

SECTION 0

GENERAL INFORMATION

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SECTION 0A

GENERAL INFORMATION

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SUPPLEMENTAL INFLATABLE RESTRAINT (SIR) HANDLING

CAUTION: This vehicle is equipped with Supplemental Inflatable Restraint (SIR). Refer to **CAUTIONS** in Section 9J under "ON-VEHICLE SERVICE" and the SIR Component and Wiring Location view in Section 9J before performing service on or around SIR components or wiring. Failure to follow **CAUTIONS** could result in possible air bag deployment, personal injury, or otherwise unneeded SIR system repairs.

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.

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.

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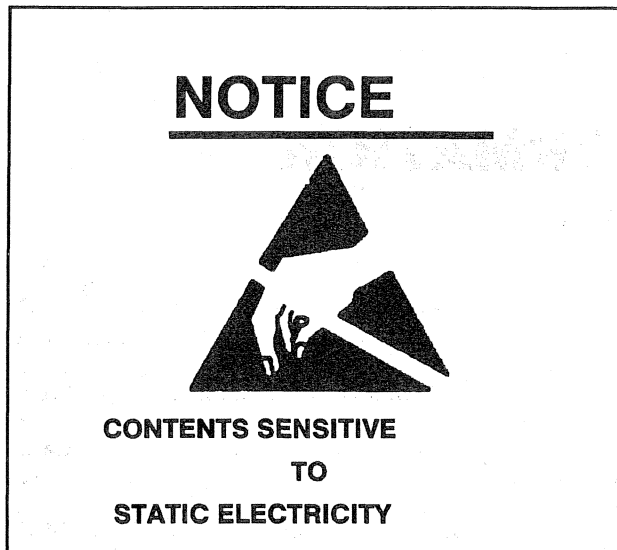


Figure 1—Electrostatic Discharge Label

- 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.
- Do not remove the solid state component from its protective packaging until you are ready to install the part.
- 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 Placard, 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).

SPECIAL TOOL ORDERING INFORMATION

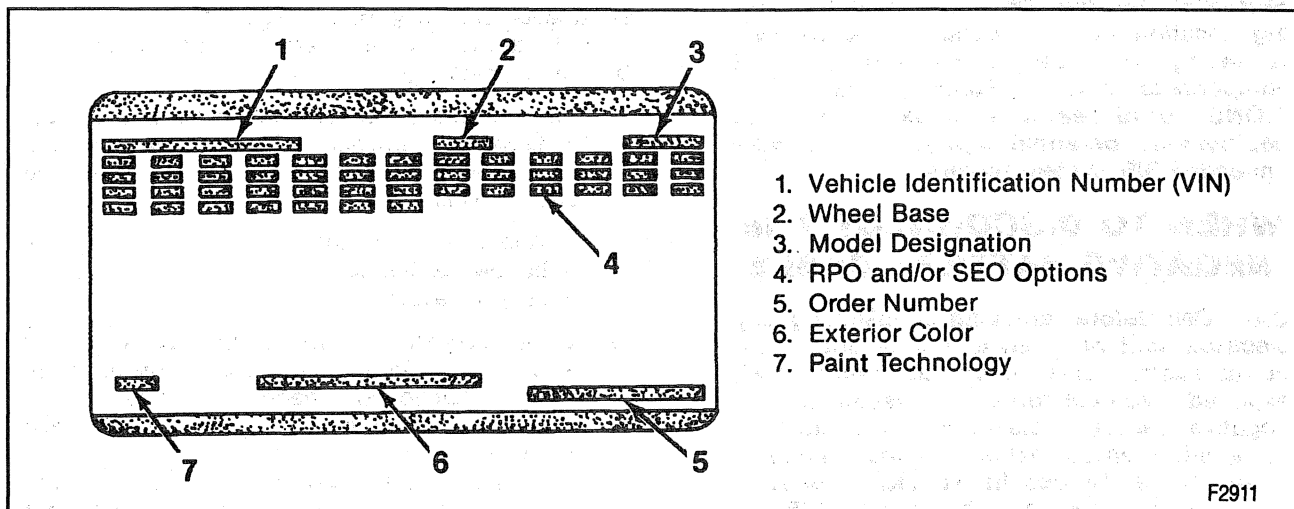
Special service tools shown in this service manual that have tool product numbers beginning with "J" or "BT" are available for worldwide distribution from:

Kent-Moore
SPX Corporation
29784 Little Mack
Roseville, MI 48066-2298
1-800-345-2233
Mon.-Fri. 8:00 a.m.--5:00 p.m. EST
Telex: 244040 KMTR UR
Fax: 810-578-7375

Scan tools and accessories can be purchased through Kent-Moore at the above address and phone number.

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).



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Figure 2—Service Parts Identification Label

Figure 3—Complete Vehicle Certification Label

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.

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.

Figure 4—Incomplete Vehicle Certification Label

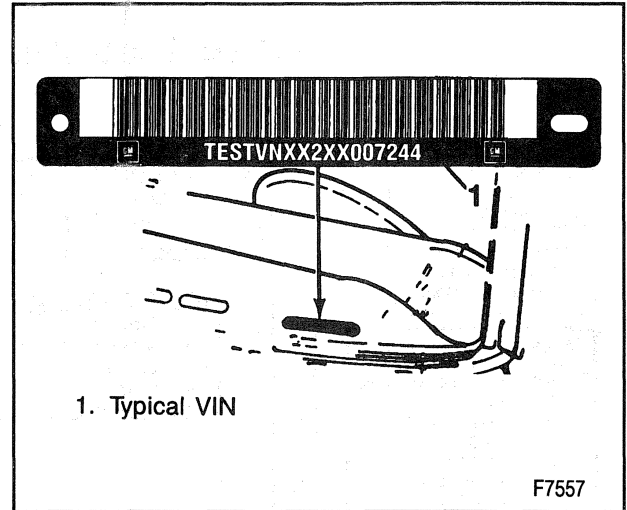


Figure 5—Vehicle Identification Number (VIN) Location

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.

VEHICLE IDENTIFICATION NUMBER

The vehicle identification number (VIN) is the seven-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.

MODEL IDENTIFICATION

Models and body styles are shown in figure 7.

ENGINE IDENTIFICATION NUMBER

The VIN provides detailed engine identification and code information by liter and by the engine code letter located on the vehicle identification plate.

Stick-on labels attached to the engine, or 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 eight positions (figures 8, 9, 10, and 11).

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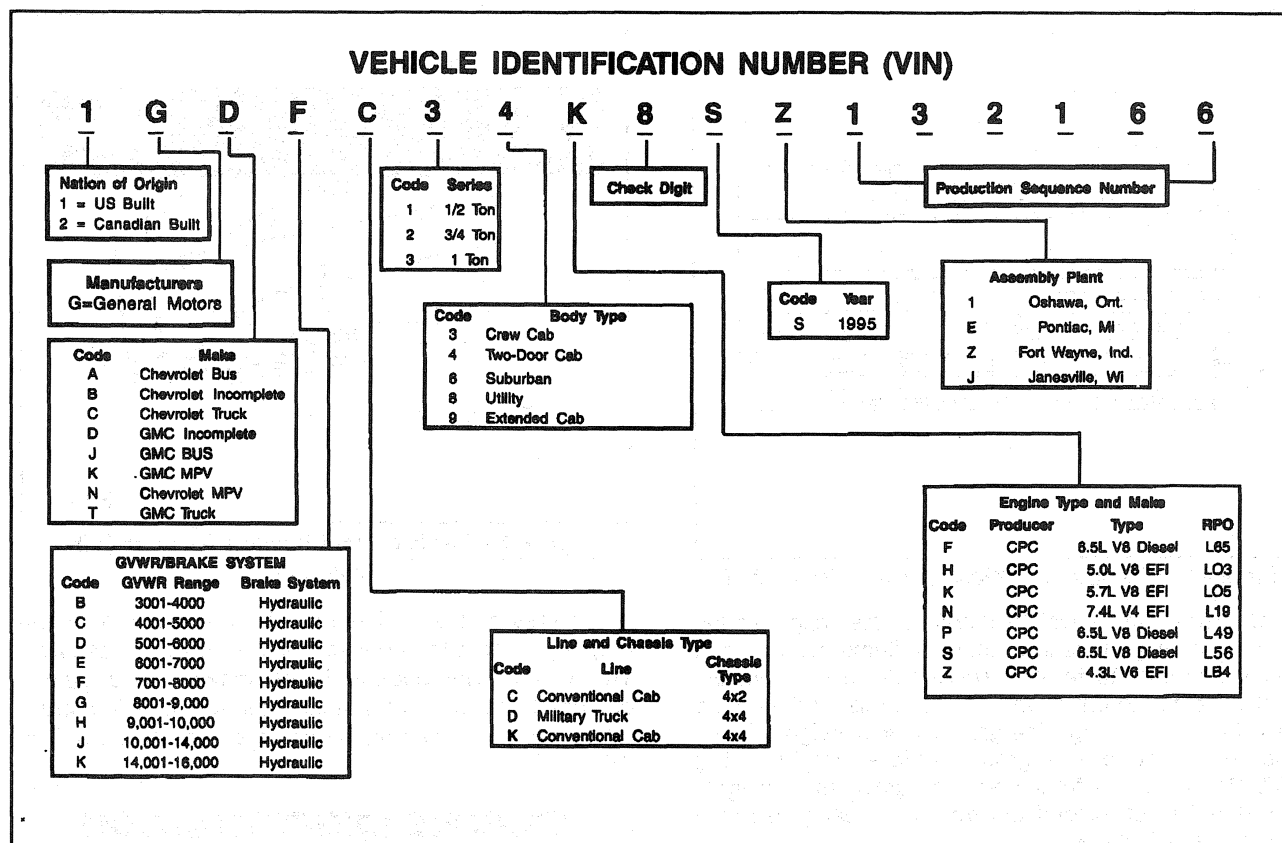


Figure 6—Vehicle Identification Chart

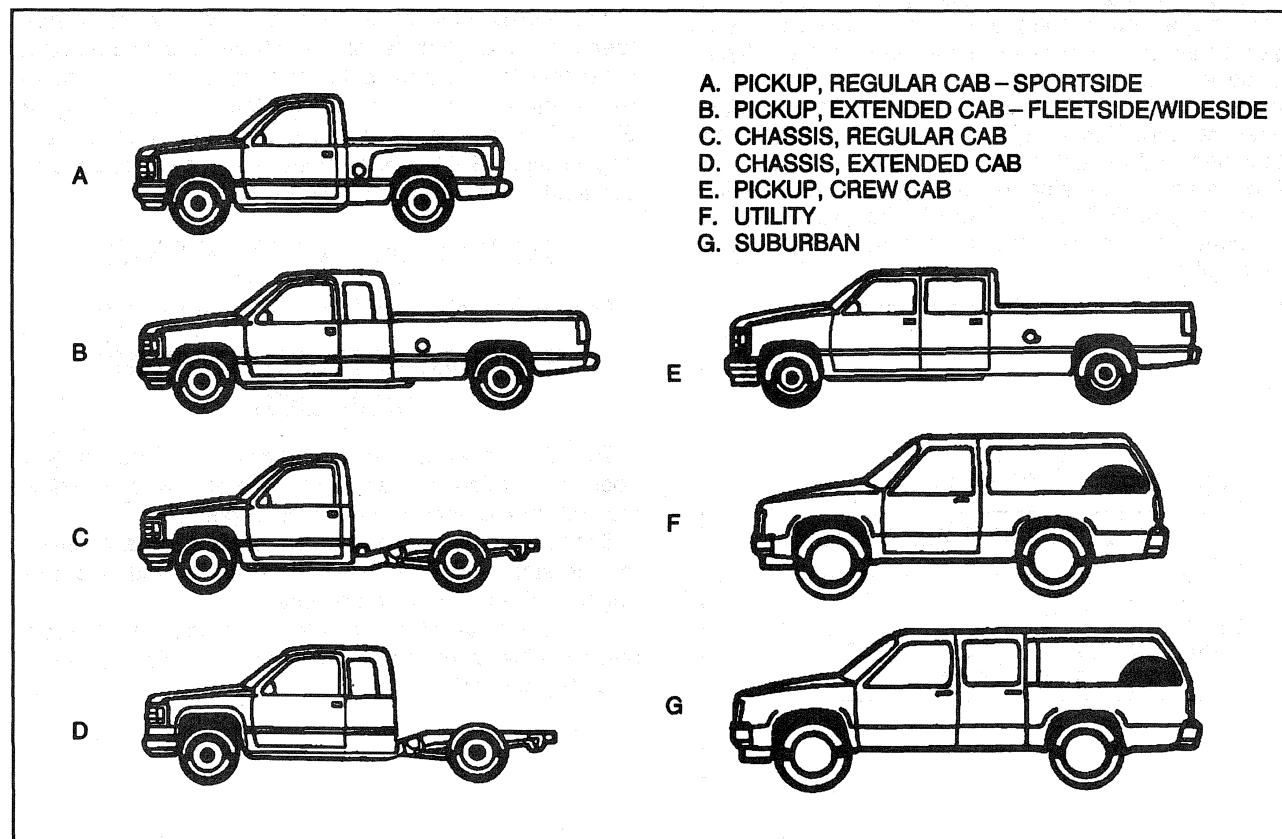


Figure 7—Model Identification

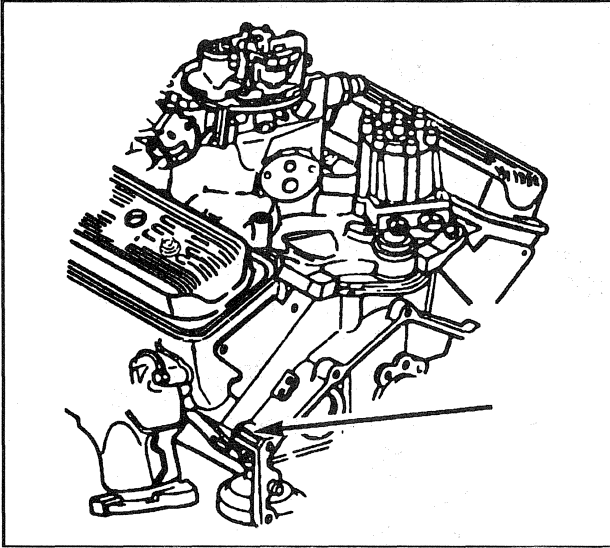


Figure 8—4.3L Engine I.D. Location

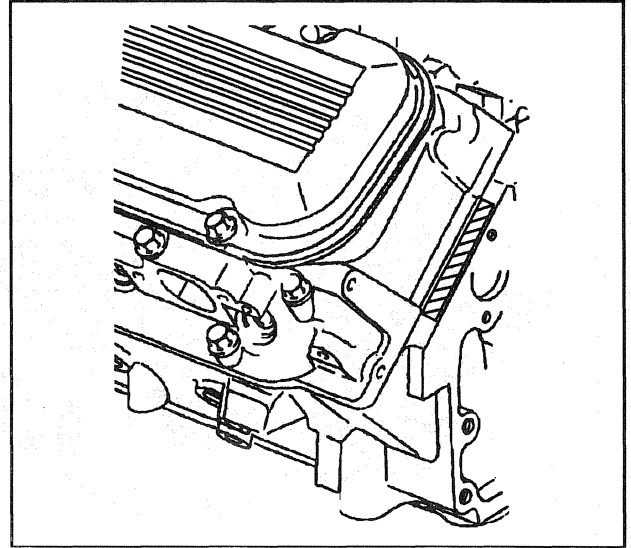


Figure 10—7.4L Engine I.D. Location

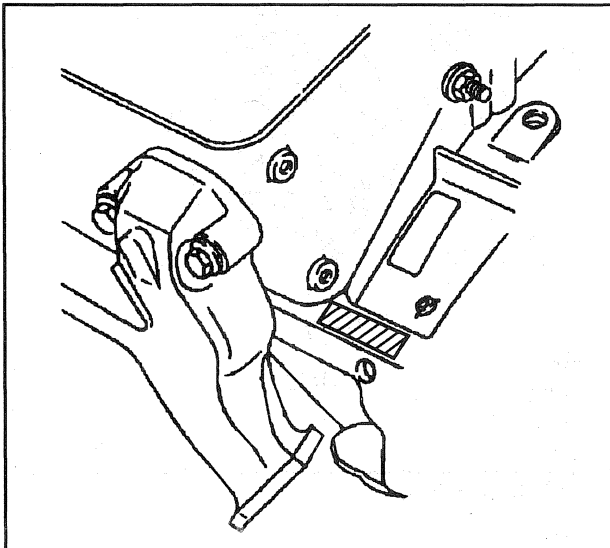


Figure 9—5.0L and 5.7L Engine I.D. Location

TRANSMISSION IDENTIFICATION NUMBER

Manual and automatic transmission model identification is located on a label or tag applied to the transmission case (figures 12 through 18). 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."

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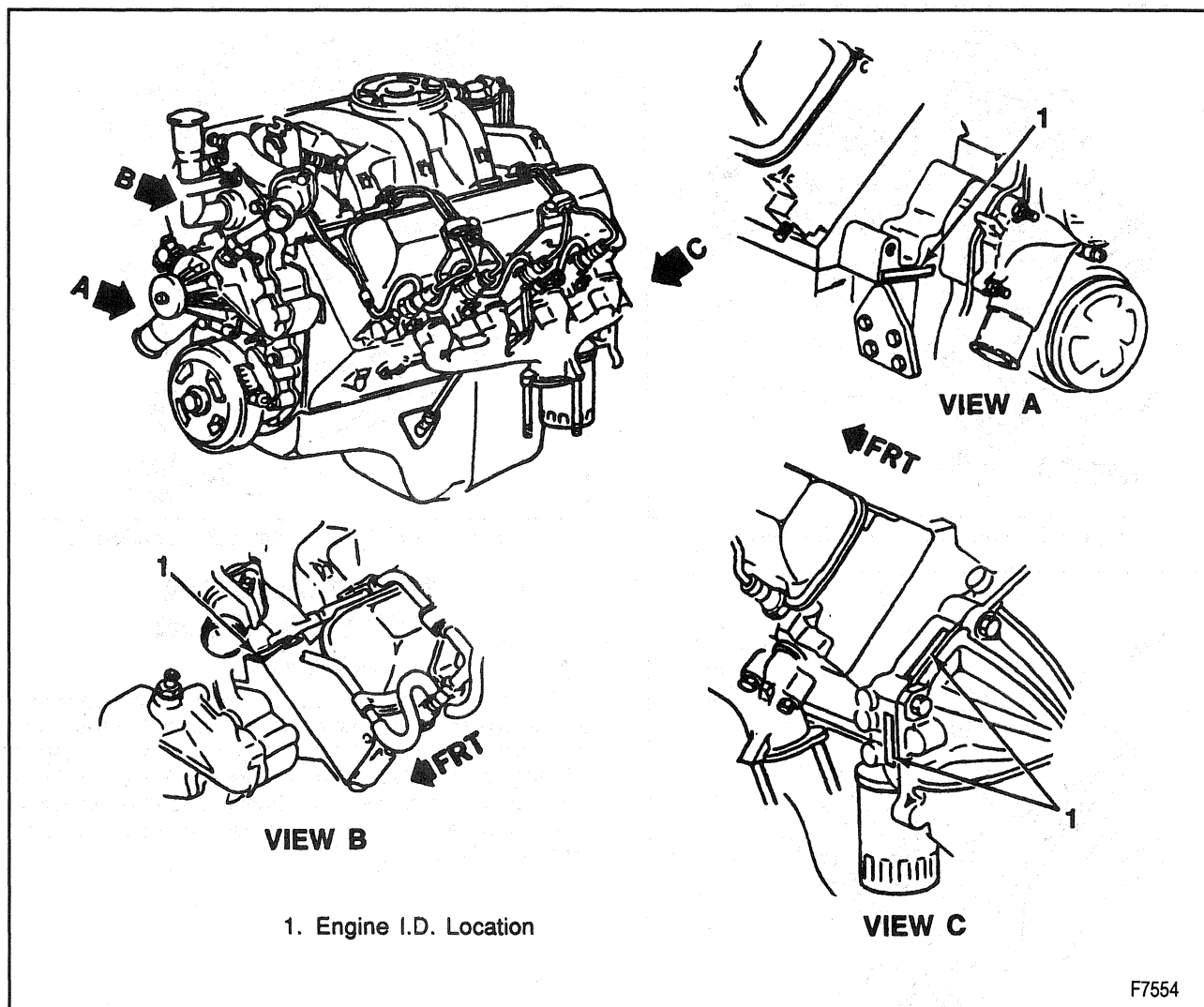


Figure 11—6.5L Diesel Engine I.D. Location

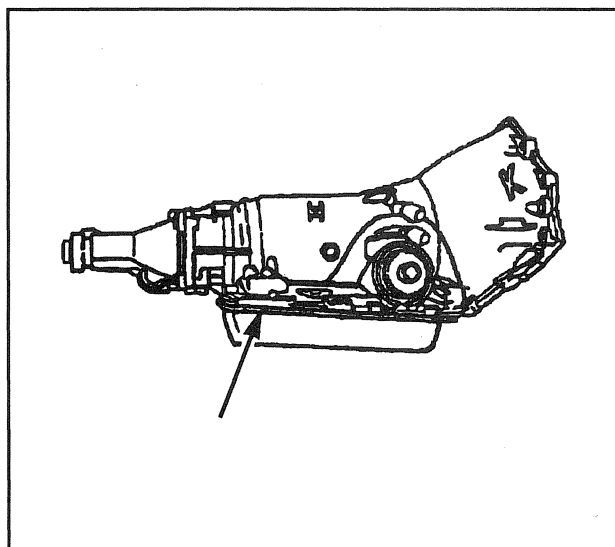


Figure 12—Hydra-Matic 4L60-E Transmission
I.D. Location (1 of 2)

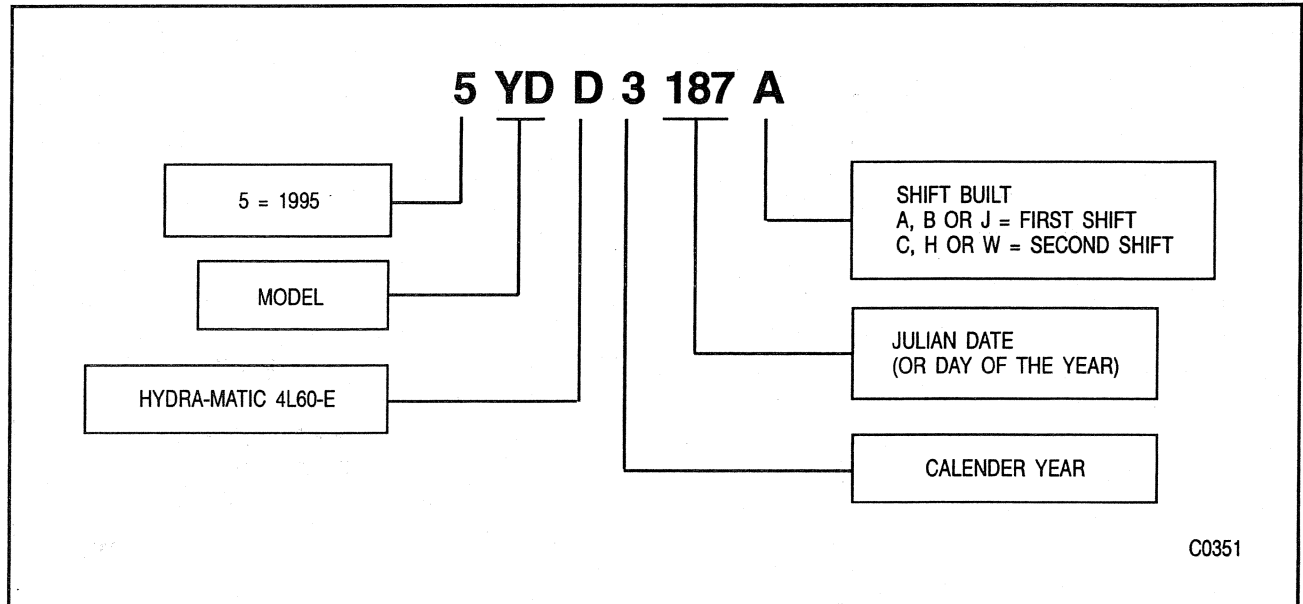


Figure 13—Hydra-Matic 4L60-E Transmission I.D. (2 of 2)

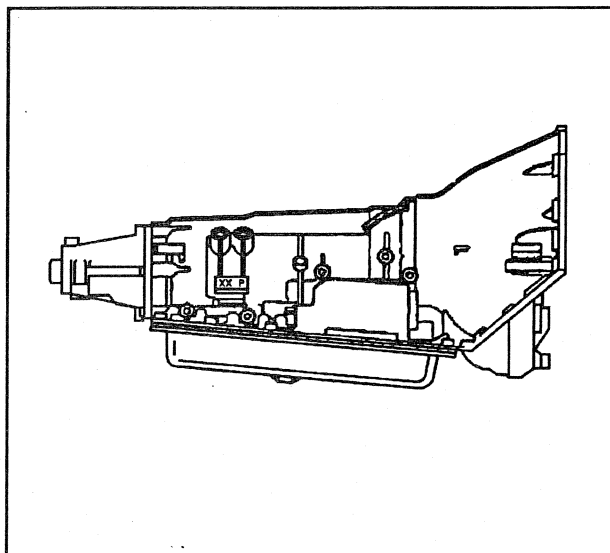


Figure 14—Hydra-Matic 4L80-E Transmission I.D. Location (1 of 2)

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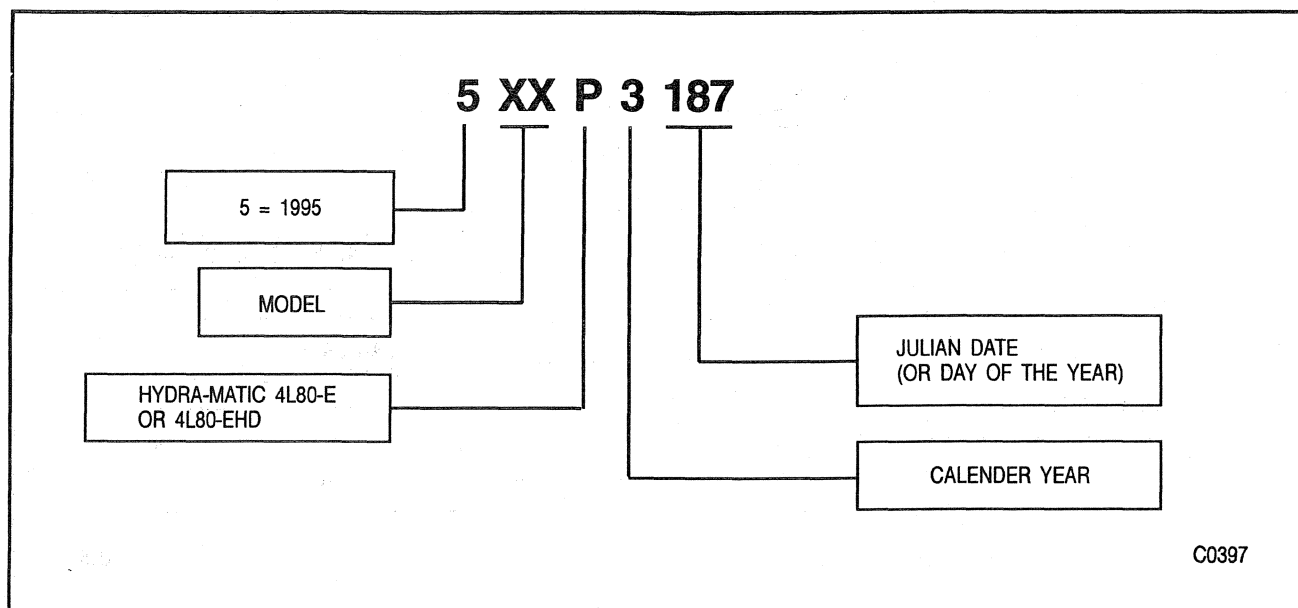


Figure 15—Hydra-Matic 4L80-E Transmission I.D. (2 of 2)

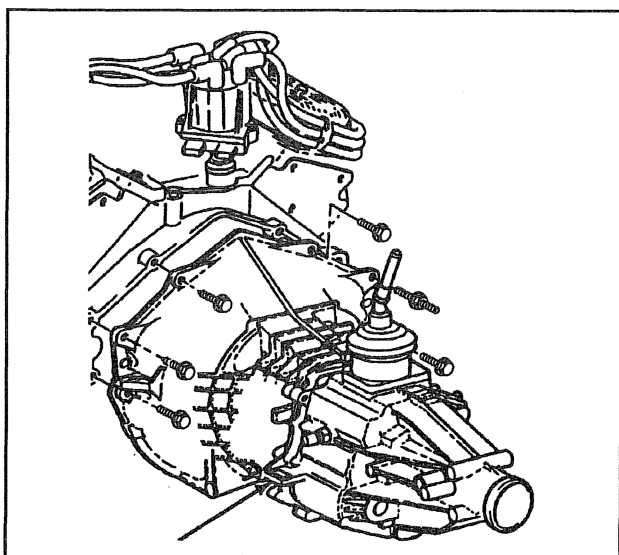


Figure 16—New Venture Gear 3500 Transmission
I.D. Location

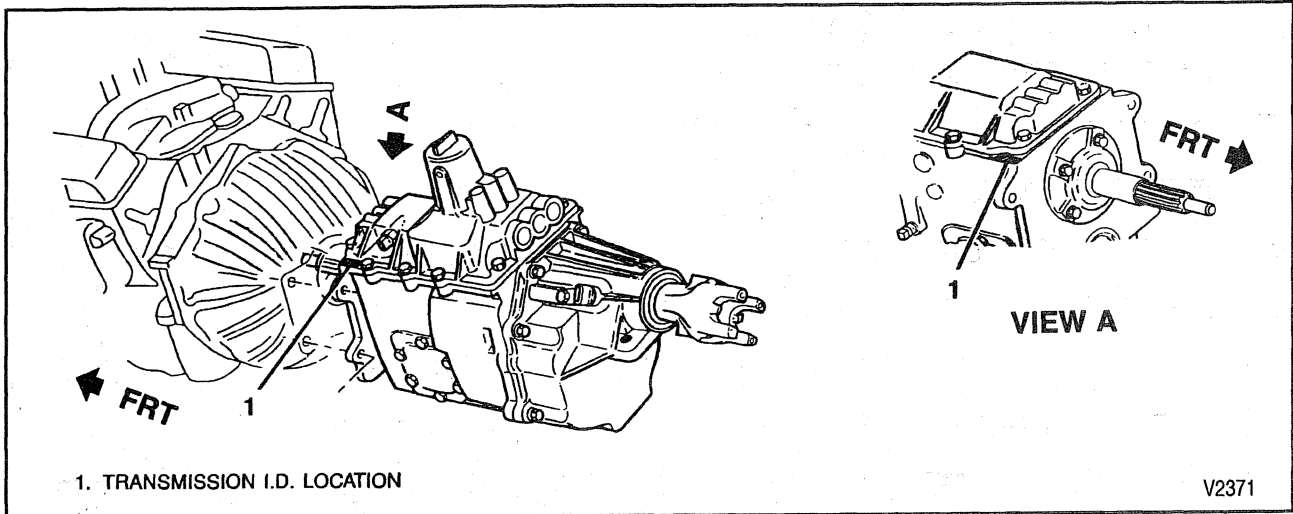


Figure 17—New Venture Gear 4500 Transmission I.D. Location

Model	Engine		Transmission	
	Base	Option	Base	Option
C107 (03)	4.3L V6 (LB4)	5.0L V8 (L03) 5.7L V8 (L05)	5 Spd. Manual (MG5)	4 Spd. Auto (M30) 5 Spd. Manual (MG5)
C107 (53)	4.3L V6 (LB4)	5.0L V8 (L03) 5.7L V8 (L05) 6.5L V8 (L49) 6.5L V8 (L56)	5 Spd. Manual (MG5)	5 Spd. Manual (MT8) 4 Spd. Auto (MT1) 4 Spd. Auto (M30) 5 Spd. Manual (MG5)
C109 (03)	4.3L V6 (LB4)	5.0L V8 (L03) 5.7L V8 (L05) 6.5L V8 (L56) 6.5L V8 (L49)	5 Spd. Manual (MG5)	5 Spd. Manual (MT8) 4 Spd. Auto (MT1) 4 Spd. Auto (M30) 5 Spd. Manual (MG5)
C109 (06)	5.7L V8 (L05)	6.5L V8 (L56)	4 Spd. Auto (M30)	4 Spd. Auto (MT1)
C109 (53)	4.3L V6 (LB4)	5.0L V8 (L03) 5.7L V8 (L05) 6.5L V8 (L49) 6.5L V8 (L56)	5 Spd. Manual (MG5)	5 Spd. Manual (MG5) 4 Spd. Auto (MT1) 5 Spd. Manual (MT8) 4 Spd. Auto (M30)
C207 (53)	4.3L V6 (LB4)	5.0L V8 (L03) 5.7L V8 (L05) 6.5L V8 (L56)	5 Spd. Manual (MG5)	5 Spd. Manual (MG5) 4 Spd. Auto (MT1) 5 Spd. Manual (MT8) 4 Spd. Auto (M30)
C209 (03)	4.3L V6 (LB4)	5.0L V8 (L03) 5.7L V8 (L05) 7.4L V8 (L19) 6.5L V8 (L49) 6.5L V8 (L56) 6.5L V8 (L65)	5 Spd. Manual (MG5)	5 Spd. Manual (MG5) 5 Spd. Manual (MT8) 4 Spd. Auto (M30) 4 Spd. Auto (MT1)
C209 (06)	5.7L V8 (L05)	6.5L V8 (L65)	4 Spd. Auto (MT1)	4 Spd. Auto (MT1)
C209 (53)	4.3L V6 (LB4)	5.0L V8 (L03) 5.7L V8 (L05) 7.4L V8 (L19) 6.5L V8 (L49) 6.5L V8 (L56) 6.5L V8 (L65)	5 Spd. Manual (MG5)	5 Spd. Manual (MG5) 5 Spd. Manual (MT8) 4 Spd. Auto (M30) 4 Spd. Auto (MT1)

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Model	Engine		Transmission	
	Base	Option	Base	Option
C309 (03)	5.7L V8 (L05)	7.4L V8 (L19) 6.5L V8 (L65)	5 Spd. Manual (MT8)	5 Spd. Manual (MT8) 4 Spd. Auto (MT1)
C309 (43)	5.7L V8 (L05)	7.4L V8 (L19) 6.5L V8 (L65)	5 Spd. Manual (MT8)	5 Spd. Manual (MT8) 4 Spd. Auto (MT1)
C309 (53)	5.7L V8 (L05)	7.4L V8 (L19) 6.5L V8 (L65)	5 Spd. Manual (MT8)	5 Spd. Manual (MT8) 4 Spd. Auto (MT1)
C310 (03)	5.7L V8 (L05)	7.4L V8 (L19) 6.5L V8 (L65)	5 Spd. Manual (MT8)	5 Spd. Manual (MT8) 4 Spd. Auto (MT1)
C314 (03)	5.7L V8 (L05)	7.4L V8 (L19) 6.5L V8 (L65)	5 Spd. Manual (MT8)	5 Spd. Manual (MT8) 4 Spd. Auto (MT1)
C318 (03)	5.7L V8 (L05)	7.4L V8 (L19) 6.5L V8 (L65)	5 Spd. Manual (MT8)	5 Spd. Manual (MT8) 4 Spd. Auto (MT1)
K105 (16)	5.7L V8 (L05)	6.5L V8 (L56)	5 Spd. Manual (MG5)	4 Spd. Auto (M30) 4 Spd. Auto (MT1)
K107 (03)	4.3L V6 (LB4)	5.0L V8 (L03) 5.7L V8 (L05)	5 Spd. Manual (MG5)	5 Spd. Manual (MG5) 4 Spd. Auto (MT1) 5 Spd. Manual (MT8) 4 Spd. Auto (M30)
K107 (53)	4.3L V6 (LB4)	5.0L V8 (L03) 5.7L V8 (L05) 6.5L V8 (L49) 6.5L V8 (L56)	5 Spd. Manual (MG5)	5 Spd. Manual (MG5) 4 Spd. Auto (MT1) 5 Spd. Manual (MT8) 4 Spd. Auto (M30)
K109 (03)	4.3L V6 (LB4)	5.0L V8 (L03) 5.7L V8 (L05) 6.5L V8 (L49) 6.5L V8 (L56)	5 Spd. Manual (MG5)	5 Spd. Manual (MG5) 4 Spd. Auto (MT1) 5 Spd. Manual (MT8) 4 Spd. Auto (M30)
K109 (06)	5.7L V8 (L05)	6.5L V8 (L56)	4 Spd. Auto (M30)	4 Spd. Auto (MT1)
K109 (53)	4.3L V6 (LB4)	5.0L V8 (L03) 5.7L V8 (L05) 6.5L V8 (L49) 6.5L V8 (L56)	5 Spd. Manual (MG5)	5 Spd. Manual (MT8) 4 Spd. Auto (M30) 4 Spd. Auto (MT1)
K207 (53)	4.3L V6 (LB4)	5.0L V8 (L03) 5.7L V8 (L05) 6.5L V8 (L49) 6.5L V8 (L56)	5 Spd. Manual (MG5)	5 Spd. Manual (MG5) 5 Spd. Manual (MT8) 4 Spd. Auto (M30) 4 Spd. Auto (MT1)
K209 (03)	4.3L V6 (LB4)	5.0L V8 (L03) 5.7L V8 (L05) 7.4L V8 (L19) 6.5L V8 (L49) 6.5L V8 (L56) 6.5L V8 (L65)	5 Spd. Manual (MG5)	5 Spd. Manual (MG5) 5 Spd. Manual (MT8) 4 Spd. Auto (M30) 4 Spd. Auto (MT1)
K209 (06)	5.7L V8 (L05)	7.4L V8 (L19) 6.5L V8 (L65)	4 Spd. Auto (MT1)	4 Spd. Auto (MT1)
K209 (53)	4.3L V6 (LB4)	5.0L V8 (L03) 5.7L V8 (L05) 7.4L V8 (L19) 6.5L V8 (L49) 6.5L V8 (L56) 6.5L V8 (L65)	5 Spd. Manual (MG5)	5 Spd. Manual (MG5) 5 Spd. Manual (MT8) 4 Spd. Auto (M30) 4 Spd. Auto (MT1)
K309 (03)	5.7L V8 (L05)	7.4L V8 (L19) 6.5L V8 (L65)	5 Spd. Manual (MT8)	5 Spd. Manual (MT8) 4 Spd. Auto (MT1)
K309 (43)	5.7L V8 (L05)	7.4L V8 (L19) 6.5L V8 (L65)	5 Spd. Manual (MT8)	5 Spd. Manual (MT8) 4 Spd. Auto (MT1)

Model	Engine		Transmission	
	Base	Option	Base	Option
K309 (53)	5.7L V8 (L05)	7.4L V8 (L19) 6.5L V8 (L65)	5 Spd. Manual (MT8)	5 Spd. Manual (MT8) 4 Spd. Auto (MT1)
K310 (03)	5.7L V8 (L05)	7.4L V8 (L19) 6.5L V8 (L65)	5 Spd. Manual (MT8)	5 Spd. Manual (MT8) 4 Spd. Auto (MT1)
K314 (03)	5.7L V8 (L05)	7.4L V8 (L19) 6.5L V8 (L65)	5 Spd. Manual (MT8)	5 Spd. Manual (MT8) 4 Spd. Auto (MT1)

Model Codes:

C—Two-Wheel Drive

K—Four-Wheel Drive

03—Two Door Cab

06—Four Door Suburban

16—Two Door Utility

43—Four Door Cab

53—Two Door Extended Cab

T2960

Figure 18—Engine and Transmission Applications

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 LBS. 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 cause damage to the frame.

The only lift points for these vehicles are shown in figures 19 and 20, 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 LBS. GVWR

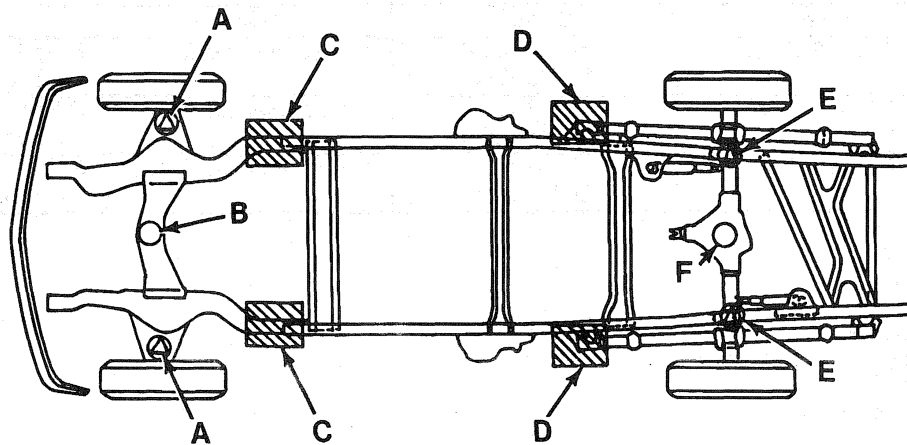
Lifting With A Hoist:

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.

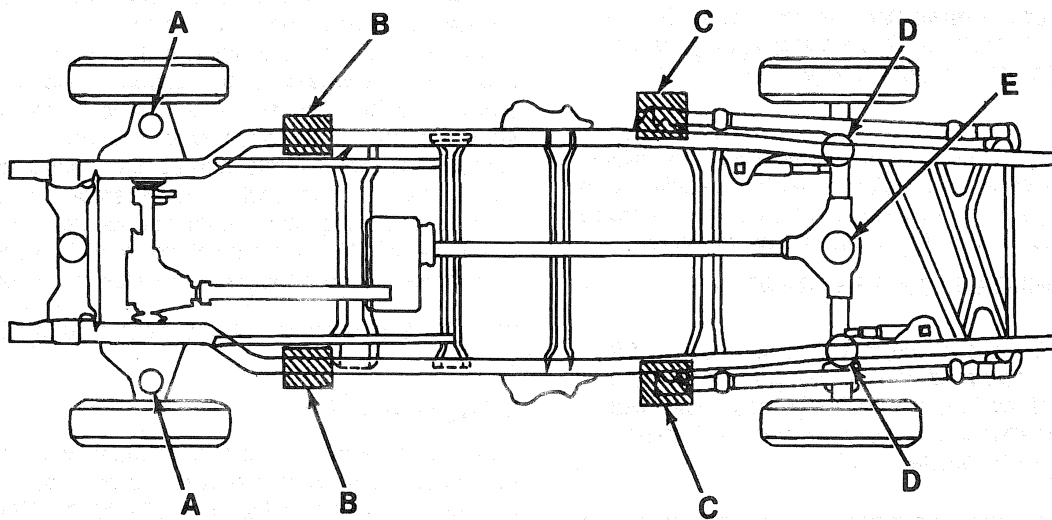
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- A. Lower control arm; inboard of the lower ball joint.
- B. Center of front suspension crossmember.
- C. Frame at forward edge of crossmember.
- D. Rear spring at front bracket.
- E. Rear axle just inboard of the spring.
- F. Rear axle at the center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

F2916

Figure 19—Chassis Lift Points—C Models (Under 12,000 Lb. GVWR)



- 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 20—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.

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 CYLINDER CODING

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.

NOTICE: Tumbler's used on 1995 model year vehicles are NOT interchangeable with tumblers used on previous model years.

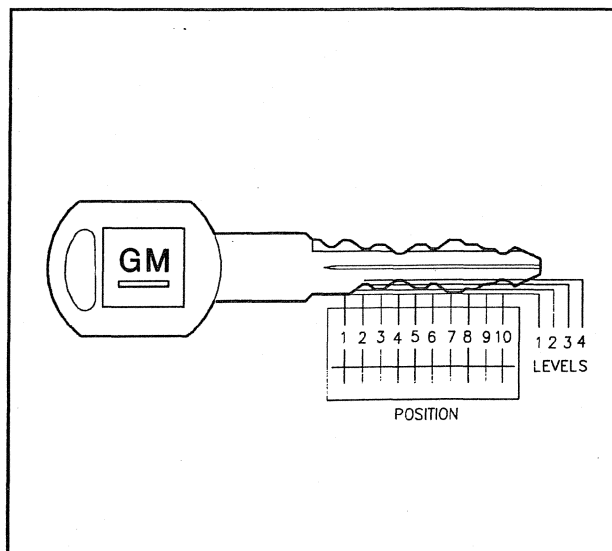


Figure 21—Key Code Diagram

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.

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 it's bore. Four types of tumblers result in various lock combinations. Each tumbler is coded according to a number, 1 through 4, stamped on it's 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 (refer to 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 22).
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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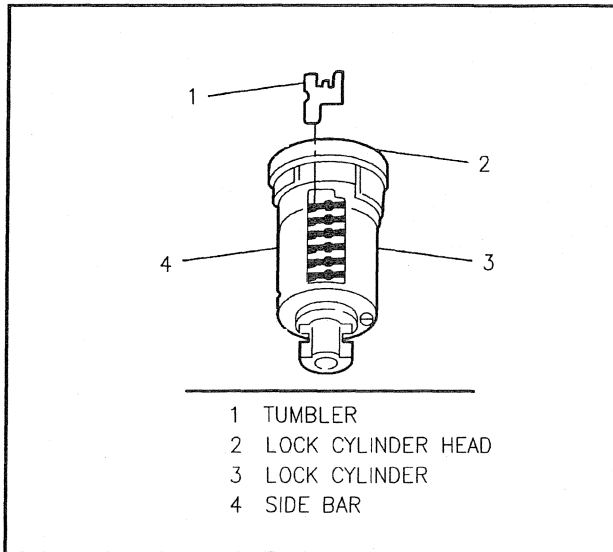


Figure 22—Installing Tumblers

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 (GM P/N 12345120) or a light oil (5W30).

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.

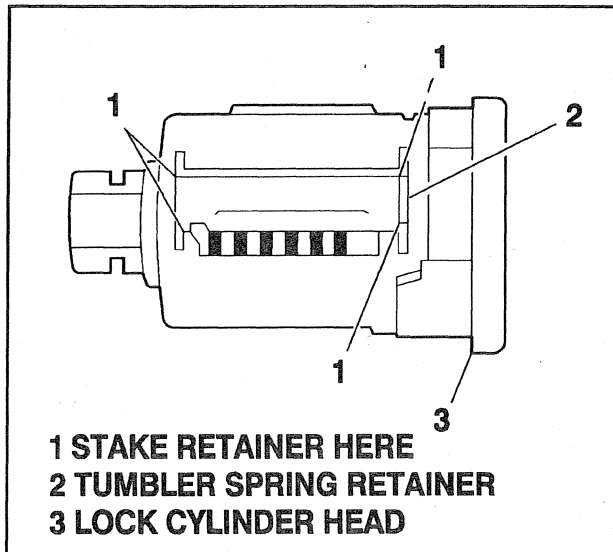


Figure 23—Locking Tumblers in Place

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 Posidriv or Type 1A. Either a Phillips head or Type 1A cross-recess screwdriver can be used in Posidriv recess screw heads, but Type 1A cross-recess screwdrivers will perform better.

Metric and customary thread notation differ slightly. The difference is explained under "Thread Notation (figure 24)."

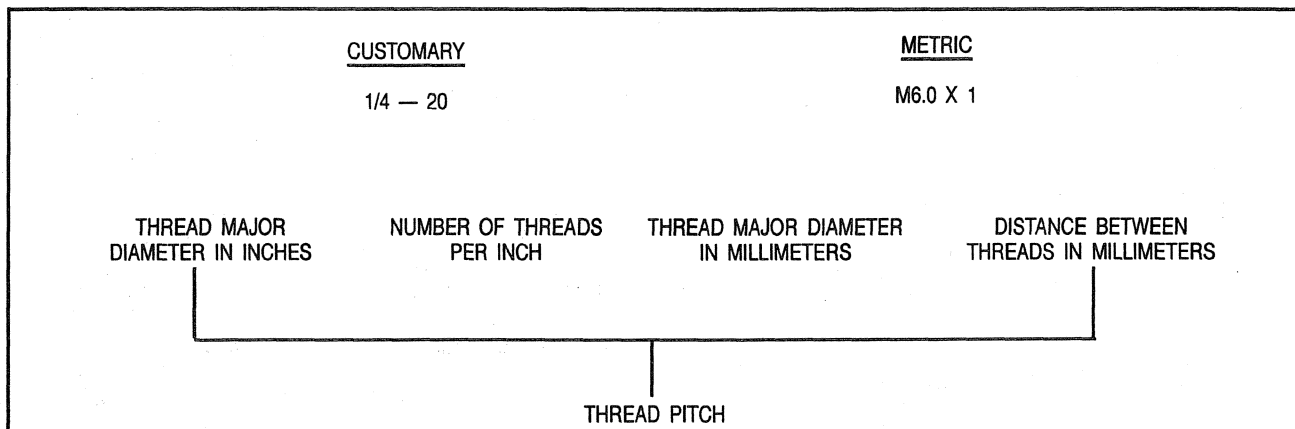


Figure 24—Thread Notation

T3340

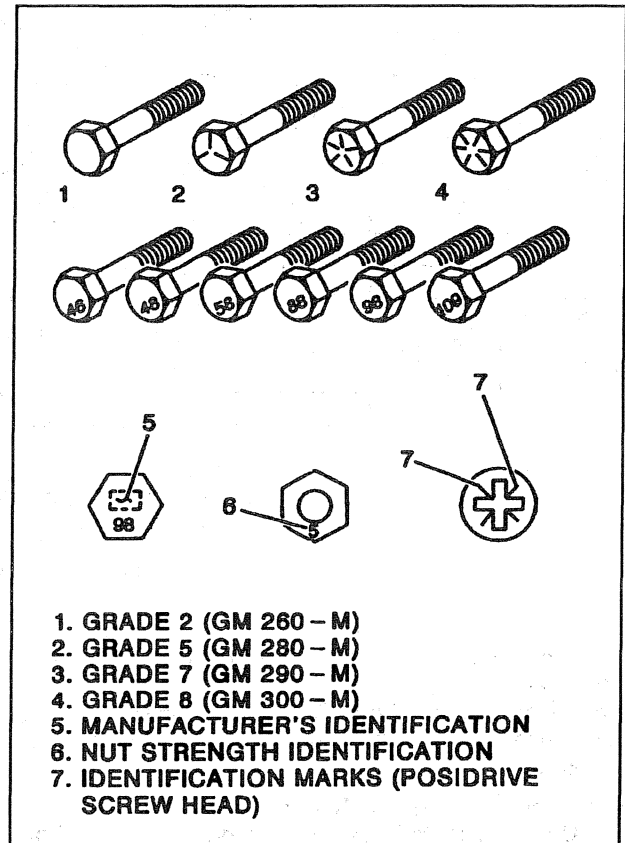
FASTENER STRENGTH IDENTIFICATION

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. To review the different strength markings available, refer to figure 25.

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. Refer to figure 26 and "Prevailing Torque Fasteners."



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PREVAILING TORQUE FASTENERS

A									
		6 & 6.3	8	10	12	14	16	20	
4, 5	N.m	0.4	0.8	1.4	2.2	3.0	4.2	7.0	
	Lbs. In.	4.0	7.0	12	18	25	35	57	
1, 2, 3, 6, 7, 8, 9	N.m	0.4	0.6	1.2	1.6	2.4	3.4	5.6	
	Lbs. In.	4.0	5.0	10	14	20	28	46	
B									
		.250	.312	.375	.437	.500	.562	.625	.750
4, 5	N.m	0.4	0.6	1.4	1.8	2.4	3.2	4.2	6.2
	Lbs. In.	4.0	5.0	12	15	20	27	35	51
1, 2, 3, 6, 8, 9	N.m	0.4	0.6	1.0	1.4	1.8	2.6	3.4	5.2
	Lbs. In.	4.0	5.0	9.0	12	15	22	28	43

A. Metric Sizes

B. Inch Sizes

1. Top Lock Type
2. Center Lock
3. Dry Adhesive Coating
4. Out Of Round Thread
5. Deformed Thread Profile

6. Nylon Strip Or Patch
7. Nylon Washer Insert
8. Nylon Patch
9. Nylon Insert

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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. Observe that, before fastener seats, 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.

J1930 WORD CONVERSION

General Motors complies with the Society of Automotive Engineers (SAE) Recommended Practice J1930. J1930 is an industry-wide standard that was adopted into government regulations and requires certain electrical and electronic components and systems be known by the same nomenclature that have the same function. 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 J1930 word conversions, refer to figure 27.

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)	<ol style="list-style-type: none"> 1. Electronically Erasable Programmable Read Only Memory (EEPROM) 2. Erasable Programmable Read Only Memory (EPROM) 3. Programmable Read Only Memory (PROM)

J1930 CONVERSION CHART	
From	To
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)
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)

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J1930 CONVERSION CHART	
From	To
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)
Oxygen (O ₂)	Oxygen (O2)
Oxygen Sensor (O2)	1. Heated Oxygen Sensor (HO2S) 2. Oxygen Sensor (O2S)
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 (HO2S Signal) 2. Oxygen Sensor Signal (O2S 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)
T2934	

Figure 27—J1930 Conversion Chart

SYMBOLS, ABBREVIATIONS, AND ACRONYMS

A—Ampere
 AC—Alternating Current
 A/C—Air Conditioning
 ACL—Air Cleaner
 ADJ—Adjust
 A/F—Air Fuel Ratio
 AIR—Secondary Air Injection
 Alt—Altitude
 ANT—Antenna
 AP—Accelerator Pedal
 ASM—Assembly
 AT—Automatic Transmission
 ATDC—After Top Dead Center

Auth—Authority
 Auto—Automatic
 BARO—Barometric Pressure
 Bat—Battery
 B+—Battery Positive Voltage
 BP—Back Pressure
 BTDC—Before Top Dead Center
 °C—Degrees Celsius
 CAC—Charge Air Cooler
 Calif—California
 CCOT—Cycling Clutch Orifice Tube
 CD—Compact Disc
 CE—Commutator End
 CFI—Continuous Fuel Injection
 CID—Cubic Inch Displacement
 CKP—Crankshaft Position

CL—Closed Loop	IGN—Ignition
CMP—Camshaft Position	ILC—Idle Load Compensator
CO—Carbon Monoxide	INJ—Injection
Coax—Coaxial	IP—Instrument Panel
Conn—Connector	IPC—Instrument Panel Cluster
Conv—Converter	INT—Intake
CPI—Central Port Fuel Injection	ISC—Idle Speed Control
CPP—Clutch Pedal Position	km—Kilometer
CPS—Central Power Supply	km/h—Kilometer per hour
Crank—Crankshaft	kPa—KiloPascals
CTP—Closed Throttle Position	KS—Knock Sensor
CV—Constant Velocity	kV—Kilovolts (thousands of volts)
Cyl—Cylinder(s)	L—Liter
DC—Direct Current	LF—Left Front
DE—Drive End	LH—Left Hand
DFI—Direct Fuel Injection	LR—Left Rear
Diff—Differential	LS—Left Side
DI—Distributor Ignition	L4—Four Cylinder In-Line engine
Dist—Distributor	MAF—Mass Air Flow
DLC—Data Link Connector	MAN—Manual
DTC—Diagnostic Trouble Code	MAP—Manifold Absolute Pressure
DTM—Diagnostic Test Mode	MAT—Manifold Air Temperature
DVM—Digital Voltmeter	Max—Maximum
EAC—Electric Air Control	MC—Mixture Control
EAS—Electric Air Switching	MDP—Manifold Differential Pressure
ECL—Engine Coolant Level	MFI—Multiport Fuel Injection
ECT—Engine Coolant Temperature	MIL—Malfunction Indicator Lamp
ECU—Engine Calibration Unit (PROM)	Min—Minimum
EEPROM—Electrically Erasable Programmable	mL—Milliliter
Read Only Memory	mm—Millimeter
EFE—Early Fuel Evaporation	MPG—Miles Per Gallon
EGR—Exhaust Gas Recirculation	MPH—Miles Per Hour
EGR TVV—Exhaust Gas Recirculation	MST—Manifold Surface Temperature
Thermal Vacuum Valve	mV—MilliVolt
EI—Electronic Ignition	NC—Normally Closed
EM—Engine Modification	N.m —Newton Meters
EPROM—Erasable Programmable	NO—Normally Open
Read Only Memory	NOx—Nitrogen, Oxides of
ESC—Electronic Spark Control	NVRAM—Non-Volatile Random Access Memory
ESD—Electrostatic Discharge	OBD—On Board Diagnostic (level 1)
ETR—Electronically Tuned Receiver	OBDII—On Board Diagnostic (level 2)
EVAP—Evaporative Emission	OC—Oxidation Catalytic Converter
EXH—Exhaust	OD—Outside Diameter
4WAL—Four Wheel Antilock Brakes	OL—Open Loop
* F—Degrees Fahrenheit	O2—Oxygen
FC—Fan Control	O2S—Oxygen Sensor
FED—Federal (All States Except Calif.)	PAIR—Pulse Secondary Air Injection
GAL—Gallon	P/B—Power Brakes
GEN—Generator	PCM—Powertrain Control Module
Gov—Governor	PCV—Positive Crankcase Ventilation
g—Gram	PNP—Park/Neutral Position
GND—Ground	PRESS—Pressure
Harn—Harness	PROM—Programmable Read Only Memory
HC—Hydrocarbons	PS—Power Steering
HD—Heavy Duty	psi—Pounds per Square Inch
Hg—Mercury	Pt—Pint
HiAlt—High Altitude	PWM—Pulse Width Modulated
HO2S—Heated Oxygen Sensor	Qt—Quart
IAC—Idle Air Control	RAM—Random Access Memory
IAT—Intake Air Temperature	REF—Reference
IC—Ignition Control	RF—Right Front
ICM—Ignition Control Module	RFI—Radio Frequency Interference
ID—Identification or Inside Diameter	RH—Right Hand
IFI—Indirect Fuel Injection	ROM—Read Only Memory

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RPM—Engine Speed
RPO—Regular Production Option
RR—Right Rear
RS—Right Side
RTV—Room Temperature Vulcanizing
RVR—Response Vacuum Reducer
RWAL—Rear Wheel Antilock Brakes
SAE—Society of Automotive Engineers
Sec—Secondary
SFI—Sequential Multiport Fuel Injection
SI—System International
Sol—Solenoid
SPEC—Specification
Speedo—Speedometer
SRI—Service Reminder Indicator
SRT—System Readiness Test
ST—Scan Tool
SYN—Synchronize
TAC—Thermostatic Air Cleaner
Tach—Tachometer
TB—Throttle Body
TBI—Throttle Body Fuel Injection
TCC—Torque Converter Clutch
TDC—Top Dead Center
Term—Terminal
Thermo—Thermostatic Air Cleaner

TEMP—Temperature
TP—Throttle Position
TRANS—Transmission
TV—Throttle Valve
TVRS—Television & Radio Suppression
TVV—Thermal Vacuum Valve
TWC—Three Way Catalytic Converter
TWC+OC—Three Way + Oxidation Catalytic Converter
U-Joint—Universal Joint
V—Volt(s)
VAC—Vacuum
VAF—Volume Air Flow
VCM—Vehicle Control Module
VDOT—Variable Displacement Orifice Tube
VIN—Vehicle Identification Number
VR—Voltage Regulator
V-ref—ECM Reference Group
VRV—Vacuum Reducer Valve
VSS—Vehicle Speed Sensor
V6—Six Cylinder "V" Engine
w/—With
w/b—Wheel Base
w/o—Without
WOT—Wide Open Throttle
WU-OC—Warmup Oxidation Catalytic Converter
WU-TWC—Warmup Three Way Catalytic Converter

OPTION AND PROCESS CODES

AE7 Seating: 40/60 Split Front Bench
AG9 Seat Adjuster: Power, 6 Way
AJ1 Window: Deep Tint, All Except Windshield and Door Glass
AJ3 Restraint System: Front Seat, Inflatable, Driver
AK9 Restraint System: Rear Seat, Shoulder
AM7 Seat: Rear Folding Bench
AS3 Rear Seat: Suburban
ATZ Rear Seat: Delete
AT5 Rear Seat: Center, Folding
AU0 Lock Control, Remote Entry
AU3 Lock: Side Door, Electric
AU6 Lock: Tailgate, Elect. Release
A20 Window: Rear Quarter Vent, Swing Out
A28 Window: Rear Full Width, Sliding
A31 Window: Side, Power
A50 Seat: Front Bucket
A52 Seat: Front Folding Bench
A95 Front Bucket Seats, High Back and Reclining
BG9 Covering: Floor, Rubber
BVE Steps, Side, Running Board
BYP Sales: Sport Equipment Package
BZY Liner, Pickup Box
B3J Diesel Equipment
B32 Floor Mats: Front Removable, Color Keyed
B33 Floor Mats: Rear Removable, Color Keyed
B37 Covering: Floor Mats, Frt. & Rear, Aux
B71 Moldings: Wheel Opening, Colored
B85 Moldings: Bright Body Side
B96 Moldings: Chrome Wheel Opening
C25 Wiper System: Rear Window
C3F 7700 Lbs. GVW Rating
C36 Heater: Auxiliary

C49 Defogger: Rear Window, Electric
C5B 15,000 Lbs. GVW Rating
C5I 8050 Lbs. GVW Rating
C5M 6100 Lbs. GVW Rating
C5P 6250 Lbs. GVW Rating
C5Q 6300 Lbs. GVW Rating
C5S 6600 Lbs. GVW Rating
C5U 6800 Lbs. GVW Rating
C5Z 7200 Lbs. GVW Rating
C6P 8600 Lbs. GVW Rating
C6U 9000 Lbs. GVW Rating
C6W 9200 Lbs. GVW Rating
C6Y 9600 Lbs. GVW Rating
C60 Air Conditioning: Front, Manual
C69 Air Conditioning: Rear, Roof Mounted
C7A 10,000 Lbs. GVW Rating
C7E 11,000 Lbs. GVW Rating
C7I 6450 Lbs. GVW Rating
C7L 12,000 Lbs. GVW Rating
C95 Roof Lamp: Courtesy, Dual Reading
DD7 Mirror, Inside Rearview, Light Sensitive, Compass
DE2 Mirror, Outside Rearview, Left and Right, Folding
DF2 Mirrors Exterior: Camper Type, Stainless Steel
DG5 Mirrors Exterior: West Coast Type, Stainless Steel
DK6 Console: Instrument, Roof
DR1 Mirrors, Exterior: LH & RH Man. Cont., Painted
D44 Mirrors, Exterior: Black
D45 Mirrors, Exterior: Bright
D48 Mirrors, Exterior: Electric, Painted
D55 Console: Frt. Comp., Floor

E55	Endgate	NA1	Emission System (Less than 8500 Lbs.)
E62	Pickup Box: Sportside/Stepside	NA4	Emission System (Above 8500 Lbs.)
E63	Pickup Box: Fleetside	NA5	Emission System: Federal, Tier 0
FE9	Certification, Emission, Federal	NB2	Emission System: California, Tier 0
FF4	Torsion Bar Spring Adjust Arm, Left	NB6	Emission System: California, Tier 1
FF5	Torsion Bar Spring Adjust Arm, Right	ND3	Vehicle Label: Emission Control
FF6	Torsion Bar Spring Adjust Arm, Left	NK7	Fuel Tank, 117 L, 31 Gal.
FF7	Torsion Bar Spring Adjust Arm, Right	NM8	Emission System: Leadged Fuel
FF8	Torsion Bar Spring Adjust Arm, Left	NP5	Steering Wheel, Leather Wrapped
FF9	Torsion Bar Spring Adjust Arm, Right	NRQ	Exhaust: Close Coupled
FK2	Torsion Bar Spring Adjust Arm, Left	NY1	Shield: Fuel Tank Steel
FK3	Torsion Bar Spring Adjust Arm, Right	NZZ	Skid Plate: Off Road
FWI	Plant Code: Fort Wayne, IN	N33	Steering Column: Tilt
F44	Chassis Equipment, Heavy Duty	N83	Wheels: 15 X 7, Chrome, Styled
F51	Shock Absorbers: Front & Rear, Heavy Duty	N90	Wheels: Aluminum, Cast
F60	Springs, Front: Heavy Duty	OSG	Plant Code: Oshawa, ONT, GM of Canada
F61	Rear Stabilizer Shaft	PF4	Wheel: 16 x 7, Aluminum, Forged
GK9	Axle: Rear, 4.63 Ratio	P01	Wheel Trim: Wheel Covers
GMC	Plant Code: Pontiac, MI	P06	Wheel Trim: Trim Rings
GQ1	Axle: Rear, Standard Ratio	P13	Carrier, Spare Wheel, Side Mounted
GTY	Rear Axle, Wide Track	P18	Carrier, Spare Tire with Hoist
GT4	Axle: Rear, 3.73 Ratio	QBN	Tire: All, LT245/75R16/C BW R/PE ST TBL OOR
GT5	Axle: Rear, 4.10 Ratio	QBX	Tire: All, LT245/75R16/C WOL R/PE ST TBL OOR
GU4	Axle: Rear, 3.08 Ratio	QHA	Tire: All, P235/75R15/X BW R/PE ST TL ALS
GU6	Axle: Rear, 3.42 Ratio	QHB	Tire: All, P235/75R15/X WS2 R/PE ST TL ALS
G50	Spring: Rear, Heavy Duty, Variation 1	QHP	Tire: All, LT225/75R16/D BW R/PE ST TL ALS
G80	Axle, Rear: Limited Slip Differential	QHR	Tire: All, LT225/75R16/D BW R/PE ST TL OOR
HC4	Axle: Rear, 4.56 Ratio	QIT	Tire: All, LT245/75R16/C BL R/PE ST TL ALS
HC7	Axle: Rear, 5.13 Ratio	QIW	Tire: All, LT245/75R16/E BL R/PE ST TL OOR
JAN	Plant Code: Janesville, WI.	QIX	Tire: All, LT265/75R16/C BL R/PE ST TL OOR
JB5	Power Brake, Disc/Drum, 6400 Lbs.	QIY	Tire: All, LT265/75R16/C WOL R/PE ST TL OOR
JB6	Power Brakes, Disc/Drum, 7200 Lbs.	QIZ	Tire: All, LT245/75R16/E BL R/PE ST TL OOR
JB7	Power Brakes, Disc/Drum, 8400 Lbs.	QJV	Tire: All, LT225/75R16/C BL R/PE ST TL ALS
JB8	Power Brakes, Disc/Drum, 10,000 Lbs.	Q4B	6200 Lbs. GVW Rating
JD5	Dual Power Brakes, Disc/Drum, 6400 Lbs.	R04	Wheels, Rear: Single
JD6	Hydraulic Power Brakes, Disc/Drum, 7200 Lbs.	R05	Wheels, Rear: Dual
JD7	Hydraulic Power Brakes, Disc/Drum, 8400 Lbs.	TP2	Battery: Auxiliary, Camper
JF9	Hydraulic Power Brakes, 4 Wheel Discs	TR9	Lighting, Auxiliary
KC4	Cooling System: Engine Oil	TS6	Lamp: Stop, High Level
KC5	Receptacle, Electrical Accessory	T61	Daytime Running Lights
KL5	Conversion: Natural Gas	UD4	Speed Alarm: 120 km/hr.
KNP	Cooling System, Transmission, HD	UF2	Lamp: Cargo Area
K05	Heater: Engine Coolant	UK1	Frequencies: Japanese Radio
KXB	Generator, Dual, 100 Amp	UL0	Radio Equipment: AM/FM Stereo, Seek/Scan, Auto Reverse Music Search Cassette, Auto Tone, Clock, ETR
K34	Cruise Control: Electric	UL2	Frequencies: European Radio
K60	Generator: 100 Ampere	UL5	Radio: Delete
K68	Generator: 105 Ampere	UM6	Radio Equipment: ETR AM/FM Stereo Cassette, Clock w/Seek & Scan
LB4	Engine: 4.3 Liter V6, TBI	UM7	Radio Equipment: ETR AM/FM Stereo, Clock w/Seek & Scan
L03	Engine: 5.0 Liter V8, TBI	UN0	Radio Equipment: AM/FM Stereo, Seek/Scan, Compact Disc, Auto Tone, Clock, ETR
L05	Engine: 5.7 Liter V8, TBI	UP0	Radio Equipment: AM/FM Stereo, Seek/Scan, Auto Reverse, Music Search Cassette, Compact Disc, Auto Tone, Clock, ETR
L19	Engine: 7.4 Liter V8, TBI	UQ3	Speaker System, Performance, Enhance Audio
L49	Engine: 6.5 Liter V8, Diesel	UQ5	Speaker System, Four, Dual Front Door Mounted
L56	Engine: 6.5 Liter V8, Turbo Diesel	UY1	Camper Wiring Harness
L65	Engine: 6.5 Liter V8, Turbo Diesel, HO		
MG5	Transmission: 5-Speed Manual, Getrag, 84 mm		
MM5	Transmission: Manual, 5-Speed w/Overdrive		
MT1	Transmission: Hydra-Matic 4L80-E, 4-Speed Automatic		
MT8	Transmission: New Venture Gear 4500, 5-Speed Manual		
MW3	Transmission: New Venture Gear 3500, 5-Speed Manual		
MXO	Transmission: Automatic w/Overdrive		
M30	Transmission: Hydra-Matic 4L60-E, 4-Speed Automatic		

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UY7	Harness, Wiring: Trailer, 7 Wire	YBX	Tire: Rear, LT245/75R16/C WOL R/PE ST TBL OOR
U01	Lamps, Roof Marker	YCN	Tire: Rear, P275/60R15 BW R/PE ST TL AL3 107H
U18	Speedometer (Kilo.)	YD3	Axle: Base Equipment
VB3	Bumper: Chromed Rear Step	YD6	Spring: Rear, Base Equipment
VG3	Bumper: Deluxe Front Bumper	YE9	Convenience Pkg., Comfort & Decor Level #3, CL/SLE
VK3	Bracket, License Plate: Front	YFL	Tire: Rear, P235/75R15/N BW R/PE ST TL ALS 105S
VR4	Trailer Equipment: Weight Distributing Platform Hitch	YFM	Tire: Rear, P235/75R15/N XNW R/PE ST TL ALS
VR6	Hook, Tie Down	YFN	Tire: Rear, P235/75R15/N RWL R/PE ST TL ALS
VXS	Vehicle, Complete	YF2	Sales Pkg., Ambulance Upfitter
VXT	Vehicle, Incomplete	YF5	Certification, Emission, California
VYU	Provisions, Snow Plow Prep	YF7	Sales Pkg., RV Upfitter
V08	Cooling System: Heavy Duty	YGA	Tire: Rear, P245/75R16 BW R/PE ST TL AT 109S
V10	Cold Climate Package	YGB	Tire: Rear, P245/75R16 WOL R/PE ST TL AT 109S
V22	Appearance: Deluxe Front	YGK	Tire: Rear, LT245/75R16/E BL R/PE ST OOR
V27	Bumper Guards, Front	YGL	Tire: Rear, LT265/75R16/C BL R/PE ST OOR
V43	Bumper: Painted Rear Step	YGM	Tire: Rear, LT265/75R16/C WOL R/PE ST OOR
V54	Luggage Carrier: Roof, Painted	YHA	Tire: Rear, P235/75R15 XL ST ALS BL
V76	Tow Hook: Front	YHB	Tire: Rear, P235/75R15/X XNW R/PE ST TL ALS
XBK	Tire: Front, LT245/75R16/C BL R/PE ST TBL ALS	YHE	Tire: Rear, LT225/75R16/C BL R/PE ST ALS
XBN	Tire: Front, LT245/75R16/C BL R/PE ST TBL OOR	YHH	Tire: Rear, LT245/75R16/E BL R/PE ST ALS
XBX	Tire: Front, LT245/75R16/C BL R/PE ST TBL OOR	YHJ	Tire: Rear, LT225/75R16/C BL R/PE ST OOR
XCN	Tire: Front, P275/60R15 BW R/PE ST TL AL3 107H	YHN	Tire: Rear, LT225/75R16/D BL R/PE ST TL ALS
XFL	Tire: Front, P235/75R15/N BW R/PE ST TL ALS 105S	YHP	Tire: Rear, LT225/75R16/D BL R/PE ST TL ALS
XFM	Tire: Front, P235/75R15/N XNW R/PE ST TL ALS	YHR	Tire: Rear, LT225/75R16/D BL R/PE ST TL OOR
XFN	Tire: Front, P235/75R15/N RWL R/PE ST TL ALS	YTN	Tire: Rear, 225/70R19.5/F BW R/ST ST TL HWY
XGA	Tire: Front, P245/75R16 BW R/PE ST AL AT 109S	YYK	Tire: Rear, LT215/85R16/D BL R/PE ST TL HWY
XGB	Tire: Front, P245/75R16 WOL R/PE ST AL AT 109S	YYL	Tire: Rear, LT215/85R16/D BL R/PE ST TL OOR
XGK	Tire: Front, LT245/75R16/E BL R/PE ST OOR	ZBK	Tire: Spare, LT245/75R16/C BL R/PE ST TBL OOR
XGL	Tire: Front, LT265/75R16/C BL R/PE ST OOR	ZBN	Tire: Spare, LT245/75R16/C BL R/PE ST TBL OOR
XGM	Tire: Front, LT265/75R16/C WOL R/PE ST OOR	ZBX	Tire: Spare, LT245/75R16/C WOL R/PE ST TBL OOR
XHA	Tire: Front, P235/75R15/X BW R/PE ST TL ALS	ZCN	Tire: Spare, P275/60R15 BW R/PE ST TL AL3 107H
XHB	Tire: Front, P235/75R15/X XNW R/PE ST TL ALS	ZFL	Tire: Spare, P235/75R15/BW R/PE ST TL ALS 105S
XHE	Tire: Front, LT225/75R16/C BL R/PE ST ALS	ZFM	Tire: Spare, P235/75R15/N XNW R/PE ST TL ALS
XHH	Tire: Front, LT245/75R16/E BL R/PE ST ALS	ZFN	Tire: Spare, P235/75R15/N XNW R/PE ST TL ALS
XHJ	Tire: Front, LT225/75R16/C BL R/PE ST OOR	ZGA	Tire: Spare, P245/75R16 BW R/PE ST TL AT 109S
XHN	Tire: Front, LT225/75R16/C WOL R/PE ST OOR	ZGB	Tire: Spare, P245/75R16 WOL R/PE ST TL AT 109S
XHP	Tire: Front, LT225/75R16/D BL R/PE ST TL ALS	ZGK	Tire: Rear, LT245/75R16/E BL R/PE ST OOR
XHR	Tire: Front, LT225/75R16/D BL R/PE ST TL OOR	ZGL	Tire: Spare, LT265/75R16/E BL R/PE ST OOR
XTN	Tire: Front, 225/70R19.5/F BW R/ST TL HWY	ZGM	Tire: Spare, LT265/75R16/E BL R/PE ST OOR
XYK	Tire: Front, LT215/85R16/D BL R/PE ST TL HWY	ZHA	Tire: Spare, P235/75R15/X BW R/PE ST TL ALS
XYL	Tire: Front, LT215/85R16/D BL R/PE ST TL OOR		
X88	Conversion: Nameplate, Chevrolet		
YA9	Axle: Front, 3,400 Lbs.		
YBK	Tire: Rear, LT245/75R16/C BL R/PE ST TBL ALS		
YBN	Tire: Rear, LT245/75R16/C BL R/PE ST TBL OOR		

ZHB	Tire: Spare, P235/75R15/X XNW R/PE ST ALS	39A	Stripe Color Accent: Two-Tone, Light Teal Metallic/Silver
ZHE	Tire: Spare, LT225/75R16/C BL R/PE ST ALS	39L	Secondary Color: Exterior, Indigo Metallic
ZHH	Tire: Spare, LT245/75R16/E BL R/PE ST ALS	39U	Primary Color: Exterior, Indigo Metallic
ZHJ	Tire: Spare, LT225/75R16/C BL R/PE ST OOR	41L	Secondary Color: Exterior, Black
ZHN	Tire: Spare, LT225/75R16/C WOL R/PE ST OOR	41U	Primary Color: Exterior, Black
ZHP	Tire: Spare, LT225/75R16/D BL R/PE ST TL ALS	43U	Primary Color: Exterior, Emerald Green
ZHR	Tire: Spare, LT225/75R16/D BL R/PE ST TL OOR	46U	Primary Color: Exterior, Dark Green
ZP6	Sales Pkg., Combination, Rear Wiper, Rear Window Defogger	50L	Secondary Color: Exterior, Olympic White
ZQ2	Sales Pkg., Drivers Convenience, #1	50U	Primary Color: Exterior, Olympic White
ZQ3	Sales Pkg., Drivers Convenience, #2	51A	Stripe: Color Accent, Two Tone, Gray/Silver
ZQ8	Chassis Package: Sport	55L	Secondary Color: Exterior, Light Autumnwood Metallic
ZTN	Tire: Spare, P225/70R19.5/F BW R/ST ST TL HWY	55U	Primary Color: Exterior, Light Autumnwood Metallic
ZW9	Body Equipment: Base Body or Chassis	56L	Secondary Color: Exterior, Dark Autumnwood Metallic
ZYK	Tire: Spare, LT215/85R16/D BL R/PE ST TL AT 109S HWY	56U	Primary Color: Exterior, Dark Autumnwood Metallic
ZYL	Tire: Spare, LT215/85R16/D BL R/PE ST TL AT 109S OOR	6Y4	Wheel and Tire: Spare, Delete
ZY1	Color Combination: Solid	60A	Stripe: Color Accent, Two Tone, Beige/Black
ZY2	Color Combination: Two-Tone	61U	Primary Color: Exterior, Tan
ZY4	Color Combination: Deluxe Two-Tone	64C	Trim Combination: Cloth, Light Beige
Z49	Equipment, Export, Canadian Mandatory	64D	Trim Combination: Cloth, Light Beige
Z71	Chassis Package: Off-Road	64I	Interior Trim, Light Beige
Z81	Chassis: Basic Camper Equipment	64V	Trim Combination: Vinyl, Light Beige
Z82	Trailer Equipment: Heavy Duty	642	Trim Combination: Leather, Light Beige
01L	Secondary Color: Exterior, Special	65A	Stripe: Color Accent, Two Tone, Beige Metallic/Dark Autumnwood Metallic
01U	Primary Color: Exterior, Special	71A	Stripe: Color Accent, Two Tone, Silver/Red
12U	Primary Color: Exterior, Yellow White	71U	Primary Color: Exterior, Red Orange
13C	Trim Combination: Cloth, Light Gray	72U	Primary Color: Exterior, Standard Red
13D	Trim Combination: Cloth, Light Gray	74L	Secondary Color: Exterior, Victory Red
13I	Interior Trim: Light Smoke Gray	74U	Primary Color: Exterior, Victory Red
13V	Trim Combination: Vinyl, Light Gray	76L	Secondary Color: Exterior, Dk Garnet Red Met
132	Trim Combination: Leather, Light Gray	76U	Primary Color: Exterior, Dk Garnet Red Met
19U	Primary Color: Exterior, Lamp Black	79C	Trim Combination, Cloth, Ruby Red
20L	Secondary Color: Exterior, Lt. Quasar Blue Metallic	79D	Trim Combination, Cloth, Ruby Red
20U	Primary Color: Exterior, Lt. Quasar Blue Metallic	79I	Interior Trim, Ruby Red
23U	Primary Color: Exterior, Ocean Blue	79V	Trim Combination, Vinyl, Ruby Red
24U	Primary Color: Exterior, Medium Blue Metallic	792	Trim Combination, Leather, Ruby Red
26A	Stripe: Color Accent, Two Tone, Blue/Silver	8E6	Bumper: Rear Painted
26C	Trim Combination: Cloth, Navy	80A	Stripe: Color Accent, Two Tone, Gunmetal/Red
26D	Trim Combination: Cloth, Navy	84L	Secondary Color: Exterior, Dark Hunt Club Red Metallic
26I	Interior Trim, Navy	84U	Primary Color: Exterior, Dark Hunt Club Red Metallic
26V	Trim Combination: Vinyl, Navy	90U	Primary Color: Exterior, Gray Metallic
262	Trim Combination: Leather, Navy	91L	Secondary Color: Exterior, Dark Argent
27A	Stripe Color Accent: Two-Tone, Light Atlantic Blue/Indigo	93A	Stripe: Color Accent, Two Tone, Gold/Red
29U	Primary Color: Exterior, Dark Blue	96L	Secondary Color: Exterior, Ultra Silver Metallic
30L	Secondary Color: Exterior, Atlantic Blue Metallic	96U	Primary Color: Exterior, Ultra Silver Metallic
30U	Primary Color: Exterior, Atlantic Blue Metallic		

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NOTES

SECTION 0B

MAINTENANCE AND LUBRICATION

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SCHEDULED MAINTENANCE SERVICES

NORMAL VEHICLE USE

The maintenance instructions contained in the Maintenance Schedule are based on the assumption that the vehicle will be used as designed:

- To carry passengers and cargo within the limitation indicated on the vehicle certification label located on the edge of the driver's door.
- On reasonable road surfaces within legal operating limits.
- On unleaded gasoline.

MAINTENANCE SCHEDULE I

Follow Maintenance Schedule I if the vehicle is operated under one or more of the following conditions:

- When most trips are less than 6 km (4 miles).
- Operating when outside temperatures remain below freezing and when most trips are less than 16 km (10 miles).
- When most trips include extended idling and/or frequent low-speed operation as in stop-and-go traffic.
- Towing a trailer.
- Operating in dusty areas.

Maintenance Schedule I should also be followed if the vehicle is used in delivery service or other commercial applications.

MAINTENANCE SCHEDULE II

Follow Maintenance Schedule II only if none of the driving conditions specified in Maintenance Schedule I apply.

EXPLANATION OF SCHEDULED MAINTENANCE SERVICES

Refer to figures 1 through 6 for the schedules of time and/or mileage intervals. The following text gives the details of the required maintenance services.

ENGINE OIL AND ENGINE OIL FILTER CHANGE



Important

Always use "SG or SH" quality Energy Conserving II oils of proper viscosity.

The "SH" designation may be shown alone or in combination with other designations such as SH/CC, SH/CD, SF, SG, CC, etc.

OIL FILTER



Important

To prevent leakage of all oil filters such as PF-1218, PF-52, etc., it is very important that the installation instructions listed below are closely followed.

Remove the old filter by turning counterclockwise. 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 torqued.

Figure 1—Maintenance Schedule I - Gasoline Engines with Light Duty Emissions

Item No.	If your driving conditions meet those specified in "Scheduled Maintenance Services" in this Section (or see index), use Maintenance Schedule I (+)																					
	Service	Miles (000)	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
		Kilometers (000)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
1	Engine Oil Change*—Every 3 Months, or	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	Oil Filter Change*—Every 3 Months, or	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	Chassis Lubrication—Every 12 Months, or	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3	Clutch Fork Ball Stud Lubrication (5-speed manual transmission with RPO MW3 only)										+											+
5	Cooling System Service *—Every 24 Months or										+											+
6	Air Cleaner Filter Replacement*\$										+											+
7	Front Wheel Bearing Repack						+				+					+						+
8	Transmission Service **																					
10	Fuel Filter Replacement*\$										+											+
11	Spark Plugs Replacement*										+											+
12	Spark Plug Wire Inspection*																					+
15	Engine Timing Check*\$																					+
16	Fuel Tank, Cap and Lines Inspection *\$																					+
18	Engine Accessory Drive (Serpentine) Belt Inspection*																					+
24	Tire and Wheel Rotation**		+						+				+						+			
25	Drive Axle Service**	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
26	Brake Systems Inspection**																					

* An Emission Control Service

** See "Explanation of Scheduled Maintenance Services" in the index

\$ 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. General Motors, however, urges that all recommended maintenance services be performed at the indicated intervals and the maintenance be recorded.

T0401/T0901

THE SERVICES SHOWN ON THIS CHART UP TO 60,000 MILES (100 000 km) ARE TO BE DONE AFTER 60,000 MILES AT THE SAME INTERVALS.

T0402/T0902

Item No.	If your driving conditions meet those specified in "Scheduled Maintenance Services" in this Section (or see Index), use Maintenance Schedule I (+)									
	Service	Miles (000)	7.5	15	22.5	30	37.5	45	52.5	60
		Kilometers (000)	12.5	25	37.5	50	62.5	75	87.5	100
1	Engine Oil Change*—Every 12 Months, or		•	•	•	•	•	•	•	•
	Oil Filter Change*—Every 12 Months, or		•	•	•	•	•	•	•	•
2	Chassis Lubrication—Every 12 Months, or		•	•	•	•	•	•	•	•
3	Clutch Fork Bell Stud Lubrication					•				•
5	Cooling System Service*—Every 24 Months or					•				•
6	Air Cleaner Filter Replacement*					•				•
7	Front Wheel Bearing Repack					•				•
8	Transmission Service **									
10	Fuel Filter Replacement*\$									•
11	Spark Plugs Replacement*					•				•
12	Spark Plug Wire Inspection*									•
15	Engine Timing Check*\$									•
16	Fuel Tank, Cap and Lines Inspection*\$									•
18	Engine Accessory Drive (Serpentine) Belt Inspection*									•
24	Tire and Wheel Rotation**		•		•		•		•	
25	Drive Axle Service**		•	•	•	•	•	•	•	•
26	Brake Systems Inspection**									

* An Emission Control Service

** See "Explanation of Scheduled Maintenance Services" in the Index

\$ 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. General Motors, however, urges that all recommended maintenance services be performed at the indicated intervals and the maintenance be recorded.

THE SERVICES SHOWN ON THIS CHART UP TO 60,000 MILES (100 000 km) ARE TO BE DONE AFTER 60,000 MILES AT THE SAME INTERVALS.

T0403/T0903

3100S2424

Figure 2—Maintenance Schedule II - Gasoline Engines with Light Duty Emissions

Figure 3—Maintenance Schedule I - Gasoline Engines with Heavy Duty Emissions

Item No.	If your driving conditions meet those specified in "Scheduled Maintenance Services" in this Section (or see Index), use Maintenance Schedule 1 (+)																					
	Service	Miles (000)	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
		Kilometers (000)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
1	Engine Oil Change* - Every 3 Months, or	+	+	+	+	+	+															
	Oil Filter Change* - Every 3 Months, or	+	+	+	+	+	+															
2	Chassis Lubrication - Every 12 Months, or	+	+	+	+	+	+															
3	Clutch Fork Ball Stud Lubrication							+														+
5	Cooling System Service* - Every 24 Months or									+								+				
6	Air Cleaner Filter Replacement									+								+				
7	Front Wheel Bearing Repack						+			+				+				+				
8	Transmission Service**																					
10	Fuel Filter Replacement*						+			+				+				+				+
11	Spark Plugs Replacement*										+									+		
12	Spark Plug Wire Inspection*																					+
13	EGR System Inspection*																					+
14	Electronic Vacuum Regulator Valve (EVRV) Inspection*																					+
15	Engine Timing Check ▲ *									+								+				
16	Fuel Tank, Cap and Lines Inspection*																					+
17	Thermostatically Controlled Air Cleaner Inspection ▲ *									+								+				
18	Engine Accessory Drive (Serpentine) Belt Inspection*						+			+				+				+				+
19	Evaporative Control System Inspection*																					+
20	Shields and Underhood Insulation Inspection ▲ ■						+			+				+				+				+
21	Air Intake System Inspection ▲ ■									+								+				
22	Thermostatically Controlled Engine Cooling Fan Check ▲ ■ - Every 12 Months or						+			+				+				+				+
24	Tire and Wheel Rotation**			+						+				+					+			
25	Drive Axle Service**		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
26	Brake Systems Inspection**																					

* An Emission Control Service

** See "Explanation of Scheduled Maintenance Services" in this section.

▲ Also a Noise Emission Control Service

■ Applicable only to vehicles sold in the United States

TD404

THE SERVICES SHOWN ON THIS CHART UP TO 60,000 MILES (100,000 km) ARE TO BE DONE AFTER 60,000 MILES AT THE SAME INTERVALS.
T0405

Figure 4—Maintenance Schedule II - Gasoline Engines with Heavy Duty Emissions

Item No.	Service	If your driving conditions meet those specified in "Scheduled Maintenance Services" in this Section (or see Index), use Maintenance Schedule 1 (+)																							
		Miles (000)	3	6	9	12	15	18		21	24	27	30	33	36	39	42	45	48	51	54	57	60		
		Kilometers (000)	5	10	15	20	25	30		35	40	45	50	55	60	65	70	75	80	85	90	95	100		
1	Engine Oil Change* - Every 12 Months, or			•		•		•			•		•		•		•		•		•		•		
	Oil Filter Change* - Every 12 Months, or			•		•		•			•		•		•		•		•		•		•		
2	Chassis Lubrication - Every 12 Months, or			•		•		•			•		•		•		•		•		•		•		
3	Clutch Fork Ball Stud Lubrication												•											•	
5	Cooling System Service* - Every 24 Months or										•								•						
6	Air Cleaner Filter Replacement										•								•						
7	Front Wheel Bearing Repack										•								•						
8	Transmission Service**																								
10	Fuel Filter Replacement*										•								•						
11	Spark Plugs Replacement*												•											•	
12	Spark Plug Wire Inspection*																							•	
13	EGR System Inspection*																							•	
14	Electronic Vacuum Regulator Valve (EVRV) Inspection*																							•	
15	Engine Timing Check ▲*										•								•						•
16	Fuel Tank, Cap and Lines Inspection*																								•
17	Thermostatically Controlled Air Cleaner Inspection ▲*										•								•						
18	Engine Accessory Drive (Serpentine) Belt Inspection*						•				•				•				•					•	
19	Evaporative Control System Inspection*																							•	
20	Shields and Underhood Insulation Inspection ▲■						•				•				•				•					•	
21	Air Intake System Inspection ▲■										•								•						
22	Thermostatically Controlled Engine Cooling Fan Check ▲■ - Every 12 Months or						•				•				•				•					•	
24	Tire and Wheel Rotation**			•				•					•				•					•			
25	Drive Axle Service**			•			•				•				•			•				•			
26	Brake Systems Inspection**																								

* An Emission Control Service

** See "Explanation of Scheduled Maintenance Services" in this section.

▲ Also a Noise Emission Control Service

■ Applicable only to vehicles sold in the United States

T0406

THE SERVICES SHOWN ON THIS CHART UP TO 60,000 MILES (100,000 km) ARE TO BE DONE AFTER 60,000 MILES AT THE SAME INTERVALS.
T0407

Item No.	If your driving conditions meet those specified in "Scheduled Maintenance Services" in this section, use Maintenance Schedule I (+).																									
	Service	Miles (000)	2.5	5	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	37.5	40	42.5	45	47.5	50	52.5	55	57.5	60
		Kilometers (000)	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84	88	92	100
1	Engine Oil Change*—Every 3 Months, or		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	Oil Filter Change*—Every 3 Months, or		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	Chassis Lubrication—Every 12 Months, or		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3	Clutch Fork Ball Stud Lubrication												+													+
4	Engine Idle Speed Adjustment*			+									+													+
5	Cooling System Service *—Every 24 Months or												+													+
6	Air Cleaner Filter Replacement*★																									
7	Front Wheel Bearing Repack								+					+						+						+
8	Transmission Service**																									
9	CDRV System Inspection*																									+
10	Fuel Filter Replacement*												+													+
13	EGR System Inspection*																									+
18	Engine Accessory Drive (Serpentine) Belt Inspection*																									+
20	Shields and Underhood Insulation Inspection▲■					+				+			+				+			+						+
21	Air Intake System Inspection▲■					+				+			+				+			+						+
22	Thermostatically Controlled Engine Cooling Fan Check▲■—Every 12 Months or					+				+			+				+			+						+
23	Exhaust Pressure Regulator Valve Inspection*																									+
24	Tire and Wheel Rotation**				+											+							+			
25	Drive Axle Service**			+		+			+		+		+		+		+		+		+		+		+	+
26	Brake Systems Inspection**																									

★ Change filter every 15,000 miles (24 000 km), except when operating in dusty conditions. Dusty conditions may require more frequent filter replacement. Extreme dust and dirt operating conditions (off-road), may require the air filter to be checked as often as every 300 miles (483 km) and replaced as necessary.

* An Emission Control Service

** See "Explanation of Scheduled Maintenance Services" in this section.

▲ Also a Noise Emission Control Service

■ Applicable only to trucks sold in the United States

T0408/T0908

THE SERVICES SHOWN ON THIS CHART UP TO 60,000 MILES (100 000 km) ARE TO BE DONE AFTER 60,000 MILES AT THE SAME INTERVALS.

T0409/T0909

Figure 5—Maintenance Schedule I - Diesel Engines

310015288

Figure 6—Maintenance Schedule II - Diesel Engines

Item No.	Service	If your driving conditions meet those specified in "Scheduled Maintenance Services" in this section, use Maintenance Schedule I (+).																									
		Miles (000)	2.5	5	7.5	10	12.5	15	17.5	20		22.5	25	27.5	30	32.5	35	37.5	40	42.5	45	47.5	50	52.5	55	57.5	60
		Kilometers (000)	4	8	12	16	20	24	28	32		36	40	44	48	52	56	60	64	68	72	76	80	84	88	92	100
1	Engine Oil Change*—Every 12 Months, or			•		•		•		•			•		•		•		•		•		•		•		•
	Oil Filter Change*—Every 12 Months, or			•		•		•		•			•		•		•		•		•		•		•		•
2	Chassis Lubrication—Every 12 Months, or			•		•		•		•			•		•		•		•		•		•		•		•
3	Clutch Fork Ball Stud Lubrication														•												•
4	Engine Idle Speed Adjustment*			•											•												•
5	Cooling System Service*—Every 24 Months or														•												•
6	Air Cleaner Filter Replacement*★														•												•
7	Front Wheel Bearing Repack														•												•
8	Transmission Service**																										
9	CDRV System Inspection*																										•
10	Fuel Filter Replacement*														•												•
13	EGR System Inspection*																										•
18	Engine Accessory Drive (Serpentine) Belt Inspection*																										•
20	Shields and Underhood Insulation Inspection▲■					•				•					•			•					•				•
21	Air Intake System Inspection▲■					•				•					•			•					•				•
22	Thermostatically Controlled Engine Cooling Fan Check▲■—Every 12 Months or					•				•					•			•					•				•
23	Exhaust Pressure Regulator Valve Inspection*																										•
24	Tire and Wheel Rotation**			•				•		•			•		•		•		•		•		•		•		•
25	Drive Axle Service**			•		•		•		•			•		•		•		•		•		•		•		•
26	Brake Systems Inspection**																										

* An Emission Control Service

** See "Explanation of Scheduled Maintenance Services" in this section.

▲ Also a Noise Emission Control Service (applicable to vehicles with engine VIN code Y).

■ Applicable only to trucks sold in the United States

T0410/T0910

THE SERVICES SHOWN ON THIS CHART UP TO 60,000 MILES (100 000 km) ARE TO BE DONE AFTER 60,000 MILES AT THE SAME INTERVALS.

T0411/T0911

310015289

OB-8 MAINTENANCE AND LUBRICATION

Lightly oil gasket with clean oil, and install filter. After the oil filter gasket contacts the oil filter mounting surface, tighten an additional 3/4 to 1 full turn. When necessary, use a cap-type wrench, strap-type wrench with handle, or equivalent to ensure proper installation.

With engine oil at the proper level, run the engine 3 minutes. Thoroughly check the filter area and drain plug 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.

NOTICE: *Using oils of any viscosity other than those viscosities 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.

OTHER REQUIRED SERVICES EACH TIME OIL IS CHANGED

1. **Automatic Transmission Fluid Level**--Maintain fluid level within operating range on the oil level indicator. Refer to "Approximate Fluid Capacities."
 2. **Manual Transmission Fluid Level**--Check fluid level and add as required. Refer to "Approximate Fluid Capacities."
 3. **Engine Coolant Level and Condition**--Check the coolant level in the coolant reservoir and add if necessary. If an overheating condition has occurred, check the coolant level in the radiator after the engine has cooled. Inspect the coolant and replace if it is dirty or rusty.
 4. **Brake Systems Inspection**--Inspect lines and hoses for proper hookup, binding, leaks, cracks, chafing, etc. For convenience, the following should be done when the wheels are removed for rotation: Inspect the disc brake pads for wear and rotors for surface condition. Inspect the drum brake linings for wear and cracks. Inspect other brake parts, including drums, wheel cylinders, parking brake, etc., at the same time. Check the parking brake adjustment. Inspect the brakes more often if habit or conditions result in frequent braking.
 5. **Tire Inflation Pressure Check**--Check the tires for proper inflation.
 6. **Drive Axle Service**--Check front/rear axle fluid level and add as needed. Check constant velocity joints and axle seals for leaking.
 - On vehicles with a locking differential--Drain fluid at first oil change and refill. Check fluid level and add as needed at subsequent oil changes. In dusty areas or trailer towing applications, drain fluid at every 24,135 km (15,000 miles) and refill.
 - On vehicles without a locking differential--Check fluid level and add as needed at every oil change. In dusty areas or trailer towing applications, drain fluid every 24,135 km (15,000 miles) and refill.
 - More frequent lubrication may be required for heavy-duty or off-road use.
 - On 3500 H.D. models with applications requiring extreme overload/trailer tow conditions and high speed conditions (above 72 km/h [45 mph] for extended periods of time)--Change lubrication every 4,828 km (3,000 miles) or 3 months, whichever comes first, or use 75W-140 synthetic lubrication.
7. **Windshield Washer Fluid Level**--Check the level in the reservoir and add if necessary.
 8. **Hood Latch Operation**--When opening the hood, note the operation of the secondary latch. It should keep the hood from opening all the way when the primary latch is released. Make sure the hood closes firmly.
 9. **Lamp Operation**--Check the operation of the license plate lamp, side marker lamps, headlamps and high beams, parking lamps, tail lamps, brake lamps, turn signals, backup lamps, and hazard warning flasher.
 10. **Power Steering System Reservoir Level**--Check and keep at proper level as described in SECTION 3B.
 11. **Brake Master Cylinder Reservoir Level**--Check the fluid as described in SECTION 5A and keep it at the proper level. A low fluid level can indicate a leak or worn disc pads that may need service.
 12. **Transfer Case (Four Wheel Drive) Inspection**--Every 12 months or at oil change intervals, check front axle and transfer case and add lubricant when necessary. Inspect shift mechanism. Check the vent hose at the transfer case for kinks and proper installation. More frequent lubrication may be required with heavy-duty or off-road use.

CHASSIS LUBRICATION

Lubricate the front suspension, ball joints, king pin bushings, steering linkage, parking brake cable guides, rear driveline center splines and front axle propshaft splines, brake pedal springs, and clutch pedal spring at the intervals specified (figures 7, 8, 9, and 10).

If you have a 3500 HD model, lubricate the king pins and bushings every 2,500 km (1,500 miles) for Schedule I, or every 5,000 km (3,000 miles) for Schedule II.

Ball joints and king pin bushings should not be lubricated unless their temperature is -12° C (10° F) or higher. During cold weather, the ball joint should be allowed to warm up as necessary before being lubricated. Use a low-pressure grease gun on all joints to prevent seal damage.

SERVICES TO BE PERFORMED AT LEAST TWICE A YEAR

1. **Weatherstrip Lubrication**--Apply a thin film of silicone grease using a clean cloth.
2. **Steering and Suspension Inspection**--Inspect the front and rear suspension and steering systems 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. Clean and inspect the front drive axle boot seals for damage, tears, or leakage and replace as necessary.

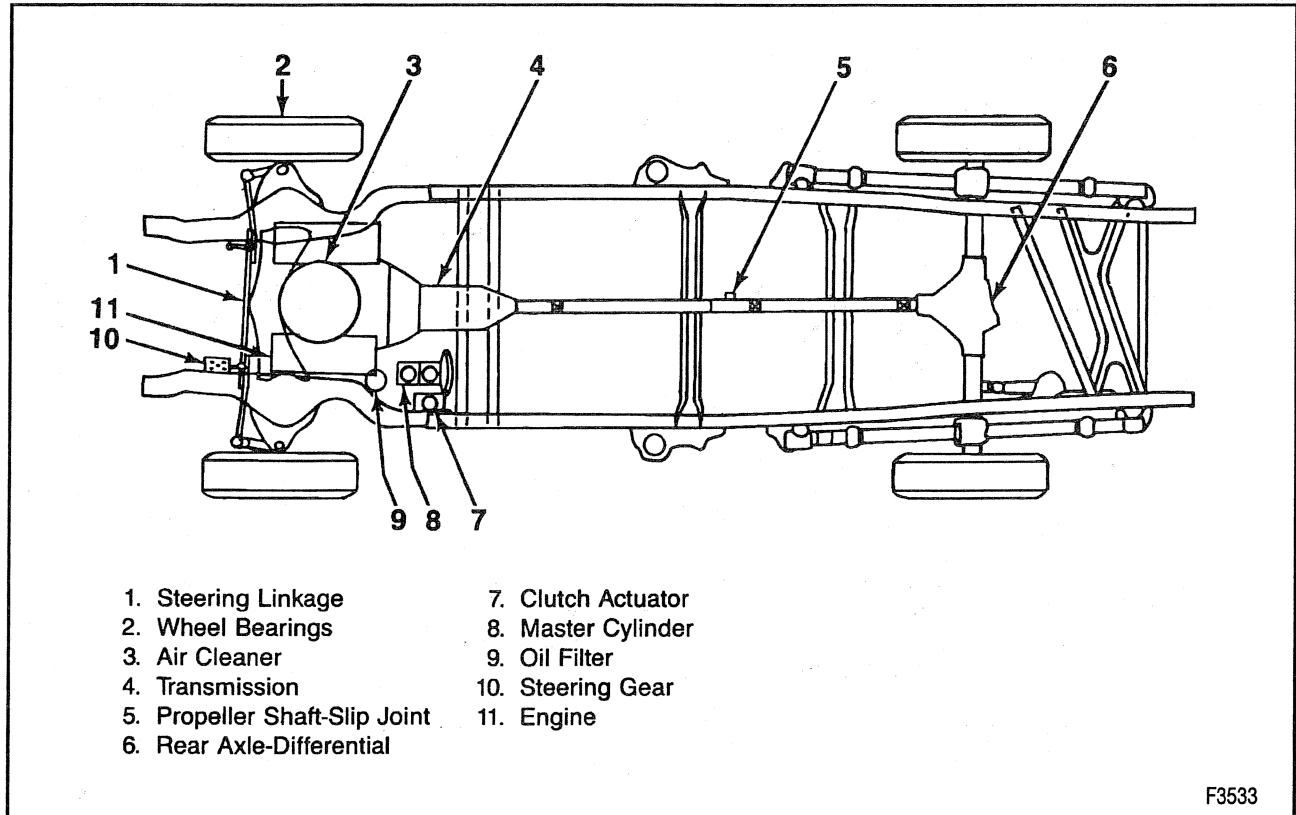


Figure 7—Lubrication Points (Two-Wheel Drive Models)

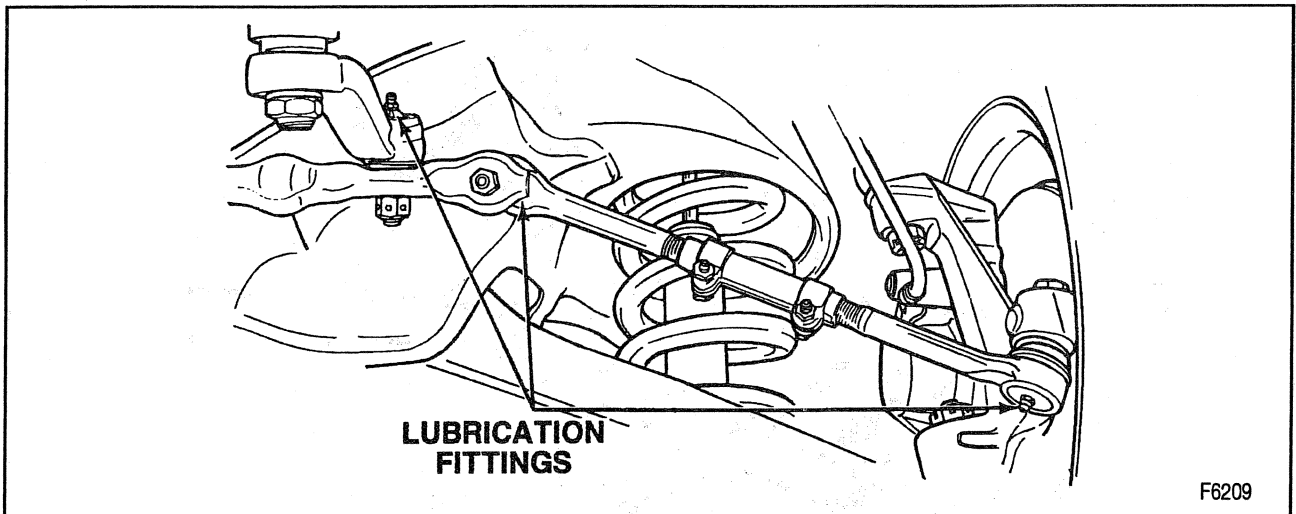


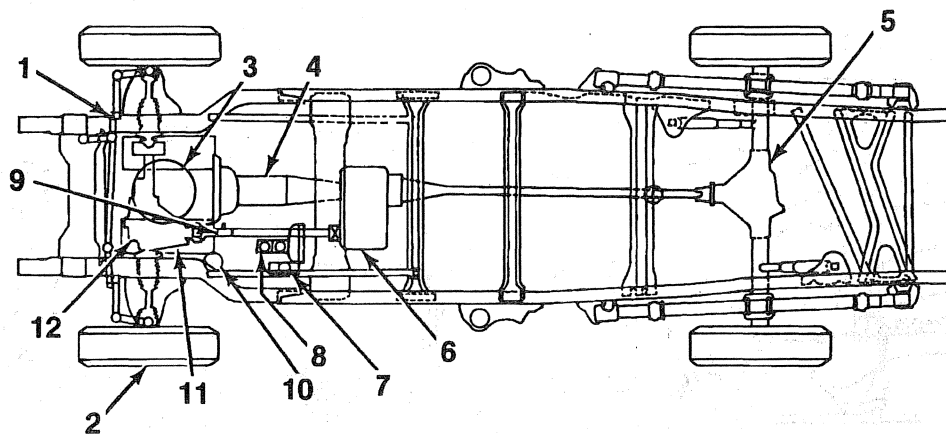
Figure 8—Lubrication Fittings (Driver Side)

3. Exhaust System Inspection--Inspect the complete system including the three-way catalytic converter. 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 buildup in the floor pan or let exhaust fumes seep into the passenger compartment.

4. Throttle Linkage Inspection--Lubricate all pivot points with engine oil, except the TBI throttle shaft. Do not oil any accelerator or cruise control cables. Replace any cables that have high effort or excessive wear.

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

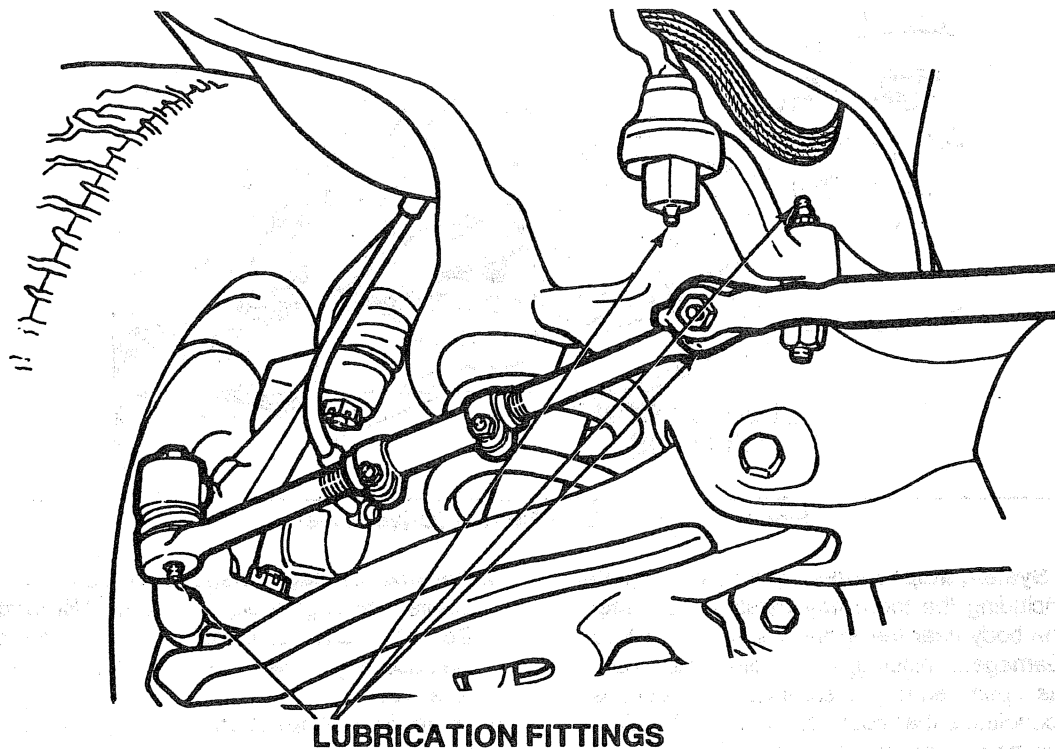
OB-10 MAINTENANCE AND LUBRICATION



- | | |
|-----------------------------|-------------------------------|
| 1. Steering Linkage | 8. Brake Master Cylinder |
| 2. Wheel Bearings | 9. Front Propeller Shaft |
| 3. Air Cleaner | 10. Oil Filter |
| 4. Transmission | 11. Engine |
| 5. Rear Axle - Differential | 12. Front Axle - Differential |
| 6. Transfer Case | |
| 7. Clutch Actuator | |

F3534

Figure 9—Lubrication Points (Four-Wheel Drive Models)



F6210

Figure 10—Lubrication Fittings (Passenger Side)

SERVICES TO BE PERFORMED AT LEAST ANNUALLY

1. **Parking Brake and Transmission "Park" Mechanism Operation**--Before checking the holding ability of the parking brake and automatic transmission "Park" mechanism, park on a fairly steep hill with enough room for movement in the downhill direction.
 - To check the parking brake: With the engine running and the transmission in "N" (Neutral), slowly remove foot pressure from the regular brake pedal. Do this until the vehicle is held by the parking brake only.
 - To check the "P" (Park) mechanism holding ability: Apply the regular brake and shift to "P" (Park). Release the manual parking brake, then slowly release the regular brake.

CAUTION: To reduce the risk of personal injury or property damage, be prepared to apply the regular brakes promptly if the vehicle begins to move.

2. **Transmission Neutral or Clutch Start Switch Operation**

- Before you start, make sure you have enough room around the vehicle.
- Firmly apply both the manual parking brake and the regular brake. Do not use the accelerator pedal.
- Be ready to turn off the engine immediately if it starts.
- On automatic transmission vehicles, try to start the engine in each gear. The starter should crank only in the "P" (Park) or "N" (Neutral) positions.
- On manual transmission vehicles, put the shift lever in "N" (Neutral), push the clutch down halfway, and try to start the engine. The starter should work only when the clutch is pushed down all the way to the floor.

CAUTION: Before performing the above transmission neutral starter switch check, make sure you have enough room around the vehicle. Then, firmly apply the parking brake and regular brakes. Do not use the accelerator pedal. If the engine starts, be ready to turn off the ignition promptly. Take these precautions because the vehicle could move without warning and possibly cause personal injury or property damage.

3. **Steering Column Lock Operation**--While parked, try to turn the key to "Lock" in each gear range.

- With an automatic transmission, the key should turn to "Lock" only when the gear shift is in "P" (Park).
- With a manual transmission, the key should turn to "Lock" only when the gear shift is in "R" (Reverse).

On vehicles with a key release button, try to turn the key to "Lock" without depressing 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."

4. **Lap and Shoulder Belt Condition and Operation**--Inspect the seatbelt system, including webbing, buckles, latch plates, retractor, guide loops, and anchors. Have a belt assembly replaced if the webbing has been cut or otherwise damaged.
5. **Seatback Recliner Operation (If Equipped)**--Make sure the recliner is holding by pushing and pulling on the top of the seat back while it is reclined.
6. **Spare Tire and Jack Storage**--Be alert to rattles in the rear of the vehicle. Make sure the spare tire, all jacking equipment, any tire inflator, and any covers or doors are securely stowed at all times. Oil the jack ratchet or screw mechanism after each use.
7. **Key Lock Service**--Lubricate all key lock cylinders.
8. **Body Lubrication Service**--Lubricate all body door hinges, including the endgate, and endgate handle pivot points. Lubricate 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.
9. **Cooling System Service**--Drain, flush, and refill the system with new coolant. 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 (if equipped). Wash the radiator neck. To ensure proper operation, pressure test the radiator and cap.
10. **Transfer Case Service**--Check the transfer case fluid level. Check the vent hose at the transfer case for kinks and proper installation. More frequent lubrication may be required in heavy or frequent trailer towing applications. A fluid loss may indicate a problem. Have it inspected and repaired at once.

CONTINUATION OF SCHEDULED MAINTENANCE SERVICES

1. **Tire and Wheel Inspection and Rotation**--For proper wear and maximum tire life, rotate tires at the first 10,000 km (6,000 miles) for Schedule I or 12,500 km (7,500 miles) for Schedule II and then every 25,000 km (15,000 miles) thereafter. Check the tires for uneven wear or damage. If irregular or premature wear exists, check the wheel alignment. Also, check for damaged wheels. For dual rear wheels, whenever the vehicle, wheels, or fasteners are new; have the wheel fastener torque set at the first 160, 1,600, and 10,000 km (100, 1,000 and 6,000 miles).

For 3500 HD models, block the tires opposite those being removed to keep the vehicle from moving.

2. **Engine Accessory Drive Belt Inspection**--Inspect belt. Look for cracks, fraying, wear, and proper tension. Replace as needed. Refer to SECTION 6B1.

OB-12 MAINTENANCE AND LUBRICATION

3. **Transmission Service**--On vehicles with an automatic transmission, change the transmission fluid and filter every 25,000 km (15,000 miles) for vehicles under 8,600 GVWR or every 20,000 km (12,000 miles) for vehicles over 8,600 GVWR if the vehicle is mainly driven under one or more of these conditions:
- In heavy city traffic, where the outside temperature regularly reaches above 32° C (90° F) or higher.
 - Hilly or mountainous terrain.
 - Frequent trailer towing.
 - Uses such as found in taxi, police car, or delivery service.
- If the vehicle is not used mainly under any of these conditions, change the fluid and filter every 50,000 km (30,000 miles) for vehicles under 8,600 GVWR or every 40,000 km (24,000 mile) for vehicles over 8,600 GVWR.
- On vehicles with a manual transmission, the transmission fluid does not require periodic changing.
4. **Spark Plug Replacement**--Replace the spark plugs with the type listed in this section. Refer to "Maintenance Items."
5. **Spark Plug Wire Inspection**--Clean wires and inspect for burns, cracks, or other damage. Check the wire boot fit at the distributor and at the spark plugs. Replace wires as needed.
6. **EGR System Service**--Perform "EGR System Check." Refer to the Driveability, Emissions, and Electrical Diagnosis Manual.
7. **Air Cleaner Filter Replacement**--Replace the air cleaner filter every 50,000 km (30,000 miles) or more often under dirty conditions.
8. **Engine Timing Check**--Adjust the timing to underhood label specifications. Inspect the inside and outside of the distributor cap and rotor for cracks, carbon tracking, and corrosion. Clean and replace as needed.
9. **Fuel Tank, Cap, and Lines Inspection**--Inspect the fuel tank, cap, and lines (including fuel rails and injection assembly) for damage or leaks. Inspect the fuel cap gasket for an even filler neck imprint or any damage. Replace parts as needed.
10. **PCV System Inspection**--Check that the PCV (Positive Crankcase Ventilation) system works properly. Replace the valve and any worn, plugged, or collapsed hoses as necessary.
11. **Fuel Filter Replacement**--Replace the fuel filter at the specified interval or sooner if clogged.
12. **Front Wheel Bearing Repack (2WD Only)**--Clean and repack the front wheel bearings at each brake relining, or at the specified interval, whichever comes first.
13. **Clutch Fork Ball Stud Lubrication**--Lubricate the clutch fork ball stud through the fitting on the clutch housing. Lubricant must be added sparingly to the fitting, as only 0.0066 lb. (0.003 kg) is required to lubricate the ball stud surface. Do not add lubricant more often than required as clutch damage may occur (5-Speed w/Low Gear Models Only).
14. **Transfer Case Fluid Change**--In heavy or frequent trailer towing applications, drain the fluid and refill every 50,000 km (30,000 miles).
15. **Engine Idle Speed Adjustment (6.5L VIN Y Diesel Engines)**--Adjust to the specifications shown on the underhood label. You must use calibrated test equipment.
16. **CDRV System Inspection**--Check the Crankcase Depression Regulator Valve System for any worn, plugged or collapsed hoses.
17. **Electronic Vacuum Regulator Valve (EVRV) Inspection**--Inspect filter for excessive contamination or plugging. If required, clean element with a solution of biodegradable soap and water, let dry and reinstall element.
18. **Evaporative Control System (ECS) Inspection**--Check all fuel and vapor lines and hoses for proper hookup, routing, and condition. Check that the purge valve operates properly, if equipped. Replace as needed.
19. **Shields and Underhood Inspection**--Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
20. **Air Intake System Inspection**--Check the air intake system to see that the gaskets are seated properly and all hose connections, fasteners, and other components are tight. Also, make sure that the air cleaner housing is properly seated, the cover fits tightly, and the wingnut is tight. Tighten connections and fasteners or replace damaged parts as required.
21. **Thermostatically Controlled Air Cleaner Inspection (If Equipped)**--Inspect all hoses and ducts for proper hookup. Make sure valve works properly.
22. **Exhaust Pressure Regulator Valve Inspection**--Check that the valve works properly. Correct any binding. Inspect hoses for cracks, chafing, and decay. Replace parts as needed.
23. **Accelerator Cable Replacement**--Replace the accelerator cable on all gasoline equipped engines at 160,000 km (100,00 miles). The 6.5L diesel engines used on this vehicle are equipped with an electronic accelerator, so cable replacement is not required.

RECOMMENDED FLUIDS AND LUBRICANTS

Engine Oil—GM Goodwrench motor oil or equivalent for API Service SG or SG/CE of the recommended viscosity.

Engine Coolant—Mixture of water and a good quality ethylene glycol base antifreeze conforming to GM Specification 6038M, (GM P/N 1052103) or equivalent.

Hydraulic Clutch System—Hydraulic clutch fluid (GM P/N 12345347) or equivalent DOT-3 brake fluid.

Hydraulic Brake System—Delco Supreme II (GM P/N 1052535) 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 or II-E automatic transmission fluid.

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

Differential (Locking)—SAE 80-W-90 gear lubricant (GM P/N 1052271).

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 LB or GC-LB (GM P/N 1052497).

Chassis Lubrication—Chassis grease meeting requirements of GM 6031-M (GM P/N 1052497).

Weatherstrips—Silicone grease (GM P/N 1052863) or equivalent.

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

Hood Latch Pivots and Spring Anchor—Engine oil.

Hood Latch Release Pawl—Chassis grease meeting requirements of GM specification 6031M (GM P/N 1052497).

Automatic Transmission Shift Linkage, Floor Shift Linkage, Hood and Door Hinges, and Body Door Hinge Pins—Engine oil.

Manual Transmission:

A. 5-Speed (RPO MT8)—Castrol Syntorq or equivalent (GM P/N 12345871).

B. 5-Speed (RPO MG5)—Standard transmission fluid (GM P/N 12345349).

Transfer Case—DEXRON®II-E 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 (GM P/N 12345120) or a synthetic light weight engine oil (SAE 5W-30).

T2962

MAINTENANCE ITEMS

Air Cleaner Element

4.3L (VIN Z)	AC Type A-178CW
5.0L (VIN H)	AC Type A-348C
5.7L (VIN K)	AC Type A-348C
6.5L (VIN F, P, and S)	AC Type A-917C
7.4L (VIN N)	AC Type A-348C

Engine Oil Filter

4.3L (VIN Z)	AC Type PF-52
5.0L (VIN H)*	AC Type PF-1218
5.7L (VIN K)*	AC Type PF-1218
6.5L (VIN F, P, and S)	AC Type PF-1218
7.4L (VIN N)	AC Type PF-1218

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

PCV Valve

4.3L (VIN Z)	AC Type CV-789C
5.0L (H), 5.7L (K), 7.4L (N)	AC Type CV-774C

Spark Plugs and Gap

4.3L (VIN Z)	AC Type CR43TS (90 mm, .035")
5.0L (VIN H)	AC Type CR43TS (90 mm, .035")
5.7L (VIN K)	AC Type CR43TS (90 mm, .035")
7.4L (VIN N)	AC Type CR43TS (90 mm, .035")

OB-14 MAINTENANCE AND LUBRICATION

Fuel Filter

4.3L (VIN Z)	AC Type GF-481
5.0L (VIN H)	AC Type GF-481
5.7L (VIN K)	AC Type GF-481
6.5L (VIN F, P, and S)	AC Type TP-1006
7.4L (VIN N)	AC Type GF-481

Radiator Cap

4.3L (VIN Z)	AC Type RC-36
5.0L (VIN H)	AC Type RC-36
5.7L (VIN K)	AC Type RC-36
6.5L (VIN F, P, and S)	AC Type RC-32
7.4L (VIN N)	AC Type RC-32

APPROXIMATE FLUID CAPACITIES

Engine Cooling System

4.3L (VIN Z)	
With Air Conditioning	10.3 L (11 qts.)
Without Air Conditioning	10.3 L (11 qts.)
5.0L (VIN H)	
With Air Conditioning	17.0 L (18 qts.)
Without Air Conditioning	16.5 L (17.5 qts.)
5.7L (VIN K)	
With Air Conditioning	17.0 L (18 qts.)
Without Air Conditioning	16.5 L (17.5 qts.)
With Air Conditioning—3500 H.D.	25.5 L (27 qts.)
Without Air Conditioning—3500 H.D.	25.0 L (26.5 qts.)
6.5L (VIN F, P, and S)	
With Air Conditioning	25.0 L (26.5 qts.)
Without Air Conditioning	25.0 L (26.5 qts.)
7.4L (VIN N)	
With Air Conditioning	23.5 L (25 qts.)
Without Air Conditioning	22.0 L (23 qts.)
With Air Conditioning—3500 H.D.	27.0 L (28.5 qts.)
Without Air Conditioning—C3500 H.D.	25.0 L (26.5 qts.)

Engine Crankcase

4.3L (VIN Z)	
With Filter*	4.3 L (4.5 qts.)
Without Filter*	3.8 L (4.0 qts.)
5.0L (VIN H)	
With Filter*	4.8 L (5.0 qts.)
Without Filter*	3.8 L (4.0 qts.)
5.7L (VIN K)**	
With Filter*	4.8 L (5.0 qts.)
Without Filter*	3.8 L (4.0 qts.)
6.5L (VIN F, P, and S)*	
With Filter*	6.5 L (7.0 qts.)
7.4L (VIN N)**	
With Filter*	6.5 L (7.0 qts.)
Without Filter*	5.7 L (6.0 qts.)

* Oil filter should be changed at every oil change.

** Add one additional quart for C3500 H.D. 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)	117.0 L (31 Gallons)
3500 HD Models	
Standard (Side Tank).....	87.0 L (23 Gallons)
Optional (Rear Tank)	117.0 L (31 Gallons)

Transmission

4L60-E Automatic—Drain and Refill	4.7 L (5 qts.)
After Complete Overhaul.....	10.6 L (11 qts.)
4L80-E Automatic—Drain and Refill	7.3 L (7.7 qts.)
After Complete Overhaul.....	12.8 L (13.5 qts.)
New Venture Gear 4500 Manual	3.78 L (4 qts.)
New Venture Gear 3500 Manual	2.0 L (2.2 qts.)

ADJUSTABLE BELT TENSION SPECIFICATIONS

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

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OB-16 MAINTENANCE AND LUBRICATION

NOTES

SECTION 0C

VIBRATION DIAGNOSIS

CAUTION: This vehicle is equipped with Supplemental Inflatable Restraint (SIR). Refer to CAUTIONS in Section 9J under "ON-VEHICLE SERVICE" and the SIR Component and Wiring Location view in Section 9J before performing service on or around SIR components or wiring. Failure to follow CAUTIONS could result in possible air bag deployment, personal injury, or otherwise unneeded SIR system repairs.

NOTICE: Always use the correct fastener in the correct location. Use the correct fastener part number to replace a fastener. If the correct fastener part number is not available, a fastener of equal size and strength may be used. Do not use a fastener that is stronger when the correct fastener part number is not available in the following applications:

- Some bolts are designed to permanently stretch, and if a stronger fastener is used the part will not be tightened correctly. These permanently stretching bolts will be called out. The correct part number fasteners must be used to replace this type of fastener because there is no available equivalent.
- Other bolts are designed to break if over tightened to prevent part damage. If a stronger fastener is used part damage may occur.

Fasteners that need to be replaced when removed will be called out. Fasteners that require thread lockers or thread sealant will be called out. The correct tightening specification and sequence must be used when installing fasteners. Part or system damage may occur if the above instructions are not followed.

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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 four 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.

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.

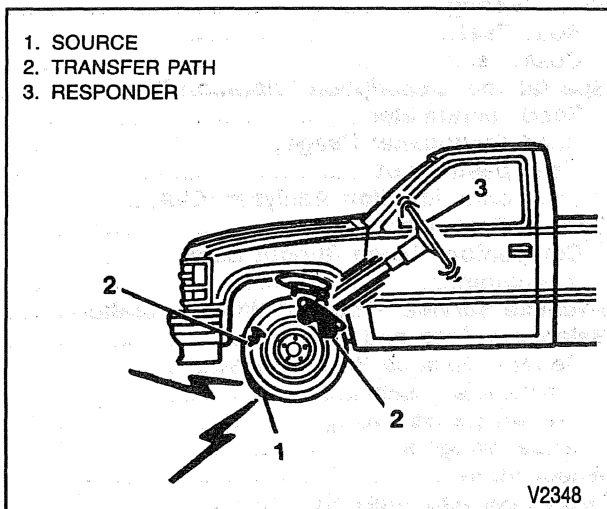


Figure 1—Vibration Source, Path, Responder

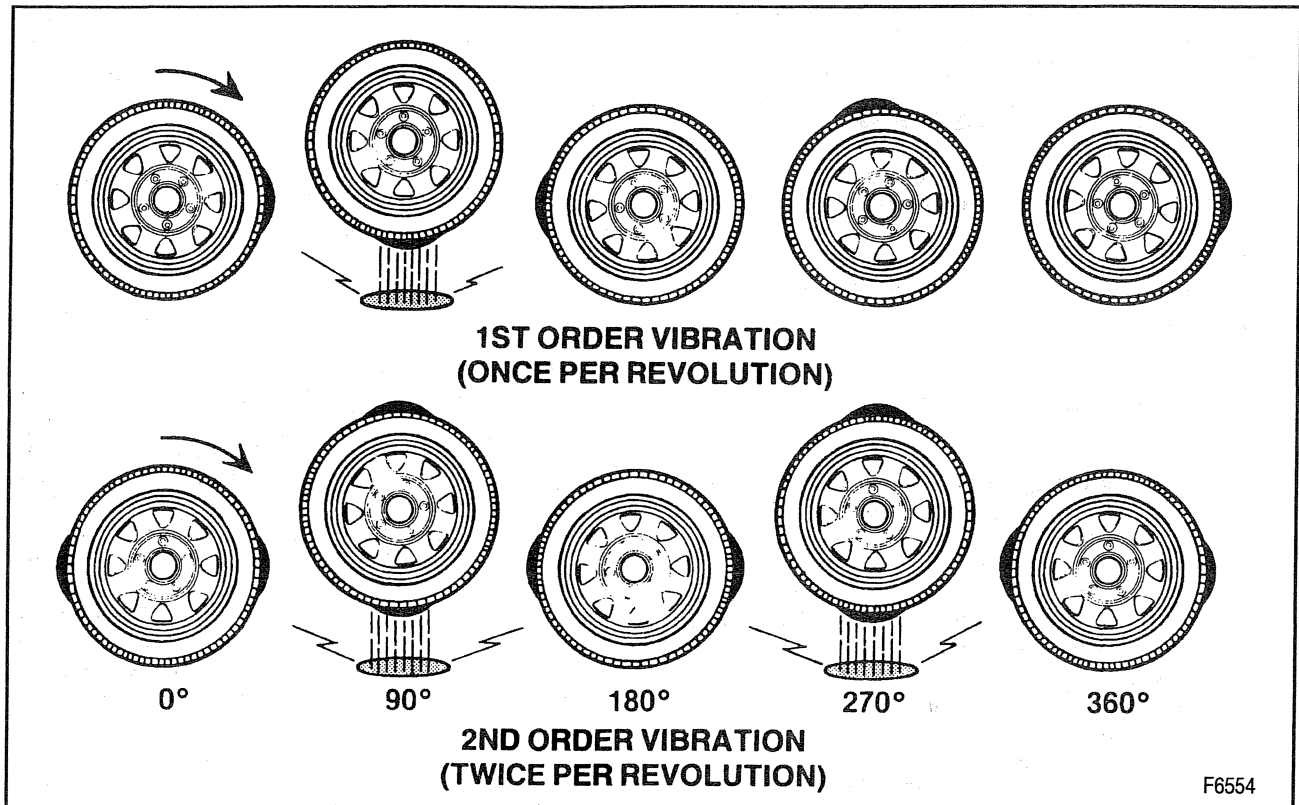


Figure 2—Order of Vibration

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.
4. Place the transmission in neutral or park position and slowly increase engine rpm to determine and 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:

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 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:

1. Drive the vehicle and observe the disturbance with varying payload.
2. 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.
3. 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:

1. Drive the vehicle in high gear and locate the vibration. Record the vehicle speed and rpm at which the problem occurs.
2. 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.

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3. 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.

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 (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."

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.

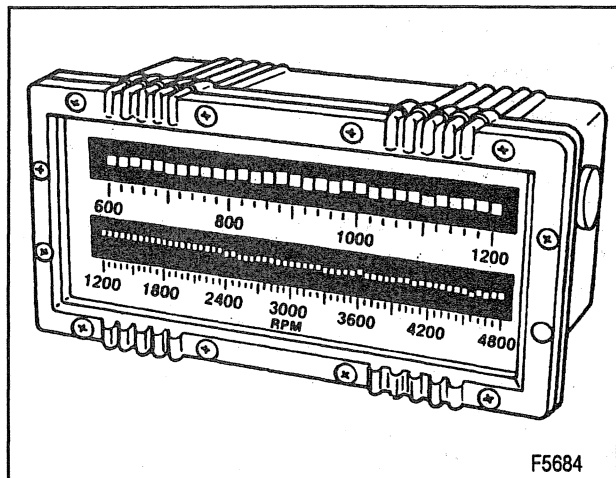


Figure 3—Reed Tachometer

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 at 5 mph
P235/75R15	ALS	1.00
	OOR	0.99
P275/60HR15	AL3	1.03
31X10.5R15/B	OOR	0.95
LT225/75R16	ALS	0.99
	OOR	0.98
LT245/75R16	ALS	0.95
	OOR	0.94
LT265/75R16	OOR	0.90
LT215/85R16	HWY	0.95
	OOR	0.94
LT235/85R16	HWY	0.91
	OOR	0.90
7.50R16	HWY	0.90
	OOR	0.90
8.75R16.5	HWY	0.98
225/70R19.5	HWY	0.89

AL3=Performance (GT+4)
ALS=All Season
HWY=Highway
OOR=On/Off Road

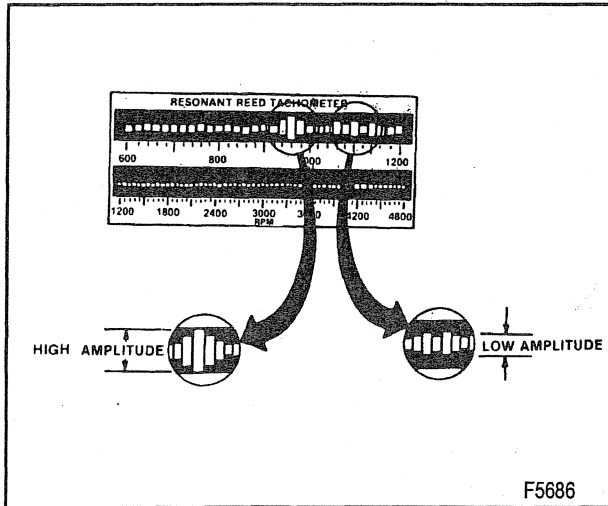


Figure 4—Amplitude

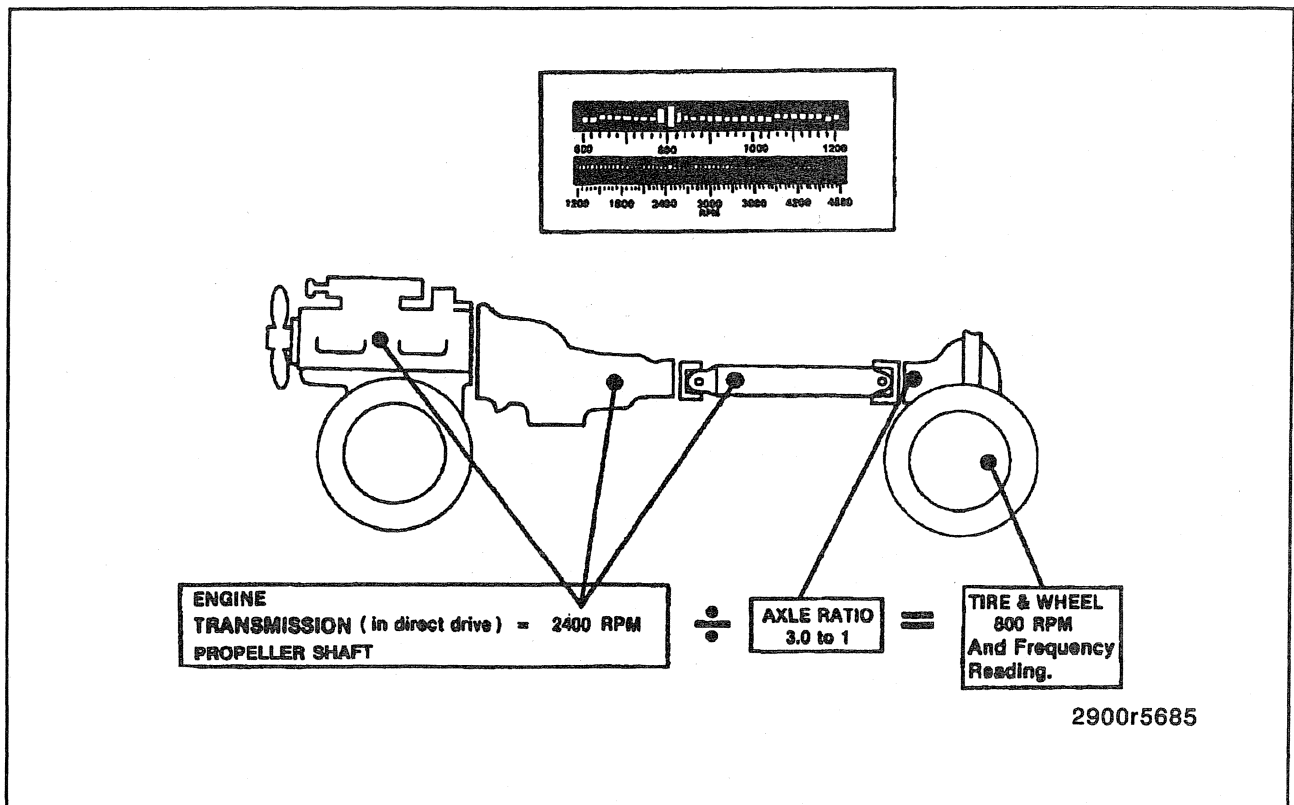


Figure 5—Reed Tachometer 1st Order Vibration

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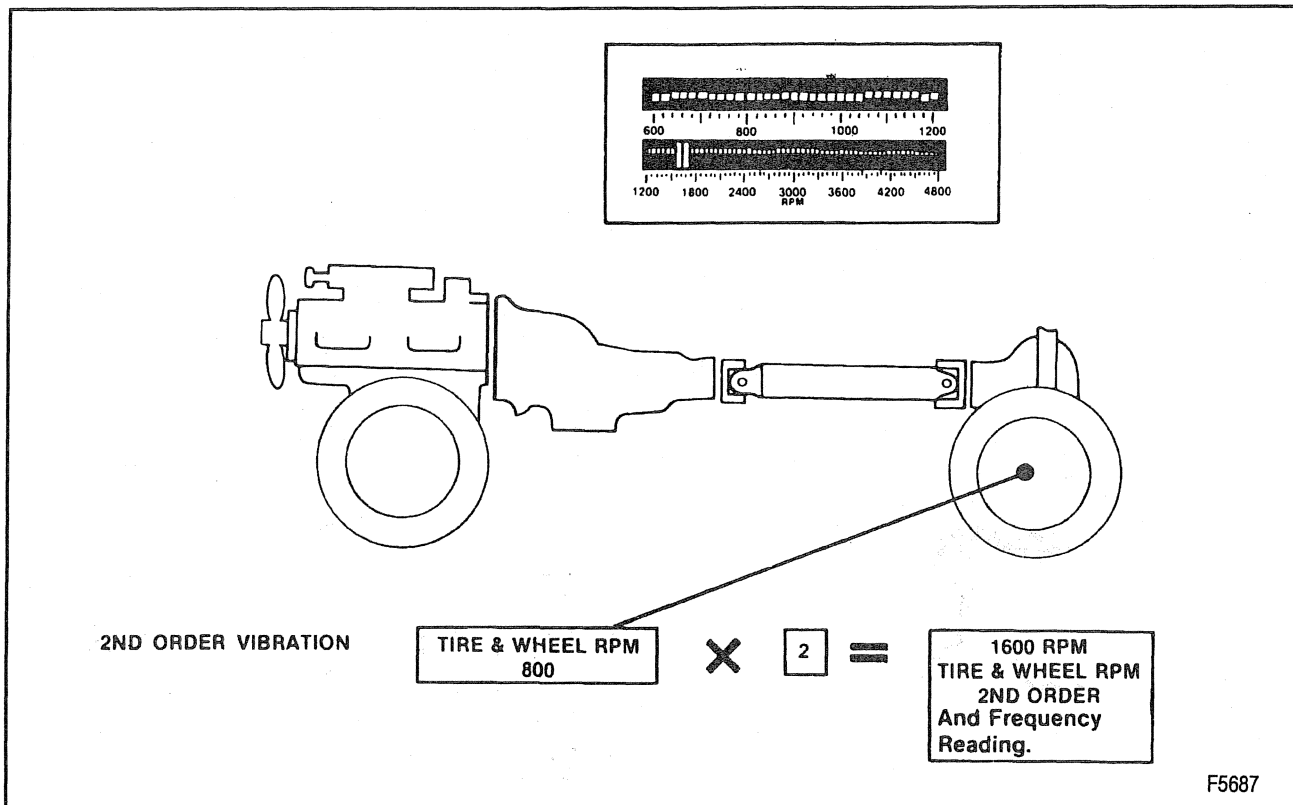


Figure 6—Reed Tachometer 2nd Order Vibration

ELECTRONIC VIBRATION ANALYZER (EVA)

The Electronic Vibration Analyzer (EVA) J 38792 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).

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 GAGE

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 Gage. When working with larger pinion flanges, use the runout gage adapter sleeves J 35819-100. 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 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.

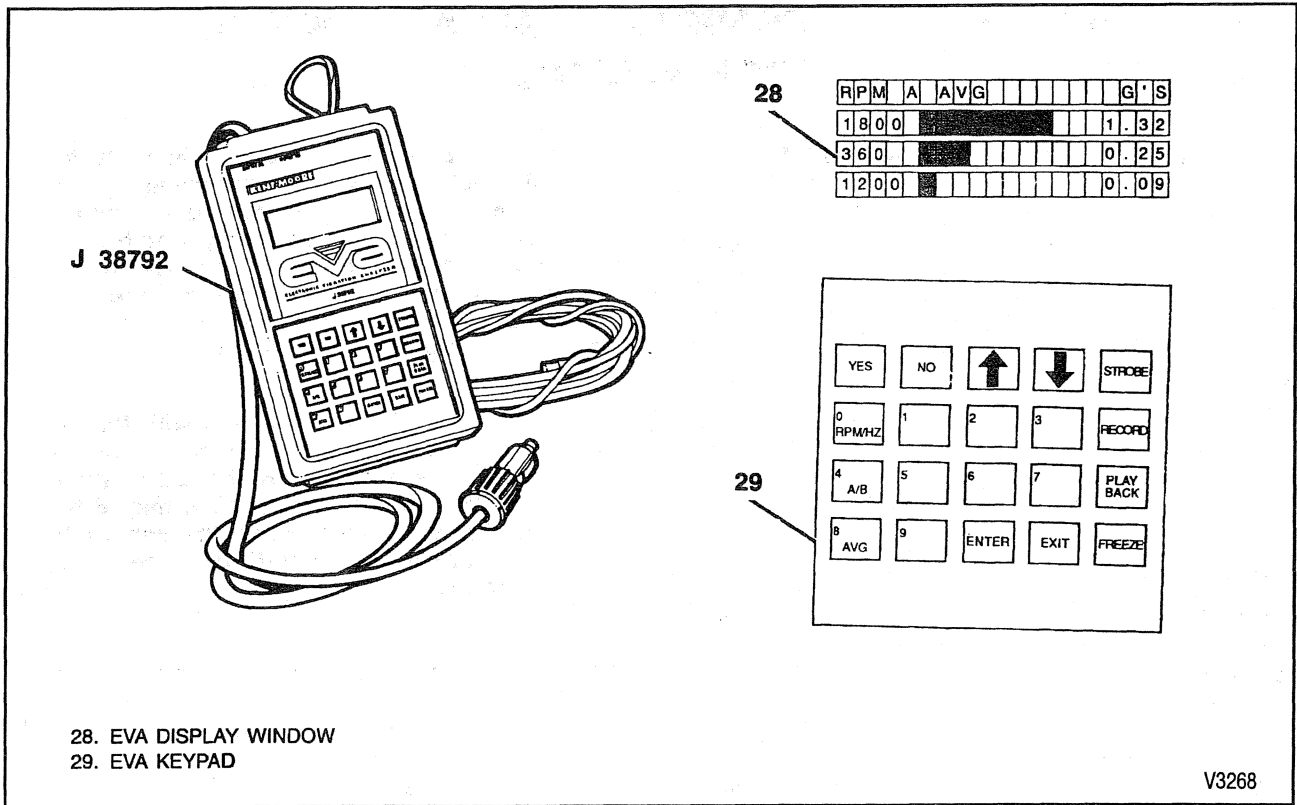


Figure 7—Electronic Vibration Analyzer (EVA)

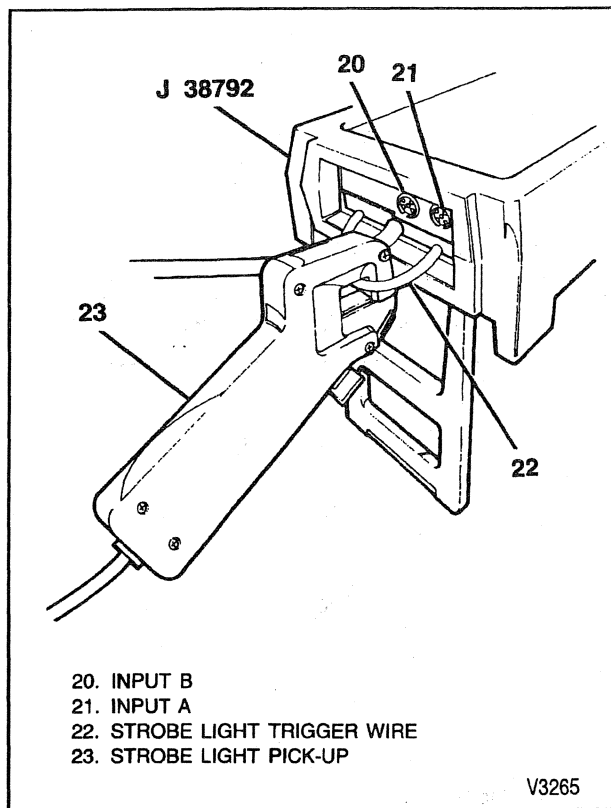


Figure 8—EVA Inputs and Connections

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 heavy 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 locate on the balancer with a cone through the back side of the center pilot hole not by the wheel stud holes.

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 35 mph (55 km/h) 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.

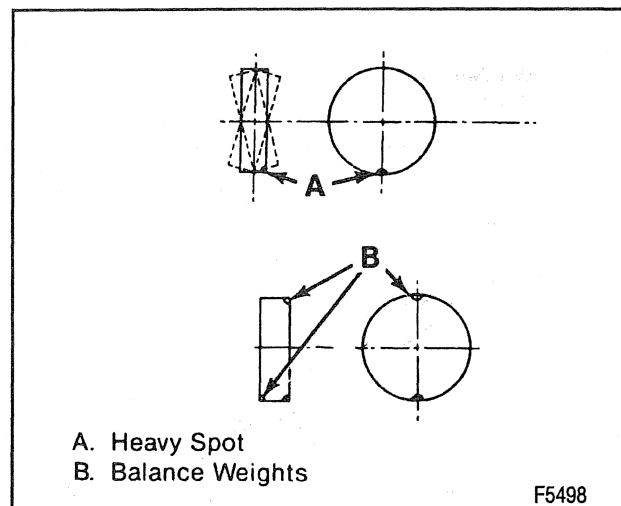


Figure 9—Static Unbalance

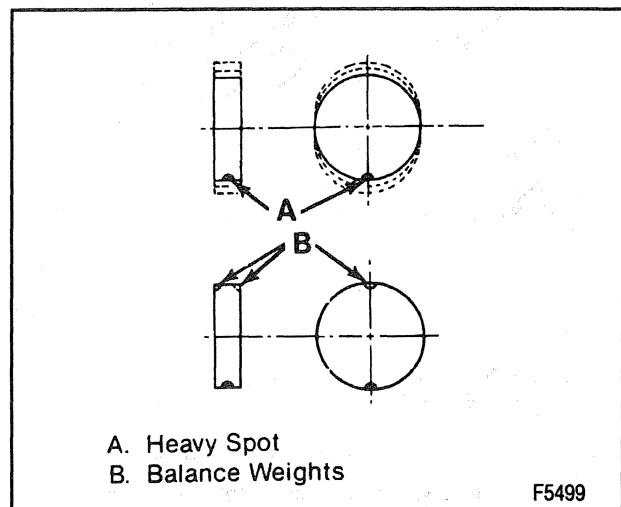


Figure 10—Dynamic Unbalance

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.

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.
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.

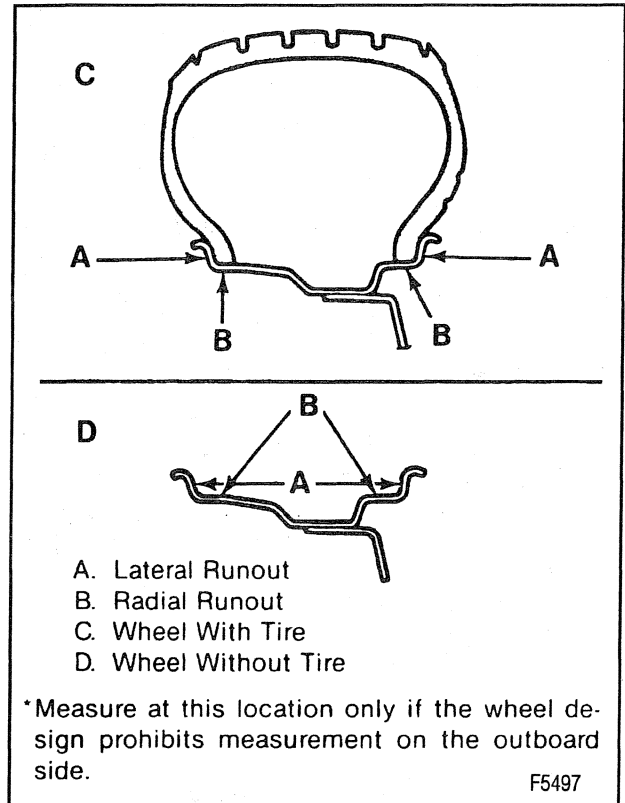


Figure 11—Wheel Runout

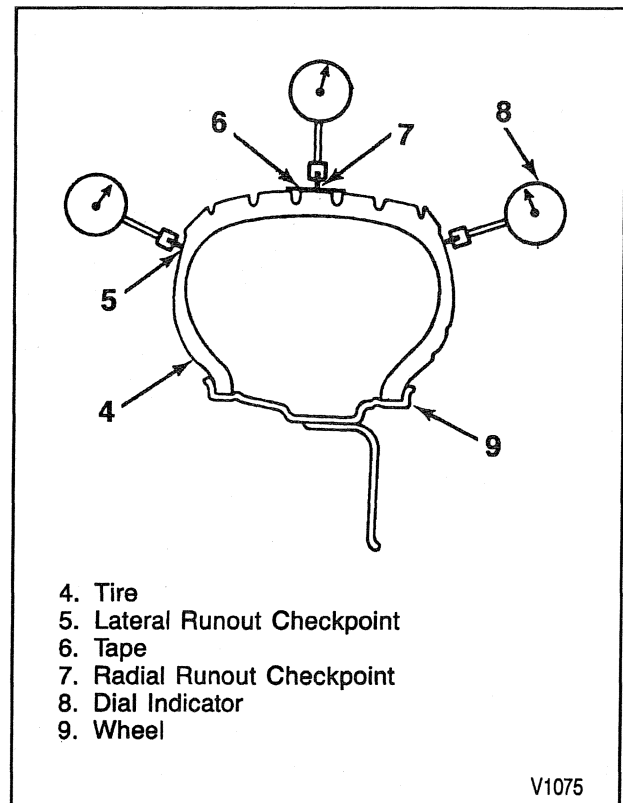


Figure 12—Measuring Radial and Lateral Runout

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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 NON-UNIFORM 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.

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.

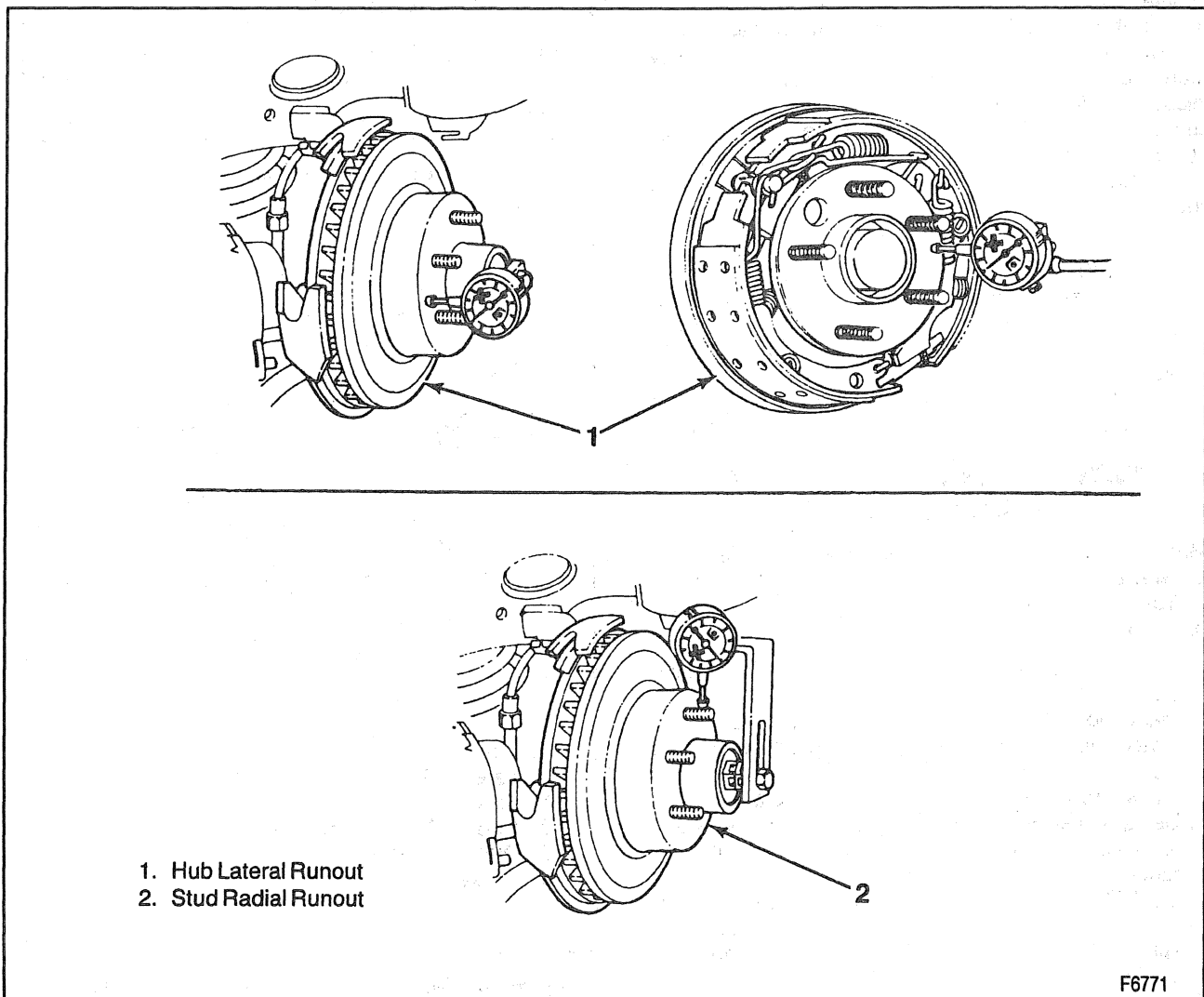


Figure 13—Hub and Axle Shaft Stud Runout

MEASURING AXLE SHAFT STUD RUNOUT



Install or Connect

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



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 45-50 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 45-55 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.”

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

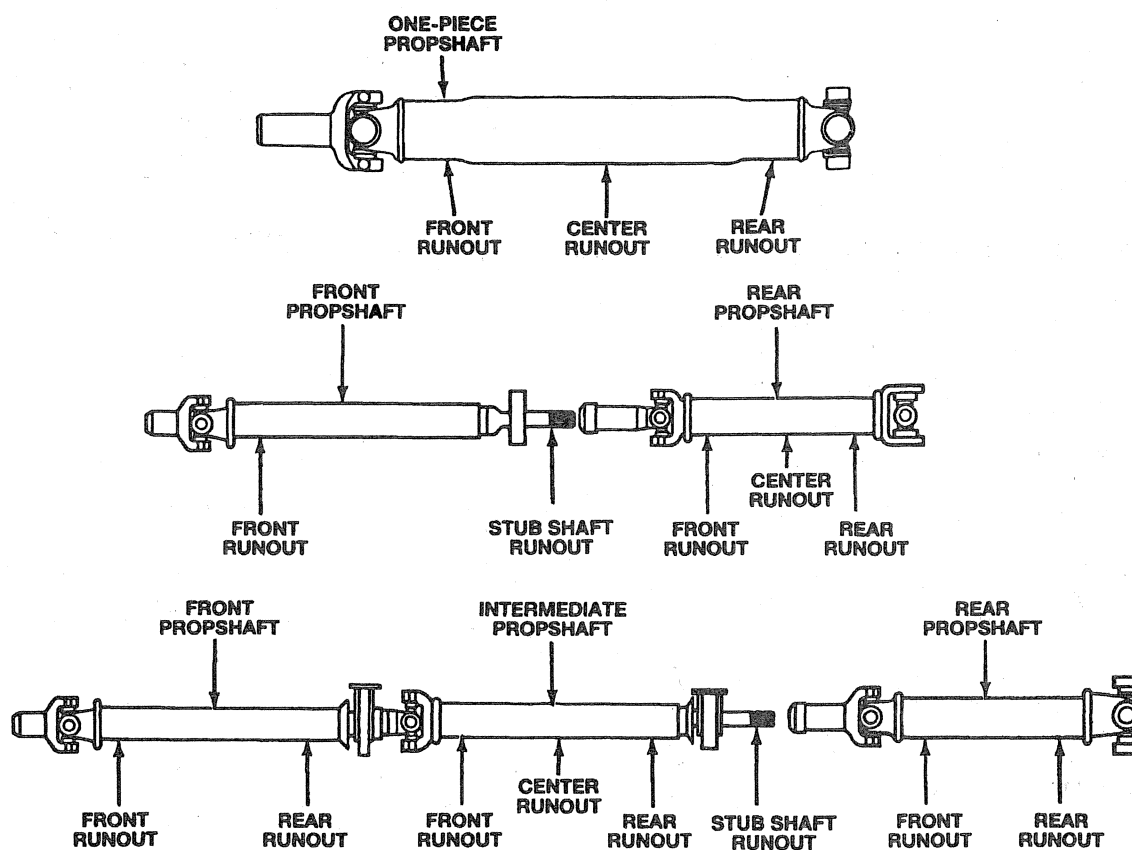
- Propeller shaft, universal joints, and attachments.



Tighten

- Any loose attachments or fasteners.

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PROPSHAFT RUNOUT SPECIFICATIONS				
PROPSHAFT	FRONT RUNOUT	CENTER RUNOUT	REAR RUNOUT	STUB SHAFT RUNOUT
ONE-PIECE	0.040"	0.050"	0.055"	—
ALUMINUM GRAPHITE	0.040"	—	0.040"	—
TWO-PIECE FRONT SLIP YOKE	0.020"	—	—	0.003" ¹
TWO-PIECE FRONT FIXED YOKE	0.040"	—	—	0.004" ¹
TWO-PIECE REAR	0.030" ²	0.030"	0.035"	—
THREE-PIECE	0.025"	0.040"	0.040"	0.004" ¹

¹Take measurement on splines, 1/2-inch from the end.

²Measured with rear shaft disconnected from front shaft. Front shaft must be within runout tolerances.

V2349

Figure 14—Checking Propeller Shaft Runout

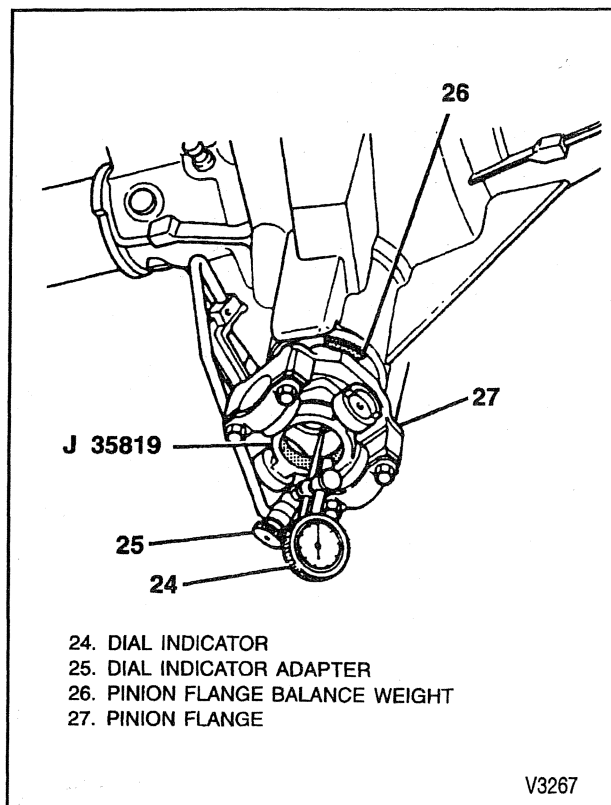


Figure 15—Pinion Flange Runout

! 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."
- 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."

PROPELLER SHAFT BALANCING

HOSE CLAMP METHOD (Figures 16, 17, and 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.
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 50-55 mph (81-89 km/h). 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.

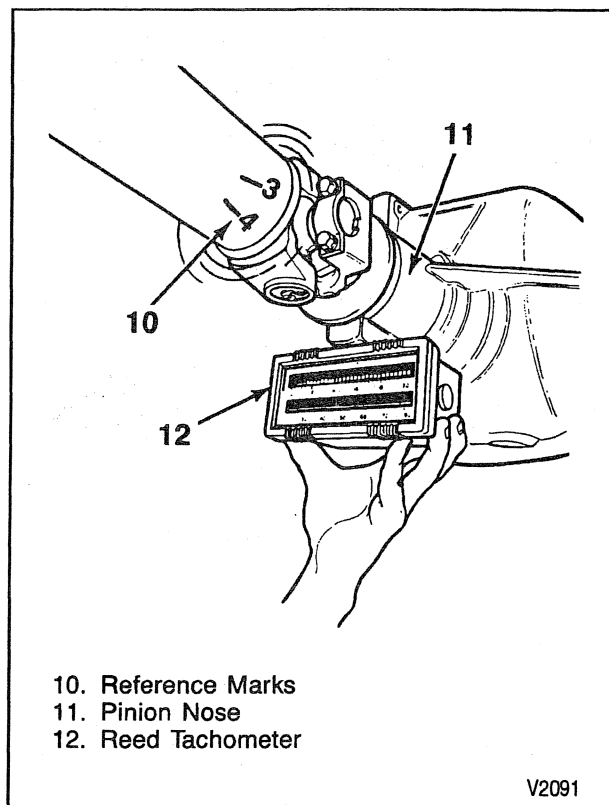


Figure 16—Propeller Shaft Reference Marks and Reed Tachometer Position

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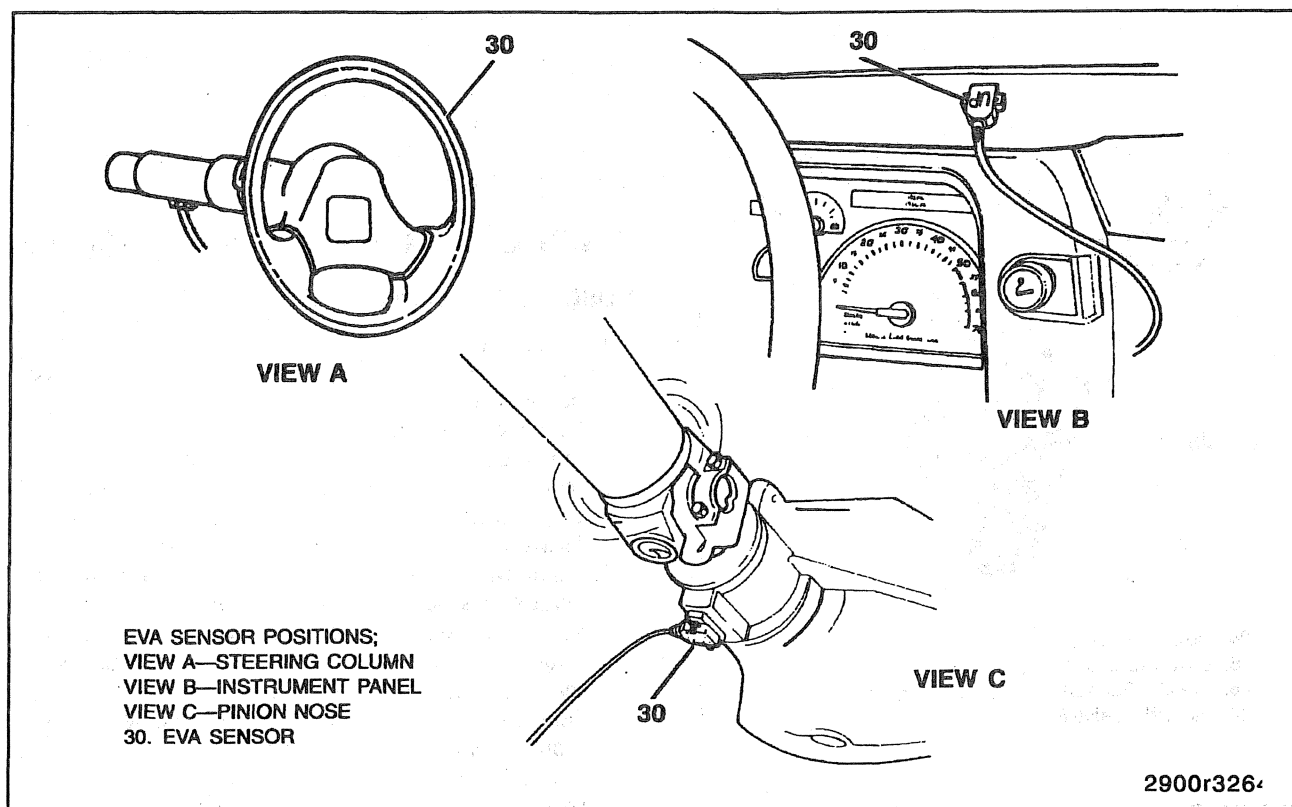


Figure 17—EVA Sensor Positions

CAUTION: Never run vehicle higher than 55 mph (89 km/h). 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.

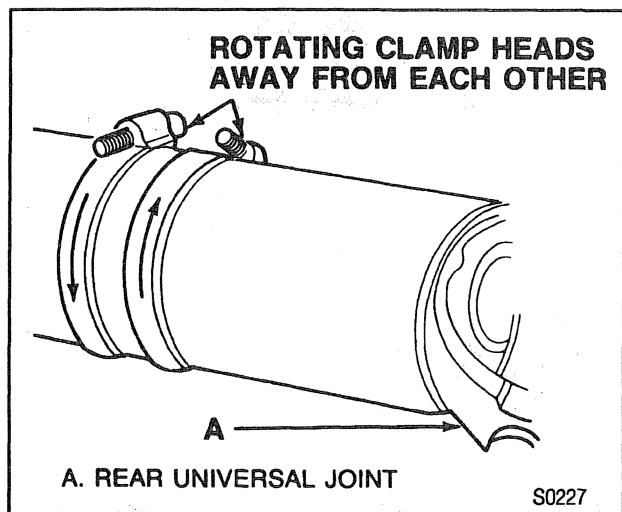


Figure 18—Rotating Hose Clamps

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.

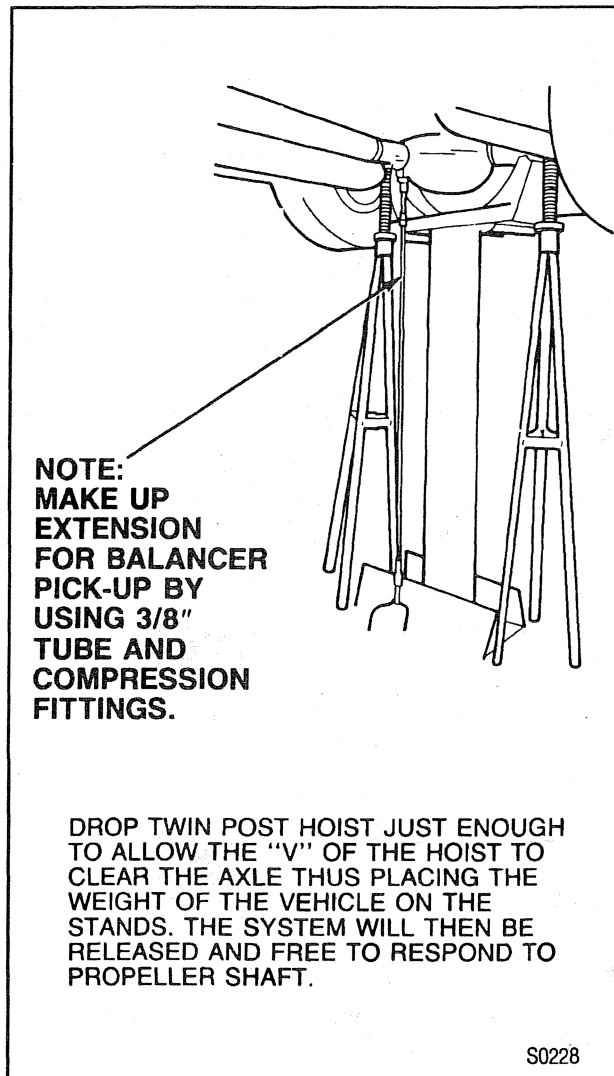


Figure 19—Pickup Unit Replacement

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, as shown in figure 16.
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 bottom (6 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 top of the propeller shaft (12 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.

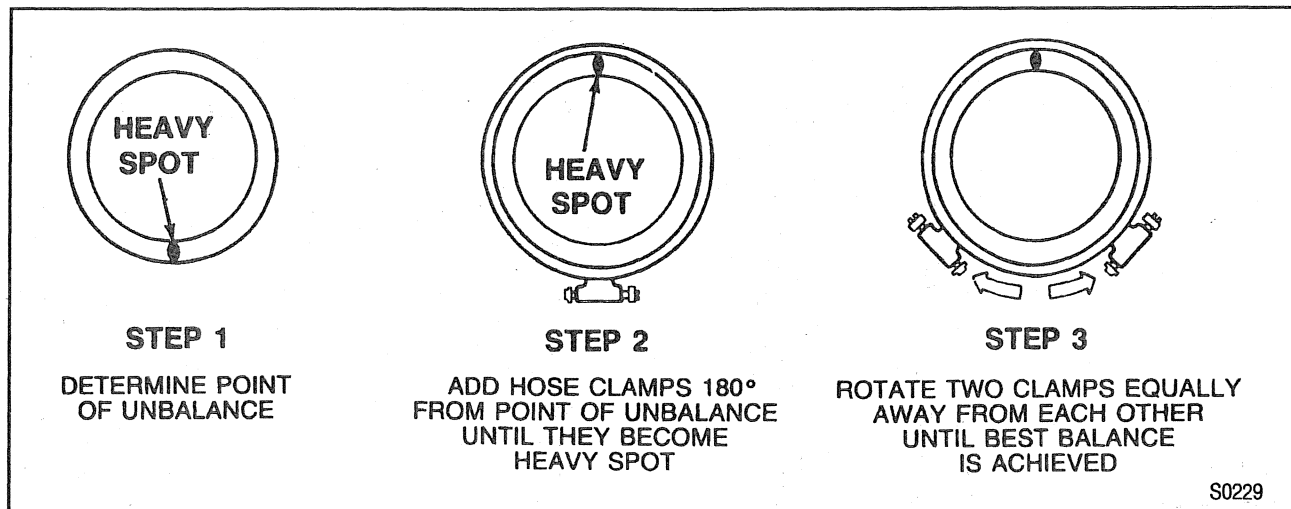


Figure 20—Positioning Hose Clamps to Achieve Best Balance

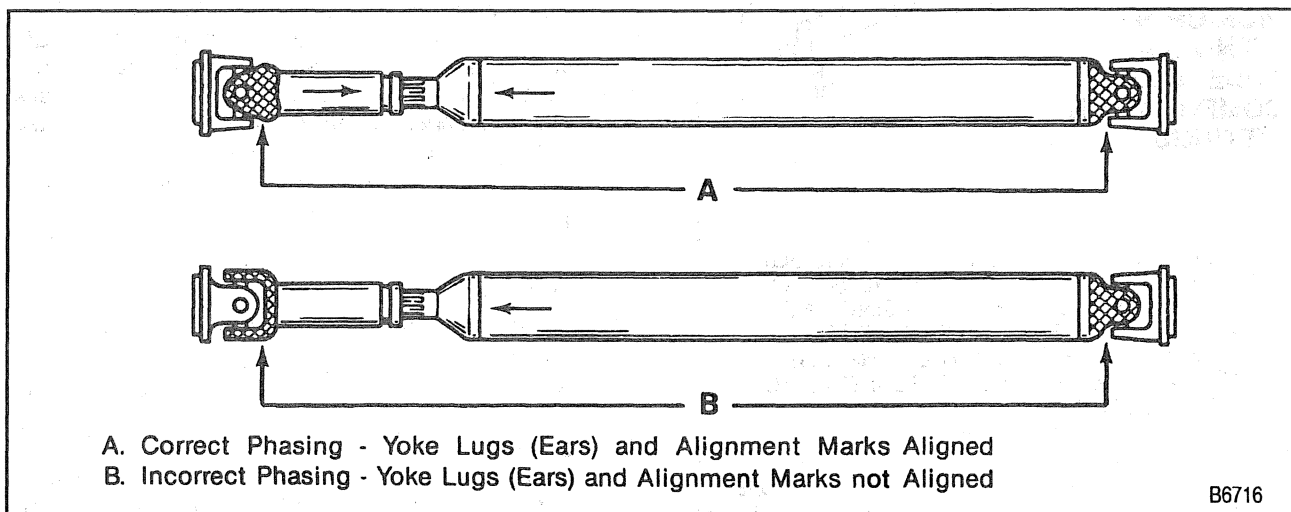


Figure 21—Phasing

DRIVELINE ANGLES

When two shafts intersect at any common universal joint, the bend that is formed is called the working angle (figure 22). The larger the working angle, the greater the 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 cancelled 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 the J 23498-A inclinometer on the propeller shaft bearing cap (figure 23).

ANGLE AT REAR UNIVERSAL JOINT

1. Place inclinometer J 23498-A 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 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.

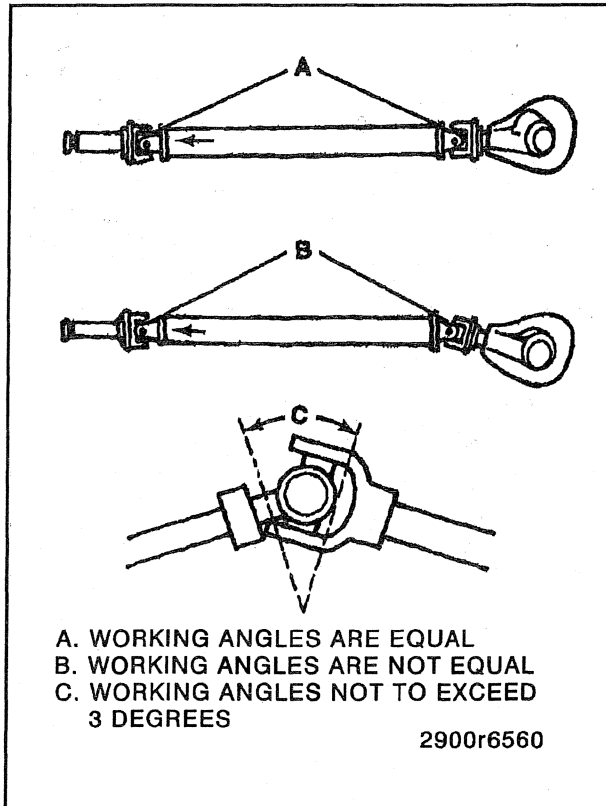


Figure 22—Working Angles

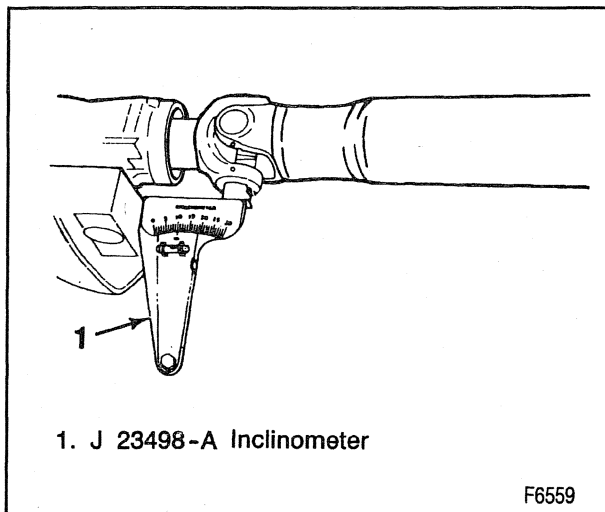


Figure 23—Measuring Driveline Angles

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

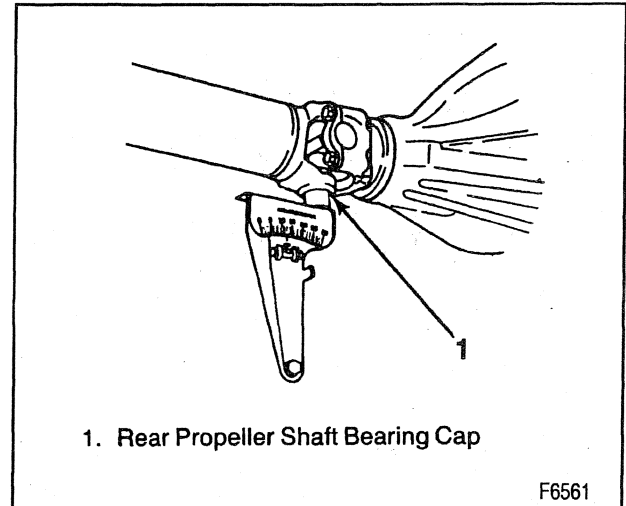


Figure 24—Measuring Rear U-Joint Working Angle

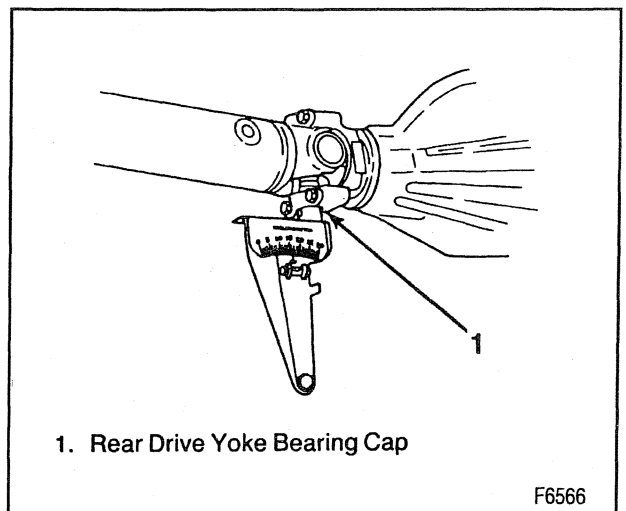


Figure 25—Measuring Rear U-Joint Working Angle

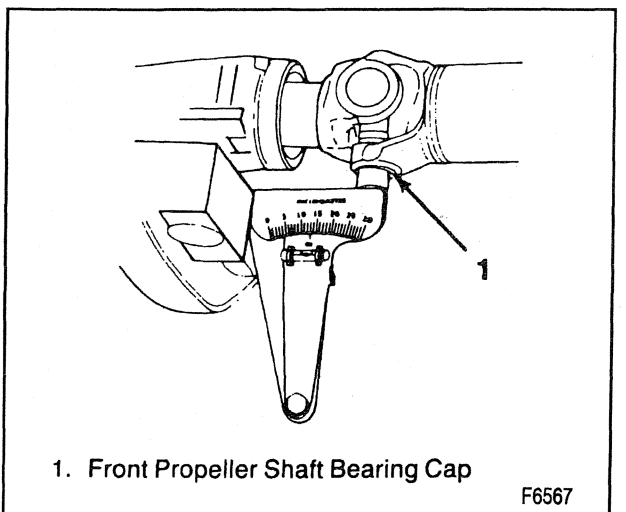


Figure 26—Measuring Front U-Joint Working Angle

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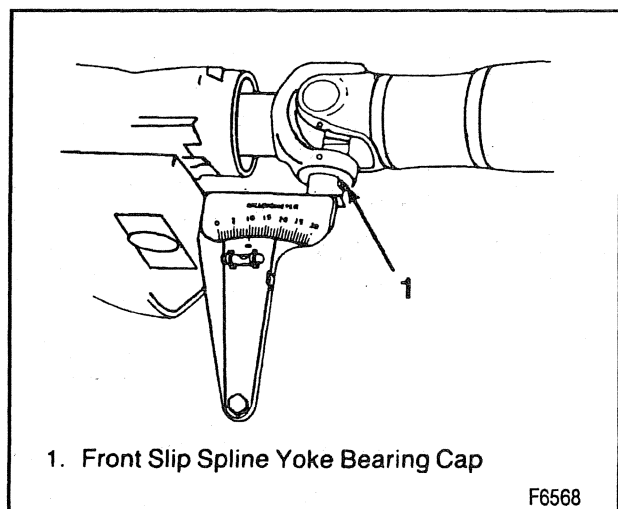


Figure 27—Measuring Front U-Joint Working Angle

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).

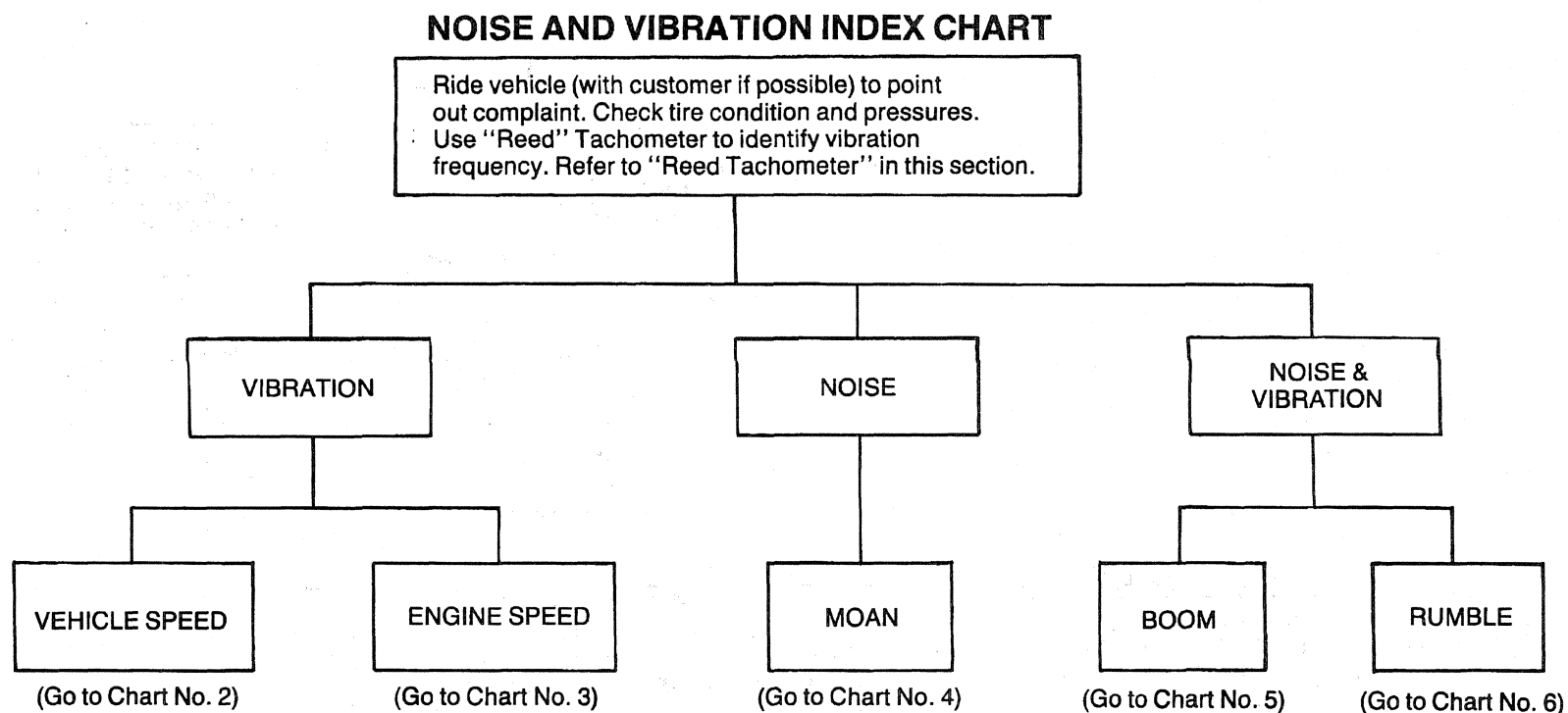
VIBRATION DIAGNOSIS CHARTS

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 28—Vibration Diagnosis Chart #1



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.

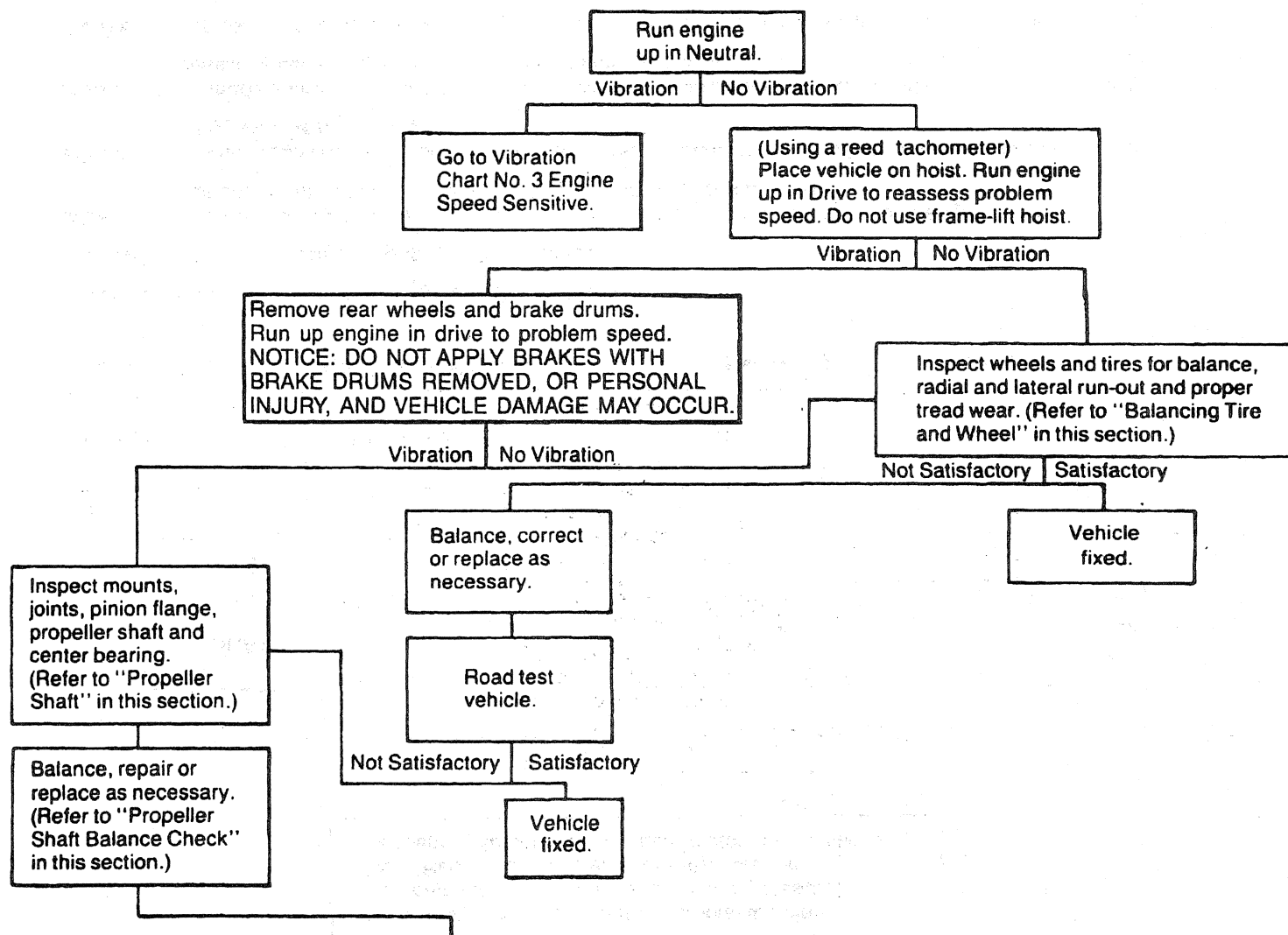
RUMBLE* A steady drumming sound and vibration which is vehicle speed sensitive and continues as long as the vehicle speed is maintained, regardless of engine speed.

*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.

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



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Figure 29—Vibration Diagnosis Chart #2

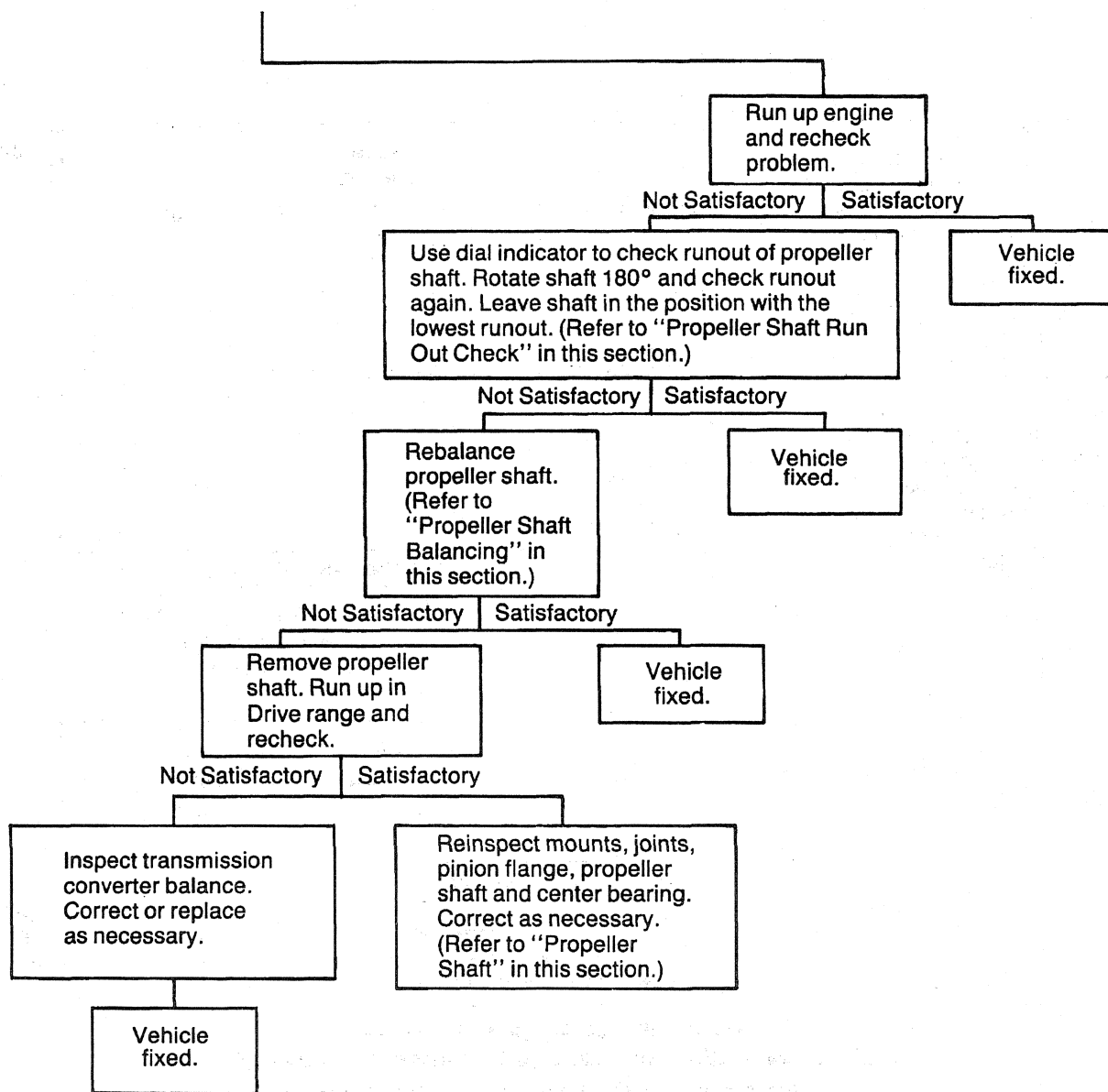


Figure 30—Vibration Diagnosis Chart #2 Continued

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

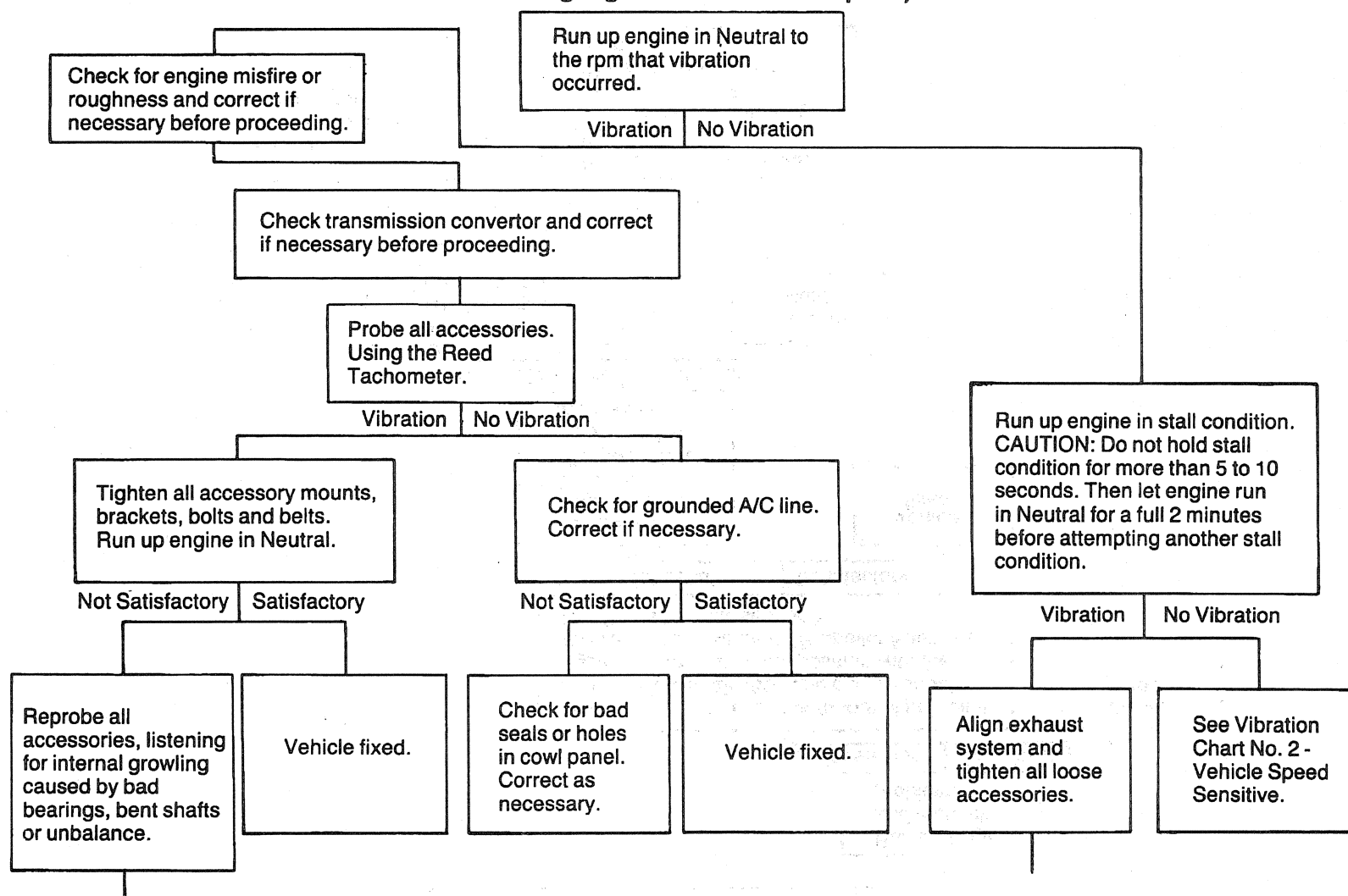
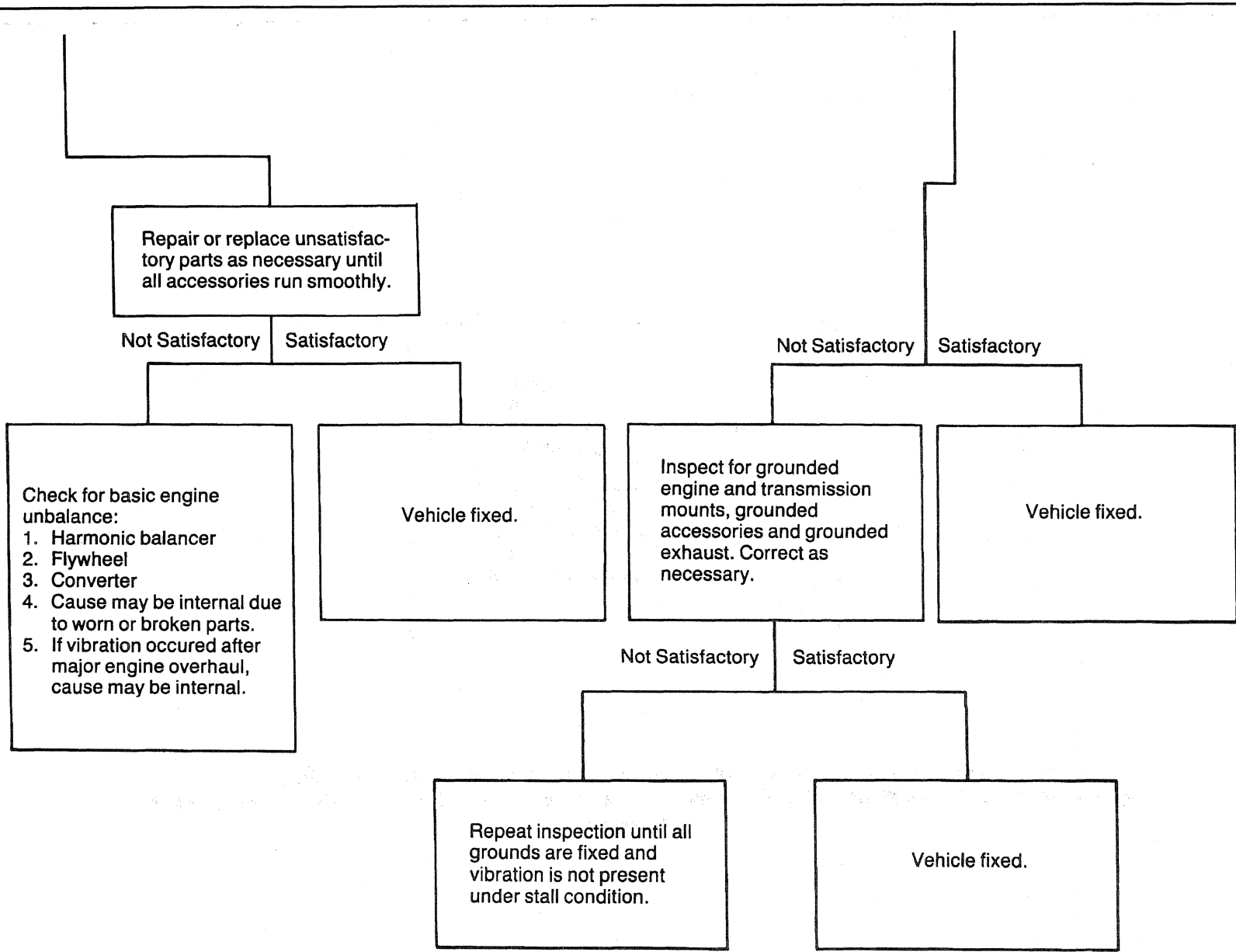


Figure 31—Vibration Diagnosis Chart #3

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Figure 32—Vibration Diagnosis Chart #3 Continued

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)

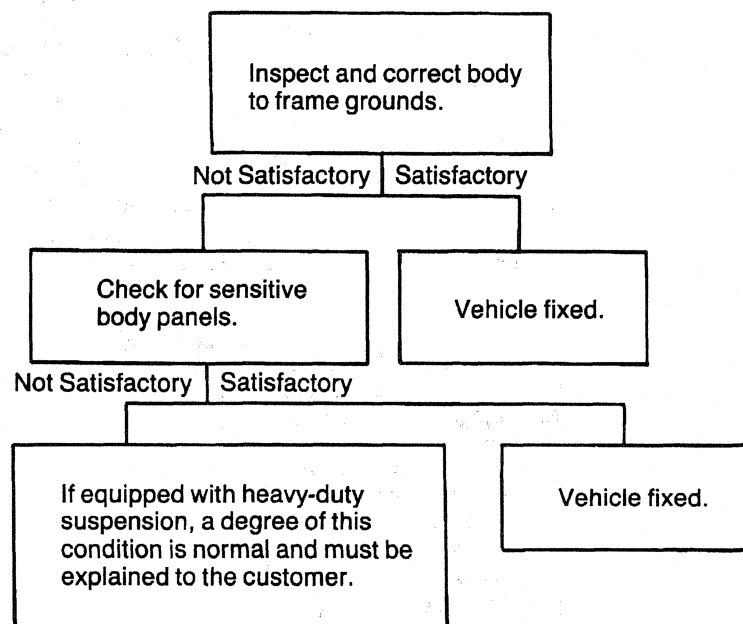
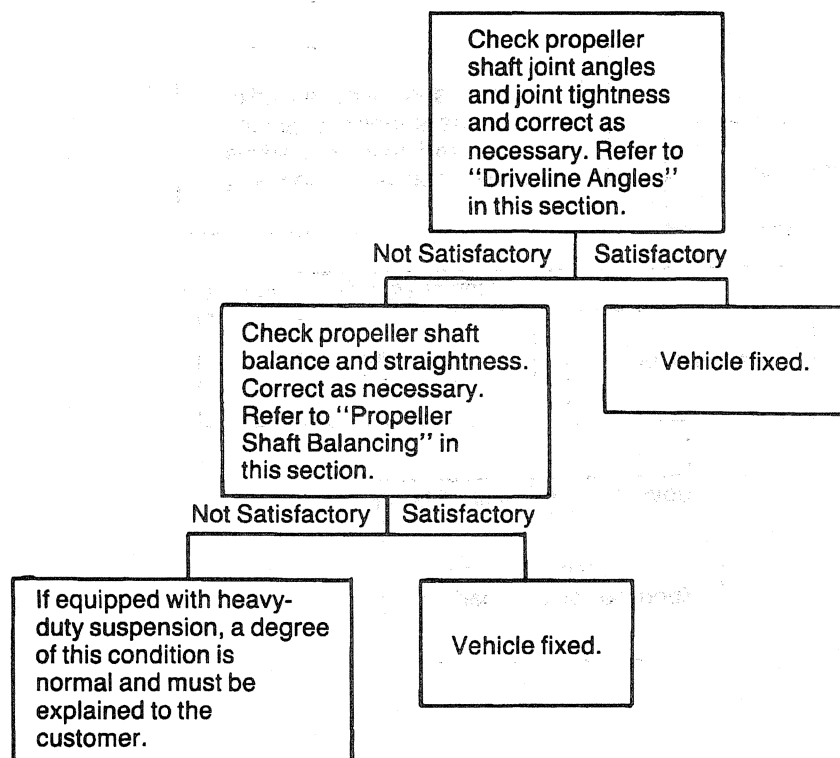


Figure 34—Vibration Diagnosis Chart #5

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 FRONT ENGINE—REAR DRIVE

Vehicle Information

Complaint Speed: _____ mph

Year: _____ Model: _____

Symptom: _____

VIN: _____

Frequency: _____

Engine: _____ Trans: _____

Engine Speed: _____ rpm

Tire Size: _____ Axle Ratio: _____

Gear: _____

TPC Spec: _____

Tire/Wheel Speed

Vibration Occurs at: mph ÷ 5 (mph) = increments of 5 mph

5 mph increments x tire RPS* at 5 mph (from chart) = Tire/Wheel Speed, RPS (Hz) 1st order

1st order x 2 = 2nd order

1st order x 3 = 3rd order

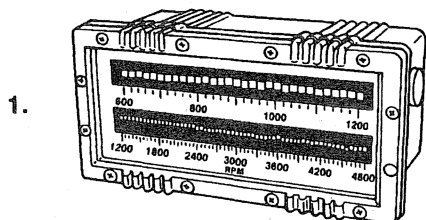
Propshaft Speed

1st order tire x (axle ratio) = Propshaft Speed 1st order

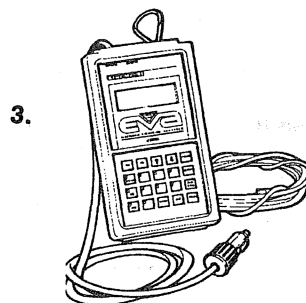
1st order propshaft x 2 = 2nd order

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

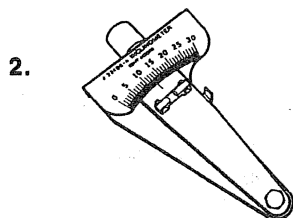
SPECIAL TOOLS



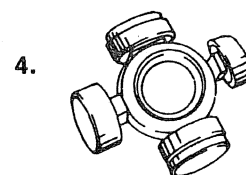
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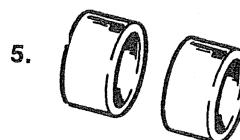
J 38792



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