

SECTION 0A

GENERAL INFORMATION

CAUTION: This vehicle has a Supplemental Inflatable Restraint (SIR) System. Refer to the SIR Component and Wiring Location view in order to determine whether you are performing service on or near the SIR components or the SIR wiring. When you are performing service on or near the SIR components or the SIR wiring, refer to the SIR On-Vehicle Service information. Failure to follow the CAUTIONS could cause air bag deployment, personal injury, or unnecessary SIR system repairs.

NOTICE: Always use the correct fastener in the proper location. When you replace a fastener, use **ONLY** the exact part number for that application. General Motors will call out those fasteners that require a replacement after removal. General Motors will also call out the fasteners that require thread lockers or thread sealant. **UNLESS OTHERWISE SPECIFIED, do not use supplemental coatings (paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.**

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0A-2 GENERAL INFORMATION

SUPPLEMENTAL INFLATABLE RESTRAINT (SIR) HANDLING

CAUTION: This vehicle has a Supplemental Inflatable Restraint (SIR) System. Refer to the SIR Component and Wiring Location view in order to determine whether you are performing service on or near the SIR components or the SIR wiring. When you are performing service on or near the SIR components or the SIR wiring, refer to the SIR On-Vehicle Service information. Failure to follow the CAUTIONS could cause air bag deployment, personal injury, or unnecessary SIR system repairs.

Refer to CAUTIONS and the SIR Component and Wiring Location view in SECTION 9J when performing service on or around SIR components or SIR wiring. SIR equipped vehicles can be identified by:

- Steering wheel hub marked "INFLATABLE RESTRAINT."
- "INFLATABLE RESTRAINT" indicator lamp in the instrument cluster.
- Code "2" for the seventh digit of the vehicle identification number (VIN).

WHEN TO DISCONNECT THE NEGATIVE BATTERY CABLE

CAUTION: Before removing or installing any electrical unit, or when a tool or equipment could easily come in contact with "live" exposed electrical terminals, disconnect the negative battery cable to help prevent personal injury and/or damage to the vehicle or components. Unless instructed otherwise, the ignition switch must be in the "OFF" or "LOCK" position.

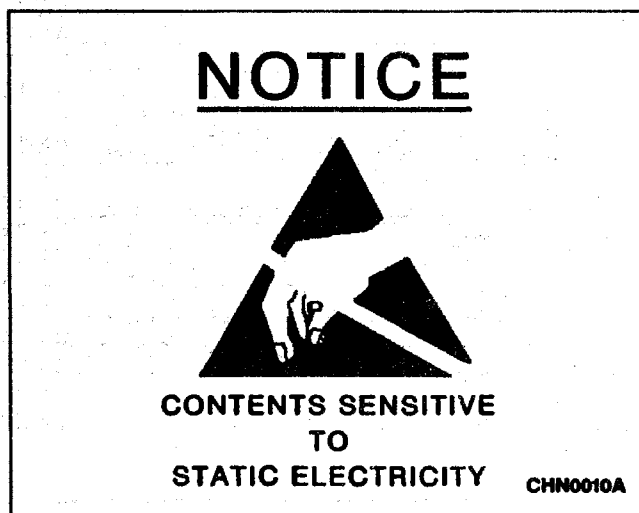


Figure 1—Electrostatic Discharge Label

HANDLING ELECTROSTATIC DISCHARGE (ESD) SENSITIVE PARTS

Many solid state electrical components can be damaged by Electrostatic Discharge (ESD). Some will display a label, but many will not (Figure 1).

In order to avoid possibly damaging any components, observe the following:

1. Body movement produces an electrostatic charge. To discharge personal static electricity, touch a ground point (metal) on the vehicle. This should be done any time you:
 - Slide across the seat.
 - Sit down or get up.
 - Do any walking.
2. Do not touch exposed electric terminals on components with your finger or any tools. Remember, the connector that you are checking might be tied into a circuit that could be damaged by electrostatic discharge.
3. When using a screwdriver or similar tool to disconnect a connector, never let the tool come in contact with or come between the exposed terminals.
4. Never jumper, ground, or use test equipment probes on any components or connectors unless specified in diagnosis. When using test equipment, always connect the ground lead first.
5. Do not remove the solid state component from its protective packaging until you are ready to install the part.
6. Always touch the solid state components package to a ground before opening. Solid state components can also be damaged if:
 - They are bumped or dropped.
 - They are laid on any metal work benches or components that operate electrically, such as a TV, radio, or oscilloscope.

REPLACEMENT LABELS

Replacement labels are available through GM Service Parts Operations (SPO) for the following:

- Vehicle Emission Control Information (Exhaust Emission Tune-Up)
- Spare Wheel Caution
- Jacking
- Spare Tire Storage
- Serpentine Belt Routing
- Engine Fan Caution

These and other labels will be found in the Standard Parts Catalog.

The Vehicle Certification Label, Tire Pressure Label, and Service Parts Identification Label are NOT available as service parts.

SERVICE PARTS IDENTIFICATION LABEL

The Service Parts Identification Label has been developed and placed on the vehicle to aid service and parts personnel in identifying parts and options originally installed on the vehicle (Figure 2).

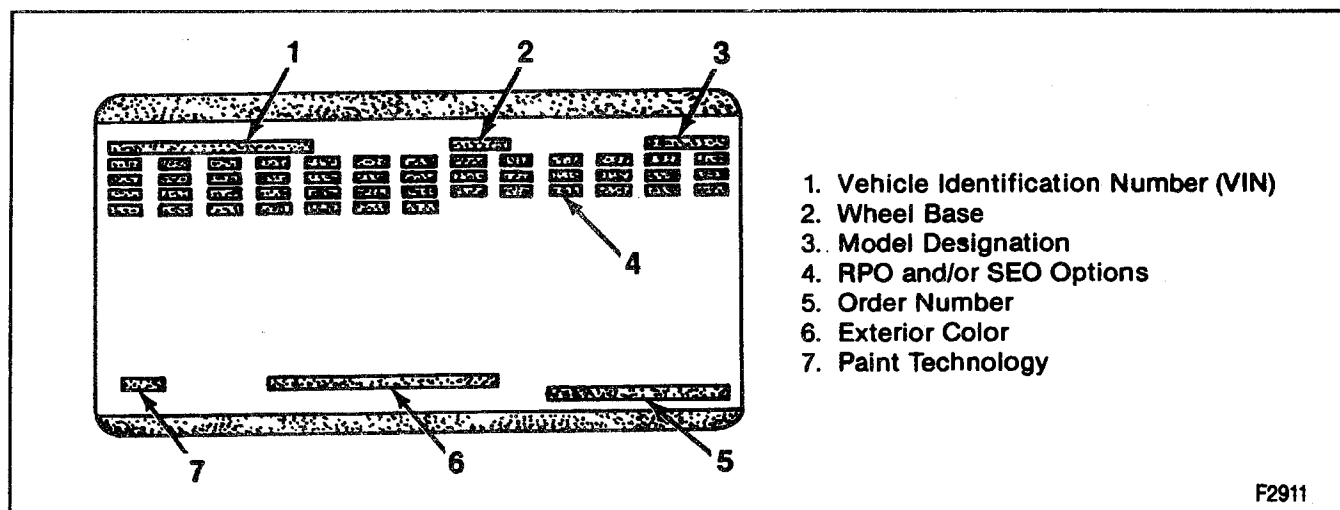


Figure 2—Service Parts Identification Label

SPECIAL TOOL ORDERING INFORMATION

Special service tools shown in this service manual that have tool product numbers beginning with "J" or "BT" are available for worldwide distribution from:

Kent-Moore
Automotive Group
SPX Corporation
28635 Mound Road
Warren, MI 48092-3499
1-800-345-2233
Mon. - Fri. 8:00 a.m. - 7:00 p.m. EST
Telex: 244040 KMTR UR
Fax: 800-578-7375

General Motors dealers can purchase TECH II® scan tools and accessories through:

GM Dealer Equipment
1-800-GM-TOOLS
Mon. - Fri. 8:00a.m. to 7:00 p.m. EST.

Non General Motors dealer repair facilities can purchase TECH II® scan tools and accessories from Kent-Moore at the above address.

DIAGNOSTIC WORKSHEET

A GM Diagnosis Worksheet has been designed to improve communications between the service customer and the technician. The diagnostic worksheet does provide the technician with more information than the conventional repair order, since it is filled out by the service customer. The GM Diagnostic Worksheets are available to you at no cost. GM Service Bulletin 58-01-01 has information on how to order this diagnostic worksheet.

VEHICLE CERTIFICATION LABEL

The vehicle certification label indicates the Gross Vehicle Weight Rating (GVWR), front and rear Gross Axle Weight Rating (GAWR), and the payload rating for the vehicle (Figures 3 and 4).

The gross vehicle weight (GVW) is the weight of the originally-equipped vehicle and all items added to it after it has left the factory. This would include bodies, winches, etc., the driver and all occupants, and the load the vehicle is carrying. The gross vehicle weight (GVW) must not exceed the gross vehicle weight rating (GVWR). Also, the front and rear gross axle weights (GAW) must not exceed the front and rear gross axle weight rating (GAWR).

The payload rating shown on the label is the maximum allowable cargo load (including the weight of the driver and all occupants) that the vehicle can carry based on all factory installed equipment on the vehicle. The payload rating is reduced if any accessories or other equipment is added to the vehicle after final date of manufacture. The weight of these items should be determined and deducted from the payload rating.

GVWR GAWR FRT GAWR RR LB/KG

TIRE SIZE FRT RR SPA

SPEED RTG RIM

PAYLOAD =

PSI/KPA (COLD)

SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION

Figure 3—Vehicle Certification Label (Complete Vehicle)

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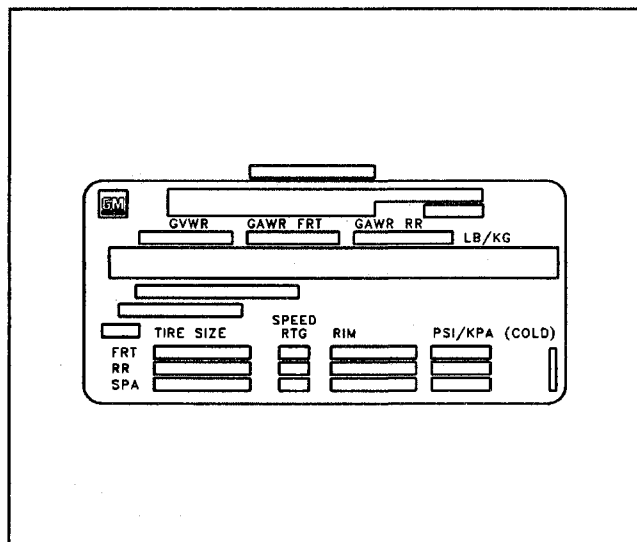


Figure 4—Vehicle Certification Label
(Incomplete Vehicle)

The vehicle may also have a gross combination weight rating (GCWR). The GCW is the total weight of the loaded tow vehicle (including passengers) and a loaded trailer.

The tires on the vehicle must be the proper size and properly inflated for the load that the vehicle is carrying. The vehicle certification label shows the originally equipped tire size and recommended inflation pressures. For more information on tires, refer to SECTION 3E.

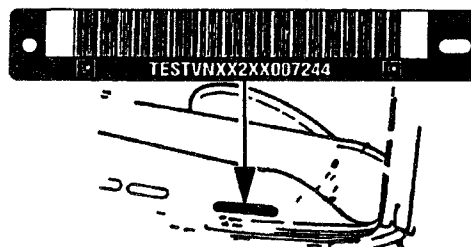


Figure 5—Vehicle Identification Number (VIN)
Location

VEHICLE IDENTIFICATION NUMBER (VIN)

The Vehicle Identification Number (VIN) is the seven-teen-digit legal identifier of the vehicle. It is located on a plate that is attached to the left top of the instrument panel and can be seen through the windshield (Figure 5). To find the manufacturer, model and chassis type, engine type, GVW range, model year, plant code, and sequential number, refer to Figure 6.

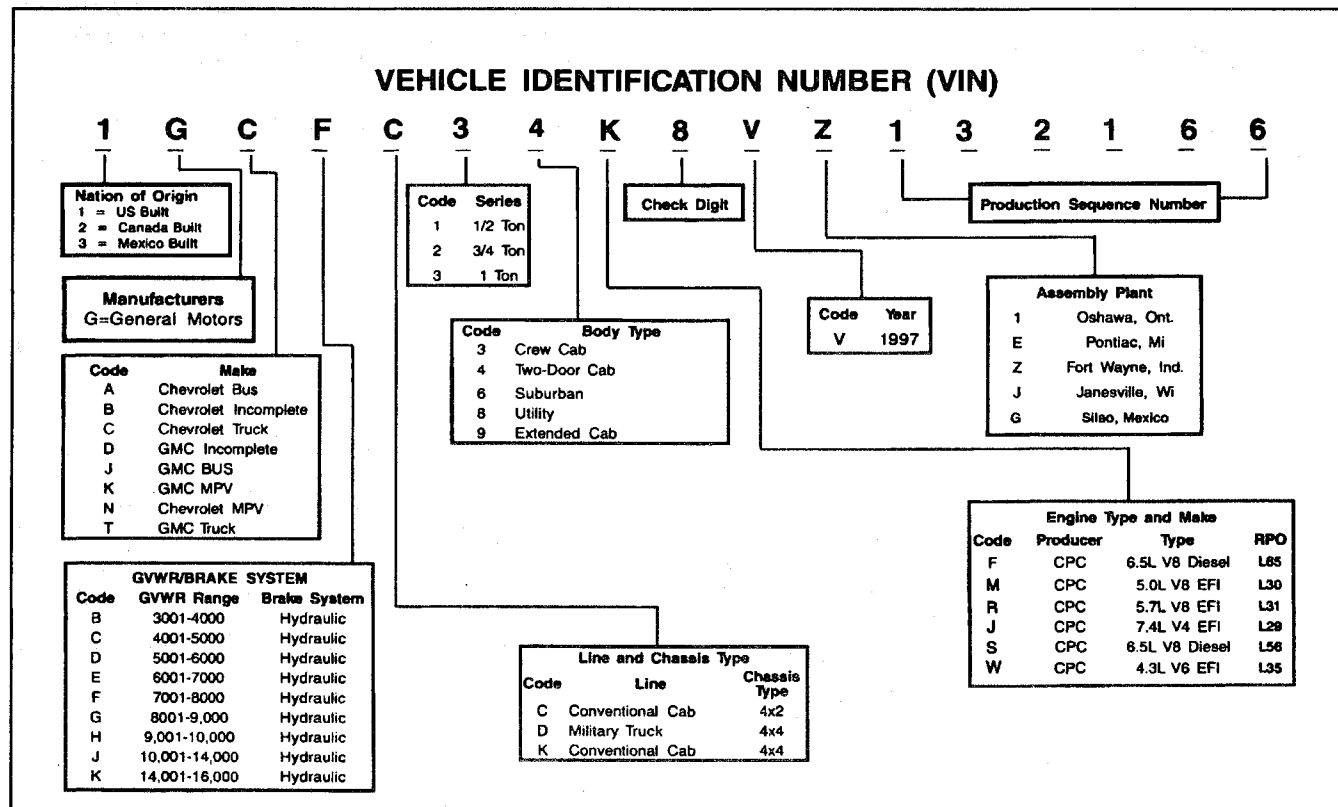


Figure 6—Vehicle Identification Chart

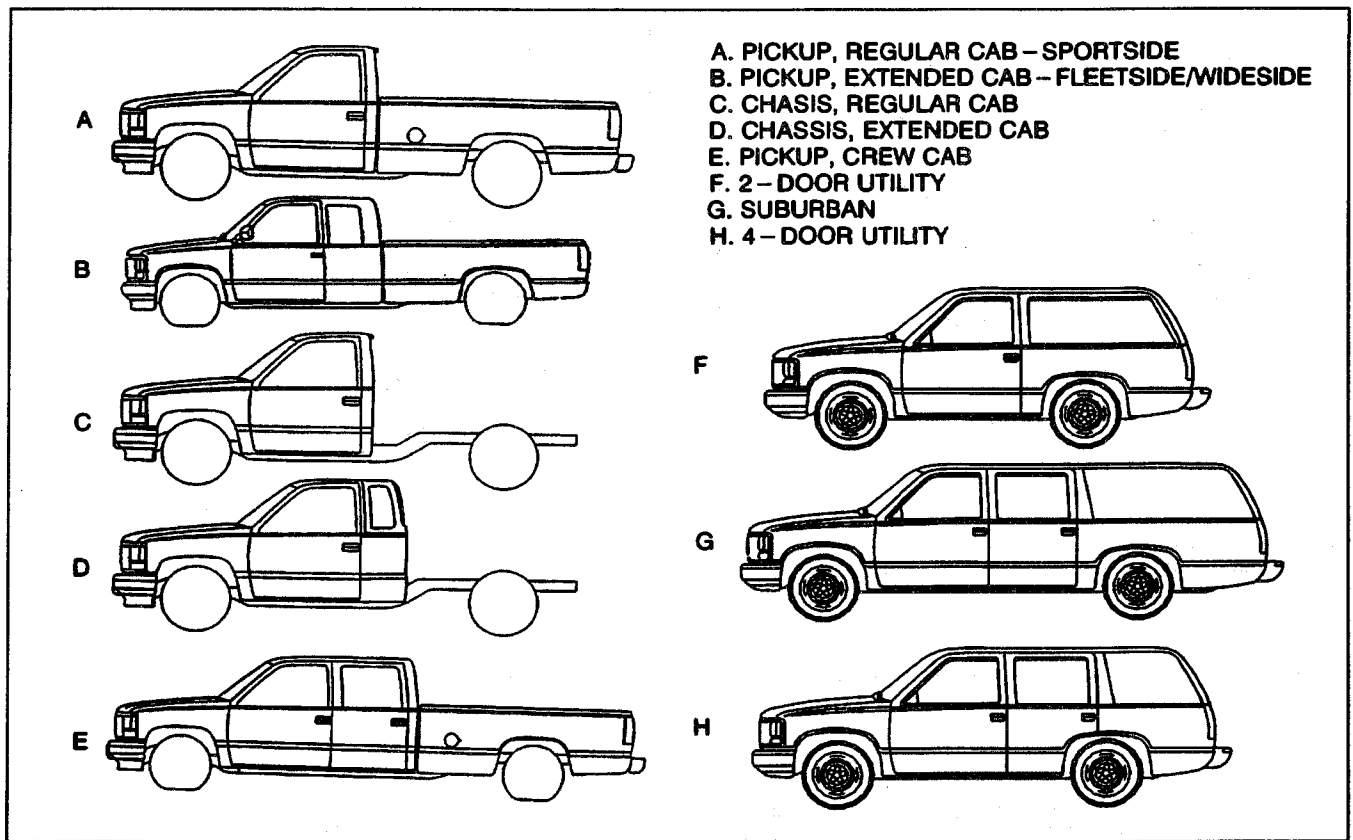


Figure 7—Model Identification

ENGINE IDENTIFICATION NUMBER

The eighth digit of the Vehicle Identification Number will specify the engine in the vehicle.

Stick-on labels attached to the engine, laser etching, or stampings on the engine block, indicate the engine unit number or date code.

All engines are stamped with an engine identification number. The stamping contains nine positions (Figures 8 through 11).

TRANSMISSION IDENTIFICATION NUMBER

Manual and automatic transmission model identification is located on a label or tag applied to the transmission case (Figures 12 through 17). If the label or tag is missing or unreadable, use the Service Parts Identification label to determine which transmission was installed in the vehicle. For more information, refer to "Service Parts Identification Label" in this section.

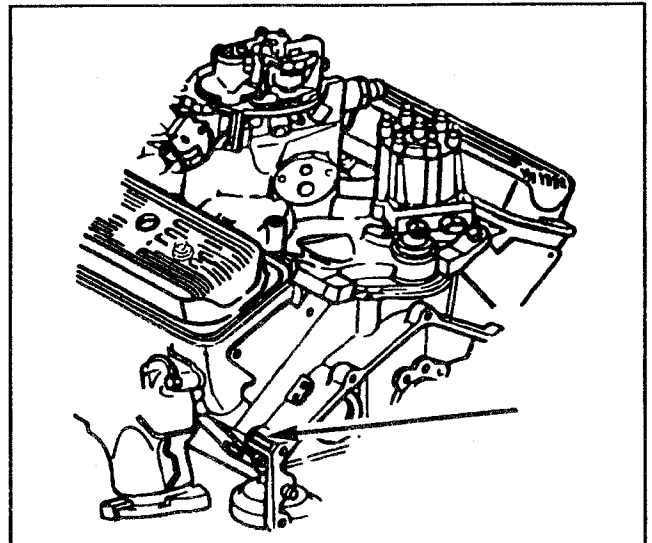


Figure 8—4.3L Engine ID Location

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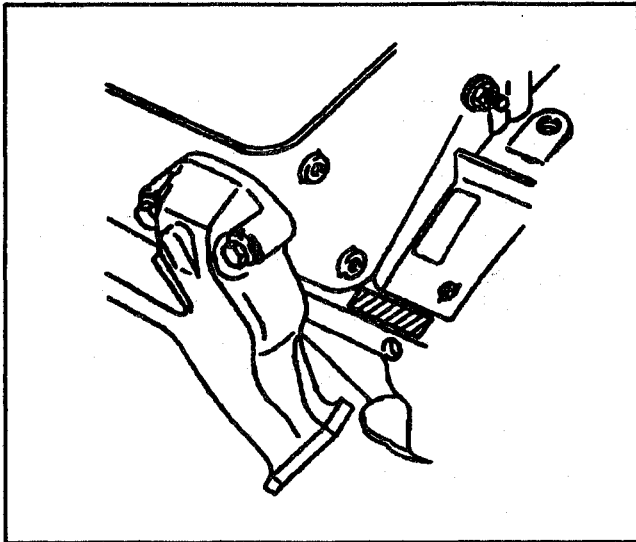


Figure 9—5.0L and 5.7L Engine ID Location

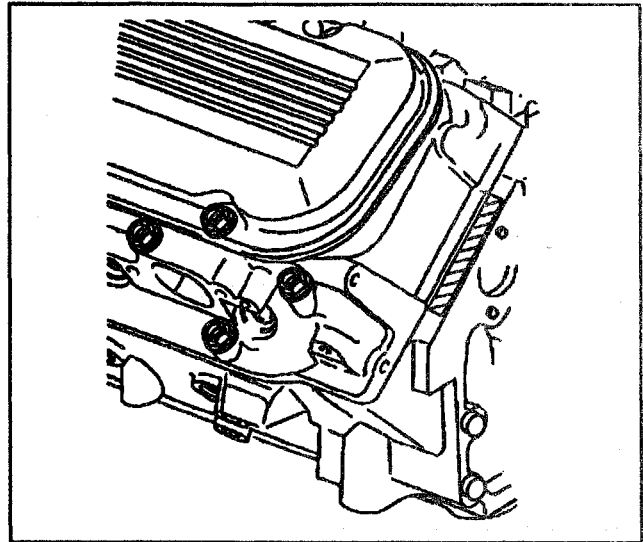


Figure 10—7.4L Engine ID Location

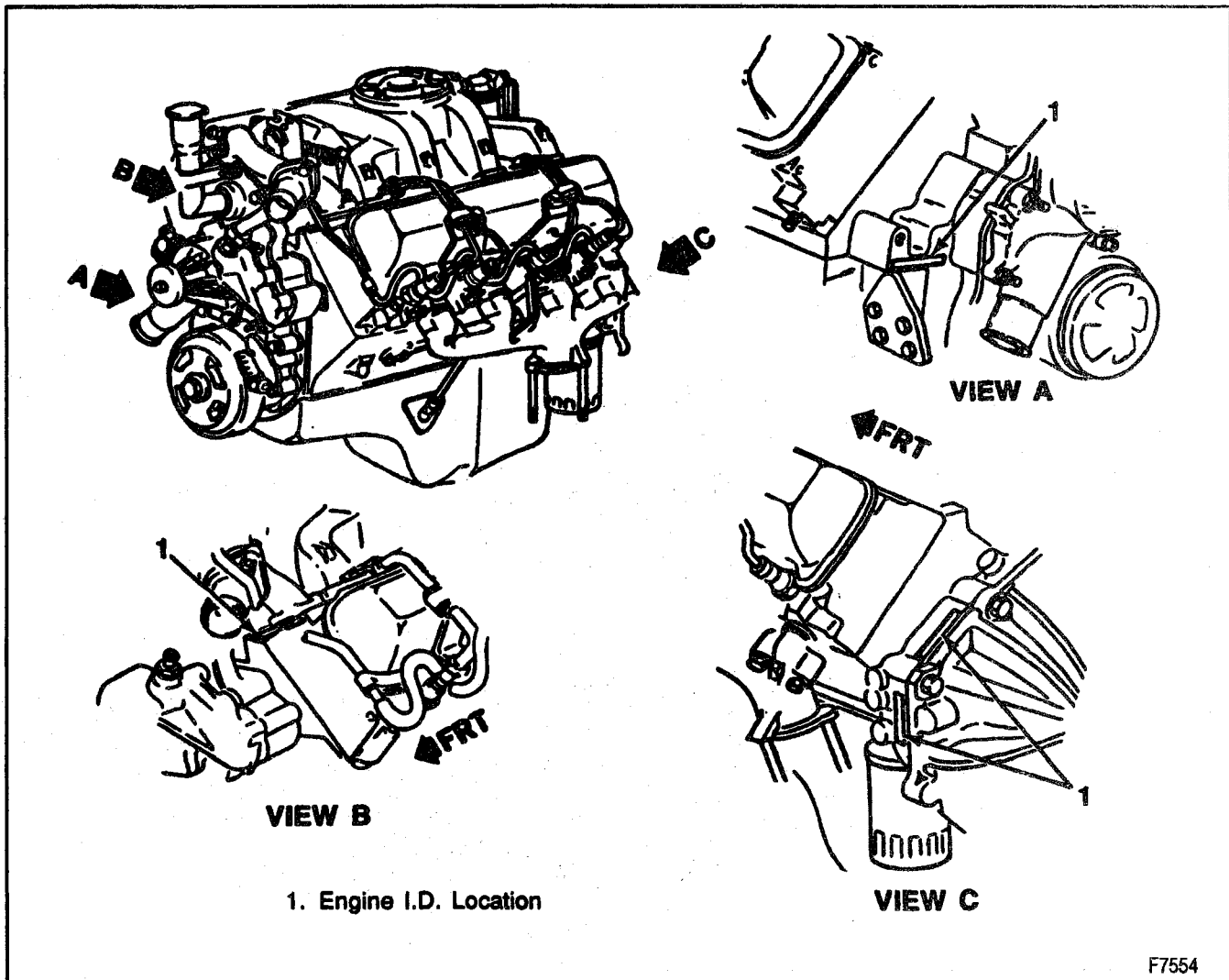


Figure 11—6.5L Diesel Engine ID Location

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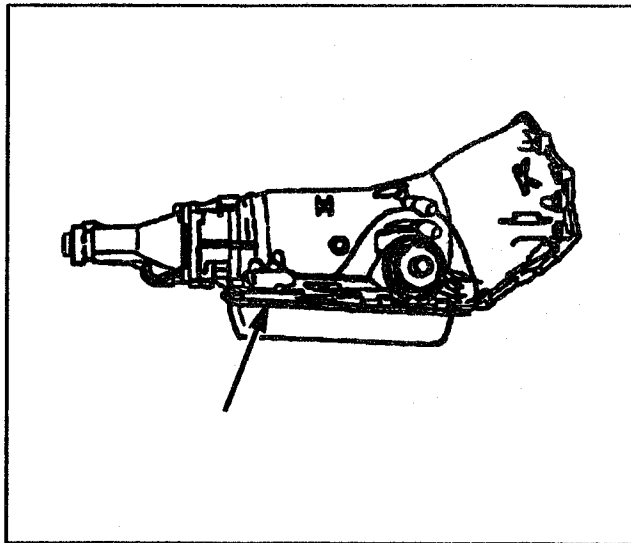


Figure 12—Hydra-Matic 4L60-E Transmission ID Location

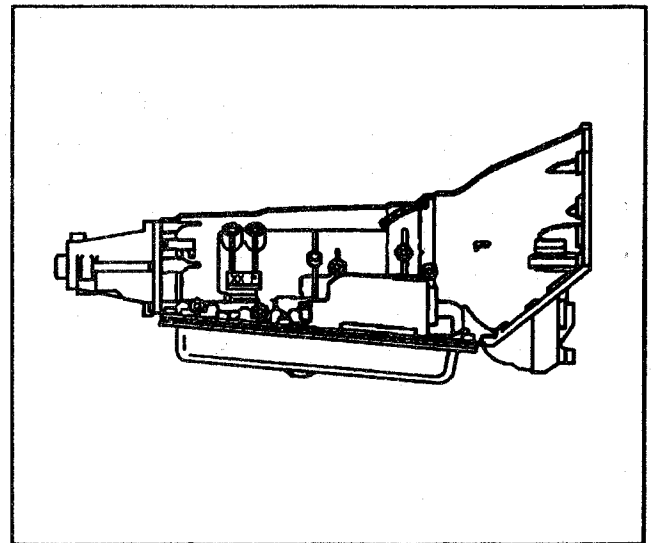


Figure 14—Hydra-Matic 4L80-E Transmission ID Location

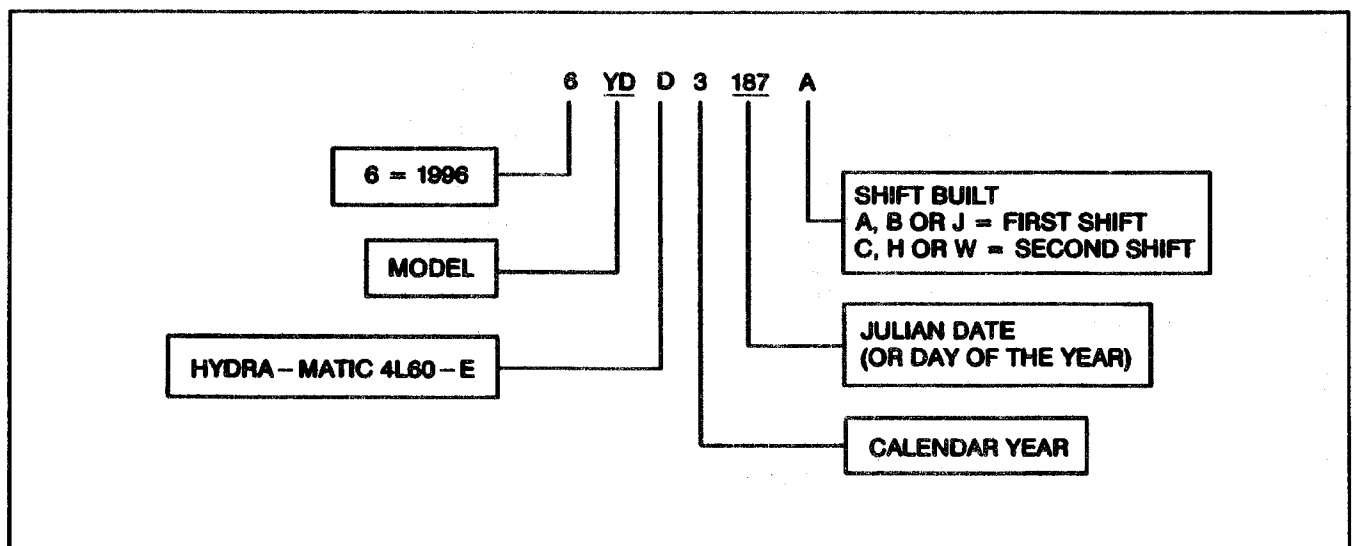


Figure 13—Hydra-Matic 4L60-E Transmission ID

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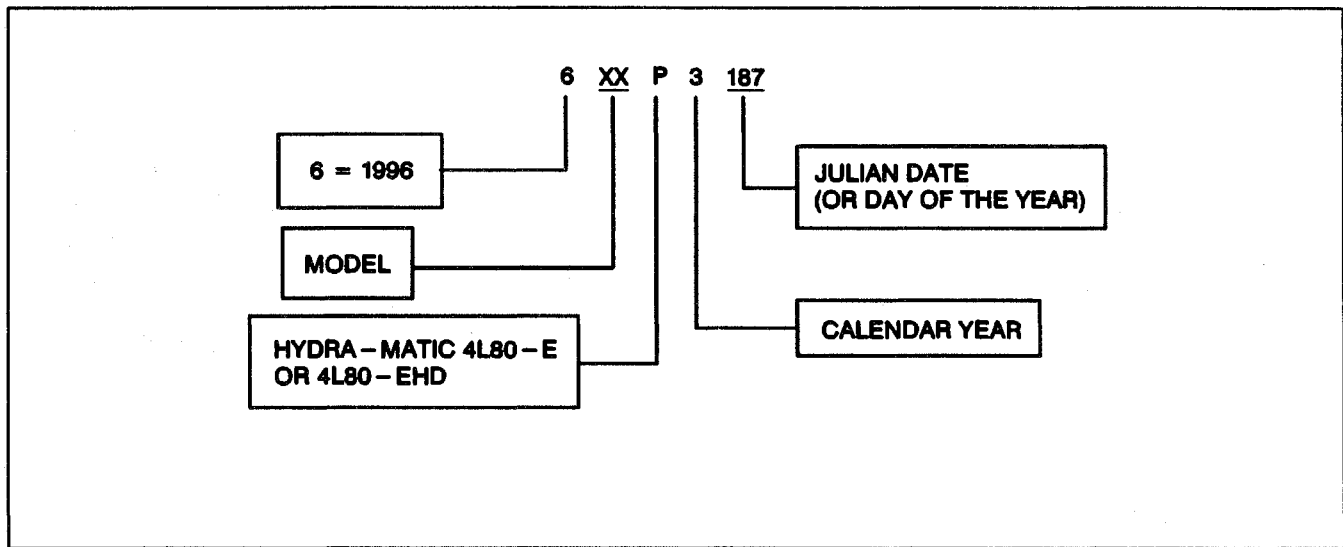


Figure 15—Hydra-Matic 4L80-E Transmission ID

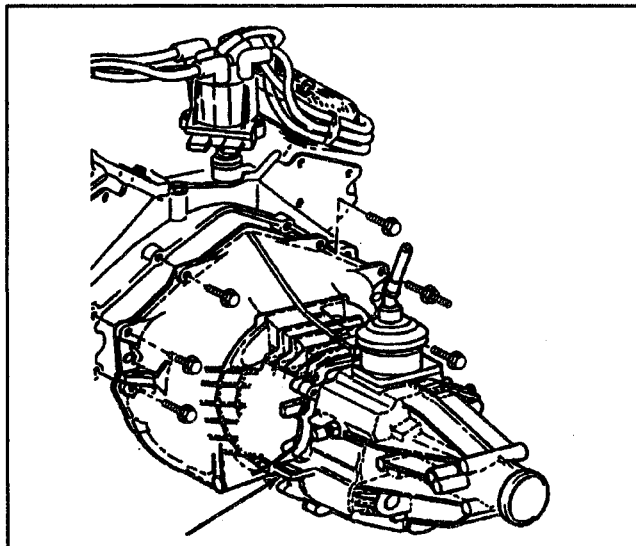


Figure 16—New Venture Gear 3500 Transmission ID Location

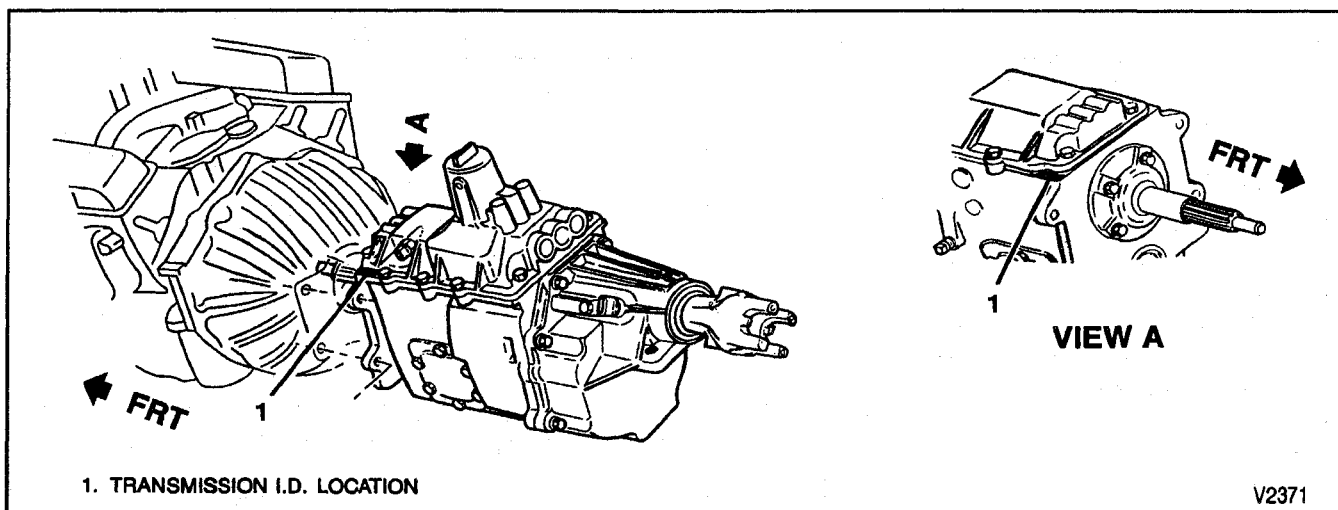


Figure 17—New Venture Gear 4500 Transmission ID Location

ENGINE AND TRANSMISSION APPLICATIONS

Model	Engine		Transmission	
	Base	Option	Base	Option
C105 (16)	5.7L V8 (L31)		4 Speed Auto (M30)	
C107 (03)	4.3L V6 (L35)	5.0L V8 (L30)	5 Speed Manual (MG5)	4 Speed Auto (M30)
		5.7L V8 (L31)		5 Speed Manual (M50)
		5.7L V8 (L31)		4 Speed Auto (M30)
		6.5L V8 (L56)		5 Speed Manual (M50)
C107 (06)	5.7L V8 (L31)		4 Speed Auto (M30)	
C109 (03)	4.3L V6 (L35)	5.0L V8 (L30)	5 Speed Manual (MG5)	4 Speed Auto (MT1)
		5.7L V8 (L31)		4 Speed Auto (M30)
		6.5L V8 (L56)		5 Speed Manual (M50)
C109 (06)	5.7L V8 (L31)	6.5L V8 (L65)	4 Speed Auto (M30)	4 Speed Auto (MT1)
C109 (53)	5.0L V8 (L30)	5.7L V8 (L31)	5 Speed Manual (MG5)	4 Speed Auto (MT1)
		6.5L V8 (L56)		4 Speed Auto (M30)
				5 Speed Manual (M50)
C207 (53)	5.0L V8 (L30)	5.7L V8 (L31)	5 Speed Manual (MG5)	4 Speed Auto (MT1)
		6.5L V8 (L56)		4 Speed Auto (M30)
				5 Speed Manual (M50)
C209 (03)	5.0L V8 (L30)	5.7L V8 (L31)	5 Speed Manual (MW3)	4 Speed Auto (MT1)
		7.4L V8 (L29)		
		6.5L V8 (L56)		
		6.5L V8 (L65)		
C209 (06)	5.7L V8 (L30)	7.4L V8 (L29)	4 Speed Auto (MT1)	
		6.5L V8 (L65)		
C209 (53)	5.7L V6 (L31)	7.4L V8 (L29)	5 Speed Manual (MW3)	4 Speed Auto (MT1)
		6.5L V8 (L65)		
C309 (03)	5.7L V8 (L31)	7.4L V8 (L29)	5 Speed Manual (MW3)	4 Speed Auto (MT1)
		6.5L V8 (L65)		
C309 (43)	5.7L V8 (L31)	7.4L V8 (L29)	5 Speed Manual (MW3)	4 Speed Auto (MT1)
		6.5L V8 (L65)		
C309 (53)	5.7L V8 (L31)	7.4L V8 (L29)	5 Speed Manual (MW3)	4 Speed Auto (MT1)
		6.5L V8 (L65)		
C310 (03)	5.7L V8 (L31)	7.4L V8 (L29)	5 Speed Manual (MW3)	4 Speed Auto (MT1)
		6.5L V8 (L65)		
C314 (03)	5.7L V8 (L31)	7.4L V8 (L29)	5 Speed Manual (MW3)	4 Speed Auto (MT1)
		6.5L V8 (L65)		

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Model	Engine		Transmission	
C318 (03)	7.4L V8 (L29)		5 Speed Manual (MW3)	4 Speed Auto (MT1)
K105 (16)	5.7L V8 (L31)	6.5L V8 (L56)	4 Speed Auto (M30)	4 Speed Auto (MT1)
K107 (03)	4.3L V6 (L35)	5.0L V8 (L30)	5 Speed Manual (MG5)	5 Speed Manual (M50)
		5.7L V8 (L31)		4 Speed Auto (M30)
K107 (06)	5.7L V8 (L31)		4 Speed Auto (M30)	
K107 (53)	4.3L V6 (L35)	5.0L V8 (L30)	5 Speed Manual (MG5)	4 Speed Auto (MT1)
		5.7L V8 (L31)		5 Speed Manual (M50)
		6.5L V8 (L56)		4 Speed Auto (M30)
K109 (03)	4.3L V6 (L35)	5.0L V8 (L30)	5 Speed Manual (MG5)	4 Speed Auto (MT1)
		5.7L V8 (L31)		5 Speed Manual (M50)
		6.5L V8 (L56)		4 Speed Auto (M30)
K109 (06)	5.7L V8 (L31)	6.5L V8 (L65)	4 Speed Auto (M30)	4 Speed Auto (MT1)
K109 (53)	4.3L V6 (L35)	5.0L V8 (L30)	5 Speed Manual (MG5)	4 Speed Auto (MT1)
		5.7L V8 (L31)		5 Speed Manual (M50)
		6.5L V8 (L56)		4 Speed Auto (M30)
K207 (53)	5.7L V8 (L31)	7.4L V8 (L29)	5 Speed Manual (MW3)	4 Speed Auto (MT1)
		6.5L V8 (L65)		
K209 (03)	5.7L V8 (L31)	7.4L V8 (L29)	5 Speed Manual (MW3)	4 Speed Auto (MT1)
		6.5L V8 (L65)		
K209 (06)	5.7L V8 (L31)	7.4L V8 (L29)	4 Speed Auto (MT1)	
		6.5L V8 (L65)		
K209 (53)	5.7L V8 (L31)	7.4L V8 (L29)	5 Speed Manual (MW3)	4 Speed Auto (MT1)
		6.5L V8 (L65)		
K309 (03)	5.7L V8 (L31)	7.4L V8 (L29)	5 Speed Manual (MW3)	4 Speed Auto (MT1)
		6.5L V8 (L65)		
K309 (43)	5.7L V8 (L31)	7.4L V8 (L29)	5 Speed Manual (MW3)	4 Speed Auto (MT1)
		6.5L V8 (L65)		
K309 (53)	5.7L V8 (L31)	7.4L V8 (L29)	5 Speed Manual (MW3)	4 Speed Auto (MT1)
		6.5L V8 (L65)		
K310 (03)	5.7L V8 (L31)	7.4L V8 (L29)	5 Speed Manual (MW3)	4 Speed Auto (MT1)
		6.5L V8 (L65)		
K314 (03)	5.7L V8 (L31)	7.4L V8 (L29)	5 Speed Manual (MW3)	4 Speed Auto (MT1)
		6.5L V8 (L65)		

Model Codes:

C - Two-Wheel Drive

K - Four-Wheel Drive

03 - Two Door Cab

06 - Suburban or Four Door Utility

16 - Two Door Utility

43 - Crew Cab

53 - Two Door Extended Cab

GENERAL VEHICLE LIFTING AND JACKING

CAUTION: When a vehicle is on a hoist, support the vehicle at the opposite end from which components are being removed in order to reduce the possibility of the vehicle falling off the hoist and causing personal injury.

NOTICE: When jacking or lifting a vehicle, make sure that the lift pads do not contact the catalytic converter, brake lines, brake cables, or fuel lines. Such contact may result in damage or unsatisfactory vehicle performance.

When removing major components from the vehicle while the vehicle is on a hoist, chain the vehicle frame to the hoist pads at the same end as the removed components to prevent tip-off and personal injury.

Vehicles Under 12,000 Lb GVWR

NOTICE: Do not attempt to use a hoist to lift a vehicle equipped with a camper body. The weight distribution of the body may make the vehicle unstable during hoisting and can cause damage to the frame.

The only lift points for these vehicles are shown in Figures 18 and 19, and are described in the following paragraphs.

When lifting a C or K model vehicle with a hoist, the front pads should be positioned under the frame rails, just forward of the second crossmember. The rear pads should be positioned under the rear spring front brackets.

When lifting a C model vehicle front end with a floor jack, position the jack pad under the lower control arm and inboard from the ball joint. The C model vehicle front end can also be lifted by positioning the floor jack pad under the center of the front crossmember.

When lifting a C model vehicle front end with a vehicle jack, position the jack under the lower control arm and inboard from the ball joint.

When lifting a C or K model vehicle rear end with a floor jack, position the jack pad either between the spring pad and the shock absorber hanger or under the axle differential case.

When lifting a C or K model vehicle rear end with a vehicle jack, position the jack pad between the spring pad and the shock absorber hanger.

When lifting a K model vehicle front end with a floor jack, position the jack pad either under the middle of the front crossmember or under the lower control arm at the lowest point of the control arm.

Any time a vehicle is lifted with a vehicle jack or a floor jack, the wheels at the opposite end of the lifted end should be chocked. Also, use jack stands to provide support. When supporting the vehicle with jack stands, the jack stands should be placed under the frame, the front suspension crossmember, or the axle.

When removing major components from the vehicle while the vehicle is on a hoist, the vehicle frame should be chained to the hoist pads in order to prevent tip-off.

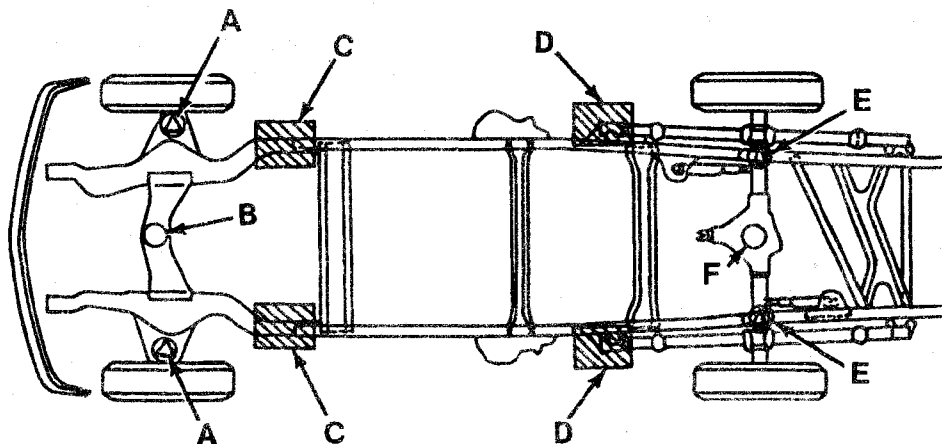
Vehicles Between 12,000 and 15,000 Lb GVWR

Lifting with a Hoist

Do not attempt to lift either of these vehicles with a single-post hoist. Single-post hoists are not rated to lift vehicles of these weights. The 12,000 lb GVWR vehicle may be lifted with a wheel hoist if the hoist is rated for more than 12,000 lbs.

A twin-post hoist can be used, provided each post is rated for more than the GAWR of the vehicle being lifted. This is particularly true for the rear axle. The addition of various types of bodies and other equipment to the original cab chassis may have resulted in heavier GAWRs than indicated on the certification label.

If the 12,000 lb GVWR vehicle is being lifted, place the front hoist supports at the lower control arms, inboard of the lower ball joints. Place the rear support at the axle tube.

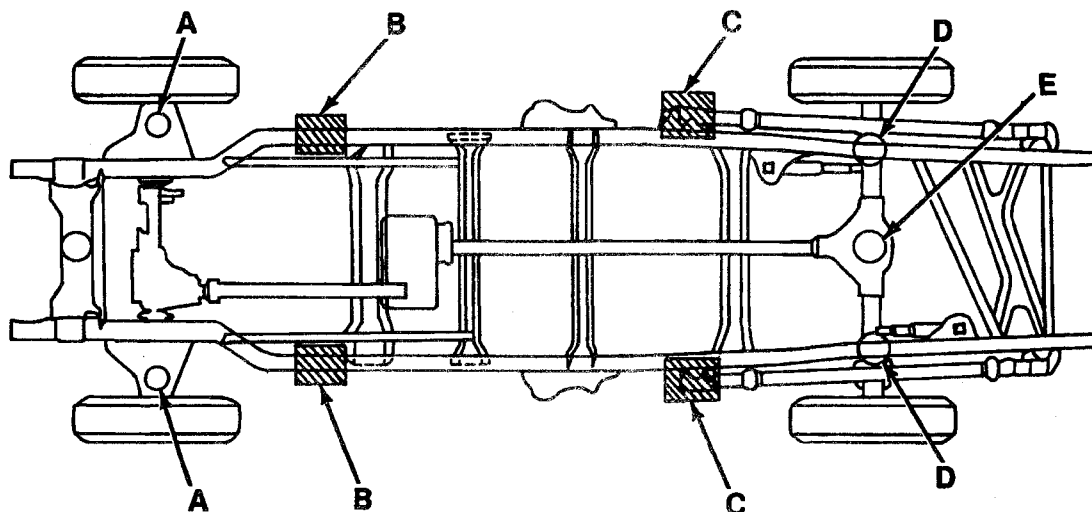


- A. Lower control arm; inboard of the lower ball joint.
- B. Center of front suspension crossmember.
- C. Frame at forward edge of crossmember.
- D. Rear spring at front bracket.
- E. Rear axle just inboard of the spring.
- F. Rear axle at the center of the differential case.

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Figure 18—Chassis Lift Points - C Models (Under 12,000 Lb GVWR)

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- A. Lower Control Arm; Inboard of the Lower Ball Joint
- B. Frame Just Forward of the Crossmember
- C. Rear Spring at Front Bracket
- D. Rear Axle Just Inboard of the Spring Mount
- E. Rear Axle at the Center of the Differential Case

F3513

Figure 19—Chassis Lift Points - K Models (Under 12,000 Lb GVWR)

If the 15,000 lb GVWR vehicle is being lifted, the front support can be placed under the I-beam front axle. Place the rear support under the axle tube.

When removing major components from the vehicle while the vehicle is on a hoist, the vehicle frame should be chained to the hoist pads in order to prevent tip-off (Figure 20).

Lifting with a Floor Jack

CAUTION: Do not attempt to use an in-vehicle type jack, such as a bumper or scissors jack on the 15,000 lb GVWR vehicle. These jacks are not strong enough for the weight of the vehicle, and could collapse suddenly, causing damage to the vehicle or personal injury.

When lifting the front end of the vehicle with a floor jack, position the jack pad under the frame rail just rearward of the body mount or under the lower control arm and inboard from the ball joint. The 15,000 lb GVWR vehicle can also be lifted under the front axle.

When lifting the rear end of the vehicle, position the jack pad under the rear axle between the spring attachment and shock bracket.

Any time a vehicle is lifted with a vehicle jack or a floor jack, the wheels at the opposite end of the lifted end should be chocked. If jack stands are also used for support, they may only be placed just rearward of the body mounts. Do not place jack stands under the rear section of the frame or under any crossmember.

LOCK CYLINDERS

Key Identification and Usage

These vehicles use a one-key locking system. A single, two-sided key operates the ignition, all doors, and any lockable storage compartments. The key is reversible, and can be inserted with either side facing up.

Key code information is provided on an alpha-numeric bar-coded tag attached to the key ring. This tag accompanies the vehicle to the dealership. If the tag is not available, call Roadside Assistance. You will need the seventeen digit vehicle identification number to obtain the key code.

Once the key code is identified, the lock combination can be determined using a coded list. This list is available from key cutting equipment suppliers.

Cutting Keys

1. Determine the code from the code list.
2. Cut a blank key to the proper level for each of six tumbler positions.
3. Check the key operation in the lock cylinder.

Replacement Lock Cylinders

Lock cylinders are available from service parts warehouses. The new cylinder has a locking bar staked in place. Tumblers are also available and must be assembled into the cylinder.

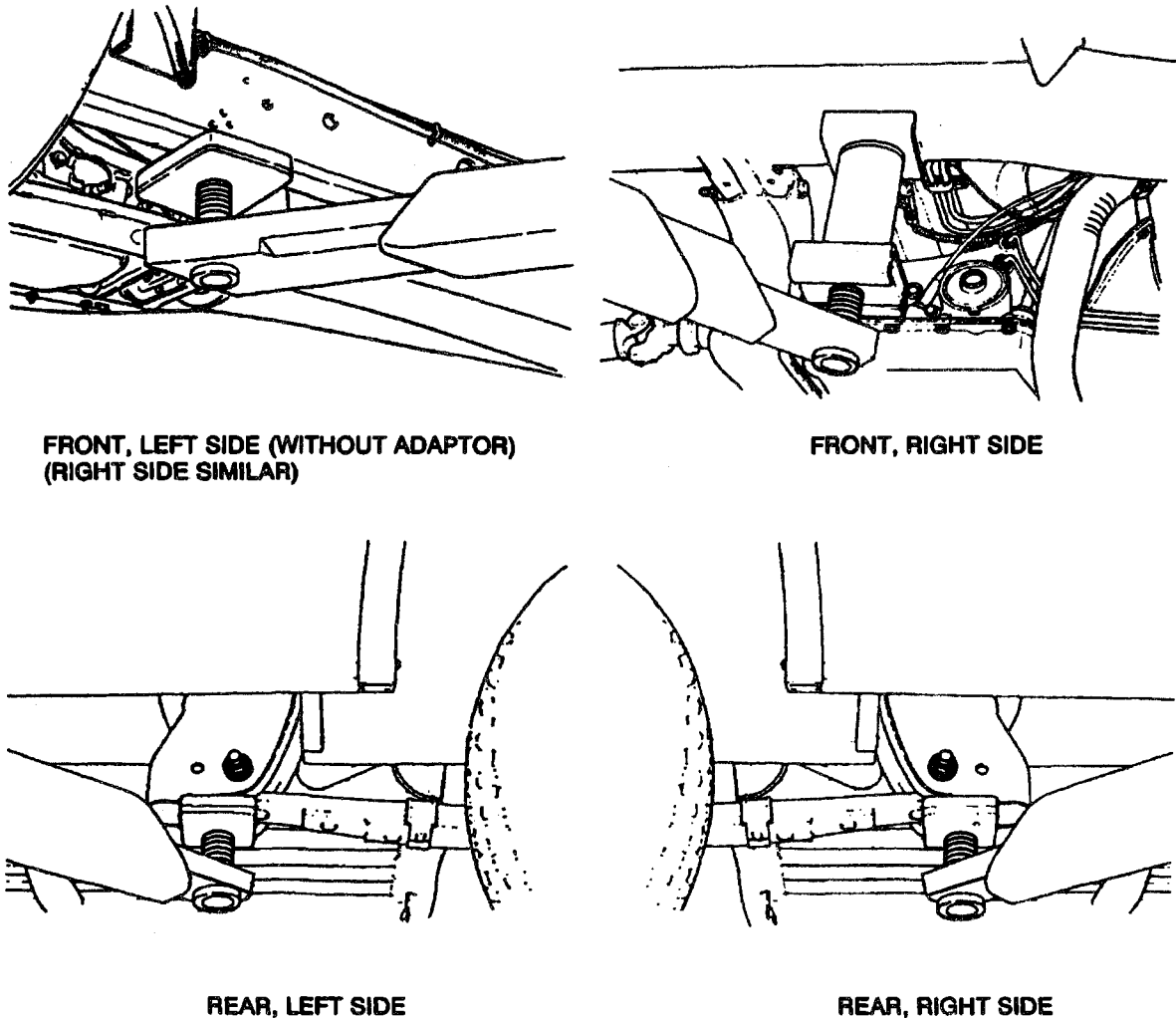


Figure 20—Lifting the Vehicle

ASSEMBLING AND CODING LOCK CYLINDERS

Ignition Lock Cylinders

Ignition tumblers are shaped exactly alike with the exception of two notch positions on the key shank. As the key is inserted in the lock cylinder, tumblers are lowered to the correct heights so that notches on each tumbler are at the same level. When the notches on all tumblers line up, the side bar is pushed into the notches by two small springs. This allows the cylinder to turn in its bore. Four types of tumblers result in various lock combinations. Each tumbler is coded according to a number, 1 through 4, stamped on its side.



Assemble

1. Determine the tumbler numbers and arrangement.

- With the numerical key code, use the code list provided by a key cutting equipment supplier.

- Without the numerical key code or without a code list, read the key (Figure 21).

- A. Lay the key on the key code diagram. Make sure the key is outlined by the diagram.
- B. Start with position number one. Find and record the lowest level (tumbler number) that is visible. Repeat for each of the remaining five positions.

2. Starting with position one (the open end or head of the cylinder), insert tumblers in their proper slots in the order called for by the code (Figure 21).
3. Pull the side bar out so that the tumblers will drop completely into place.
4. Insert one tumbler spring above each tumbler.
5. Insert the spring retainer so that the end prongs slide into the slots at each end of the cylinder. Press the retainer down.
6. Insert the key into the lock cylinder to check for proper installation. If the tumblers are installed properly, the side bar will drop down. If it doesn't, take the cylinder apart and reassemble it.

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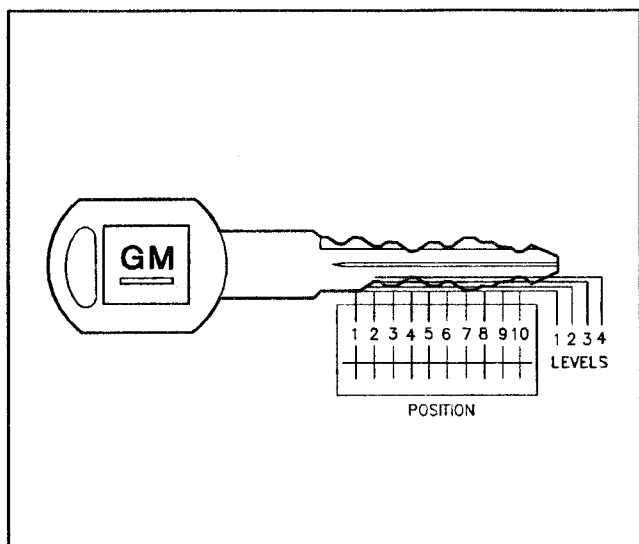


Figure 21—Key Code Diagram

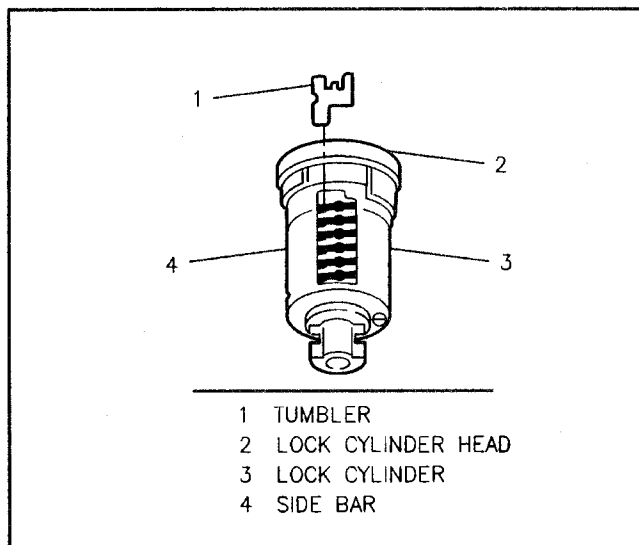


Figure 22—Installing Tumblers

NOTICE: Use leather or wood on each vise jaw to prevent damage to the cylinder.

7. Remove the key and secure the cylinder in a vise with the spring retainer exposed.
8. Stake the spring retainer securely in place at each end, using a suitable staking tool. Stake the cylinder metal over the retainer (Figure 23).
9. Lock cylinders should be lubricated with GM multi-purpose lubricant Superlube® GM P/N 12346241 or a light oil (5W30).

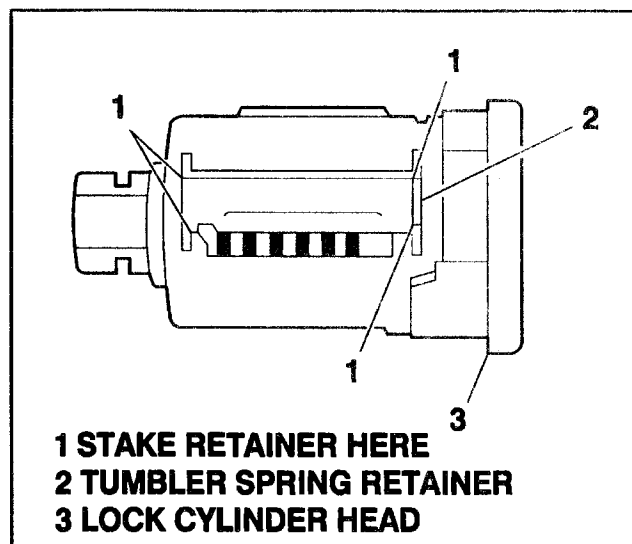


Figure 23—Locking Tumblers in Place

All Other Lock Cylinders

Lock cylinders with snap-in tumblers are used for all locks except the ignition. The lock cylinder has four or five tumbler positions. The number 1 or 2 position (closest to the cylinder head) is a brass retainer tumbler. The 2 through 5 positions or 3 through 5 positions are standard tumbler positions depending on cylinder type. Therefore, only the last 4 or 5 tumbler combinations are required. To assemble the lock cylinder, determine the tumbler numbers and arrangement, as previously described, and install the tumblers.

METRIC FASTENERS

Current model GM vehicles are primarily dimensioned in the metric system. Many metric fasteners are very close in dimension to well-known customary fasteners in the inch system. It is very important that replacement fasteners be of the correct nominal diameter, thread pitch, and strength.

Original equipment metric fasteners (except "beauty" bolts, such as exposed bumper bolts, and cross-recess head screws) are identified by a number or marking indicating the strength of the material in the fastener as outlined later. Metric cross-recess screws are identified by a Posidrive® or Type 1A. Either a Phillips head or Type 1A cross-recess screwdriver can be used in Posidrive® recess screw heads, but Type 1A cross-recess screwdrivers will perform better.

ENGLISH TO SI METRIC CONVERSION TABLE

TO CONVERT	INTO	MULTIPLY BY
LENGTH		
Inch	millimeters (mm)	25.4
Foot	meters (m)	0.3048
Yard	meters	0.9144
Mile	Kilometers (km)	1.609
AREA		
Inch ²	millimeters ² (mm ²)	645.2
Inch ²	centimeters ² (cm ²)	6.45
Foot ²	meters ² (m ²)	0.0929
Yard ²	meters ²	0.8361
VOLUME		
Inch ³	mm ³	16387.0
Inch ³	cm ³	16.387
Inch ³	liters (l)	0.0164
Quart	liters	0.9464
Gallon	liters	3.7854
Yard ³	meters ³	0.7646
MASS		
Pound	kilograms (kg)	0.4536
Ton	kilograms (kg)	907.18
Ton	tonne (t)	0.907
FORCE		
Kilogram	newtons (N)	9.807
Ounce	newtons	0.2780
Pound	newtons	4.448
TEMPERATURE		
Deg. Fahrenheit	Deg. Celsius (C)	(°F - 32) × 1.8
ACCELERATION		
Foot/sec ²	meter/sec ² (m/s ²)	0.3048
Inch/sec ²	meter/sec ²	0.0254
TORQUE		
Pound-inch	newton-meters (N·m)	0.11298
Pound-foot	newton-meters (N·m)	1.3558
POWER		
Horsepower	kilowatts (kW)	0.746
PRESSURE OR STRESS		
Inches of water	kilopascals (kPa)	0.2491
Pounds/sq. in.	kilopascals	6.895
ENERGY OR WORK		
BTU	joules (J)	1055.0
Foot-pound	joules	1.3558
Kilowatt-hour	joules (J=one W/s)	3.6 × 10 ⁶
LIGHT		
Foot candle	lumens/meter ² (lm/m ²)	10.764
FUEL PERFORMANCE		
Miles/gal	kilometers/liter (km/l)	0.4251
Gal/mile	liter/kilometer (l/km)	2.3527
VELOCITY		
Miles/hour	kilometers/hr. (km/h)	1.6093

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FASTENER STRENGTH IDENTIFICATION

Most commonly used metric fastener strength property classes are 9.8 and 10.9 with the class identification embossed on the head of each bolt. Some metric nuts will be marked with single digit strength identification numbers on the nut face.

When replacing metric fasteners, use bolts and nuts of the same strength (or greater) as the original fasteners (the same number marking or higher). Likewise, select replacement fasteners of the correct size. Correct replacement metric fasteners available in the aftermarket parts channels were designed to metric standards of countries other than the United States, and may be of a lower strength, may not have the numbered head marking system, and may be of a different thread pitch. The metric fasteners used on GM products are designed to new, international standards that may not yet be manufactured by some non-domestic bolt and nut suppliers.

PREVAILING TORQUE FASTENERS

A prevailing torque nut is designed to develop an interference between the nut and bolt threads. This is most often accomplished by distortion of the top of an all-metal nut by using a nylon patch on the threads in the middle of the hex flat. A nylon insert may also be used as a method of interference between nut and bolt threads.

A prevailing torque bolt is designed to develop an interference between bolt and nut threads, or the threads of a tapped hole. This is accomplished by distorting some of the threads or by using a nylon patch or adhesive.

Recommendations For Reuse:

1. Clean, unruined prevailing torque nuts and bolts may be reused as follows:
 - A. Clean dirt and other foreign material off the nut or bolt.
 - B. Inspect the nut or bolt to ensure there are no cracks, elongation, or other signs of abuse or overtightening. If there is any doubt, replace with a new prevailing torque fastener of equal or greater strength.
 - C. Assemble the parts. Hand start the nut or bolt.
 - D. Before fastener seats, observe that it develops the proper torque. If there is any doubt, replace with a new prevailing torque fastener of equal or greater strength.
 - E. Tighten the fastener to the torque specified in the appropriate section of this manual.
2. Bolts and nuts that are rusty or damaged should be replaced with new parts of equal or greater strength.

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J 1930 WORD CONVERSION

General Motors complies with the Society of Automotive Engineers (SAE) Recommended Practice J 1930. J 1930 is an industry-wide standard that was adopted into government regulations and requires certain electrical and electronic components and systems that have the same function be known by the same nomenclature.

This standard is also being applied to abbreviations and acronyms. This standard is being used in all GM service publications.

To make this standard work, some names and abbreviations are being replaced with those recommended by the SAE standard.

For determining J 1930 word conversions, refer to Figure 25.

THREAD NOTATION

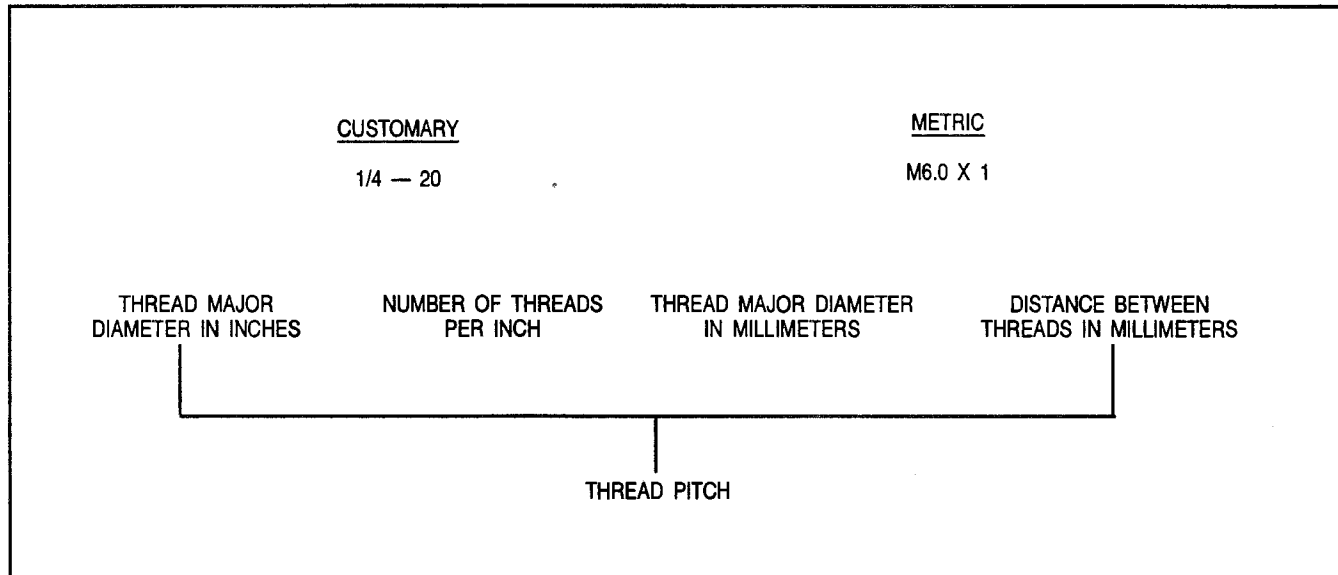


Figure 24—Thread Notation

T3340

J1930 CONVERSION CHART	
From	To
Absolute Pressure Sensor (APS)	Manifold Absolute Pressure Sensor (MAP Sensor)
Accelerator (ACCEL)	Accelerator Pedal (AP)
Air Cleaner Assembly	Air Cleaner (ACL)
Air Cleaner Filter Element	Air Cleaner Filter (ACL Filter)
Air Induction System	Air Intake System
Air Injection Reaction System (A.I.R. System)	Secondary Air Injection System (AIR System)
Assembly Line Communication Link (ALCL)	Data Link Connector (DLC)
Assembly Line Data Link (ALDL)	Data Link Connector (DLC)
BCM-PCM Data Problem	BCM-PCM Data Link
Calibration Pack (CAL-PAK)	1. Electronically Erasable Programmable Read Only Memory (EEPROM) 2. Erasable Programmable Read Only Memory (EPROM) 3. Programmable Read Only Memory (PROM)
Camshaft Sensor	Camshaft Position Sensor (CMP Sensor)
Canister Purge (CP)	Evaporative Emission Canister Purge (EVAP Canister Purge)
Catalytic Converter (Cat. Conv.)	1. Oxidation Catalytic Converter (OC) 2. Three Way Catalytic Converter (TWC) 3. Three Way and Oxidation Catalytic Converter (TWC&OC) 4. Warmup Oxidation Catalytic Converter (WU-OC) 5. Warmup Three Way Catalytic Converter (WU-TWC)
Check Engine Indicator	Malfunction Indicator Lamp (MIL)

J1930 CONVERSION CHART	
From	To
Code	Diagnostic Trouble Code (DTC)
Computer Controlled Coil Ignition (C3I)	Electronic Ignition (EI)
Computer Command Control (CCC)	Engine Control Module (ECM)
Controlled Canister Purge (CCP)	Evaporative Emission Canister Purge (EVAP Canister Purge)
Coolant Temperature Switch (CTS)	Engine Coolant Temperature Switch (ECT Switch)
Coolant Temperature Sensor (CTS)	Engine Coolant Temperature Sensor (ECT Sensor)
Cooling Fan Control	Cooling Fan Control (Cooling FC)
Detonation Sensor	Knock Sensor (KS)
Diagnostic Circuit Check	Onboard Diagnostic System Check (OBD System Check)
Digital Fuel Injection (DFI)	1. Multiport Fuel Injection (MFI) 2. Sequential Multiport Fuel Injection (SFI)
Digital Electronic Fuel Injection (DEFI)	1. Multiport Fuel Injection (MFI) 2. Sequential Multiport Fuel Injection (SFI)
Direct Ignition System (DIS)	Electronic Ignition System (EI System)
Distributor HEI Module	Distributor Ignition Control Module (DI Control Module)
Distributorless Ignition System (DIS)	Electronic Ignition (EI)
Dual Bed Monolith (DBM)	1. Oxidation Catalytic Converter (OC) 2. Three Way Catalytic Converter (TWC)
Electric Air Control (EAC)	Secondary Air Injection Bypass Valve (AIR Bypass Valve)
Electric Air Switching (EAS)	Secondary Air Injection Switching Valve (AIR Switching Valve)
Electronic Control Module (ECM)	Engine Control Module (ECM)
Electronic Fuel Injection	1. Multiport Fuel Injection (MFI) 2. Sequential Multiport Fuel Injection (SFI) 3. Throttle Body Fuel Injection (TBI)
Electronic Spark Timing (EST)	Ignition Control (IC)
Electronic Spark Timing Circuit (EST Circuit)	Ignition Control Circuit (IC Circuit)
Electronic Spark Timing System (EST System)	Distributor Ignition System (DI System)
Electronic Spark Control Circuit (ESC Circuit)	Knock Sensor Circuit (KS Circuit)
Electronic Spark Control System (ESC System)	Knock Sensor System (KS System)
Electronic Vacuum Regulator Valve (EVRV)	Exhaust Gas Recirculation Electronic Vacuum Regulator Solenoid Valve
Engine Calibration Unit (ECU)	Programmable Read Only Memory (PROM)
Evaporative Emission Control System (EECS)	Evaporative Emission Control System (EVAP Control System)
Evaporative Emission Control System (EECS)	Evaporative Emission System (EVAP System)
Exhaust Gas Recirculation/Thermostatic Vacuum Switch (EGR/TVS)	Exhaust Gas Recirculation Thermal Vacuum Valve (EGR TVV)
Fuel Cal-Pak Missing	PROM Missing
Generator (Gen)	Generator (GEN)
Governor	Engine Speed Governor (RPM Governor)
High Energy Ignition (HEI)	Distributor Ignition (DI)
Lean Exhaust	1. Heated Oxygen Sensor Signal (HO2S Signal) 2. Oxygen Sensor Signal (O2S Signal)
Manifold Air Temperature Sensor (MAT Sensor)	Intake Air Temperature Sensor (IAT Sensor)
Mem-Cal Error	1. EPROM Error 2. PROM Error
Memory and Calibration Unit (MEM-CAL)	1. Erasable Programmable Read Only Memory (EPROM) 2. Programmable Read Only Memory (PROM)
Mixture Control (M/C)	Mixture Control (MC)
Multi-Port Fuel Injection (MPFI)	Multiport Fuel Injection (MFI)
Nitrogen Oxides (NO _x)	Nitrogen Oxides (NO _x)

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J1930 CONVERSION CHART	
From	To
Oxygen (O ₂)	Oxygen (O ₂)
Oxygen Sensor (O ₂)	1. Heated Oxygen Sensor (HO ₂ S) 2. Oxygen Sensor (O ₂ S)
Park/Neutral Switch (P/N Switch)	Park/Neutral Position Switch (PNP Switch)
Port Fuel Injection (PFI)	Multiport Fuel Injection (MFI)
Power Steering (P/S)	Power Steering (PS)
Power Steering Switch	Power Steering Pressure Switch (PSP Switch)
Pulse Air Injection System (PAIR)	Pulsed Secondary Air Injection System (PAIR System)
Revolutions Per Minute (RPM)	Engine Speed (RPM)
Rich Exhaust	1. Heated Oxygen Sensor Signal (HO ₂ S Signal) 2. Oxygen Sensor Signal (O ₂ S Signal)
"Scan" Data	Scan Tool Data (ST Data)
Sequential Fuel Injection (SFI)	Sequential Multiport Fuel Injection (SFI)
Sequential-port Fuel Injection (SFI)	Sequential Multiport Fuel Injection (SFI)
Service Engine Soon Indicator (SES Indicator)	Malfunction Indicator Lamp (MIL)
Thermal Vacuum Switch (TVS)	Thermal Vacuum Valve (TVV)
Thermostatic Air Cleaner (TAC)	Air Cleaner (ACL)
Throttle Body Injection (TBI)	Throttle Body Fuel Injection (TBI)
Throttle Switch	1. Closed Throttle Position Switch (CTP Switch) 2. Wide Open Throttle Switch (WOT Switch)
Throttle Position Sensor (TPS)	Throttle Position Sensor (TP Sensor)
Throttle Position Switch (TPS)	1. Closed Throttle Position Switch (CTP Switch) 2. Wide Open Throttle Switch (WOT Switch)
Tuned Port Injection (TPI)	Multiport Fuel Injection (MFI)
Transmission/Transaxle Converter Clutch (TCC)	Torque Converter Clutch (TCC)
Viscous Converter Clutch (VCC)	Torque Converter Clutch (TCC)
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Figure 25—J 1930 Conversion Chart

SYMBOLS, ABBREVIATIONS, AND ACRONYMS

The following abbreviations and symbols may appear in this manual.

A

A - Ampere(s)	AM/FM - Amplitude Modulation/Frequency Modulation
ABS - Anti-lock Brake System	Ant-Antenna
A/C - Air Conditioning	API - American Petroleum Institute
AC - Alternating Current	APT - Adjustable Part Throttle
ACC - Automatic Climate Control	ARS - Automatic Restraint System
ACL - Air Cleaner	asm - assembly
ACR4 - Air Conditioning Refrigerant, Recovery, Recycling, Recharging	ASR - Acceleration Slip Regulation
A/D - Analog-to-Digital	A/T - Automatic Transmission/Transaxle
Adj - Adjust	ATC - Automatic Temperature Control
A/F - Air/Fuel (Ratio)	ATDC - After Top Dead Center
AI - Artificial Intelligence	Auto - Automatic
AIR - Secondary Air Injection	avg - average
ALC - Automatic Level Control	AWD - All Wheel Drive
Alt - Altitude	AWG - American Wire Gage

B

B+ - Battery Positive
B- - Battery Negative
BARO - Barometric (pressure)
bat - battery
BCM - Body Control Module

BHP - Brake Horsepower
BP - Back Pressure
BTDC - Before Top Dead Center
BTSI - Brake Transmission Shift Interlock
Btu - British thermal units

C

°C - Degrees Celsius
CAC - Charge Air Cooler
Calif - California
Cam - Camshaft
CCM - Central Control Module
CCOT - Cycling Clutch Orifice Tube
CD - Compact Disc
CE - Commutator End
CEAB - Cold Engine Air Bleed
CEMF - Counter Electromotive Force
cfm - cubic feet per minute
cg - center of gravity
CID - Cubic Inch Displacement
CKP - Crankshaft Position
CKT - Circuit
CL - Closed Loop
cm3 - cubic centimeters
CMP - Camshaft Position

CO - Carbon Monoxide
CO2 - Carbon Dioxide
Coax - Coaxial
Conn - Connector
Conv - Converter
CPA - Connector Position Assurance
CMFI - Central Multi-port Fuel Injection
CPP - Clutch Pedal Position
CPS - Central Power Supply
CPU - Central Processing Unit
CRT - Cathode Ray Tube
CRTC - Cathode Ray Tube Controller
CS - Charging System
CTP - Closed Throttle Position
cu ft or ft3 - cubic foot, or feet
cu in or in3 - cubic inch, or inches
CV - Constant Velocity (joint)
Cyl - Cylinder(s)

D

DAB - Delayed Accessory Bus
dB - decibels
dBA - decibels on A-weighted scale
DC - Direct Current
DE - Drive End
DEC - Digital Electronic Controller
DERM - Diagnostic Energy Reserve Module
DFI - Direct Fuel Injection
DI - Distributor Ignition

dia - diameter
DIC - Driver Information Center
Diff - Differential
DLC - Data Link Connector
DOHC - Dual Overhead Camshafts
DRL - Daytime Running Lamps
DTC - Diagnostic Trouble Code
DVM - Digital Voltmeter
DVOM - Digital Volt/Ohmmeter

E

EBCM - Electronic Brake Control Module
EBTCM - Electronic Brake and Traction Control Module
ECC - Electronic Climate Control
ECI - Extended Compressor at Idle
ECM - Engine Control Module
ECS - Emission Control System
ECT - Engine Coolant Temperature

EEPROM - Electronically Erasable Programmable Read Only Memory
EEVIR - Evaporator Equalized Values in Receiver
EFE - Early Fuel Evaporation
EGR - Exhaust Gas Recirculation
EI - Electronic Ignition
ELC - Electronic Level Control
EMF - Electromotive Force
EPA - Environmental Protection Agency

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EPR - Exhaust Pressure Regulator
EPROM - Erasable Programmable Read Only Memory
ESD - Electrostatic Discharge
ETC - Electronic Temperature Control

ETCC - Electronic Touch Climate Control
ETR - Electronically Tuned Receiver
EVAP - Evaporative Emission
Exh - Exhaust

F

°F - Degrees Fahrenheit
FC- Fan Control
FDC - Fuel Data Center
FED - Federal (All States Except California)
FI - Fuel Injection
FMVSS - Federal Motor Vehicle Safety Standards

ft - foot, feet
FOD - Front of Dash
FT - Fuel Trim
4WAL - Four Wheel Anti-lock
4WD - Four Wheel Drive
FWD - Front Wheel Drive

G

g - gravitational acceleration, grams
GA - Gage
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
GAWR - Gross Axle Weight Rating
GVW - Gross Vehicle Weight
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
Hg - Mercury
Hi Alt - High Altitude

HO₂S - Heated Oxygen Sensor
hp - horsepower
HPL - High Pressure Liquid
HPS - High Performance System
HPV - High Pressure Vapor
HUD - Head-Up Display
HVAC - Heater-Vent-Air Conditioning
HVACM - Heater-Vent-Air Conditioning Module
HVM - Heater Vent Module
Hz - Hertz

I

IAC - Idle Air Control
IAT - Intake Air Temperature
IC - Ignition Control/Integrated Circuit
ICM - Ignition Control Module
ID - Inside Diameter, Identification
IDI - Integrated Direct Ignition
ign - ignition
ILC - Idle Load Compensator

in - inch(es)
INJ - Injection
Int - Intake
I/P - Instrument Panel
ISC - Idle Speed Control
ISO - International Standards Organization
ISS - Input Shaft Speed

K

KAM - Keep Alive Memory
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
lb ft - pound feet (torque)
lb in - pound inch (torque)
LCD - Liquid Crystal Display
LED - Light Emitting Diode

LF - Left Front
LH - Left Hand
LR - Left Rear
lt - left
LTPWS - Low Tire Pressure Warning System

M

MAF - Mass Air Flow
Man - Manual
MAP - Manifold Absolute Pressure
Max - Maximum
M/C - Mixture Control
MDP - Manifold Differential Pressure
MFI - Multi-port Fuel Injection
mi - miles
MIL - Malfunction Indicator Lamp
min - minimum

mL - milliliters
mm - millimeters
mpg - miles per gallon
mph - miles per hour
ms - millisecond
MST - Manifold Surface Temperature
M/T - Manual Transmission/Transaxle
MV - Megavolt
mV - Millivolt

N

NC - Normally Closed
NEG - Negative
Neu - Neutral
NLGI - National Lubricating Grease Institute
N.m - Newton-meters (torque)

NO - Normally Open
NOx - Oxides of Nitrogen
NPTC - National Pipe Thread Coarse
NPTF - National Pipe Thread Fine

O

O2 - Oxygen
O2S - Oxygen Sensor
OBD - On-Board Diagnostic
OBD II - On-Board Diagnostic System, Series II
OC - Oxidation Converter (Catalytic)
OD - Outside Diameter

OE - Original Equipment
OEM - Original Equipment Manufacturer
OHC - Overhead Camshaft
OL - Open Loop
ORC - Oxidation Reduction Converter (Catalytic)
oz - ounce(s)

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P

PAG - Polyalkylene Glycol
PAIR - Pulsed Secondary Air Injection
PASS-Key® - Personalized Automotive Security System Key
P/B - Power Brakes
PCM - Powertrain Control Module
PCS - Pressure Control Solenoid
PCV - Positive Crankcase Ventilation
PID - Parameter Identification
PKE - Passive Keyless Entry
PM - Permanent Magnet
P/N - Part Number
PNP - Park/Neutral Position

POA - Pilot Operated Absolute (Valve)
POS - Positive
POT - Potentiometer (Variable Resistor)
ppm - parts per million
PROM - Programmable Read Only Memory
PS - Power Steering
PSP - Power Steering Pressure
psi - pounds per square inch
psia - pounds per square inch absolute
psig - pounds per square inch gage
pt - pint
PWM - Pulse Width Modulation

Q

qt - quart(s)

R

R-134a - Refrigerant-134a
RAM - Random Access Memory (non permanent memory device, memory contents are lost when power is removed)
RAP - Retained Accessory Power
Ref - Reference
RF - Right Front
RFI - Radio Frequency Interference
RH - Right Hand

ROM - Read Only Memory (permanent memory device, memory contents are retained when power is removed)
RPM - Engine Speed
RPO - Regular Production Option
RR - Right Rear
rt - right
RTD - Real Time Dampening
RTV - Room Temperature Vulcanizing (sealer)
RWD - Rear Wheel Drive

S

s - second(s)
SAE - Society of Automotive Engineers
SC - Supercharger
SCB - Supercharger Bypass
SDM - Sensing and Diagnostic Module
SEO - Special Equipment Option
SFI - Sequential Multi-port Fuel Injection
SI - System International (modern version of metric system)
SIR - Supplemental Inflatable Restraint

sol - solenoid
SO₂ - Sulfur Dioxide
SPO - Service Parts Operations
sq ft, ft² - square foot(feet)
sq in, in² - square inch(es)
SRC - Selective Ride Control
SS - Shift Solenoid
Stat - Status
ST - Scan Tool
syn - synchronizer

T

TAC - Throttle Actuator Control
Tach - Tachometer
TAP - Transmission Adaptive Pressure
TBI - Throttle Body Fuel Injection
TCC - Torque Converter Clutch
TCS - Traction Control System
TDC - Top Dead Center
TEMP - Temperature
Term - Terminal
TFT - Transmission Fluid Temperature
THM - Turbo Hydra-Matic
TP - Throttle Position

TPM - Tire Pressure Monitor
TR - Transmission Range
TRANS - Transmission/Transaxle
TC - Turbocharger
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

U-Joint - Universal Joint

V

V - Volt(s), Voltage
V6 - Six-Cylinder Engine
V8 - Eight-Cylinder Engine
Vac - Vacuum
VATS - Vehicle Anti-Theft System
VCM - Vehicle Control Module
VDOT - Variable Displacement Orifice Tube

VDV - Vacuum Delay Valve
vel - velocity
VF - Vacuum Fluorescent
VIN - Vehicle Identification Number
VMV - Vacuum Modulator Valve
VR - Vacuum Regulator
VSS - Vehicle Speed Sensor

W

w - with
W/B - Wheel Base
w/o - without
WOT - Wide Open Throttle

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

Z

ZF - Zahnradfabrik Friedrichshafen

REGULAR PRODUCTION OPTION (RPO) CODES

AE7	Seating: 40/60 Split Front Bench	C71	6,450 lb GVW Rating
AG9	Seat Adjuster: Power, 6-Way	C7L	12,000 lb GVW Rating
AJ1	Window: Deep Tint, All Except Windshield and Door Glass	C95	Roof Lamp: Courtesy, Dual Reading
AJ3	Restraint System: Front Seat, Inflatable, Driver	DD7	Mirror, Inside Rearview, Light Sensitive, Compass
AJ4	Restraint System: Front Seat, Inflatable, Passenger	DE2	Mirror, Outside Rearview, Left and Right, Folding
AK6	Restraint System: Front Seat, Inflatable, Driver & Passenger	DF2	Mirrors Exterior: Camper Type, Stainless Steel
AM7	Seat: Rear Folding Bench	DG5	Mirrors Exterior: West Coast Type, Stainless Steel
APC	Provisions: Front Bucket Seating	DK6	Console: Instrument, Roof
APD	Provisions: Front Bench Seating	DR1	Mirrors, Exterior: LH & RH Man. Cont., Painted
APR	Sales Incentive: Work Truck 2500	D44	Mirrors, Exterior: Black
AS3	Rear Seat: Suburban	D45	Mirrors, Exterior: Bright
AT5	Rear Seat: Center, Folding	D48	Mirrors, Exterior: Electric, Painted
AU0	Lock Control, Remote Entry	D55	Console: Frt. Compt., Floor
AU3	Lock: Side Door, Electric	EXP	Export I.E.S.
AU6	Lock: Tailgate, Electric Release	EF1	Rear Bumper Provisions: Delete
AXP	VIN Ident Position	E24	Side Cargo Door: Hinged
A20	Window: Rear Quarter Vent, Swing Out	E55	Endgate
A28	Window: Rear Full Width, Sliding	E62	Pickup Box: Sportside/Stepside
A31	Window: Side, Power	E63	Pickup Box: Fleetside
A50	Seat: Front Bucket	FE9	Certification, Emission, Federal
A52	Seat: Front Folding Bench	FF4	Torsion Bar Spring Adjust Arm, Left
A95	Front Bucket Seats, High Back and Reclining	FF5	Torsion Bar Spring Adjust Arm, Right
BG9	Covering: Floor, Rubber	FF6	Torsion Bar Spring Adjust Arm, Left
BNP	Molding, Wheel Opening Delete	FF7	Torsion Bar Spring Adjust Arm, Right
BVE	Steps, Side, Running Board	FF8	Torsion Bar Spring Adjust Arm, Left
BYP	Sales: Sport Equipment Package	FF9	Torsion Bar Spring Adjust Arm, Right
BZY	Liner, Pickup Box	FG5	Shock Absorbers FRT & RR, Gas Preloaded, Delco/Bilstein
B30	Floor: Carpet Covering	FK2	Torsion Bar Spring Adjust Arm, Left
B32	Floor Mats: Front Removable, Color Keyed	FK3	Torsion Bar Spring Adjust Arm, Right
B33	Floor Mats: Rear Removable, Color Keyed	FWI	Plant Code: Fort Wayne, IN
B37	Covering: Floor Mats, Frt. & Rear, Aux	F44	Chassis Equipment, Heavy Duty
B4L	Label: Price Refer Geographic Chart	F51	Shock Absorbers: Front & Rear, Heavy Duty
B71	Moldings: Wheel Opening, Colored	F60	Springs, Front: Heavy Duty
B85	Moldings: Bright Body Side	F61	Rear Stabilizer Shaft
B96	Moldings: Chrome Wheel Opening	GK9	Axle: Rear, 4.63 Ratio
CMD	Plant Code: Flint, MI, GM T&D	GMC	Plant Code: Pontiac, MI
C25	Wiper System: Rear Window	GTY	Rear Axle, Wide Track
C3F	7,700 lb GVW Rating	GT4	Axle: Rear, 3.73 Ratio
C36	Heater: Auxiliary	GT5	Axle: Rear, 4.10 Ratio
C49	Defogger: Rear Window, Electric	GU4	Axle: Rear, 3.08 Ratio
C5B	15,000 lb GVW Rating	GU6	Axle: Rear, 3.42 Ratio
C5G	5,600 lb GVW Rating	G80	Axle, Rear: Limited Slip Differential
C5I	8,050 lb GVW Rating	HC4	Axle: Rear, 4.56 Ratio
C5M	6,100 lb GVW Rating	HC7	Axle: Rear, 5.13 Ratio
C5P	6,250 lb GVW Rating	JAN	Plant Code: Janesville, WI.
C5Q	6,300 lb GVW Rating	JB5	Power Brake, Disc/Drum, 6,400 lb
C5S	6,600 lb GVW Rating	JB6	Power Brakes, Disc/Drum, 7,200 lb
C5U	6,800 lb GVW Rating	JB7	Power Brakes, Disc/Drum, 8,400 lb
C5W	7,000 lb GVW Rating	JB8	Power Brakes, Disc/Drum, 10,000 lb
C5Z	7,200 lb GVW Rating	JD5	Dual Power Brakes, Disc/Drum, 6,400 lb
C6P	8,600 lb GVW Rating	JD6	Hydraulic Power Brakes, Disc/Drum, 7,200 lb
C6U	9,000 lb GVW Rating	JD7	Hydraulic Power Brakes, Disc/Drum, 8,400 lb
C6W	9,200 lb GVW Rating	JF9	Hydraulic Power Brakes, 4-Wheel Discs
C6Y	9,600 lb GVW Rating	KC4	Cooling System: Engine Oil
C60	Air Conditioning: Front, Manual	KNP	Cooling System, Transmission, HD
C69	Air Conditioning: Rear, Roof-Mounted	KXB	Generator, Dual 100 Amp
C7A	10,000 lb GVW Rating	K02	Fan, Radiator Booster
C7E	11,000 lb GVW Rating	K05	Heater: Engine Coolant
		K19	Reactor System, Air Injection

K34	Cruise Control: Electric	UK1	Frequencies: Japanese Radio
K47	Air Cleaner, High Capacity	UL0	Radio Equipment: AM/FM Stereo, Seek/Scan, Auto Reverse Music Search Cassette, Auto Tone, Clock, ETR
K60	Generator: 100 Ampere	UL2	Frequencies: European Radio
K68	Generator: 105 Ampere	UL5	Radio: Delete
L35	Engine: 4.3L V6, TBI	UM6	Radio Equipment: ETR AM/FM Stereo Cassette, Clock w/Seek & Scan
L30	Engine: 5.0L V8, TBI	UM7	Radio Equipment: ETR AM/FM Stereo, Clock w/Seek & Scan
L31	Engine: 5.7L V8, TBI	UN0	Radio Equipment: AM/FM Stereo, Seek/Scan, Compact Disc, Auto Tone, Clock, ETR
L29	Engine: 7.4L V8, TBI	UP0	Radio Equipment: AM/FM Stereo, Seek/Scan, Auto Reverse, Music Search Cassette, Compact Disc, Auto Tone, Clock, ETR
L56	Engine: 6.5L V8, Turbo Diesel	UQ3	Speaker System, Performance, Enhance Audio
L65	Engine: 6.5L V8, Turbo Diesel, HO	UQ5	Speaker System, Four, Dual Front Door Mounted
MG5	Transmission: 5-Speed Manual, Getrag, 84 mm	UY1	Camper Wiring Harness
MSL	Plant Code: Silao, Mexico, GM De Mexico	U01	Lamps, Roof Marker
MT1	Transmission: Hydra-Matic 4L80-E, 4-Speed Automatic	U18	Speedometer
MW3	Transmission: New Venture Gear 4500, 5-Speed Manual	VB3	Bumper: Chromed Rear Step
M30	Transmission: Hydra-Matic 4L60-E, 4-Speed Automatic	VC0	Vehicle Label, Noise Control Information
M50	Transmission: New Venture Gear 3500, 5-Speed Manual	VC1	Label, Price/Fuel Economy
NA1	Emission System (Less than 8,500 lb)	VC3	Label, Price/Fuel Economy US Territories
NA4	Emission System (Above 8,500 lb)	VC4	Label, Price/Fuel Economy Puerto Rico
NA5	Emission System: Federal, Tier 0	VC5	Label Shipping, Except US, US Possessions, Or Japan
NB2	Emission System: California, Tier 0	VC6	Label Shipping, Hawaii, US Territories, and Puerto Rico
NB6	Emission System: California, Tier 1	VG3	Bumper: Deluxe Front Bumper
NF2	Emission System Federal, Tier 1	VG8	Vehicle Label, Notice to Buyer
NM8	Emission System: Lead Fuel	VG9	Protector Wax, Exterior Body
NP1	Transfer Case Electronic Shift Control, Two Speed	VK3	Bracket, License Plate: Front
NP5	Steering Wheel, Leather Wrapped	VK5	Seat Temporary, for Shipping
NQZ	Fuel Tank, Aux., RR Mounted, 18 Gal., Delete	VR4	Trailing Equipment: Weight Distributing Platform Hitch
NRQ	Exhaust: Close Coupled	VR7	Vehicle, Non-Saleable
NY1	Shield: Fuel Tank Steel	VXS	Vehicle, Complete
NZZ	Skid Plate: Off Road	VXT	Vehicle, Incomplete
N33	Steering Column: Tilt	VYU	Provisions, Snow Plow Prep
N83	Wheels: 15 X 7, Chrome, Styled	V10	Cold Climate Package
N90	Wheels: Aluminum, Cast	V22	Appearance: Deluxe Front
OSG	Plant Code: Oshawa, ONT, GM of Canada	V27	Bumper Guards, Front
PF4	Wheel: 16 x 7, Aluminum, Forged	V43	Bumper: Painted Rear Step
P06	Wheel Trim: Trim Rings	V54	Luggage Carrier: Roof, Painted
QBN	Tire: All, LT245/75R16/C BW R/PE ST TBL OOR	V60	Vehicle Statement Gulf States Organization, Incomplete Vehicle
QBX	Tire: All, LT245/75R16/C WOL R/PE ST TBL OOR	V73	Vehicle Statement US/Canada
QFL	Tire: All, P235/75R15 BW R/PE ST TL ALS 1055	V76	Tow Hook: Front
QFM	Tire: All, P235/75R15/N WS2 R/PE ST TL ALS	V78	Vehicle Statement Delete
QFN	Tire: All, P235/75R15 WL R/PE ST TL ALS 1055	V87	Vehicle Statement Gulf States Organization
QGA	Tire: All, P245/75R16 BW R/PE ST TL AT 109S	WD1	Identification, Pilot Vehicle
QGB	Tire: All, P245/75R16 WOL R/PE ST TL AT 109S	W99	Equipment Misc. Equip for Venez (G.M. Controlled)
QGC	Tire: All, P265/75R16 BW R/PE ST TL AT 114S	XBK	Tire: Front, LT245/75R16/C BL R/PE ST TBL ALS
QGD	Tire: All, P265/75R16 WOL R/PE ST TL AT 114S	XBN	Tire: Front, LT245/75R16/C BL R/PE ST TBL OOR
QHA	Tire: All, P235/75R15/X BW R/PE ST TL ALS	XBX	Tire: Front, LT245/75R16/C BL R/PE ST TBL OOR
QHR	Tire: All, LT225/75R16/D BW R/PE ST TL OOR	XFL	Tire: Front, P235/75R15/N BW R/PE ST TL ALS 105S
QIW	Tire: All, LT245/75R16/E BL R/PE ST TL OOR	XFM	Tire: Front, P235/75R15/N XNW R/PE ST TL ALS
QIZ	Tire: All, LT245/75R16/E BL R/PE ST TL OOR	XFN	Tire: Front, P235/75R15/N RWL R/PE ST TL ALS
Q4B	6,200 lb GVW Rating	XGA	Tire: Front, P245/75R16 BW R/PE ST AL AT 109S
RSA	Restraint, Front Seat, Auto, Passive		
RSB	Restraint, Front Seat, 208, Manual, Active		
R04	Wheels, Rear: Single		
R05	Wheels, Rear: Dual		
TP2	Battery: Auxiliary, Camper		
T61	Daytime Running Lights		
T62	Lighting Daytime Running: Delete		
T85	Headlamps LH Rule Of Road, E Mark		
UD4	Speed Alarm: 120 km/h		

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XGB Tire: Front, P245/75R16 WOL R/PE ST AL AT 109S
XGC Tire: Front, P265/75R16 BW R/PE ST TL AT 114S
XGD Tire: Front, P265/75R16 WOL R/PE ST TL AT 114S
XGK Tire: Front, LT245/75R16/E BL R/PE ST OOR
XHA Tire: Front, P235/75R15/X BW R/PE ST TL ALS
XHE Tire: Front, LT225/75R16/C BL R/PE ST ALS
XHH Tire: Front, LT245/75R16/E BL R/PE ST ALS
XHP Tire: Front, LT225/75R16/D BL R/PE ST TL ALS
XHR Tire: Front, LT225/75R16/D BL R/PE ST TL OOR
XTN Tire: Front, 225/70R19.5/F BW R/ST TL HWY
XYK Tire: Front, LT215/85R16/D BL R/PE ST TL HWY
XYL Tire: Front, LT215/85R16/D BL R/PE ST TL OOR
X81 Sales Incentive Price Leader
X88 Conversion: Nameplate, Chevrolet
YA7 Test Emission, California Assembly Line
YA9 Axle: Front, 3,400 lb
YBK Tire: Rear, LT245/75R16/C BL R/PE ST TBL ALS
YBN Tire: Rear, LT245/75R16/C BL R/PE ST TBL OOR
YBX Tire: Rear, LT245/75R16/C WOL R/PE ST TBL OOR
YD3 Axle: Base Equipment
YD6 Spring: Rear, Base Equipment
YD7 Axle (Used with R05) for Scheduling GVW Plate
YE9 Convenience Pkg., Comfort & Decor Level #3, CL/SLE
YFL Tire: Rear, P235/75R15/N BW R/PE ST TL ALS 105S
YFN Tire: Rear, P235/75R15/N RWL R/PE ST TL ALS
YF2 Sales Pkg., Ambulance Upfitter
YF4 Vehicle Engineering, Hold Order
YF7 Sales Pkg., RV 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
YGK Tire: Rear, LT245/75R16/E BL R/PE ST OOR
YG4 Optional Seats Not Desired
YHA Tire: Rear, P235/75R15 XL ST ALS BL
YHB Tire: Rear, P235/75R15/X XNW R/PE ST TL ALS
YHH Tire: Rear, LT245/75R16/E BL R/PE ST ALS
YHP Tire: Rear, LT225/75R16/D BL R/PE ST TL ALS
YHR Tire: Rear, LT225/75R16/D BL R/PE ST TL OOR
YTN Tire: Rear, 225/70R19.5/F BW R/ST ST TL HWY
YYK Tire: Rear, LT215/85R16/D BL R/PE ST TL HWY
YYL Tire: Rear, LT215/85R16/D BL R/PE ST TL OOR
ZA6 Package Price Leader
ZA7 Package Value Leader, Canadian
ZBK Tire: Spare, LT245/75R16/C BL R/PE ST TBL OOR
ZBN Tire: Spare, LT245/75R16/C BL R/PE ST TBL OOR
ZBX Tire: Spare, LT245/75R16/C WOL R/PE ST TBL OOR
ZFL Tire: Spare, P235/75R15/BW R/PE ST TL ALS 105S
ZFN Tire: Spare, P235/75R15/N XNW R/PE ST TL ALS
ZGA Tire: Spare, P245/75R16 BW R/PE ST TL AT 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: Rear, LT245/75R16/E BL R/PE ST OOR
ZHA Tire: Spare, P235/75R15/X BW R/PE ST TL ALS
ZHH Tire: Spare, LT245/75R16/E BL R/PE ST ALS
ZHP Tire: Spare, LT225/75R16/D BL R/PE ST TL ALS
ZHR Tire: Spare, LT225/75R16/D BL R/PE ST TL OOR
ZP6 Sales Pkg., Combination, Rear Wiper, Rear Window Defogger
ZQ2 Sales Pkg., Driver's Convenience, #1
ZQ3 Sales Pkg., Driver's Convenience, #2
ZTN Tire: Spare, P225/70R19.5/F BW R/ST ST TL HWY
ZYK Tire: Spare, LT215/85R16/D BL R/PE ST TL AT 109S HWY
ZYL Tire: Spare, LT215/85R16/D BL R/PE ST TL AT 109S OOR
ZY1 Color Combination: Solid
ZY2 Color Combination: Two-Tone
ZY4 Color Combination: Deluxe Two-Tone
Z49 Equipment, Export, Canadian Mandatory
Z71 Chassis Package: Off-Road
Z81 Chassis: Basic Camper Equipment
Z82 Trailering Equipment: Heavy Duty
01L Secondary Color: Exterior, Special
01U Primary Color: Exterior, Special
05L Secondary Color: Exterior, Cyclamen
05U Primary Color: Exterior, Cyclamen
12U Primary Color: Exterior, Yellow White
13C Trim Combination: Cloth, Light Gray
13D Trim Combination: Cloth, Light Gray
13I Interior Trim: Light Smoke Gray
13V Trim Combination: Vinyl, Light Gray
132 Trim Combination: Leather, Light Gray
19U Primary Color: Exterior, Lamp Black
23L Secondary Color: Exterior Lt. Blue Metallic
23U Primary Color: Exterior, Lt. Blue Metallic
24L Secondary Color: Exterior, Medium Blue Metallic
24U Primary Color: Exterior, Medium Blue Metallic
26A Stripe: Color Accent, Two-Tone, Blue/Silver
26C Trim Combination: Cloth, Navy
26D Trim Combination: Cloth, Navy
26I Interior Trim, Navy
26L Secondary Color: Exterior, Pastel Blue
26U Primary Color: Exterior, Pastel Blue
26V Trim Combination: Vinyl, Navy
262 Trim Combination: Leather, Navy
27A Stripe Color Accent: Two-Tone, Light Atlantic Blue/Indigo
27L Secondary Color: Exterior, Lt. Stellar Blue Metallic
27U Primary Color: Exterior, Lt. Stellar Blue Metallic
29U Primary Color: Exterior, Dark Blue
31A Stripe Color Accent: Mint Green Mica
32A Stripe Color Accent: Two-Tone, Lt. Teal Metallic
35L Secondary Color: Exterior, Med Mesa Brown
35U Primary Color: Exterior, Med Mesa Brown
38L Secondary Color: Exterior, Bright Teal Metallic
38U Primary Color: Exterior, Bright Teal Metallic
41L Secondary Color: Exterior, Black
41U Primary Color: Exterior, Black

46U	Primary Color: Exterior, Dark Green	65L	Secondary Color: Exterior, Dark Chestnut Metallic
50L	Secondary Color: Exterior, Olympic White	65U	Primary Color: Exterior, Dark Chestnut Metallic
50U	Primary Color: Exterior, Olympic White	7GC	Component Front RH Computer Selected Suspension
51A	Stripe: Color Accent, Two-Tone, Gray/Silver	7GF	Component Front RH Computer Selected Suspension
51L	Secondary Color: Toreador Red Metallic	7GG	Component Front RH Computer Selected Suspension
51U	Primary Color: Toreador Red Metallic	7GH	Component Front RH Computer Selected Suspension
52C	Trim Combination: Cloth, Light Neutral	7GK	Component Front RH Computer Selected Suspension
52D	Trim Combination: Cloth, Light Neutral (D)	7GL	Component Front RH Computer Selected Suspension
52I	Interior Trim: Light Neutral	7GR	Component Front RH Computer Selected Suspension
52V	Trim Combination, Vinyl, Light Neutral	7WF	Component Front RH Computer Selected Suspension
522	Trim Combination, Leather, Light Neutral	7WK	Component Front RH Computer Selected Suspension
55L	Secondary Color: Exterior, Light Autumnwood Metallic	7WL	Component Front RH Computer Selected Suspension
55U	Primary Color: Exterior, Light Autumnwood Metallic	7WN	Component Front RH Computer Selected Suspension
56A	Stripe Color Accent: Two-Tone, Medium Beige/Black	7WP	Component Front RH Computer Selected Suspension
59L	Secondary Color: Exterior, Red Maple II	7WS	Component Front RH Computer Selected Suspension
59U	Primary Color: Exterior, Red Maple II	7WT	Component Front RH Computer Selected Suspension
6GC	Component Front LH Computer Selected Suspension	7WW	Component Front RH Computer Selected Suspension
6GF	Component Front LH Computer Selected Suspension	7WX	Component Front RH Computer Selected Suspension
6GH	Component Front LH Computer Selected Suspension	7WZ	Component Front RH Computer Selected Suspension
6GK	Component Front LH Computer Selected Suspension	7XA	Component Front RH Computer Selected Suspension
6GL	Component Front LH Computer Selected Suspension	7XC	Component Front RH Computer Selected Suspension
6GR	Component Front LH Computer Selected Suspension	7XD	Component Front RH Computer Selected Suspension
6WF	Component Front LH Computer Selected Suspension	7XJ	Component Front RH Computer Selected Suspension
6WK	Component Front LH Computer Selected Suspension	7YB	Component Front RH Computer Selected Suspension
6WL	Component Front LH Computer Selected Suspension	71U	Primary Color: Exterior, Red Orange
6WN	Component Front LH Computer Selected Suspension	72U	Primary Color: Exterior, Standard Red
6WP	Component Front LH Computer Selected Suspension	74L	Secondary Color: Exterior, Victory Red
6WS	Component Front LH Computer Selected Suspension	74U	Primary Color: Exterior, Victory Red
6WT	Component Front LH Computer Selected Suspension	77L	Secondary Color: Exterior, Black Cherry Met
6WW	Component Front LH Computer Selected Suspension	77U	Primary Color: Exterior, Dark Cherry Metallic
6WX	Component Front LH Computer Selected Suspension	79A	Stripe Color Accent, Dark Claret
6WZ	Component Front LH Computer Selected Suspension	79C	Trim Combination, Cloth, Ruby Red
6XA	Component Front LH Computer Selected Suspension	79D	Trim Combination, Cloth, Ruby Red
6XC	Component Front LH Computer Selected Suspension	79I	Interior Trim, Ruby Red
6XD	Component Front LH Computer Selected Suspension	79V	Trim Combination, Vinyl, Ruby Red
6XJ	Component Front LH Computer Selected Suspension	792	Trim Combination, Leather, Ruby Red
6YB	Component Front LH Computer Selected Suspension	8E6	Bumper: Rear Painted
61U	Primary Color: Exterior, Tan	80A	Stripe: Color Accent: Two-tone, Gunmetal/Red
65A	Stripe: Color Accent, Two-tone, Beige Metallic/Dark Autumnwood Metallic	82A	Stripe Color Accent: Lt. Blue and Lt. Gray
		83A	Stripe Color Accent: Two-Tone, Green/Silver
		84A	Stripe Color Accent: Two-Tone, Silver/Garnet
		87A	Stripe Color Accent: Charcoal and Red-Orange

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90U Primary Color: Exterior, Gray Metallic
91L Secondary Color: Exterior, Dark Argent

96L Secondary Color: Exterior, Ultra Silver Metallic
96U Primary Color: Exterior, Ultra Silver Metallic

SECTION 0B

MAINTENANCE AND LUBRICATION

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GENERAL DESCRIPTION

INTRODUCTION

This section covers the maintenance required to retain safety, dependability and emission control performance.



Important

Keep the engine oil at the proper level and change as recommended.

VEHICLE MAINTENANCE AND THE ENVIRONMENT

Proper vehicle maintenance not only keeps the vehicle in good working condition, but also helps the environment. All recommended maintenance procedures are important. Improper vehicle maintenance or the removal of important components can significantly affect the environment. Improper fluid levels or even the wrong

tire inflation can increase emission levels. To help protect the environment, and to help keep the vehicle in good condition, perform all recommended maintenance.

HOW THIS SECTION IS ORGANIZED

The remainder of this section is divided into the following five parts:

“Scheduled Maintenance Services” shows what services to perform and how often. Some of these services can be complex, and require a trained technician to perform.

CAUTION: Performing maintenance work on a vehicle can be dangerous. Attempting repairs or service without the appropriate training, tools, and equipment could cause injury to you or others and damage to the vehicle.

OB-2 MAINTENANCE AND LUBRICATION

"Owner/Driver Checks and Services" tells what the owner/driver should check at the intervals specified.

"Periodic Maintenance Inspections" explains important inspections that a trained technician should perform.

"Recommended Fluids and Lubricants" lists some products GM recommends to help keep this vehicle properly maintained. Use these products, or their equivalents, whenever performing maintenance services.

SCHEDULED MAINTENANCE SERVICES

USING THE MAINTENANCE SCHEDULE

Because of the different ways GM vehicles are used, maintenance needs vary. More frequent maintenance intervals than found in this manual may be needed. When reading this section, keep in mind the conditions under which the vehicle is operated, and adjust the maintenance intervals accordingly.

The proper fluids and lubricants to use are listed in **"Recommended Fluids and Lubricants"** in this section. Use the proper fluids and lubricants whenever servicing this vehicle.

The maintenance schedules found in this manual are for vehicles that:

- Carry passengers and cargo within recommended limits. Refer to "Vehicle Certification Label" in SECTION 0A.
- Are driven on reasonable road surfaces within legal driving limits.
- Are driven off-road in the recommended manner. Refer to the Owner's Manual.
- Use the recommended unleaded fuel.

SELECTING THE RIGHT SCHEDULE

First you will need to decide which of the two schedules is right for your vehicle. Diesel engine vehicles have different maintenance requirements; follow a schedule designated for diesel engine vehicles only.

Short Trip/City Definition

Follow the Short Trip/City maintenance schedule if any one of these are true:

- Most trips are less than 5 to 10 miles (8 to 16 km). This is particularly important when outside temperatures are below freezing.
- Most trips include extensive idling (such as frequent driving in stop and go traffic).
- The vehicle is operated in dusty areas or off-road frequently.
- Trailer towing or using a carrier on top of the vehicle frequently.
- The vehicle is used for delivery service, police, taxi, or other commercial applications.

Short Trip/City Maintenance Schedule Summary

These intervals summarize the Short Trip/City Maintenance Schedule. See "Short Trip/City Maintenance Schedule" in this section, for the complete maintenance schedule.

Every 3,000 Miles (5 000 km) or 3 Months

Engine Oil and Filter Change
Chassis Lubrication

Drive Axle Service. Refer to "Footnotes" in this section.

Every 6,000 Miles (10 000 km)

Tire Rotation

Every 15,000 Miles (25 000 km)

Shields and Underhood Insulation Inspection (GVWR above 8,500 lbs only).

Thermostatically Controlled Engine Cooling Fan Check.

Front Wheel Bearing Repack (2 Wheel Drive Only)

Every 30,000 Miles (50 000 km)

Fuel Filter Replacement

Every 50,000 Miles (83 000 km)

Automatic Transmission Service (vehicles over 8600 GVWR or driven under severe conditions).

Every 60,000 Miles (100 000 km)

Engine Drive Belt Inspection

Fuel Tank, Cap and Lines Inspection

Exhaust Gas Recirculation System Inspection.

Evaporative Control System Inspection.

Every 100,000 Miles (166 000 km)

Spark Plug Replacement

Spark Plug Wire Inspection

Engine Timing Check

Positive Crankcase Ventilation (PCV) Valve Inspection.

Every 150,000 Miles (240 000 km)

Cooling System Service (or every 60 months, whichever occurs first).

Long Trip/Highway Definition

Follow the Long Trip/Highway maintenance schedule ONLY if none of the conditions from the Short Trip/City maintenance schedule are true. Do not use this section if the vehicle is used for trailer towing, driven in a dusty area or used off paved roads. Use the Short Trip/City schedule for these conditions.

Long Trip/Highway Schedule Summary

These service intervals summarize the Long Trip/Highway Maintenance Schedule. See "Long Trip/Highway Maintenance Schedule" in this section, for the complete maintenance schedule.

Long Trip/Highway Intervals

Every 7,500 Miles (12 500 km)

Engine Oil and Filter Change (or every 12 months, whichever occurs first)

Chassis Lubrication (or every 12 months, whichever occurs first)

Drive Axle Service. Refer to "Footnotes" in this section.

Tire Rotation

Every 15,000 Miles (25 000 km)

Shields and Underhood Insulation Inspection (GVWR above 8,500 lbs only).

Thermostatically Controlled Engine Cooling Fan Check.

Every 30,000 Miles (50 000 km)

Fuel Filter Replacement.

Front Wheel Bearing Repack (2 Wheel Drive Only).

Every 60,000 Miles (100 000 km)

Engine Accessory Drive Belt Inspection.

Fuel Tank, Cap and Lines Inspection.

Exhaust Gas Recirculation System Inspection.

Evaporative Control System Inspection.

Every 100,000 Miles (166 000 km)

Spark Plug Replacement.

Spark Plug Wire Inspection.

Positive Crankcase Ventilation (PCV) Valve Inspection.

Every 150,000 Miles (166 000 km)

Cooling System Service (or every 60 months, whichever occurs first).

SHORT TRIP/CITY MAINTENANCE SCHEDULE (GASOLINE ENGINES)

The services shown in this schedule up to 100,000 miles (166 000 km) should be performed after 100,000 miles (166 000 km) at the same intervals. The services shown at 150,000 miles (240 000 km) should be performed at the same interval after 150,000 miles (240 000 km).

3,000 Miles (5 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

6,000 Miles (10 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

9,000 Miles (15 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.

- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

12,000 Miles (20 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

15,000 Miles (25 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- For 2 Wheel Drive vehicles only: Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Vehicles With GVWR Above 8,500 lbs Only: Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up. Be sure the valve works properly.

18,000 Miles (30 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*

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- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

21,000 Miles (35 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

24,000 Miles (40 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.

27,000 Miles (45 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

30,000 Miles (45 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines

and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.

- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- For 2 Wheel Drive vehicles only: Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Replace fuel filter. *An Emission Control Service.*
- Vehicles With GVWR Above 8,500 lbs Only: Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up. Be sure the valve works properly.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

33,000 Miles (55 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

36,000 Miles (60 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

39,000 Miles (65 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

42,000 Miles (70 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

45,000 Miles (75 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Inspect air filter if driving in dusty conditions. Replace filter if necessary. *An Emission Control Service.*
- For 2 Wheel Drive vehicles only: Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Vehicles With GVWR Above 8,500 lbs Only: Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up. Be sure the valve works properly.

48,000 Miles (80 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

50,000 Miles (83 000 km)

- Change automatic transmission fluid and filter if the vehicle's GVWR is over 8600 lbs. or if the vehicle is mainly driven under one or more of these conditions:
 - A. In heavy traffic where the outside temperature regularly reaches 90° F (32° C) or higher.
 - B. In hilly or mountainous terrain.
 - C. When doing frequent trailer towing.
 - D. Uses such as found in taxi, police or delivery service.

51,000 Miles (85 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

54,000 Miles (90 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

57,000 Miles (95 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

60,000 Miles (100 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*

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- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Inspect engine accessory drive belt. *An Emission Control Service.*
- Replace fuel filter. *An Emission Control Service.*
- Inspect fuel tank, cap and lines for damage or leaks. Inspect fuel cap gasket for any damage. Replace parts as needed. *An Emission Control Service.*
- For 2 Wheel Drive vehicles only: Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Vehicles With GVWR Above 8,500 lbs Only: Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up. Be sure the valve works properly.
- Conduct evaporative control system inspection. Check all fuel and vapor lines and hoses for proper hook-up, routing and condition. Check that the purge valve works properly (if equipped). Replace as needed.
- Conduct Exhaust Gas Recirculation (EGR) system inspection.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

63,000 Miles (105 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

66,000 Miles (110 000 km).

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

69,000 Miles (115 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

72,000 Miles (120 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

75,000 Miles (125 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- For 2 Wheel Drive vehicles only: Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Vehicles With GVWR Above 8,500 lbs Only: Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up. Be sure the valve works properly.

78,000 Miles (130 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear

driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.

- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

81,000 Miles (135 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

84,000 Miles (140 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

87,000 Miles (145 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

90,000 Miles (150 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin

bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.

- For 2 Wheel Drive vehicles only: Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Vehicles With GVWR Above 8,500 lbs Only: Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up. Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Replace fuel filter. *An Emission Control Service.*
- For 2 Wheel Drive vehicles only: Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Vehicles With GVWR Above 8,500 lbs Only: Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up. Be sure the valve works properly.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

93,000 Miles (155 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

96,000 Miles (160 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

99,000 Miles (165 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer

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case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.

- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

100,000 Miles (166 000 km)

- Replace spark plugs *An Emission Control Service*.
- Inspect spark plug wires. *An Emission Control Service*.

- Change automatic transmission fluid and filter if the vehicle's GVWR is over 8600 lbs. or if the vehicle is mainly driven under one or more of these conditions:

A. In heavy traffic where the outside temperature regularly reaches 90° F (32° C) or higher.

B. In hilly or mountainous terrain.

C. When doing frequent trailer towing.

D. Uses such as found in taxi, police or delivery service.

- Inspect Positive Crankcase Ventilation (PCV) Valve. **150,000 Miles (240 000 km)**

- Drain flush and refill cooling system (or every 60 months since last service, whichever occurs first).

- Inspect hoses. Clean radiator, condenser, pressure cap and neck. Pressure test the cooling system and pressure cap. *An Emission Control Service*.

SHORT TRIP/CITY MAINTENANCE SCHEDULE (DIESEL ENGINES)

The services shown in this schedule up to 100,000 miles (166 000 km) should be performed after 100,000 miles (166 000 km) at the same intervals. The services shown at 150,000 miles (240 000 km) should be performed at the same interval after 150,000 miles (240 000 km).

2,500 Miles (4 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service*.
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).

5,000 Miles (8 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service*.
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

7,500 Miles (12 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service*.
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

10,000 Miles (16 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service*.
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- Check the air intake system installation to assure that gaskets are properly sealed and that hose con-

nections, fasteners and other components are tight. Also check to be sure that the air cleaner housing is properly seated, the cover fits tightly and the wing nuts are tight. Tighten connections and fasteners or replace damaged parts as necessary.

- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

12,500 Miles (20 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).

15,000 Miles (24 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Inspect air cleaner filter if the vehicle has been driven in dusty conditions. Replace filter if necessary. *An Emission Control Service.*
- For 2 Wheel Drive vehicles only: Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

17,500 Miles (28 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball

joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).

20,000 Miles (32 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- Check the air intake system installation to assure that gaskets are properly sealed and that hose connections, fasteners and other components are tight. Also check to be sure that the air cleaner housing is properly seated, the cover fits tightly and the wing nuts are tight. Tighten connections and fasteners or replace damaged parts as necessary.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

22,500 Miles (36 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

25,000 Miles (40 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines,

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and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).

- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Replace fuel filler cap if driving in dusty conditions.

27,500 Miles (44 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).

30,000 Miles (48 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Replace fuel filter.
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- For 2 Wheel Drive vehicles only: Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Check the air intake system installation to assure that gaskets are properly sealed and that hose connections, fasteners and other components are tight. Also check to be sure that the air cleaner housing is properly seated, the cover fits tightly and the wing nuts are tight. Tighten connections and fasteners or replace damaged parts as necessary.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

32,500 Miles (52 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).

35,000 Miles (56 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

37,500 Miles (60 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

40,000 Miles (64 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items

at this mileage interval (or every 12 months, whichever occurs first).

- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- Check the air intake system installation to assure that gaskets are properly sealed and that hose connections, fasteners and other components are tight. Also check to be sure that the air cleaner housing is properly seated, the cover fits tightly and the wing nuts are tight. Tighten connections and fasteners or replace damaged parts as necessary.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

42,500 Miles (68 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).

45,000 Miles (72 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Inspect air cleaner filter if the vehicle has been driven in dusty conditions. Replace filter if necessary. *An Emission Control Service.*
- For 2 Wheel Drive vehicles only: Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

47,500 Miles (76 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*

- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).

50,000 Miles (80 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Change automatic transmission fluid and filter if the vehicle's GVWR is over 8600 lbs or if the vehicle is mainly driven under one or more of these conditions:
 - A. In heavy traffic where the outside temperature regularly reaches 90° F (32° C) or higher.
 - B. In hilly or mountainous terrain.
 - C. When doing frequent trailer towing.
 - D. Uses such as found in taxi, police or delivery service.
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- Check the air intake system installation to assure that gaskets are properly sealed and that hose connections, fasteners and other components are tight. Also check to be sure that the air cleaner housing is properly seated, the cover fits tightly and the wing nuts are tight. Tighten connections and fasteners or replace damaged parts as necessary.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Replace fuel filler cap if driving in dusty conditions.

52,500 Miles (84 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricat-

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ed unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).

- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

55,000 Miles (88 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

57,500 Miles (92 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).

60,000 Miles (96 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- For 2 Wheel Drive vehicles only: Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Check the crankcase depression regulator valve system for any worn, plugged or collapsed hoses. *An Emission Control Service.*

- Replace fuel filter.
- Check the EGR System (if equipped) (except Code F engine). *An Emission Control Service.*
- Inspect accessory drive (serpentine) belt for cracks, fraying and wear and check belt for proper tension. Adjust or replace belt as needed. *An Emission Control Service.*
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- Check the air intake system installation to assure that gaskets are properly sealed and that hose connections, fasteners and other components are tight. Also check to be sure that the air cleaner housing is properly seated, the cover fits tightly and the wing nuts are tight. Tighten connections and fasteners or replace damaged parts as necessary.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

62,500 Miles (100 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).

65,000 Miles (104 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

67,500 Miles (108 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*

- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

70,000 Miles (112 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- Check the air intake system installation to assure that gaskets are properly sealed and that hose connections, fasteners and other components are tight. Also check to be sure that the air cleaner housing is properly seated, the cover fits tightly and the wing nuts are tight. Tighten connections and fasteners or replace damaged parts as necessary.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

72,500 Miles (116 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).

75,000 Miles (120 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Inspect air cleaner filter if the vehicle has been driven in dusty conditions. Replace filter if necessary. *An Emission Control Service.*
- For 2 Wheel Drive vehicles only: Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.
- Replace fuel filler cap if driving in dusty conditions.

77,500 Miles (124 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).

80,000 Miles (128 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- Check the air intake system installation to assure that gaskets are properly sealed and that hose connections, fasteners and other components are tight. Also check to be sure that the air cleaner housing

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is properly seated, the cover fits tightly and the wing nuts are tight. Tighten connections and fasteners or replace damaged parts as necessary.

- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

82,500 Miles (132 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

85,000 Miles (136 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

87,500 Miles (140 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).

90,000 Miles (144 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*

- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up. Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- For 2 Wheel Drive vehicles only: Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Replace fuel filter.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

92,500 Miles (148 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).

95,000 Miles (152 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

97,500 Miles (156 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines,

and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).

- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

100,000 Miles (160 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- Check the air intake system installation to assure that gaskets are properly sealed and that hose connections, fasteners and other components are tight. Also check to be sure that the air cleaner housing is properly seated, the cover fits tightly and the wing nuts are tight. Tighten connections and fasteners or replace damaged parts as necessary.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

- Inspect the hoses and replace them if they are cracked, swollen, or deteriorated. Tighten all hose clamps (except constant tension clamps). Remove debris and clean the outside of the radiator and air conditioning condenser. Wash the radiator neck. To ensure proper operation, pressure test the radiator and cap.

- Change automatic transmission fluid and filter if the vehicle's GVWR is over 8600 lbs or if the vehicle is mainly driven under one or more of these conditions:

- A. In heavy traffic where the outside temperature regularly reaches 90° F (32° C) or higher.
 - B. In hilly or mountainous terrain.
 - C. When doing frequent trailer towing.
 - D. Uses such as found in taxi, police or delivery service.
- Replace fuel filler cap if driving in dusty conditions.

150,000 Miles (240 000 km)

- Drain, flush and refill the cooling system with new coolant (or every 60 months, whichever occurs first).

FOOTNOTES

The California Air Resources Board has determined that the failure to perform this maintenance item will not nullify the emission warranty or limit recall liability prior to the completion of vehicle useful life. GM, however, urges that all recommended maintenance be recorded.

Drive Axle Service:

- Locking Differential—Drain fluid and refill at first engine oil change. At subsequent oil changes, check fluid level and add fluid as needed.
- Standard Differential—Check fluid level and add fluid as needed at every oil change.
- 3500 HD Models with applications requiring extreme overload/trailer towing conditions and high-speed (above 45 mph or 70 km/h) conditions for extended periods of time must have the drive axle fluid changed every 30,000 miles (50,000 km).

LONG TRIP/HIGHWAY MAINTENANCE SCHEDULE (GASOLINE ENGINES)

The services shown in this schedule up to 100,000 miles (166 000 km) should be performed after 100,000 miles (166 000 km) at the same intervals. The services shown at 150,000 miles (240 000 km) should be performed at the same interval after 150,000 miles (240 000 km).

7,500 Miles (12 500 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*

- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

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15,000 Miles (25 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Vehicles With GVWR Above 8,500 lbs Only: Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up. Be sure the valve works properly.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

22,500 Miles (37 500 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

30,000 Miles (50 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- For 2 Wheel Drive vehicles only: Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Replace fuel filter. *An Emission Control Service.*
- Vehicles With GVWR Above 8,500 lbs Only: Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up. Be sure the valve works properly.

- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

37,500 Miles (62 500 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

45,000 Miles (75 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Vehicles With GVWR Above 8,500 lbs Only: Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up. Be sure the valve works properly.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

50,000 Miles (83 000 km)

- Change automatic transmission fluid and filter if the vehicle's GVWR is over 8600 lbs or if the vehicle is mainly driven under one or more of these conditions:
 - A. In heavy traffic where the outside temperature regularly reaches 90° F (32° C) or higher.
 - B. In hilly or mountainous terrain.
 - C. When doing frequent trailer towing.
 - D. Uses such as found in taxi, police or delivery service.

52,500 Miles (87 500 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.

- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

60,000 Miles (100 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- For 2 Wheel Drive vehicles only: Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Inspect engine accessory drive belt. *An Emission Control Service.*
- Replace fuel filter. *An Emission Control Service.*
- Inspect fuel tank, cap and lines for damage or leaks. Inspect fuel tank cap gasket for any damage. Replace parts as needed. *An Emission Control Service.*
- Vehicles With GVWR Above 8,500 lbs Only: Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up. Be sure the valve works properly.
- Conduct Exhaust Gas Recirculation (EGR) system inspection.
- Conduct evaporative control system inspection. Check all fuel and vapor lines and hoses for proper hook-up, routing and condition. Check that the purge valve works properly (if equipped). Replace as needed.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

67,500 Miles (112 500 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

75,000 Miles (125 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Vehicles With GVWR Above 8,500 lbs Only: Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up. Be sure the valve works properly.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

82,500 Miles (137 500 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

90,000 Miles (150 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- For 2 Wheel Drive vehicles only: Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Replace fuel filter. *An Emission Control Service.*
- Vehicles With GVWR Above 8,500 lbs Only: Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up. Be sure the valve works properly.

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- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

97,500 Miles (162 500 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission shift linkage, transfer case shift linkage, parking brake cable guides, rear driveline center splines, front axle propshaft splines and brake pedal springs. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

100,000 Miles (166 000 km)

- Inspect spark plug wires.

- Replace spark plugs. *An Emission Control Service.*
- Change automatic transmission fluid and filter if the vehicle's GVWR is over 8600 lbs or if the vehicle is mainly driven under one or more of these conditions:

- A. In heavy traffic where the outside temperature regularly reaches 90° F (32° C) or higher.
- B. In hilly or mountainous terrain.
- C. When doing frequent trailer towing.
- D. Uses such as found in taxi, police or delivery service.

- Inspect Positive Crankcase Ventilation (PCV) Valve.
- ### 150,000 Miles (240 000 km)

- Drain, flush and refill cooling system (or every 60 months since last service, whichever occurs first). Inspect hoses. Clean radiator, condenser, pressure cap and neck. Pressure test the cooling system and pressure cap. *An Emission Control Service.*

LONG TRIP/HIGHWAY MAINTENANCE SCHEDULE (DIESEL ENGINES)

The services shown in this schedule up to 100,000 miles (166 000 km) should be performed after 100,000 miles (166 000 km) at the same intervals. The services shown at 150,000 miles (240 000 km) should be performed at the same interval after 150,000 miles (240 000 km).

5,000 Miles (8 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

7,500 Miles (12 000 km)

- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

10,000 Miles (16 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*

- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- Check the air intake system installation to assure that gaskets are properly sealed and that hose connections, fasteners and other components are tight. Also check to be sure that the air cleaner housing is properly seated, the cover fits tightly and the wing nuts are tight. Tighten connections and fasteners or replace damaged parts as necessary.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

15,000 Miles (24 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four

wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).

- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

20,000 Miles (32 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- Check the air intake system installation to assure that gaskets are properly sealed and that hose connections, fasteners and other components are tight. Also check to be sure that the air cleaner housing is properly seated, the cover fits tightly and the wing nuts are tight. Tighten connections and fasteners or replace damaged parts as necessary.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up. Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

22,500 Miles (36 000 km)

- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

25,000 Miles (40 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

30,000 Miles (48 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- For 2 Wheel Drive vehicles only: Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Replace fuel filter.
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- Check the air intake system installation to assure that gaskets are properly sealed and that hose connections, fasteners and other components are tight. Also check to be sure that the air cleaner housing is properly seated, the cover fits tightly and the wing nuts are tight. Tighten connections and fasteners or replace damaged parts as necessary.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

35,000 Miles (56 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

37,500 Miles (60 000 km)

- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

40,000 Miles (64 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*

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- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- Check the air intake system installation to assure that gaskets are properly sealed and that hose connections, fasteners and other components are tight. Also check to be sure that the air cleaner housing is properly seated, the cover fits tightly and the wing nuts are tight. Tighten connections and fasteners or replace damaged parts as necessary.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

45,000 Miles (72 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

50,000 Miles (80 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).

- Change automatic transmission fluid and filter if the vehicle's GVWR is over 8600 lbs. or if the vehicle is mainly driven under one or more of these conditions:

- A. In heavy traffic where the outside temperature regularly reaches 90° F (32° C) or higher.
- B. In hilly or mountainous terrain.
- C. When doing frequent trailer towing.
- D. Uses such as found in taxi, police or delivery service.

- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- Check the air intake system installation to assure that gaskets are properly sealed and that hose connections, fasteners and other components are tight. Also check to be sure that the air cleaner housing is properly seated, the cover fits tightly and the wing nuts are tight. Tighten connections and fasteners or replace damaged parts as necessary.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

52,500 Miles (84 000 km)

- Rotate tires. Refer to SECTION 3E.

- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

55,000 Miles (88 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

60,000 Miles (96 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items

at this mileage interval (or every 12 months, whichever occurs first).

- For 2 Wheel Drive vehicles only: Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Check the crankcase depression regulator valve system for any worn, plugged or collapsed hoses. *An Emission Control Service.*
- Replace fuel filter.
- Check the EGR System (if equipped) (except Code F engine). *An Emission Control Service.*
- Inspect accessory drive (serpentine) belt for cracks, fraying and wear and check belt for proper tension. Adjust or replace belt as needed. *An Emission Control Service.*
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- Check the air intake system installation to assure that gaskets are properly sealed and that hose connections, fasteners and other components are tight. Also check to be sure that the air cleaner housing is properly seated, the cover fits tightly and the wing nuts are tight. Tighten connections and fasteners or replace damaged parts as necessary.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

65,000 Miles (104 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

67,500 Miles (108 000 km)

- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

70,000 Miles (112 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four

wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).

- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- Check the air intake system installation to assure that gaskets are properly sealed and that hose connections, fasteners and other components are tight. Also check to be sure that the air cleaner housing is properly seated, the cover fits tightly and the wing nuts are tight. Tighten connections and fasteners or replace damaged parts as necessary.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

75,000 Miles (120 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

80,000 Miles (128 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- Check the air intake system installation to assure that gaskets are properly sealed and that hose connections, fasteners and other components are tight.

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Also check to be sure that the air cleaner housing is properly seated, the cover fits tightly and the wing nuts are tight. Tighten connections and fasteners or replace damaged parts as necessary.

- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

82,500 Miles (132 000 km)

- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

85,000 Miles (136 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

90,000 Miles (144 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- For 2 Wheel Drive vehicles only: Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Replace fuel filter.
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- Check the air intake system installation to assure that gaskets are properly sealed and that hose connections, fasteners and other components are tight. Also check to be sure that the air cleaner housing is properly seated, the cover fits tightly and the wing nuts are tight. Tighten connections and fasteners or replace damaged parts as necessary.
- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.

- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.
- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

95,000 Miles (152 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

97,500 Miles (156 000 km)

- Rotate tires. Refer to SECTION 3E.
- During tire rotation, check brake calipers for freedom of movement. Refer to SECTION 5B1.

100,000 Miles (160 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate the front suspension, kingpin bushings, steering linkage, transmission linkage, parking brake cable guides, rear driveline center splines, and brake pedal springs. Additionally, for four wheel drive vehicles, lubricate the transfer case shift linkage and front axle propshaft splines. Ball joints and kingpin bushings should not be lubricated unless their temperature is 10° F (-12° C) or higher. Complete the listed lubrication service items at this mileage interval (or every 12 months, whichever occurs first).
- Inspect the hoses and replace them if they are cracked, swollen, or deteriorated. Tighten all hose clamps (except constant tension clamps). Remove debris and clean the outside of the radiator and air conditioning condenser. Wash the radiator neck. To ensure proper operation, pressure test the radiator and cap.
- Change automatic transmission fluid and filter if the vehicle's GVWR is over 8600 lbs or if the vehicle is mainly driven under one or more of these conditions:
 - A. In heavy traffic where the outside temperature regularly reaches 90° F (32° C) or higher.
 - B. In hilly or mountainous terrain.
 - C. When doing frequent trailer towing.
 - D. Uses such as found in taxi, police or delivery service.
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
- Check the air intake system installation to assure that gaskets are properly sealed and that hose con-

nections, fasteners and other components are tight. Also check to be sure that the air cleaner housing is properly seated, the cover fits tightly and the wing nuts are tight. Tighten connections and fasteners or replace damaged parts as necessary.

- If the engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
- Check rear/front axle fluid level and add fluid as needed. Check constant velocity joints and axle seals for leaking.

150,000 Miles (240 000 km)

- Drain, flush and refill the cooling system with new coolant (or every 60 months, whichever occurs first).
- Inspect the hoses and replace them if they are cracked, swollen or deteriorated. Tighten all hose clamps (except constant tension clamps). Remove debris and clean the outside of the radiator and air conditioning condenser. Wash the radiator neck. Pressure test the radiator and cap.

OWNER/DRIVER CHECKS AND SERVICES

Listed below are checks and services that should be performed at the intervals specified to help ensure the safety, dependability and emission control performance of the vehicle.

Make sure all necessary checks and services are completed as scheduled. When adding fluids or lubricants to the vehicle, use only those shown in "Recommended Fluids and Lubricants" in this section.

At the First 100, 1,000 and 6,000 Miles (160, 1 600 and 10 000 km)

For vehicles with dual wheels, check dual wheel nut torque. For proper torque, refer to SECTION 3E.

At Each Fuel Fill

It is important to perform these underhood checks at each fuel fill.

Engine Oil Level

Check the engine oil level and add the proper oil if necessary.

Engine Coolant Level

Check the engine coolant level and add the proper coolant mixture if necessary. Refer to SECTION 6B.

Windshield Washer Fluid Level

Check the windshield washer fluid level in the windshield washer tank and add the proper fluid if necessary. Refer to SECTION 8E1.

At Least Once a Month

Tire Inflation

Check tire inflation. Make sure tires are inflated to the pressures specified on the Certification/Tire label located on the driver's door.

Cassette Deck.

Clean cassette deck. Cleaning should be done every 50 hours of tape play. Refer to SECTION 9A.

FOOTNOTES

The California Air Resources Board has determined that the failure to perform this maintenance item will not nullify the emission warranty or limit recall liability prior to the completion of vehicle useful life. We, however, urge that all recommended maintenance be recorded.

Drive Axle Service:

- Locking Differential—Drain fluid and refill at first engine oil change. At subsequent oil changes, check fluid level and add fluid as needed.
- Standard Differential—Check fluid level and add fluid as needed at every oil change.
- 3500 HD Models with applications requiring extreme overload/trailer towing conditions and high-speed (above 45 mph or 70 km/h) conditions for extended periods of time must have the drive axle fluid changed every 30,000 miles (50,000 km).

At Least Twice a Year

Restraint System Check

Make sure the safety belt reminder light and all the belts, buckles, latchplates, retractors and anchorages are working properly. Look for any other loose or damaged safety belts system parts. If you see anything that might keep a safety belt system from doing its job, have it repaired. Have any torn or frayed safety belts replaced. Also look for any opened or broken air bag covers, and have them repaired or replaced. (The air bag system does not require regular maintenance.)

Air Cleaner Filter Restriction Indicator Check

These vehicles have an indicator on the engine that lets you know when the air cleaner filter is dirty and needs to be replaced. Check indicator at least twice a year or when the oil is changed. Inspect the air cleaner filter restriction indicator more often if the vehicle is used in dusty areas or under off road conditions.

Manual Transmission Check

Check the transmission fluid level; add if needed. A fluid loss may indicate a problem. Check the system and repair if needed.

Automatic Transmission Check

Check the transmission fluid level; add if needed. A fluid loss may indicate a problem. Check the system and repair if needed.

Hydraulic Clutch System Check

Check the fluid level in the clutch reservoir. A fluid loss in the system could indicate a problem. Have the system inspected and repaired at once.

At Least Once a Year

Key Lock Cylinders

Lubricate the key lock cylinders with the lubricant specified in "Recommended Fluids and Lubricants," in this section.

OB-24 MAINTENANCE AND LUBRICATION

Body Lubrication Service

Lubricate all body door hinges, the body hood, fuel door and rear compartment hinges, latches and locks including interior glove box and console doors, and any moving seat hardware. Lubricate the hood safety lever pivot and prop rod pivot. More frequent lubrication may be required when exposed to a corrosive environment.

Starter Switch

CAUTION: When performing this check, the vehicle could move suddenly. If it does, you or others could be injured. Follow the steps below.

1. Before you start, make sure you have enough room around the vehicle.
2. Firmly apply both the parking brake and the regular brake.

NOTE: Do not use the accelerator pedal, and be ready to turn off the engine immediately if it starts.

3. Try to start the engine in each gear. The starter should work only in PARK (P) or NEUTRAL (N). If the starter works in any other position, the vehicle needs service.

Steering Column Lock

While parked, and with the parking brake set, try to turn the key to "LOCK" in each shift lever position.

- With an automatic transmission, the key should turn to lock only when the shift lever is in (P) "PARK".

On vehicles with a key release button, try to turn the key to lock without the button. The key should turn to "LOCK" only with the key button depressed.

On all vehicles, the key should come out only in "LOCK".

Parking Brake and Automatic Transmission (P) "PARK" Mechanism Check.

CAUTION: When performing this check, the vehicle could begin to move. You or others could be injured and property could be damaged. Make sure there is room in front of your vehicle in case it begins to roll. Be ready to apply the regular brake at once should the vehicle begin to move.

Park on a fairly steep hill, with the vehicle facing downhill. Keeping your foot on the regular brake, set the parking brake.

- To check the parking brake: With the engine running and transmission in NEUTRAL (N), slowly remove foot pressure from the regular brake pedal. Do this until the vehicle is held by the parking brake only.
- To check the PARK (P) mechanism's holding ability: Shift to PARK (P). Then release all brakes.

Lap and Shoulder Belts Condition and Operation

Inspect belt system, including: webbing, buckles, latch plates, retractors, guide loops and anchors. Replace the belt if the webbing has been cut or otherwise damaged.

PERIODIC MAINTENANCE INSPECTIONS

Listed below are inspections and services that should be performed at least twice a year (for instance, each spring and fall). Make sure any necessary repairs are completed at once.

Steering and Suspension Inspection

Inspect the front and rear suspension and steering system for damaged, loose or missing parts, signs of wear, or lack of lubrication. Inspect power steering lines and hoses for proper hookup, binding, leaks, cracks, chafing, etc. Lubricate the steering linkage.

Exhaust System Inspection

Inspect the complete exhaust system. Inspect the body near the exhaust system. Look for broken, damaged, missing or out-of-position parts as well as open seams, holes, loose connections, or other conditions that could cause a heat build-up in the floor pan or could let exhaust fumes into the vehicle. Refer to SECTION 6F.

Throttle Linkage Inspection

The throttle system (includes accelerator and cruise control) should operate freely without hesitation between full-closed and wide-open throttle. Any throttle system component causing hesitation or sticking should be replaced. Inspect for the following:

1. Missing parts such as retainers or clips.

2. Interference of linkage or cable conduit to critical components such as fuel lines, brake pipes, harness leads, etc.

3. Proximity of cable to exhaust system and other heat sources; check for melting and/or discoloration.

4. Clearance of throttle system moving parts throughout their travel from other stationary components.

5. Damage of components due to cable kinking, severe abrasion, misalignment, etc.

Drive Axle Service

Check rear/front axle fluid level and add as needed. Check constant velocity joints and axle seals for leaking.

Transfer Case Inspection

Every 12 months or at oil change intervals, check front axle and transfer case and add lubricant when necessary. Check vent hose at transfer case for kinks and proper installation. More frequent lubrication may be required on off-road use.

Radiator and Heater Hose Inspection Inspect the hoses and replace them if they are cracked, swollen or deteriorated. Inspect all pipes, fittings, and clamps; replace as needed.

Brake System Inspection

Inspect the complete system. Inspect brake lines and hoses for proper hookup, binding, leaks, cracks, chafing, etc. Inspect brake pads and shoes for cracks and wear and drums and rotors for surface condition.

Inspect other brake parts such as wheel cylinders, calipers, parking brake, etc. Check parking brake adjustment. Inspect brakes more often if conditions result in frequent braking.

ENGINE OIL AND FILTER CHANGE



Important

Always use engine oil with the American Petroleum Institute Certified for Gasoline Engines "Starburst" symbol of the proper viscosity. Refer to the Owner's manual for the proper engine oil viscosity.

Oil Filter



Important

To prevent oil filter leakage, etc., it is very important to follow the installation instructions listed below.

- A. Remove the old filter by turning it counter clockwise. Clean the gasket sealing area on the engine oil filter mounting surface. (If the engine has an adapter base, make sure the threaded nipple or bolt is properly tightened.)
- B. Lightly oil the new oil filter gasket with clean oil, and install the filter. After the oil filter gasket contacts the oil filter mounting surface, tighten $3/4$ to 1 full turn. When necessary, use a cap-type wrench, strap-type wrench with handle, or equivalent to ensure proper installation.
- C. With engine oil at the proper level, run the engine three minutes and thoroughly check the filter area for leaks.

Engine Oil Viscosity

Engine oil viscosity (thickness) has an effect on fuel economy and cold-weather operation (starting and oil flow). Lower viscosity engine oils can provide better fuel economy and cold weather performance; however, higher temperature weather conditions require higher viscosity engine oils for satisfactory lubrication. Viscosity ratings can be found on the oil container or supplied by the oil manufacturer.

NOTICE: *Using oils of any viscosity other than those recommended could result in engine damage.*

When choosing an oil, consider the range of temperatures the vehicle will be operated in before the next oil change. Then select the recommended oil viscosity.

RECOMMENDED FLUIDS AND LUBRICANTS

Engine Oil—GM Goodwrench® motor oil or equivalent for API Service with STARBURST SYMBOL of the recommended viscosity.

Engine Coolant—Mixture of water and GM Goodwrench® DEX-COOL™ (orange colored, Silicate-Free) Antifreeze conforming to GM specification 6277M.

Hydraulic Clutch System—Hydraulic clutch fluid GM P/N 12345347.

Hydraulic Brake System—Delco Supreme II® GM P/N 12377967 or equivalent DOT-3 brake fluid.

Parking Brake Cables—Chassis grease meeting requirements of NLGI Grade 2, Category LB or GC-LB GM P/N 1052497 or equivalent.

Power Steering System—Power steering fluid meeting requirements of GM specification 9985010, GM P/N 1050017 or equivalent.

Automatic Transmission—DEXRON® III automatic transmission fluid.

Differential (Front and Rear Axle)—SAE 80-W-90 GL-5 gear lubricant GM P/N 1052271.

Differential (3500 HD with DANA Rear Axle)—SAE 75W-140 synthetic gear lubricant GM P/N 12346140.

Clutch Fork Ball Stud—Chassis grease meeting requirements of NLGI Grade 2, Category LB or GC-LB GM P/N 1052497.

Front Wheel Bearings—Chassis grease meeting requirements of NLGI Grade 2, Category GC or GC-LB GM P/N 1051344.

Chassis Lubrication—Chassis grease meeting requirements of NLGI Grade 2, Category LB or GC-LB GM P/N 1052497.

Weatherstrips—Dielectric Silicone grease GM P/N 12345379 or equivalent.

Windshield Washer Solvent—GM Optikleen washer solvent GM P/N 1051515 or equivalent.

Hood Latch Pivots and Spring Anchor—Lubriplate lubricant aerosol GM P/N 12346293 or equivalent.

Hood Latch Release Pawl—GM Multipurpose lubricant, Superlube® GM P/N 12346241 or equivalent.

Automatic Transmission Shift Linkage, Floor Shift Linkage, Hood and Door Hinges, and Body Door Hinge Pins—Multipurpose lubricant, Superlube® GM P/N 12346241 or equivalent.

Manual Transmission:

A. 5-Speed (RPO MW3)—Castrol SYNTORQ® LT or equivalent GM P/N 12346190.

B. 5-Speed (RPO MG5)—GM P/N 12345349 or equivalent.

Transfer Case—DEXRON® III automatic transmission fluid GM P/N 12345881.

Transfer Case Shift Lever, Propeller Shaft—Chassis grease meeting requirements of NLGI Grade 2, Category LB or GC-LB GM P/N 1052497.

Constant Velocity Universal Joint—Chassis grease meeting requirements of GM 6031-M GM P/N 1052497.

Key Lock Cylinders—GM Multi-Purpose lubricant, Superlube® GM P/N 12346241 or a synthetic light weight engine oil (SAE 5W-30).

Parking Brake Cable Pivot—Chassis grease meeting requirements of NLGI Grade 2, Category GC or GC-LB GM P/N 1051344.

T2962

MAINTENANCE ITEMS

Air Cleaner Element	
4.3L (VIN W)	AC Type A1300C
5.0L (VIN M)	AC Type A1300C
5.7L (VIN R)	AC Type A1300C
6.5L (VIN F and S)	AC Type A1236C
7.4L (VIN J)	AC Type A1300C

Engine Oil Filter	
4.3L (VIN W)	AC Type PF-52
5.0L (VIN M)*	AC Type PF-1218
5.7L (VIN R)*	AC Type PF-1218
6.5L (VIN F and S)	AC Type PF-1218
7.4L (VIN J)	AC Type PF-1218

*Four-wheel drive vehicles use a PF-52 oil filter.

PCV Valve	
4.3L (VIN W)	AC Type CV-746C
5.0L (VIN M)	AC Type CV-796C
5.7L (VIN R)	AC Type CV-796C
7.4L (VIN J)	AC Type CV-774C

Spark Plugs and Gap	
4.3L (VIN W)	AC Type 41-932 (1.52 mm,.060")
5.0L (VIN M)	AC Type 41-932 (1.52 mm,.060")
5.7L (VIN R)	AC Type 41-932 (1.52 mm,.060")
7.4L (VIN J)	AC Type 41-932 (1.52 mm,.060")

Fuel Filter	
4.3L (VIN W)	AC Type GF-626
5.0L (VIN M)	AC Type GF-626
5.7L (VIN R)	AC Type GF-626
6.5L (VIN F and S)	AC Type TP-1006
7.4L (VIN J)	AC Type GF-626

Radiator Cap	
4.3L (VIN W)	AC Type RC-36
5.0L (VIN M)	AC Type RC-36
5.7L (VIN R)	AC Type RC-36
6.5L (VIN F and S)	AC Type RC-33
7.4L (VIN J)	AC Type RC-36

APPROXIMATE FLUID CAPACITIES

Engine Cooling System	
4.3L (VIN W) With Air Conditioning	12.3 L (13.0 qts.)
4.3L (VIN W) Without Air Conditioning	12.3 L (13.0 qts.)
5.0L (VIN M) With Air Conditioning	17.0 L (18.0 qts.)
5.0L (VIN M) Without Air Conditioning	16.6 L (17.5 qts.)
5.7L (VIN R) With Air Conditioning	19.0 L (20.0 qts.)
5.7L (VIN R) Without Air Conditioning	16.6 L (17.5 qts.)
5.7L (VIN R) With Air Conditioning - C 3500HD	25.5 L (27.0 qts.)
5.7L (VIN R) Without Air Conditioning - C 3500HD	25.0 L (26.5 qts.)
6.5L (VIN F and S) With Air Conditioning	26.0 L (27.5 qts.)
6.5L (VIN F and S) Without Air Conditioning	26.0 L (27.5 qts.)
7.4L (VIN J) With Air Conditioning	26.0 L (27.5 qts.)
7.4L (VIN J) Without Air Conditioning	23.5 L (25.0 qts.)
7.4L (VIN J) With Air Conditioning - C 3500HD	27.0 L (28.5 qts.)
7.4L (VIN J) Without Air Conditioning - C 3500HD	25.0 L (26.5 qts.)

Engine Crankcase	
4.3L (VIN W) With Filter	4.3 L (4.5 qts.)
5.0L (VIN M) With Filter	4.8 L (5.0 qts.)
5.7L (VIN R)* With Filter	4.8 L (5.0 qts.)
6.5L (VIN F and S) With Filter	6.5 L (7.0 qts.)
7.4L (VIN J)* With Filter	6.5 L (7.0 qts.)
Oil filter should be changed at every oil change.	
* Add one additional quart of oil for C 3500HD models.	

Fuel Tank	
Short Bed Models	98.0 L (26 Gallons)
Long Bed Models	128.0 L (34 Gallons)
Four-Door Models (Standard)	128.0 L (34 Gallons)
Chassis-Cab Models	
Standard (Side Tank)	87.0 L (23 Gallons)
Optional (Rear Tank)	68.0 L (18 Gallons)
C 3500HD	
Standard (Side Tank)	87.0 L (23 Gallons)
Optional (Rear Tank)	68.0 L (18 Gallons)
Two-Door Utility	113.0 L (30 Gallons)
Four-Door Utilities	113.0 L (30 Gallons)
Suburban	159.0 L (42 Gallons)

Transmission	
4L60-E Automatic (Drain and Refill)	4.7 L (5.0 qts.)
4L60-E Automatic (After Complete Overhaul)	10.6 L (11.0 qts.)
4L80-E Automatic (Drain and Refill)	7.3 L (7.7 qts.)
4L80-E Automatic (After Complete Overhaul)	12.8 L (13.5 qts.)
New Venture Gear 4500 Manual	3.78 L (4.0 qts.)
New Venture Gear 3500 Manual	2.0 L (2.2 qts.)

ADJUSTABLE BELT TENSION SPECIFICATIONS

Serpentine Belt

Belt tension is maintained by a spring tensioned idler pulley.
No adjustment of the serpentine belt is necessary.

SECTION 0C

VIBRATION DIAGNOSIS

CAUTION: This vehicle has a Supplemental Inflatable Restraint (SIR) System. Refer to the SIR Component and Wiring Location view in order to determine whether you are performing service on or near the SIR components or the SIR wiring. When you are performing service on or near the SIR components or the SIR wiring, refer to the SIR On-Vehicle Service Information. Failure to follow the CAUTIONS could cause air bag deployment, personal injury, or unnecessary SIR system repairs.

NOTICE: Always use the correct fastener in the proper location. When you replace a fastener, use *ONLY* the exact part number for that application. General Motors will call out those fasteners that require a replacement after removal. General Motors will also call out the fasteners that require thread lockers or thread sealant. **UNLESS OTHERWISE SPECIFIED**, do not use supplemental coatings (paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.

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GENERAL DESCRIPTION

VIBRATION DIAGNOSIS

Vibration is a back and forth oscillation that can be seen, heard, or felt. Imbalance or misalignment of the vehicle is usually the cause of a vibration.

Path, Source, and Responder

In many cases the vibration that is being seen, heard, or felt is not the source but the responder (Figure 1). Many times the severity of the vibration will depend on how it is transmitted through the vehicle.

VIBRATION CLASSES

Vibration problems can be classified into five sensitivity categories. Many problems fit into more than one of the categories. These categories can usually be combined into one of the following "classes" of categories:

- A. Engine Speed Sensitive Only.
- B. Vehicle Speed Sensitive Only.
- C. Torque Sensitive and Vehicle Speed Sensitive.
- D. Torque Sensitive and Engine Speed Sensitive.
- E. Torque Sensitive, Vehicle Speed Sensitive, and Jounce Sensitive.

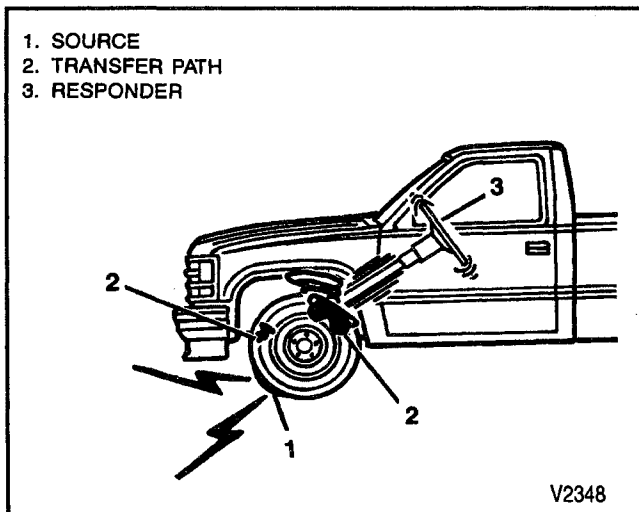


Figure 1—Vibration Source, Path, Responder

The first step in correcting a vibration problem is to determine which of the above best describe the problem. The second step is to determine the vehicle speed and RPM at which the vibration occurs or is most intense.

ORDERS OF VIBRATION

Some components vibrate more than others at a given speed. These multiple vibrations are referred to as the order of vibration. The order of a vibration is defined as the number of disturbances created by one rotation of a component. For example, a tire with one heavy spot will produce one disturbance each rotation - a first order vibration. An oval shaped tire will produce two disturbances each rotation - a second order vibration (Figure 2).

VIBRATION CATEGORIES

There are several excitation sources and many responding systems which may cause a vibration complaint. Most vibrations are caused by wheel and tire disturbances or driveline imbalances. Each of these categories has a specific vibration associated with it. By systematically classifying the vibration into one of the following categories you can eliminate many components as the source.

Vehicle Speed Sensitive

Most vibration complaints will be found to be vehicle speed sensitive. The frequency of the vibration depends only on the speed of the vehicle.

Vehicle speed sensitivity can be determined as follows:

1. Drive the vehicle in high gear and locate the vibration problem. Record the vehicle speed and the RPM at which the problem occurs.
2. Shift the vehicle into a lower gear and again locate the vibration problem. Record the vehicle speed and the RPM at which the problem occurs.
3. If the problem occurs at the same vehicle speed as when the vehicle was in high gear, the vibration is vehicle speed sensitive.

- Place the transmission in neutral or park position and slowly increase engine RPM to determine an engine-speed related vibration. Record the RPM at which the vibration occurs.

Engine Speed Sensitive

Another group of vibration complaints will be found to be engine speed sensitive. The frequency of the vibration depends only on the speed of the engine, independent of the speed of the vehicle.

Engine speed sensitivity can be determined as follows:

- Drive the vehicle in high gear and locate the vibration problem. Record the vehicle speed and the RPM at which the problem occurs.
- Shift the vehicle into a lower gear and again locate the vibration problem. Record the vehicle speed and the RPM at which the problem occurs.
- If the problem occurs at the same RPM as when the vehicle was in high gear, the vibration is engine speed sensitive.

Payload or Jounce Sensitive

A payload or jounce sensitive problem is one which varies in intensity as the height of the vehicle changes with respect to the surface of the road. The intensity varies as the springs are extended or compressed.

Payload or jounce sensitivity can be determined as follows:

- Drive the vehicle and observe the disturbance with varying payload.
- Drive the vehicle over a road that dips in such a way that it causes the rear of the vehicle to move

up and down relative to the surface of the road. Keeping a constant throttle, notice when the disturbance occurs.

- If the disturbance occurs when the vehicle height is changed due to the payload, or it occurs on roads that cause the vehicle to dip, this can be determined as payload or jounce sensitive.

Torque Sensitive

A torque sensitive problem is one which increases in intensity as the torque (power) output of the engine increases. The intensity of the vibration increases as the throttle opening is increased.

Torque sensitivity can be determined as follows:

- Drive the vehicle in high gear and locate the vibration. Record the vehicle speed and RPM at which the problem occurs.
- Note the vibration while varying the throttle position. Drive the vehicle with steady throttle, slowly increasing to heavy throttle by going up hill. Or apply the brakes while increasing the throttle opening then slowly decrease to minimum throttle and coast during the vibration.
- If the vibration becomes more severe as the throttle opening is increased, the vibration is torque sensitive. This typically changes the pinion angle.

ROAD TESTING

To help diagnose and isolate the source of a vibration, it is important to road test the vehicle and use a systematic approach in narrowing down the possible causes of a vibration.

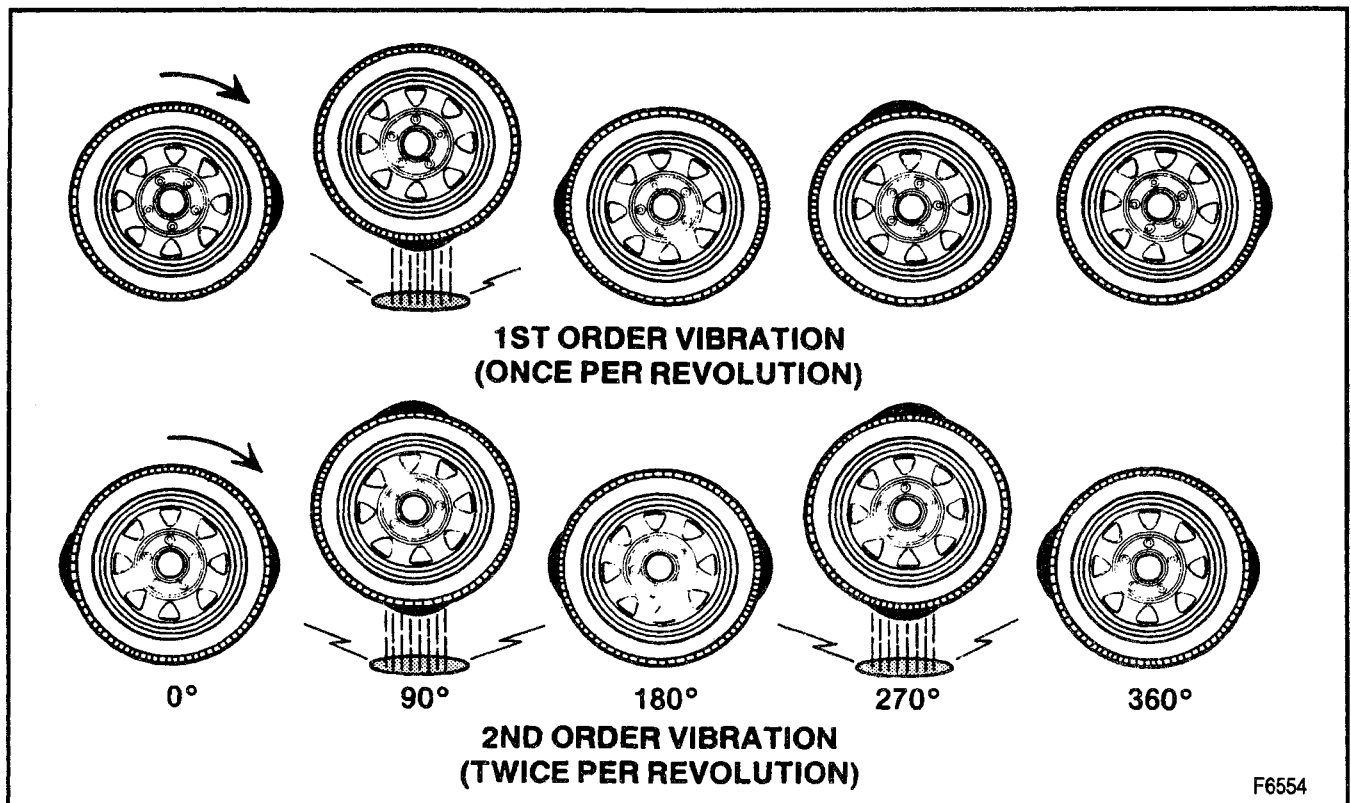


Figure 2—Order of Vibration

OC-4 VIBRATION DIAGNOSIS

1. When did the vibration start?
2. Did the vibration start after a repair procedure in any of the following areas?
 - Exhaust System
 - Undercoating
 - Tire Repair or Replacement
 - Wheel Alignment
 - Engine Repair

These questions will give you a basic outline and will enable you to eliminate many components and focus attention on only those items that can be responsible for the conditions encountered.

Four major component groups are usually the cause of, or are related to vibration. When road testing a vehicle for vibration, remember these groups:

- Engine and mounts.
- Tires, wheels, and brake drums.
- Propeller shaft and universal joints.
- Transmission or transfer case mounts.

Before road testing a vehicle, check the following:

1. In-or-out of phase propeller shaft.
2. All fasteners for tightness at universal joints, wheel lugs, engine mounts, transmission, or transfer case mounts.
3. Tire air pressure.
4. Payload conditions.

Road Test

Road test the vehicle to diagnose the complaint. Refer to "Reed Tachometer" or "Electronic Vibration Analyzer (EVA)." Record the speed and RPM at which the greatest vibration occurs. The vibration is likely to be felt in the steering wheel or in the seat bottom. The road test can be helpful in locating the vibration source either forward or aft.

Coast Test

Drive the vehicle past the vibration speed, shift into neutral, and coast back through the vibration speed. In this test two kinds of vibrations normally occur; a shaking or a buzzing. A shaking vibration is usually caused by tires or a wheel and brake assembly problem. A buzzing vibration is usually caused by a driveline problem.

SPECIAL TOOL DESCRIPTION (VIBRATION DIAGNOSIS)

Special tools can be used to identify the frequency of a rotational component with a repetitive vibration. These tools consist of a reed tachometer or an Electronic Vibration Analyzer (EVA).

Reed Tachometer

The Biddle Frahm Reed Tachometer P/N 313510 (or equivalent) measures vibration in Cycles Per Minute (CPM) (Figure 3). It consists of two rows of reeds. Each row is designed to vibrate at a particular frequency.

If you can match the rotational speed of a particular component with the frequency reading of the reed tachometer, you will know in which area to concentrate your efforts for repairs.

These frequency relationships exist for all vibrations that occur in a vehicle and understanding these relationships can often solve difficult vibration problems.

Reed Tachometer Usage

The best place to put the reed tachometer in a truck is on top of the instrument panel. This is an effective location for picking up vibration and providing ease of viewing.

However, if the vibration frequency cannot be read with the reed tachometer on the instrument panel, it can be placed in other locations that may be responding to the source of the vibration. To reduce the effect of road surface, vehicles should be test driven on a smooth road (preferably asphalt).

An important thing to be aware of when using the reed tachometer for the first time is that the reeds are very sensitive and will pick up many low amplitude vibrations (Figure 4). These will appear as slight movements of many reeds, and do not correspond to any particular component. Reed movement that corresponds to a vibrating component will be greater in amplitude, traveling the full range of the viewing area.

The following examples illustrate two typical applications of a reed tachometer. The Electronic Vibration Analyzer (EVA) can be substituted for the reed tachometer. Refer to "Electronic Vibration Analyzer" in this section.

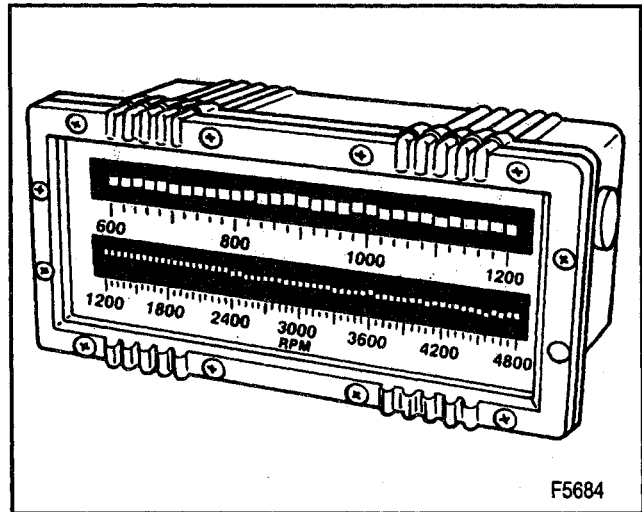


Figure 3—Reed Tachometer

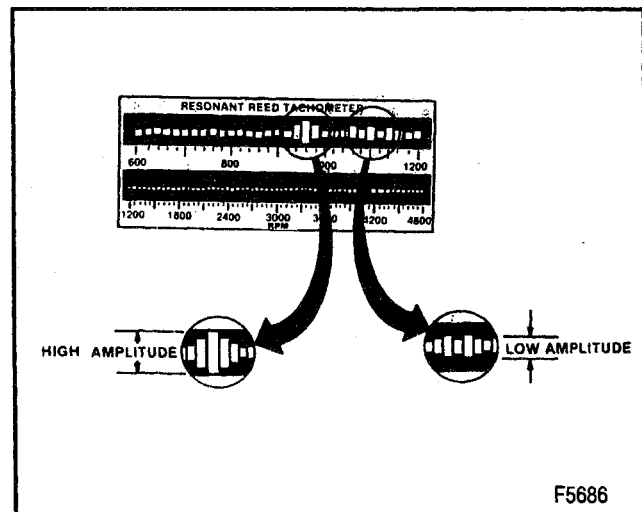


Figure 4—Amplitude

Example 1

Road test reveals low frequency (shake) vibration at 2400 RPM with the transmission in direct drive.

Known facts - Reed tachometer frequency reads at 800 cycles per minute (Figure 5).

Vibration is vehicle speed sensitive.

Rear end ratio 3.0 to 1.

Calculations - First order of tire and rear end: 2400 RPM and 3.0 to 1 rear axle ratio = 800 RPM.

First order of propshaft: 2400.

Conclusion - The vibration frequency (800) is related to the first order rotation of the tire/wheel assembly. Given this relationship, you can correct the tire/wheel assembly for a first order disturbance.

Example 2

Road test reveals high frequency vibration at 2400 RPM with the transmission in direct drive.

Known facts - Reed tachometer frequency reads at 1600 cycles per minute (Figure 6).

Vibration is vehicle speed dependent.

Rear end ratio 3.0 to 1.

Calculations - First order of tire and rear end: 2400 RPM and 3.0 to 1 rear axle ratio = 800 RPM.

First order of tire and wheel: 800.

Second order of tire and wheel: $800 \times 2 = 1600$.

Conclusion - The vibration frequency 1600 is related to the second order rotation of the tire and wheel.

Tire Speed Chart

Tire Size	Tread	Revs/Sec @ 8km/h (5mph)
P235/75R15	ALS	1.00
P245/75R16	ALT	0.95
P265/75R16	ALT	0.91
LT215/85R16	HWY	0.95
LT215/85R16	OOR	0.94
LT225/75R16	ALS	0.99
LT225/75R16	OOR	0.98
LT245/75R16	ALS	0.95
LT245/75R16	OOR	0.94
7.50R16	HWY	0.90
8.75R16.5	HWY	0.98
225/70R19.5	HWY	0.89

ALS = All Season

ALT = All Terrain

OOR = On/Off Road

HWY = Highway

Electronic Vibration Analyzer (EVA)

The J 38792 Electronic Vibration Analyzer (EVA) speeds up the diagnosis of vibrations by displaying the three most predominant frequencies and their amplitudes. These frequencies are displayed in bar graph form. The strongest vibration is displayed first, the next strongest second, and the weakest displayed last (Figure 7).

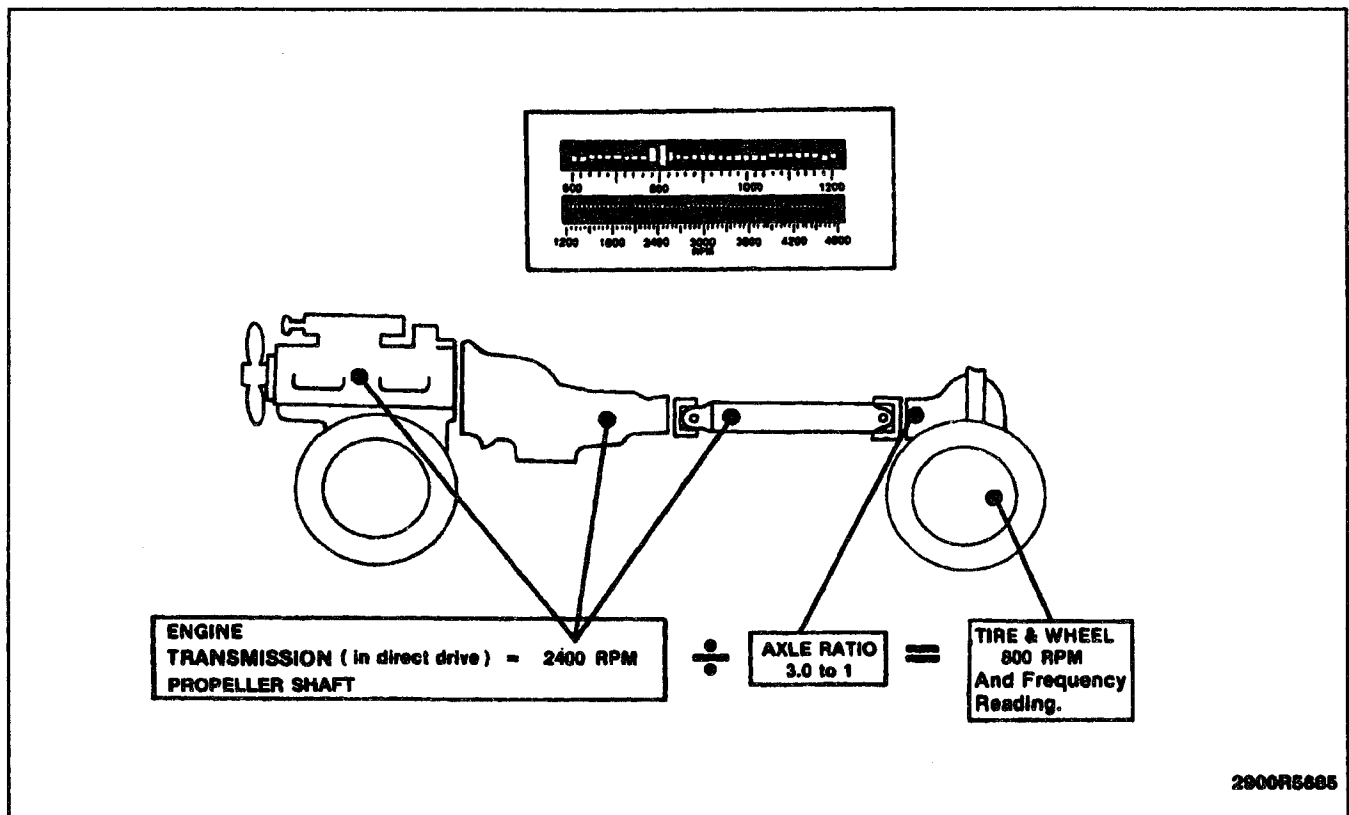


Figure 5—Reed Tachometer 1st Order Vibration

OC-6 VIBRATION DIAGNOSIS

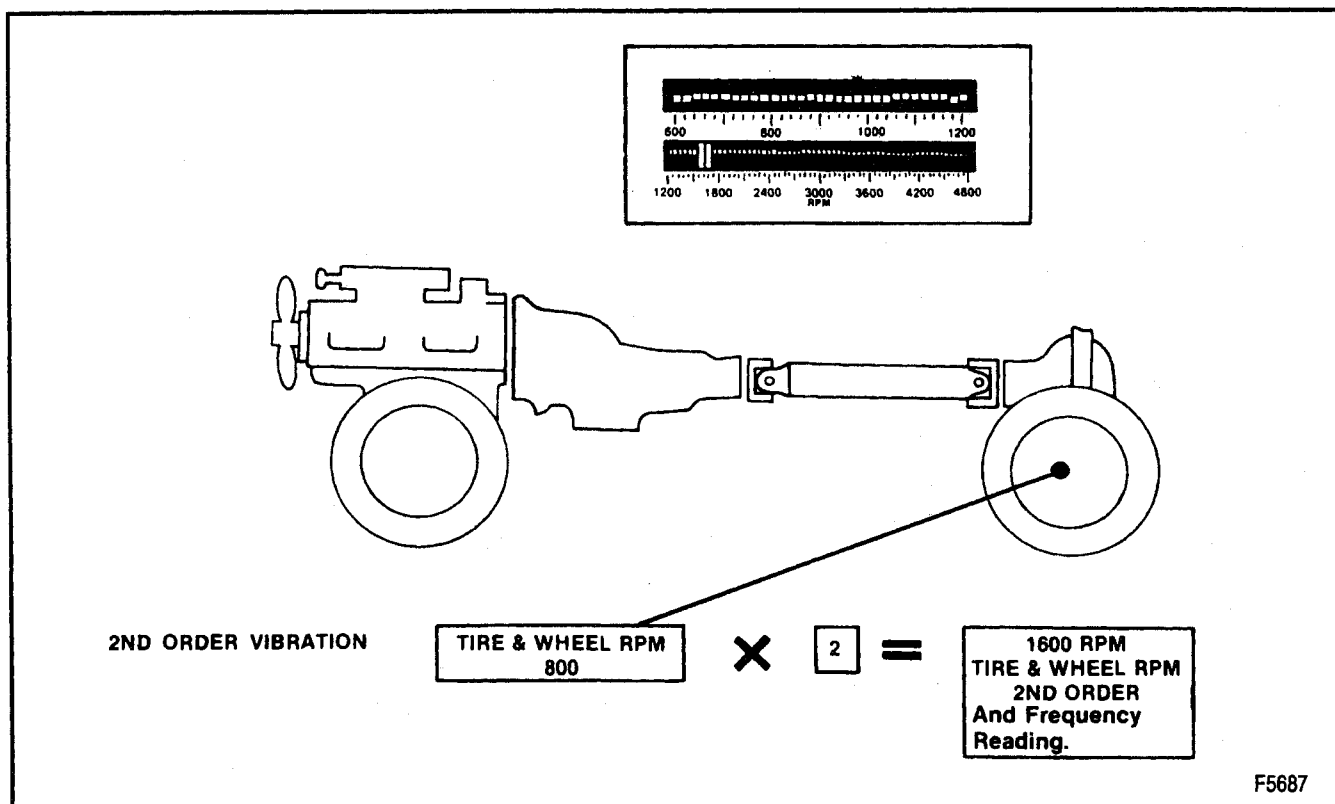


Figure 6—Reed Tachometer 2nd Order Vibration

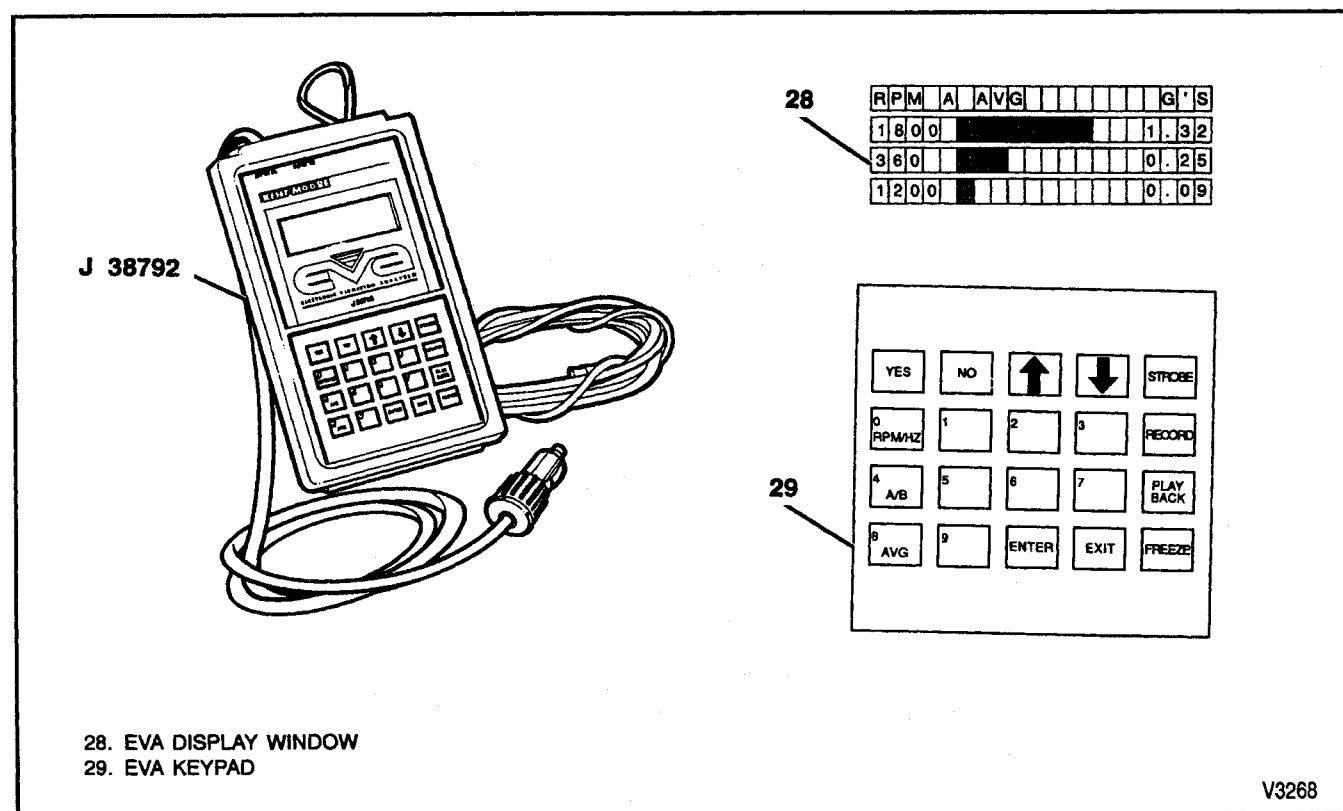


Figure 7—Electronic Vibration Analyzer (EVA)

The EVA is equipped with a vibration sensor that can be plugged into either input A or input B on the front of the EVA.

The vibration sensor can be mounted almost anywhere on the vehicle by using a magnet or adhesive putty. There is a trigger wire on the front of the EVA that a strobe light pickup can be attached to for driveshaft balancing (Figure 8).

! Important

- The vibration sensor is marked with the word "UP" on one side. For the sensor to accurately and consistently pickup vibrations, it must be mounted as close as possible to the source of the vibration in the horizontal position with the "UP" identification facing up. Refer to the instruction manual accompanying the EVA for sensor calibration.

SPECIAL TOOL DESCRIPTION

Companion Flange Runout Gauge

A good place to start when diagnosing a vibration problem is to consider pinion flange runout. Pinion flange runout affects the rear of the propshaft by moving it off its center rotating point. A pinion flange with excessive runout will have the same effect on the vehicle as a propshaft with excessive runout.

To measure pinion flange runout use J 35819 Companion Flange Runout Gauge. When working with larger pinion flanges, use J 35819-100 runout gauge adapter sleeves. A dial indicator with a magnetic base, or a clamp base will also be needed.

Inclinometer

Drive line angles do not refer to the angle of the propshaft alone, but to the angle where the propshaft

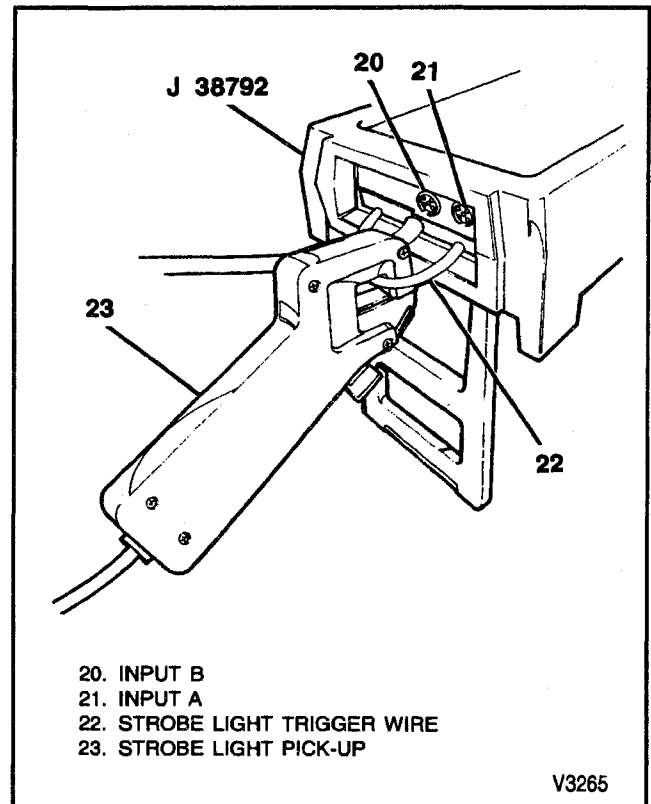


Figure 8—EVA Inputs and Connections

meets the front yoke or rear yoke on vehicles with a one-piece propshaft, and where the propshafts intersect on vehicles with a two-piece propshaft. The front and rear yokes must be included when measuring a two-piece propshaft system. The special tool used for checking driveline angles is J 23498-A, an inclinometer.

ON-VEHICLE SERVICE—TIRE AND WHEEL VIBRATIONS

BALANCING TIRES AND WHEELS

There are two types of tire and wheel balancing; static and dynamic. Static balance is the equal distribution of weight around the wheel. Wheels that are statically unbalanced cause a bouncing action called wheel tramp (Figure 9). This condition will eventually cause uneven tire wear.

Dynamic balance is the equal distribution of weight on each side of the centerline so that when the wheel spins there is no tendency for it to move from side to side (Figure 10). Wheels that are dynamically unbalanced may cause wheel shimmy.

General Balance Precautions

Deposits of foreign material must be cleaned from the inside of the wheel. Remove stones from the tread to avoid operator injury during spin balancing and to obtain a good balance. The tire should be inspected for any damage, then balanced according to the equipment manufacturer's recommendations.

Whenever a heavier, solid locking wheel nut is used to replace a standard nut, it should be installed nearest the valve stem, and a 14 gram (1/2 ounce) balance weight should be added 180 degrees opposite the locking nut on the wheel's inboard side.

When rotating tires, always install the locking nut nearest the tire valve stem so that it remains opposite the balance weight. This procedure will improve the wheel balance by compensating for the heavier locking wheel nut.

Off-Vehicle Balancing

Most electronic off-vehicle balancers are more accurate than the on-vehicle spin balancers. They are easy to use and give a dynamic (two-plane) balance. Although they do not correct for drum or rotor unbalance, like on-vehicle spin balancing, they are more accurate. When balancing off-vehicle, the wheel should be located on the balancer with a cone through the back side of the center pilot hole not by the wheel stud holes.

OC-8 VIBRATION DIAGNOSIS

On-Vehicle Balancing

On-vehicle balancing will help correct vibrations due to brake drum, rotor, and wheel cover imbalance.

When balancing on-vehicle, remove the balance weights from the off-vehicle dynamic balance. If more than 28 grams (one ounce) of additional weight is required, it should be split between the inner and outer rim flange.



Important

- The driven tire and wheel assemblies should be spun using the engine. Limit speed as stated in the following Caution.

CAUTION: Do not spin the drive wheels faster than 55 km/h (35 mph) as indicated by the speedometer. This limit is necessary because the speedometer indicates only one-half of the actual wheel speed when one drive wheel is spinning and the other drive wheel is stopped. Personal injury and damage may result from high speed spinning.

CAUTION: On vehicles equipped with limited slip rear axles, do not attempt to balance a tire on a drive wheel with the other drive wheel on the ground. The vehicle may drive through this wheel and cause the vehicle to move unexpectedly, resulting in personal injury and property damage.

To distinguish between a standard rear axle and a limited slip rear axle, check for Positraction (G80) on the Service Parts Identification label.

Wheel Weights

If more than 85 grams (3 ounces) are needed, the wheel weights should be split as equally as possible between the inboard and outboard flanges.

Balancing of assemblies with factory aluminum wheels requires the use of special clip-on type wheel weights. These weights are designed to fit over the thicker rim flange of the aluminum wheel.

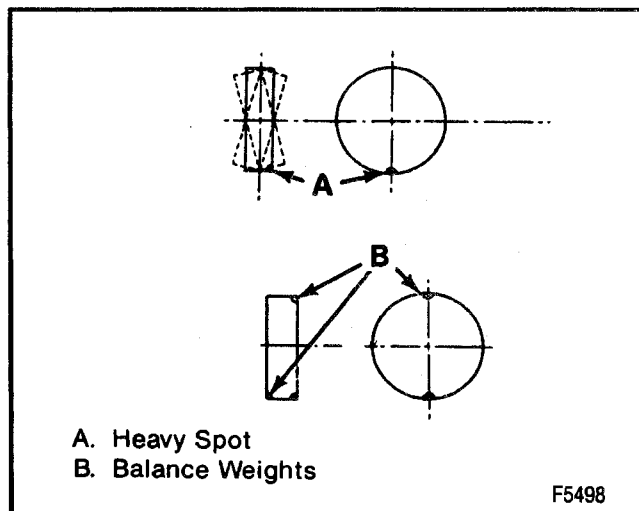


Figure 9—Static Unbalance

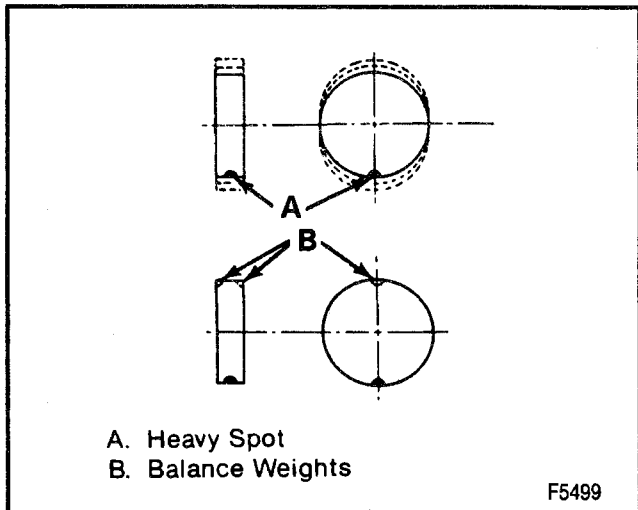


Figure 10—Dynamic Unbalance

Adhesive wheel weights are also available. Use the manufacturer's procedures to install adhesive wheel weights.

WHEEL RUNOUT

Measure wheel runout with an accurate dial indicator. Take measurements with the wheel installed on the vehicle or off the vehicle using an accurate mounting surface such as on a wheel balancer. Measurements may be taken with or without the tire mounted on the wheel.

Radial runout and lateral runout should be measured on both the inboard and outboard rim flanges (Figure 11). With the dial indicator firmly in position, slowly rotate the wheel one revolution and record the total indicator reading. If any measurement exceeds specifications, and there is vibration that wheel balancing will not correct, the wheel should be replaced. Disregard any indicator readings due to welds, paint runs, scratches, etc.

• STEEL WHEELS:

Radial runout.....1mm (0.040 inch)
Lateral runout..... 1.2 mm (0.045 inch)

• ALUMINUM WHEELS:

Radial runout.....0.8 mm (0.030 inch)
Lateral runout..... 0.8 mm (0.030 inch)

TIRE/WHEEL ASSEMBLY RUNOUT

Before measuring the runout of a tire/wheel assembly, the vehicle should be driven long enough to warm up the tires. Do this before any measurements are taken, then do the following:

1. Lift the vehicle and support with suitable safety stands.
2. Mark the location of each tire/wheel assembly in relation to the wheel studs and to their position on the vehicle.
3. Install tire/wheel assembly on wheel balancer.

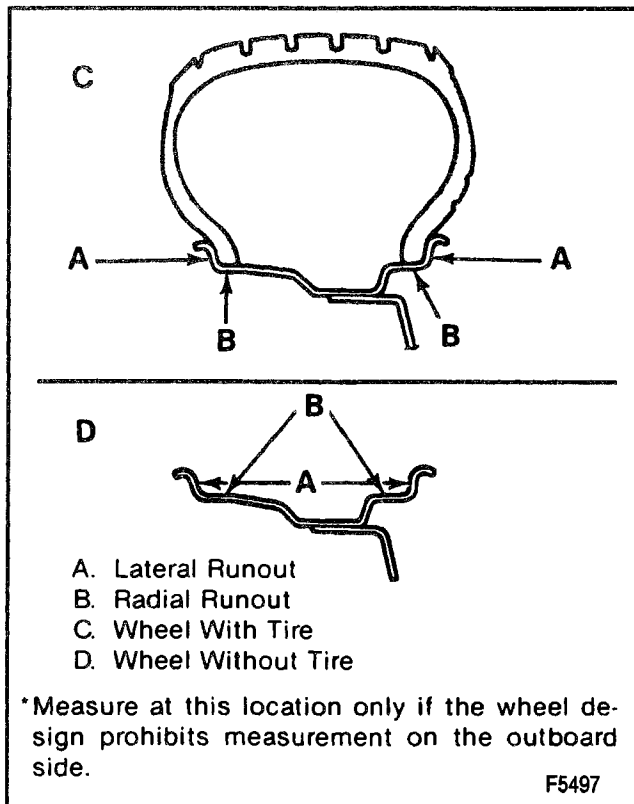


Figure 11—Wheel Runout

4. Using a dial indicator with a magnetic base and a roller tip, position it on the balancer so the different runout checks can be done (Figure 12).
5. DO NOT start the wheel balancer with the dial indicator in place. These checks should be done by spinning the tire BY HAND ONLY on the tire balancer.
6. Slowly rotate the assembly one complete turn and "zero" the dial indicator on the low spot.
7. Rotate the assembly one more complete turn and note the amount of runout.

The maximum allowable radial and lateral runout is 1.3 mm (0.050 inch) when measuring off the vehicle, and 1.5 mm (0.060 inch) when measuring on the vehicle.

CORRECTING NONUNIFORM TIRES

There are two ways to correct tires that cause a vibration even though they are properly balanced. One method uses an automatic machine which loads the tire and buffs small amounts of rubber from high spots on the outer two tread rows. Correction by this method is usually permanent and does not significantly affect the tire tread life.

Another method is to dismount the tire and rotate it 180 degrees on the rim. It is important that this be done on tire and wheel assemblies which are known to be causing a vibration as it is just as likely to cause good assemblies to vibrate.

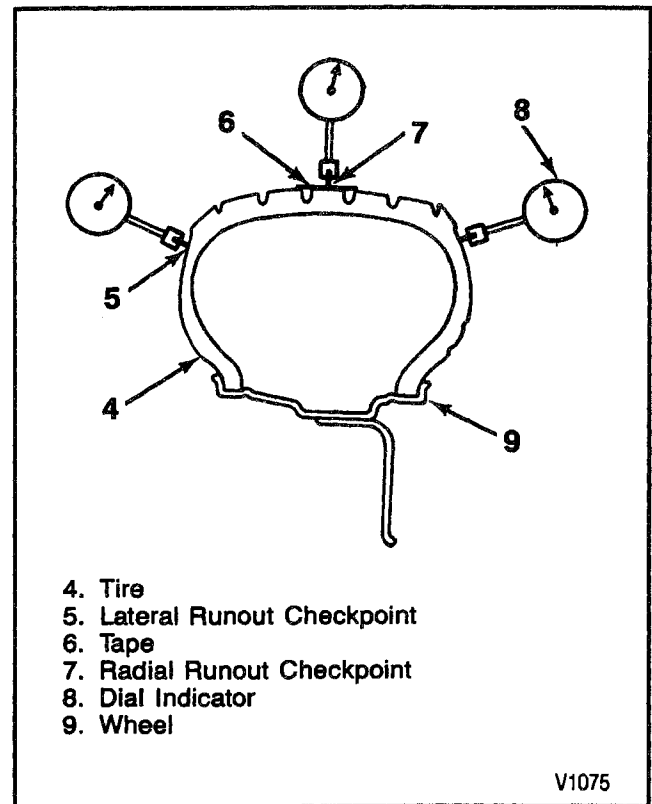


Figure 12—Measuring Radial and Lateral Runout

HUB AND AXLE SHAFT STUD RUNOUT

When wheel and tire runout occurs on the vehicle and does not occur in off-vehicle testing, the hub and axle shaft should be checked (Figure 13).

Measuring Rotor or Axle Shaft Runout

Install or Connect

The dial indicator on the machined surface outside the bolts on the rotor or axle flange (Figure 13).

Measure

- Runout.

1. Turn the rotor or axle flange to locate the low spot.
2. Zero the dial indicator.
3. Turn the rotor or axle flange to check the total lateral runout.

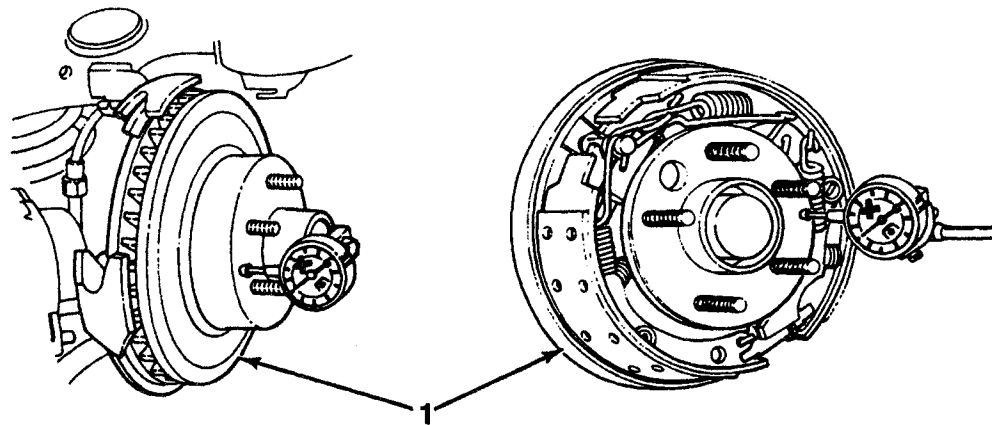
- 0.130 mm (0.005 inch) is the acceptable lateral runout.

Measuring Axle Shaft Stud Runout

Install or Connect

The dial indicator to contact the wheel mounting studs (Figure 13).

OC-10 VIBRATION DIAGNOSIS



1. Hub Lateral Runout
2. Stud Radial Runout

F6771

Figure 13—Hub and Axle Shaft Stud Runout



Measure

- Runout.
 1. Turn the hub to register on each of the studs.
 2. Zero the dial indicator on the lowest stud.
 3. Check the total runout on the remaining studs.
 - 0.8 mm (0.030 inch) is the acceptable radial runout.

ON-VEHICLE SERVICE—DRIVELINE VIBRATIONS

Driveline vibrations will generally produce a high speed vibration, a “buzz” or “shudder.” With tire and wheel speeds in the 72 to 81 km/h (45 to 50 mph) range, the average tire and wheel speeds are 600 RPM. A driveline will turn at a higher RPM because of the gear ratios. Most driveline vibrations occur in the 72 to 89 km/h (45 to 55 mph) range, and most usually become strongest on either acceleration or deceleration. Driveline vibrations come from six general areas:

1. Shaft Balance
2. Shaft Runout

3. Pinion Flange Runout
4. Companion Flange Runout
5. Joint Phasing
6. Driveline Angles

Most driveline vibrations that are associated with a “buzz” or “shudder” type vibration will also have a high frequency reading on the reed tachometer or the EVA. Refer to “Reed Tachometer” or to “Electronic Vibration Analyzer” in this section.

PROPELLER SHAFT RUNOUT CHECK

Noise vibration at high speed could be caused by a bent propeller shaft. The propeller shaft could have been damaged by rough handling or a collision. Check for propeller shaft straightness.

1. Raise the vehicle on a twin post hoist so the wheels can spin.
2. Attach a dial indicator having a magnetic base to a smooth place on the vehicle underbody.
3. Take dial indicator readings at the propeller shaft check points (Figure 14).



Important

- Do not locate the dial indicator at a weld.
4. With the transmission in neutral, hand rotate the axle pinion flange or the transmission yoke and take the necessary dial indicator readings on the propeller shaft. Record the readings. If the runout is over specification at one or more check points, rotate the propeller shaft 180 degrees at the pinion flange or companion flange. Reinstall and check the runout. If the runout is still over specification check the pinion or companion flange runout. Use a dial indicator and J 35819 Companion Flange Runout Gage before replacing the propeller shaft (Refer to Figure 15). For models having a two-piece driveline, measure the rear propeller shaft runout first (Figure 14). Reference mark the position of the rear propeller shaft yoke to the pinion flange or companion flange, then remove the rear propeller shaft. Measure the front propeller shaft runout on the tube and at the splined shaft end. If the runout exceeds the specifications found in Figure 14, replace the shaft.
 - The runout of splined shaft end will affect the runout of the front measurement on the rear shaft.
 5. Check the runout on the replacement propeller shaft. If the new propeller shaft runout is over specification, double-check the pinion flange runout (Figure 15).



Important

- The splined end of the front propeller shaft is critical to the smooth operation of a two-piece driveline. Be sure the dial indicator readings are accurate.

PROPELLER SHAFT BALANCE CHECK



Remove or Disconnect

- Raise the vehicle on a twin post hoist so the wheels can spin.
1. Tire and wheel assemblies and the brake drums.

CAUTION: Do not apply the brake with the drums removed or personal injury and vehicle damage may occur.



Inspect

- Propeller shaft, universal joints, and attachments for mud, undercoating, or loose fasteners.



Clean

- Propeller shaft, universal joints, and attachments.



Tighten

- Any loose attachments or fasteners.



Important

- Run the vehicle in gear at the speed where the vibration peaks; observe the intensity of the vibration as indicated by the reed tachometer. The greater the disturbance, the greater the amount of amplitude that will be seen on the reed tachometer or the EVA. When using the reed tachometer or EVA to check propeller shaft balance, hold the reed tachometer or fasten the EVA sensor on a stationary component as close to the vibration as possible when reading the amplitude. Refer to "Reed Tachometer" or "Electronic Vibration Analyzer" in this section.
- Stop the engine.
 2. Propeller shaft.

NOTICE: A screwdriver or bar should not be used in the universal joint/spider location, to rotate the propshaft because seal damage may result. Use a chain or strap wrench wrapped around the pinion flange to rotate propshaft.

- Rotate the propeller shaft 180 degrees from the original position.



Install or Connect

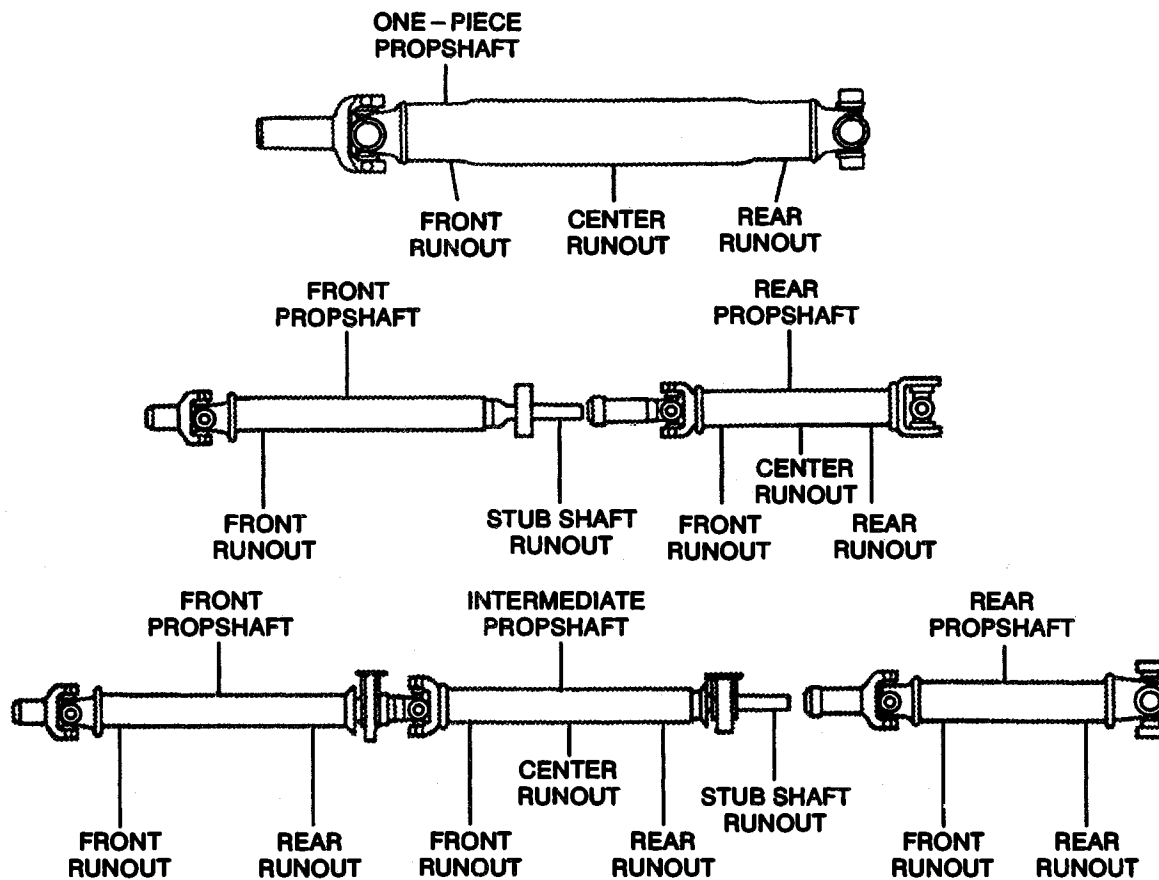
1. Propeller shaft.
 - Determine the position which gives the lowest amplitude reading on the reed tachometer or EVA.
2. Rear drums, wheels, and tire assemblies.
 - Determine the position which gives the best driveline response by road testing the vehicle for a final check of the propeller shaft balance.
 - For unacceptable balance, refer to "Propeller Shaft Balancing" in this section.

PROPELLER SHAFT BALANCING

Hose Clamp Method (Figures 16 through 18)

1. Place the vehicle on a twin-post hoist so that the rear of the vehicle is supported on the rear axle housing and the rear wheels are free to rotate. Remove both rear wheel assemblies and reinstall the wheel lug nuts with flat sides next to the drums.

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PROPELLER SHAFT	FRONT CHECK	CENTER CHECK	REAR CHECK
One Piece	0.025"	0.050"	0.025"
Two Piece Driveshaft:			
Front Piece	0.025"	0.005"*	
Rear Piece		0.030"†	0.030"
*NOTE: This measurement must be taken on the ground surface near the spline, with the rear propeller shaft removed.			
†NOTE: This measurement must be taken with the rear propeller shaft mounted on the front shaft which is within specifications.			

Figure 14—Checking Propeller Shaft Runout

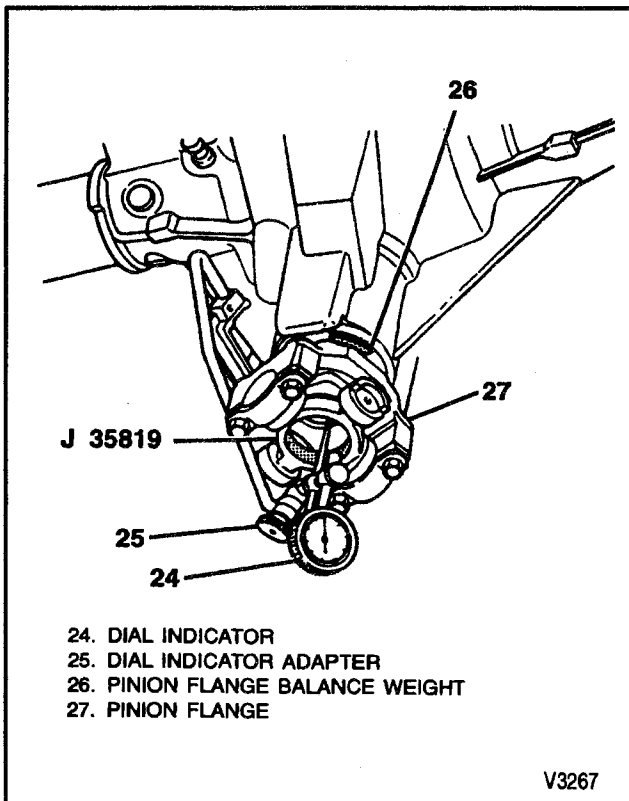


Figure 15—Pinion Flange Runout

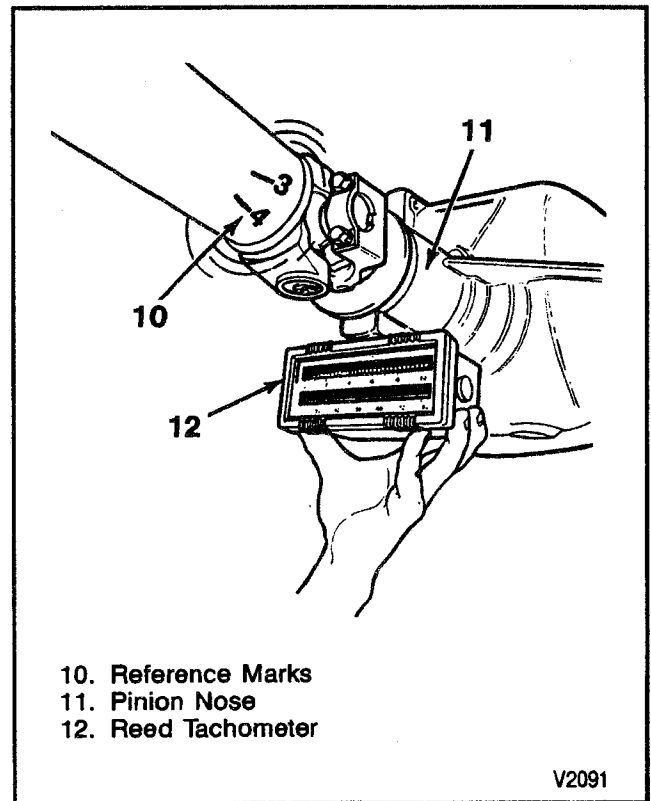


Figure 16—Propeller Shaft Reference Marks and Reed Tachometer Position

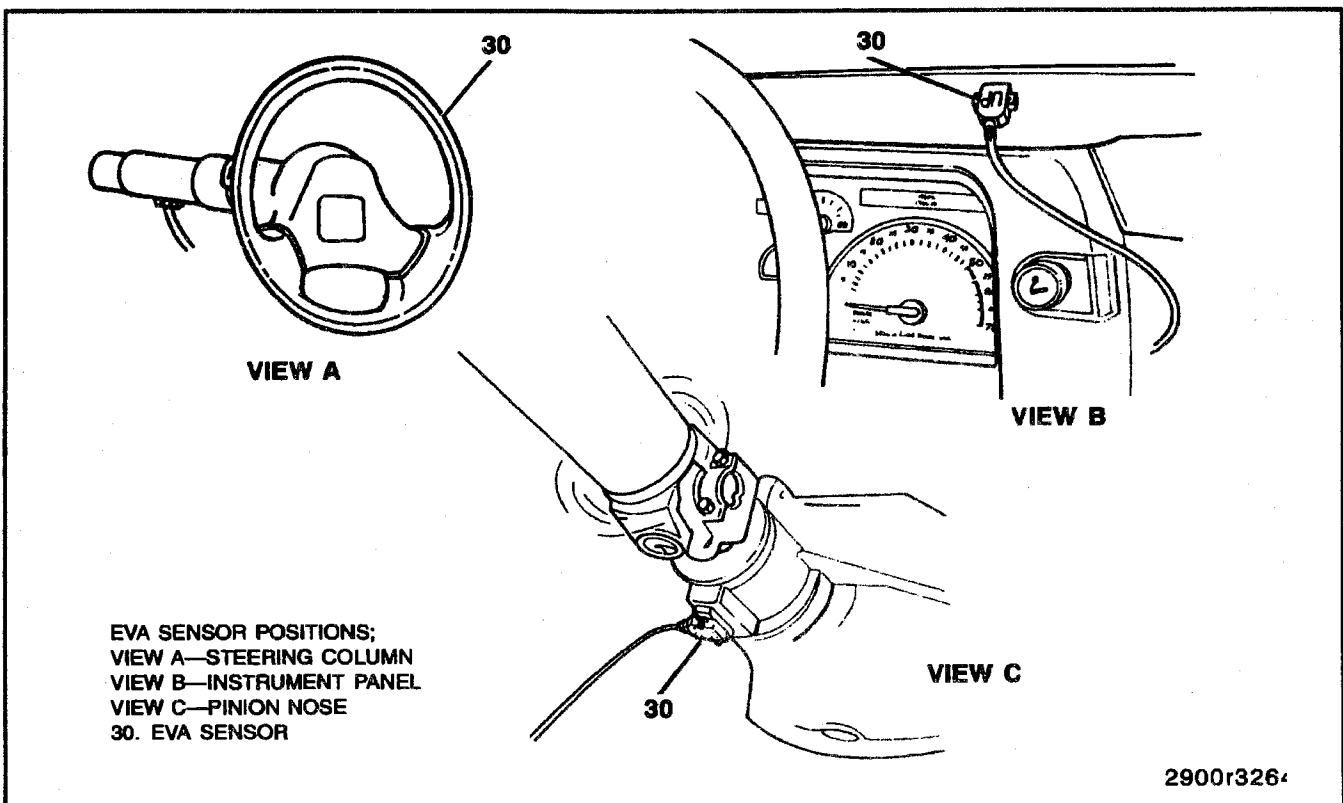


Figure 17—EVA Sensor Positions

OC-14 VIBRATION DIAGNOSIS

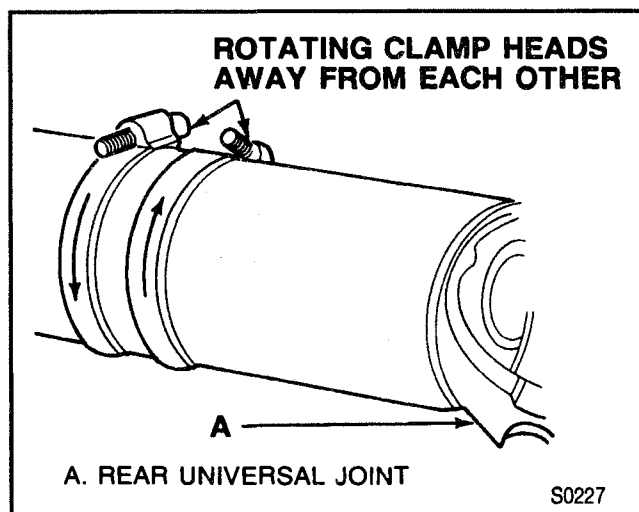


Figure 18—Rotating Hose Clamps

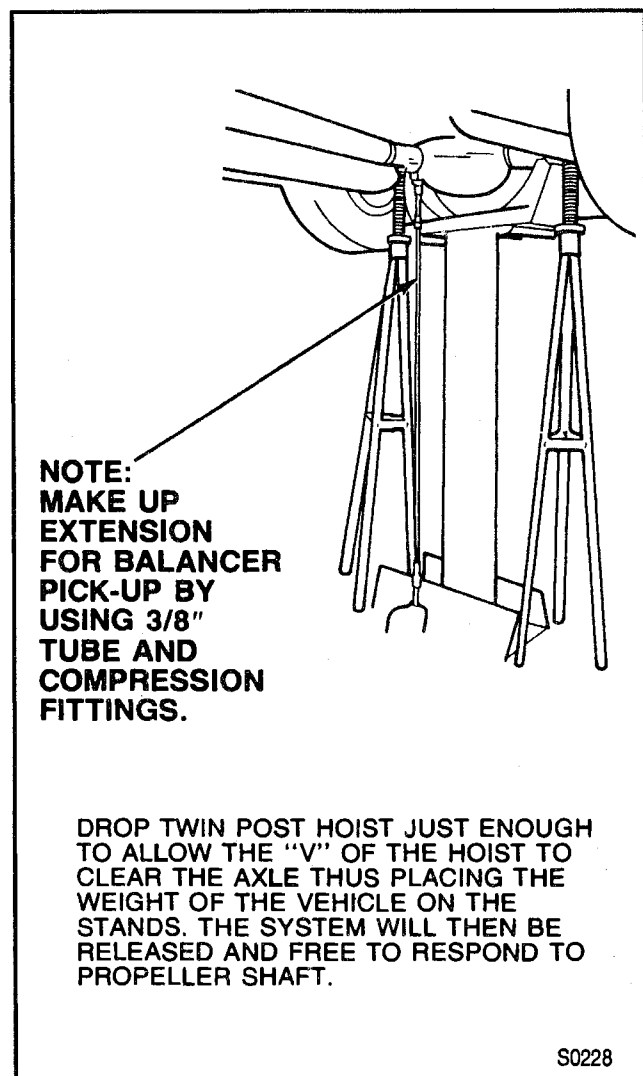


Figure 19—Pickup Unit Replacement

2. Mark and number propeller shaft at four points 90 degrees apart at the rear of the propeller shaft just forward of the balance weights (Figure 16).
3. Install two hose clamps on the rear of the propeller shaft and slide them rearward until the clamps stop at the nearest balance weight welded to the tube. Align both clamps at any one of the four marks made on the shaft in Step 2 and tighten.
4. Run the vehicle through the speed range to 81 to 89 km/h (50 to 55 mph). Note the amount of imbalance felt at the front of axle housing or as indicated by a reed tachometer or the EVA sensor. Refer to Figures 16 and 17.

CAUTION: Never run vehicle higher than 89 km/h (55 mph). All persons should stay clear of universal joints and balance weight areas to avoid possible injury. Do not run the vehicle on the hoist for extended periods due to the danger of overheating the transmission or engine.

5. Loosen clamps and rotate clamp heads 90 degrees to the next mark on the propeller shaft. Tighten clamps and repeat Step 4.
6. Repeat Step 5 until vehicle has been run with clamp heads located at all four marks on shaft.
7. Position clamps at point of least imbalance. Rotate the clamp heads away from each other 45 degrees (one on each side of the position) (Figure 18). Run the vehicle and note if balance has improved. In some cases it may be necessary to use one clamp or possibly three clamps in order to obtain a good balance. Replace the propeller shaft if three hose clamps do not improve the balance.
8. Continue to rotate the clamps apart in smaller angular increments until the balance of the propeller shaft is achieved.
9. Reinstall wheel assemblies and road test the vehicle for final check of balance. A minimal vibration felt in the vehicle on the hoist may not show up during a road test.

Strobe Light Method (Figures 8, 19, and 20)

Either a strobe light wheel balancer or an EVA can be used to balance a propeller shaft. The balance pickup unit should be placed directly under the nose of the axle carrier and as far forward as possible. When using the EVA for propshaft balancing, connect the strobe light to the trigger wire on the front of the EVA. By pushing the strobe button on the EVA's keypad, the EVA will go into the strobe mode, allowing the strobe light to flash.

1. Place the vehicle on a twin post hoist so the rear of the vehicle is supported on the rear axle housing and the rear wheels are free to rotate. Lower the hoist and allow the axle to rest on jackstands. Leaving the axle in the hoist fixture can destroy the sensitivity of the operation. Remove both rear wheel assemblies and reinstall wheel lug nuts with flat sides next to the drums.
2. Mark and number the propeller shaft at four points 90 degrees apart at the rear of the propeller shaft just forward of the balance weights.

3. Place the strobe light wheel balancer pickup or the EVA sensor under the nose of the carrier (Figures 17 and 19).
4. Run the vehicle in gear at the speed where the disturbance is at its peak, as indicated by driver input and by use of a reed tachometer or EVA holding at a constant speed. Point the strobe light up at the spinning propeller shaft and note the position of one of the reference numbers. Shut the engine off and position the propeller shaft so the reference numbers will be in the same position as was noted while the shaft was rotating. When the strobe light flashed, the heaviest point of the propeller shaft was at the top (12 o'clock). To balance the propeller shaft, it is necessary to apply the balancing weights (hose clamps) 180 degrees away from the heaviest point or at the bottom of the propeller shaft (6 o'clock).
5. Install two screw-type hose clamps on the propeller shaft as close to the balance weight and rear of the propeller shaft as possible. Position both clamp heads 180 degrees from the heaviest point on the propeller shaft as indicated by the strobe light. Tighten clamps.
6. Run the vehicle through the speed range. If disturbance is gone, nothing further need be done on the hoist. If the disturbance is not gone, and the strobe light shows the clamp heads at the bottom (6 o'clock) of the propeller shaft, go to Step 7. If the strobe light shows the two clamp heads at the top of the propeller shaft, add one more hose clamp and recheck. If the strobe light shows the three clamp heads at the top of the propeller shaft, remove the propeller shaft and re-index it 180 degrees on the rear axle pinion flange. Recheck without clamps. Repeat balance starting with Step 5. If the propeller shaft still needs more than three hose clamps at the same clock position, replace it.



Important

- Before replacing the propeller shaft double-check the pinion flange runout (Figure 15).

If the clamps are 180 degrees from their original position after the propeller shaft was reindexed, the axle pinion flange is out of balance and must be replaced. DO NOT use more than three hose clamps to balance the propeller shaft. If the strobe light shows the hose clamps at the bottom of the propeller shaft, but the disturbance still exists, go to Step 7.

7. Rotate two of the hose clamps equal distances away from each other toward the top (one on each side of the position) in small increments until the best balance is achieved (Figure 20). In some cases, it may be necessary to use one clamp or possibly three clamps in order to obtain a good balance. Replace the propeller shaft if three hose clamps do not correct the problem.
8. Install the wheels and road test the vehicle for a final check of balance. Vibration felt in the vehicle on the hoist may not show up during a road test.

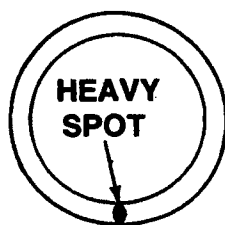
PROPELLER SHAFT PHASING

The propeller shaft is designed and built with the yoke lugs (ears) in line with each other. This design produces the smoothest running shaft possible, and is called phasing (Figure 21).

Vibration can be caused by an out-of-phase propeller shaft. The propeller shaft will absorb vibrations from speeding up and slowing down each time the universal joint goes around. A total cancellation of vibration produces a smooth flow of power in the driveline.

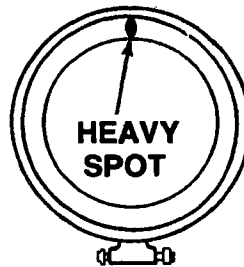
DRIVELINE ANGLES

When two shafts intersect at any common universal joint, the bend that is formed is called the working angle (Figure 22). The working angle should not exceed 3 degrees. The larger the working angle, the greater the



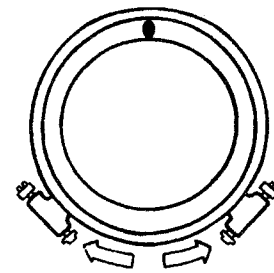
STEP 1

DETERMINE POINT OF UNBALANCE



STEP 2

ADD HOSE CLAMPS 180° FROM POINT OF UNBALANCE UNTIL THEY BECOME HEAVY SPOT



STEP 3

ROTATE TWO CLAMPS EQUALLY AWAY FROM EACH OTHER UNTIL BEST BALANCE IS ACHIEVED

S0229

Figure 20—Positioning Hose Clamps to Achieve Best Balance

OC-16 VIBRATION DIAGNOSIS

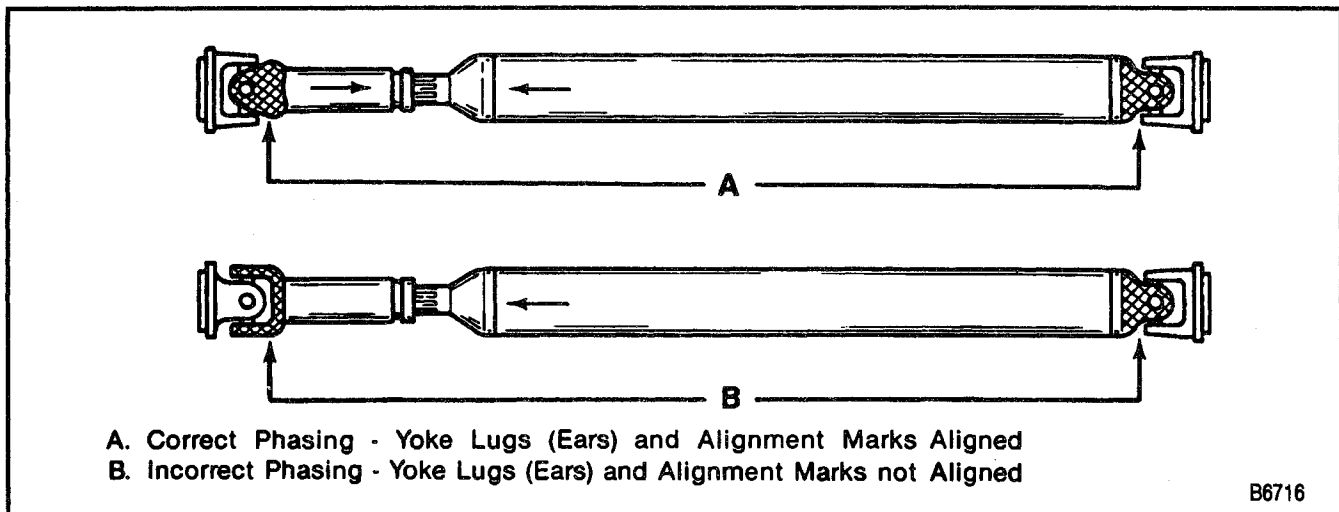


Figure 21—Phasing

amount of acceleration and deceleration of the universal joint. For every revolution of the propeller shaft, there are two accelerations and decelerations of the universal joints. This speeding up and slowing down of the universal joint must be canceled out to produce a smooth power flow. This is done through phasing and proper universal joint working angles.

Measuring Driveline Angles

Driveline angles can be measured using an inclinometer. Support the vehicle at curb weight with a full tank

of gasoline. Install J 23498-A Inclinometer on the propeller shaft bearing cap (Figure 23).

Angle at Rear Universal Joint

1. Place J 23498-A Inclinometer on rear propeller shaft bearing cap (Figure 24). Center the bubble in the sight glass and record the measurement. The bearing cap must be straight up and down and free of dirt or other foreign material to obtain an accurate measurement.
2. Rotate the propeller shaft 90 degrees and place the inclinometer on the rear drive yoke bearing cap (Figure 25). Center the bubble in the sight glass and record the measurement.
3. Subtract the small figure from the larger figure to obtain the rear universal joint angle.

Angle at Front Universal Joint

1. Place the inclinometer on front propeller shaft bearing cap (Figure 26). Center the bubble in the sight and record measurement.
2. Rotate the propeller shaft 90 degrees and place the inclinometer on the front slip spline yoke bearing

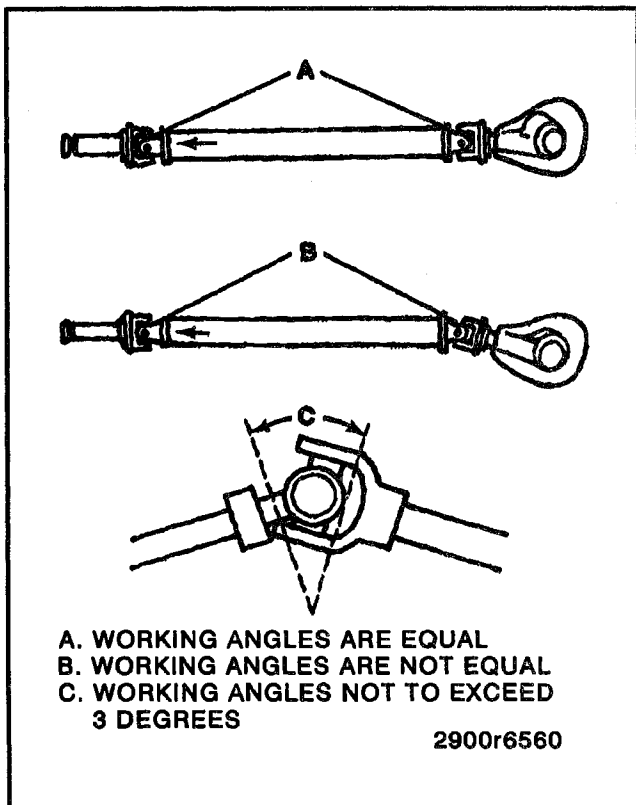


Figure 22—Working Angles

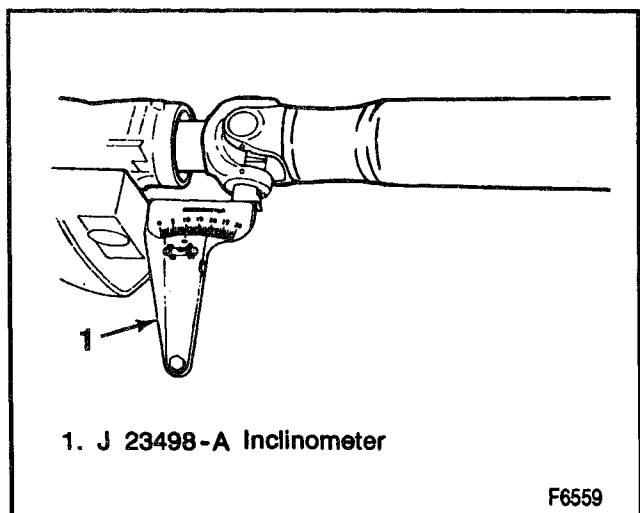


Figure 23—Measuring Driveline Angles

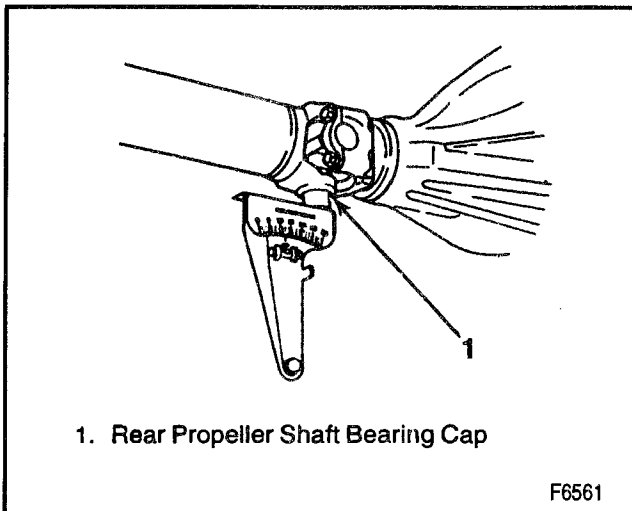


Figure 24—Measuring Rear U-Joint Working Angle

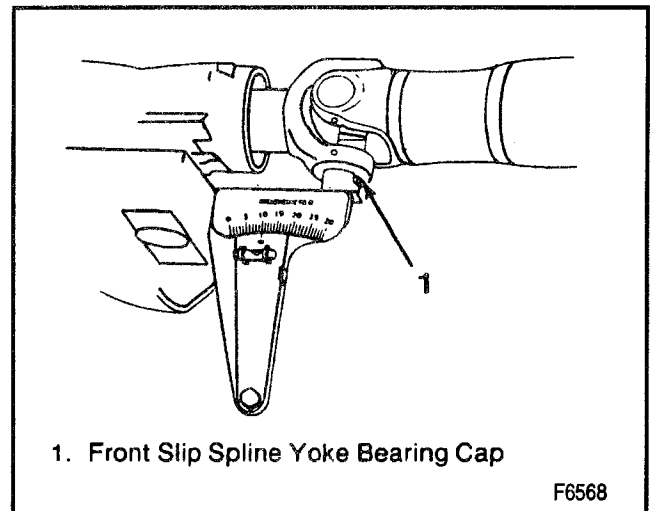


Figure 27—Measuring Front U-Joint Working Angle

cap (Figure 27). Center the bubble on the sight glass and record the measurement.

3. Subtract the smaller figure from the larger figure to obtain the front universal joint angle.

Rules For Measuring Driveline Angles

Rule Number 1 —The working angles of each pair of U-joints must be within one-half degree of being equal on shafts that turn at 3200 RPM or higher, or within one degree of being equal on shafts that turn at speeds below 3200 RPM.

Rule Number 2 —(Involves a two drive shaft, three U-joint system). With a three-joint system there is always an odd joint that cannot be paired with another joint. Since the U-joint between the transmission and the front shaft does not have a mate to cancel out its acceleration and deceleration, this front shaft should be within one-half degree of the transmission angle for high-speed shaft and within one degree for low-speed shafts. If the rear-end pinion angle is not equal to either the engine/transmission angle or front shaft angle, it should be at an angle between those two. There can be a one-half degree difference between the center and rear U-joint working angles, provided neither of the working angles exceed 3 degrees on high-speed shafts (turning at 3200 RPM or higher), or 5 degrees on low-speed shafts (turning below 3200 RPM).

VIBRATION DIAGNOSIS CHARTS

Refer to Figures 28 through 35.

TECHNICIAN VIBRATION DIAGNOSIS FORM

The form used for diagnosing a vibration problem is found after the vibration diagnosis charts. Copies of this form should be made for future use.

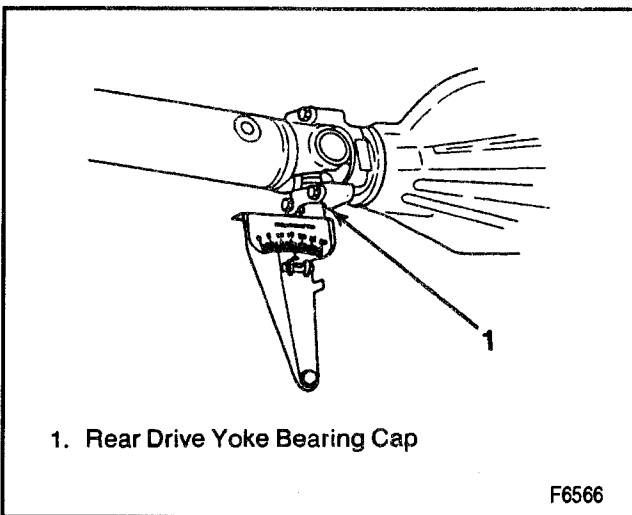


Figure 25—Measuring Rear U-Joint Working Angle

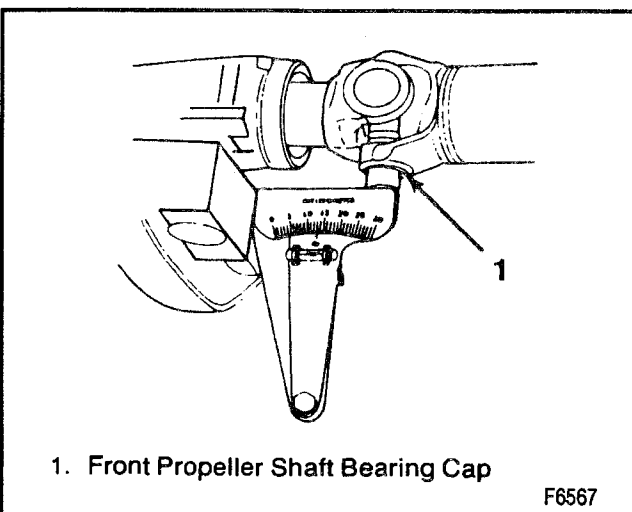
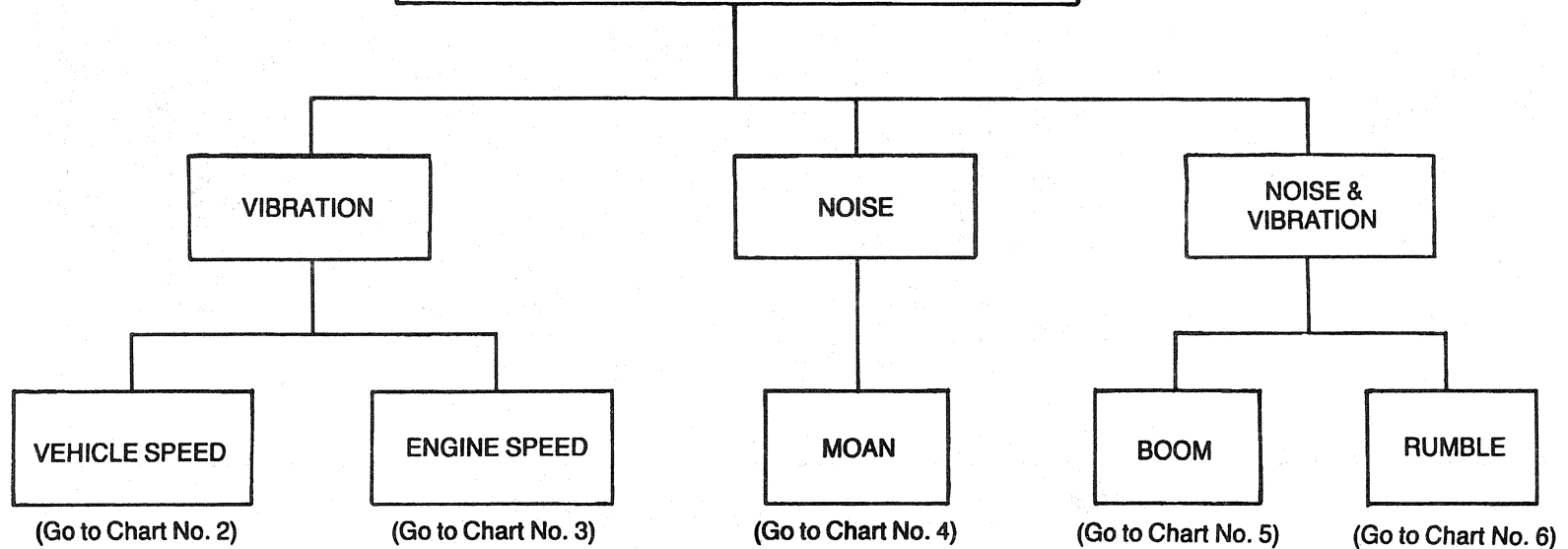


Figure 26—Measuring Front U-Joint Working Angle

NOISE AND VIBRATION INDEX CHART

Ride vehicle (with customer if possible) to point out complaint. Check tire condition and pressures. Use "Reed" Tachometer to identify vibration frequency. Refer to "Reed Tachometer" in this section.



VEHICLE SPEED — Speedometer (vehicle speed) related.

ENGINE SPEED — Tachometer (engine speed) related.

MOAN — A low frequency noise which sounds like exhaust noise, is engine rpm and/or engine torque sensitive. Most customers will complain of noise — maybe a vibration or buzz in floor.

BOOM — A drum sound which occurs on impact with hole or seams in the road then dies out, could have a vibration along with the drumming sound.

RUMBLE* A steady drumming sound and vibration which is vehicle speed sensitive and continues as long as the vehicle speed is maintained, regardless of engine speed.

*NOTE: "Load sensitive rumble" — may only be noted with certain vehicle loads and speed conditions.

"Height (jounce) sensitive rumble" — Noise and vibration will vary in intensity and degree as vehicle height change takes place with road terrain change.

Figure 28—Vibration Diagnosis Chart #1

VIBRATION — Vehicle Speed Sensitive **(Vibration Occurs at a Specific Vehicle Speed)**

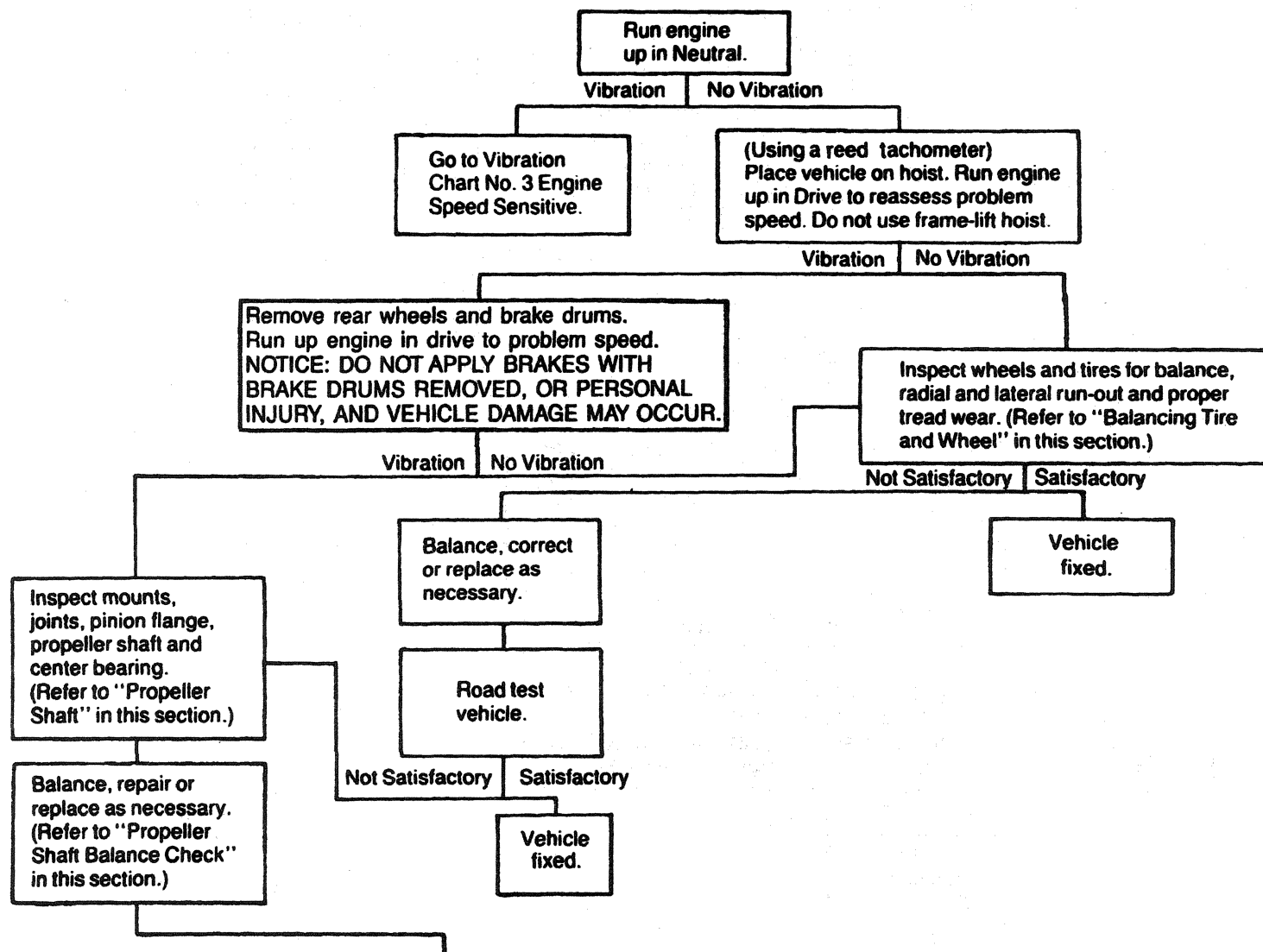


Figure 29—Vibration Diagnosis Chart #2

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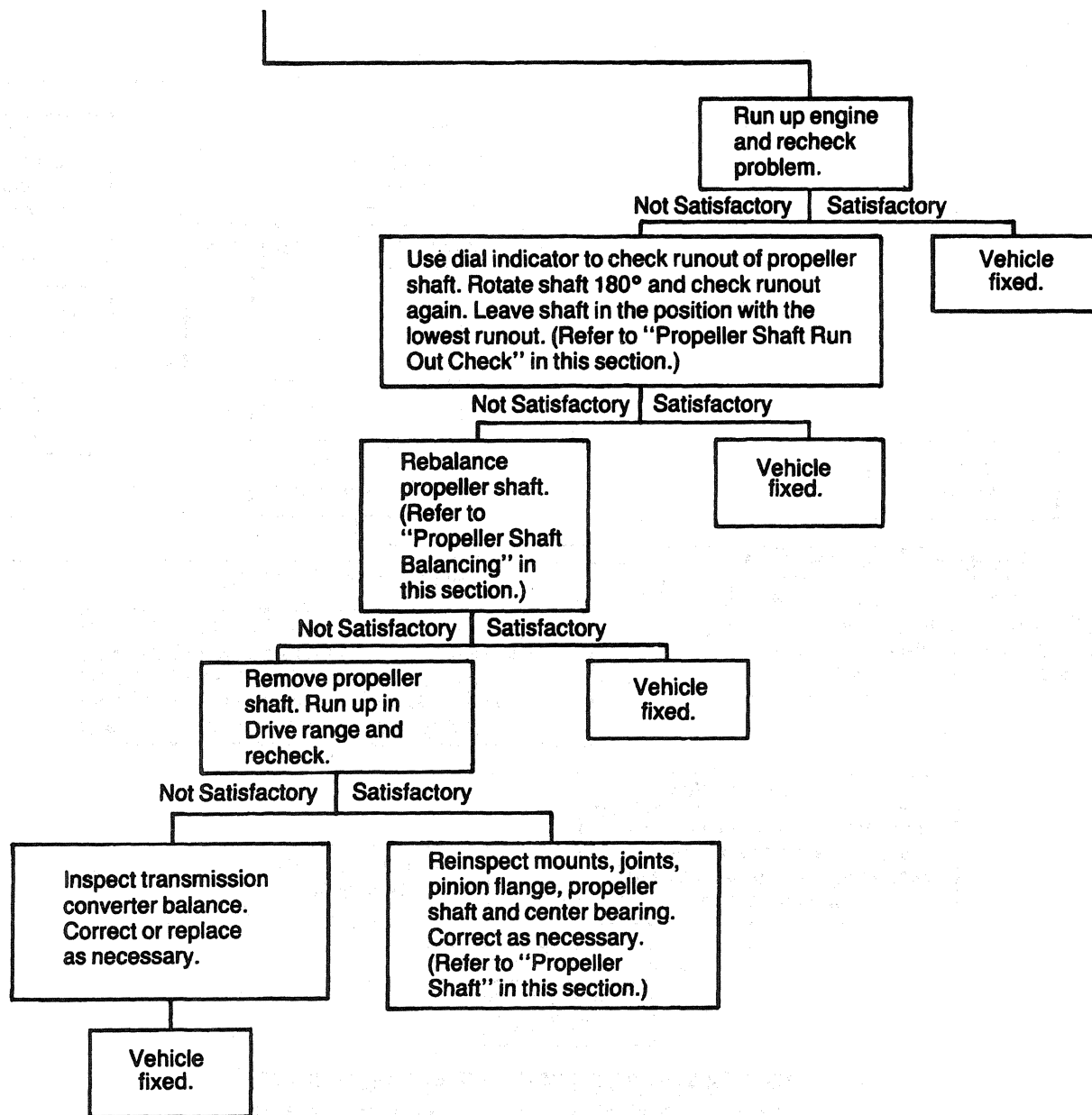


Figure 30—Vibration Diagnosis Chart #2 Continued

VIBRATION — Engine Speed Sensitive **(A vibration occurring at a certain engine tachometer** **reading regardless of vehicle speed)**

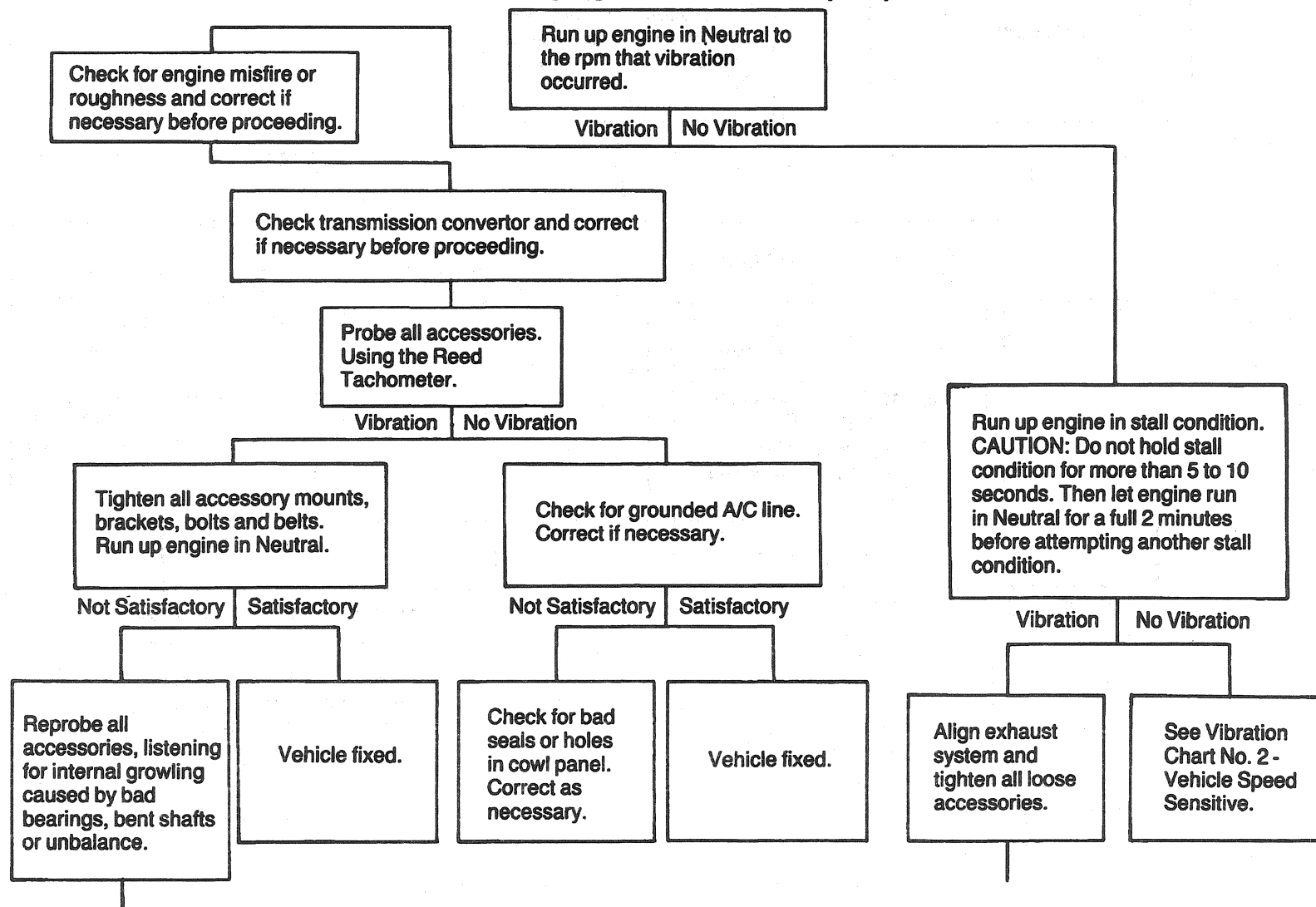
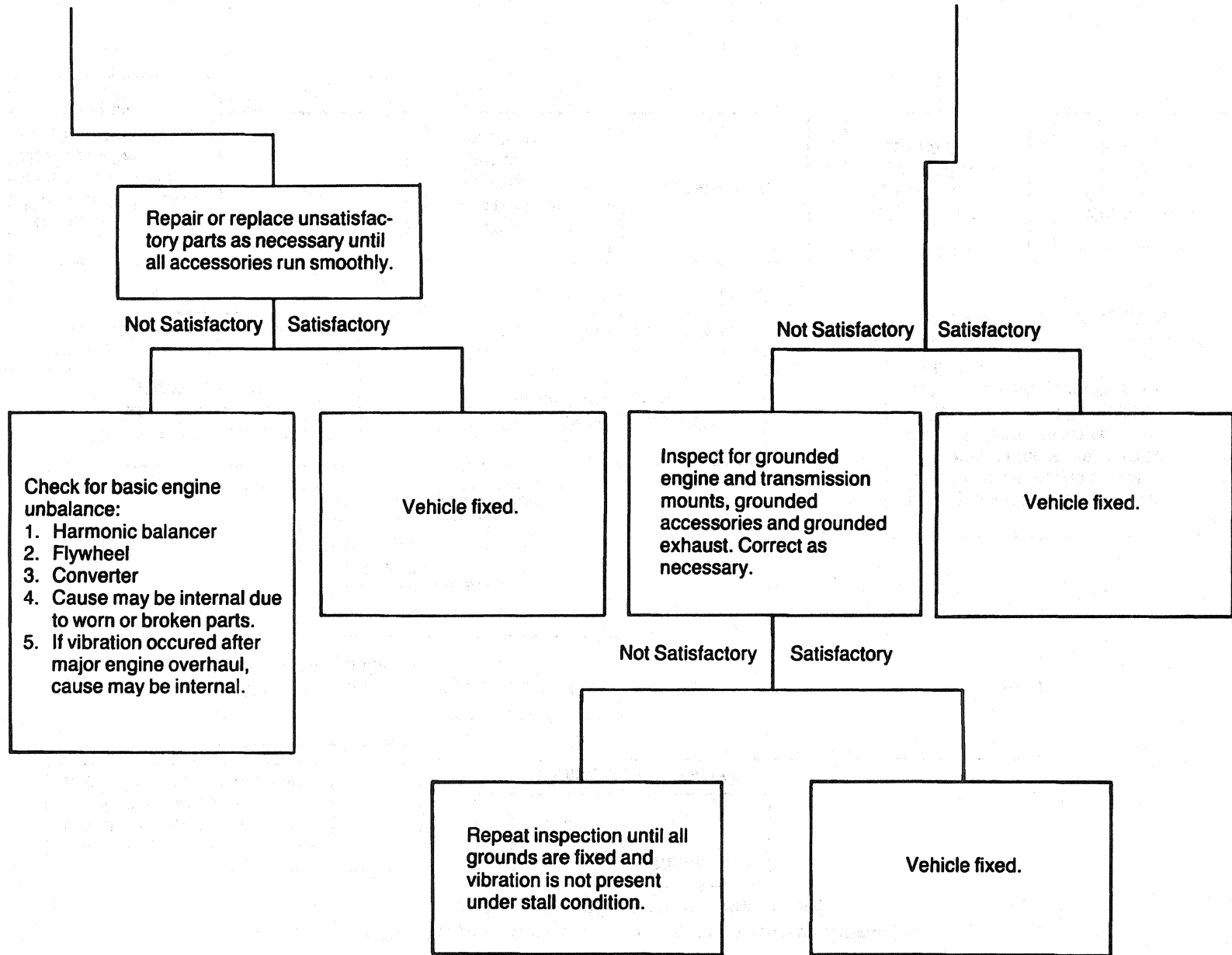


Figure 31—Vibration Diagnosis Chart #3

F6775

Figure 32—Vibration Diagnosis Chart #3 Continued

F6776



MOAN

(Low Frequency Noise Which Sounds Like Exhaust Noise, is Engine RPM and/or Engine Torque Sensitive — Sometimes Accompanied by Vibration or Buzz in Floor)

Visually and physically inspect and correct:

1. Loose air cleaner wing nut.
2. Loose accessory drive belts.
3. All accessory mounting brackets and bolts for tightness.
4. Grounded A/C lines.
5. Grounded engine and transmission mounts.
6. Grounded exhaust system.

Figure 33—Vibration Diagnosis Chart #4

BOOM — Noise and Vibration
 (A drum sound which occurs on impact
 with holes or seams in the road surface)

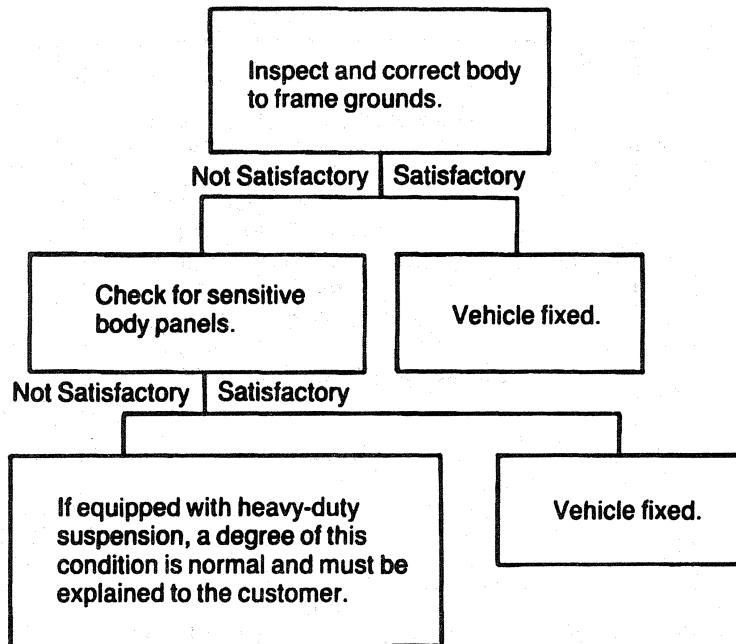
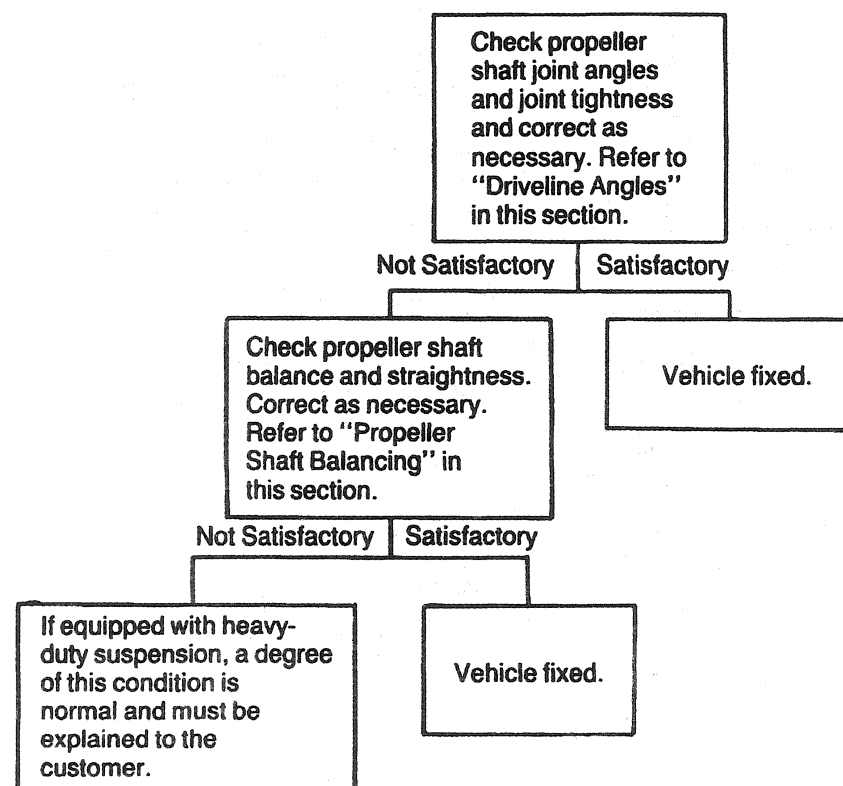


Figure 34—Vibration Diagnosis Chart #5

RUMBLE — Noise and Vibration
(A steady drumming sound which is vehicle speed sensitive
and continues as long as vehicle speed is maintained)



NOTE: Rumble may be vehicle load sensitive or vehicle height sensitive.
Refer to "Vibration Categories" in this section.

Figure 35—Vibration Diagnosis Chart #6

TIRE/WHEEL AND PROPSHAFT ROTATION

Vehicle Information

Complaint Speed: _____ km/h
(mph)
Symptom: _____
Frequency: _____
Engine Speed: _____ rpm
Gear: _____

Year: _____ Model: _____
VIN: _____
Engine: _____ Trans: _____
Tire Size: _____ Axle Ratio: _____
TPC Spec: _____

Tire/Wheel Speed

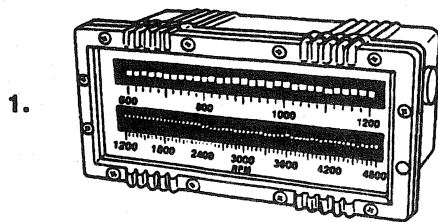
Vibration Occurs at:	<input type="text"/>	mph ÷ 8 (5 mph)	=	<input type="text"/>	increments of 8 km/h (5 mph)
8 km/h increments	<input type="text"/>	x <input type="text"/>		<input type="text"/>	
					tire RPS* at 8 km/h (5 mph) (from chart)
1st order	<input type="text"/>	x 2	=	<input type="text"/>	Tire/Wheel Speed, RPS (Hz) 1st order
1st order	<input type="text"/>	x 3	=	<input type="text"/>	2nd order
			=	<input type="text"/>	3rd order

Propeller Shaft Speed

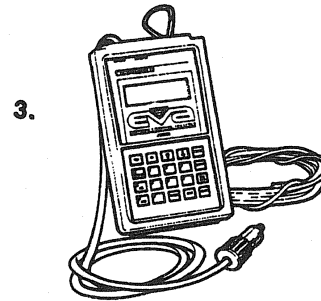
1st order tire	<input type="text"/>	x <input type="text"/>	=	<input type="text"/>	Propeller Shaft Speed 1st order
		(axle ratio)			
1st order propshaft	<input type="text"/>	x 2	=	<input type="text"/>	2nd order

*RPS=revolutions per second; equates to cycles per second (Hz).

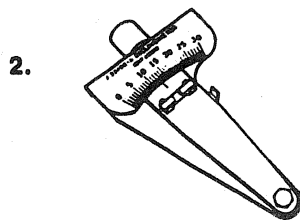
SPECIAL TOOLS



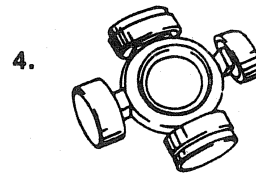
P/N 313510



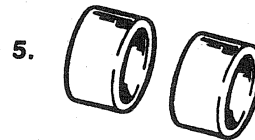
J 38792



J 23498-A



J 35819



J 35819-100

- 1. BIDDLE FHRAM REED TACHOMETER
- 2. INCLINOMETER
- 3. ELECTRONIC VIBRATION ANALYZER (EVA)
- 4. COMPANION FLANGE RUNOUT GAGE
- 5. RUNOUT GAGE ADAPTER SLEEVES