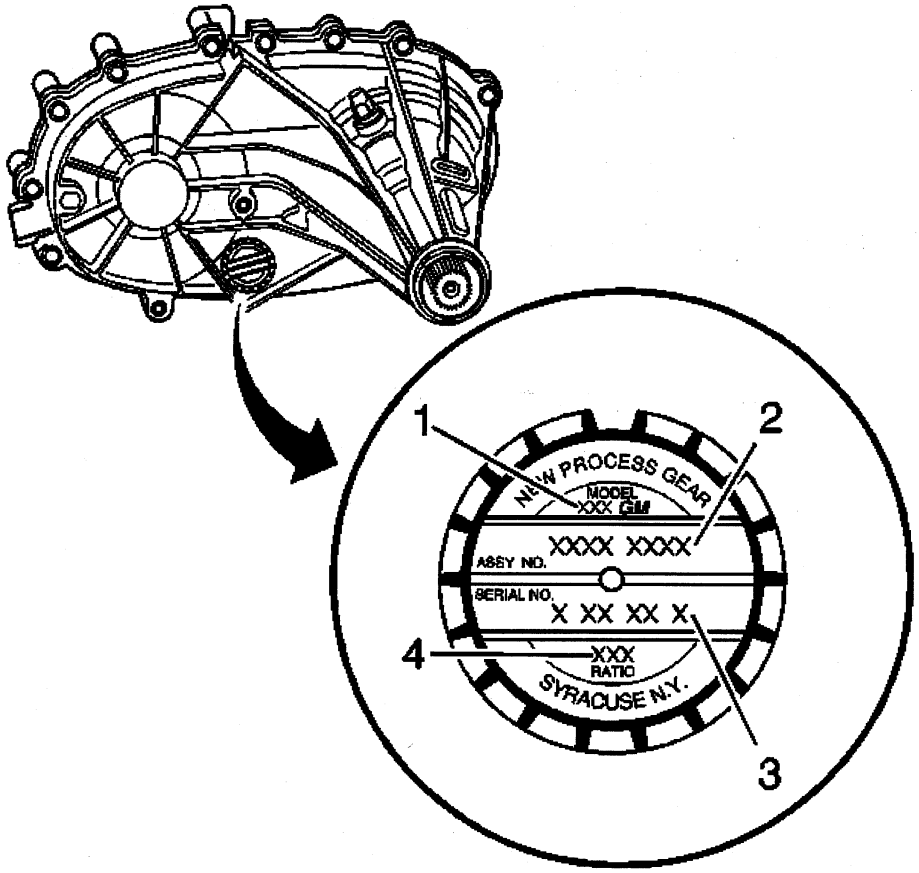


(1) Model Year
(2) Hydra-Matic 4L60-E
(4) Julian Date (or Day of the Year)
(5) Shift Built (A, B, J = First Shift; C, H, W = Second Shift)
(6) Model
(7) Transmission ID Location
(8) Hydra-Matic 4L60-E
(9) Julian Date (or Day of the Year)
(10) Serial No.
(11) Shift Built (A, B, J = First Shift; C, H,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

Engine and Transmission Usage

Model	Engine		Transmission	
	Base	Option	Base	Option
S155 (06,16) T155 (06, 16)	4.2L, V6, MFI, DOHC	--	4L60E - Automatic, 4 speed	--
Model Codes: S-Two-Wheel Drive and T-Four-Wheel Drive 06--Four-Door Utility 16--Two-Door Utility				

Transfer Case Identification

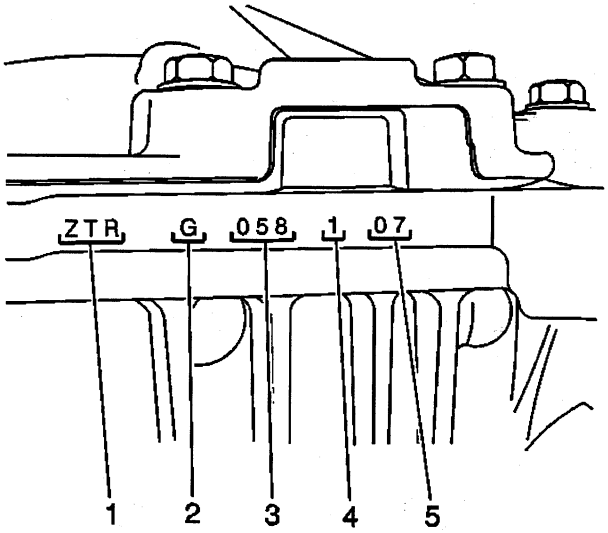


An identification tag is attached to the rear half of the transfer case. The tag provides the following information:

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

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

Axle Identification – Front



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

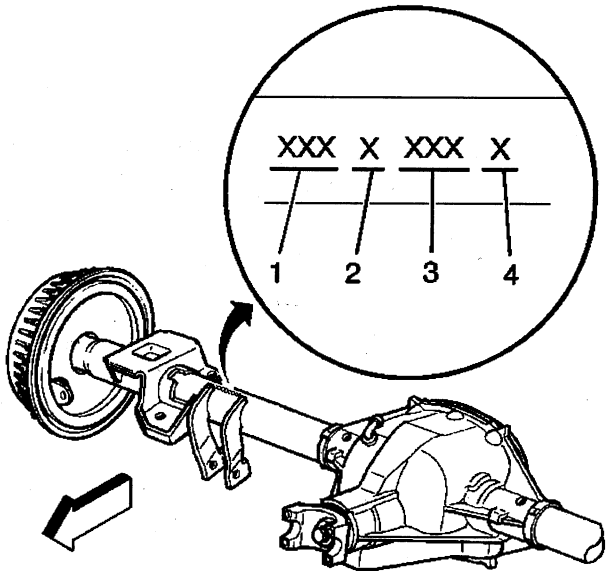
Front axle identification information is stamped on the top of the differential carrier assembly.

The following broadcast codes identifies the axle ratio:

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

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

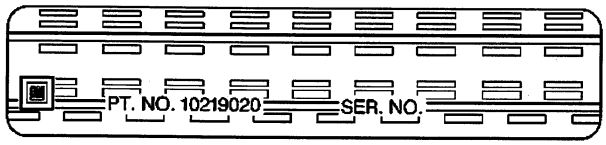
Axle Identification – Rear



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

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

Labeling - Anti-Theft



Notice

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

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

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

RPO Code List

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

RPO	Description
AAB	Memory Driver Convenience Package
AJ1	Window Tinted, Deep Tint All Except W/S and Drs
AJ7	Restraint System Seat, Inflatable, Driver & Pass, Frt & Side
AK5	Restraint System Seat, Inflatable, Driver & Pass
AL6	Restraint Cargo
AM7	Seat, RR Folding
AM9	Seat RR Split Back, Folding
AP9	Net Convenience
AR9	Seat Frt Bkt, Deluxe
AU0	Lock Control Remote Entry
AX4	Restraint Conversion Seat, Man, European
A50	Seat Frt Bkt
BAG	Parts Pkg Export
BVE	Parts Package Export
B30	Covering Floor Carpet
B32	Covering Frt Floor Mats, Aux
B33	Covering Rear Floor Mats, Aux
B42	Covering Floor Mat, Lugg Compt, Fitted
CE1	Wiper System Windshield, Pulse, Moisture Sensitive
CE4	Washer Headlamp, High Pressure
CF5	Roof Sun, Glass, Sliding, Elec
CJ2	HVAC System Air Conditioner Frt, Auto Temp Cont, Aux Temp Cont
CJ3	HVAC System Air Conditioner Frt, Man Temp Cont, Aux Temp Cont
C4D	GVW Rating 5, 550 lbs
C49	Defogger RR Window, Electric
C5N	GVW Rating 5,750 lbs
C7H	GVW Rating 6, 400 lbs/2, 900 kg
DD7	Mirror I/S R/V, Lt Sensitive Compass
DF5	Mirror I/S R/V Lt Sensitive Compass, O/S Temp Display
DK2	Mirror, O/S LH & RH Remote Control, Electric, Heated, Color
DK7	Console Roof Interior, Custom
DK9	Mirror O/S LH & RH, Remote Control, Electric, Heated, Turn Signal Indicator, Color
DP1	Mirror Provisions Convex Glass
DR1	Mirror, O/S LH & RH, Manual Control, Color
D25	Mirror O/S LH & RH, Remote Control, Electric, Heated, Light Sensitive, Manual Folding, Turn Signal Indicator, Color
D59	Mirror O/S LH & RH, Remote Control, Electric, Heated, Light Sensitive, Power Folding, Turn Signal Indicator, Color
GT4	Axle Rear 3.73 Ratio (Dup with 5X1)
GT5	Axle Rear 4.10 Ratio (Dup with GT8)
GU6	Axle Rear 3.42 Ratio
G67	Level Control Auto, Air
G80	Axle Positraction Limited, Slip
JE1	Brake System Europe
JF8	Brake Vac Power, 4 Whl Disc
KA1	Heater Seat, Frt
KG4	Generator 150 Amp

K05	Heater Engine Block
K34	Cruise Control Automatic, Electronic
LL8	Engine, Gas, 6 Cyl, 4.2 L, MFI, DOHC, L6, Alum, GM
M30	Transmission, Auto 4 Spd, Hmd, 4L60-E, Electronic
NC1	Emission System California, LEV
NF2	Emission System Federal, Tier 1
NF7	Emission System Federal, NLEV
NP4	Transfer Case Active, All Wheel Drive (AWD)
NP5	Steering Wheel Leather Wrapped
NP7	Steer Column EEC Approved
NW7	Traction Control Powertrain Management Only
N40	Steering Power, Non-Variable Ratio
N74	Wheel 17 x 7, Aluminum, Sport
N75	Wheel 17 x 7, Aluminum, Custom
N77	Wheel 17 x 7, Aluminum, Deluxe
N79	Wheel Spare Full Size, Steel
N80	Wheel 17 x 7, Aluminum, Premium
N86	Wheel Spare Full Size, Low Mass Aluminum
QC3	Wheel 16 x 7, Aluminum, Special
QC4	Wheel 16 x 7, Aluminum, Custom
QRE	Tire All P245/70R16-106S, BW PE/ST TL ALS
QRF	Tire All P245/70R16-106S, WOL PE/ST TL ALS
QTE	Tire All P245/65R17-105S BW PE/ST TL OOR
QTM	Tire All P245/65R17-105S BW PE/ST TL ALS
QTR	Tire All P245/65R17-105S WOL PE/ST TL OOR
Q4B	GVW Rating 6, 200 lbs
RYJ	Covering Cargo Area, Retractable
STW	Steering Wheel Leather Wrapped with Redundant Controls
TB4	Body Equipment Lift Gate (Manual)
T61	Lamp System Daytime Running
T96	Lamp Fog, Frt
UA6	Theft Deterent Sys
UC6	Radio AM/FM Stereo, Seek/Scan, RDS, Multiple Compact Disc, Auto Tone Control, Clock, ETR
UE1	Communication System Vehicle, G.P.S. 1
UG1	Opener Garage Door, Universal
UK6	Radio Control Rear Seat and Earphone Jacks
UNO	Radio AM/FM Stereo, Seek/Scan, CD, Auto Tone, Clock, ETR
UPC	Recorder Convenience, Recall
UPO	Radio AM/FM Stereo, Seek/Scan, Auto Rev Music Search Cassette, CD, Auto Tone, Clock, ETR
UQA	Speaker System Premium Performance Enhanced Audio
U42	Entertainment Pkg Rear Seat
U68	Display Driver Info Center
U73	Antenna Fixed, Radio
U84	Antenna Body Side Window, Radio
VPH	Vehicle Preparation Overseas Delivery
VR6	Hook Tie-Down Shpg
V40	Provisioni Options Ultra Seating Pkg - Power Adjust, Recline, Lumbar
V73	Vehicle Statement USA/Canada
X88	Conversion Name Plate: Chevrolet
YC5	Convenience Package Decor Level #5
YC6	Convenience Package Decor Level #6
ZM5	Sales Package Underbody Shield

ZW7	Chassis Package Premium Smooth Ride
Z70	Conversion Name Plt Oldsmobile
Z88	Conversion Name Plt GMC

Technical Information

Maintenance and Lubrication

Capacities - Approximate Fluid

Application	Specification	
	Metric	English
Axles		
Front Axle	0.8 Liters	1.7 Pints
Rear Axle	1.9 Liters	4.0 Pints
Rear Axle w/8.6" ring gear	2.28 Liters	4.8 Pints
Engine Cooling System		
• 4.2L LL8 DOHC	13.1 Liters	13.9 Quarts
Engine Crankcase		
• 4.2L LL6 DOHC	6.6 Liters	7.0 Quarts
Fuel Tank	75.7 Liters	18.6 Gallons
Transmission		
• 4L60-E After Filter/Pan Removal	4.7 Liters	5.0 Quarts
• After Complete Overhaul-4L60-E	10.6 Liters	11 Quarts

Maintenance Items

Application	Part Number
Automatic Transmission Filter Kit	GM P/N 24200796
Air Cleaner	
4.2L L6 MFI (LL8)	AC Delco® Part No. A2014C
Engine Oil Filter	
4.2L L6 MFI (LL8)	AC Delco® Part No. PF58
Spark Plugs	
4.2L L6 MFI (LL8)	AC Delco® Part No.41-965
Fuel Filter	
4.2L L6 MFI (LL8)	AC Delco® Part No. GF831
Windshield Wiper Blades	20.0 inches (50.8 cm)
Backglass Wiper Blade	14.0 inches (35.6 cm)

Fluid and Lubricant Recommendations

Usage	Fluid/Lubricant
Engine Oil	Engine oil with the American Petroleum Institute Certified for Gasoline Engines starburst symbol of the proper viscosity. To determine the preferred viscosity for your vehicle's engine, see Engine Oil in the Index.
Engine Coolant	50/50 mixture of clean, drinkable water and use only GM Goodwrench® DEX-COOL® or Havoline® DEX-COOL® Coolant. See Engine Coolant in the Index.
Hydraulic Brake System	Delco Supreme 11® Brake Fluid (GM P/N 12377967, Canadian P/N 992667 or equivalent DOT-3 brake fluid).
Windshield Washer Solvent	GM Optikleen® Washer Solvent (GM P/N 1051515, Canadian P/N 993033) or equivalent.
Parking Brake Cable Guides	Chassis Lubricant (GM P/N 12377985 or equivalent) or lubricant meeting requirements of NLGI #2, Category LB or GC-LB.
Power Steering System	GM Power Steering Fluid (GM P/N 1052884 - 1 pint, 1050017 - 1 quart, Canadian P/N 993294 - 1 pint, Canadian P/N 992646 - 1 quart or equivalent).
Automatic Transmission	DEXRON III® Automatic Transmission Fluid.
Key Lock Cylinders	Multi-Purpose Lubricant, Superlube® (GM P/N 12346241, Canadian P/N 10953474 or equivalent).
Chassis Lubrication	Chassis Lubricant (GM P/N 12377985 or equivalent) or lubricant meeting requirements of NLGI #2, Category LB or GC-LB.
Front and Rear Axle	SAE 75W-90 Synthetic Axle Lubricant (GM P/N 12378261, Canadian P/N 10953455) or equivalent meeting GM Specification 9986115.
Transfer Case	AUTO-TRAK II Fluid (GM Part No. 12378508, Canadian P/N 10953626).
Rear Driveline Center Spline and universal Joints	Chassis Lubricant (GM P/N 12377985 or equivalent) or lubricant meeting requirements of NLGI #2, Category LB or GC-LB.
Constant Velocity Universal Joint	Chassis Lubricant (GM P/N 12377985 or equivalent) or lubricant meeting requirements of NLGI #2, Category LB or GC-LB.
Hood Latch Assembly, Secondary Latch, Pivots, Spring Anchor	Lubriplate® Lubricant Aerosol (GM P/N 12346293 or equivalent) or lubricant meeting requirements of NLGI #2, Category LB or GC-LB.
Hood and Door Hinges	Multi-Purpose Lubricant, Superlube® (GM P/N 12346241, Canadian P/N 10953474 or equivalent).
Outer Tailgate Handle Pivot Points and Hinges	Multi-Purpose Lubricant, Superlube® (GM P/N 12346241, Canadian P/N 10953474 or equivalent).
Weatherstrip Conditioning	Dielectric Silicone Grease (GM P/N 12345579, Canadian P/N 1974984 or equivalent).
Weatherstrip Squeaks	Synthetic Grease With Teflon, Superlube® (GM P/N 12371287, Canadian P/N 10953437 or equivalent).

Descriptions and Operations

Power Steering System

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

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

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

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

- A recirculating ball system
- A rack and pinion system

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

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

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

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

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

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

Steering 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.

Ignition Lock Cylinder Control Actuator

If the vehicle is equipped with a floor mounted console gear shifter, it has a ignition lock cylinder control actuator system in the steering column as an added safety feature. The ignition lock cylinder control actuators purpose is to prevent the steering wheel from being locked when the transmission is in gear and the vehicle may still be moving. The column ignition lock system consists of a ignition lock cylinder control acutator, and a park position switch that is located in the A/T shift lock control switch. The ignition lock cylinder control acutator contains a pin that is spring loaded out to mechanically prevent the ignition key cylinder from being turned to the lock position when vehicle transmission is not in the Park position. If vehicle power is lost, and/or the transmission is not in the Park position the operator will not be able to turn the ignition key to the lock position and will not be able to remove the ignition key from the column.

Suspension Description and Operation

Front Suspension

The front suspension has 2 primary purposes:

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

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

This requires that the steering knuckle be suspended between an upper and a lower control arm. The lower control arm attaches from the steering Knuckle at the outermost point of the control arm. The attachment is through a ball and socket type joint. The innermost end of the control arm attached at 2 points to the vehicle frame, through semi-rigid bushings. The upper control arm attaches to the frame in the same fashion. Between the lower control arm and a spring seat on the vehicle's frame, under tension, is a coil spring.

This up and down motion of the steering knuckle as the vehicle travels over bumps is absorbed predominantly by the coil spring. The vertical movement of the steering knuckle as the vehicle travels over irregular road surfaces will tend to compress the spring and spring tension will lead the spring to return to the original, at-rest state. This action isolates the vehicle from the road surface. The upper and lower control arms are allowed to pivot at the vehicle frame in a vertical fashion. The ball joint allows the steering knuckle to maintain the perpendicular relationship to the road surface.

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

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

Rear Suspension

These vehicles use either a coil spring suspension or an air suspension configuration that utilizes two air springs. On vehicles equipped with the air springs, two separate height sensors control the air springs, one for the left spring and one for the right spring.

A separate air compressor is used to inflate the air springs and maintain proper ride height.

Two direct double-acting shock absorbers provide ride control. The shock absorbers are angle-mounted between the frame. The shock absorbers are attached with brackets. The brackets are attached to the anchor plate.

The rear spring steel stabilizing bar helps minimize body roll and sway during cornering. The rear stabilizer shaft is connected to the rear axle and the frame.

The rear suspension system on this vehicle consists of the following components:

- The rear axle
- Two coil springs or two air springs

- Two height sensors, air suspension only
- Air compressor, air suspension only
- Air supply lines, air suspension only
- Two shock absorbers
- The rear axle tie rod
- Two upper control arms
- Two lower control arms

Air Suspension

The primary mission of the Air Suspension System is the following for the rear suspension under loaded and unloaded conditions:

- Keep the vehicle visually level
- Provide optimal headlight aiming
- Maintain optimal ride height

The Air Suspension System consists of the following items:

- Air Suspension Compressor Assembly
- Air Suspension Sensors
- Rear Air Springs

The Air Suspension Compressor Assembly has the ability to detect faults and indicate the appropriate fault code via a blink code on the inflator switch LED. The Air Suspension Compressor Assembly will indicate the code when the condition to cause the code becomes current.

During compressor activation the exhaust valve will be activated for a calibrated length of time to provide compressor head relief. After a calibrated length of time the compressor relay will activate to start the compressor. When trim height is achieved the relay will be deactivated. The exhaust valve and compressor relay are part of the air suspension compressor assembly. The Air Suspension System shall maintain the rear trim height within 4 mm (0.15 in)in all loading conditions and the leveling function shall deactivate if the vehicle is overloaded. The side to side variation has to be maintained within 8 mm (0.31 in). After ignition is turned off, the module will stay awake for between 30 minutes and 2 1/2 hours. The system will exhaust pressure within 30 minutes after ignition is turned off to lower the vehicle after unloading. The leakage of the complete load leveling system shall not result in more than 1.4 mm (0.05 in) drop of rear suspension height at GVWR during a 24 hour period.

There are software Leveling Sequence Timers that detect conditions of excessive output at which no leveling is accruing. These timers shall keep track of conditions which cause excessive run time or no calibratable change in trim height. These timers are defined in more detail below.

Accumulator Timer

The primary purpose of the accumulator timer is to detect conditions in which excessive activity may occur. The conditions are generally as follows: in the compress mode the existences of pneumatic leaks in the system, in the exhaust mode the existence of pneumatic blockage or unloaded vehicle conditions. The accumulator shall keep track of the accumulated run time of the compressor. If the accumulator timer reaches its calibratable limit the output function will be disabled until the accumulator is reset. The accumulator timer will be reset with each transition into the RUN power mode or if the complementary output activation is required.

Progress Timer

The primary propose of the progress timer is to quickly detect conditions in which excessive output activity may occur at zero vehicle speed condition. If the Air Suspension System does not detect a calibratable change in position within a calibratable time period, the output function will be disabled. The timer will be reset with each ignition switch cycle into the RUN position.

Air Suspension Sensors

The air suspension sensor arm is attached to an armature that rotates inside a coil. The inductance of the coil, not the resistance, changes dependant on the position of the armature in the coil. The air suspension

module determines the angle of the sensor arm by sending a pulse width modulated supply voltage through the coil and measuring the response time. The sensors must be calibrated to the correct D height and are not adjustable.

Rear Air Springs

The air springs are mounted in the frame in the same location were the coil spring is mounted for a vehicle without air suspension. Support pieces are affixed to the axle for the air springs.

Wheels and Tires

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Spare Wheel Hoist Assembly Mounting Bolts	50 N·m	37 lb ft
Wheel Nut	140 N·m	103 lb ft

General Description

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

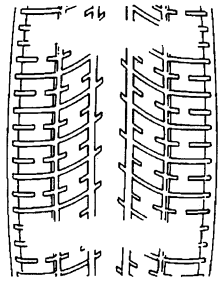
The following factors have an important influence on tire life:

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

The following factors increase tire wear:

- Heavy cornering
- Excessively rapid acceleration
- Heavy braking

Tread Wear Indicators Description



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

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

Metric Wheel Nuts and Bolts Description

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

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

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

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

Tire Inflation Description

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

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

Inspect the tire pressure when the following conditions apply:

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

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

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

Inflation Pressure Conversion (Kilopascals to PSI)

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

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

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

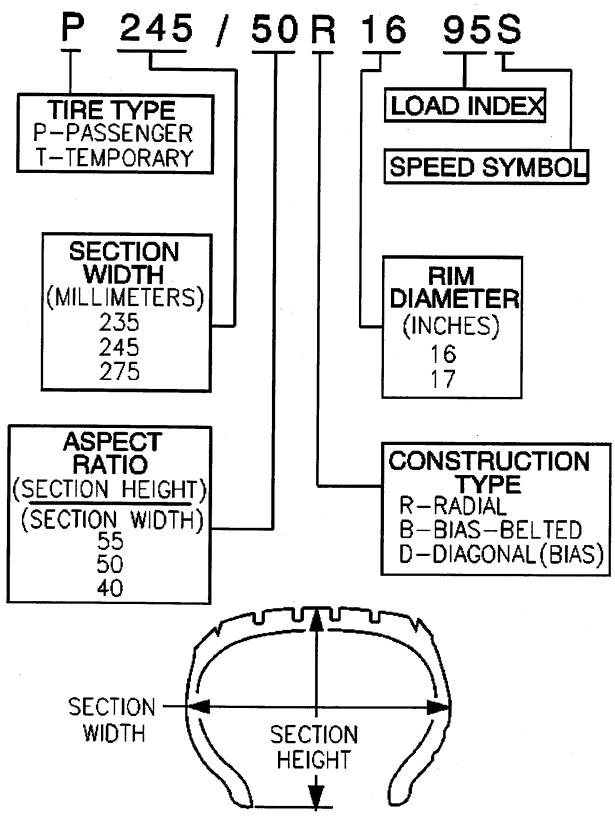
Tires with a lower than recommended pressure can cause the following conditions:

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

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

- Uneven braking
- Steering lead
- Reduced vehicle handling

P-Metric Sized Tires Description



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

Driveline System Description and Operation

Driveline/Axle – Propeller Shaft

The front propeller shaft consists of the following components:

- Propeller shaft tube
- Universal joint
- Flange yoke
- Constant velocity joint

The rear propeller shaft consists of the following components:

- Propeller shaft tube
- 2 universal joints
- Slip yoke

Front Propeller Shaft Operation

The front propeller shaft connects the transfer case to the front axle. It transmits the rotating force from the transfer case to the front axle when the transfer case is engaged.

Rear Propeller Shaft Operation

The rear propeller shaft connects the transmission or transfer case to the rear axle. It transmits the rotating force from the transmission or transfer case to the rear axle.

Propeller Shaft Phasing Description

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

Universal Joint Description

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

Wheel Drive Shafts Description and Operation

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

- Front wheel drive shaft constant velocity joint (outer joint).
- Front wheel drive shaft tri-pot joint (inner joint).
- The front wheel drive shaft connects the front wheel drive shaft tri-pot joint and the front wheel drive shaft constant velocity joint.
- The front wheel drive shaft tri-pot joint is completely flexible, and moves with an in and out motion.
- The front wheel drive shaft constant velocity joint is flexible but can not move in and out.

The Wheel Drive Shaft is a balanced shaft that transmits rotational force from the front differential to the front wheels when the transfer case is engaged. The wheel drive shaft is mounted to the front differential

by bolting the flange of the wheel drive shaft to the flange on the inner output shaft of the front differential. The other end of the wheel drive shaft is splined to fit into and drive the hub assembly when the transfer case is engaged. The tri-pot joint and constant velocity joint on the wheel drive shaft allows the shaft to be flexible to move with the suspension travel of the vehicle.

Front Drive Axle Description and Operation

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

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

- Differential Carrier Housing
- Differential Case Assembly
- Inner Axle Shaft
- Intermediate Shaft Bearing Assembly (located on the right side of the oil pan)
- Electric Motor Actuator

The front axle on Selectable Four Wheel Drive (S4WD) model vehicles uses a disconnect feature mounted on the right side of the oil pan in order to engage and disengage the front axle. When the driver engages the 4WD system, the Transfer Case Control Module sends a signal to the electric motor actuator to energize and extend the plunger inside. The extended plunger moves the clutch fork and clutch fork sleeve across from the clutch fork outer gear that is splined to the right side wheel drive shaft to the clutch fork inner gear that is splined to the inner axle shaft. The locking of the two gears allows the axle to operate in the same manner as a semi-floating rear axle. A propeller shaft connects the transfer case to the front axle. The differential carrier assembly uses a conventional ring and pinion gear set to transmit the driving force of the engine to the wheels. The open differential allows the wheels to turn at different rates of speed while the axle continues to transmit the driving force. This prevents tire scuffing when going around corners and premature wear on internal axle parts. The ring and pinion set and the differential are contained within the carrier. The axle identification number is located on top of the differential carrier assembly or on a label on the bottom of the right half of differential carrier assembly. The wheel drive shafts are completely flexible assemblies consisting of inner and outer constant velocity CV joints protected by thermoplastic boots and connected by a wheel drive shaft.

Automatic Four Wheel Drive (A4WD) Front Axle Description and Operation

The Automatic Four Wheel Drive (A4WD) Front Axle consist of the following components:

- Differential Carrier Housing
- Differential Case Assembly
- Inner Axle Shaft
- Intermediate Shaft bearing Assembly (located on the right side of the oil pan)

The front axle on Automatic Four Wheel Drive (A4WD) model vehicles do not have a disconnect feature in order to engage and disengage the front axle. The Automatic Four Wheel Drive system uses the same differential carrier assembly and intermediate shaft bearing assembly, but the clutch fork, the clutch fork sleeve and the inner/outer gears have been replaced with a single splined sleeve that connects the inner axle shaft directly to the right side wheel drive shaft. This connection allows the right side wheel drive shaft and the intermediate axle shaft to be directly connected to the differential case assembly. It also results in having the wheel drive shafts, the intermediate axle shaft and the propeller shaft to spin continuously. When the transfer case is active, the clutch assembly within the transfer case controls the amount of torque applied to the front axle. The remaining components are the same as the selectable four wheel drive axle.

Rear Drive Axle Description and Operation

The rear axle for this vehicle consist of the following components:

- Aluminum Differential Carrier Housing
- Differential Case Assembly (Open or Locking)
- Ring Gear and Drive Pinion Shaft
- Left and right axle shaft tubes
- Left and right axle shafts
- Fill Plug
- Drain Plug

The rear axle receives power from the propeller shaft and transfers it to the drive pinion through the universal joint and the pinion yoke, which is attached to the drive pinion. The drive pinion transfers the power to the ring gear which is splined to the drive pinion at a 90 degree angle. The ring gear is attached to the differential case which contains four gears inside of it. Two of the gear are side gears and two are pinion gears. Each side gear is splined to an axle shaft so each axle shaft turns when it's side gear rotates. The pinion gears are mounted on a differential pinion shaft, and the pinion gears are free to rotate on this shaft. The pinion shaft is fitted into a bore in the differential case and is at right angles to the axle shafts. Power is transmitted through the differential as follows: the drive pinion rotates the ring gear. The ring gear rotates the differential case. The ring gear, as it rotates with the differential case, forces the pinion gears against the side gears. The side gears rotate the axle shafts to which the wheels are attached to. When both wheels have an equal amount of traction, the pinion gears do not rotate on the pinion shaft because of input force on the pinion gears is equally divided between the two side gears. Therefore, the pinion gears revolve with the pinion shaft, but do not rotate around the shaft itself. As long as the input force is equal between the two axle shafts, the axle shafts could be solidly attached to the ring gear. The addition of the two pinion gears and the two side gears are needed to allow the axle shafts to turn at different speeds. When the vehicle turns a corner, the inner wheel turns slower than the outer wheel. The amount slower the inner wheel spins is equal to the same amount the outer wheel spins faster, as compared to the straight line speed. When this happens, the pinion gears rotate around the pinion shaft and allow the wheels to spin at different speeds

Locking Differential Description and Operation

The locking differential consists of the following components:

- Differential Case
- Differential Pinion Gears and Thrust Washers
- Differential Cam Unit and Clutch Disc Assembly (Left Side)
- Differential Side Gear and Clutch Disc Assembly (Right Side)
- Differential Side Gear Thrust Washer (Left Side)
- Differential Side Gear Shim (Right Side)
- Locking Differential Governor Assembly
- Locking Differential Latching Bracket Assembly

The locking differential allows for normal differential function as indicated in the standard rear axle description. Additionally, the locking differential uses multi-disc clutch packs and a speed sensitive engagement mechanism that locks both wheels together if one wheel spins excessively during slow vehicle operation. Under light loads, the clutch plates alone tend to lock the axle shafts to the differential case, and therefore locking to each other. This is due primarily to the gear separating the load developed on the right clutch pack. This induced clutch torque capacity resists motion between the side gear and the axle differential case. The differential allows the wheels to turn at different speeds while the axle shafts continue to transmit the driving force. Heavier throttle application will cause an axle speed difference. This action starts the full-lock feature of the unit. Full-lock activation is accomplished through the use of a heavyweight governor mechanism, a cam gear unit and a multi-disc pack. The flyweights on the governor mechanism move outward in order to engage a latching bracket whenever the wheel-to-wheel speed varies by approximately 100 RPM or more. This action locks the cam plate, which expands the cam gear unit and compresses the multi-disc clutch packs on each side of the differential which locks both of the side gears to the case. The 100 RPM wheel-to-wheel speed allows for cornering with the differential

lockup. At vehicle speeds above approximately 32 km/h (20 mph), the latching bracket overcomes a spring preload and swings away from the flyweights. At this vehicle speed or greater, the differential is designed not to lock since added traction is generally not needed.

Transfer Case Description – NVG236/246 (NP8)

The NVG 236/246 transfer case features a 4 button shift control switch located on the instrument panel. When the vehicle has the ignition key in the RUN position, the transfer case shift control module starts monitoring the transfer case shift control switch to determine if the driver desires a new mode/gear position. At a single press of the transfer case shift control switch, the lamp of the new desired position will begin flashing to inform the driver that the transfer case shift control module has received the request for a new mode/gear position. The lamp will continue to flash until all shifting criteria has been met and the new mode/gear position has been reached, or has been engaged. Once the new mode/gear position is fully active, the switch indicator lamp for the new position will remain ON constantly.

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

The NVG 236/246 transfer case has the added feature of also providing the driver with 3 manual mode/gear positions:

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

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

- The engine is running.
- The automatic transmission is in Neutral, clutch depressed on manual transmissions.
- The vehicle speed is below 5 km/h (3 mph).

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

- The key is ON.
- The automatic transmission is in Neutral, clutch depressed on manual transmissions.
- The vehicle speed is below 5 km/h (3 mph).
- The transfer case is in 2HI mode.

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

View the list of major components that make up the automatic transfer case (ATC) system below.

Transfer Case Shift Control Module

The transfer case shift control module uses the VIN information for calculations that are required for the different calibrations used based on axle ratio, transmission, tire size, and engine. The system does not know which calibration to use without this information. This information is provided to the transfer case shift control module via Class 2 data bus from the powertrain control module (PCM).

The transfer case shift control module monitors front and rear propshaft speed as well as controlling the operation of the transfer case encoder motor assembly and the engaging and disengaging of the front axle.

Transfer Case Encoder Motor

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

The transfer case encoder motor can be turned ON and OFF using a scan tool. You may also monitor Motor Control A and B circuits using a scan tool.

Transfer Case Encoder

The encoder is mounted to the transfer case encoder motor assembly and is replaced only as an assembly. The encoder converts the sector shaft position, representing a mode or range, into electrical signal inputs to the transfer case shift control module. The module detects what position the transfer case is in by monitoring the 4 encoder channels (P, A, B, and C). These inputs translate into AUTO 4WD, 2HI, 4HI, NEUTRAL, and 4LO or whether the motor is still in transition between gears.

The transfer case encoder channel circuits may be monitored using a scan tool.

Transfer Case Motor Lock

The transfer case motor lock is used to prevent the transfer case from changing mode/gear positions or popping out of position when the vehicle is in 2HI, 4HI, and 4LO. When the lock circuit is energized, the transfer case encoder motor is allowed to rotate. When the transfer case is placed 2HI, 4HI, or 4LO the motor lock circuit has no voltage provided to it, applying the lock which assures that the transfer case remains in the current mode/gear position. When AUTO 4WD is selected the motor lock remains applied until an adaptive mode, torque being applied to the front propshaft is required. During an adaptive mode the motor lock circuit is energized, the locking mechanism is released, enabling the encoder motor to turn and apply torque to the front propshaft.

The transfer case motor lock circuit can be turned ON and OFF using a scan tool. You may also monitor the lock circuit using a scan tool.

Transfer Case Speed Sensors

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

Vehicle Speed Sensor

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

Rear Propshaft Speed Sensor

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

Front Propshaft Speed Sensor

The transfer case shift control module converts the pulsating AC voltage from the front transfer case speed sensor to front propshaft speed in RPM to be used for calculations, and to monitor the difference between the front and rear sensor speed. It is also used in the AUTO 4WD mode to determine the

amount of slip and the percent of torque to apply to the front axle. The front propshaft speed can be displayed with a scan tool.

SERVICE 4WD Indicator

The SERVICE 4WD message is displayed on the driver information center and is an integral part of the cluster and cannot be serviced separately. This message is used to inform the driver of the vehicle of malfunctions within the automatic transfer case (ATC) system. The SERVICE 4WD message is controlled by the transfer case shift control module via a Class 2 message.

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 to expand park brake shoe (rear disc, drum-in-hat system), or drum brake shoes toward the friction surface of the drum-in-hat of the rear brake rotor, or the brake drum.

Threaded park brake actuators/adjusters are also used to control clearance between the park brake shoe (rear disc, drum-in-hat system), or the drum brake shoes and the friction surface of the drum-in-hat (of the rear brake rotor), or the brake drum.

Park Brake Shoe (Rear Disc, Drum-In-Hat System)

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

System Operation

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

ABS Description and Operation

Antilock Brake System

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

During antilock braking, a series of rapid pulsations is felt in the brake pedal. These pulsations are caused by the rapid changes in position of the individual solenoid valves as the EBCM responds to wheel speed sensor inputs and attempts to prevent wheel slip. These pedal pulsations are present only during

antilock braking and stop when normal braking is resumed or when the vehicle comes to a stop. A ticking or popping noise may also be heard as the solenoid valves cycle rapidly. During antilock braking on dry pavement, intermittent chirping noises may be heard as the tires approach slipping. These noises and pedal pulsations are considered normal during antilock operation.

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

Engine Description and Operation

Engine Mechanical Specifications 4.2L

Application	Specification	
	Metric	English
General Data		
• Engine Type	In-Line-6	
• Displacement	4.2 L	256 cu in
• RPO (VIN Code)	LL8	
• Bore	93 mm	3.66 in
• Stroke	102 mm	4.02 in
• Compression Ratio	10 : 1	
• Firing Order	1-5-3-6-2-4	
• Oil Pressure (At the sending unit) Warm - Minimum	85 kPa	12 psi @ 1200 RPM
Spark Plug Gap		
• Maximum	1.25 mm	0.050 in
• Minimum	1.14 mm	0.044 in

Fastener Tightening Specifications

Application	Specifications	
	Metric	English
A/C Line Bracket Nut at Oil Level Indicator Tube	7 N·m	61 lb in
A/C Line Bracket Bolt at Engine Lift Bracket	10 N·m	89 lb in
A/C Compressor bolts	50 N·m	37 lb ft
A.I.R. Cover Stud	25 N·m	18 lb ft
Camshaft Cap Bolt	12 N·m	106 lb in
Camshaft Cover Bolt	10 N·m	89 lb in
Cooling Fan Hub Nut	56 N·m	41 lb ft
Crankshaft Balancer Bolt		
• First Pass	150 N·m	110 lb ft
• Final Pass	180 degrees	
Crankshaft Rear Housing Bolt	10 N·m	89 lb in
Cylinder Head Access Hole Plug (Plastic)	5 N·m	44 lb in
Cylinder Head Bolt (14)		
• First Pass	30 N·m	22 lb ft
• Final Pass	155 degrees	
Cylinder Head End Bolts (2 Short)		
• First Pass	7 N·m	62 lb in
• Final Pass	60 degrees	
Cylinder Head End Bolt (1 Long)		
• First Pass	7 N·m	62 lb in
• Final Pass	120 degrees	
Drive Belt Idler Pulley Bolt	50 N·m	37 lb ft
Drive Belt Tensioner Bolt	50 N·m	37 lb ft
Engine Flywheel Bolt		
• First Pass	25 N·m	18 lb ft
• Final Pass	50 degrees	
Engine Front Cover Bolt	10 N·m	89 lb in
Engine Front Cover Spacer Bolt	10 N·m	89 lb in
Engine Front Lift Bracket Bolt	50 N·m	37 lb ft
Engine Harness Bracket Bolt	50 N·m	37 lb ft

Engine Mount Bracket Bolt (engine)	50 N·m	37 lb ft
Engine Mount Bracket Bolt (frame)	110 N·m	81 lb ft
Engine Mount Nuts (upper and lower)	70 N·m	52 lb ft
Exhaust Camshaft Actuator Bolt		
• First Pass	25 N·m	18 lb ft
• Final Pass	135 degrees	
Exhaust Pipe Bolts	50 N·m	37 lb ft
Front Differential Bolts	85 N·m	63 lb ft
Generator Battery Lead Nut	9 N·m	80 lb in
Heater Inlet Fitting	45 N·m	33 lb ft
Heater Outlet Fitting	45 N·m	33 lb ft
Intake Camshaft Sprocket Bolt		
• First Pass	20 N·m	15 lb ft
• Final Pass	100 degrees	
Intake Manifold Bolt	10 N·m	89 lb in
Oil Filter (PF 58)		
• First Pass	17 N·m	13 lb ft
• Final Pass	150 degrees	
Oil Filter Adapter	30 N·m	22 lb ft
Oil Level Indicator Tube Stud	10 N·m	89 lb in
Oil Pan Bolt (Ends)	10 N·m	89 lb in
Oil Pan Bolt (Sides)	25 N·m	18 lb ft
Oil Pan Drain Plug	26 N·m	19 lb ft
Oil Pan Nut	25 N·m	18 lb ft
Oil Pan Stud	11 N·m	97 lb in
Oil Pressure Sensor	20 N·m	15 lb ft
Oil Pump Cover Bolt	10 N·m	89 lb in
Oil Pump Pressure Relief Valve	14 N·m	124 lb ft
Power Steering Pump Bolt	25 N·m	18 lb ft
Timing Chain Tensioner Bolt	25 N·m	18 lb ft
Timing Chain Tensioner Guide Bolt	14 N·m	124 lb in
Timing Chain Tensioner Shoe Bolt	25 N·m	18 lb ft
Timing Chain Top Guide Bolt	10 N·m	89 lb in
Torque Converter Bolts	60 N·m	44 lb ft
Transmission Bell Housing Bolts	50 N·m	37 lb ft
Transmission Fluid Tube to Air Adapter Nut	10 N·m	89 lb in

Drive Belt System Description

The drive belt system consists of the following components:

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

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

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

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

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

Engine Cooling

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Air Conditioning Condenser Bolt	28 N·m	21 lb ft
Coolant Heater	50 N·m	37 lb ft
Coolant Recovery Reservoir Bolt	12 N·m	106 lb in
Coolant Recovery Reservoir Nut	10 N·m	89 lb in
Cooling Fan Nut	56 N·m	41 lb ft
Engine Harness Bracket Bolt (4.2L)	45 N·m	33 lb ft
Fan Blade Bolt	27 N·m	20 lb ft
Fan Shroud Bolt	28 N·m	21 lb ft
Thermostat Housing Bolt (4.2L)	10 N·m	89 lb in
Water Pump Bolt (4.2L)	10 N·m	89 lb in
• First Pass	15 N·m	11 lb ft
• Final Pass	30 N·m	22 lb ft
Water Pump Pulley Bolt (4.2L)	25 N·m	18 lb ft

Cooling System Description and Operation

Coolant Heater

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

Cooling System

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

Cooling Cycle

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

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

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

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

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

Coolant

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

Radiator

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

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

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

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

Pressure Cap

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

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

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

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

Coolant Recovery System

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

In effect, a cooling system with a coolant recovery reservoir is a closed system. When the pressure in the cooling system gets too high, it will open the pressure valve in the pressure cap. This allows the coolant, which has expanded due to being heated, is allowed to flow through the overflow tube and into the recovery reservoir. As the engine cools down, the temperature of the coolant drops and a vacuum is created in the cooling system. This vacuum opens the vacuum valve in the pressure cap, allowing some of the coolant in the reservoir to be siphoned back into the radiator. Under normal operating conditions, no coolant is lost. Although the coolant level in the recovery reservoir goes up and down, the radiator and cooling system are kept full. An advantage to using a coolant recovery reservoir is that it eliminates almost all air bubbles from the cooling system. Coolant without bubbles absorbs heat much better than coolant with bubbles.

Air Baffles and Seals

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

Water Pump

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

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

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

Thermostat

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

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

Engine Oil Cooler

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

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

Transmission Oil Cooler

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

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

Engine Electrical

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Air Conditioning Line Bracket Bolt (4.2L)	10 N·m	89 lb in
Battery Hold Down Retainer Nut	15 N·m	11 lb ft
Battery Negative Cable	15 N·m	11 lb ft
Battery Positive Cable	15 N·m	11 lb ft
Battery Positive Cable Lead to Starter Nut	9 N·m	80 lb in
Battery Tray Bolt	20 N·m	15 lb ft
Battery Tray Brace Bolt	10 N·m	89 lb in
Engine Harness to Engine Block Bolt (4.2L)	50 N·m	37 lb ft
Engine Harness to Shock Tower Bolt (4.2L)	10 N·m	89 lb in
Engine Harness to Wheelhouse Panel Bolt (4.2L)	10 N·m	89 lb in
Engine Lift Hook Bolt (4.2L)	50 N·m	37 lb ft
Generator Bolt	50 N·m	37 lb ft
Generator Cable Nut	9 N·m	80 lb in
Positive Terminal to Underhood Junction Block Bolt	10 N·m	89 lb in
Starter Bolt	50 N·m	37 lb ft
Starter Solenoid Nut	3.4 N·m	30 lb in

Battery Usage

Base	
Cold Cranking Amperage (CCA)	690 A
Reserve Capacity Rating	90 Minutes
Replacement Battery Number	78-6YR

Battery Temperature vs Minimum Voltage

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

Starter Motor Usage

Applications	Starter Type
4.2L (LL8)	PG-260L

Generator Usage

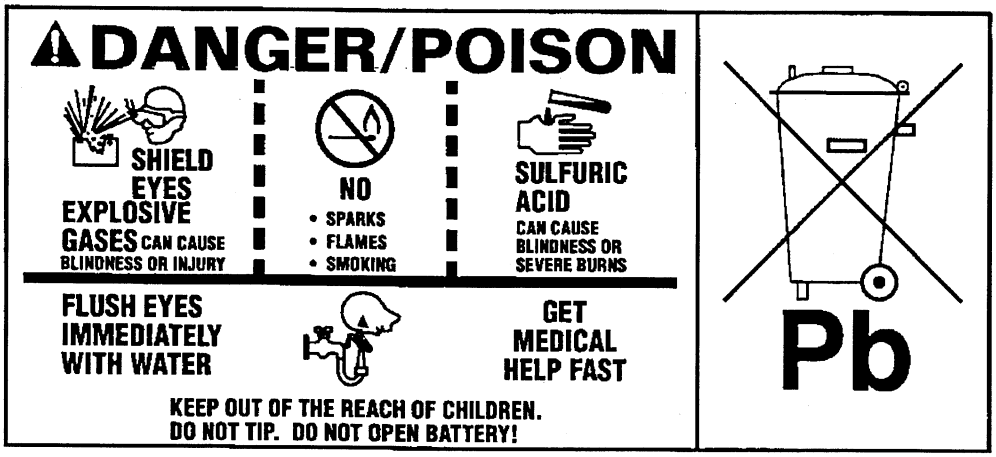
Engine	Generator Model	Rated Output AMPS	Load Test Output AMPS
Gasoline Engine	AD244	150 A	105 A

Battery Description and Operation

Caution

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

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



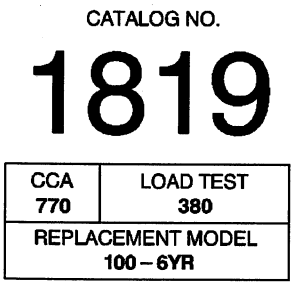
The maintenance free battery is standard. There are no vent plugs in the cover. The battery is completely sealed except for two small vent holes in the side. These vent holes allow the small amount of gas that is produced in the battery to escape.

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

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

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

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



A battery has 2 ratings:

- Reserve capacity
- Cold cranking amperage

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

Reserve Capacity

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

Cold Cranking Amperage

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

Circuit Description

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

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

Starting System Description and Operation

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

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

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

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

Charging System Description and Operation

Generator

The generator features the following major components:

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

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

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 PCM, 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 PCM. When the voltage regulator detects a charging system problem, it grounds this circuit to signal the PCM that a problem exists. The PCM monitors the generator field duty cycle signal circuit. The

system voltage sense circuit receives battery positive voltage that is Hot At All Times through a fuse link that is connected to the starter motor. This voltage is used by the regulator as the reference for system voltage control.

Load Shed System Description and Operation

Load Shed Level	Affected Systems	Action Taken
Load-Shed Level 0	No systems affected	Normal operation
Load-Shed Level 1	Heated Outside Rear View Mirrors, Heated Rear Window / Rear Window Defrost, Heated Seats	Cycled at 80% duty cycle, OFF for 4 of every 20 second cycle. Indicator and timer not affected.
	Front Automatic HVAC	Reduce blower speed to 80% of current setting if the HVAC is not in the Defrost mode. The HVAC controller uses a ramping program to make the change invisible to the operator. No action is taken if the HVAC system is in Defrost.
	Rear Automatic HVAC	Turn OFF blower. The operator must turn ON system when load-shed level is exited. System will not respond to operator input until current load-shed level is exited.
	Message Center, Instrument Cluster	No messages or indicators are displayed. Data (DPID) indicating that the Load-Shed 1 was entered is stored and may be accessed with a scan tool. DPID will reset after 50 ignition switch cycles with no repeated load-shed 1 action or with a battery disconnection.
Load-Shed Level 2	Heated Outside Rear View Mirrors, Heated Rear Window / Rear Window Defrost, Heated Seats	Turned OFF. Indicator and timer also turned OFF. The operator must turn ON system when load-shed level is exited. System will not respond to operator input until current load-shed level is exited. This system will respond to only one Load-Shed Level 2 command per ignition switch cycle.
	Front Automatic HVAC	Blower turned OFF if the HVAC system is not in the Defrost mode. No action is taken if the HVAC system is in the Defrost mode. Operator may over-ride by manually turning the blower ON. This system will respond to only one Load-Shed 2 command per ignition switch cycle.
	Rear Automatic HVAC	Rear HVAC blower remains OFF. The operator must turn ON system when load-shed level is exited. System will not respond to operator input until current load-shed level is exited. This system will respond to only one Load-Shed Level 2 command per ignition switch cycle.
	Message Center, Instrument Cluster	"Battery Saver Action" message is displayed. Battery / Charging System Failure icon is illuminated. Chime may be activated constantly until the load-shed level is exited. Data (DPID) indicating that the Load-Shed Level 2 was entered is stored and may be accessed with a scan tool. DPID will reset after 50 ignition switch cycles with no repeated Load-Shed 2 actions or with a battery disconnection.

Engine Controls

Engine Controls – 4.2L

Ignition System Specifications

Application	Specification	
	Metric	English
Firing Order	1-5-3-6-2-4	
Spark Plug Torque	18 N·m	13 lb ft
Spark Plug Gap	1.27 mm	0.05 in
Spark Plug Type	AC 41-965	

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Accelerator Pedal Position (APP) Sensor	10 N·m	89 lb in
Air Cleaner Cover/Resonator Retaining Screw	4 N·m	35 lb in
Air Cleaner Outlet Duct Nut	2.5 N·m	22 lb in
Air Cleaner Outlet Resonator to Engine Bolts	6 N·m	53 lb in
Air Cleaner Outlet Resonator to Throttle Body Clamp	4 N·m	35 lb in
Air Cleaner Resonator Outlet Duct Clamp	4 N·m	35 lb in
Air Cleaner Retaining Nuts	10 N·m	89 lb in
Camshaft Position (CMP) Actuator Solenoid Valve Retaining Bolt	10 N·m	89 lb in
Camshaft Position Sensor Retaining Bolt	10 N·m	89 lb in
Coolant Hose Nipple	17 N·m	13 lb ft
Coolant Temperature Sensor	16 N·m	12 lb ft
Crankshaft Position (CKP) Sensor Retaining Bolt	10 N·m	89 lb in
Evaporative Emission (EVAP) Canister Bracket Attaching Bolt	25 N·m	18 lb in
EVAP Purge Valve Mounting Bracket Attaching Bolt	10 N·m	89 lb in
Fuel Fill Hose Clamps	2.5 N·m	22 lb in
Fuel Fill Pipe Bracket Nut	10 N·m	89 lb in
Fuel Fill Pipe Ground Strap Bolt	10 N·m	89 lb in
Fuel Filter	25 N·m	18 lb in
Fuel Hose Bundle Strap Retaining Bolt	3.75 N·m	33 lb in
Fuel Pipe Strap Retaining Bolts	3.75 N·m	33 lb in
Fuel Pressure Regulator Retainer Screw	8 N·m	71 lb in
Fuel Rail Retaining Bolts	10 N·m	89 lb in
Fuel Return Pipe Retainer Screw	8 N·m	71 lb in
Fuel Tank Shield Bolts	25 N·m	18 lb ft
Fuel Tank Strap Attaching Bolts	32 N·m	24 lb ft
Heated Oxygen Sensor (HO2S)	41 N·m	30 lb ft
Idle Air Control (IAC) Valve Attaching Screws	3 N·m	27 lb in
Ignition Coil Retaining Bolts	10 N·m	89 lb in
Knock Sensor (KS) Bolt	25 N·m	18 lb ft
Resonator Integral Clamp	4 N·m	35 lb in
Resonator Retaining Bolts	10 N·m	89 lb in
Spark Plug	17-23 N·m	13-16 lb ft
Throttle Body Retaining Studs	10 N·m	89 lb in
Throttle Position (TP) Sensor Bolts	2 N·m	18 lb in
Upper Manifold Bolts	8 N·m	71 lb in
Upper Manifold Nuts	8 N·m	71 lb in
Vacuum Module Attaching Bolts	8 N·m	71 lb in

Fuel System Specifications

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

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

If you are using fuel rated at 87 octane or higher and you hear heavy knocking, your engine needs service. But do not worry if you hear a little pinging noise when you are accelerating or driving up a hill. That is normal, and you do not have to buy a higher octane fuel to get rid of the pinging. However, if there is a heavy, constant knock, that means you have a problem.

Notice

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

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

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

Exhaust System

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Catalytic Converter Heat Shield Bolts	7 N·m	62 lb in
Exhaust Muffler Nuts	45 N·m	33 lb ft
Exhaust Manifold Bolts (4.2L)		
• First Pass	25 N·m	18 lb ft
• Second Pass	25 N·m	18 lb ft
• Final Pass	25 N·m	18 lb ft
Exhaust Manifold Heat Shield Nut (4.2L)	5 N·m	44 lb in
Exhaust Manifold Heat Shield Stud (4.2L)	10 N·m	89 lb in
Exhaust Muffler Heat Shield Bolt	7 N·m	62 lb in
Exhaust Pipe Clamp Nut	50 N·m	37 lb ft
Exhaust Pipe Nut	50 N·m	37 lb ft
Transmission Filler Tube Bracket Nut (4.2L)	10 N·m	89 lb in

Exhaust System Description

Important

Use of non-OEM parts may cause driveability concerns.

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

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

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

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

Resonator

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

Catalytic Converter

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

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

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

The catalyst in the converter is not serviceable.

Muffler

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

Transmission/Transaxle Description and Operation

Automatic Transmission - 4L60-E

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Accumulator Cover to Case Bolt	8.0-14.0 N·m	6-10 lb ft
Case Extension to Case Bolt	42.0-48.0 N·m	31-35 lb ft
Case Extension to Case Bolt (4WD Shipping)	11.2-22.6 N·m	8.3-16.7 lb ft
Converter Cover Bolt	10 N·m	89 lb in
Converter Housing to Case Screw	65.0-75.0 N·m	48-55 lb ft
Cooler Pipe Connector	35.0-41.0 N·m	26-30 lb ft
Detent Spring to Valve Body Bolt	20.0-27.0 N·m	15-20 lb ft
Floorshift Control Bolt	10 N·m	89 lb in
Flywheel to Torque Converter Bolt	63 N·m	46 lb ft
Forward Accumulator Cover to Valve Body Bolt	8.0-14.0 N·m	6-10 lb ft
Heat Shield to Transmission Bolt	17 N·m	13 lb ft
Line Pressure Plug	8.0-14.0 N·m	6-10 lb ft
Manual Shaft to Inside Detent Lever Nut	27.0-34.0 N·m	20-25 lb ft
Negative Battery Cable Bolt	15 N·m	11 lb ft
Oil Level Indicator Bolt	47 N·m	35 lb ft
Oil Pan to Transmission Case Bolt	11 N·m	97 lb in
Oil Passage Cover to Case Bolt	8-14.0 N·m	6-10 lb ft
Park Brake Bracket to Case Bolt	27.0-34.0 N·m	20-25 lb ft
Park/Neutral Position Switch Screw	3 N·m	27 lb in
Plate to Case Bolt (Shipping)	27.0-34.0 N·m	20-25 lb ft
Plate to Converter Bolt (Shipping)	27.0-34.0 N·m	20-25 lb ft
Plug Assembly, Automatic Transmission Oil Pan (C/K)	30-40 N·m	22.1-29.5 lb ft
Plug Assembly, Automatic Transmission Oil Pan (Y)	28-32 N·m	20.7-23.6 lb ft
Pressure Control Solenoid Bracket to Valve Body Bolt	8.0-14.0 N·m	6-10 lb ft
Pump Assembly to Case Bolt	26.0-32.0 N·m	19-24 lb ft
Pump Cover to Pump Body Bolt	20.0-27.0 N·m	15-20 lb ft
Shift Cable Grommet Screw	1.7 N·m	15 lb in
Shift Control Cable Attachment	20 N·m	15 lb ft
Speed Sensor Retainer Bolt	10.5-13.5 N·m	7.7-10 lb ft
Stud, Automatic Transmission Case Extension (Y-car)	18.0-22.0 N·m	13-16 lb ft
TCC Solenoid Assembly to Case Bolt	8.0-14.0 N·m	6-10 lb ft
Trans Mount to Transmission Bolt	25 N·m	18 lb ft
Transmission Fluid Pressure Manual Valve Position Switch to Valve Body Bolt	8.0-14.0 N·m	6-10 lb ft
Transmission Oil Cooler Pipe Fitting	35.0-41.0 N·m	26-30 lb ft
Transmission Oil Pan to Case Bolt	9.5-13.8 N·m	7-10 lb ft
Transmission to Engine Bolt	47 N·m	35 lb ft
Valve Body to Case Bolt	8.0-14.0 N·m	6-10 lb ft

Transmission General Specifications

Name	Hydra-matic 4L60-E
RPO Codes	M30
Production Location	Toledo, Ohio Romulus, MI Ramos Arizpe, Mexico
Vehicle Platform (Engine/Transmission) Usage	S/T
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)	245 mm 258 mm 298 mm 300 mm
Pressure Taps	Line Pressure
Transmission Fluid Type	DEXRON® III
Transmission Type: 4	Four Forward Gears
Transmission Type: L	Longitudinal Mount
Transmission Type: 60	Product Series
Transmission Type: E	Electronic Controls
Position Quadrant	P, R, N, , D, 2, 1 P, R, N, , 3, 2, 1
Case Material	Die Cast Aluminum
Transmission Weight Dry (Approximate)	245 mm Converter 65.4 kg (144.30 lbs) 258 mm Converter 79.9 kg (176.6 lbs) 298 mm Converter 70.5 kg (155.70 lbs) 300 mm Converter 86.17 kg (190.5 lbs)
Transmission Weight Wet (Approximate)	245 mm Converter 72.4 kg (159.55 lbs) 258 mm Converter 89.2 kg (197.7 lbs) 298 mm Converter 80.5 kg (176.16 lbs) 300 mm Converter 98.4 kg (218.0 lbs)
Maximum Trailer Towing Capacity	6,130 kg (13,500 lbs)
Maximum Gross Vehicle Weight (GVW)	3,900 kg (8,600 lbs)

Fluid Capacity Specifications

Application	Specification	
	Metric	English
Pan Removal	4.7 L	5 qts
Overhaul	10.6 L	11 qts
245 mm Torque Converter Approximate Fluid Capacity Dry Fill	8.3 L	8.8 qts
258 mm Torque Converter Approximate Fluid Capacity Dry Fill	8.8 L	9.3 qts
298 mm Torque Converter Approximate Fluid Capacity Dry Fill	11.25 L	11.9 qts
300 mm Torque Converter Approximate Fluid Capacity Dry Fill	11.50 L	12.1 qts

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 transmission 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

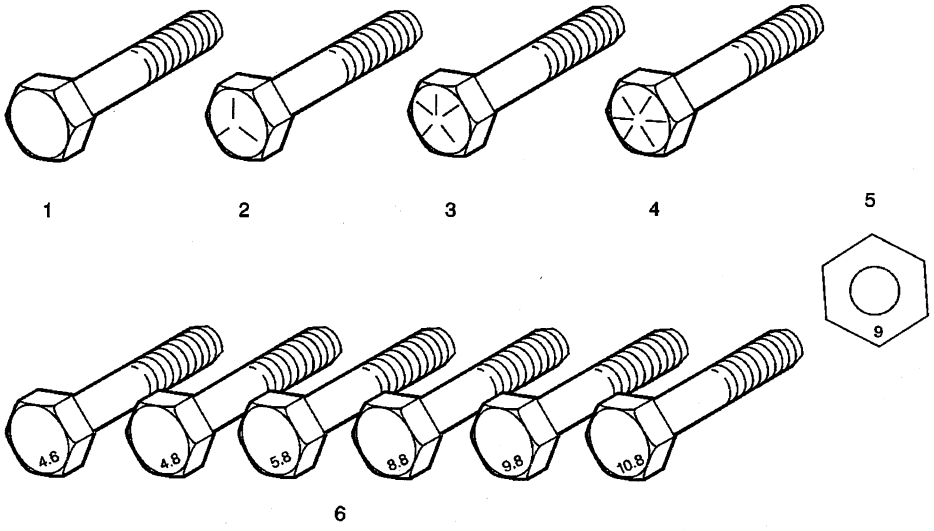
Metric Fasteners

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

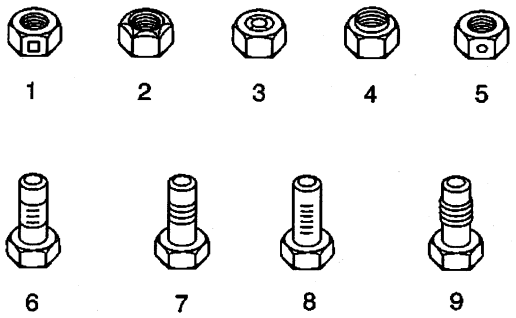
These fasteners accomplish the thread interface by a designed distortion or deformation in the fastener.

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