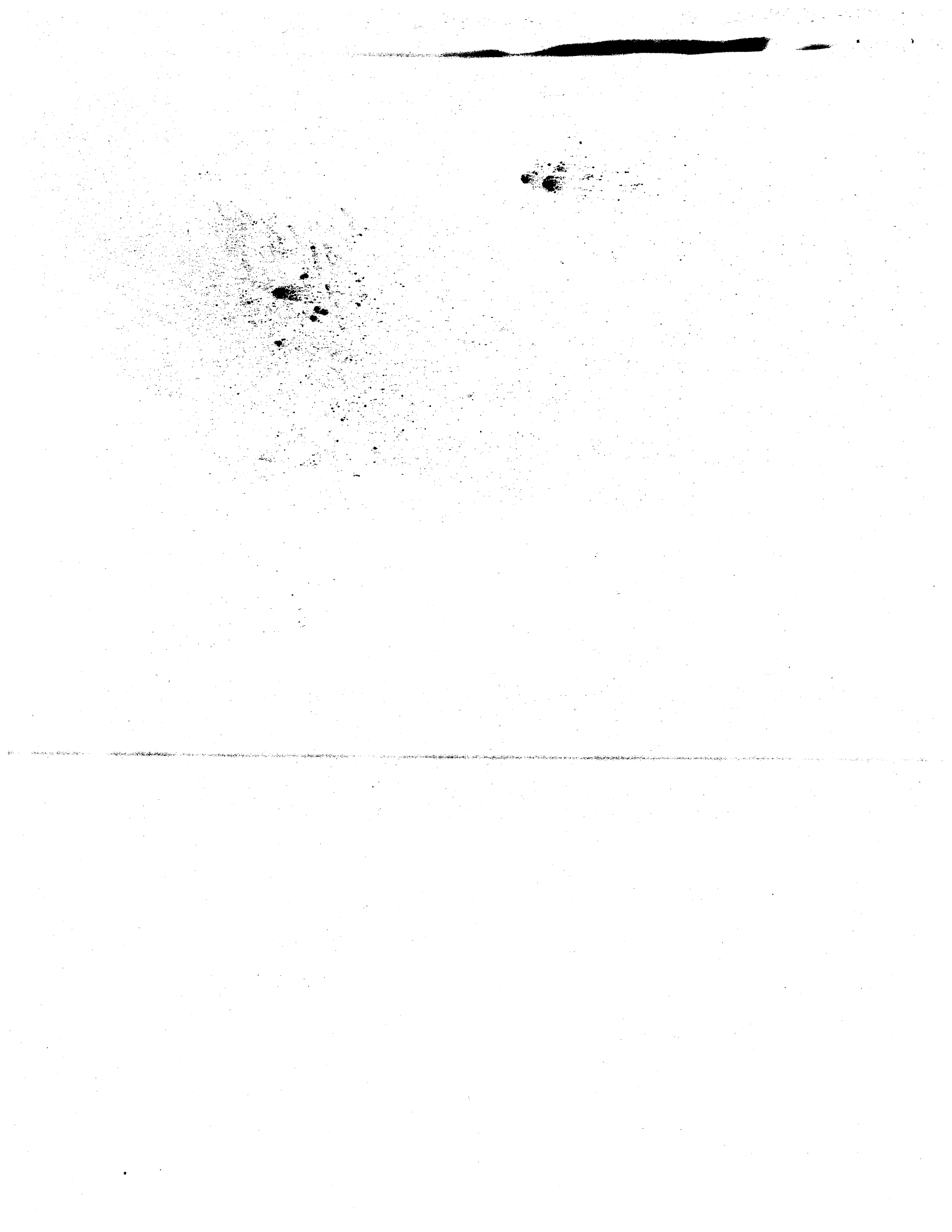
Chevrolet

C/K & Silverado Trucks

2000



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Product Information

2000 C/K Pickup — High Value Wrapped in Rugged Versatility

DETROIT — A top seller in the full-size pickup segment for decades, C/K Pickup continues to live up to its tough, dependable reputation for 2000.

A new Emerald Green Metallic paint for 2000 helps round out the C/K Pickup nine-color paint spectrum. C/K Pickup is available in 28 different models, including Regular Cab, Extended Cab, Crew Cab and Chassis Cab formats, with either a long or short box. Add three trim levels (Base, LS and LS Premium) to the equation, and you have a truly versatile pickup.

"Clearly, C/K Pickup has proven itself over the years with its versatility and dependability," said Rick Scheidt, C/K Brand Manager. "Whether it's for personal or commercial-use, C/K Pickup offers one of the widest selections of models and GVW packages available in a light-duty pickup."

Three engines power the C/K Pickup line — a Vortec 5700 V8 SFI, Vortec 7400 V8 SFI and a heavy-duty 6.5 liter Turbo-Diesel. Available with either a 5-speed manual overdrive or 4-speed electronically controlled automatic overdrive transmission, these powertrains provide rugged, long-lasting performance.

C/K Pickup four-wheel-drive models come with a patented Insta-Trac system that includes a "Low" setting for difficult terrain. A convenient electric shift version is available on three-quarter ton models. C/K Pickup features an independent front suspension and variable-rate rear suspension for a smooth, controlled ride.

C/K Pickup provides a generous level of comfort and convenience features, such as a standard AM/FM stereo, dual 12-volt auxiliary power outlets and slide-out, in-dash cup holders. A unique center floor console (included with optional bucket seats), features a handy pivoting writing surface, map pocket and a removable cup holder and coin holder. Seats come in a variety of configurations and surfaces, depending on model.

Key safety and security features include: 4-wheel antilock brakes (ABS), Daytime Running Lamps (DRL) and a brake/transmission shift interlock (automatic transmission) that prevents the vehicle from being shifted out of "Park" without the brake pedal being depressed. The PASSlock® theft-deterrent system helps protect the vehicle from theft by not allowing the vehicle to start for up to 10 minutes if an improper key or unauthorized ignition technique is attempted.

The durable and long-lasting reputation of C/K Pickup helps give it one of the highest resale values in it class. With its numerous models, bodystyles and GVW packages, it's easy to see why C/K Pickup has been a leader in the full-size pickup market for so long.

Brand Identity

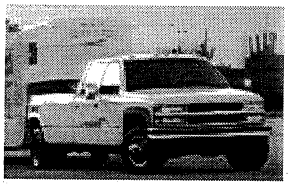
What's New And Highlights

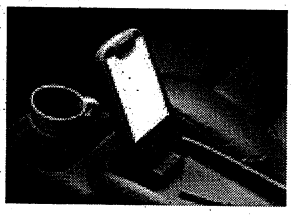
Exterior

- Emerald Green Metallic replaces Meadow Green Metallic.

Vortec 7400 V8 Engine

The available Vortec 7400 V8 big block engine provides C/K Pickup with added power for heavy-duty hauling



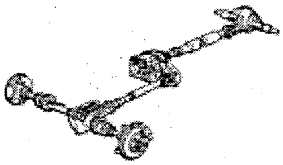


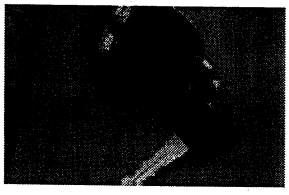
Center Console

The available center console includes a handy writing surface and cup holders

Four-Wheel-Drive System

The available Insta-Trac four-wheel-drive system helps keep C/K Pickup 4x4 models moving even under difficult road conditions.





Security

The PASSlock® vehicle theft-deterrent system provides C/K Pickup buyers with added security.

Model Summary

- C/K2500 Crew Cab Short Box
- K2500 Extended Cab Short Box
- C/K2500 Regular and Extended Cab Long Box
- C/K2500 Chassis Cab
- C/K3500 Regular Cab Long Box
- C/K3500 Extended Cab Long Box
- C/K3500 Crew Cab Short or Long Box
- C/K3500 Chassis Cab
- C/K3500 Crew Cab Chassis Cab
- C3500 HD Regular Cab Chassis Cab.

Trim Levels

- Base
- LS
- LS Premium

Marketplace

Chevy C/KPickup — still the most dependable, longest-lasting full-size pickup on the road.* C/K is available in 2500 (3/4-ton) and 3500 (1-ton) with Base or LS trim. And C/K Pickup has the only Crew Cab models in this year's Chevy Truck lineup. The Crew Cab, featuring four full-size doors, has room for up to six people and is available with LS interior and Custom Leather seating surfaces. Like all C/Ks, the Crew Cab Pickups have strong Vortec engines and outstanding trailering capabilities.

For the 2001 model year, Chevrolet will expand the Silverado lineup with the addition of a complete lineup of 2500 HD and 3500 models.

Competitors:

- Ford F-Series
- Dodge Ram.

Buyer Demographics

Age Target:	Mid-30s to mid-40s
Education:	22–24% are college graduates
Median Household Income:	$55,000–$60,000
Purchaser:	Predominately male buyers.

* Dependability based on longevity: 1981–1998 full-size light-duty pickup registrations including Chassis Cabs. Excludes other GM products.

Vehicle Overview

Interior Overview

Key Standard Features*

Base Model:

- ETR AM/FM stereo with seek-scan and digital clock
- Dual covered auxiliary power outlets
- Vinyl or cloth bench seat
- Color-keyed rubber floor covering
- PASSlock® theft-deterrent system
- Illuminated entry feature
- Ergonomically designed instrument panel
- Rotary instrument panel controls
- Large door handles
- Two slide-out cup holders
- Molded armrests, convenient map pockets and speakers are contained within the door trim panels
- Console (included with optional high-back bucket seats) has a pivoting writing surface on top of the lid, a map pocket on the underside of the lid, a removable cup holder insert and a removable coin holder. Extended Cab model includes a latching rear storage drawer and two slide-out cup holders for rear-seat passengers
- Passenger assist handles
- Intermittent windshield wipers
- Single two-sided key operates ignition and doors, eliminating the need for two separate keys
- Padded sunvisors
- Rear-seat heat ducts (Extended Cab models)
- Rear seat on Extended Cab models features a flip-down seatback that provides a flat load surface. The bottom cushion also folds up to create more cargo room.

LS Adds The Following, In Addition To Or Replacing Base Model Features:

- Custom Cloth bench seat (split on Extended Cab, full on Regular Cab)
- Color-keyed carpeting
- Leather-wrapped steering wheel
- Full-width storage tray behind seat
- Air conditioning
- Power windows and door locks
- ETR AM/FM stereo with cassette, seek-scan and digital clock
- Tilt-Wheel™ steering column and cruise control.

LS Premium Adds The Following, In Addition To Or Replacing Ls Model Features:

- Custom Leather seating surfaces
- Self-dimming inside rearview mirror with integral compass (standard on Crew Cab)
- Power driver seat
- Remote Keyless Entry.

Exterior/Structural Overview

Key Standard Features*

Base Model:

- Daytime Running Lamps (DRL)
- Painted rear bumper with step pad
- Dual black foldaway rearview mirrors
- Extensive corrosion protection
- Two-tier loading is made available by pockets in the upper cargo box walls that create a second loading level above the wheelwells (Fleetside)
- Solar-Ray tinted glass
- Two front recovery hooks are standard equipment on all four-wheel-drive models and available on two-wheel-drive models
- Frame of each C/K Pickup has an all-welded, ladder-type channel design with a boxed front-end section. The box section design adds strength where it is needed most — to support the engine, front suspension and transmission. The frame's deep C-channel rails are cross-braced for increased strength and rigidity
- Precision-aligned door hinges
- Welded cargo box eliminates exposed bolt heads that can damage cargo or invite rust
- Double-wall construction helps prevent dents on the inside of the cargo box and tailgate from showing on the outside
- Ribbed body panels on the cab floor, back panels and cargo box floor add strength without increasing weight.

LS and LS Premium Models Add The Following, In Addition To Or Replacing Base Model Features:

- Chrome rear bumper with step-pad
- Electric remote rearview mirrors
- Rally wheel trim.

Exterior Paint

Basecoat/clearcoat paint used on C/K Pickup helps resist fading and provides a high-gloss shine for long-lasting exterior beauty. Clearcoat finish is used with all colors — solids and metallics.

Paint Colors

- Emerald Green Metallic
- Dark Carmine Red Metallic
- Dark Copper Metallic
- Light Pewter Metallic
- Onyx Black
- Summit White
- Victory Red
- Indigo Blue Metallic
- Sunset Gold Metallic
- Charcoal Gray Metallic

* See Feature Availability Chart for additional features.

Functional Overview

Key Standard Features*

- Vortec 5700 engine (standard on most models)
- 5-speed manual transmission with overdrive (standard on most models)
- Speed-sensitive power steering
- 4-wheel antilock disc/drum brakes
- Aluminized stainless-steel exhaust system
- Silver-painted wheels with black center cap.

* See Feature Availability Chart for additional features.

Safety And Security

- Crash Avoidance Features
- 4-wheel antilock brake system
- Daytime Running Lamps (DRL)
- Steering wheel center-mounted horn pad
- Brake/transmission shift interlock (automatic transmissions) prevents the vehicle from being shifted out of PARK without the brake pedal being depressed.
- Starter interlock switch (manual transmissions) prevents the starter from engaging unless the clutch pedal is depressed.

Occupant Protection Features

- Safety belt warning lamp
- Crush zones
- Energy-absorbing steering column
- Front outboard head restraints
- Manual lap/shoulder safety belts.

Security Features

PASSlock® vehicle theft-deterrent system is standard on all C/K Pickup models for extra protection. PASSlock® disables the fuel system unless the proper key is used. If an improper key is used, the vehicle will not start for up to 10 minutes, even if the proper key is subsequently inserted

- Available Remote Keyless Entry

Sound Systems

Base Model

Standard:

- ETR AM/FM stereo with seek-scan and digital clock

LS and LS Premium Models

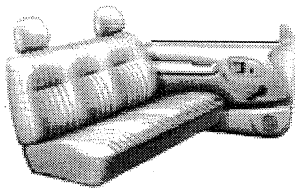
Standard:

- ETR AM/FM stereo with cassette player, seek-scan and digital clock

Optional:

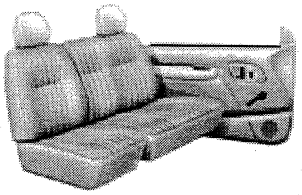
- ETR AM/FM stereo with cassette player, seek-scan, digital clock, TheftLock, speed-compensated volume and auto tone control
- ETR AM/FM stereo with compact disc player, seek-scan, digital clock, TheftLock, speed-compensated volume and auto tone control
- ETR AM/FM stereo with cassette and remote compact disc players, seek-scan, digital clock, TheftLock, speed-compensated volume and auto tone control.

Seats



Base Regular Cab And Crew Cab

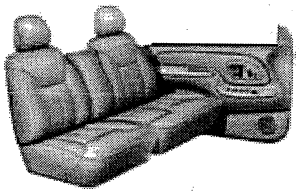
- Standard vinyl bench seat. Vinyl seating contributes to durable, easy-to-clean upholstery (or no-cost cloth option on Regular Cab).



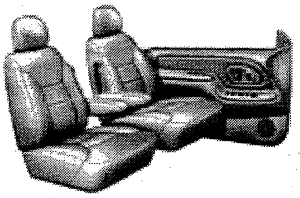
Base Extended Cab

- Standard 60/40 split-bench seat (vinyl or no-cost cloth option).

Regular Cab LS and Crew Cab LS



- Standard bench seat in Custom Cloth or optional Custom Leather seating surfaces
- Optional reclining 60/40 split-bench seat in Custom Cloth or Custom Leather seating surfaces (shown above in leather)
- Optional reclining high-back bucket seats in Custom Cloth or Custom Leather seating surfaces.



Extended Cab LS

- Standard reclining 60/40 split-bench seat in Custom Cloth or optional Custom Leather seating surfaces
- Optional reclining high-back bucket seats in Custom Cloth or Custom Leather seating surfaces (shown above in leather).

Additional Features Available With Uplevel Seats (Depending On Seat Selected):

Wide center armrest, available on 60/40 split-bench seat only, offers additional driver and passenger convenience. The center storage armrest features a storage compartment, coin holder, convenient writing surface and a map net on the inside of the lid

- Six-way power driver seat is available on Extended Cab LS or Crew Cab LS
- Power driver- and passenger-seat lumbar adjustments are standard on LS models
- Front seatback storage nets secure small items like magazines and maps (Extended and Crew Cab only).

Interior Colors

- Neutral
- Gray
- Blue

Powertrain and Performance

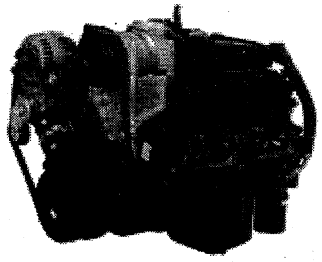
Engineering

Through its lengthy history, C/K Pickup has proven itself to be a rugged and dependable workhorse. It starts with a rugged, ladder-type frame with rigid rails and cross members to provide stiffness for a smooth ride. C/K Pickup's power comes from three available engines.

C/K Pickup is manufactured at the Flint, Michigan and Arlington, Texas assembly plants.

Engines

Depending on model, Chevy C/K Pickup buyers can choose from three highly efficient engines. Each includes a cooling system with zinc-treated aluminum radiators and oil coolers made of stainless steel. These materials help provide corrosion resistance and long component life.



Vortec 5700 V8 SFI Engines (L31)

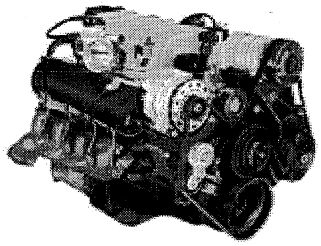
The small block V8 Vortec 5700 (L31) truck engine is designed to give C/K Pickup owners more of what they want: loads of horsepower and torque, and long intervals between recommended service visits. The Vortec 5700 V8 is standard on 2500 models and most 3500 models.

Power Ratings For The Vortec 5700 Engine:

- 255 horsepower at 4600 rpm (250 horsepower at 4200 rpm on vehicles with 10,000 lbs. GVWR or over)
- 330 lb.-ft. of torque at 2800 rpm
- Optional Compressed Natural Gas (CNG) capability (available on select C/K Pickup models with specific equipment only). This allows fleet and municipality customers to upfit the Vortec 5700 V8 to use compressed natural gas which burns cleaner, and produces fewer harmful emissions.

Vortec 5700 Engine Technical Features:

- Starter motor is the same as used on the Vortec 7400 V8 SFI engine. It helps provide long life and good corrosion resistance
- Cylinder heads with straight port design for maximum breathing ability. They feature a high compression ratio that demonstrates thermal efficiency and performance, but does not require fuel with a higher octane rating
- Durable valvetrain design
- Low maintenance*
- Single accessory drive belt
- Sequential Fuel Injection (SFI) uses a single-disk injector that is connected to eight individual valves with flexible lines. The central injector controls the flow of pressurized fuel to the valve nozzle in each intake runner. The SFI system helps deliver significant benefits to C/K Pickup customers, including a high-efficiency ignition system that helps ensure virtually instant starts in any weather.



Vortec 5700 V8 SFI Engines (L31)

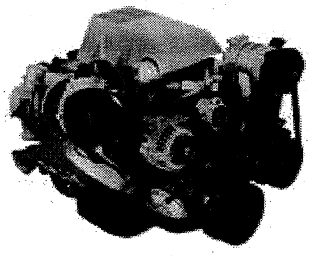
The Vortec 7400 (L29) big block V8 provides excellent horsepower and torque. The Vortec 7400 V8 is standard on the C3500 HD Chassis Cab and one-ton Crew Cab Short Box models. It is optional on all other C/K Pickup models.

Power Ratings For The Vortec 7400 Engine:

- 290 horsepower at 4000 rpm
- 410 lb.-ft. of torque at 3200 rpm.

Vortec 7400 Engine Technical Features:

- Sequential Port Fuel Injection is designed to provide an efficient fuel-delivery method that aids cold starts and hot engine restart. By placing a separate fuel injector in the intake manifold for each cylinder, the fuel delivery is very precise. This results in high power output that optimizes fuel economy
- Cylinder heads feature high-flow ports for maximum breathing ability. High-swirl, fast-burn combustion chambers and computer-designed pistons provide a 8.9:1 compression ratio, which helps demonstrate thermal efficiency and performance, but does not require fuel with a higher octane rating
- Two-piece aluminum intake manifold
- Low maintenance*
- Single accessory drive belt.



6.5 Liter Indirect EFI V8 Turbo-Diesel Engines (L65)

Power Ratings For The 6.5 Liter Turbo-Diesel Engine:

- 195 horsepower at 3400 rpm
- 430 lb.-ft. of torque at 1800 rpm (automatic)
- 420 lb.-ft. of torque at 1800 rpm (manual).

6.5 Liter Turbo-Diesel Engine Technical Features:

- Completely integrated turbocharger system with:
  - An electronically controlled Borg Warner/IHI turbocharger designed for quick response during acceleration
  - A waste gate on the exhaust side of the turbocharger to reduce boost pressure after maximum torque is obtained, thereby helping to reduce stress on the internal engine components
  - 10 psi maximum boost at 1800 rpm, helping to deliver responsive acceleration on demand without noticeable turbo-lag.
- The engine is designed to withstand the stress of turbocharging, contributing to a long life of dependable service. Among the design features are a strengthened bulkhead area of the cylinder block and larger coolant passages and oil galleries to help provide the flow needed for proper cooling and lubrication
- Combustion chamber design ensures even and complete fuel burning by optimizing the ratio of air and fuel in the prechamber, combustion chamber and cylinder. This helps engine efficiency.
- Piston spray cooling showers the bottoms of the pistons with oil for cooling and lubrication that helps promote long engine life
- Large diameter oil cooler lines
- Indirect Electronic Fuel Injection system and an electronic throttle control design — the first application of this technology in the full-size pickup segment. Electronic control reduces the number of moving parts which helps increase reliability. Benefits of the indirect Electronic Fuel Injection design include:
  - Increased fuel economy over comparable mechanical fuel injection system
  - Virtual elimination of white smoke during cold-starting and black smoke under hard acceleration
  - Improved cold-starting
  - Enhanced idle quality and lower noise
  - Engine overheating protection
  - Fuel-management system incorporates a double filter, a water separator and a fuel heater in one canister. The fuel heater helps to substantially reduce exhaust smoke during cold start-ups
  - Efficient engine cooling
  - Molded 9-blade composite fan contributes to quiet operation.

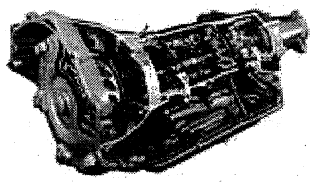
* Maintenance needs vary with different uses and driving conditions. See owner's manual for more information.

Transmissions

5-Speed Manual Transmission

Heavy-duty (MW3) — New Venture Gear 4500 — used with all engines on C/K2500 and C/K3500 Regular, Extended and Crew Cab models. The New Venture Gear 4500 manual transmission features:

- Low transmission gear rattle
- Low transmission noise due to gear profile and torsional damper design
- Impressive shift feel due to shift gate design
- Single-piece counter shaft designed for durability and reliability
- Single-rail shifter with fewer components for greater dependability than prior four-rail design.



4L80-E 4-Speed Electronically Controlled Automatic Transmission

The heavy-duty 4L80-E electronically controlled 4-speed automatic transmission with overdrive has a maximum engine torque rating of 440 lb.-ft.

4L80-E Technical Features Include:

- Wide range of gear ratios
- Precise and flexible electronic controls
- Electronic line pressure scheduling software adjusts pressure to the clutches based on the torque output of the engine contributing to smoother, more consistent shift feel
- Electronically controlled converter clutch
- Efficient transmission cooler lines
- Contoured bottom pan
- Bottom pan drain plug helps make the transmission easy to service. No longer does the entire pan have to be removed to drain the transmission fluid
- Torque converter is specially designed to enhance initial acceleration The converter's lockup clutch helps improve fuel economy by reducing slippage at cruising speeds. A converter damper makes the application and release of the lockup feature less perceptible
- Brake/transmission shift interlock
- Transmission fluid will not need to be replaced for at least 50,000 miles under normal operating conditions.*

* Maintenance needs vary with different uses and driving conditions. See owner's manual for more information.

Four-Wheel-Drive Systems

Insta-Trac

The Insta-Trac system is standard on all four-wheel-drive C/K Pickup models. Insta-Trac helps make it easy to shift into and out of four-wheel drive without leaving the cab.

- "On-the-fly" shifting from 2WD to 4WD HI and back at any speed is possible with the Insta-Trac system (vehicle must be stopped to shift into 4-LO). The system also includes a 4WD Low gear for more demanding 4WD maneuvers, such as climbing steep grades or driving through deep snow or mud

- Electronic shift transfer case is available on K2500 models. This version of Insta-Trac has all the features mentioned above, but makes shifting from 2WD to 4WD High and back again as easy as pushing a button located on the instrument panel. The base Insta-Trac system uses a manual lever to switch in and out of four-wheel drive.

Suspension

Front

- Independent Short/Long Arm (SLA) suspension with a stabilizer bar is standard on the front of every C/K Pickup. Chevy C/K Pickup has used this basic current SLA suspension since 1988 — many years ahead of Ford F-Series. SLA suspension helps the front wheels step over bumps for a stable ride and helps keep the tires in contact with the road for less tire wear and better traction
- Two-wheel-drive models feature computer-selected, friction-free coil springs which helps contribute to squeak-free operation
- Four-wheel-drive models are equipped with torsion bars which allow more room for the driveline components going to the front wheels compared with coil springs. The torsion bars are computer-selected to optimize ride and handling. The front differential is mounted to the front frame with rubber bushings on four-wheel-drive models to help isolate driveline noise and vibration. The C/K Pickup platform helps minimize the protrusion of the transmission, transfer case and driveshafts below the body, thereby contributing to additional protection when traveling over uneven road conditions.

Rear

Live rear axle and variable-rate, two-stage, multi-leaf springs comprise the rear suspension. The longer set of leaves helps provide a smooth ride when the vehicle is lightly loaded with cargo. As additional passengers and cargo are added, the longer leaves flatten out, and shorter, stiffer leaves help deliver additional support without sacrificing ride comfort.

Steering

Speed-sensitive power steering is standard on all C/K Pickup models. This electronically controlled system helps improve steering ease at lower vehicle speeds (e.g., parking). At higher speeds, steering effort reverts to normal levels. The system is also designed to help provide a lower power steering fluid operating temperature, which may help extend fluid life.

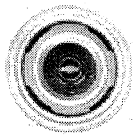
Brakes

Four wheel antilock brake system (ABS) is standard on all C/K Pickup models. ABS helps the driver maintain steering control during severe braking situations by reducing wheel lockup on most slippery surfaces. The driver simply maintains pressure on the brake pedal and steers the vehicle. ABS adjusts brake pressure by modulating the brakes several times per second, a rate even most skilled professional drivers cannot attain. The system modulates the brake-line pressure at the wheels. Drivers should not "pump" the brakes in emergency braking situations. Rather, they should maintain constant pressure on the brake pedal, allowing the system to work effectively.

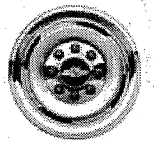
- Power front disc/rear drum brakes are featured as C/K Pickup braking systems. The large, ventilated front rotors provide brake cooling. Audible pad-wear sensors are designed to alert the driver when brake pad maintenance is needed.

Wheels And Tires

Wheels



16" Silver-painted steel wheel with black center cap — Standard on Base.



16" rally wheel trim — optional. Standard with LS.

16" front wheels. Standard on models with dual rear wheels. Shown with available rally trim.

Tires

C/K Pickup Offers The Following Tires As Standard Equipment:

- LT245/75R-16E all-season steel-belted radial blackwall tires (C2500)
- LT245/75R-16E all-season steel-belted radial blackwall tires (K2500)
- LT225/75R-16D all-season steel-belted radial blackwall tires (C3500 and K3500).

Feature Availability

	Base	LS	LS Premium
Interior			
Air conditioning – with CFC-free refrigerant	O	S	S
Convenience group – Tilt-WheelTM steering column and cruise control	O	S	S
Cup holders, dual	S	S	S
Door locks, power	NA	S	S
Door trim – molded plastic w/armrest	S	NA	NA
– color-keyed cloth and carpet trimmed	NA	S	S
Floor covering – color-keyed carpet	O[1]	S	S
– color-keyed rubber	S	O	O
– color-keyed rubber floor mats	O[1]	S	S
Gauges – trip odometer, oil pressure, voltmeter, tachometer	S	S	S
Lights, interior – dome w/delayed entry	S	S	S
Mirror – electrochromic w/8-point compass	NA	O	S
PASSlock® theft-deterrent system	S	S	S
Power outlets – dual, auxiliary	S	S	S
Seats2 – cloth bench	O	S	NA
– vinyl bench (NA Extended Cab)	S	NA	NA
– 60/40 custom cloth, split-bench (Extended Cab)	NA	S	NA
– 60/40 vinyl split-bench (Extended Cab)	S	NA	NA
– 60/40 custom leather seating surfaces	NA	NA	S
– front bucket w/custom leather seating surfaces (Extended Cab)	NA	NA	S
– power driver seat (Extended Cab)	NA	O	S
Steering wheel – leather-wrapped	NA	S	S
Stereo – ETR AM/FM stereo w/seek-scan and digital clock	S	NA	NA
– ETR AM/FM stereo w/cassette, seek-scan and digital clock	O	S	S
– ETR AM/FM stereo w/cassette, seek-scan, digital clock, TheftLock, speed-compensated volume and auto tone control	NA	O	O
– ETR AM/FM stereo w/cassette, remote compact disc, seek-scan, digital clock, TheftLock, speed-compensated volume and auto tone control	NA	O	O
Windows – power with driver's Express-Down feature	NA	S	S
Windows – rear quarter swing-out (Extended Cab)	S	S	S
Wipers – intermittent variable	S	S	S
Exterior			
Bumper – rear, painted with step pad	S	NA	NA
– rear, chrome with step pad	O	S	S
Exterior Appearance Package	O	S	S
Daytime Running Lamps	S	S	S
Mirrors – dual black fold-away	S	NA	NA
– dual black twin remote electric, fold-away	NA	S	S
– dual camper-type, stainless steel	O	O	O
Wheels– 15" x 7" to 16" x 6.5" steel	S	S	S
– chrome steel	O	O	O
– rally wheel trim	O	S	S

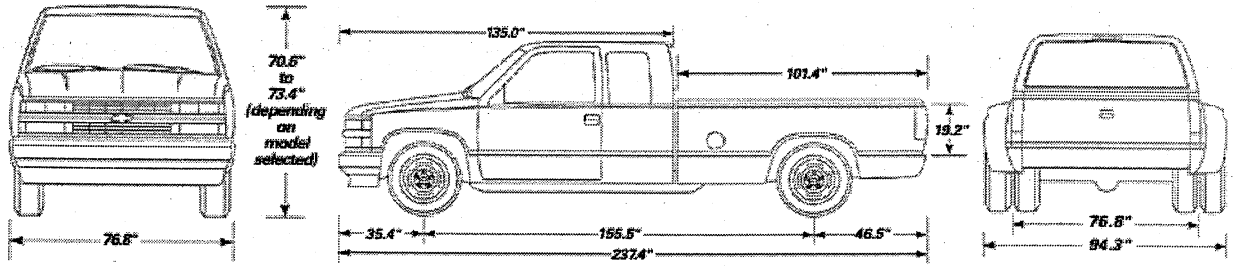
Functional			
Brakes – 4-wheel antilock (ABS)	S	S	S
– power, front disc/rear drum	S	S	S
Engine3 – Vortec 5700 V8 SFI	S	S	S
– Vortec 7400 V8 SFI	O	O	O
– heavy-duty Turbo-Diesel 6.5L V8	O	O	O
Insta-Trac four-wheel-drive system (4x4 models)	O	O	O
Remote Keyless Entry	NA	O	S
Transmission3 – 5-speed manual w/OD	S	S	S
– 4-speed electronically controlled automatic	O	O	O
Steel side door beams	S	S	S

S — Standard.
O — Optional. (Some options may be available only as part of a Preferred Equipment Group.)
NA — Not available.
1 Not available with Crew Cab.
2 C/K Pickup offers a variety of seating configurations. See the Seats Section for details.
3 Availability may vary slightly by model. See your Chevy dealership for specific model details.

Specifications

Model Availability				
	(Regular Cab and Extended Cab)		(Crew Cab)	
	C/K2500	C/K3500	C/K2500	C/K3500
Passengers	3-6	3-6	5-6	5-6
Class	Full-Size Pickup	Full-Size Pickup	Full-Size Pickup	Full-Size Pickup
Assembly plants	Flint, Mich./Arlington, TX	Flint, Mich./Arlington, TX	Flint, Mi	Flint, Mi
Primary structure	Welded steel frame	Welded steel frame	Welded steel frame	Weld steel frame
Body material	Two-sided galvanized steel (except roof)	Two-sided galvanized steel (except roof)	Two-sided galvanized steel (except roof)	Two-sided galvanized steel (except roof)

Dimensions & Capacities



	C/K2500	C/K3500	C/K2500 Crew Cab	C/K3500 Crew Cab
Exterior Dimensions (in.)	**U. S. Standard**	**U. S. Standard**	**U. S. Standard**	**U. S. Standard**
Wheelbase	131.5-155.5	131.5-155.5	154.5	168.5
Overall length	213.1-237.4	213.1-237.4	231.9	250.9
Overall height	71.2-76.0	73.2-74.0	73.9-74.5	73.974.5.
Max. width single wheels	77.0	77.0	77.0	77.0
Max. width dual wheels	-	94.3	-	94.3
Ground to rear load floor	32.6-40.0	34.1-36.1	34.2	34.2-34.7
Ground clearance, front	7.1-7.7/8.7-9.0	8.0-8.4/6.3-6.3	7.5/7.3	7.5/7.3
Ground clearance, rear	7.2-7.3/7.3-7.8	6.4-6.4/6.4-6.4	6.4/6.4	6.4/6.4
Interior Dimensions (in.)				
Headroom (front/rear*)	39.9/37.5	39.9/37.5	39.9/40.8	39.9/40.8
Legroom (front/rear)	41.7/34.8	41.7/34.8	41.7/37.9	41.7/37.9
Shoulder room (front/rear)	65.4/67.6	65.4/67.6	65.4/64.9	65.4/64.9
Hip room (front/rear)	60.0/64.2	60.0/64.2	60.0/59.3	60.0/59.3
Capacities				
Est. curb weight (lbs.) (2WD) Est. curb weight (lbs.) (4x4)	4292-5107 5178-5507	4870-5269 5256-5889	5416 5707	5488-5869 5875-6318
GVWR, standard (lbs.)	8600	9000/9200	8600	9000/9200
GVWR, maximum (lbs.)	8600	10,000	8600	10,000
Base payload (std.) (lbs.) (based on curb weight)	2755/3422	4130/3944	3184/2893	3531/3083
Maximum trailer capacity (lbs.)	10,000	10,000	10,000	10,000

Fuel tank capacity (gal./liters)	25.0 gallons on C/K20753. 34.0 gallons on all others.			
* Rear dimensions apply to Extended Cab and Crew Cab models.				
Exterior Dimensions (mm.)	Metric	Metric	Metric	Metric
Wheelbase	3341-3950	3340-3950	3924	4280
Overall length	5413-6030	5413-6030	5890	6373
Overall height	1801-1930	1859-1880	1877-1892	1877-1892
Max. width single wheels	1956	1956	1956	1956
Max. width dual wheels	-	2395	-	2395
Ground to rear load floor	828-1016	866-917	869	869-881
Ground clearance, front	180-196/221-229	203-213/160-160	190/185	191-185
Ground clearance, rear	183-185/185-198	163/163	162/162	163-163
Interior Dimensions (mm.)				
Headroom (front/rear*)	1014/953	1014/953	1014/1037	1014/1036
Legroom (front/rear)	1054/729	1054/729	1059/963	1059/963
Shoulder room (front/rear)	1651/1717	1651/1717	1661/1649	1661/1649
Hip Room (front/rear)	1527/1679	1527/1679	1524/1506	1524/1506
Capacities				
Est. curb weight (kg.) (2WD) Est. curb weight (kg.) (4x4)	1947-2317 2338-2469	2210-2476 2360-2621	2456 2588	2345 2508
GVWR, standard (kg)	3901	4083/4174	3901	4083/4174
GVWR, maximum	3901	4536	3901	4536
Base payload (std.) (kg) (based on curb weight)	1250/1433 (4x4)	1885/1814 (4x4)	1444/1312	1586/1513
Maximum trailer capacity (kg)	4536	4536	4536	4536
Fuel tank capacity	94.6 liters on C/K20753. 128.7 liters on all others.			
Steering				
	C/K2500	C/K3500	C/K2500	C/K3500
Type	Variable-ratio integral speed-sensitive power	Variable-ratio integral speed-sensitive power	Variable-ratio integral speed-sensitive power	Variable-ratio integral speed-sensitive power
Steering ratio	15/13:1	15/13:1	15/13:1	15/13:1
Turning diameter,curb-to-curb (ft./m)	43.4-51.9/13.3-15.8	43.4-51.9/13.2-15.8	50.5-51.6/15.39-15.72	50.5-55.7/15.39-17

Brakes						
	C/K2500		C/K3500		C/K2500 (Crew Cab)	
Type	Power-assist, front disc/rear drum w/4-wheel ABS		Power-assist, front disc/rear drum w/4-wheel ABS		Power-assist, front disc/rear drum w/4-wheel ABS	
	U.S. Standard	Metric	U. S. Standard	Metric	U. S. Standard	Metric
Front disc size	11.57 x 1.25 in.	294 x 32mm	12.50 x 1.26 in.	18 x 32mm	12.50 x 1.26* in.	18 x 32mm
Rear drum size	11.15 x 2.75 in.	283 x 70mm	13.0 x 3.50 in.	330 x 89mm	13.0 x 3.50 in.	330 x 89mm
Booster diameter	9.5/ tandem in.	241mm	9.5/ hydraulic boost in.	241mm	9.5/ hydraulic boost in.	241mm
Parking brake actuation	Cable to rear wheels		Cable to rear wheels		Cable to rear wheels	

* 12.5" x 1.50" with dual rear wheels.

Gasoline Engines		
	L31	L29
Type	Vortec 5700 V8 SFI	Vortec 7400 V8 SFI
Block material	Cast iron	Cast iron
Cylinder head material	Cast iron	Cast iron
Bore & Stroke (in.)/mm	4.00 x 3.48/102 x 88	4.25 x 4.00/108 x 106
Displacement (cu. in./cc)	350/5733	454/7440
Compression ratio	9.4:1	8.9:1
Induction system	SFI	SFI
Valves/cylinder	2	2
Lifters	Hydraulic roller	Hydraulic roller
Cam drive	Chain	Chain
Horsepower/kW @ RPM (SAE net)	255 @ 4600/190 kW @ 4600	290 @ 4000/216 kW @ 4000
Torque/N-m @ RPM (SAE net)	330 @ 2800/441 N-m @ 2800	410 @ 3200/556 N-m @ 3200
Recommended fuel (min.)	87 octane or alt. fuel	87 octane
Model availability		
C/K2500: Reg. Cab & Ext. Cab	Standard	Optional
C/K3500: Reg. Cab & Ext. Cab	Standard	Optional
C/K2500 Crew Cab	Standard	Optional
C/K3500 Crew Cab	Standard (Long Box only)	Standard (Short Box only) (Optional)
Transmission Availability		
5-speed OD manual	Standard (MW3)	Standard (MW3)
4-speed OD automatic	Optional (MT1)	Optional (MT1)

Diesel Engines	
	L65 H.D. Turbo
Type	6.5 liter OHV V8
Block	Cast iron
Cylinder head	Cast iron
Bore & stroke (in.)/mm	4.06 x 3.82/103 x 97
Displacement (cu. in./cc)	395/6468

Compression ratio	20:1
Induction system	Indirect EFI w/turbo
Valves/cylinder	2
Lifters	Hydraulic roller
Cam drive	Chain
Horsepower/kW @ RPM (SAE net)	195 @ 3400/145 kW @ 3400
Torque/N-m @ RPM (SAE net)	420[1] @ 1800/569 N-m @ 1800
Model availability	
C/K2500 Reg. & Ext. Cab	Optional
C/K3500: Reg. & Ext. Cab	Optional
C/K3500: Crew Cab	Optional (Long Box only)
5-speed OD manual[2]	Standard (MW3)
4-speed OD automatic[3]	Optional (MT1)

[1] With manual transmission. Torque with optional automatic transmission is 430 ft.-lbs [2]RPO MW3 heavy-duty manual transmission. [3]RPO MT1 (4L80-E) electronically controlled heavy-duty transmission.

Transmissions (Manual)	
Type	Heavy-duty manual 5-speed with deep low (MW3)
1st	5.61
2nd	3.04
3rd	1.67
4th	1.00
5th	0.75
Reverse	5.61
Transmissions (Automatic)	
Type	Heavy-duty electronically controlled automatic 4-speed w/O.D. and torque cconv. (4L80-E)
1st	2.48
2nd	1.48
3rd	1.00
4th	0.75
Reverse	2.08
Suspension	
Frame	All-welded, ladder-type, channel design w/box front section
Front (2WD)	Independent, with computer-selected coil springs
Front (4WD)	Independent, with computer-selected torsion bars
Rear (2WD/4WD)	Hypoid drive, semi-elliptic, 2-stage multi-leaf springs
Shocks, front (mm)	35
Shocks, rear (mm)	32
Stabilizer bar, front (2WD/4x4) (mm)	32/30
Rear axle (std.)	Semi-floating (C/K2500 with gas engine), full-floating (C/K250

Wheels & Tires				
	C/K2500	C/K3500	C/K2500 Crew Cab	C/K3500 Crew Cab
Wheel type	Steel	Steel	Steel	Steel
Wheel size (2WD/4x4)(in.)	16 x 6.5	16 x 6.5*	16 x 6.5	16 x 6.5*
Tire type	Varies with model	Varies with model	Varies with model	Varies with mod
Tire size (2WD)				
Single rear wheels	Varies with model	LT245/75R-16E	LT245/75R-16E	LT245/75R-16E
Dual rear wheels	-	LT225/75R-16 D	-	LT225/75R-16D
Tire size (4WD)				
Single rear wheels	Varies with model	LT245/75R-16E	LT245/75R-16E	LT245/75R-16E
Dual rear wheels	-	LT225/75R-16D	-	LT225/75R-16D

All specifications are preliminary and subject to change. Chevrolet Motor Division, June 1999. *With dual rear wheels the rear wheel size is 16" x 6".

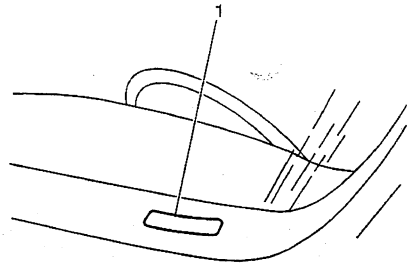
Trailering Information (2wd/4x4)*						
	Vortec 5700 V8		Vortec 7400 V8		6.5L Turbo-Diesel V8	
Trailer classification	Medium		Heavy		Medium	
	U.S. Standard	Metric	U. S. Standard	Metric	U. S. Standard	Metric
Maximum trailer weight ratings (up to) Weight distribution hitch	10,000/ 8300 lbs.	4536/ 3765 kg	10,000/ 10,000 lbs.	4536/ 4536 kg	110,000/ 8000 lbs.	4218/40 82kg
Fifth wheel (gooseneck)	10,000/ 8300 lbs.	3402/ 3176 kg	13,800/ 13,500 lbs.	6260/ 6123 kg	9300/ 9000 lbs	4218/ 4082kg

NOTE: Trailer tongue weight should be 10 to 15 percent of total loaded trailer weight (up to 1000 lbs.).

* Maximum trailer weight ratings are based on Regular Cab models and are calculated assuming a standard equipped base vehicle plus driver. Trailer ratings for Extended Cab and Crew Cab models will be reduced. The weight of optional equipment, passengers, cargo and required trailering equipment will also reduce the maximum trailer weight your truck can tow. See your Chevy Truck dealer for additional details.

Vehicle Identification

Vehicle Identification Number (VIN)

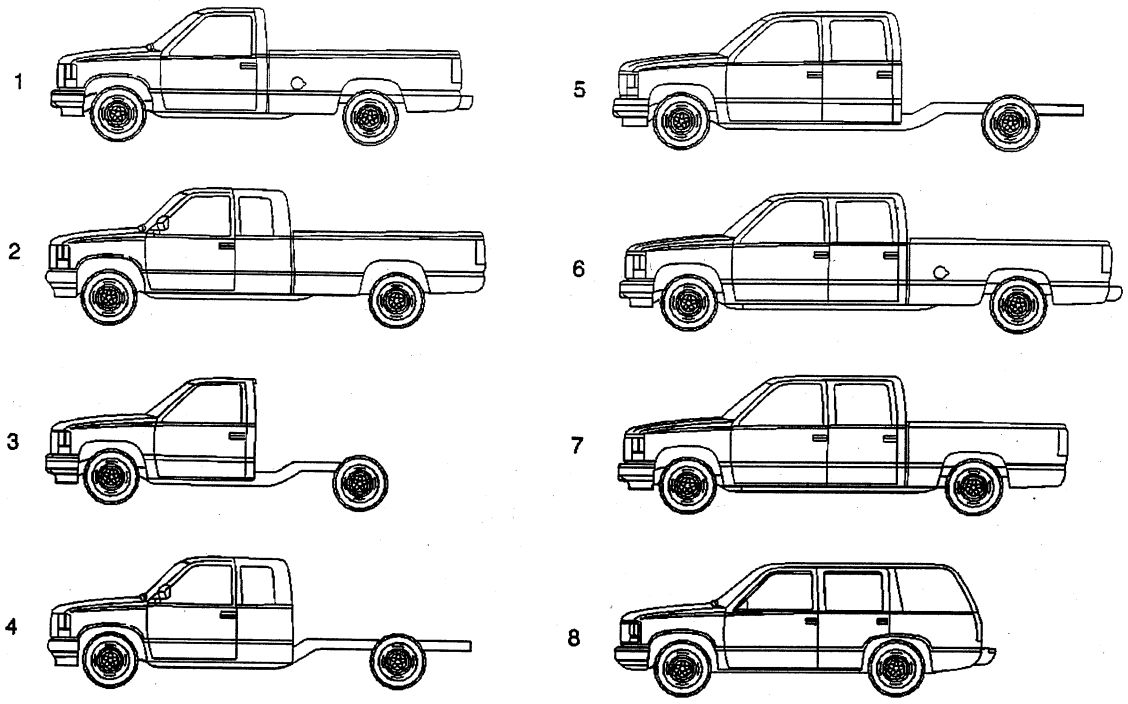


The vehicle identification number (VIN) plate is the legal identifier of the vehicle. The VIN plate is located on the upper LH corner of the Instrument Panel and can be seen through the windshield from the outside of the vehicle:

Position	Definition	Character	Description
1	Country of Origin	1 2 3	United States Canada Mexico
2	Manufacturer	G	General Motors
3	Make	B C D T	Chevrolet Incomplete Chevrolet Truck GMC Incomplete GMC Truck
4	GVWR/Brake System	B C D E F G H J K	3001-4000/Hydraulic 4001-5000/Hydraulic 5001-6000/Hydraulic 6001-7000/Hydraulic 7001-8000/Hydraulic 8001-9000/Hydraulic 9001-10000/Hydraulic 10001-14000/Hydraulic 14001-16000/Hydraulic
5	Truck Line/Chassis Type	C D K	Conventional Cab/4x2 Military Truck/4x4 Conventional Cab/4x4
6	Series	1 2 3	½ Ton ¾ Ton 1 Ton
7	Body Type	3 4 6 8 9	Crew Cab Two-Door Cab Utility Extended Cab

8	Engine Type	F R J S	(L65) 6.5L Diesel (L31) 5.7L Gas (L29) 7.4L Gas (L56) 6.5L Diesel
9	Check Digit	--	--
10	Model Year	Y	2000
11	Plant Location	J F G R	Janesville, WI Silao, Mexico Arlington, TX
12-17	Plant Sequence Number	--	--

C/K Model Identification



(1) Regular Cab Pickup

(2) Extended Cab Pickup

(3) Regular Cab Chassis

(4) Extended Cab Chassis

(5) Crew Cab Chassis

(6) Crew Cab Pickup

(7) Crew Cab, Short Box Pickup

(8) 4 Door Utility

Engine and Transmission Application

Model	Engine		Transmission	
	Base	Option	Base	Option
C107 (06)	5.7L V8 (L31)	-	4 Spd. Auto. (M30)	-
C107 (53)	-	5.7L V8 (L31)	4 Spd. Auto. (M30)	4 Spd. Auto. (MT1)
C109 (06)	5.7L V8 (L31)	6.5L V8 (L65)	4 Spd. Auto. (M30)	4 Spd. Auto. (MT1)
C207 (43)	5.7L V8 (L31)	7.4L V8 (L29) 6.5L V8 (L65)	5 Spd. Manual (MW3)	4 Spd. Auto. (MT1)
C209 (03)	5.7L V8 (L31)	7.4L V8 (L29) 6.5L V8 (L56) 6.5L V8 (L65)	5 Spd. Manual (MW3)	4 Spd. Auto. (MT1)
C209 (06)	5.7L V8 (L31)	7.4L V8 (L29) 6.5L V8 (L65)	4 Spd. Auto. (MT1)	-
C307 (43)	7.4L V8 (L29)	6.5L V8 (L65)	5 Spd. Manual (MW3)	4spd. Auto. (MT1)
C309 (03)	5.7L V8 (L31)	7.4L V8 (L29) 6.5L V8 (L65)	5 Spd. Manual (MW3)	4 Spd. Auto. (MT1)
C309 (43)	5.7L V8 (L31)	7.4L V8 (L29) 6.5L V8 (L65)	5 Spd. Manual (MW3)	4 Spd. Auto. (MT1)
C309 (53)	5.7L V8 (L31)	7.4L V8 (L29) 6.5L V8 (L65)	5 Spd. Manual (MW3)	4 Spd. Auto. (MT1)
C310 (03)	5.7L V8 (L31)	7.4L V8 (L29) 6.5L V8 (L65)	5 Spd. Manual (MW3)	4 Spd. Auto. (MT1)
C314 (03)	5.7L V8 (L31)	7.4L V8 (L29) 6.5L V8 (L65)	5 Spd. Manual (MW3)	4 Spd. Auto. (MT1)
C318 (03)	7.4L V8 (L29)	6.5L V8 (L65)	5 Spd. Manual (MW3)	4 Spd. Auto. (MT1)
K107 (06)	5.7L V8 (L31)	-	4 Spd. Auto. (M30)	-
K107 (53)	-	5.7L V8 (L31)	-	4 Spd. Auto. (M30) 5 Spd.
K109 (06)	5.7L V8 (L31)	6.5L V8 (L65)	4 Spd. Auto. (M30)	4 Spd. Auto. (MT1)
K207 (43)	5.7L V8 (L31)	7.4L V8 (L29) 6.5L V8 (L65)	5 Spd. Manual (MW3)	4 Spd. Auto. (MT1)
K207 (53)	5.7L V8 (L31)	7.4L V8 (L29) 6.5L V8 (L65)	5 Spd. Manual (MW3)	4 Spd. Auto. (MT1)
K209 (03)	5.7L V8 (L31)	7.4L V8 (L29) 6.5L V8 (L65)	5 Spd. Manual (MW3)	4 Spd. Auto. (MT1)
K209 (06)	5.7L V8 (L31)	7.4L V8 (L29) 6.5L V8 (L65)	4 Spd. Auto. (MT1)	-
K209 (53)	5.7L V8 (L31)	7.4L V8 (L29) 6.5L V8 (L65)	5 Spd. Manual (MW3)	4 Spd. Auto. (MT1)
K307 (43)	7.4L V8 (L29)	6.5L V8 (L65)	5 Spd. Manual (MW3) 4spd. Auto. (MT1)	
K309 (03)	5.7L V8 (L31)	7.4L V8 (L29) 6.5L V8 (L65)	5 Spd. Manual (MW3)	4 Spd. Auto. (MT1)

K309 (43)	5.7L V8 (L31)	7.4L V8 (L29) 6.5L V8 (L65)	5 Spd. Manual (MW3)	4 Spd. Auto. (MT1)
K309 (53)	5.7L V8 (L31)	7.4L V8 (L29) 6.5L V8 (L65)	5 Spd. Manual (MW3)	4 Spd. Auto. (MT1)
K310 (03)	5.7L V8 (L31)	7.4L V8 (L29) 6.5L V8 (L65)	5 Spd. Manual (MW3)	4 Spd. Auto. (MT1)
K314 (03)	5.7L V8 (L31)	7.4L V8 (L29) 6.5L V8 (L65)	5 Spd. Manual (MW3)	4 Spd. Auto. (MT1)

Model Codes: C-Rear Wheel Drive
K-Selectable Four Wheel Drive
03-Two Door Cab
06- Four Door Utility
43-Crew Cab
53-Two Door Extended Cab

VIN Derivative

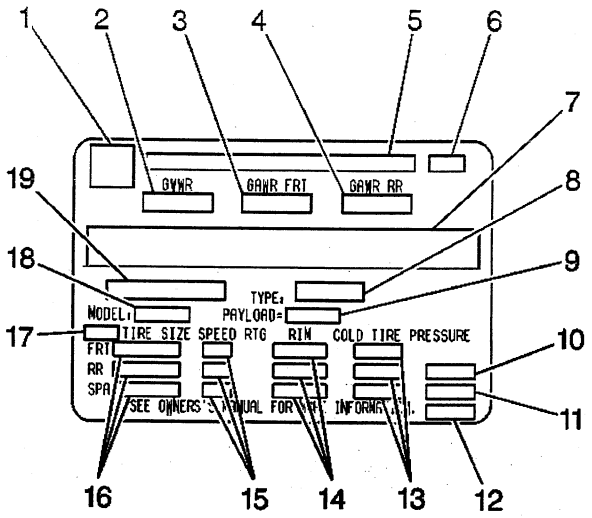
All engines and transmissions are stamped or laser etched with a partial vehicle identification number (VIN), which was derived from the complete VIN. A VIN derivative contains the following nine positions:

Position	Definition	Character	Description
1	GM Division Identifier	G	General Motors
2	Model Year	Y	2000
3	Assembly Plant	1 E Z J G R	Oshawa, Ontario Fort Wayne, IN Janesville, WI Silao, Mexico Arlington, TX
4-9	Plant Sequence Number	--	--

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

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

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.

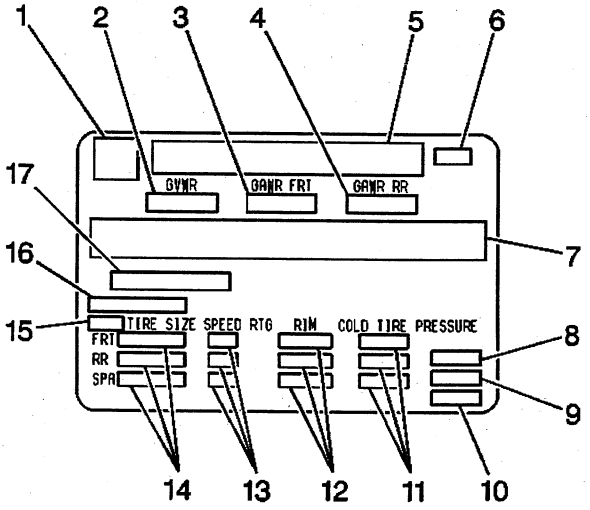
The front gross axle weight rating (GAWR FRT) is the weight exerted on the front axle. The rear gross axle weight rating (GAW RR) is the weight exerted on the rear axle. The front and rear gross axle weights must not exceed the front and rear gross axle weight ratings.

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

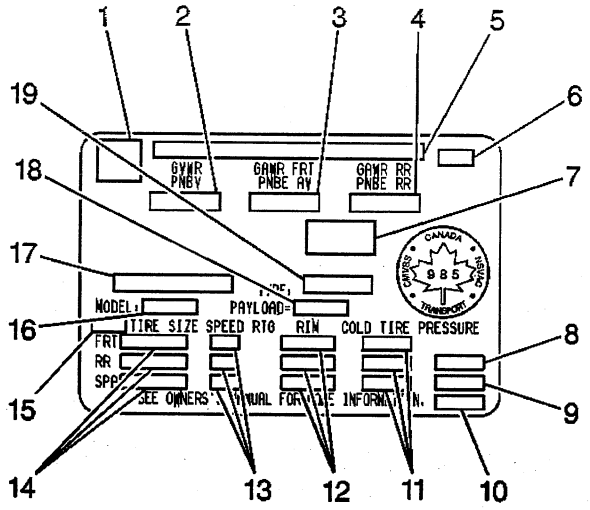
Gross vehicle weight (GVW) is the weight of the vehicle and everything it carries. Include the following items when figuring the GVW:

- 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.

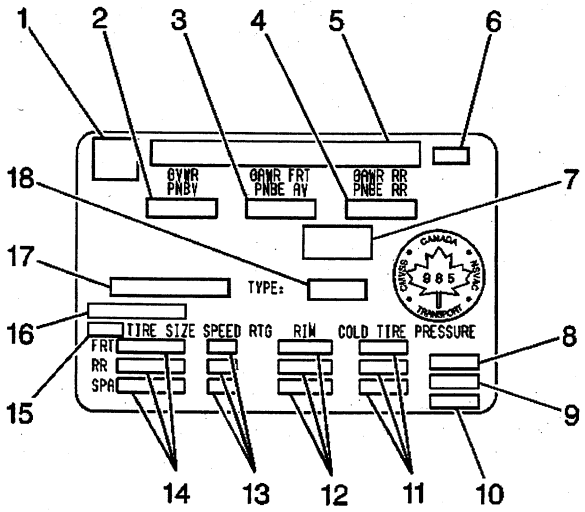
The front gross axle weight rating (GAWR FRT) is the weight exerted on the front axle. The rear gross axle weight rating (GAW RR) is the weight exerted on the rear axle. The front and rear gross axle weights must not exceed the front and rear gross axle weight ratings.

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
(2) Gross Vehicle Weight Rating
(3) Gross Axle Weight Rating - Front
(4) Gross Axle Weight Rating - Rear
(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

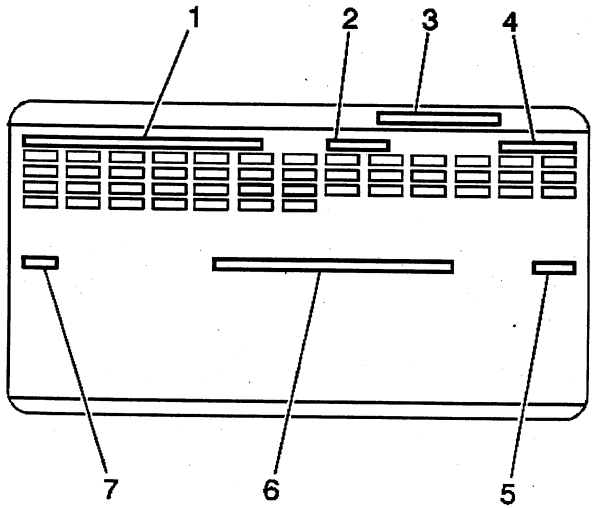
Gross vehicle weight (GVW) is the weight of the vehicle and everything it carries. Include the following items when figuring the GVW:

- 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.

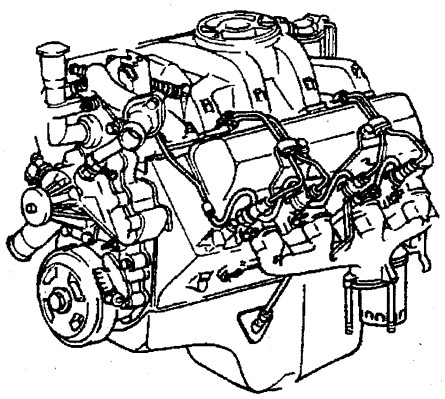
Service Parts Identification Label (SPID)

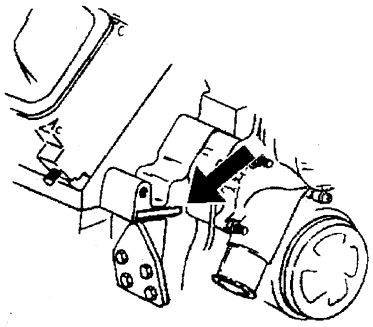


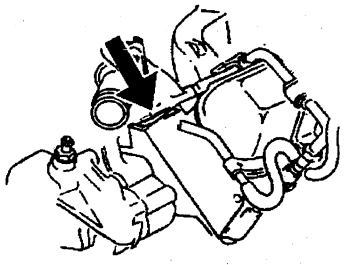
(1) Vehicle Identification Number
(2) Wheel Base
(3) Part Number Location
(4) Model Designation
(5) Order Number
(6) Exterior Color
(7) Paint Technology

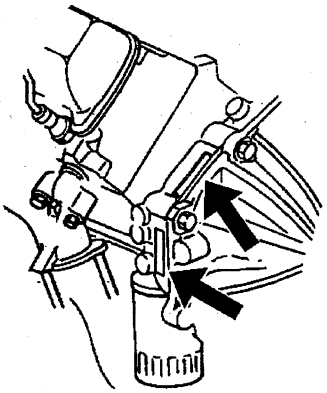
The service parts identification label is placed on the vehicle in order to help service and parts personnel identify the vehicle's original parts and the vehicle's original options.

Engine ID and VIN Derivative Location 6.5L Diesel







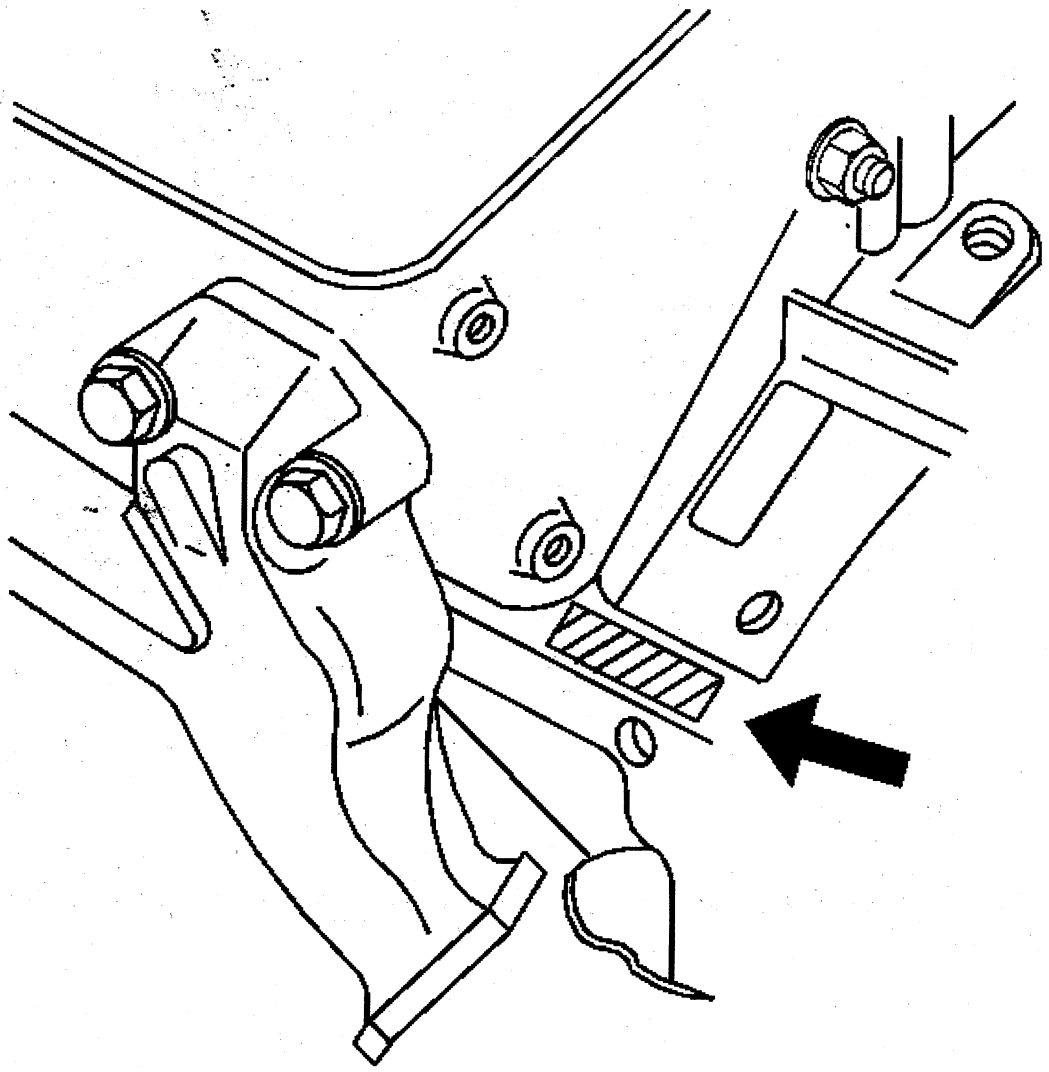


The engine unit number or date code is either laser etched or stamped into the engine block.

All engines are stamped with an eight digit engine identification number.

The 6.5L V-8 diesel engine VIN identification is located at the top left rear of the engine block.

Engine ID and VIN Derivative Location 5.7L

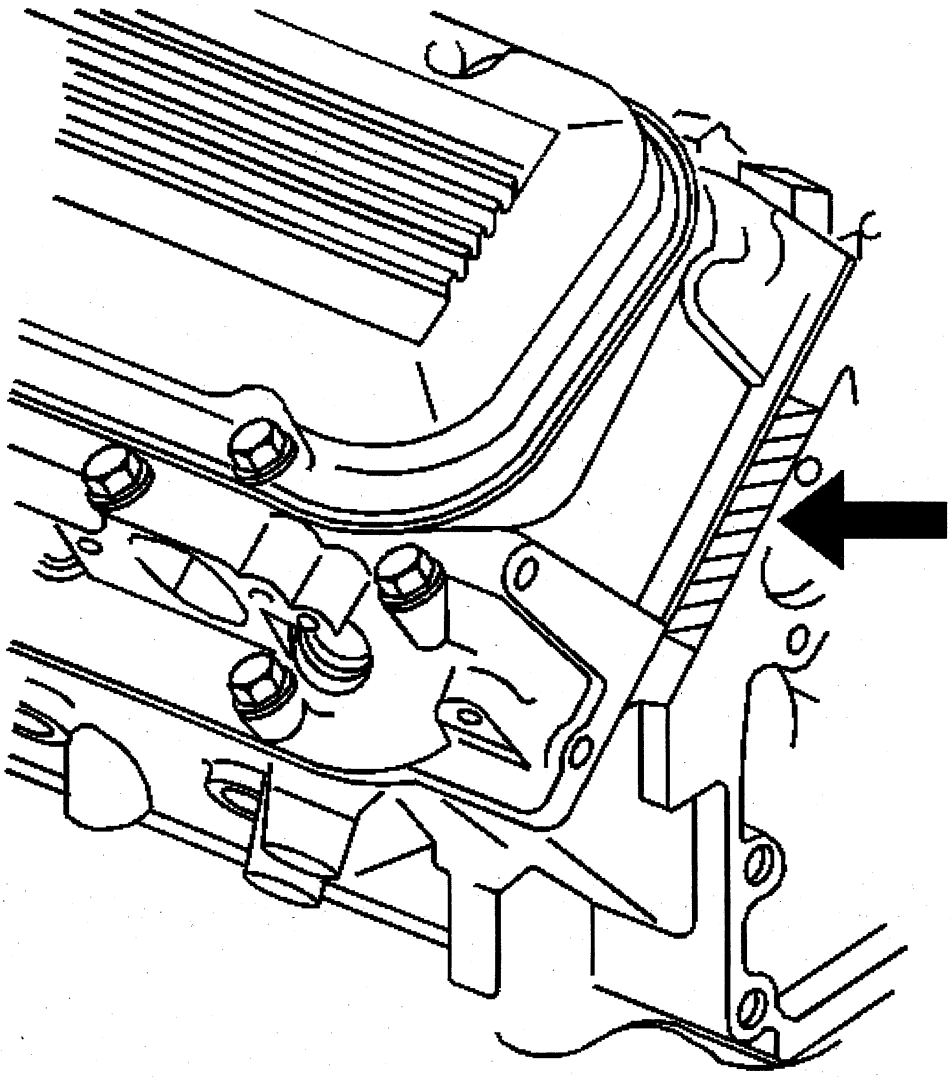


All engines are stamped with an eight digit engine identification number.

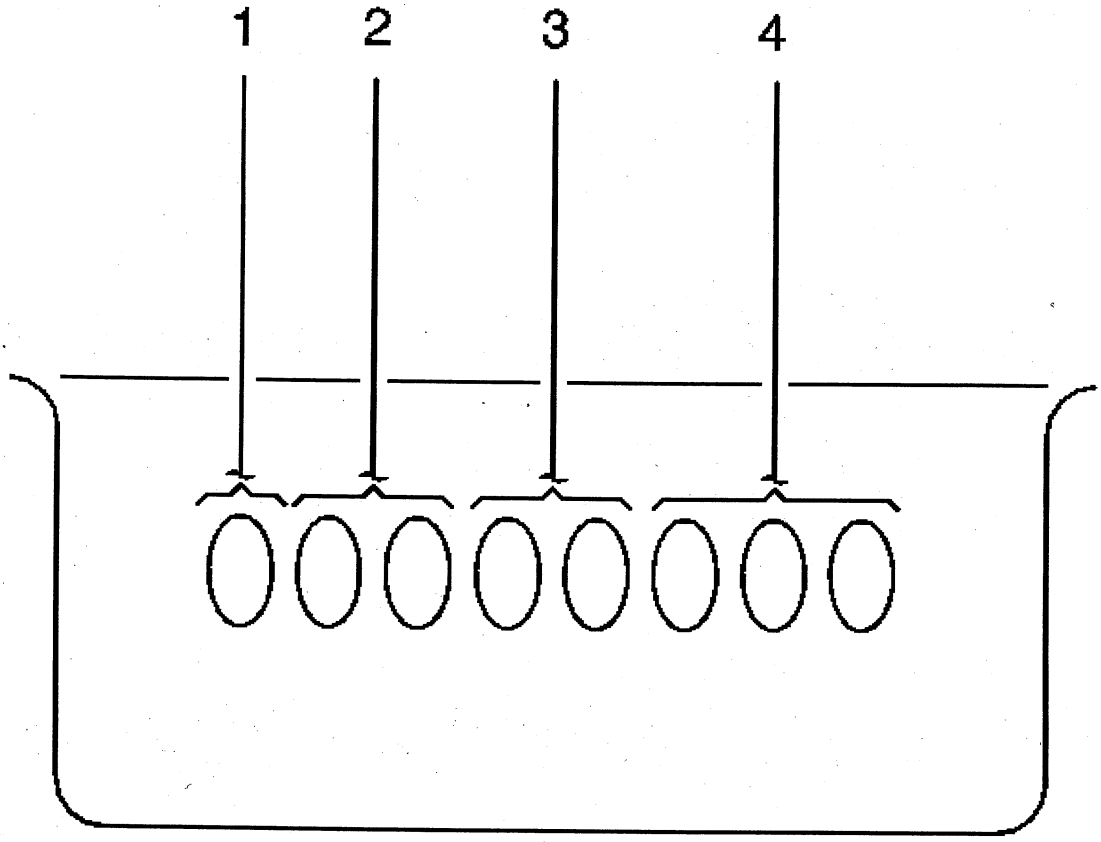
The Vehicle Identification Number (VIN) is located on the left side rear of the engine block (near the transmission bellhousing) and typically is a nine digit number stamped onto the engine at the vehicle assembly plant.

- The first digit identifies the division.
- The second digit identifies the model year.
- The third digit identifies the assembly plant.
- The fourth through ninth digits are the last six digits of the Vehicle Identification Number (VIN).

Engine ID and VIN Derivative Location 7.4L



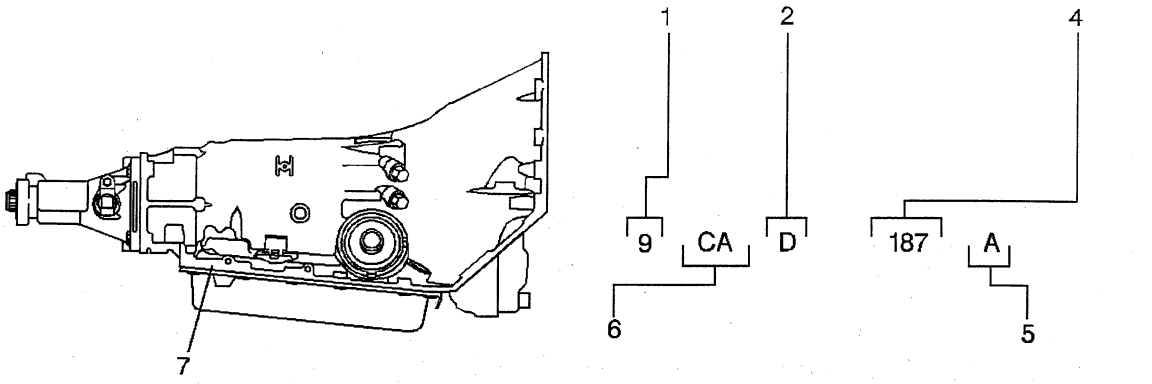
Engine ID Legend

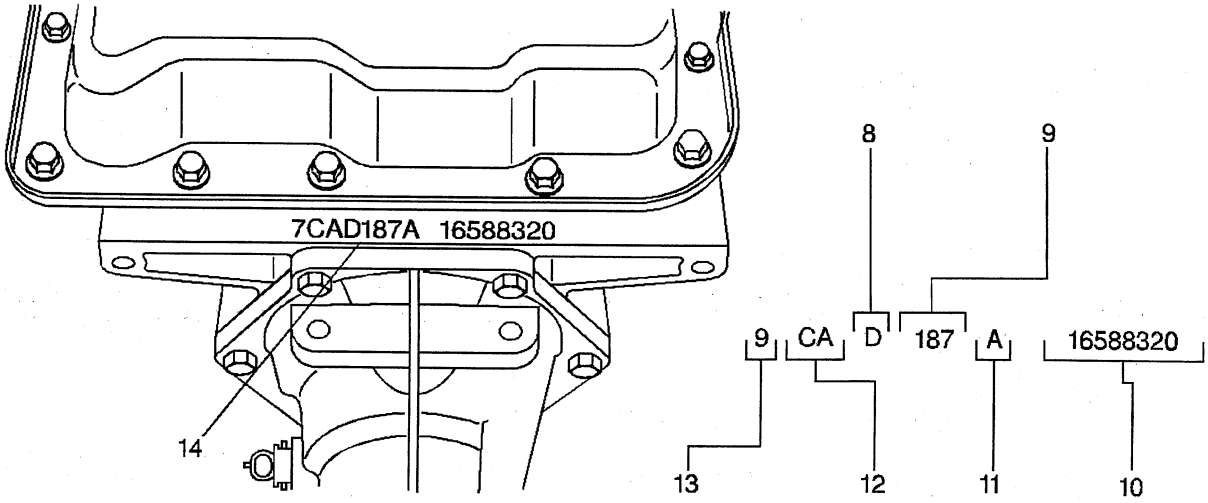


1. Source Code
2. Month of Build
3. Date of Build
4. Broadcast Code

Transmission ID and VIN Derivative Location

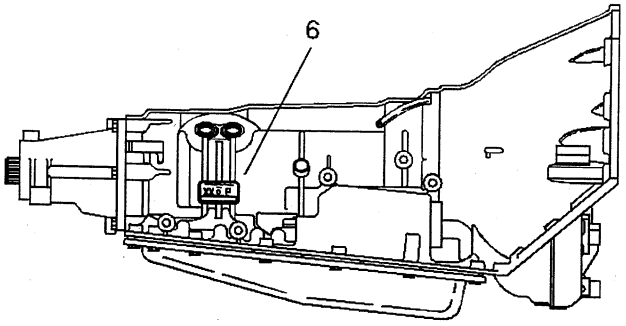
4L60-E Transmission ID Location

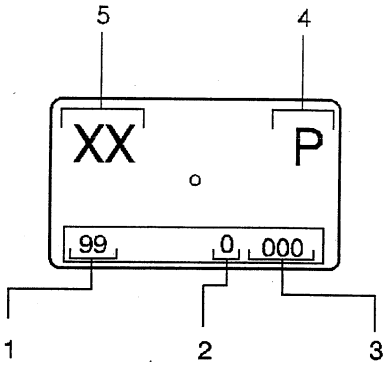




(1) Model Year
(2) Hydra-Matic 4L60-E
(4) Julian Date (or Day of the Year)
(5) Shift Built (A, B, J = First Shift; C, H, W = Second Shift)
(6) Model
(7) Transmission ID Location
(8) Hydra-Matic 4L60-E
(9) Julian Date (or Day of the Year)
(10) Serial No.
(11) Shift Built (A, B, J = First Shift; C, H,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

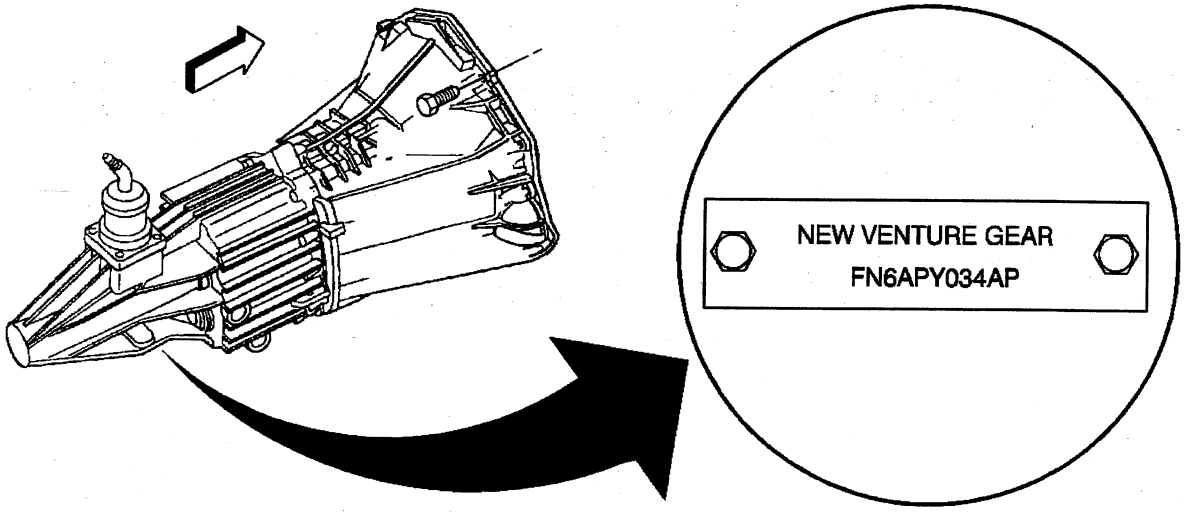
4L80-E Transmission ID Location





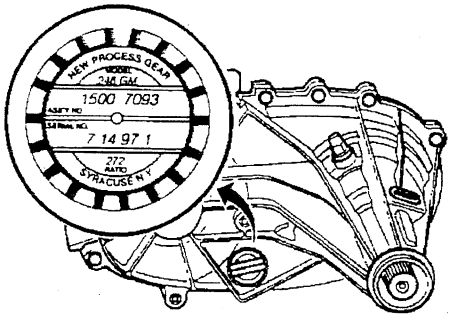
1. Calendar Year
2. Julian Date of the Year
3. Shift and Line Number
4. Plant
5. Model
6. Location on Transmission

Manual Trans-New Venture



The transmission model identification is located on a label or tag on the transmission case. If this label is missing or unreadable, use the service parts identification label in order to identify the vehicle's transmission.

Transfer Case Identification



NV MODEL IDENTIFICATION KEY

246

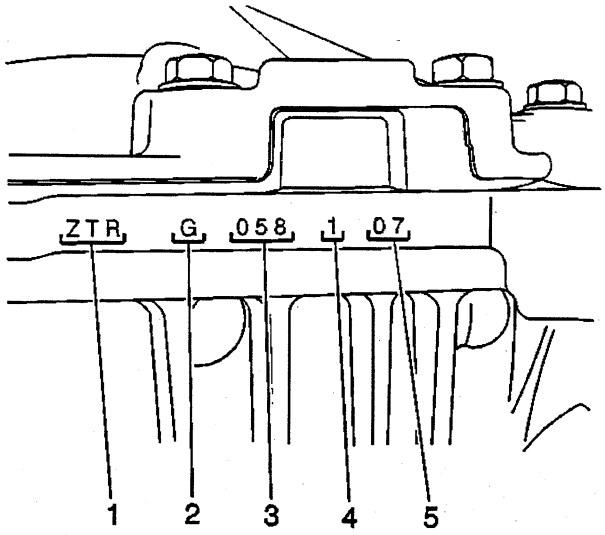
1	Single Speed	3	T – Truck/L – Van	1	Manual
2	2 Speed	4	K – Truck	3	Selectable
				6	Automatic

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

- The transfer case model number
- An assembly number
- A serial number
- The low range reduction ratio

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

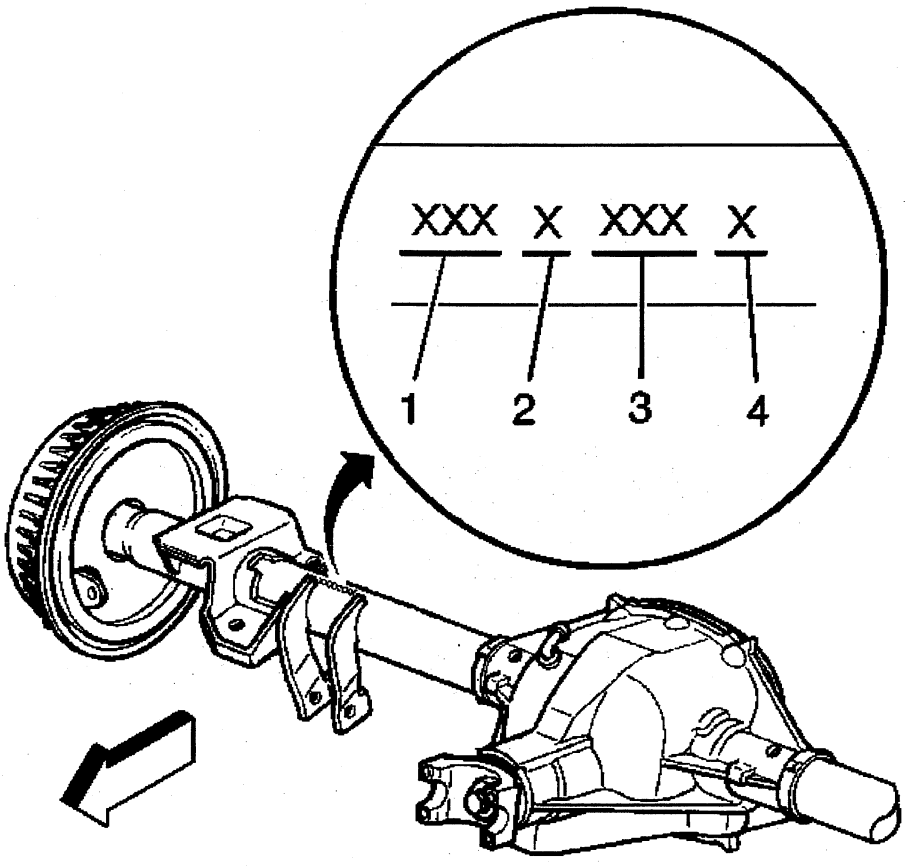
Front axle identification information is stamped on the top of the differential carrier assembly.

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.

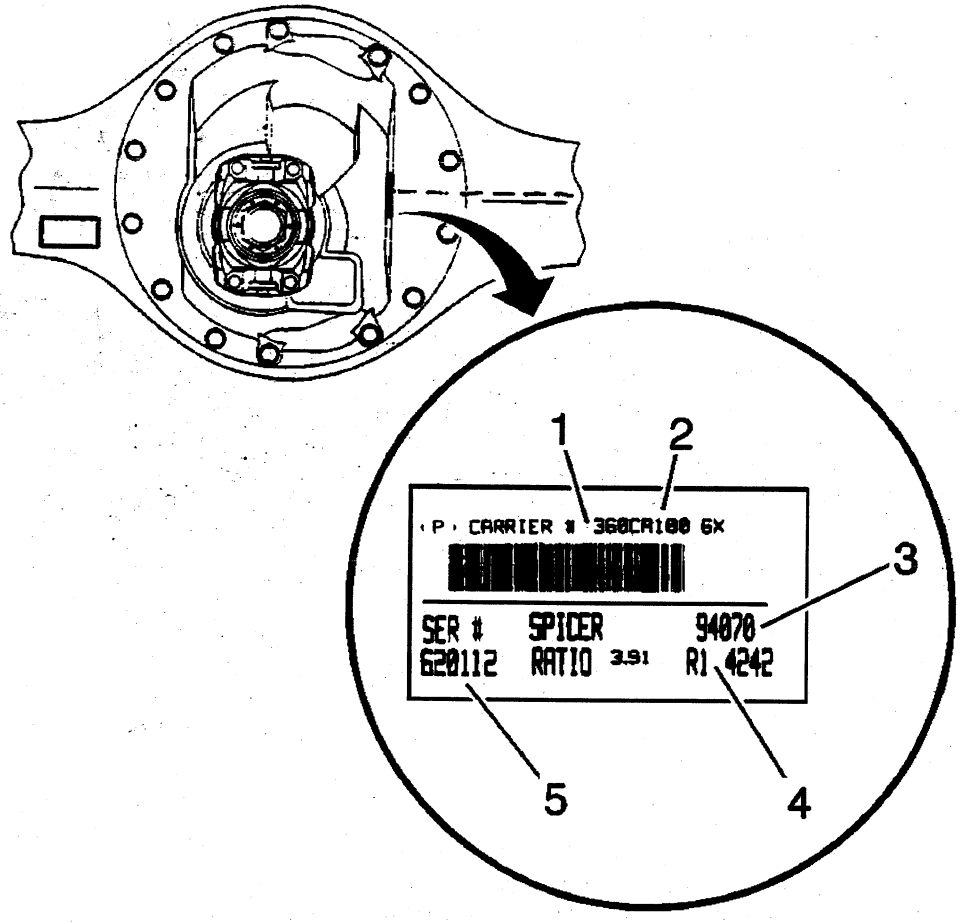
Axle Identification – Rear



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

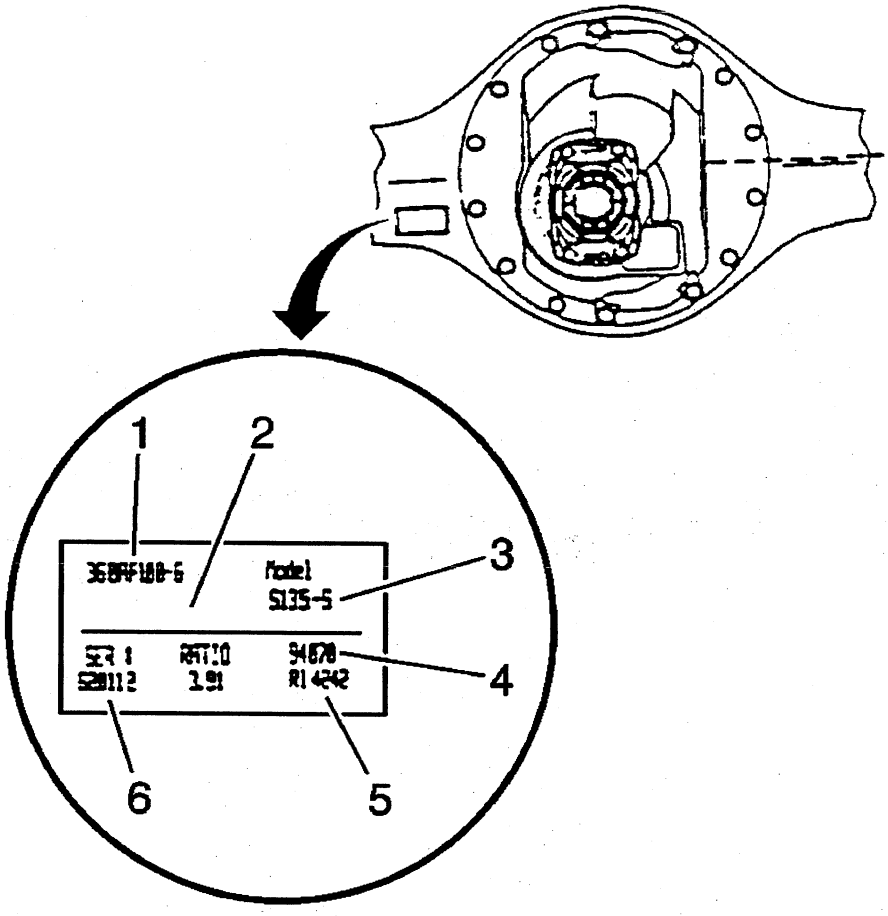
All rear axles are identified by a broadcast code on the right axle tube near the carrier. The rear axle identification and manufacturer's codes must be known before attempting to adjust or to repair axle shafts or the rear axle case assembly. Rear axle ratio, differential type, manufacturer, and build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

Dana/Spicer® Rear Axle Differential Carrier ID(c)



(1) Dana® Part Number
(2) Customer Part Number (Optional)
(3) Julian Date Code
(4) Line Set Number (Optional)
(5) Last Six Digits of Vehicle Serial Number (Optional)

Dana/Spicer® Rear Axle ID(c)



(1) Dana® Part Number
(2) Customer Part Number (Optional)
(3) Model
(4) Julian Date Code
(5) Line Set Number (Optional)
(6) Last Six Digits of Vehicle Serial Number (Optional)

The housing tag is the same type of tag used for the Differential Carrier.

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
AE7	60/40 Front Split Bench Seat, Driver, Passenger Easy Entry
AG2	Adjuster, Front Passenger Seat Power 6-Way (Req. IP2)
AG9	Adjuster Seat Power 6-Way Dr/Pass (GME Req. Y94 - Pont Req. IPC Cloth)
AJ1	Window Tinted Deep, All Except Windshield and Doors (Frt) (Solar Privacy Glass)
AM7	Seat, Rear Folding
APC	Provisions, Front Bucket Seating
APD	Provisions, Front Bench Seating
APR	Sales Incentive, 2500 Work Truck
AS3	Seat, Rear Suburban
ATZ	Seat, Rear Delete
AT5	Seat, Rear Folding, Center
AU0	Lock Control: Remote Entry
AU3	Locks, Power Door
AU6	Electric End Gate Lock Remote Release
A20	Window: Rear Quarter Swing Out
A21	Window: Non Encapsulated Glass
A31	Window: Power
A50	Seat, Front Bucket
A52	Seat, Front Bench
A95	Seat, Front Bucket, High Back, Pass and Driver Reclining
BAG	Parts Package, Export
BG9	Floor Covering, Rubber
BNP	Molding Wheel Opening Delete
BVE	Steps, Running Board
BYP	Sales, Sport Equipment Package
BZY	Liner, Pickup Box
B30	Floor Covering, Carpet
B71	Molding, Wheel Opening Colored
B85	Molding, Body Side, Exterior
B96	Molding, Wheel Opening
CKD	Vehicle Completely Knocked Down
C25	Wiper System, Rear Window
C3F	7700 LBS GVW Rating
C36	Auxiliary Heater
C49	Defogger Rear Window Electric
C5B	15000Lbs. GVW Rating
C51	8050 LBS. GVW Rating
C5M	6100 LBS GVW Rating
C5P	6250 LBS GVW Rating
C5Q	6300 LBS GVW Rating
C5S	6600 LBS. GVW Rating
C5U	6800KBS, GVW Rating
C6A	7300 LBS. GVW Rating
C6E	9400 LBS. GVW Rating
C6P	8600 LBS. GVW Rating

C6U	9000 LBS. GVW Rating
C6W	9200 LBS. GVW Rating
C6Y	9600 LBS. GVW Rating
C60	HVAC System, Front Air Conditiong
C69	HVAC System, Rear Air Conditing
C7A	10000 LBS GVW Rating
C7E	11000 LBS GVW Rating
C7I	6450 LBS GVW Rating
C7L	12000 LBS GVW Rating
DDO	Mirror, Outside, LH and RH, Electric, Heated Electrochromic
DD7	Mirror: I/S, Rearview Light Sensitive, Compass
DE2	Mirror: O/S, LH & RH, Folding, Painted
DF2	Mirror: O/S, LH & RH, Camper Style, Stainless Steel
DF5	Mirror: I/S, Rearview, Electrochromic, Compass and Outside Temperature
DG5	Mirror: O/S LH & RH, Large Stainless Steel
DK6	Console: Roof, Interior
D07	Console: Front Compartment Floor
D44	Mirror: Outside, Painted
D45	Mirror: Outside, Stainless Steel
D48	Mirror: Outside, Remote Control, Electric
D55	Console, Front Compartment, Floor
EF1	Bumper Provisions, Rear, Delete
E24	Door, Rear Side Hinged
E55	Body Equipment End Gate
E63	Body Equipment, Fleetside Pickup Box
FF4	Torsion Bar Spring Adjuster (C)
FF5	Torsion Bar Spring Adjuster (D)
FF6	Torsion Bar Spring Adjuster (E)
FF7	Torsion Bar Spring Adjuster (F)
FF8	Torsion Bar Spring Adjuster (G)
FF9	Torsion Bar Spring Adjuster (H)
FG5	Shock Absorbers: Front & Rear, Gas, Delco/Billstein, 46MM
FK2	Torsion Bar Spring Adjuster (A)
FK3	Torsion Bar Spring Adjuster (B)
F44	Chassis, Heavy Duty
F51	Shock Absorbers, Front and Rear, Heavy Duty
F60	Spring, Front, Heavy Duty
F61	Stabilizer Shaft: Rear
GK9	Rear Axle: 4.63 Ratio
GTY	Axle Wide Track
GT4	Rear Axle: 3.73 Ratio
GT5	Rear Axle: 4.10 Ratio
GU4	Rear Axle: 3.08 Ratio
GU6	Rear Axle: 3.42 Ratio
G80	Rear Axle: Positraction
HC4	Rear Axle: 4.56 Ratio
HC7	Rear Axle: 5.13 Ratio
JB5	Brake System: Power, Front Disc, Rear Drum, 6400 LBS
JB6	Brake System: Power, Front Disc, Rear Drum, 7200 LBS
JB7	Brake System: Power, Front Disc, Rear Drum, 8400 LBS
JB8	Brake System: Power, Front Disc, Rear Drum, 10000 LBS
JD5	Brake System: Dual Power, Front Disc, Rear Drum, 6400 LBS

JD6	Brake System: Hydraulic Power, Front Disc, Rear Drum, 7200 LBS
JD7	Brake System: Hydraulic Power, Front Disc, Rear Drum, 8400 LBS
JF9	Brake System: Hydraulic Power, Four Wheel Disc
KA1	Heated Seats, DR/PS, High Back Buckets w/Leather
KC4	Cooling System, Engine Oil
KFU	Consumers Energy Fleet Incentive
KG9	Generator, 140 Amp
KL5	Modification Engine, Natural Gas
KL6	Provisions, Natural Gas
KNP	Transmission, Heavy Duty Cooling System
KW2	Generator, 124 Amp
KXB	Dual Generator, 100 Amp
K02	Fan: Radiator Booster
K05	Heater: Engine Block
K19	Electric Air Injection System
K34	Cruise Control: Automatic, Electronic
K47	Air Cleaner, High Capacity
K53	Robust Fuel System Fuel Sensor
K60	Generator: 100 Ampere
K68	Generator: 105 Ampere
L29	Engine: 7.4 Liter V8, MFI
L31	Engine: 5.7 Liter V8, CPI
L56	Engine Diesel: 6.5 Liter V8, Turbo
L65	Engine Diesel: 6.5 Liter V8, Turbo
MT1	Transmission: 4L80-E, 4-Speed Automatic, Electronic
MW3	Transmission: Manual 5-Speed, New Venture Gear
M30	Transmission: 4L60-E, 4-Speed Automatic, Electronic
NA1	Emission System: GVW Less than 8500 LBS
NA4	Emission System: GVW Above 8500 LBS
NB6	Emission System: California, Tier 1
NC1	Emission System:California, LEV
NF2	Emission System: Federal, Tier 1
NM8	Leaded Fuel System Compatible
NN8	Emission Override Unleaded Fuel, Export
NP1	Transfer Case, Electronic Shift, Two Speed
NP8	Two Speed Case Pushbutton Control
NP5	Steering Wheel: Leather Wrapped
NQZ	Fuel Tank, Auxiliary, Rear Mounted, 18 Gallon, Delete
NRQ	Exhaust Close Coupled
NY1	Shield, Fuel Tank
NZZ	Sales Package, Skid Plate, Off Road Sport
N33	Steering Column: Tilt Type
N83	Wheel: 15 x 7, Chrome Styled
N90	Wheel: 15 x 7, Aluminum Cast, 4.75 Inch Bolt Circle
PAC	Police Conversion Sales Package (Base)
POD	Police Conversion Sales Package (Uplevel)
PC5	Wheel, 15 x 7, Steel Styled
PF4	Wheel, 16 x 7, Aluminum Cast
PO6	Wheel, Trim Discs
PX2	Chrome Style Aluminum Wheel
QBN	Tire: All, LT245/75R16/C BW R/PE ST TBL OOR
QBX	Tire: All, LT245/75R16/C WOL R/PE ST TBL OOR

QFL	Tire: All, P235/75R15 BW R/PE ST TL ALS 105S
QFN	Tire: All, P235/75R15 WL R/PE ST TL ALS 105S
QGA	Tire: All, P245/75R16 BW R/PE ST TL ALS 109S
QGB	Tire: All, P245/75/R16 WOL R/PE ST TL ALS 109S
QGC	Tire: All, P265/75/R16 BW R/PE ST TL ALS 114S
QGD	Tire: All, P265/75/R16 WOL R/PE ST TL ALS 114S
QHA	Tire: All, P235/75/R15/X BW R/PE ST TL ALS
QHM	Tire: All, P235/75R15 WOL R/PE ST TL ALS 108S (X Load)
QIW	Tire: All, P245/75/R16 BL R/PE ST TL OOR
QIZ	Tire: All, P245/75/R16 BL R/PE ST TL ALS
QMJ	Tire: All, P265/70R16 BW R/PE ST TL AL2 111S
Q2G	Tire: All, P23570R15 BW R/PE ST TL AL3 102V
Q4B	GVW RATING 6200 LBS
RHD	Right Hand Drive
R04	Wheel, Single Rear
R05	Wheel, Dual Rear
R4J	All Goodrich Tire Brand
R4Y	All Goodyear Tire Brand
TGK	Color Combination Solid, Special Paint
TGL	Color Combination Two Tone, Special Paint
TP2	Battery Auxiliary, Camper
TP3	Dual 600 CCA Battery
TL1	Grille: Special
TR2	Unique Export
T17	Tire Brand All (Firestone)
T2H	Ornamentation Extr, Export Unique Requirements
T62	Lighting, Daytime Running, Delete
T85	Headlamps: LH Rule of Road, E Mark
UC2	Speedometer: Instrument, Kilometers & Miles, Kilometer Odometer, Positive Bias
UD4	Alarm: Vehicle Speed, 120 K/H
UG1	Homelink™ 3-Channel Transmitter
UK1	Radio, Frequencies, Japanese
ULO	Radio: AM/FM Stereo, Seek/Scan, Auto Reverse Cassette, Music Search
UL2	Radio, Frequencies, European
UL5	Radio: Delete
UM6	Radio: AM/FM Stereo, Seek/Scan, Auto Reverse Cassette, Clock, ETR
UM7	Radio: AM/FM Stero, Seek/Scan, Clock, ETR
UN0	Radio: AM/FM Stereo, Seek/Scan, Compact Disc, Auto Tone
UP0	Radio: AM/FM Stereo, Seek/Scan, Auto Reverse, Music Search, Cassette, Compact Disc Player, Auto Tone
UQ3	Speaker System Performance Enhanced Radio
UQ5	Speaker System 4, Dual Front Door Mounted, Dual Extended Range, Quarter Mounted
UV8	Mobile Telephone Provisions
UW3	Radio: AM/FM Stereo, Seek/Scan, Auto Reverse, Music Search
UY1	Wiring Provisions, Camper
U01	Roof Marker Lamp, Five
U1Z	Passenger Compartment Multiple Compact Disc Player
U19	Speedometer Inst. Kilo and Miles
VB3	Bumper, Rear Step, Chrome, Impact Strip
VC0	Vehicle Label, Noise Control Information
VGC	Paint Etch Protector Film
VG3	Bumper, Front Impact Strip

VK3	License Plate, Front Mounting Package
VK5	Seat: Temporary, For Shipping
VPH	Vehicle Preparation Overseas Delivery
VP6	Noise Control
VR4	Trailer Hitch: Weight Distributing Platform
VR6	Hook: Tie Down
VWX	Base Vehicle Grille
VYU	Provisiions, Snow Plow Prep
VXS	Vehicle Complete
VXT	Vehicle Incomplete
V10	Provisions: Cold Climate
V22	Grille Chrome, Radiator
V27	Guards, Front Bumper
V43	Bumper, Rear Step, Painted
V54	Luggage Carrier, Roof, Painted
V60	Vehicle Statement Gulf States Organization, Incomplete Vehicle
V73	Vehicle Statement US/Canada
V76	Tow Hook
V78	Vehicle Statement Delete
V87	Vehicle Statement Gulf States Organization
W99	Equipment Misc Equip For Venez
XBN	Tire: Front, LT245/75/R16/C BL R/PE ST TBL OOR
XBX	Tire: Front, LT245/75/R16/C WOL R/PE ST TBL OOR
XFL	Tire: Front, P235/75/R15 ST TL ALS B/W
XFN	Tire: Front, P235/75/R15/N WL R/PE ST TL ALS 105S
XGA	Tire: Front, P245/75/R16 BW R/PE ST TL AT 109S
XGB	Tire: Front, P245/75/R16 WOL R/PE ST TL AT 109S
XGC	Tire: Front, P265/75/R16 BW R/PE ST TL AT 114S
XGD	Tire: Front, P265/75/R16 WOL R/PE ST TL AT 114S
XGK	Tire: Front, LT245/75/R16 BL R/PE ST OOR
XHA	Tire: Front, P235/75/R15X BL R/PE ST TL ALS
XHH	Tire: Front, LT245/75/R16E BL R/PE ST ALS
XHM	Tire: Front, P235/75/R15 WOL R/PE ST TL ALS 108S (X/LOAD)
XHP	Tire: Front, LT225/75/R16D BL R/PE ST TL ALS
XHR	Tire: Front, LT225/75/R16D BL R/PE ST TL OOR
XMJ	Tire: Front, P265/70R16 BW R/PE ST TL AL2 111S
XQG	Tire: Front, P235/70R15 BW R/PE ST TL AL3 102V
XTN	Tire: Front, 225/70R9.5F BW R/ST ST TL TWY
XYK	Tire: Front, LT215/85R16D BL R/PE ST TL OOR
XYL	Tire: Front, LT215/85R16D BL R/PE ST TL HWY
X78	Colombia Equipment
X88	Conversion Name Plate - CHEVROLET
YBN	Tire: Rear, LT245/75R16C BL R/PE ST TBL OOR
YBX	Tire: Rear, LT245/75R16C WOL R/PE ST TBL OOR
YE9	Convenience Package Comfort and Decor Level #3
YFL	Tire: Rear, P235/75R15 BW R/PE ST TL ALS
YFN	Tire: Rear, P235/75R15N RWL R/PE ST TL ALS 105S
YF2	Sales Package, Ambulance Upfitter
YF7	Sales Package, Recreational Vehicle Upfitter
YGA	Tire: Rear, P245/75R16 BW R/PE ST TL AT 109S
YGB	Tire: Rear, P245/75R16 WOL R/PE ST TL AT 109S
YGC	Tire: Rear, p265/75R16 BW R/PE ST TL AT 114S

YGD	Tire: Rear, P265/75R16 WOL R/PE ST TL AT 114S
YG6	HVAC System Air Conditioning
YGK	Tire: Rear, P245/75R16E BL R/PE ST OOR (9591214)
YHA	Tire: Rear, P235/75R15X BL R/PE ST TL ALS
YHH	Tire: Rear, P245/75R16E BL R/PE ST ALS
YHM	Tire: Rear, P235/75R15 WOL R/PE ST TL ALS 108S (X/LOAD)
YHP	Tire: Rear, LT225/75R16D BL R/PE ST TL ALS
YQG	Tire: Rear, p235/70R15 BW R/PE ST TL AL3 102V
YTN	Tire: Rear, LT225/70R19.5 BW R/ST ST TL HWY
YMJ	Tire: Rear, LT215/85R16D BL R/PE ST TL HWY
YYL	Tire: Rear, LT215/85R16D BL R/PE ST TL OOR
Y91	Sales Package Luxury (GMT 425)
YG6	Conversion Name PLT Holden
ZBN	Tire: Spare LT245/75R16C BL R/PE ST TBLE OOR
ZBX	Tire: Spare LT245/75R16C WOL R/PE ST TBLE OOR
ZFL	Tire: Spare P235/75R15 BW R/PE ST TL ALS 105S
ZFN	Tire: Spare P235/75R15N RWL R/PE ST TL ALS 105S
ZGA	Tire: Spare P245/75R16 BW R/PE ST TL ALS 109S
ZGB	Tire: Spare P245/75R16 WOL R/PE ST TL AT 109S
ZGC	Tire: Spare P265/75R16 BW R/PE ST TL AT 114S
ZGD	Tire: Spare P265/75R16 WOL R/PE ST TL AT 114S
ZGK	Tire: Spare LT245/75R16E BL R/PE ST OOR
ZHA	Tire: Spare P235/75R15X BW R/PE ST TL ALS
ZHH	Tire: Spare LT245/75R16E BL R/PE ST ALS
ZHM	Tire: Spare P235/75R14 WOL R/PE ST TL ALS 108S (X/LOAD)
ZHP	Tire: Spare LT225/75R16D BL R/PE ST TL ALS
ZHR	Tire: Spare LT225/75R16D BL R/PE ST TL OOR
ZK3	99 Pull-Ahead Design
ZMJ	Tire: Spare P265/70R16 BW R/PE ST TL AL2 111S
ZM9	Sales Package Comfort and Convenience (Utility/Suburban Feature Package)
ZN1	Export Sales Package
ZP6	Sales Package Combination, Rear Window Wiper/Rear Window Defogger
ZQG	Tire: Spare P235/70R15 BW R/PE ST TL AL3 102A
ZTN	Tire: Spare LT225/70R19.5F BW R/ST ST TL HWY
ZW9	Body Equipment, Base Body or Chassis Cab
ZYK	Tire: Spare LT215/85R16D BL R/PE ST TL HWY
ZYL	Tire: Spare LT21585R16D BL R/PE ST TL OOR
ZY1	Color Combination, Solid
ZY2	Color Combination, Two Tone
ZY4	Color Combination, Deluxe Two Tone
Z49	Export, Canadian Modified Mandatory Base Equipment
Z5X	Mirror Provisions - Arabic Lanuage
Z56	Police Conversion Chassis Package
Z71	Chassis Package/Off-Road
Z81	Camper Special
Z82	Trailer Provisions Special Equipment, Heavy Duty
Z88	Conversion Name Plate, GMC TRUCK
01L	Exterior Color Secondary, Special
01U	Exterior Color Primary, Special
1M1	Marking U.S. Army Reflective White
1M3	Marking U.S Navy Reflective White
11L	Secondary Color Exterior, Pewter Metallic

11U	Primary Color Exterior, Pewter Metallic
12U	Primary Color Exterior, Linen White
13C	Trim Combination Colth, Light Gray
13D	Trim Combination Cloth, Light Gray
13I	Interior Color, Light Gray
13V	Trim Combination Vinyl, Light Gray
132	Trim Combination Leather, Light Gray
14L	Secondary Color, Exterior, Storm Gray Metallic
14U	Primary Color Exterior, Storm Gray Metallic
17U	Primary Color Exterior, Silvermist Metallic
18U	Primary Color Exterior, Dark Green Gray Metallic
19U	Primary Color Exterior, Lamp Balck
23U	Primary Color Exterior, Ocean Blue
24L	Secondary Color Exterior, Opal Bule
24U	Primary Color Exterior, Opal Blue
24U	Primary Color Exterior, Medium Blue Metallic
25L	Secondary Color Exterior, Bright Blue Metallic
26B	Trim Combination Cloth, Navy
26C	Trim Combination Cloth, Navy
26D	Trim Combination Cloth, Navy
26I	Interior Trim, Navy
26V	Trim Combination Vinyl, Navy
262	TrimCombination Leather, Navy
29U	Primary Color Exterior, Dark Blue
3EC	Tire Rear, LT215/85R16E BL R/ST TL HWY
3ED	Tire Rear, LT215/85R16E BL R/ST ST TL ALS
34U	Primary Color Exterior, Medium Blue Metallic
35L	Secondary Color Exterior, Laguna Green
39L	Secondary Color Exterior, Indigo Blue Metallic
39U	Primary Color Exterior, Indigo Blue Metallic
4BL	Tire Spare, LT265/75PR16D RWL R/PE ST TL AT
4EC	Tire Spare, LT215/85R16E BL R/ST ST TL HWY
4ED	Tire Spare, LT215/85R16E BL R/ST ST TL ALS
41L	Secondary Color Exterior, Black
41U	Primary Color Exterior, Black
43U	Primary Color Exterior, Emerald Green
46U	Primary Color Exterior, Dark Green
50U	Primary Color Exterior, Olympic White
51L	Secondary Color Exterior, Dark Toreador Metallic
51u	Primary Color Exterior Dark Toreador, Metallic
52B	Trim Combination Cloth, Light Neutral
52C	Trim Combination Cloth, Light Neutral
52D	Trim Combination Cloth, Light Neutral
52I	Interior Trim, Light Neutral
52V	Trim Combination Vinyl, Light Neutral
522	Trim Combinatiion Leather, Light Neutral
552	Secondary Color Exterior Light Autumwind Metallic
56A	Stripe Color Accent, Medium Beige/Black
6DC	Compartment Front LH Computer Sel Suspension
6GC	Front LH Computer Sel Supension
6GF	Front LH Computer Sel Supension
6GG	Front LH Computer Sel Supension

6GH	Front LH Computer Sel Supension
6GK	Front LH Computer Sel Supension
6GL	Front LH Computer Sel Supension
6GR	Front LH Computer Sel Supension
6WF	Front LH Computer Sel Supension
6WK	Front LH Computer Sel Supension
6WL	Front LH Computer Sel Supension
6WN	Front LH Computer Sel Supension
6WP	Front LH Computer Sel Supension
6WS	Front LH Computer Sel Supension
6WW	Front LH Computer Sel Supension
6WZ	Front LH Computer Sel Supension
6XA	Front LH Computer Sel Supension
6XC	Front LH Computer Sel Supension
6XD	Front LH Computer Sel Supension
6XJ	Front LH Computer Sel Supension
6YB	Front LH Computer Sel Supension
6Y4	Spare Wheel and Tire Delee
6OL	Secondary Color Exterior
6OU	Primary Color Exterior Gold Metallic
61U	Primary Color Exterior, Tan
65L	Secondary Color Exterior, Smokey Camel Metallic
65U	Primary Color Exterior, Smokey Carmel Metallic
68U	Primary Color Exterior, Meadow Green Metallic
69L	Secondary Color Exterior, Copper Metallic
69U	Primary Color Exterior, Copper Metallic
7DC	Front RH Computer Sel Suspension
7GC	Front RH Computer Sel Suspension
7GF	Front RH Computer Sel Suspension
7GG	Front RH Computer Sel Suspension
7GH	Front RH Computer Sel Suspension
7GK	Front RH Computer Sel Suspension
7GL	Front RH Computer Sel Suspension
7WF	Front RH Computer Sel Suspension
7WK	Front RH Computer Sel Suspension
7WL	Front RH Computer Sel Suspension
7WN	Front RH Computer Sel Suspension
7WP	Front RH Computer Sel Suspension
7WS	Front RH Computer Sel Suspension
7WT	Front RH Computer Sel Suspension
7WN	Front RH Computer Sel Suspension
7WX	Front RH Computer Sel Suspension
7WZ	Front RH Computer Sel Suspension
7XA	Front RH Computer Sel Suspension
7XC	Front RH Computer Sel Suspension
7XD	Front RH Computer Sel Suspension
7XJ	Front RH Computer Sel Suspension
7YB	Front RH Computer Sel Suspension
71U	Primary Color Exterior, Red Orange
72U	Primary Color Exterior, Standard Red
74L	Secondary Color Exterior, Victory Red
74U	Primary Color Exterior, Victor Red

79C	Trim Combination Cloth, Ruby Red
79D	Trim Combination Cloth, Ruby Red
79I	Interior Trim, Ruby Red
79V	Trim Combination Vinyl, Ruby Red
792	Trim Combination Leather, Ruby Red
81A	Stripe Color Accent, Two Tone, Gunmetal/Light Pewter
82A	Stripe Color Accent, Light Silver/Dark Green
90U	Primary Color Exterior, Gray Metallic
91L	Secondary Color Exterior, Dark Argent
94A	Stripe Color Accent, Two Tone, Medium Gold/Dark Gold
95A	Stripe Color Accent, Two Tone, Light Pewter/Gunmetal

Technical Information

Maintenance and Lubrication

Capacities - Approximate Fluid

Application	Specification	
	Metric	English
Engine Cooling System		
• 5.7L (VIN R) With Air Conditioning	19.0 litres	20.0 quarts
• 5.7L (VIN R) Without Air Conditioning	16.6 litres	17.5 quarts
• 5.7L (VIN R) With Air Conditioning - C 3500 HD	25.5 litres	27.0 quarts
• 5.7L (VIN R) Without Air Conditioning - C 3500 HD	25.0 litres	26.5 quarts
• 6.5L (VIN F and S) With Air Conditioning	26.0 litres	27.5 quarts
• 6.5L (VIN F and S) Without Air Conditioning	26.0 litres	27.5 quarts
• 7.4L (VIN J) With Air Conditioning	26.0 litres	27.5 quarts
• 7.4L (VIN J) Without Air Conditioning	23.5 litres	25.0 quarts
• 7.4L (VIN J) With Air Conditioning - C 3500 HD	27.0 litres	28.5 quarts
• 7.4L (VIN J) Without Air Conditioning - C 3500 HD	25.0 litres	26.5 quarts
Engine Crankcase		
• 5.7L (VIN R) With Filter	4.8 litres	5.0 quarts
• 6.5L (VIN F and S) With Filter	7.6 litres	8.0 quarts
• 7.4L (VIN J) With Filter	6.5 litres	7.0 quarts
Fuel Tank		
• Short Bed Models	98.0 litres	25.4 gallons
• Long Bed Models	128.0 litres	33.8 gallons
• Crew Cab Models	128.0 litres	33.8 gallons
• Chassis-Cab Models (Standard Side Tank)	87.0 litres	23.0 gallons
• Chassis-Cab Models (Optional Rear Tank)	68.0 litres	18.0 gallons
• C 3500 HD (Standard Side Tank)	87.0 litres	23.0 gallons
• C 3500 HD (Optional Rear Tank)	68.0 litres	18.0 gallons
• Two-Door Utility	113.0 litres	30.0 gallons
• Four-Door Utility	113.0 litres	30.0 gallons
• Suburban	166.6 litres	44.0 gallons
• Diesel	159.0 litres	42.0 gallons
Transmission		
• 4L60-E	4.7 litres	5.0 quarts
• After Complete Overhaul	10.6 litres	11.2 quarts
• 4L80-E	7.3 litres	7.7 quarts
• After Complete Overhaul	12.8 litres	13.5 quarts
• New Venture Gear 3500 Manual Transmission	2.0 litres	2.1 quarts
• New Venture Gear 4500 Manual Transmission	3.78 litres	4.0 quarts
Transfer Case		
• New Venture 241	2.1 litres	2.2 quarts
• New Venture 243	2.1 litres	2.2 quarts
• New Venture 246	1.9 litres	2.0 quarts
• Borg Warner 4401	1.5 litres	1.6 quarts
• Borg Warner 4470	1.5 litres	1.6 quarts

Maintenance Items

Usage	Type
Air Cleaner	
• 5.7L (VIN R)	AC Type A1300C/ A1301C(HD)
• 6.5L (VIN F and S)	AC Type A1300C/ A1306C/A1301C (HD)
• 7.4L (VIN J)	AC Type A1300C
Engine Oil Filter	
• 5.7L (VIN R) RWD	AC Type PF-1218
• 5.7L (VIN R) S4WD	AC Type PF-52
• 6.5L (VIN F and S) RWD AND S4WD	AC Type PF-1218
• 7.4L (VIN J) RWD AND S4WD	AC Type PF-1218
Spark Plugs and Gaps	
• 5.7L (VIN R)	AC Type 41-932 (GAP 1.52 mm, 0.060 in)
• 7.4L (VIN J)	AC Type 41-932 (GAP 1.52 mm, 0.060 in)
Fuel Filter	
• 5.7L (VIN R)	AC Type TP-1006
• 7.4L (VIN J)	AC Type GF-626

Fluid and Lubricant Recommendations

Usage	Fluid/Lubricant
Engine Oil (Gasoline Engine)	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, refer to Engine Oil Viscosity in Explanation of Scheduled Services.
Engine Oil (Diesel Engine)	Engine Oil with the letters CG-4 designation may appear either alone, or in combination with other API designations, such as API CG-4/SH, CG-4/SJ, SH/CG-4, or SJ/CG-4. These letters show American Petroleum Institute (API) levels of quality. To determine the preferred viscosity for your vehicle's diesel engine.
Engine Coolant	50/50 mixture of clean, drinkable water and use only GM Goodwrench® DEX-COOL® or Havoline® DEX-COOL® Coolant.
Hydraulic Brake System	Delco Supreme 11® Brake Fluid (GM Part No. 12377967 or equivalent DOT-3 Brake Fluid).
Windshield Washer Solvent	GM Optikleen® Washer Solvent (GM Part No. 1051515) or equivalent.
Hydraulic Clutch System	Hydraulic Clutch Fluid (GM Part No. 12345347 or equivalent DOT-3 Brake Fluid).
Parking Brake Cable Guides	Chassis Lubricant (GM Part No. 12377985 or equivalent meeting requirements of NLGI#2, Category LB or GC-LB.
Power Steering System	GM Power Steering Fluid (GM Part No. 1052884 - 0.4732 liters (1 pint), 1050017 - 0.9464 liters (1 quart), or equivalent).
Manual Transmission (5-Speed with Low Gear, RPO MW3)	GM Goodwrench Synthetic Manual Transmission Fluid (GM Part No. 12346190 - 0.9464 liters (1 quart) or equivalent SAE 75W-90 GL-4 Gear Oil.
Automatic Transmission	DEXRON®-III Automatic Transmission Fluid
Key Lock Cylinders	Multi-Purpose Lubricant, Superlube® (GM part No. 12346241 or equivalent).
Floor Shift Linkage	Lubriplate® Lubricant Aerosol (GM Part No. 12346293 or equivalent) or lubricant meeting requirements of NLGI #2, Category LB or GC-LB.
Chassis Lubrication	Chassis Lubricant (GM Part No. 12377985 or equivalent) or Lubricant meeting requirements of NLGI No. 2, Category LB or GC-LB.
Front Wheel Bearings (RWD)	Wheel Bearing Lubricant meeting requirements of NLGI #2, Category GC or GC-LB (GM Part No. 105344 or equivalent).
Front Axle (Standard Differential)	Lubricant (GM Part No. 1052271, or equivalent).
Rear Axle (Standard Differential)	SAE 75W-90 Synthetic Axle Lubricant, GM Part No. 12378261 (in Canada use Part No. 10953455) or equivalent meeting GM Specification 9986115.
Rear Axle (Locking Differential)	SAE 80W-90 Axle Lubricant; use only GM Part No. 1052271. Do not add friction modifier.
Rear Axle (Locking Differential) (Diesel Engine)	Axle Lubricant; use only GM Part No. 1052271. Do not add friction modifier.
Differential, C3 (HD3500) Trucks With Dana Rear Axle	SAE 75W-140 Synthetic Axle Lubricant (GM Part No. 12346140) or equivalent.
Manual Transfer Case	DEXRON®-III Automatic Transmission Fluid.
Automatic Transfer Case	Automatic Transfer Case Fluid (GM Part No. 12378396).
Front Axle Propshaft Spline, Rear Driveline Center Splines and Universal Joints	Chassis Lubricant (GM Part No. 12377985 or equivalent) or lubricant meeting requirements of NLGI #2, Category LB or GC-LB.
One-Piece Propshaft Spline (Two-Wheel Drive with Auto. Trans)	Spline Lubricant, Special Lubricant (GM Part No. 12345879) or lubricant meeting requirements of GM 9985830.
Hood Latch Assembly, Secondary	Lubriplate® Lubricant Aerosol (GM Part No. 12346293 or equivalent)

Latch, Pivots, Spring Anchor and Release Pawl.	or lubricant meeting requirements of NLGI #2, Category LB or GC-LB.
Hood and Door Hinges	Multi-Purpose Lubricant, Superlube® (GM Part No. 12346241 or equivalent).
Body Door Hinge Pins, Tailgate Hinge and Linkage Folding Seat and Fuel Door Hinge	Multi-Purpose Lubricant Superlube® (GM Part No. 12346241 or equivalent).
Tailgate Handle Pivot Points, Hinges, Latch Bolt and Linkage	Multi-Purpose Lubricant Superlube® (GM Part No. 12346241 or equivalent).
Weatherstrip Conditioning	Dielectric Silicone Grease (GM Part No. 12346241 or equivalent).
Weatherstrip Squeaks	Synthetic Grease with teflon, Superlube® (GM Part No. 12371287 or equivalent).

Tire and Wheel Runout Specifications

Application	Specification	
	Metric	English
Aluminum Wheel		
Lateral	0.762 mm	0.030 in
Radial	0.762 mm	0.030 in
Steel Wheel		
Lateral	1.143 mm	0.045 in
Radial	1.015 mm	0.040 in
Tire and Wheel Assembly (Radial and Lateral)		
Off-Vehicle	1.27 mm	0.05 in
On-Vehicle	1.52 mm	0.06 in
Wheel Stud	0.25 mm	0.01 in
Wheel Hub	0.130 mm	0.005 in

Propeller Shaft Runout Specifications

Full-Size Pick-Up Truck								
Propshaft	Front Runout		Center Runout		Rear Runout		Stub Shaft Runout	
One-Piece	0.61 mm	0.024 in	0.61 mm	0.024 in	0.61 mm	0.024 in	--	--
Aluminum Graphite	0.61 mm	0.024 in	--	--	0.61 mm	0.024 in	--	--
Two-Piece Front Slip Yoke	0.04 mm	0.002 in	.25 mm	0.010 in	--	--	0.08 mm*	0.003 in*
Two-Piece Rear	0.40 mm	0.016 in	0.25 mm	0.010 in	0.40 mm	0.016 in	--	--
Three-Piece	0.61 mm	0.024 in	0.61 mm	0.024 in	0.61 mm	0.024 in	0.08 mm	0.003 in

* This measurement must be taken on the ground surface near the spline with the rear propeller shaft removed.

Descriptions and Operations

Power Steering System Description and Operation

The hydraulic power steering system consists of the following components:

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

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

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

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

The smaller opening contains the following components:

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

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

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

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

Steering Linkage Description and Operation

The steering linkage consists of a Pitman arm, idler arm, relay rod and two adjustable tie rods. On some S4WD vehicles, the steering shock absorber attaches to the relay rod.

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

The C3500HD steering linkage consists of the Pitman arm, the tie rod assembly, and the adjustable drag link.

In the heavy duty series, when you turn the wheel, the gear rotates the Pitman arm. The Pitman arm forces the adjustable drag link to one side. The tie rod moves sideways, activating the steering knuckles and turning the wheels.

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

Steering Wheel and Column - Standard Description and Operation

The steering wheel and column has 4 primary functions:

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

Vehicle Steering

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

Vehicle Security

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

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

Driver Convenience

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

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

Driver Safety

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

Variable Effort Steering Description

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

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

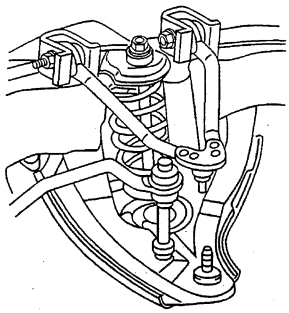
A sensor mounted on the steering column detects the steering wheel movements associated with defensive driving maneuvers. A control module uses this sensor input and the vehicle speed in order to adjust the amount of current to the solenoid.

The EVO system consists of the following components:

- The power steering (PS) solenoid actuator is located on the power steering pump discharged fitting.
- The EVO/Passlock™ module is mounted on the instrument panel carrier, beneath the radio.
- The steering handwheel speed sensor (HWSS) is located in the lower bearing of the steering column.
- The vehicle speed sensor is located on the transmission output shaft or on selectable four wheel drive the transfer case output shaft.
- The powertrain control module (PCM) is located in the engine compartment on the left inner wheel well panel (diesel engines only).
- The vehicle control module (VCM) is located in the engine compartment on the left inner wheel well panel (gasoline engines only).

Suspension Description and Operation

Front Suspension



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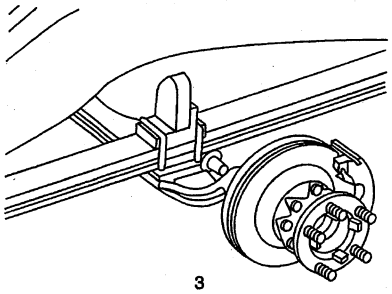

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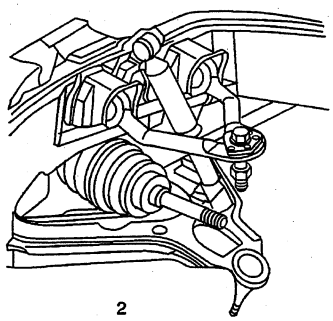


2

(1) C Series (except C3500HD)
(2) K Series
(3) C Series (C3500HD)

The front suspension allows each wheel to compensate for changes in the road surface without affecting the opposite wheel. Each wheel, except C3500HD, independently connects to the frame with a steering knuckle, ball joint assemblies, and upper and lower control arms.

Two tie rods connect to steering arms on the knuckles and to a relay rod. These operate the front wheels.

Two-wheel drive C Series models (1), except C3500HD, have coil chassis springs. These springs are mounted between the spring housings on the frame and the lower control arms. Shock absorbers mount inside the coil springs. The coil springs attach to the lower control arms with bolts and nuts.

The upper part of each shock absorber extends through a frame bracket. Two grommets, two grommet retainers, and a nut secure the upper part of the shock to the frame.

A spring steel stabilizer shaft controls the side roll of the front suspension on some models. This shaft is mounted in rubber bushings that are held by brackets to the frame side rails. The ends of the stabilizer shaft connect to the lower control arms with link bolts. Rubber grommets isolate these link bolts.

A ball joint assembly is riveted to the outer end of the upper control arm. A castellated nut and a cotter pin join the steering knuckle to the upper ball joint.

The inner ends of the lower control arm have pressed-in bushings. The bolts pass through the bushings and join the arm to the frame. The lower ball joint assembly is a press fit in the lower control arm and attaches to the steering knuckle with a castellated nut and a cotter pin.

Ball socket assemblies have rubber grease seals. These seals prevent entry of moisture and dirt, preventing damage to the bearing surfaces. And, all ball joints have grease fittings for routine maintenance.

Four-wheel drive (2) K Series models have a front suspension that consists of the following components:

- Control arms
- Stabilizer shaft
- Shock absorber
- Torsion bar (right and left side)

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

K Series models have sealed front wheel bearings. These bearings are pre-adjusted and need no lubrication. Heat treatment may create darkened areas on the bearing assembly. This discoloration does not signal a need for replacement.

A heavy-duty front suspension (3) is standard on the C3500HD model. This suspension is centered around a solid I-beam axle that includes taper leaf springs, shock absorbers, and a stabilizer shaft.

Rear Suspension

All of the C/K series vehicles use a leaf spring and a solid rear axle suspension system. The rear axle assembly is attached to the multi-leaf springs by the U-bolts. The front ends of the springs are attached to the frame at the front hangers through the rubber bushings. The rear ends of the springs are attached to the frame with the shackles that allow the springs to change their length while the vehicle is in motion.

The ride control is provided by two identical direct double-acting shock absorbers angle-mounted between the frame and the brackets attached to the axle tubes.

Wheels and Tires

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Hoist to Crossmember Nuts (All Pickup Models)	25 N·m	18 lb ft
Hoist to Wheel Carrier Nuts (4 Door Utility Models)	47 N·m	35 lb ft
Support Bolts (Suburban Models)	5 N·m	44 lb in
Support Bolts (2 Door Utility Models)	44 N·m	32 lb ft
Wheel Nut Stud (C1) (5 Studs)	170 N·m	125 lb ft
Wheel Nut Stud (CK1, 2) (6 Studs)	170 N·m	125 lb ft
Wheel Nut Stud (CK2, 3) (Single Wheel) (8 Studs)	170 N·m	125 lb ft
Wheel Nut Stud (CK3) (Dual Wheel) (8 Studs)	170 N·m	125 lb ft
Wheel Nut Stud (C3500HD) (Dual Wheel) (10 Studs)	220 N·m	162 lb ft

General Description

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

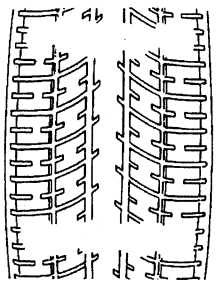
The following factors have an important influence on tire life:

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

The following factors increase tire wear:

- Heavy cornering
- Excessively rapid acceleration
- Heavy braking

Tread Wear Indicators Description



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

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

Metric Wheel Nuts and Bolts Description

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

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

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

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

Tire Inflation Description

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

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

Inspect the tire pressure when the following conditions apply:

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

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

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

Inflation Pressure Conversion (Kilopascals to PSI)

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

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

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

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

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

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

- Uneven braking
- Steering lead
- Reduced vehicle handling

Tire Description

Caution

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

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

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

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

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

The following is required of replacement tires:

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

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

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

Conditions for Tire Replacement

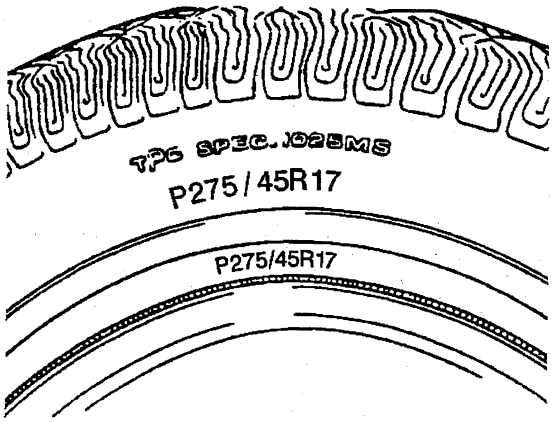
Replace the tires when one and/or all of the following conditions are evident:

- When the tire(s) is worn to a point where 1.6 mm (2/32 in) or less of tread remains. The tires have built in tread wear indicators that appear between the tread grooves when the tread is worn to 1.6 mm (2/32 in) or less to help in the detection of this condition. Replace the tire when the indicators appear in two or more adjacent grooves at three spots around the tire.

- When the following conditions are evident on the tread:
  - When the tread is cracked.
  - When the tread is cut.
  - When the tread is snagged deeply enough to expose the cord.
  - When the tread is snagged deeply enough to expose the fabric.
  - When the sidewall is snagged deeply enough to expose the cord.
  - When the sidewall is snagged deeply enough to expose the fabric.
- When the following conditions are evident on the tire:
  - When the tire has a bump.
  - When the tire has a bulge (protrusion).
  - When the tire is split.
  - Please note that slight sidewall indentations are normal in radial tires.
- When the following damage is evident on the tire and the damage cannot be correctly repaired because of the size or the location of the damage:
  - When the tire has a puncture.
  - When the tire is cut, or other damage.

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

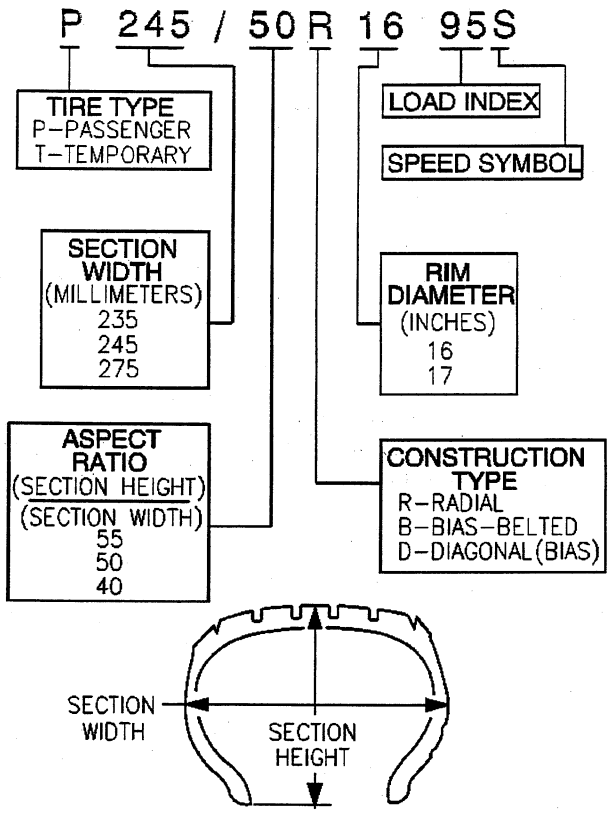
All Seasons Tires Description



Most GM vehicles are equipped with steel belted all-season radial tires as standard equipment. These tires qualify as snow tires, with a higher than average rating for snow traction than the non-all season radial tires previously used. Other performance areas, such as wet traction, rolling resistance, tread life, and air retention, are also improved. This is done by improvements in both tread design and tread compounds. These tires are identified by an M + S molded in the tire side wall after the tire size. The suffix MS is also molded in the tire side wall after the TPC specification number.

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

P-Metric Sized Tires Description



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

Driveline System Description and Operation

Driveline/Axle – Propeller Shaft

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

Two Piece Propeller Shaft Description

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

Three Piece Propeller Shaft Description

There are four universal joints used on the three piece propeller shaft. Two center bearing assemblies are used to support the propeller shaft connection point, and help isolate the vehicle from vibration.

Propeller Shaft Phasing Description

The driveline components in this vehicle have been system balanced at the factory. System balance provides for a smoother running driveline. These components include the propeller shafts, drive axles, pinion shafts and output shafts. Affixed to the rear axle is a system balanced driveline notice indicating that the driveline components have been factory tested. The propeller shaft is designed and built with the yoke lugs/ears in line with each other. This produces the smoothest running shaft possible. A propeller shaft designed with built in yoke lugs in line is known as in -- phase. An out of phase propeller shaft often causes vibration. The propeller shaft generates vibration from speeding up and slowing down each time the universal joint goes around. The vibration is the same as a person snapping a rope and watching the wave reaction flow to the end. An in phase propeller shaft is similar to 2 persons snapping a rope at the same time and watching the waves meet and cancel each other out. A total cancellation of vibration produces a smooth flow of power in the drive line. All splined shaft slip yokes are keyed in order to ensure proper phasing.

Universal Joint Description

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

Center Bearing Description

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

Front Drive Axle Description and Operation

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

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

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

The front axle on Selectable Four Wheel Drive model vehicles uses a central disconnect feature in order to engage and disengage the front axle. When the driver engages the 4WD system, the Transfer Case Control Module sends a signal to the electric motor actuator to energize and extend the plunger inside. The extended plunger moves the clutch fork and clutch fork sleeve across the inner axle shaft and the clutch fork shaft and locks the two shafts together. The locking of the two shafts allows the axle to operate in the same manner as a semi-floating rear axle. A propeller shaft connects the transfer case to the front axle. The differential carrier assembly uses a conventional ring and pinion gear set to transmit the driving force of the engine to the wheels. The open differential allows the wheels to turn at different rates of

speed while the axle continues to transmit the driving force. This prevents tire scuffing when going around corners and premature wear on internal axle parts. The ring and pinion set and the differential are contained within the carrier. The axle identification number is located on top of the differential carrier assembly or on a label on the bottom of the right half of differential carrier assembly. The drive axles are completely flexible assemblies consisting of inner and outer constant velocity CV joints protected by thermoplastic boots and connected by a wheel drive shaft.

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

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

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

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

Rear Drive Axle Description and Operation – 11"

Rear Axle Description

The Dana 11 inch ring gear axle uses a conventional ring and pinion gear set to transmit the driving force of the engine to the rear wheels. The gear set transfers the driving force at a 90 degree angle from the propeller shaft to the axle shafts.

This axle is full-floating. The wheel hubs support the axle shaft at the wheel ends. The shaft at the wheel end is supported and splined to the hub inner-diameter. The differential supports the other splined end of the shaft.

Two tapered roller bearings support the pinion gear. Underneath the inner pinion bearing cup, an oil baffle is installed to promote better lubrication. Also underneath the inner pinion bearing cup, the pinion position shims are located which are use to set the pinion depth. A shim pack at the front of the axle housing between the bearing cone and pinion gear sets the pinion bearing preload.

The ring gear bolts to the differential case.

Two tapered rolling bearings support the differential case. The differential side bearing preload is controlled by a 0.76 mm (0.030 in) hardened shim and a selective outboard spacer shim. The location of the hardened shim is between each differential bearing cone and the differential case. The location of the selective outboard spacer shim is between each differential bearing cup and the housing.

Rear Axle Operation

A basic differential has a set of 4 gears. Two are side gears and 2 are pinion gears. Some differentials have more than 2 pinion gears. Each side gear is splined to an axle shaft; so each axle shaft turns when its side gear rotates.

The pinion gears are mounted on a differential pinion shaft, and the gears are free to rotate on this shaft. The pinion shaft is fitted into a bore in the differential case and is at right angles to the axle shafts.

Power is transmitted through the differential as follows: the drive pinion rotates the ring gear. The gear, being bolted to the differential case, rotates the case. The differential pinion, as it rotates with the case,

forces the pinion gears against the side gears. When both wheels have equal traction, the pinion gears do not rotate on the pinion shaft because the input force on the pinion gear is equally divided between the two side gears. Therefore, the pinion gears revolve with the pinion shaft, but do not rotate around the shaft itself. The side gears, being splined to the axle shafts and in mesh with the pinion gears, rotate the axle shafts.

If a vehicle were always driven in a straight line, the ring and pinion gears would be sufficient. The axle shaft could then be solidly attached to the ring gear and both driving wheels would turn at equal speed.

However, if it became necessary to turn a corner, the tires would scuff and slide because the outside wheel would travel further than the inside wheel. To prevent tire scuffing and sliding, the differential allows the axle shafts to rotate at different speeds.

When the vehicle turns a corner, the inner wheel turns slower than the out wheel and slows its rear axle side gear; as the shaft is splined to the side gear). the rear axle pinion gears will roll around the slowed rear axle side gear, driving the rear axle side gear and wheel faster.

Rear Drive Axle Description and Operation – Other than 11"

Rear axles for this vehicle consist of the following components:

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

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

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

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

Locking/Limited Slip Rear Axle Description and Operation

The locking differential consists of the following components:

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

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

Limited-Slip Function

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

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

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

Locking Function

Locking action occurs through the use of some special parts:

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

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

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

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

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

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

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

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

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

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

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

Locking Differential Torque-Limiting Disc

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

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

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

Transfer Case - BW 4401 & BW 4470 (Two Speed Manual)

The transfer case is used to provide power flow from the transmission to the front axle. The transfer case also provides a way of disconnecting the front axle in order to provide better fuel economy and quieter operation when the vehicle is driven on roads where the four-wheel drive is not required. The transfer

case provides an additional gear reduction when placed in low range. This is useful when driving in difficult off-road conditions.

The K3 models with single or dual rear wheels use the Borg Warner models 4401 or 4470 transfer case. Both of these transfer cases use a shift lever and a shift linkage in order to change the operating range. The models 4401 and 4470 are aluminum case, chain driven units with four modes of operation:

- neutral
- two wheel drive high range
- four wheel drive high range
- four wheel drive low range

A planetary gear set provides the reduction gearing for the low range.

A floor mounted shift lever is used in order to select the operating range for the 4401 and the 4470 transfer cases. The indicator lamps on the floor console show the current mode of operation. The four wheel drive indicator lamp illuminates whenever the front axle is engaged. After selecting four wheel drive from the two wheel drive position, a slight delay for the front axle indicator lamp to illuminate is normal.

Two Wheel Drive Operation

When the transfer case is in the two wheel drive range, the torque flows from the input gear to the range shift hub and the main shaft, through the propeller shaft to the rear axle.

2HI to 4HI

The Borg Warner 4401 and 4470 transfer cases use an electro--mechanincal in order to provide smoother shifting. The system requires no maintenance or service.

The system consists of a control module mounted in a relay socket under the hood, and an electro--mechanical clutch inside the transfer case. The clutch replaces the conventional blocker wing. When energized, the clutch provides synchronization, resulting in a smooth shift. When the transfer case lever is moved to the 4HI or 4LO position, the current is supplied to the Timer Logic and Relay Module, which controls the application of power to the synchronizer and the front axle actuator.

Important

The front axle indicator lamp does not illuminate until the front axle is fully engaged.

Shifting from 2WD to 4WD causes the following sequence of actions to occur:

1. Operation of the shift linkage closes a switch in the transfer case. This switch applies current to the timer logic and relay module. The module applies current to the synchronizer and, after a delay of a few seconds, closes a switch that applies ground to the front axle actuator control input.
2. The electro--mechanical clutch provides smooth engagement of the front propeller shaft to the drive sprocket.
3. The front axle actuator uses an electric motor to engage the right axle output shaft to the front axle differential.
4. When the front axle is fully engaged, the actuator closes a switch causing the 4WD indicator lamp to illuminate and removing current from the synchronizer.

Four Wheel Drive High Range Operation

The torque flows from the input gear to the mainshaft the same as in the 2WD operation. The shift to 4WD causes the synchronizer sleeve to engage with the clutch teeth of the drive sprocket. This locks the drive sprocket to the mainshaft through the synchronizer sleeve. The torque is transmitted through the drive sprocket and the drive chain to the driven sprocket and the output shaft. The torque then flows through the front propeller shaft to the front axle.

4HI to 2HI

If the shift lever is moved back to the 2HI position, the operations in the preceding steps are reversed. The actuator motor operates in the opposite direction to disengage the right front axle from the front differential. This opens a switch extinguishing the 4WD indicator lamp.

Four Wheel Drive Low Range Operation

When the transfer case is shifted into the 4LO position, the torque flow and the operation is similar to the 4HI range, except that the range shift hub engages the planetary carrier. The planetary gear set then provides a gear reduction to the front and the rear axles.

Identification

The Borg Warner transfer cases have an identification tag attached to a bolt on the extension housing. The tag provides the transfer case model number, the serial number, a build date, and a low range reduction ratio.

Transfer Case - NVG 241-NP2 (Two Speed Manual)

The transfer case is used to provide power flow from the transmission to the front axle. The transfer case also provides a way of disconnecting the front axle in order to provide better fuel economy and quieter operation when the vehicle is driven on roads where the four-wheel drive is not required. The transfer case provides an additional gear reduction when placed in low range. This is useful when driving in difficult off-road conditions. The New Venture Gear model NVG241 manually shifted transger case is used on four-wheel drive vehicles under 9200 lb GVW (K1 and K2).

The models NVG241 is an aluminum case, chain driven unit with four modes of operation:

- neutral
- two wheel drive high range
- four wheel drive high range
- four wheel drive low range

A planetary gear set provides the reduction gearing for the low range.

A floor mounted shift lever is used in order to select the operating range for the NVG241 transfer case. The indicator lamps on the floor console show the current mode of operation. The four wheel drive indicator lamp illuminates whenever the front axle is engaged. After selecting four wheel drive from the two wheel drive position, a slight delay for the front axle indicator lamp to illuminate is normal.

Two Wheel Drive Operation

When the transfer case is in the two wheel drive range, the torque flows from the input gear to the range shift hub and the main shaft, through the propeller shaft to the rear axle.

2HI to 4HI

The system consists of a control module mounted in a relay socket under the hood, and an electromagnetic clutch inside the transfer case. The clutch replaces the conventional blocker wing. When energized, the clutch provides synchronization, resulting in a smooth shift. When the transfer case lever is moved to the 4HI or 4LO position, the current is supplied to the Timer Logic and Relay Module, which controls the application of power to the synchronizer and the front axle actuator.

Important

The front axle indicator lamp does not illuminate until the front axle is fully engaged.

Shifting from 2WD to 4WD causes the following sequence of actions to occur:

1. Operation of the shift linkage engages fhe front propeller shaft.
2. Operation of the shift linkage also closes a switch in the transfer case. That switch applies ground to the control circuit of the front axle actuator.
3. The front axle actuator uses an electric motor to engage the right axle output shaft to the front axle differential.
4. When the front axle is fully engaged, the actuator closes a switch causing the 4WD indicator lamp to illuminate.

Four Wheel Drive High Range Operation

The torque flows from the input gear to the mainshaft the same as in the 2WD operation. The shift to 4WD causes the synchronizer sleeve to engage with the clutch teeth of the drive sprocket. This locks the drive sprocket to the mainshaft through the synchronizer sleeve. The torque is transmitted through the drive sprocket and the drive chain to the driven sprocket and the output shaft. The torque then flows through the front propeller shaft to the front axle.

4HI to 2HI

If the shift lever is moved back to the 2HI position, the operations in the preceding steps are reversed. The actuator motor operates in the opposite direction to disengage the right front axle from the front differential. This opens a switch extinguishing the 4WD indicator lamp.

Four Wheel Drive Low Range Operation

When the transfer case is shifted into the 4LO position, the torque flow and the operation is similar to the 4HI range, except that the range shift hub engages the planetary carrier. The planetary gear set then provides a gear reduction to the front and the rear axles.

In vehicles equipped with automatic transmission, the transfer case closes another switch which applies ground to a terminal of the VCM or PCM for transmission control.

Transfer Case - NVG 243-NP1 (Two Speed Selectable)

The transfer case provides power flow from the transmission to the front axle. The transfer case also disconnects the front axle in order to provide better fuel economy and quieter operation when the vehicle is driven on the roads where the four-wheel drive is not required. The transfer case provides an additional gear reduction when placed in low range. This is useful when difficult off-road conditions are encountered.

The New Venture Gear Model NV243 transfer case is used on all of the four-wheel drive vehicles under 9200 lb GVW.

The Model NV243 has an aluminum case, chain driven units with four modes of operation:

- Neutral
- Two-wheel drive high range
- Four-wheel drive high range
- Four-wheel drive low range

The gear reduction for low range is provided by a planetary gear set.

The New Venture Gear Model NV243 is electronically actuated. The vehicles equipped with this model have no transfer case selector lever. The operator selects 2HI, 4HI, or 4LO by pushing one of three switches mounted on the instrument panel. During normal driving the transfer case is in the 2HI mode.

When the transfer case is in 2HI both the 4HI and the 4LO switch circuits are open, and both lights are OFF. When the four-wheel drive has been selected, the four-wheel drive indicator lamp on the switch turns on when the front axle has engaged. The lamp will blink while the front axle is engaging.

Two-Wheel Drive Operation

When the transfer case is in the 2 WHEEL range, the torque flows from the input gear to the range shift hub and the main shaft, through the propeller shaft to the rear axle.

2HI to 4HI

Important

Shifting into the 4HI range causes the following conditions to occur.

1. The front axle indicator lamp does not turn on until the front axle engages.
2. The torque flows from the input gear to the mainshaft the same as in the two-wheel position. The shift linkage moves the mode synchronizer sleeve into engagement with the clutch teeth of the drive sprocket. This locks the drive sprocket to the mainshaft through the synchronizer sleeve.
3. The torque is transmitted through the drive sprocket and the drive chain to the driven sprocket and the output shaft. The torque then flows through the front propeller shaft to the front axle.
4. The shift mechanism in the transfer case closes the transfer case switch. The current is then applied to the front axle electromechanical actuator and the front axle switch. In the K30 vehicles, the power is also supplied by the transfer case relay to the transfer case synchronizer.
5. The front axle shift mechanism, when fully engaged, closes a switch, causing the front axle indicator lamp to turn ON.

Four-Wheel Drive Low Range Operation

When the transfer case is shifted into the 4LO position, the torque flow and the operation is similar to the 4HI range, except that the range shift hub engages the planetary carrier. The planetary gear set then provides a gear reduction to the front and the rear axles.

Identification

For New Venture Gear Transfer Cases, an identification tag is attached to the rear case half. The tag provides the following information:

- The transfer case model number
- The low range reduction ratio
- The assembly part number

Transfer Case System Description

The New Venture Gear Model NV243 is an electronically controlled optional transfer case for use on four-wheel drive K trucks. The driver selects 2HI, 4HI, or 4LO by pushing one of three illuminating transfer case select switch buttons mounted on the instrument panel. The select switch buttons display the following information:

- The transfer case mode and range
- Self-test
- Diagnostic trouble codes
- Electronic shift mechanical engaging problems

During normal driving the transfer case is in the 2HI mode. When the transfer case is in 2HI both the 4HI and 4LO switch circuits are open, and both lights are OFF. When the four-wheel drive select switch button has been pressed, the four-wheel drive indicator lamp under the select switch button turns ON when the front axle has engaged. The shift select button will blink while the front axle is engaging. This is a normal condition.

The shifting of the transfer case is performed by a motor/encoder that receives drive signals from the transfer case shift control module. When the driver selects one of the transfer case select switch buttons, request signals are sent to the transfer case shift control module. If the correct input signals exists, the transfer case shift control module will send drive voltages to the motor/encoder. The motor/encoder will position the transfer case to the ordered shift position.

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

Transfer Case Circuit Description

Transfer Case Shift Control Module

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

Transfer Case Encoder Motor

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

Transfer Case Encoder

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

Transfer Case Motor Lock

The transfer case motor lock is used to provide a 2H, 4H, and 4L lock-up feature. When the lock circuit is energized, the transfer case encoder motor is allowed to turn. When the transfer case is placed 2H, 4H, or 4L the motor lock circuit has no power provided to it and the lock is applied. This assures that the transfer case remains in the current gear position. When AUTO 4WD is selected the motor lock remains applied until an adaptive mode (torque is applied to the front propshaft) is required. During an adaptive mode the motor lock circuit is energized and the motor lock is released, enabling the encoder motor to turn and apply torque to the front propshaft.

Transfer Case Speed Sensors

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

Vehicle Speed Sensor

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

Rear Propshaft Speed Sensor

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

Front Propshaft Speed Sensor

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

SERVICE indicator (4WD/AWD) Lamp

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

Braking System Description and Operation

Hydraulic Brake System Description and Operation

System Component Description

The hydraulic brake system consists of the following:

Hydraulic Brake Master Cylinder Fluid Reservoir

Contains supply of brake fluid for the hydraulic brake system.

Hydraulic Brake Master Cylinder

Converts mechanical input force into hydraulic output pressure.

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

Hydraulic Brake Pressure Balance Control System

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

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

Hydraulic Brake Pipes and Flexible Brake Hoses

Carries brake fluid to and from hydraulic brake system components.

Hydraulic Brake Wheel Apply Components

Converts hydraulic input pressure into mechanical output force.

System Operation

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

Brake Assist System Description and Operation

System Component Description

The brake assist system consists of the following:

Brake Pedal

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

Brake Pedal Pushrod

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

Vacuum Brake Booster

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

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

Vacuum Source

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

Vacuum Source Delivery System

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

System Operation

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

Disc Brake System Description and Operation

System Component Description

The disc brake system consists of the following components:

Disc Brake Pads

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

Disc Brake Rotors

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

Disc Brake Pad Hardware

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

Disc Brake Caliper Hardware

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

System Operation

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

Drum Brake System Description and Operation

System Component Description

The drum brake system consists of the following:

Drum Brake Shoes

Applies mechanical output force (from hydraulic brake wheel cylinders) to friction surface of brake drums.

Brake Drums

Uses mechanical output force applied to friction surface from drum brake shoes to slow speed of tire and wheel assembly rotation.

Drum Brake Hardware

Secures drum brake shoes firmly in proper relationship to hydraulic brake wheel cylinders. Enables sliding motion of brake shoes needed to expand toward friction surface of drums when mechanical output force is applied; provides return of brake shoes when mechanical output force is relieved.

Drum Brake Adjusting Hardware

Provides automatic adjustment of brake shoes to brake drum friction surface whenever brake apply occurs during rearward motion of the vehicle.

System Operation

Mechanical output force is applied from the hydraulic brake wheel cylinder pistons to the top of the drum brake shoes. The output force is then distributed between the primary and secondary brake shoes as the shoes expand toward the friction surface of the brake drums. The brake shoes apply the output force to the friction surface of the brake drums, which slows the rotation of the tire and wheel assemblies. The proper function of both the drum brake hardware and adjusting hardware is essential to the proper distribution of braking force.

Park Brake System Description and Operation

General Description

There are three basic types of park brakes used. The lower GVW models use leading/trailing rear drum brakes. The higher GVW models use duo-servo rear drum brakes. The highest GVW model C3500HD has a propeller shaft park brake mounted on the transmission.

Lever

The park brake lever is located on the left side of the driver's compartment and is activated by foot pressure. The lever assembly has a ratchet mechanism in it to allow varying degrees of park brake application. The park brake handle on the instrument panel allows the driver to release the park brake.

Cable System

The cable system will vary depending on the type of park brake system used. Models with rear drum brakes use a system that includes one front cable and two rear cables. The front cable connects to the lever on one end and the connector on the other end. The rear cables attach to the equalizer and connector on one end and the park brake struts in the drum brakes on the other end.

Models with a propeller shaft park brake use a one-cable system. The cable connects to the front lever on one end and the rear lever on the other end.

Brake Lamp

The BRAKE warning lamp on the instrument cluster turns on when the park brake is applied. The lamp can also be turned on by the switch in the combination valve and the antilock brake system.

Parking Brake Switch

The park brake switch is located on the lever assembly. The switch serves as the device to turn on the BRAKE lamp when the parking brake is applied and turn it off when the parking brake is released.

Daytime Running Lights

All vehicles are equipped with a daytime running light (DRL) system. This system uses the park brake switch to turn the headlamps off when the ignition switch is ON and the park brake is applied.

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 – 5.0 & 5.7L

General Specifications 5.7L

Application	Specification	
	Metric	English
General Data		
• Engine Type	V8	
• Displacement	5.7 L	350 CID
• RPO (VIN Code)	L31 (R)	
• Bore	101.63 mm	4.0012 in
• Stroke	88.39 mm	3.480 in
• Compression Ratio	9.4:1	
• Firing Order	1-8-4-3-6-5-7-2	
• Spark Plug Gap	1.52 mm	0.060 in
• Oil Pressure (Minimum at Normal Operating Temperature)	42 kPa at 1,000 RPM 125 kPa at 2,000 RPM 166 kPa at 4,000 RPM	6 psig at 1,000 RPM 18 psig at 2,000 RPM 24 psig at 4,000 RPM

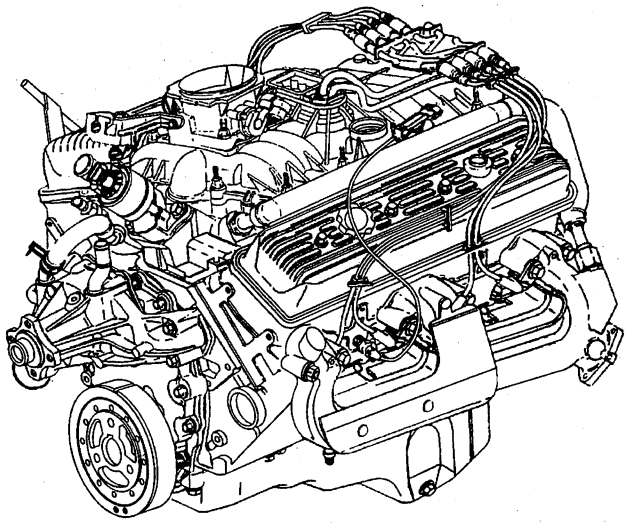
Fastener Tightening Specifications 5.0L & 5.7L

Application	Specification	
	Metric	English
Accelerator Control Cable Bracket Bolt and Nut	12 N·m	106 lb in
Belt Idler Pulley Bolt	50 N·m	37 lb ft
Camshaft Retainer Bolt	12 N·m	106 lb in
Camshaft Sprocket Bolt	25 N·m	18 lb ft
Connecting Rod Nut		
• First Pass	27 N·m	20 lb ft
• Final Pass	55 degrees	
Crankshaft Balancer Bolt	95 N·m	70 lb ft
Crankshaft Bearing Cap Bolt and Stud (Preferred Method)		
• First Pass (Two Bolt Type Bearing Cap)	20 N·m	15 lb ft
• Final Pass (Two Bolt Type Bearing Cap)	73 degrees	
• First Pass (Four Bolt Type Bearing Cap)	20 N·m	15 lb ft
• Final Pass Outboard Bolt (Four Bolt Type Bearing Cap)	43 degrees	
• Final Pass Inboard Bolt and Stud (Four Bolt Type Bearing Cap)	73 degrees	
Crankshaft Bearing Cap Bolt and Stud (Optional Strategy)		
• Two Bolt Type Bearing Cap	105 N·m	77 lb ft
• Inboard Bolt and Stud (Four Bolt Type Bearing Cap)	105 N·m	77 lb ft
• Outboard Bolt (Four Bolt Type Bearing Cap)	90 N·m	66 lb ft
Crankshaft Oil Deflector Nut	40 N·m	30 lb ft
Crankshaft Position Sensor Bolt	9 N·m	80 lb in
Crankshaft Pulley Bolt	58 N·m	43 lb ft
Crankshaft Rear Oil Seal Housing Nut and Bolt	12 N·m	106 lb in
Crankshaft Rear Oil Seal Housing Retainer Stud	6 N·m	53 lb in
Cylinder Head Bolt (Preferred Method)		
• All Bolts First Pass in Sequence	30 N·m	22 lb ft

• Long Bolt Final Pass in Sequence	75 degrees	
• Medium Bolt Final Pass in Sequence	65 degrees	
• Short Bolt Final Pass in Sequence	55 degrees	
Cylinder Head Bolt (Optional On-Vehicle Strategy)		
• First Pass in Sequence	35 N·m	26 lb ft
• Second Pass in Sequence	60 N·m	44 lb ft
• Final Pass in Sequence	90 N·m	66 lb ft
Cylinder Head Core Hole Plug	20 N·m	15 lb ft
Distributor Cap Bolt	2.4 N·m	21 lb in
Distributor Clamp Bolt	25 N·m	18 lb ft
Drive Belt Tensioner Bolt	50 N·m	37 lb ft
EGR Valve Bolt		
• First Pass	10 N·m	89 lb in
• Final Pass	30 N·m	22 lb ft
EGR Valve Pipe Nut at Intake Manifold	25 N·m	18 lb ft
EGR Valve Pipe Nut at Exhaust Manifold	30 N·m	22 lb ft
EGR Valve Pipe Clamp Bracket Bolt	25 N·m	18 lb ft
Engine Block Coolant Drain Hole Plug	20 N·m	15 lb ft
Engine Block Oil Gallery Plug	20 N·m	15 lb ft
Engine Coolant Temperature (ECT) Gauge Sensor	20 N·m	15 lb ft
Engine Flywheel Bolt	100 N·m	74 lb ft
Engine Front Cover Bolt	12 N·m	106 lb in
Engine Lift Bracket Bolt (Special Tool J 41427)	15 N·m	11 lb ft
Engine Lift Front Bracket Stud	35 N·m	26 lb ft
Engine Mount Bolt (Through-bolt) to Engine Mount Bracket	95 N·m	70 lb ft
Engine Mount Bolt to Frame	59 N·m	44 lb ft
Engine Mount Bracket Bolt to Engine	51 N·m	38 lb ft
Engine Mount Nut (Through-bolt)	68 N·m	50 lb ft
Engine Mount Nut to Frame	45 N·m	33 lb ft
Engine Oil Pressure Gauge Sensor	30 N·m	22 lb ft
Engine Oil Pressure Gauge Sensor Fitting (Plus Required Angle)	15 N·m	11 lb ft
Engine Wiring Harness Bracket Nut	12 N·m	106 lb in
Evaporative Emission (EVAP) Canister Purge Solenoid Valve Stud	10 N·m	89 lb in
Exhaust Manifold Bolt		
• First Pass	15 N·m	11 lb ft
• Final Pass	30 N·m	22 lb ft
Fan and Water Pump Pulley Bolt	25 N·m	18 lb ft
Fuel Pipe Bracket Bolt	6 N·m	53 lb in
Fuel Pipe Retainer Nut	3 N·m	27 lb in
Generator and Drive Belt Tensioner Bracket Bolt and Nut to Engine	41 N·m	30 lb ft
Generator and Drive Belt Tensioner Bracket Stud to Engine	20 N·m	15 lb ft
Ignition Coil Stud	12 N·m	106 lb in
Knock Sensor	20 N·m	15 lb ft
Lower Intake Manifold Bolt		
• First Pass in Sequence	3 N·m	27 lb in
• Second Pass in Sequence	12 N·m	106 lb in
• Final Pass in Sequence	15 N·m	11 lb ft
Oil Filter Adapter Bolt	25 N·m	18 lb ft
Oil Filter Fitting	35 N·m	26 lb ft
Oil Level Indicator Tube Bolt	12 N·m	106 lb in
Oil Pan Drain Plug	25 N·m	18 lb ft
Oil Pan Stud (Front)	6 N·m	53 lb in
Oil Pan Stud Nut	25 N·m	18 lb ft

Oil Pan Bolt or Stud Bolt	12 N·m	106 lb in
Oil Pump Bolt to Rear Crankshaft Bearing Cap		
• First Pass	20 N·m	15 lb ft
• Final Pass	65 degrees	
Oil Pump Cover Bolt	12 N·m	106 lb in
Power Steering Pump Bracket Bolt to Engine	41 N·m	30 lb ft
Power Steering Pump Bracket Stud to Engine	20 N·m	15 lb ft
Power Steering Pump Bracket Stud Nut	41 N·m	30 lb ft
Power Steering Pump Bolt	50 N·m	37 lb ft
Power Steering Pump Nut to Engine	41 N·m	30 lb ft
Power Steering Pump Rear Bracket Nut	50 N·m	37 lb ft
Spark Plug		
• Initial Installation (New Cylinder Head)	30 N·m	22 lb ft
• All Subsequent Installations	15 N·m	11 lb ft
Spark Plug Wire Support Bolt	12 N·m	106 lb in
Square Socket Plug (Engine Block Oil Gallery)	20 N·m	15 lb ft
Throttle Body Stud	9 N·m	80 lb in
Transmission Cover Bolt	12 N·m	106 lb in
Upper Intake Manifold Stud		
• First Pass	5 N·m	44 lb in
• Final Pass	10 N·m	89 lb in
Valve Lifter Guide Retainer Bolt	25 N·m	18 lb ft
Valve Rocker Arm Cover Bolt	12 N·m	106 lb in
Water Outlet Stud	25 N·m	18 lb ft
Water Pump Bolt	45 N·m	33 lb ft

Engine Component Description



The engine block is made of cast iron and has eight cylinders arranged in a V shape with four cylinders in each bank. The cylinder block is a one piece casting with the cylinders encircled by coolant jackets.

Cylinder Head

The cylinder heads are made of cast iron. The valve guides and valve seats are machined surfaces integral to the cylinder head. The 5.7L heavy duty applications have pressed in exhaust valve seats. The spark plugs are located between the intake and exhaust ports.

Camshaft

A steel engine camshaft is supported by five camshaft bearings pressed into the engine block. The camshaft sprocket, mounted to the front of the engine camshaft, is driven by the crankshaft sprocket through a camshaft timing chain.

Motion from the engine camshaft is transmitted to the valves by hydraulic roller valve lifters, valve pushrods, and ball-pivot type valve rocker arms.

Crankshaft

The crankshaft is made of cast nodular iron. The crankshaft is supported by five crankshaft bearings. The crankshaft bearings are retained by the crankshaft bearing caps, which are machined with the engine block for proper alignment and clearances. Light duty 5.0L and 5.7L engines have two bolts per crankshaft bearing cap. The heavy duty 5.7L engines have four bolts per crankshaft bearing cap, on bearing caps 2, 3, and 4. The number 5 crankshaft bearing cap at the rear of the engine is the end thrust bearing cap. The four connecting rod journals (two connecting rods per journal) are spaced 90 degrees apart. The crankshaft position sensor reluctor ring is pushed onto the front of the crankshaft. The crankshaft position sensor reluctor ring has four lugs used for crankshaft timing and it is constructed of powdered metal. The reluctor ring has an interference fit onto the crankshaft and an internal keyway for correct positioning.

Pistons and Connecting Rods

The pistons are made of cast aluminum that use two compression rings and one oil control ring assembly. The piston is a low-friction, lightweight design with a flat top and barrel-shaped skirt. The piston pins are chromium steel. The piston pins have a floating fit in the piston and are retained by a press fit in the connecting rod assembly. The connecting rods are made out of either forged powdered metal or forged steel. The connecting rods are machined with the connecting rod cap installed for proper clearances and alignment.

Valve Train

The valve train is a ball pivot type. Motion is transmitted from the camshaft through the hydraulic roller valve lifters and tubular valve pushrods to the valve rocker arms. The valve rocker arm pivots on a ball in order to open the valve. The hydraulic roller valve lifters keep all parts of the valve train in constant contact. The valve rocker arm ball is retained on the valve rocker arm ball stud with a locking nut. The valve rocker arm ball studs are pressed into the cylinder head.

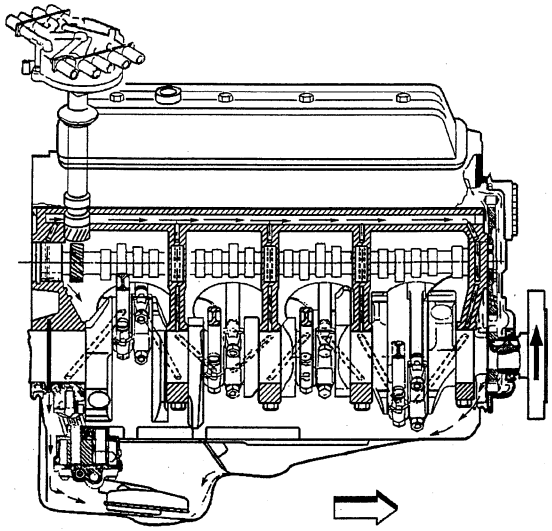
Intake Manifold

The intake manifold is a two piece design. The upper intake manifold portion is made from a composite material and the lower intake manifold portion is cast-aluminum. The throttle body mounts to the upper intake manifold. The lower intake manifold has an exhaust gas recirculation (EGR) port cast into the manifold for mixture of exhaust gases with the fuel and air mixture. The EGR valve mounts to the lower intake manifold.

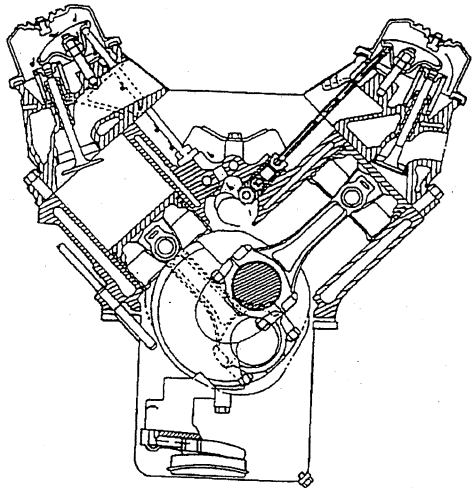
The Central Sequential Multiport Fuel Injection, Central (SFI) system uses multiple injectors to meter and distribute fuel to each engine cylinder. The Central (SFI) unit is retained by a bracket bolted to the lower intake manifold. The TBI fuel meter also houses the pressure regulator. Metal inlet and outlet fuel lines and nylon delivery tubes independently distribute fuel to each cylinder through nozzles located at the port entrance of each manifold runner where the fuel is atomized.

Lubrication

Right Side View(c)



Front View(c)



The gear-type oil pump is driven through an extension driveshaft. The extension driveshaft is driven by the distributor which is gear driven by the camshaft. The oil is drawn from the oil pan through a pickup screen and tube. Pressurized oil is delivered through internal passages in order to lubricate the camshaft and the crankshaft bearings and to provide lash control in the hydraulic valve lifters. Oil is metered from the valve lifters through the valve pushrods in order to lubricate the valve rocker arms and valve rocker arm ball pivots. Oil returning to the oil pan from the cylinder heads and the camshaft front bearing, lubricates the camshaft timing chain and the crankshaft and the camshaft sprockets.

Drive Belt System Description

The drive belt system consists of the following components:

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

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

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

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

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

Engine Mechanical – 6.5L Turbo Diesel

General Specifications

Application	Specification	
	Metric	English
General Data		
• Type	V8	
• Displacement	6.5L	396CID
• Bore	103 mm	4.0600 cu in
• Stroke	97 mm	3.8200 cu in
• Compression Ratio	20.2:1	
• Cylinder Compression (Sea Level)	2,550 kPa minimum (subtract 55 kPa per 305 m of elevation above sea level)	370 psi minimum (subtract 8 psi per 1,000 ft of elevation above sea level)
• Firing Order	1-8-7-2-6-5-4-3	
• Cranking RPM (Cold)	100-RPM minimum	
• Cranking RPM (Hot)	180-RPM minimum	
• Oil Pressure (Mechanical Gage) (Hot)	41 kPa minimum @ IDLE 207-296 kPa minimum @ 2000 RPM	6 psi minimum @ IDLE 30-43 psi minimum @ 2000 RPM
• Operating Temperature	88°C	190°F

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Accessory/Engine Lift Bracket Nut and Bolts	50 N·m	37 lb ft
Bell Housing Bolts	40 N·m	30 lb ft
Camshaft Gear Bolt	170 N·m	125 lb ft
Camshaft Thrust Plate Bolts	25 N·m	17 lb ft
Connecting Rod Cap Nuts	65 N·m	48 lb ft
Coolant Crossover Bolts/Studs	42 N·m	31 lb ft
Coolant Drain Plugs	25 N·m	18 lb ft
Crankshaft Balancer Bolt	270 N·m	200 lb ft
Crankshaft Bearing Cap Bolts		
• (Inner Bolts-12 mm) First Pass	75 N·m	55 lb ft
• (Inner Bolts-12 mm) Second Pass	75 N·m	55 lb ft
• (Inner Bolts-12 mm) Final Pass	+ 90 Degrees	
• (Outer Bolts-12 mm) First Pass	65 N·m	48 lb ft
• (Outer Bolts-12 mm) Second Pass	65 N·m	48 lb ft
• (Outer Bolts-12 mm) Final Pass	+ 90 Degrees	
• (Outer Bolts-10 mm) Single Pass	40 N·m	30 lb ft
Crankshaft Pulley Bolts	50 N·m	37 lb ft
Crankshaft Sensor Bolt	23 N·m	17 lb ft
Cylinder Head Bolts		
• First Pass	25 N·m	20 lb ft
• Second Pass	75 N·m	55 lb ft
• Third Pass	75 N·m	55 lb ft
• Final Pass	+ 90 Degrees	

Exhaust Manifolds Bolts	35 N·m	26 lb ft
Flywheel Bolts	90 N·m	65 lb ft
Front Cover Bolts	45 N·m	33 lb ft
Fuel Filter Mount Bolts	42 N·m	31 lb ft
Fuel Filter Water Drain Valve Stud	41 N·m	31 lb ft
Fuel Injection Line Fittings to Fuel Injection Pump	33 N·m	24 lb ft
Fuel Injection Line Fittings to Fuel Injection Nozzles	33 N·m	24 lb ft
Fuel Injection Nozzles	80 N·m	59 lb ft
Fuel Injection Pump Gear Retaining Bolts	25 N·m	20 lb ft
Fuel Injection Pump Nuts	40 N·m	30 lb ft
Glow Plugs	22 N·m	16 lb ft
Intake Manifold Bolts/Studs	42 N·m	31 lb ft
Oil Cooler Line Fittings	75 N·m	55 lb ft
Oil Fill Neck Nuts	23 N·m	17 lb ft
Oil Filter Adapter Bolt	63 N·m	47 lb ft
Oil Gallery Plugs	34 N·m	25 lb ft
Oil Level Indicator Tube Bracket Bolt	4 N·m	35 lb in
Oil Pan (All Except Rear Two Bolts)	10 N·m	89 lb in
Oil Pan (Rear Two Bolts)	23 N·m	17 lb ft
Oil Pan Drain Plug	25 N·m	18 lb ft
Oil Pump Bolt	90 N·m	65 lb ft
Oil Pump Cover Screws	16 N·m	12 lb ft
Oil Pump Driver Clamp Bolt	42 N·m	31 lb ft
Thermostat Housing Bolts/Studs	47 N·m	35 lb ft
Turbocharger Connector Hose Clamps	6 N·m	50 lb in
Turbocharger Exhaust Manifold Mounting Nuts	58 N·m	43 lb ft
Turbocharger Long Brace Bolt	50 N·m	37 lb ft
Turbocharger Long Brace Nut	34 N·m	26 lb ft
Turbocharger Oil Feed Line Fittings	28 N·m	21 lb ft
Turbocharger Oil Return Pipe Bolts	26 N·m	19 lb ft
Turbocharger Short Brace Bolts	25 N·m	18 lb ft
Upper Intake Connector Hose Clamps	6 N·m	50 lb in
Upper Intake Manifold to Intake Manifold Bolts	23 N·m	17 lb ft
Valve Lifter Guide Plate Clamp Bolts	27 N·m	20 lb ft
Valve Rocker Arm Cover Bolts	27 N·m	20 lb ft
Valve Rocker Arm Shaft Bolts	55 N·m	40 lb ft
Water Pump Plate to Coolant Pump Bolts	28 N·m	20 lb ft
Water Pump Plate to Front Cover Bolts	28 N·m	20 lb ft
Water Pump to Front Cover Bolts	42 N·m	32 lb ft

Engine Component Description

Cylinder Block

The engine block is made of cast iron and it has eight cylinders arranged in a V shape, with four cylinders in each bank. The engine block is a one piece casting with the cylinders encircled by coolant jackets.

Cylinder Head

The cylinder heads are made of cast iron. They have parent metal intake and exhaust valve guides, and parent metal intake and exhaust valve seats. The intake and exhaust valve seats are induction hardened for durability. Pre-combustion chambers manufactured from NIMONIC-80 (a high strength, heat resistant alloy) are located with each set of intake/exhaust valves. Glow plugs are located between each set of intake/exhaust valves, in the side of the cylinder head, protruding in to the pre-combustion chamber.

Camshaft

A steel camshaft is supported by five bearings pressed into the engine block. The camshaft sprocket is mounted to the front of the camshaft and is driven by the crankshaft sprocket through a timing chain. Motion from the camshaft is transmitted to the valves by hydraulic roller-type hydraulic valve lifters, valve pushrods, shaft-mounted rocker arms. The valve guides are integral to the cylinder head. A spiral drive gear machined into the camshaft near the rear journal operates the oil pump drive assembly.

Crankshaft

The crankshaft is made of cast nodular iron, with fillet ground main bearing journals. The crankshaft is supported by five precision fit crankshaft bearings, retained by the crankshaft bearing caps. The crankshaft bearing caps are machined with the engine block for proper alignment and clearance. The crankshaft bearing caps are retained by four bolts each. The number three crankshaft bearing at the center of the engine block is the thrust bearing. The four connecting rod journals (two rods per journal) are spaced 90 degrees apart. The crankshaft position sensor reluctor ring has four lugs used for crankshaft timing, and is integral to the crankshaft sprocket.

Pistons and Connecting Rods

The pistons are cast aluminum alloy that use two compression rings and one oil control ring assembly. The piston pins are full floating in the pistons and in the connecting rods, with spring steel retainers at each end of the piston pin bore. The connecting rods are forged steel and have precision insert type crankpin bearings.

Valve Train

The valve train is a shaft-mounted rocker arm type. Motion is transmitted from the camshaft through hydraulic roller-type valve lifters, and tubular valve pushrods, to the valve rocker arms. The valve rocker arm pivots on a shaft in order to open the valve. The hydraulic roller-type valve lifters keep all parts of the valve train in constant contact. Each valve lifter act as an automatic adjuster and maintains zero lash in the valve train. This eliminates the need for periodic valve adjustment. The valve rocker arms are located and retained by nylon retainers press fit to the valve rocker arm shaft, and by the valve rocker arm shaft retaining bolts. The valve rocker arm shaft retaining bolts are installed into the cylinder head.

Intake Manifold

The intake manifold is a two-piece design. Both the upper and lower portions are made of cast aluminum. A Manifold Absolute Pressure (MAP) sensor is mounted at the front of the upper intake manifold and sealed by an O-ring seal.

Exhaust Manifold

The two exhaust manifolds are constructed of cast iron. The exhaust manifolds direct exhaust gases from the combustion chambers to the turbocharger.

Turbocharger

The turbocharger is used to increase the amount of air that enters the engine's cylinders. The increase of air allows a proportional increase of fuel that is injected into the cylinders. The results are:

- Increased power output.
- More complete combustion of the fuel.
- Cooling of the cylinder heads, the pistons, the valves, and the exhaust gas. This cooling effect helps extend engine life.

Engine exhaust gas is directed to the turbine housing. The turbine housing acts as a nozzle to direct the exhaust gas flow to the turbine wheel blades, where heat energy and pressure from the exhaust gas drives the turbine wheel. The turbine wheel is attached to the shaft assembly along with the compressor

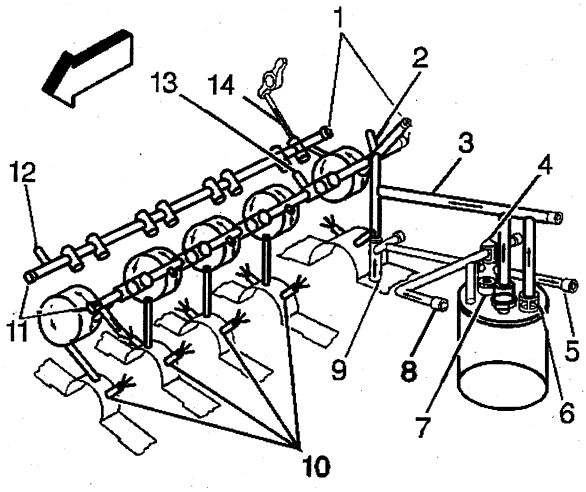
wheel, which rotates at the same speed as the turbine wheel. Clean air from the air cleaner, and crankcase vapors from the Crankcase Depression Regulator (CDR) Valve, are drawn into the compressor housing. The air is compressed by the compressor wheel blades and delivered to the engine upper intake manifold. The inside of the turbocharger compressor housing, the compressor wheel, and the inside of the intake manifold can be very oily (wet) due to the crankcase vapors -- THIS IS NORMAL.

A vacuum-operated wastegate regulator valve in the turbocharger exhaust housing regulates the flow of exhaust gasses, and the amount of boost delivered to the engine by the turbocharger. The wastegate regulator valve is controlled by the PCM, which monitors turbocharger boost pressure , engine RPM, vehicle load and power requirements. Vacuum is applied to the regulator valve to close the wastegate as increased boost is required. Vacuum is removed from the regulator valve to open the wastegate when increased boost is no longer required.

Vacuum Pump

The belt driven vacuum pump provides vacuum for the operation of the turbocharger wastegate. The vacuum pump does not require periodic maintenance, and is serviced by replacement.

Lubrication



(1) Threaded Oil Gallery Plug
(2) Center Mount Turbocharger Oil Feed
(3) Clean Oil to Engine
(4) Oil Cooler Bypass Valve
(5) To Oil Cooler
(6) Oil Filter Bypass Valve
(7) Cup Plug With 0.06 inch Hole
(8) From Oil Cooler
(9) From Oil Pump
(10) Piston Oil Nozzle Galleries
(11) Main Oil Galleries
(12) Side Mount Turbocharger Oil Feed
(13) To Oil Pressure Sensor
(14) Push Rod Oil Passage To Valve Train

A gear-type oil pump with an enclosed pressure regulator pressurizes the lubrication oil distribution system. The oil pump uses a 552 kPa (80 psi) pressure regulator spring. Bronze bushings in the oil pump

drive/driven gears, and a steel base plate, support the oil pump drive/driven gear shafts. The oil pump is driven by the oil pump drive, which, in turn, is driven by the camshaft. The oil pump draws unpressurized oil through a pickup screen and pipe that are submerged in oil inside the oil pan. The oil flows from the oil pump to an oil cooler, located by the radiator, that cools the oil. The oil cooler is protected from high operating pressure (normally seen only during cold ambient temperature conditions) by the oil cooler bypass valve. The oil cooler bypass valve is located in the engine block oil gallery to oil cooler passage (behind the oil filter or oil filter adapter assembly). The oil flows from the oil cooler or from the oil cooler bypass valve to a full-flow oil filter. The engine is protected from operating without lubrication (due to a clogged filter) by the oil filter bypass valve. The oil filter bypass valve is located in the engine block oil gallery to oil filter passage (behind the oil filter or oil filter adapter assembly).

The oil flows from the oil filter or the oil filter bypass valve to the main oil galleries. An oil pressure sensor is located on the left main oil gallery. The oil flows from the main oil galleries to the camshaft bearing bores. The channel in the camshaft bearing bores supplies the oil to the camshaft bearings and to the main bearing oil galleries. The oil flows from the upper main bearing shells to the crankshaft oil galleries. The crankshaft oil galleries supply oil to the connecting rod bearings. The oil flows from the main oil galleries to the valve lifters. Oil flows from the valve lifters through hollow valve pushrods, to the valve rocker arms. The oil then flows from the main oil galleries to the turbocharger. Oil from the turbocharger drains back to the crankcase through a gallery in the block.

Drive Belt Description and Operation

See Driver Belt Description and Operation in 5.7 & 5.7L section above.

Engine Mechanical - 7.4L

General Specifications

Application	Specification	
	Metric	English
General Data		
• Engine Type	V-8	
• Displacement	7.4L	454 CID
• RPO	L29	
• VIN	J	
• Bore	107.95 mm	4.25 in
• Stroke	101.6 mm	4.00 in
• Compression Ratio	9.0:1	
• Firing Order	1-8-4-3-6-5-7-2	
• Spark Plug Gap	0.8890 mm	0.060 in
Lubrication System		
• Oil Capacity without Filter Change	5.7 liters	6.0 qt
• Oil Pressure (Fully Warmed Oil not Hot)	68.65 kPa @ 600 RPM 172.37 kPa @ 2,000 RPM	10 psi @ 600 RPM 25 psi @ 2,000 RPM
• Oil Filter System	Full Flow	
• Oil Pump Type	Gear Driven	

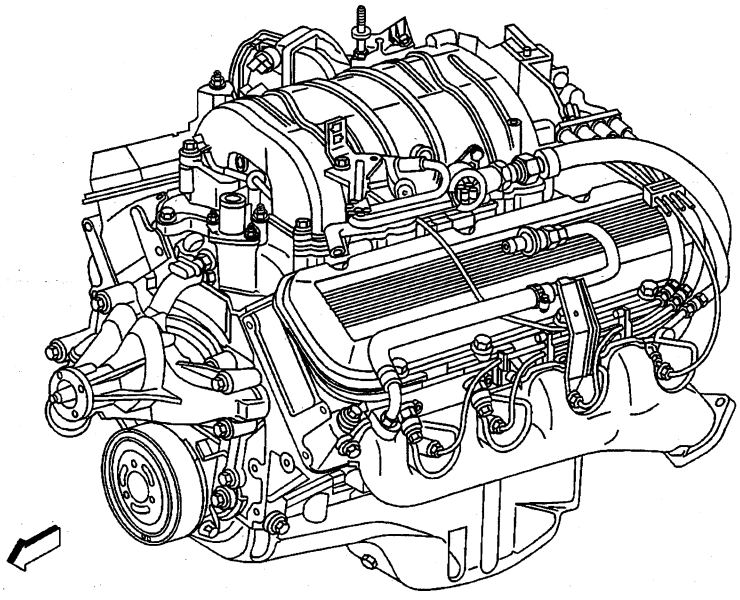
Fastener Tightening Specifications

Application	Specification	
	Metric	English
A/C Compressor Bolt	50 N·m	37 lb ft
AIR Pump Mounting Bolt	50 N·m	37 lb ft
Camshaft Retainer Bolt	12 N·m	106 lb in
Camshaft Sprocket Bolt	30 N·m	22 lb ft
Connecting Rod Bolt Nut	64 N·m	47 lb ft
Coolant Outlet Housing Bolt	40 N·m	30 lb ft
Coolant Temperature Gauge Sensor	20 N·m	15 lb ft
Coolant Temperature Sensor	20 N·m	15 lb ft
Crankshaft Balancer Bolt	149 N·m	110 lb ft
Crankshaft Bearing Cap Bolt	138 N·m	102 lb ft
Crankshaft Position Sensor Bolt	12 N·m	106 lb in
Crankshaft Pulley Bolt	40 N·m	30 lb ft
Cylinder Head Bolts First Pass in Sequence		
• All Bolts	50 N·m	37 lb ft
Cylinder Head Bolts Final Pass in Sequence		
• Bolt #1, 2, 3, 6, 7, 8, 9, 12, 14, 15	150 degrees	
• Bolt #13, 16	150 degrees	
• Bolt #4, 5, 10, 11	90 degrees	
Distributor Clamp Bolt	33 N·m	24 lb ft
EGR Inlet Pipe Fitting	60 N·m	44 lb ft
EGR Valve Bolt	22 N·m	16 lb ft
Engine Block Coolant Drain Hole Plug	20 N·m	15 lb ft
Engine Block Oil Gallery Plug		
• Front	30 N·m	22 lb ft
• Left	30 N·m	22 lb ft

• Rear	30 N·m	22 lb ft
• Top	20 N·m	15 lb ft
Engine Flywheel Bolt	88 N·m	65 lb ft
Engine Flywheel Housing Bolt	40 N·m	30 lb ft
Engine Front Cover Bolt	10 N·m	30 lb ft
Engine Lift Bracket Bolt (Special Tool J 36857)	40 N·m	106 lb in
Engine Mount		
• Front Mount Bolt	59 N·m	44 lb ft
• Front Mount Nut	45 N·m	33 lb ft
• Rear Mount Bolt	47 N·m	35 lb ft
EVAP Purge Solenoid Bolt	12 N·m	106 lb in
Exhaust Manifold		
• Adapter	160 N·m	118 lb ft
• Center Bolt	54 N·m	40 lb ft
• Nut	30 N·m	22 lb ft
• Stud	30 N·m	22 lb ft
Fuel Rail		
• Bolt	10 N·m	89 lb in
• Stud	25 N·m	18 lb ft
Generator Mounting Bolt	50 N·m	37 lb ft
Generator Mounting Bracket to Engine		
• Long Bolt	66 N·m	49 lb ft
• Short Bolt	66 N·m	49 lb ft
• Nut	66 N·m	49 lb ft
• Stud	20 N·m	15 lb ft
Generator Mounting Rear Bracket Bolt	50 N·m	37 lb ft
Idler Pulley Bolt	50 N·m	37 lb ft
Idler Pulley Bracket		
• Long Bolt	83 N·m	61 lb ft
• Short Bolt	50 N·m	37 lb ft
Ignition Coil		
• Bolt	25 N·m	18 lb ft
• Stud	25 N·m	18 lb ft
Knock Sensor	19 N·m	14 lb ft
Knock Sensor Heat Shield	12 N·m	106 lb in
Lower Intake Manifold Bolt (in Sequence)		
• First Pass	30 N·m	22 lb ft
• Final Pass	40 N·m	30 lb ft
MAP Sensor Nut	25 N·m	18 lb ft
Oil Filter	One Turn After Initial Gasket Contact	
Oil Filter Adapter		
• Bolt	25 N·m	18 lb ft
• Fitting	66 N·m	49 lb ft
Oil Level Indicator Tube Bracket Nut	54 N·m	40 lb ft
Oil Pan Bolt	25 N·m	18 lb ft
Oil Pan Drain Plug	28 N·m	21 lb ft
Oil Pump Bolt	90 N·m	65 lb ft
Oil Pump Cover Bolt	12 N·m	106 lb in
Oil Pressure Gauge Sensor	30 N·m	22 lb ft
Power Steering Pump Mounting Bracket		
• Long Bolt	66 N·m	49 lb ft
• Nut	66 N·m	49 lb ft

• Stud	20 N·m	15 lb ft
Power Steering Pump Rear Bracket Bolt	25 N·m	18 lb ft
Spark Plug (New Cylinder Head)	30 N·m	22 lb ft
Spark Plug (all Subsequent Installations)	20 N·m	15 lb ft
Spark Plug Heat Shield Nut	20 N·m	15 lb ft
Starter Motor Bolt	50 N·m	37 lb ft
Starter Motor Shield		
• Bolt	3 N·m	27 lb in
• Nut	5 N·m	44 lb in
Throttle Body		
• Nut	10 N·m	89 lb in
• Stud	12 N·m	106 lb in
Upper Intake Manifold Bolt in Sequence		
• First Pass	8 N·m	71 lb in
• Final Pass	18 N·m	13 lb ft
Valve Lifter Guide Retainer Bolt	25 N·m	18 lb ft
Valve Rocker Arm Bolt	54 N·m	40 lb ft
Valve Rocker Arm Cover Bolt	12 N·m	106 lb in
Water Pump Bolt	40 N·m	30 lb ft
Water Pump Pulley Bolt	25 N·m	18 lb ft

Engine Component Description



Cylinder Block

The engine block is made of cast iron and it has eight cylinders arranged in a V shape with four cylinders in each bank. The cylinder block is a one piece casting with the cylinders encircled by coolant jackets.

Cylinder Head

The cylinder heads are cast iron and have parent metal inlet valve guides and inlet valve seats. Cast iron exhaust valve guides and powdered metal valve seats are pressed into the exhaust ports. A spark plug is located between the valves in the side of the cylinder head.

Camshaft

A steel camshaft is supported by five bearings pressed into the engine block. The camshaft sprocket, mounted to the front of the camshaft, is driven by the crankshaft sprocket through a camshaft timing chain.

Motion from the camshaft is transmitted to the valves by hydraulic roller valve lifters, valve pushrods, and ball-pivot type rocker arms. A spiral gear machined into the camshaft near the rear journal drives a shaft assembly which operates the oil pump driveshaft assembly.

Crankshaft

The crankshaft is made of cast nodular iron. The crankshaft is supported by five crankshaft bearings. The crankshaft bearings are retained by the crankshaft bearing caps, which are machined with the block for proper alignment and clearance. The engine crankshaft bearing caps are retained by four bolts each. The number five crankshaft bearing at the rear of the engine is the end thrust bearing. The four connecting rod journals (two rods per journal) are spaced 90 degrees apart. The crankshaft position sensor reluctor ring is pushed onto the front of the crankshaft. The crankshaft position sensor reluctor ring has four lugs used for crankshaft timing and it is constructed of powdered metal. The reluctor ring has an interference fit onto the crankshaft and an internal keyway for correct positioning.

Pistons and Connecting Rods

The pistons are cast aluminum alloy that use two compression rings and one oil control ring assembly. The piston pins are a floating fit in the pistons and they are retained by a press fit in the connecting rod assembly. Connecting rods are forged steel, with precision insert type crankpin bearings.

Valve Train

The valve train is a ball pivot type. Motion is transmitted from the camshaft through the hydraulic roller valve lifters and tubular valve pushrods to the valve rocker arms. The valve rocker arm pivots on a ball in order to open the valve. The hydraulic roller valve lifters keep all parts of the valve train in constant contact. Each lifter act as an automatic adjuster and maintains zero lash in the valve train. This eliminates the need for periodic valve adjustment. The valve rocker arm bolt retains the valve rocker arm and ball seat. The valve rocker arm bolt is threaded into the cylinder head.

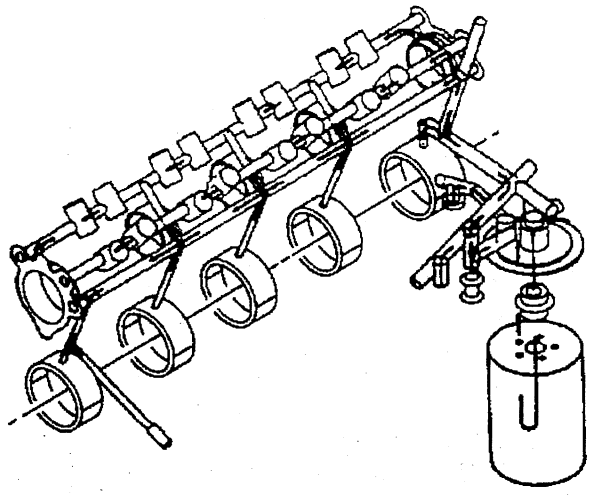
Intake Manifold

The intake manifold is a two-piece design. Both upper and lower portions are made of cast aluminum. The throttle body is attached to the upper manifold. A linear EGR port is cast into the upper intake manifold for exhaust gas recirculation mixture. The (EGR) valve bolts into the upper intake manifold. The fuel rail assembly with eight separate fuel injectors is retained to the intake manifold by six bolts. The injectors are seated in their individual manifold bores with O-ring seals to provide sealing. A Manifold Absolute Pressure (MAP) sensor is mounted at the front of the upper intake manifold and sealed by an O-ring seal. The MAP sensor is retained by a retainer.

Exhaust Manifold

The two exhaust manifolds are constructed of cast iron. The manifolds direct exhaust gases from the combustion chambers to the exhaust system. The manifolds have a threaded port for EGR inlet system pipe fittings. Some manifolds have a threaded port for AIR pipe connections.

Lubrication



The gear-type oil pump is driven through an extension driveshaft. The extension driveshaft is driven by the distributor which is gear driven by the camshaft. The oil is drawn from the oil pan through a pickup screen and tube. Pressurized oil is delivered through internal passages in order to lubricate camshaft and crankshaft bearings and to provide lash control in the hydraulic valve lifters. Oil is metered from the valve lifters through the valve pushrods in order to lubricate the valve rocker arms and ball pivots. Oil returning to the oil pan from the cylinder heads and the front camshaft bearing, lubricates the camshaft timing chain and the crankshaft and the camshaft sprockets.

Drive Belt Description and Operation

See Driver Belt Description and Operation in 5.7 & 5.7L section above.

Engine Cooling

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Coolant Crossover Housing to Cylinder Head Bolt or Stud (Diesel Engine)	42 N·m	31 lb ft
Coolant Outlet to Crossover Housing Bolt or Stud (Diesel Engine)	42 N·m	31 lb ft
Coolant Outlet to Intake Manifold Bolt or Stud (5.7L Engine)	28 N·m	21 lb ft
Coolant Outlet to Intake Manifold Bolt or Stud (7.4L Engine)	37 N·m	27 lb ft
Coolant Recovery Reservoir Bolts	10 N·m	89 lb in
Coolant Temperature Sensor	23 N·m	17 lb ft
Drive Belt Tensioner Bolt	50 N·m	37 lb ft
Engine Oil Cooler Line Bracket Bolt	9 N·m	71 lb in
Engine Oil Cooler Line Clamp Nut	13 N·m	115 lb in
Engine Oil Cooler Line Clip Bolt	6 N·m	53 lb in
Engine Oil Cooler Line Fittings	24 N·m	18 lb ft
Fan Clutch Nut to Water Pump Stud (5.7L Engine)	56 N·m	41 lb ft
Fan Clutch Nut to Water Pump Stud (6.5L Engine)	59 N·m	44 lb ft
Fan Clutch to Water Pump Stud Nuts	24 N·m	18 lb ft
Fan to Fan Clutch Bolts and Nuts (7.4L Engine)	24 N·m	18 lb ft
Fan to Fan Clutch Bolts (5.7L and 6.5L Engines only)	23 N·m	17 lb ft
Hose Support Bolt (5.7L Engine)	15 N·m	11 lb ft
Idler Pulley Bolt	50 N·m	37 lb ft
Lower Fan Shroud Bolts	9 N·m	71 lb in
Radiator Hose Clamps (Diesel Engine)	3 N·m	27 lb in
Radiator Inlet Hose Support Bolt (5.7L and 7.4L Engines only)	3 N·m	27 lb in
Radiator Inlet Hose Support Bolt (Diesel Engine)	9 N·m	71 lb in
Upper Fan Shroud Bolts	9 N·m	71 lb in
Water Pump Bolts (Gasoline Engine)	41 N·m	30 lb ft
Water Pump Plate to Block Bolts (Diesel Engine)	23 N·m	17 lb ft
Water Pump Plate to Block Studs (Diesel Engine)	23 N·m	17 lb ft
Water Pump Plate to Water Pump Bolt (Diesel Engine)	23 N·m	17 lb ft
Water Pump to Block Bolts (Diesel Engine)	23 N·m	17 lb ft
Water Pump to Block Bolts (Diesel Engine)	42 N·m	31 lb ft
Water Pump to Block Stud (Diesel Engine)	42 N·m	31 lb ft

Cooling System Description and Operation

Coolant Heater

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

Cooling System

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

Cooling Cycle

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

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

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

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

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

Coolant

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

Radiator

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

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

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

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

Pressure Cap

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

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

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

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

Coolant Recovery System

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

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

Air Baffles and Seals

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

Water Pump

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

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

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

Thermostat

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

When the coolant temperature is below the rated thermostat opening temperature, the thermostat valve remains closed. This prevents circulation of the coolant to the radiator and allows the engine to warm up. After the coolant temperature reaches the rated thermostat opening temperature, the thermostat valve will open. The coolant is then allowed to circulate through the thermostat to the radiator where the engine heat is dissipated to the atmosphere. The thermostat also provides a restriction in the cooling system,

after it has opened. This restriction creates a pressure difference which prevents cavitation at the water pump and forces coolant to circulate through the engine block.

Engine Oil Cooler

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

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

Transmission Oil Cooler

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

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

Engine Electrical

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Auxiliary Battery Tray Retaining Bolt A	23 N·m	17 lb ft
Battery Retainer Hold Down Bolt	23 N·m	17 lb ft
Camshaft Position (CMP) Sensor Screws	2.2 N·m	20 lb in
Distributor Cap Screws	2.5 N·m	22 lb in
Distributor Clamp Bolt	25 N·m	18 lb ft
Distributor Rotor Screws	2 N·m	18 lb in
Generator BAT Terminal Nut	20 N·m	15 lb ft
Generator Bottom Bracket Bolt (5.0L, 5.7L)	50 N·m	37 lb ft
Generator Bottom Bracket Bolt (6.5)	23 N·m	17 lb ft
Generator Bottom Bracket Bolt (7.4L)	25 N·m	18 lb ft
Generator Pulley Nut (CS-130D)	100 N·m	80 lb ft
Generator Pulley Nut (CS-144)	100 N·m	74 lb ft
Generator Top Bracket Bolt (4.3L, 5.0L, 5.7L, 6.5L)	25 N·m	18 lb ft
Generator Top Bracket Bolt (7.4L)	50 N·m	37 lb ft
Ignition Coil Hold Down Stud	11 N·m	8 lb ft
Ignition Coil Bolts (Vin J)	27 N·m	22 lb ft
Negative Battery Cable Terminal Nut	17 N·m	44 lb in
Positive Battery Terminal Nut	17 N·m	44 lb in
Battery Tray Mounting Bolt	25 N·m	22 lb in
Spark Plugs (New Cylinder Head)	30 N·m	22 lb ft
Spark Plugs (Used Cylinder Head)	20 N·m	15 lb ft
Starter Bracket Nut (Diesel)	8 N·m	71 lb in
Starter Brush Screws (MT-Series, Diesel)	1.5 N·m	13 lb in
Starter Brush Plate Screws (MT-Series, Diesel)	2.5 N·m	22 lb in
Starter Drive Housing Bolts (MT-Series, Diesel)	8.5 N·m	75 lb in
Starter Heat Shield Bolt (MT-Series, Diesel)	17 N·m	13 lb ft
Starter Motor Mounting Bolt (MT-Series, Diesel)	50 N·m	37 lb ft
Starter Motor Mounting Bolt (PG260-Series, Gas)	43 N·m	32 lb ft

Starter Shift Lever Nut (MT-Series, Diesel)	4.5 N·m	40 lb in
Starter Solenoid Clamp Screw	11 N·m	100 lb in
Starter Solenoid Field Lead Nut (SD-Series)	11 N·m	100 lb in
Starter Solenoid Motor Terminal Nut (MT-Series, Diesel)	11 N·m	100 lb in
Starter Solenoid Screws (MT-Series, Diesel)	2.8 N·m	25 lb in

Battery Usage

Engine Application	Option	OE Catalog	CCA Rating (Amperes)	RC Rating (Minutes)	Load Test (Amperes)	Replacement Catalog No.
5.7L (L31)	base	810	600	115	300	78-6YR
5.7L (L31)	w/Z56	814	770	115	390	78-7Yr
6.5L (L65)	base	810	600	115	300	78-6YR
6.5L (L65)	w/YF2	812	690	115	350	78-7YR
7.4L (L29)	All	810	600	115	300	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 Load Test @ 10 Volts 28-MT

Engine Type	Starter Type	Load Test @ 10 Volts AMPS Minimum	Load Test @ 10 Volts AMPS Maximum	Load Test @ 10 Volts RPM Minimum	Load Test @ 10 Volts RPM Maximum
Diesel Engine	28-MT	125 AMPS	190 AMPS	3,000 RPM	5,600 RPM

Starter Motor Usage Load Test @ 10 Volts Specs. PG-260

Engine Type	Starter Type	Load Test @ 10 Volts AMPS Minimum	Load Test @ 10 Volts AMPS Maximum	Load Test @ 10 Volts RPM Minimum	Load Test @ 10 Volts RPM Maximum
Gasoline Engine	PG260	47 AMPS	70 AMPS	6,500 RPM	11,000 RPM

Generator Usage

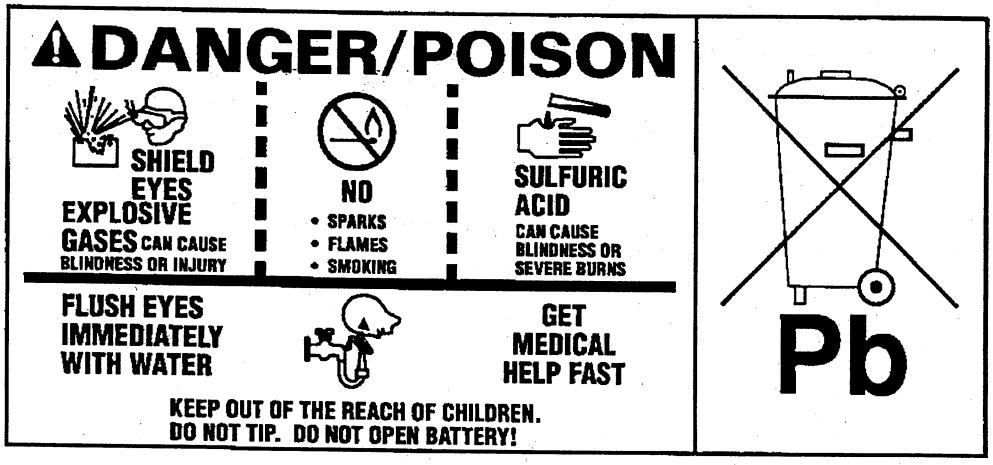
Generator Model	Engine	Option Code	Rated Output AMPS	Load Test Output AMPS
CS130D	5.7L, 6.5L	K60	100 A	70 A
CS130D	5.7L, 6.5L	K68	105 A	73 A
CS144	5.7L, 6.5L, 7.4L	KW2	124 A	86 A
CS144	5.7L, 6.5L, 7.4 L	KG9	140 A	98 A

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.**



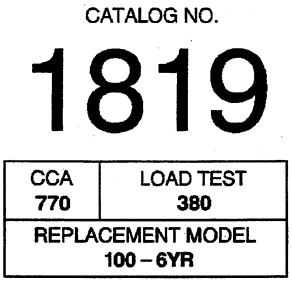
The maintenance free battery is standard. There are no vent plugs in the cover. The battery is completely sealed except for two small vent holes in the side. These vent holes allow the small amount of gas that is produced in the battery to escape.

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

Cranking Circuit

The cranking circuit consists of the battery, the starter motor, the ignition switch, and related electrical wiring. There is a fusible link in the wire running from the starter solenoid to the generator. For more information on the cranking circuit, refer to Cranking System Operation.

Starter Motor

The PG-260 starter motor achieves gear reduction at the rate of 5:1 through planetary gears. It's relatively small size and light weight offer improved cranking performance and reduced current requirements.

Solenoid windings are energized when the ignition switch is turned to the START position and the transmission is in the NEUTRAL or PARK. The plunger and shift lever movement causes the pinion to mesh with the engine flywheel ring gear, the solenoid main contacts to close, and the engine cranks. When the engine starts, the pinion overrunning clutch protects the armature from excessive speed until the key is released, at which time the plunger return spring causes the pinion to disengage. To prevent excessive overrunning, the key should be released immediately when the engine starts.

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.

Engine Controls

Engine Controls – 5.0 & 5.7L

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Air Inlet Duct Retaining Nut	2 N·m	18 lb in
Coolant Hose Nipple	17 N·m	13 lb ft
EGR Tube Retaining Bolt	25 N·m	18 lb ft
EGR Valve Attaching Bolts	25 N·m	18 lb ft
Fuel Pipe Nuts	30 N·m	22 lb ft
Fuel Pipe Retaining Nuts	3 N·m	27 lb in
Fuel Rail Attaching Bolts: Center Bolts	10 N·m	8 lb ft
Fuel Rail Attaching Bolts: Front Stud	25 N·m	18 lb ft
Fuel Rail Attaching Bolts: Rear Bolts	10 N·m	8 lb ft
Idle Air Control Attaching Screws	3 N·m	26 lb in
Intake Plenum Bolts	25 N·m	18 lb ft
Power Brake Fitting	13 N·m	115 lb in
Pressure Regulator Screw	9 N·m	84 lb in
Rear Fuel Line Bracket Retaining Bolts	6 N·m	53 lb in
Throttle Body Attaching Nuts	25 N·m	18 lb ft
Throttle Cable Bracket Bolts	25 N·m	18 lb ft
Throttle Position Screws	2 N·m	18 lb in
Upper Manifold Bolts	10 N·m	90 lb in
Upper Manifold Nuts	10 N·m	90 lb in
Vacuum Module Attaching Bolts	10 N·m	88 lb in

Fuel System Specifications

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

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

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

Notice

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

If your vehicle is certified to meet California Emission Standards, indicated on the under hood emission control label, your vehicle is designed to operate on fuels that meet California specifications. If such fuels are not available in states adopting California emissions standards, your vehicle will operate satisfactorily on fuels meeting federal specifications, but emission control system performance may be affected. The

malfunction indicator lamp on your instrument panel may turn ON and/or your vehicle may fail a smog-check test. If this occurs, return to your authorized dealer for diagnosis to determine the cause of failure. In the event there is a determination that the cause of the condition is the type of fuels used, repairs may not be covered by your warranty.

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

Engine Controls – 6.5L Turbo Diesel

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Air Filter Screws	2.8 N·m	25 lb in
Boost (BARO) Sensor Mounting Bolts	3.5 N·m	27 lb in
Crankshaft Position Sensor Mounting Bolt	25 N·m	18 lb ft
Driven Gear to Injection Pump Bolts	25 N·m	18 lb ft
EGR Control Pressure/BARO Sensor	3.5 N·m	27 lb in
Engine Control Temperature Sensor	25 N·m	18 lb ft
Frame Mounted Bracket Nuts	33 N·m	25 lb ft
Fuel Feed Pipe and Suction Pipe to Fuel Pump	30 N·m	22 lb ft
Fuel Manager/Filter to Intake Manifold Bolts	25 N·m	18 lb ft
Fuel Tank Filter Neck Clamp	2.5 N·m	25 lb in
Fuel Tank Off-Road Shield Bolts	35 N·m	26 lb ft
Injection Lines to Nozzle Fittings	25 N·m	18 lb ft
Injection Pump Flange Nuts	40 N·m	30 lb ft
Injection Nozzle	70 N·m	50 lb ft
Intake Air Temperature Sensor	25 N·m	18 lb ft
Upper Intake Manifold Cover Bolts	11 N·m	100 lb in
Water in Fuel Sensor Mounting Screws	2 N·m	13 lb in

Fuel System Specifications

Some states and provinces have restrictions on the purchase of diesel fuel for light duty vehicles and require you to buy permits or pay special taxes. Some of these restrictions apply to residents, and others apply to both residents and visitors. These restrictions can change. To learn the current restrictions in any state or province, contact your auto club, the police or other officials.

What Fuel to Use in the United States

In the United States, for best results use Number 2-D diesel fuel year-round (above and below freezing conditions) as oil companies blend Number 2-D fuel to address climate differences. Number 1-D diesel fuel may be used in very cold temperatures (when it stays below 0°F or -18°C); however, the fuel will produce a power and fuel economy loss. The use of Number 1-D diesel fuel in warm or hot climates may result in stalling, poor starting when the engine is hot and may damage the fuel injection system.

Diesel fuel may foam when filling the tank. This can cause the automatic pump nozzle to shut off, even though the tank isn't full. If this happens, just wait for the foaming to stop and then continue to fill the tank.

What Fuel to Use in Canada

Canadian fuels are blended for seasonal changes. Diesel Type A fuel is blended for better cold weather starting (when it stays below 0°F or -18°C); however, the fuel will produce a power and fuel economy loss. The use of Type A diesel fuel in warmer climates may result in stalling, poor starting. Diesel Type B fuel is blended for temperatures above 0°F (-18°C). The emission control system requires the use of diesel fuel with low sulfur (0.05% by weight) content. Both low and higher sulfur fuels will be available in

Canada. Only low sulfur diesel fuels are available in the United States. It is important that diesel-powered trucks are refueled only with low sulfur fuel. Use of fuels with higher-sulfur content will affect the function of the emission components and may caused reduced performance, excessive smoke and unpleasant odor.

Very Cold Weather Operation

If the vehicle is driven in very cold temperatures and can't get a winterized Number 2-D that has been adapted to cold weather or a Number 1-D, use one gallon of kerosene for every two gallons of diesel fuel. Once you add kerosene, run the engine for several minutes to mix the fuels. Only add kerosene when the temperature falls below 0°F (-18°C), because the fuel economy and lubricating qualities of kerosene isn't as good as that of diesel fuel.

In cold weather , the fuel filter may become clogged (waxed). To unclog the filter, move the vehicle to a warm garage area and warm the filter to a temperature between 32°-50°F (0°-10°C). Replacing the filter is not necessary.

Water in Fuel

Sometimes, water can be pumped into the fuel tank along with diesel fuel. This can happen if the service station doesn't regularly inspect and clean their fuel tanks, or the fuel gets contaminated for the service stations suppliers.

If water is pumped into the fuel tank, a water in fuel light will illuminate. If the water in fuel light illuminates, the excess water must be drained from the fuel system on the vehicle.

The water in fuel light also should illuminate briefly when the engine is started as a check. If the light doesn't illuminate, the problem should be fixed to identify a water in fuel condition correctly.

Engine Controls – 7.4L

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Air Inlet Duct Retaining Nut	2 N·m	18 lb in
Coolant Hose Nipple	17 N·m	13 lb ft
EGR Tube Retaining Bolt	25 N·m	18 lb ft
EGR Valve Attaching Bolts	25 N·m	18 lb ft
Fuel Pipe Nuts	30 N·m	22 lb ft
Fuel Pipe Retaining Nuts	3 N·m	27 lb in
Fuel Rail Attaching Bolts: Center Bolts	10 N·m	8 lb ft
Fuel Rail Attaching Bolts: Front Stud	25 N·m	18 lb ft
Fuel Rail Attaching Bolts: Rear Bolts	10 N·m	8 lb ft
Idle Air Control Attaching Screws	3 N·m	26 lb in
Intake Plenum Bolts	25 N·m	18 lb ft
Power Brake Fitting	13 N·m	115 lb in
Pressure Regulator Screw	9 N·m	84 lb in
Rear Fuel Line Bracket Retaining Bolts	6 N·m	53 lb in
Throttle Body Attaching Nuts	25 N·m	18 lb ft
Throttle Cable Bracket Bolts	25 N·m	18 lb ft
Throttle Position Screws	2 N·m	18 lb in
Upper Manifold Bolts	10 N·m	90 lb in
Upper Manifold Nuts	10 N·m	90 lb in
Vacuum Module Attaching Bolts	10 N·m	88 lb in

Fuel System Specifications

See Fuel System Specifications in 5.0L & 5.7L section above

Exhaust System

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Crossover Pipe to Manifold Bolt (Diesel Engine)	34 N·m	25 ft
Exhaust Hanger to Frame Crossmember Bolt	34 N·m	25 ft
Exhaust Hanger to Frame Nut	35 N·m	26 ft
Exhaust Manifold Nuts (Diesel Engine)	65 N·m	48 ft
Exhaust Manifold Stud (Diesel Engine)	22 N·m	16 ft
Exhaust V-Band Clamp (Diesel Engine)	12 N·m	106 in
Flange Stud Nuts (Diesel Engine)	64 N·m	47 ft
Flange Stud Nuts (Gasoline Engine)	64 N·m	47 ft
Resonator Flange seal nuts (Export)	34 N·m	25 ft
Tailpipe Hanger to Frame Nut	48 N·m	35 ft
U-Bolt Nuts	42 N·m	31 ft

Exhaust System Description

Important

Use of non-OEM parts may cause driveability concerns.

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

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

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

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

Resonator

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

Catalytic Converter

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

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

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

The catalyst in the converter is not serviceable.

Muffler

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

Transmission/Transaxle Description and Operation

Manual Transmission - NV 4500

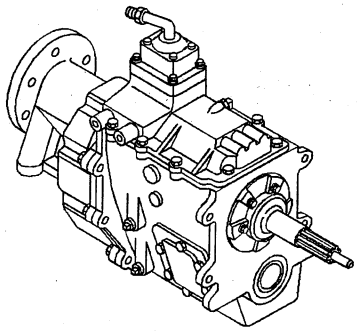
Fastener Tightening Specifications

Application	Specification	
	Metric	English
Backup Lamp Switch	28 N·m	21 lb ft
Clutch Cover Bolts	14 N·m	10 lb ft
Extension Housing to Case Bolts	54 N·m	40 lb ft
Main Drive Gear Bearing Retainer Bolts	35 N·m	26 lb ft
Mainshaft/Yoke Nut	441 N·m	325 lb ft
Oil Fill and Drain Plugs	37 N·m	27 lb ft
Shift Boot Screws	2 N·m	18 lb in
Shift Housing to Transmission Bolts	10 N·m	89 lb in
Shift Lever Nut	47 N·m	35 lb ft
Speed Sensor	20 N·m	15 lb ft
Transmission Support Bracket Bolts	100 N·m	74 lb ft
Transmission to Engine Bolts and Studs	50 N·m	37 lb ft
Transmission to Engine Cover Bolts	14 N·m	10 lb ft

Lubrication Specifications

Recommended Lubricant	Specification	
	Metric	English
Castrol Syntorq LT Transmission Fluid GM P/N 12346190	3.78 liters	4.0 quarts

Description and Operation



The New Venture Gear NV4500 (109 mm) is a five speed manual transmission used on light duty trucks. This manual transmission is identified by the RPO MW3. The 109 mm is the distance between the input shaft and the counter shaft. The transmission is available in rear wheel and four wheel drive versions.

The transmission has the following features:

- Made from cast iron for durability
- Synchronized shifting in all forward gears
- Constant mesh helical gearing for reduced noise
- Overspeed inhibitor from low to second speed gears
- Dual cone low speed gear and 2nd speed gear synchronizer
- Multiple ring sychronizers for smooth shifting

Automatic Transmission – 4L60E

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	C/K, C/K 800, F, G, M/L, S/T, Y
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 Fluid Capacity (Approximate)	245 mm Converter Dry: 8.3 l (8.8 qt) 258 mm Converter Dry: 8.8 l (9.3 qt) 298 mm Converter Dry: 11.25 l (11.9 qt) 300 mm Converter Dry: 11.50 l (12.1 qt)
Transmission Type: 4	Four Forward Gears
Transmission Type: L	Longitudinal Mount
Transmission Type: 60	Product Series
Transmission Type: E	Electronic Controls
Position Quadrant	P, R, N, Overdrive, D, 2, 1 P, R, N, Overdrive, 3, 2, 1
Case Material	Die Cast Aluminum
Transmission Weight Dry (Approximate)	245 mm Converter 65.4 kg (144.30 lb) 258 mm Converter 79.9 kg (176.6 lb) 298 mm Converter 70.5 kg (155.70 lb) 300 mm Converter 86.17 kg (190.5 lb)
Transmission Weight Wet (Approximate)	245 mm Converter 72.4 kg (159.55 lb) 258 mm Converter 89.2 kg (197.7 lb) 298 mm Converter 80.5 kg (176.16 lb) 300 mm Converter 98.4 kg (218.0 lb)
Maximum Trailer Towing Capacity	6 130 kg (13,500 lb)
Maximum Gross Vehicle Weight (GVW)	3 900 kg (8,600 lb)

Fastener Tightening Specifications

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

Fluid Capacity Specifications

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

Range Reference

Range	Park	Rev.	Neutral	OD				D			2		1	
Gear				1st	2nd	3rd	4th	1st	2nd	3rd	1st**	2nd	1st	2nd***
1-2 Shift Solenoid	ON*	ON*	ON*	ON	OFF	OFF	ON	ON	OFF	OFF	ON	OFF	ON	OFF
2-3 Shift Solenoid	ON*	ON*	ON*	ON	ON	OFF	OFF	ON	ON	OFF	ON	ON	ON	ON
2-4 Band	–	–	–	–	A	–	A	–	A	–	–	A	–	A
Reverse Input Clutch	–	A	–	–	–	–	–	–	–	–	–	–	–	–
Overrun Clutch	–	–	–	–	–	–	–	–	–	A	A	A	A	A
Forward Clutch	–	–	–	A	A	A	A	A	A	A	A	A	A	A
Forward Sprag Clutch Assembly	–	–	–	H	H	H	–	H	H	H	H	H	H	H
3-4 Clutch	–	–	–	–	–	A	A	–	–	A	–	–	–	–
Lo/Roller Clutch	–	–	–	H	–	–	–	H	–	–	H	–	H	–
Lo/Rev Clutch	A	A	–	–	–	–	–	–	–	–	–	–	A	–

- A = Applied
- H = Holding
- ON = The solenoid is energized.
- OFF = The solenoid is de-energized.
- *Shift Solenoid state is a function of vehicle speed and may change if the vehicle speed increases sufficiently in Park, Reverse or Neutral. However, this does not affect the operation of the transmission.
- **Manual Second-First gear is electronically prevented under normal operating conditions.
- ***Manual First-Second gear is only available above approximately 48-56 km/h (30-35 mph).

Shift Speed

		1-2 Shift @ +/- 250 RPM Output Shaft Speed			2-3 Shift @ +/- 200 RPM Output Shaft Speed			3-4 Shift @ +/- 150 RPM Output Shaft Speed			3-1 @ +/- 100 RPM Output Shaft Speed	3-2 @ +/- 100 RPM Output Shaft Speed	3-1 Wide Open Throttle Shift	2-3 Wide Open Throttle Shift	MIN TCC Apply @ 12% Throttle (RPM)
% of TPS		12	25	50	12	25	50	12	25	50					
Trans Cal	Axle	--			--			--			--	--	--	--	--
4.3L (L35)															
A	3.08	488	619	1125	863	1132	1875	1219	1538	2438	N/A	713	1388	5000	1575
B	3.42/3.73	485	612	1055	865	1139	1878	1224	1540	2448	N/A	717	1393	5000	1583
C	3.73	492	603	1118	849	1140	1855	1207	1520	2414	N/A	715	1363	5000	1565
4.8L (LR4)															
A	3.42	470	608	1039	862	1058	1666	1215	1588	2548	N/A	745	1392	5200	1686
B	3.73	461	608	1027	838	1068	1676	1215	1571	2535	N/A	733	1383	5200	1697
C	4.10	479	616	1049	866	1072	1687	1231	1596	2554	N/A	752	1368	5200	1710
5.0L (L30)															
A	3.42	445	600	1084	871	1064	1742	1180	1509	2438	N/A	735	1355	5000	1548
B	3.42/3.73	444	592	1079	867	1058	1738	1187	1505	2438	N/A	784	1336	5000	1590
C	3.73	489	606	1072	932	1072	1747	1188	1514	2446	N/A	862	1305	5000	1584

5.3L (LM7)															
A	3.42	475	614	1049	871	1069	1683	1228	1604	2574	N/A	752	1406	5200	1703
B	3.73	454	599	1012	826	1053	1652	1198	1549	2499	N/A	723	1363	5200	1673
C	4.10	488	628	1070	884	1093	1721	1256	1628	2604	N/A	767	1395	5200	1744
5.7L (L31)															
A	3.08/3.42	445	600	1084	871	1064	1741	1180	1509	2438	N/A	735	1355	5000	1548
B	3.42/3.73	445	594	1081	869	1060	1738	1187	1505	2438	N/A	784	1336	5000	1590
Lux B	3.73	443	590	1075	927	1138	1897	1433	1812	2655	N/A	843	1328	5000	1939
C	3.73	489	606	1072	932	1072	1747	1188	1514	2446	N/A	862	1305	5000	1584
A Police	3.08	439	592	1070	860	1051	1719	1165	1490	2407	N/A	726	1337	5000	1528
5.7L (L05) CPD															
A	3.42	488	692	895	855	1302	1791	1241	1669	2483	N/A	733	1058	4200	1750

Shift Solenoid Valve State and Gear Ratio

Gear	1-2 Shift Solenoid	2-3 Shift Solenoid	Gear Ratio
1	ON	ON	3.059:1
2	OFF	ON	1.625:1
3	OFF	OFF	1.000:1
4	ON	OFF	0.696:1

Transmission Component and System Description

The 4L60E transmission consists primarily of the following components:

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

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

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

Adapt Function

Transmission Adapt Function

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

- The clutch fiber plates
- The seals
- The springs

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

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

Automatic Transmission Shift Lock Control Description

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

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

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

Automatic Transmission – 4L80E

Transmission General Specifications

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

Fastener Tightening Specifications

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

Solenoid to Valve Body	8 N·m	71 lb in
Speed Sensor and Bracket Assembly to Case	11 N·m	97 lb in
Transmission Case to Engine	44 N·m	32 lb ft
Valve Body to Case/Lube Pipe	11 N·m	97 lb in
Valve Body to Case/PSM	11 N·m	97 lb in

Fluid Capacity Specifications Overhaul

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

Range Reference

Range	Park	Reverse	Neutral	OD				D			2		1	
Gear	N	R	N	1st	2nd	3rd	4th	1st	2nd	3rd	1st	2nd	1st	2nd
***1-2 Shift Solenoid*	ON	ON	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	OFF	ON	OFF
***2-3 Shift Solenoid*	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	ON	OFF	OFF	OFF	OFF
Fourth Clutch	--	--	--	--	--	--	A	--	--	--	--	--	--	--
Overrun Clutch	--	--	--	--	--	--	--	A	A	A	A	A	A	A
Overdrive Roller Clutch	H	H	H	H	H	H	OR	A	A	A	A	A	A	A
Forward Clutch	--	--	--	A	A	A	A	A	A	A	A	A	A	A
Direct Clutch	--	A	--	--	--	A	A	--	--	A	--	--	--	--
Front Band	--	--	--	--	--	--	--	--	--	--	--	A	--	A
Intermediate Sprag Clutch	--	--	--	*	H	OR	OR	*	H	OR	*	H	*	H
Intermediate Clutch	--	--	--	--	A	A	A	--	A	A	--	A	--	A
Lo Roller Clutch	--	--	--	H	OR	OR	OR	H	OR	OR	H	OR	H	OR
Rear Band	--	A	--	--	--	--	--	--	--	--	--	--	A	--

- A = Applied
- H = Holding
- OR = Overrunning
- * = Holding, but not effective
- ON = The solenoid is energized.
- OFF = The solenoid is de-energized.
- ** = The state of the solenoid follows a shift pattern, which depends upon vehicle speed and throttle position. The pattern does not depend upon the selected gear.

Shift Speed

		1-2 Shift Output Shaft Speed +/- 150 RPM			2-3 Shift Output Shaft Speed +/- 150 RPM			3-4 Shift Output Shaft Speed +/- 150 RPM			3-2 Shift Output Shaft Speed Zero TPS	2-1 Shift Output Shaft Speed Zero TPS	1-2 WOT Output Shaft Speed RPM	2-3 WOT Output Shaft Speed RPM
% of TPS		10	25	50	10	25	50	10	25	50	0	0	100	100
Model	RPO													
5.7L	L31	516	698	1070	930	1209	2093	1558	2093	3953	698	419	1674	3232
6.5L	L65	465	628	1023	744	1232	1790	1279	1721	2883	651	395	1163	2093
7.4L	L29	488	721	1302	930	1349	2325	1395	1907	3581	814	419	1674	3069

Transmission General Description

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

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

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

Clutch

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Clutch Housing Cover Bolts	12 N·m	9 lb ft
Clutch Pedal to Brake Support Module Bolt	50 N·m	37 lb ft
Clutch Plate to Flywheel Bolts	41 N·m	30 lb ft
Actuator Cylinder Bolts	8 N·m	71 lb in

Principal Components

The following are the principal components of the clutch system:

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

Clutch Driving Members

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

Clutch Driven Members

The driven member (friction or clutch disc) consists of a hub and a plate, with facings attached to the plate. The clutch disc has cushion springs and dampening springs. The cushion springs are slightly waved, or curled. The cushion springs are attached to the plat, and the clutch facings are attached to the springs. When the clutch is engaged, the cushion springs compress slightly to take up the shock of engagement. The dampening springs are heavy coil springs set in a circle around the hub. The hub is driven through these springs. They help to smooth out the torsional vibration so that the power flow to the transmission is smooth. There are grooves in both sides of the clutch disc facings. These grooves prevent the facings from sticking to the flywheel face and pressure plate when the clutch is disengaged. The grooves break any vacuum that might form and cause the facings to stick to the flywheel ore pressure plate.

Clutch Operating Members

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

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

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

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

Hydraulic Clutch Description

Principal Components

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

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

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

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

Clutch Driving Members

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

Clutch Driven Members

The driven member (friction or clutch disc) consists of a hub and a plate, with facings attached to the plate. The clutch disc has cushion springs and dampening springs. The cushion springs are slightly waved, or curled. The cushion springs are attached to the plat, and the clutch facings are attached to the springs. When the clutch is engaged, the cushion springs compress slightly to take up the shock of engagement. The dampening springs are heavy coil springs set in a circle around the hub. The hub is driven through these springs. They help to smooth out the torsional vibration so that the power flow to the transmission is smooth. There are grooves in both sides of the clutch disc facings. These grooves prevent the facings from sticking to the flywheel face and pressure plate when the clutch is disengaged. The grooves break any vacuum that might form and cause the facings to stick to the flywheel ore pressure plate.

Clutch Operating Members

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

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

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Hydraulic Clutch Description

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

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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

Fraction (in)	Decimal (in)	Metric (mm)
5/8	0.625	15.875
41/64	0.640625	16.27187
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

Fasteners

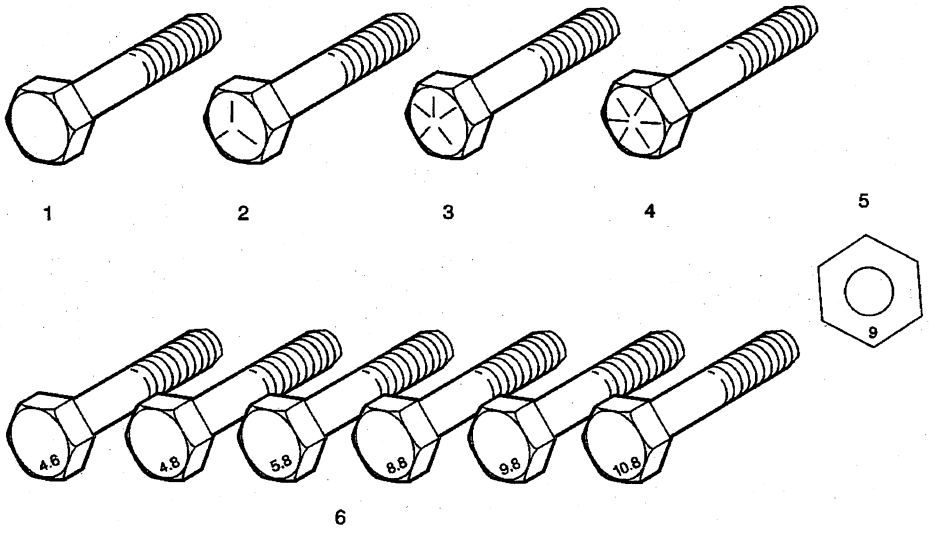
Metric Fasteners

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

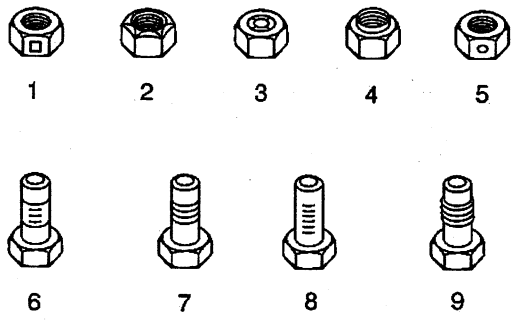
These fasteners accomplish the thread interface by a designed distortion or deformation in the fastener.

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