

PROPELLER SHAFT ALIGNMENT

DESCRIPTION

Propeller shafts are balanced, one piece, tubular shafts with universal joints at each end. Number in vehicle varies: one shaft, two shafts with center bearing, and three shafts in four-wheel drive applications. Location of slip joints varies with model and manufacturer (see illustration).

INSPECTION

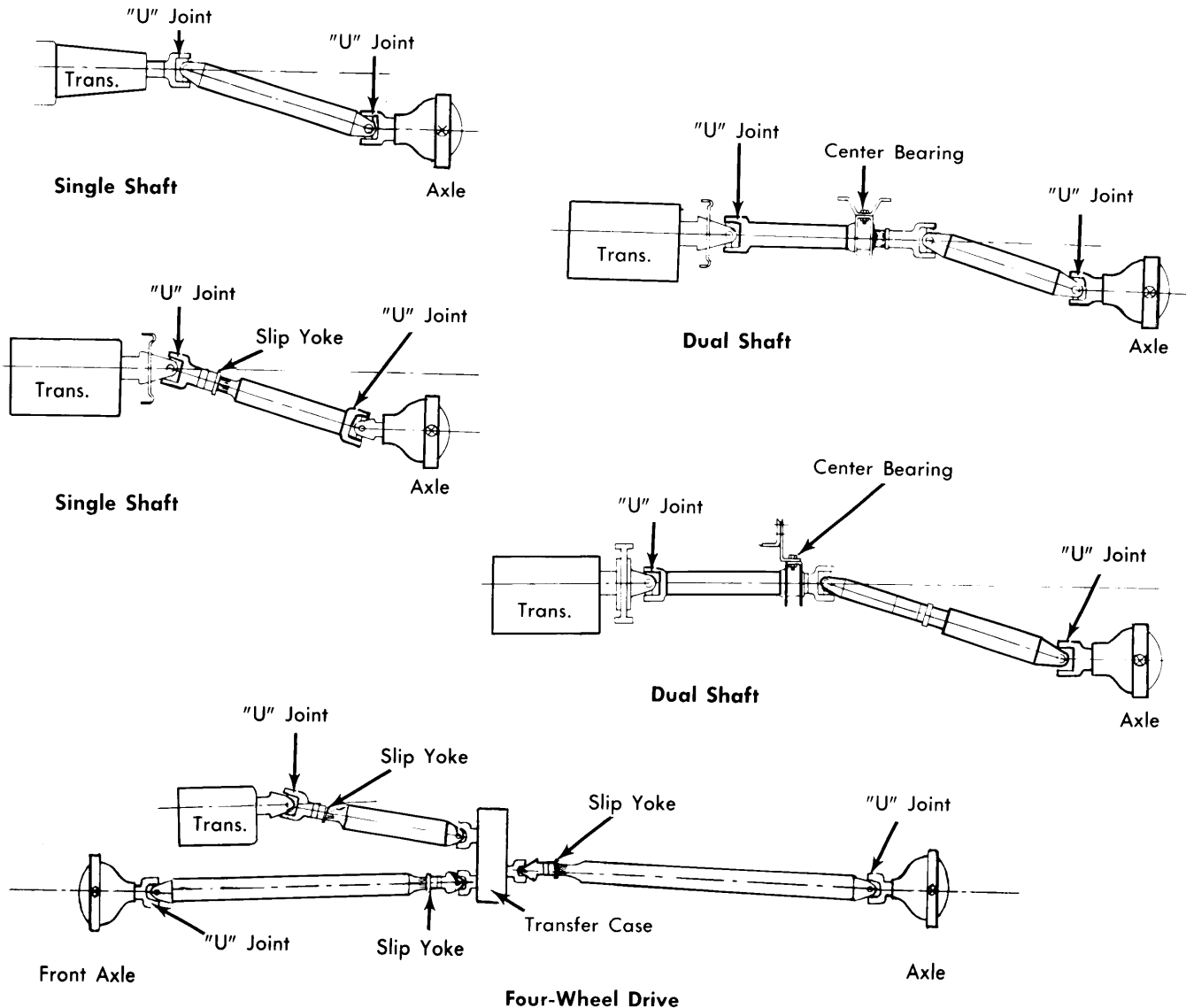
Vibration can come from many sources. Before overhauling driveline, other sources of possible vibration should be checked first.

Tires & Wheels – Check inflation and wheel balance. Check for damaged tread or foreign object in tread.

Center Bearing – Tighten drive shaft center bearing mounting bolts. If bearing insulator is deteriorated or oil soaked, it should be replaced.

Engine & Transmission Mountings – Tighten mounting bolts. If mountings are deteriorated, they should be replaced.

Propeller Shaft – Check propeller shaft for damage or dents that could affect balance. Check for undercoating adhering to shafts. If present, shafts should be thoroughly cleaned.



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TYPICAL PROPELLER SHAFT COMBINATIONS

PROPELLER SHAFT ALIGNMENT (Cont.)

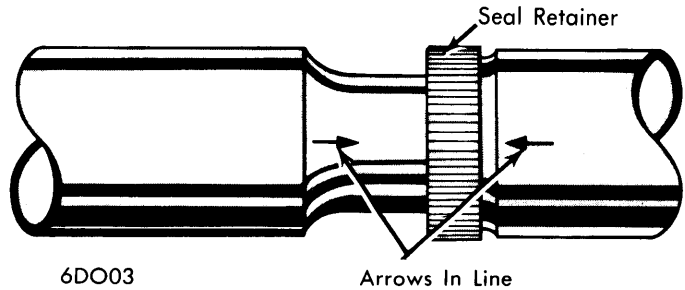
Universal Joints — Check for foreign material stuck in joints. Check for loose bolts and worn bearings.

ADJUSTMENTS

Propeller Shaft Phasing (1971-74 Chev. & GMC "G" & "P" Models With Two-Piece Driveline & 1972 C-30 & C-3500 W/307" Engine & 157" Wheelbase) — If components have been disassembled, reassemble using following procedure: Install front shaft and center bearing. Rotate shaft so that universal joint is in vertical position. Before installing rear shaft, rotate it so universal joints are vertical. Note position of splines at slip joint and rotate rear shaft four splines (C-10, two splines) toward left side of vehicle. Assemble slip joint and rear universal joint.

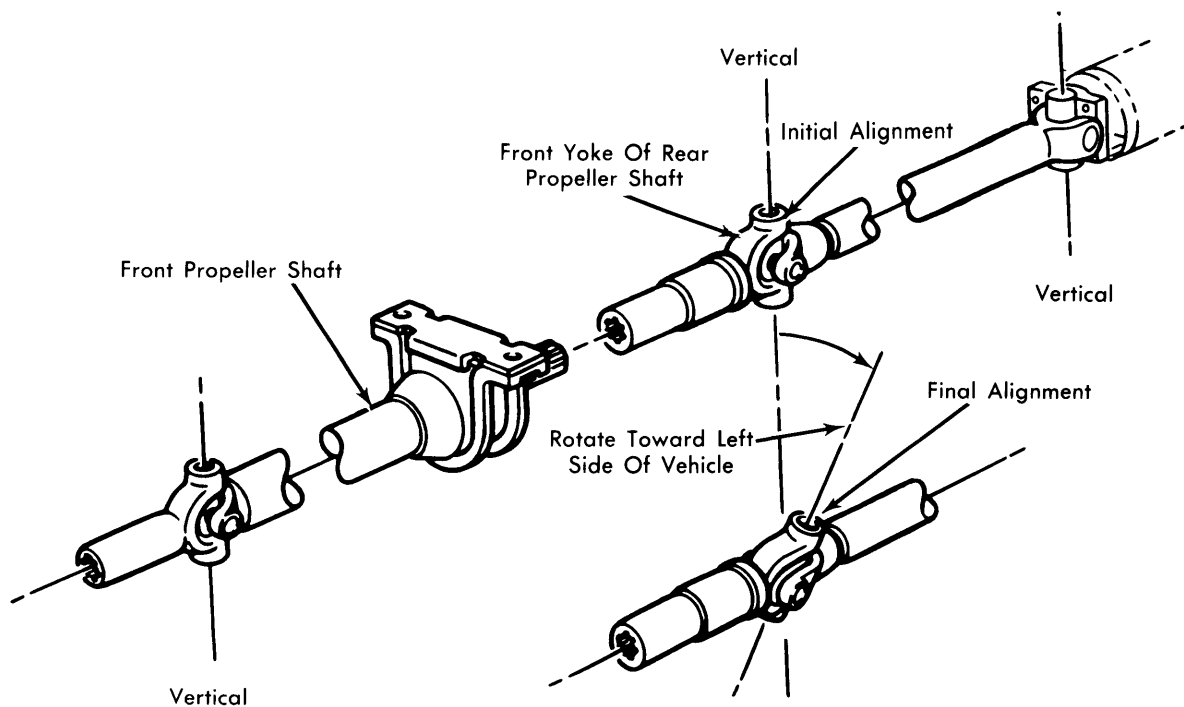
NOTE — In certain cases, splines on slip joint are not uniform in width. This will match non-uniform pattern in female part of joint and allow for assembly in only one position. If flanges are not in phase after assembly, assembly is correct as long as parts were mated properly.

Propeller Shaft Phasing (All Others) — Check that flanges on either end of drive shaft are in same plane. Often there are arrows on slip joint and drive shaft to aid in alignment. If flanges are not in same plane, disassemble universal joint and align (see Illustration).



SLIP JOINT ALIGNMENT ARROWS (TYPICAL)

Propeller Shaft Balance — Often propeller shaft imbalance can be cured by disconnecting shaft and rotating it 180° in relation to other components. Test by raising rear wheels off ground and turning shaft with engine. **CAUTION** — Avoid excessive engine speed during this type of test. If shaft still vibrates, attach a small weight to shaft at spline joint end. Weight should be about ½ oz. attached with hose clamp. Rotate shaft with engine and try weight in different locations around circumference of shaft to find position where vibration is least; then increase or decrease size of weight until vibration disappears. When proper size and location of weight are determined, tack weld weight into place.

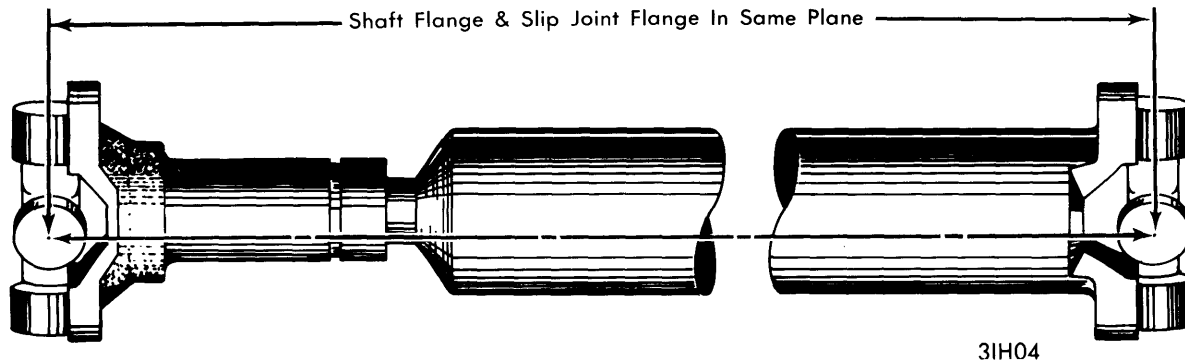


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ALIGNING UNIVERSAL JOINTS (CHEV. & GMC)

Drive Axles

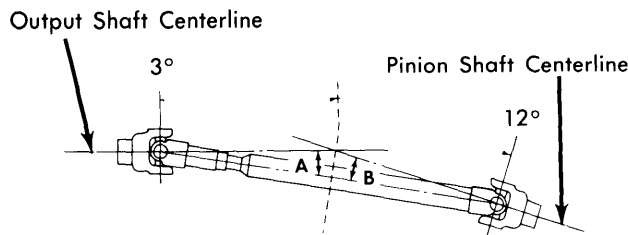
PROPELLER SHAFT ALIGNMENT (Cont.)



PROPELLER SHAFT IN PHASE

Flange Alignment & Runout - 1) All flanges must be perpendicular in both vertical and horizontal planes to engine crankshaft. The only exception is "broken back" type driveline which has flanges that are not perpendicular in vertical plane (see illustration).

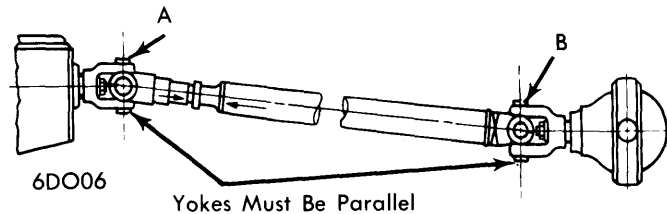
3) Parallel type joints maintain a constant velocity between output shaft and pinion shaft. Vibration is minimized and component life maximized when universal joints are parallel.



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"BROKEN BACK" TYPE DRIVELINE (TYPICAL)

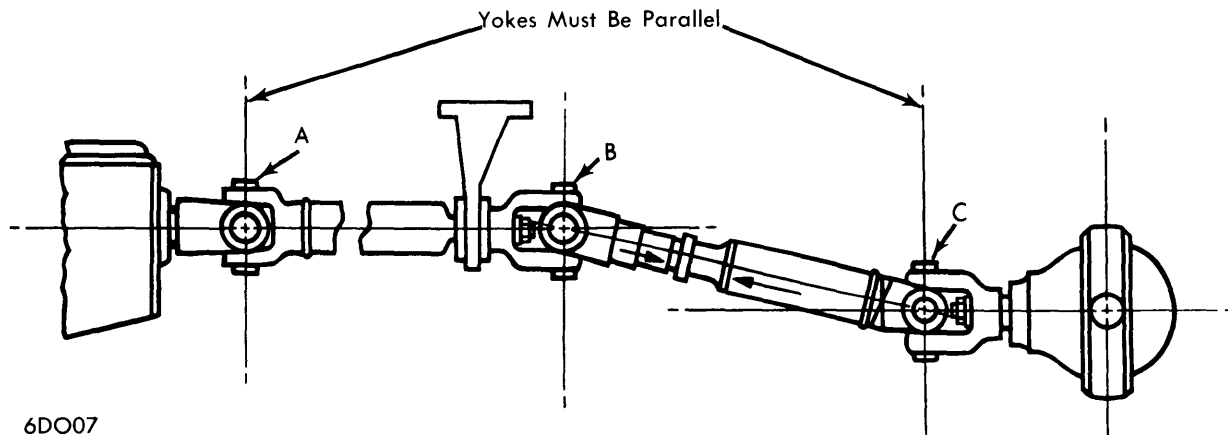
2) With nonparallel or "broken back" type installation, working angles of universal joints of a given drive shaft are equal. (See illustration, Angle A=Angle B.) This is calculated as follows: Angle of output shaft centerline is subtracted from angle of drive shaft, which should equal angle of drive shaft subtracted from pinion shaft angle.



FLANGE ALIGNMENT (ONE PIECE SHAFT)

4) Using dial indicator, measure runout of transmission flange, center bearing flange, and pinion flange. If runout exceeds .005", replace flange. If dial indicator cannot be used, push a rod with a slip fit through flange bearing bore and see if it aligns with opposite bore; if it does not, replace flange.

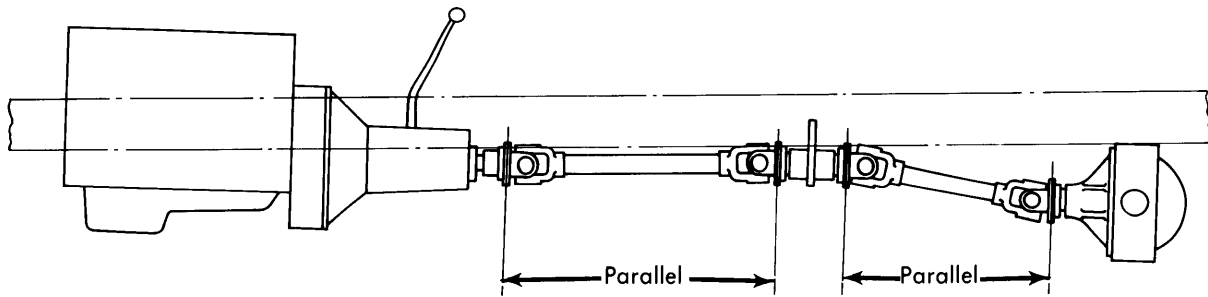
5) Rotate transmission flange until it is vertical, measuring from side. Check center bearing and pinion flanges; they cannot be more than 1° off vertical. **NOTE** - See *Propeller Shaft Phasing* in this article.



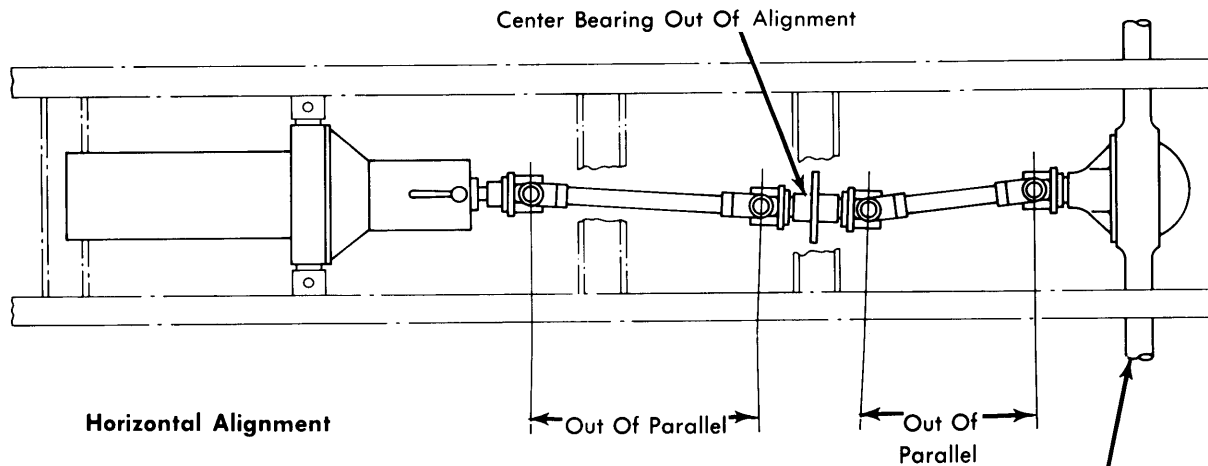
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FLANGE ALIGNMENT (TWO PIECE SHAFT)

PROPELLER SHAFT ALIGNMENT (Cont.)



Vertical Alignment



Horizontal Alignment

Axle Housing Out Of Alignment

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HORIZONTAL & VERTICAL ALIGNMENT

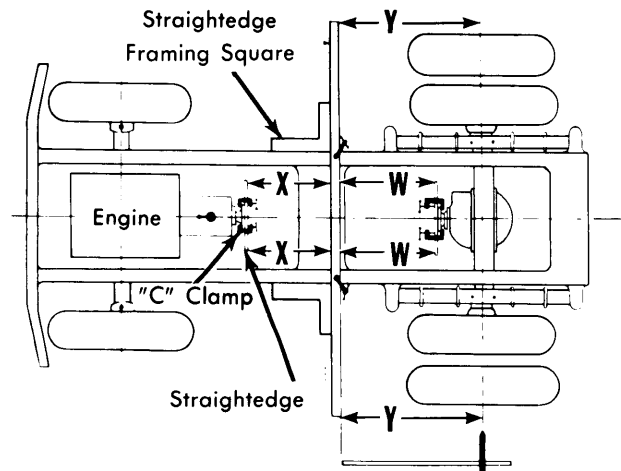
6) Rotate transmission flange until it is vertical, measuring from side. Then measure angle from end and record. Check all other flanges for same angle. They must be within $\frac{1}{2}^\circ$ of each other. Adjust as required.

7) If difficulty is encountered when making above adjustments, horizontal alignment should be checked. As shown in illustration, even though vertical alignment is correct, horizontal alignment can be badly out of adjustment especially after major component replacement or serious accident.

8) To make horizontal alignment checks, set up straightedges as shown in illustration. With transmission flange horizontal, clamp a straightedge to it so that straightedge is horizontal. Do the same with pinion flange. Using a straightedge that is 12" longer than rear wheel track, clamp it to frame side rails using large framing squares to align.

9) Measure distance "X". If two dimensions are not within $\frac{1}{16}$ " of each other, transmission flange is misaligned horizontally. Measure distance "W". If two dimensions are not within $\frac{1}{16}$ " of each other, pinion flange is misaligned horizontally. Measure

distance "Y", from edge of straightedge to center of axle shaft. If two dimensions are not within $\frac{1}{8}$ " of each other, axle housing is misaligned.

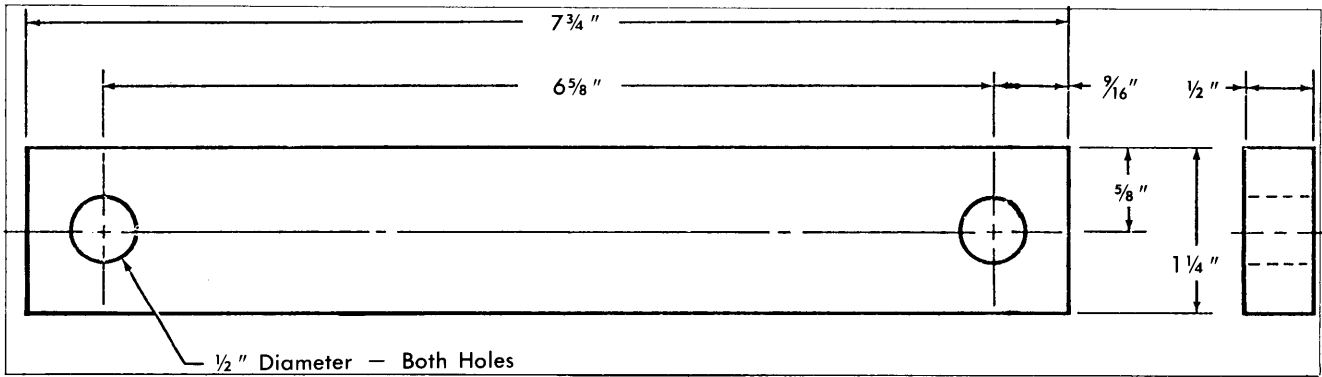


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CHECKING HORIZONTAL ALIGNMENT

Drive Axles

PROPELLER SHAFT ALIGNMENT (Cont.)

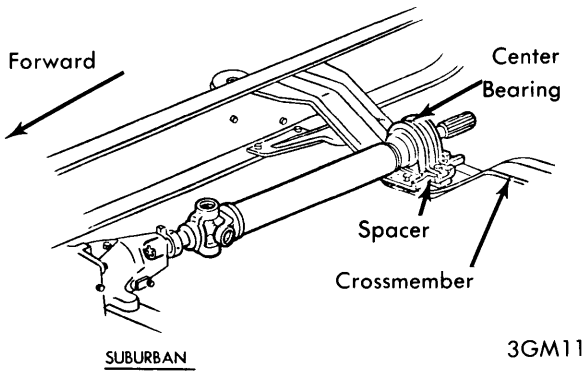


SPACER DIMENSIONS

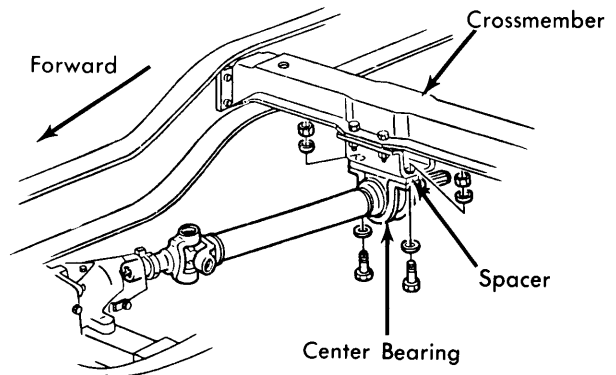
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Driveline Shudder (1973 GMC C-1500) - 1) On 1973 C-1500 conventional cab and Suburban with Turbo Hydra-Matic 400 and C-1500 Suburban with Turbo Hydra-Matic 350 built before January 2, 1973, a driveline shudder during acceleration can be fixed by installing a 1/2" spacer between propeller shaft center bearing support and propeller shaft hanger. This spacer corrects driveline angle, eliminating shudder.

2) To install spacer, remove two mounting bolts used to attach center bearing to hanger; discard bolts. Install spacer between center bearing support and attach by using two new bolts, 7/16-14 x 1 3/4".



SPACER LOCATION SUBURBAN MODELS



SPACER LOCATION CONVENTIONAL CAB MODELS

3GM12