Propeller Shafts

PROPELLER SHAFT ALIGNMENT

All Models

DESCRIPTION

Propeller shafts are balanced, 1-piece, tubular shafts with universal joints at each end. The number used in a vehicle varies: 1 shaft, 2 shafts with center bearing, or 3 shafts in 4-wheel drive applications. Location of slip joints varies with model and manufacturer. *See Fig. 1.*

INSPECTION

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

TIRES AND WHEELS

Check tire inflation and wheel balance. Check for foreign objects in tread, damaged tread, mismatched tread patterns or incorrect tire size.

CENTER BEARING

Tighten propeller shaft center bearing mounting bolts. If bearing insulator is deteriorated or oil-soaked, replace it.

ENGINE & TRANSMISSION MOUNTINGS

Tighten mounting bolts. If mountings are deteriorated, replace them.

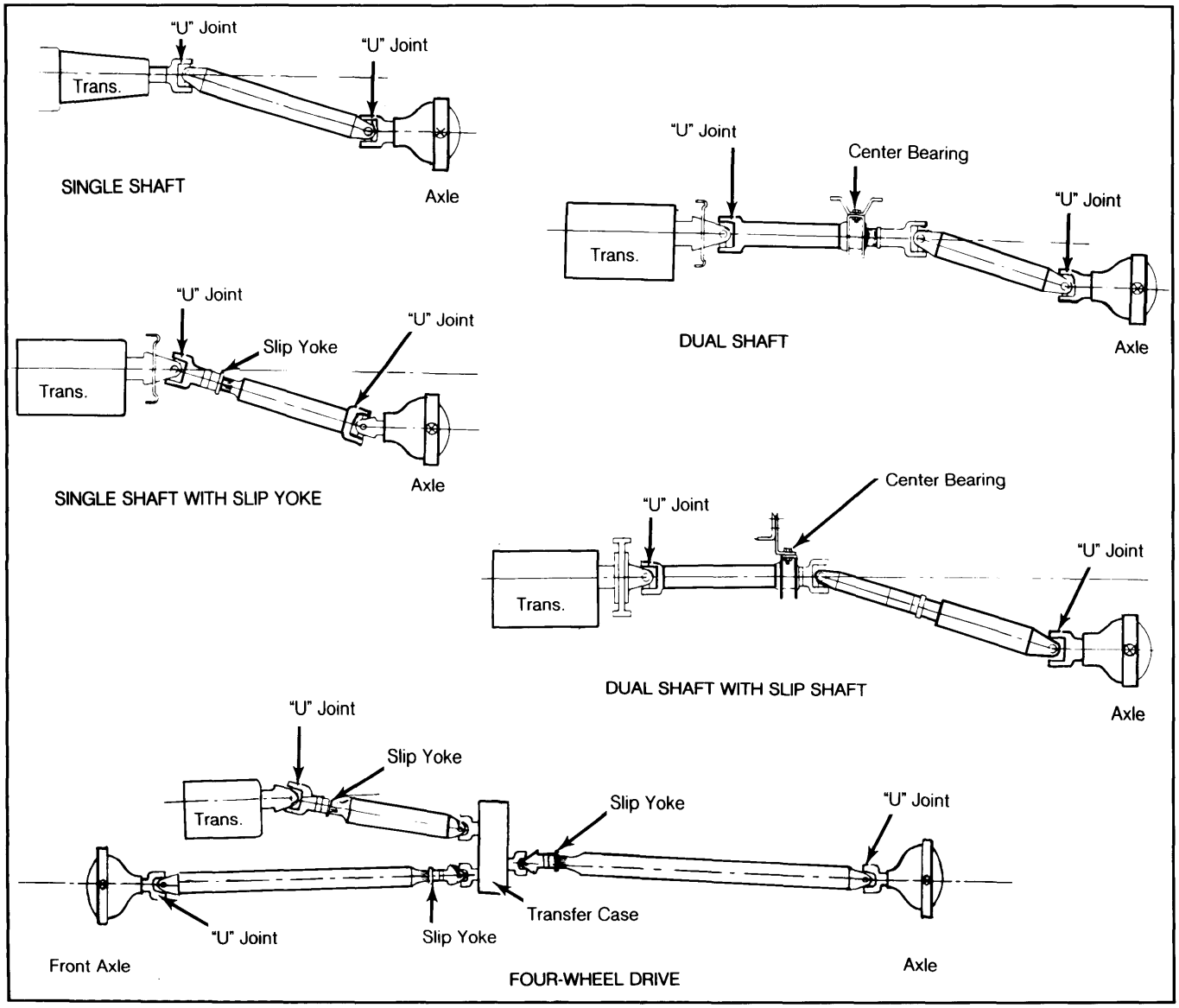
PROPELLER SHAFT

Check propeller shaft for damage or dents that could effect balance. Check for undercoating adhering to shafts. If present, clean shafts thoroughly.

UNIVERSAL JOINTS

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

Fig. 1: Five Commonly Used Propeller Shaft Combinations



Four-wheel drive models use 3 propeller shafts.

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PROPELLER SHAFT ALIGNMENT (Cont.)

ADJUSTMENTS

PROPELLER SHAFT PHASING

Chevrolet & GMC

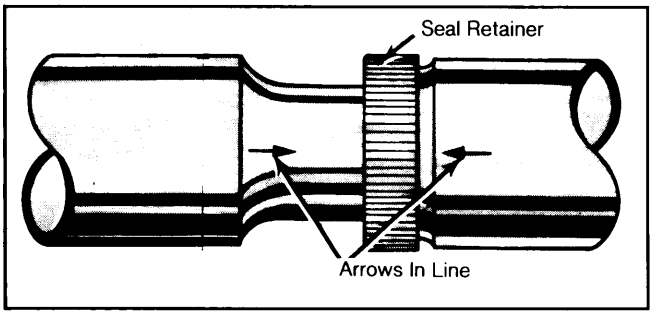
1) All models with 32 splines use an alignment key on spline, and can mate in correct position only. On "C" and "P" models with 2-piece shafts, proper phasing is accomplished with an alignment key on spline and can mate in correct position only.

2) On "G", "K", and "S" models with 2-piece shafts, rotate transmission yoke until trunnion is in vertical position. Install front propeller shaft with "U" joint trunnion in horizontal position. Install bearing support to cross-member. Align rear propeller shaft with "U" joint trunnion to horizontal position and install shaft.

All Other Models

Check that flanges on either end of propeller shaft are in same plane. Often there are arrows on slip joint and propeller shaft to aid in alignment. If flanges are not in same plane, disassemble universal joint and align.

Fig. 2: View Showing Typical Slip Joint Alignment Arrows



Align arrows to sides of seal retainer.

PROPELLER SHAFT BALANCE

1) 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: Do not run engine with transmission engaged for prolonged periods, as overheating of engine or transmission may occur.

2) On most models, balancing may be done by marking shaft in 4 positions, 90° apart. Place marks approximately 6" forward of weld, at rear end of shaft. Number marks 1 through 4.

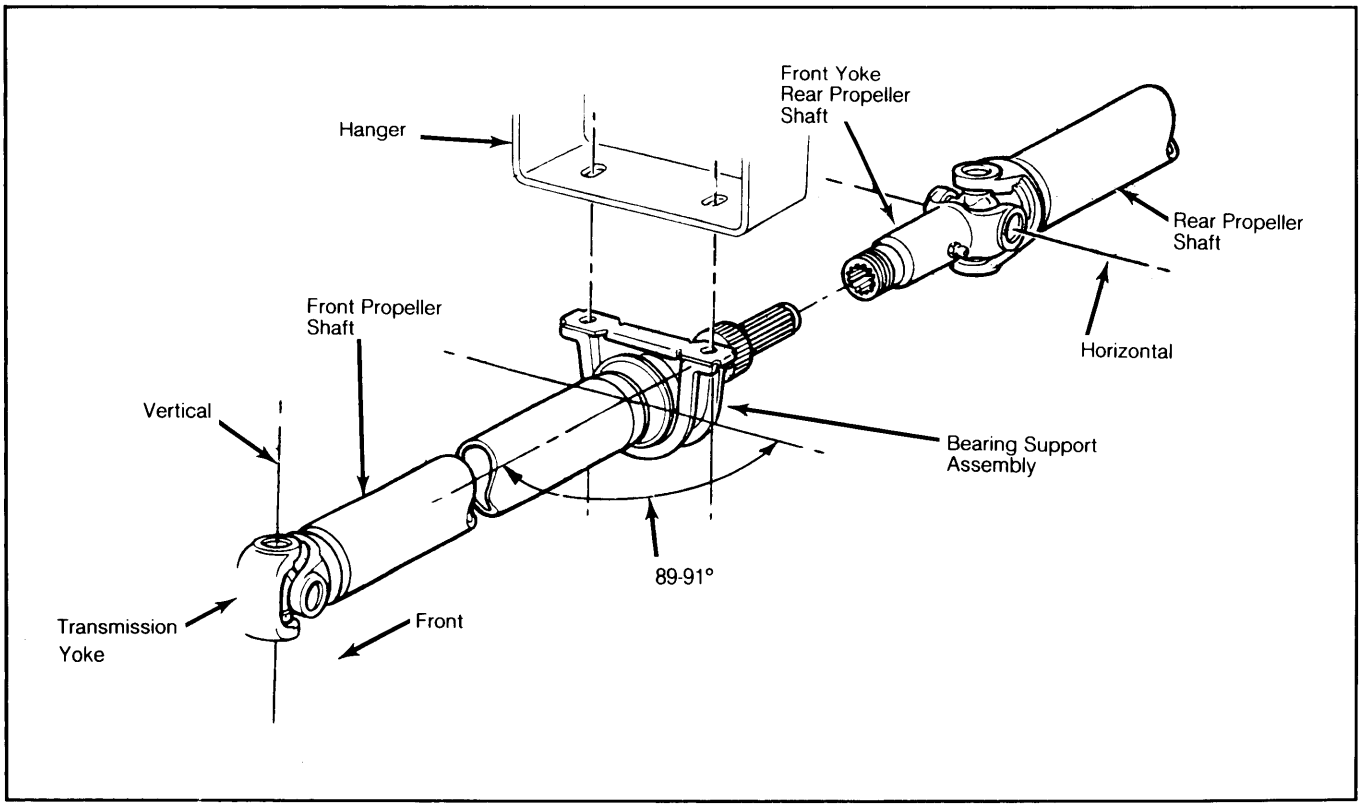
3) Place a screw-type hose clamp in No. 1 position, and rotate shaft with engine. If there is little or no change, move clamp to No. 2 position, and repeat test.

4) Continue procedure until vibration is at lowest level. If no difference is noted with clamp moved to all 4 positions, vibrations may not be propeller shaft imbalance.

5) If vibration is lessened but not completely gone, place 2 clamps at that point, and run test again. The combined weight of clamps in 1 position may worsen vibration. If so, rotate clamps ½" apart, above and below best position, and repeat test.

6) Continue to rotate clamps as necessary, until vibration is at lowest point. When point is reached where vibration has been eliminated, bend end of clamp so it will not loosen. If vibration level is still unacceptable, repeat procedure at front end of propeller shaft.

Fig. 3: Propeller Shaft Phase Alignment for Chevrolet and GMC Models ("G", "K" & "S" 2-Piece Shaft)



When aligning, set transmission and rear shaft trunnions vertically, others horizontally.

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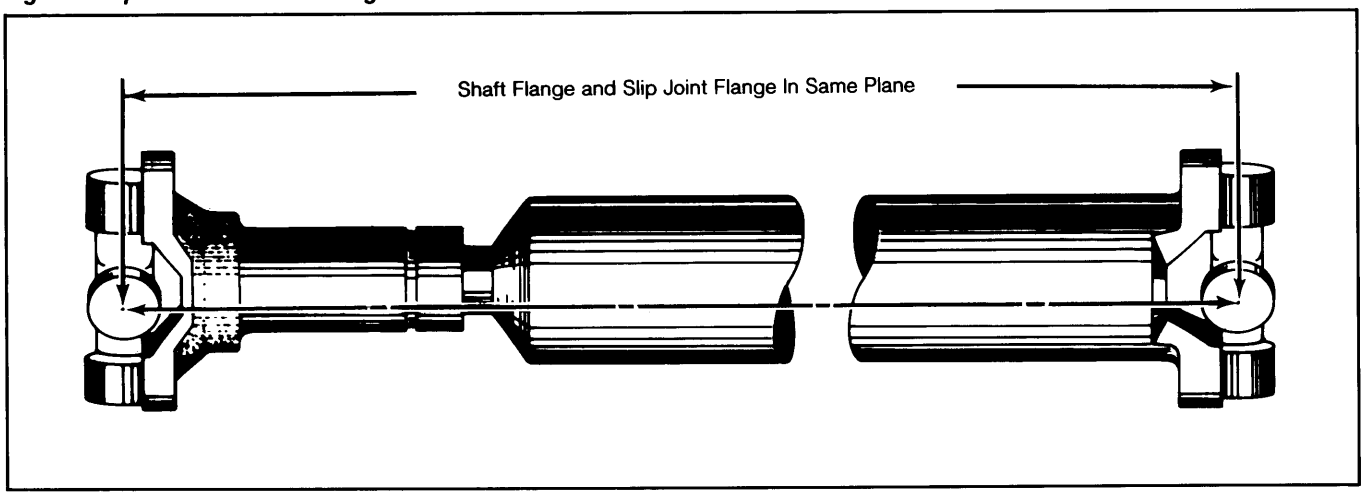
PROPELLER SHAFT ALIGNMENT (Cont.)

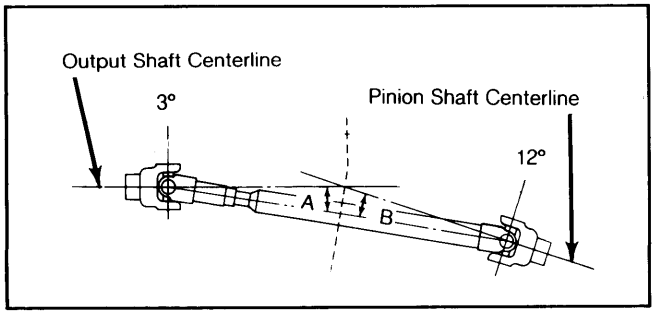
Fig. 4: Propeller Shaft Phase Alignment



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 Fig. 5.*

Fig.5: Typical "Broken Back" Type Propeller Shaft Alignment

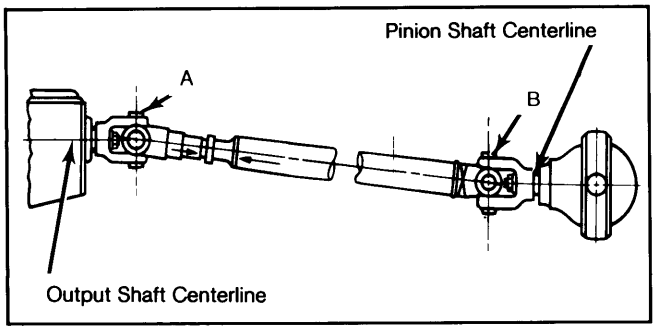


Angle "A" equals angle "B".

2) With nonparallel or "broken back" type installation, working angles of universal joints of a given propeller shaft are equal. *See Fig. 5.* Angle "A" = Angle "B".

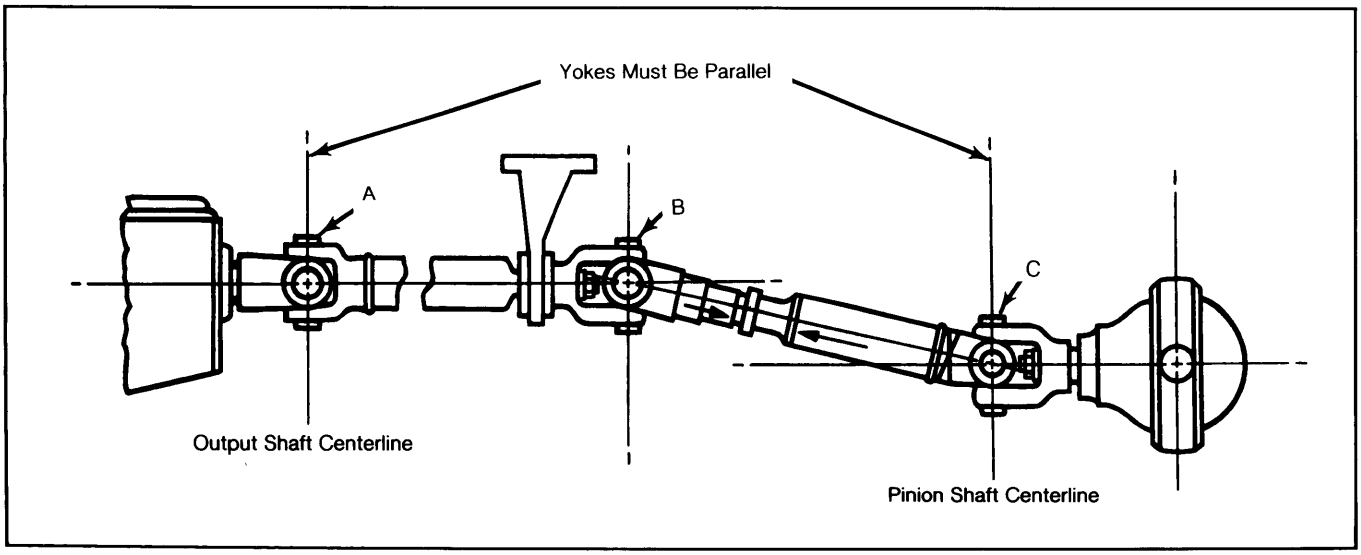
3) This is calculated as follows: Angle of output shaft centerline is subtracted from angle of propeller shaft. Difference should equal angle of propeller shaft subtracted from pinion shaft angle.

Fig. 7: Aligning 1-Piece Propeller Shaft



Yokes must be parallel.

Fig. 6: Alignment of 2-Piece Propeller Shaft Flange



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PROPELLER SHAFT ALIGNMENT (Cont.)

4) 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.

5) Using dial indicator, measure runout of transmission flange, center bearing flange, and pinion flange. If runout exceeds .003-.005" (.08-.13 mm), replace flange.

6) If dial indicator cannot be used, push rod with a slip fit through flange bearing bore. See if it aligns with opposite bore. If not, replace flange.

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

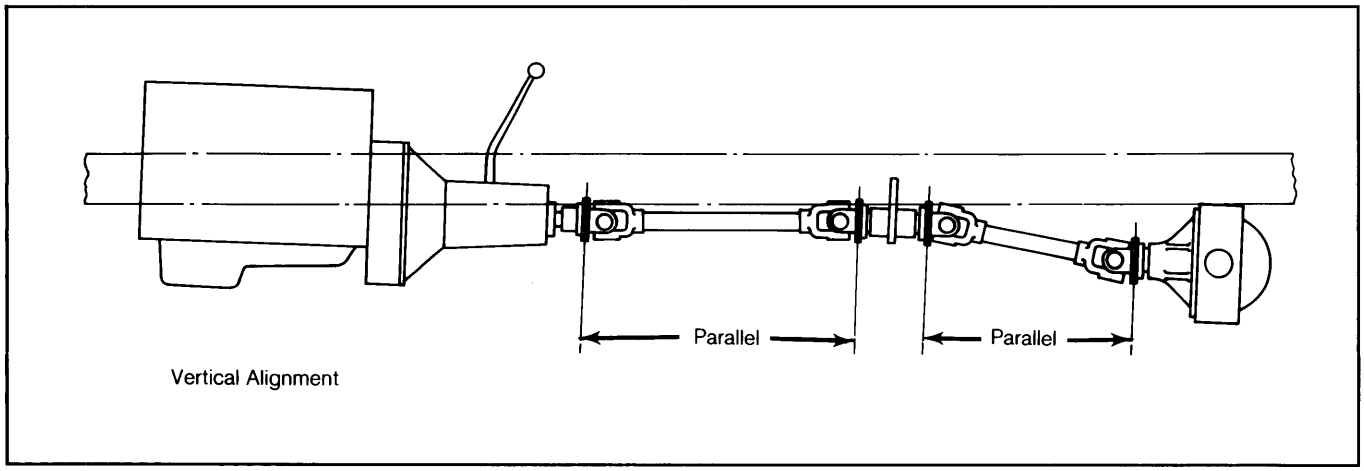
8) Rotate transmission flange until it is vertical, measured from side. Then, measure angle from end, and record it. Check all other flanges for same angle. They must be within ½° of each other. Adjust as required.

9) If difficulty is encountered when making above adjustments, horizontal alignment should be checked. Even though vertical alignment is correct, horizontal alignment can be badly out of adjustment. This is especially true after major component replacement or serious accident. *See Fig. 9.*

10) To make horizontal alignment checks, set up straigtedges. *See Fig. 10.* With transmission flange horizontal, clamp a straightedge to it, so that straightedge is horizontal. Do the same with pinion flange.

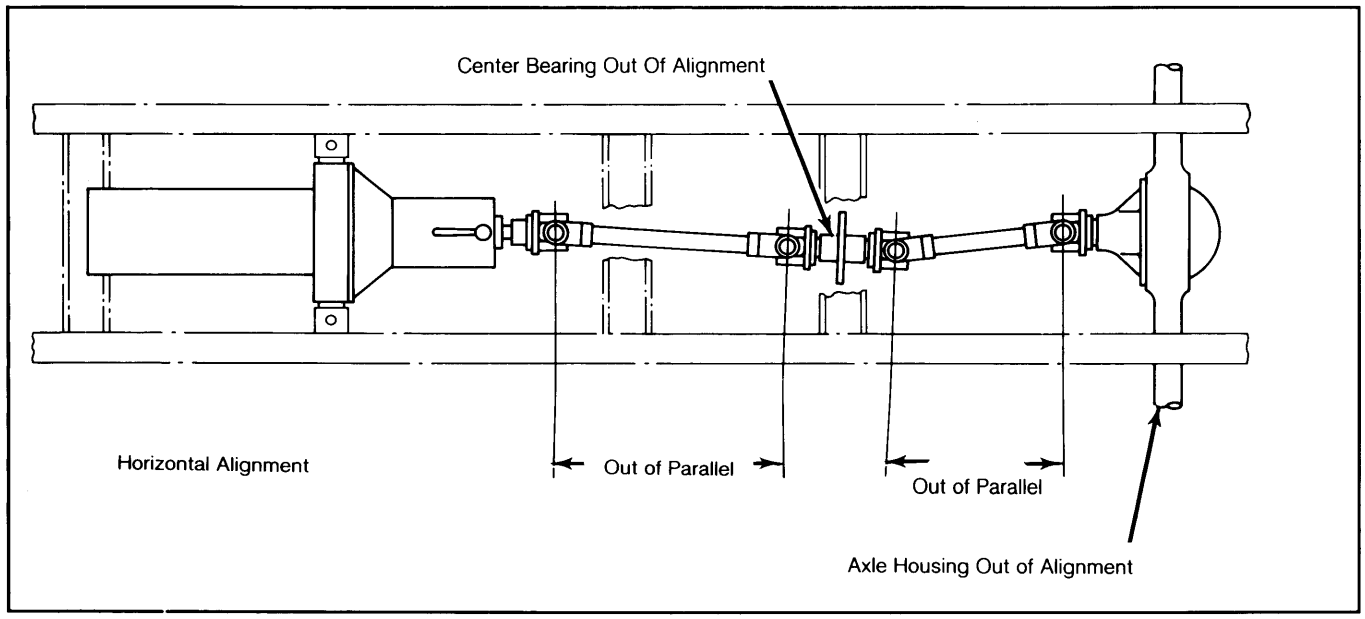
11) Using a straightedge that is 12" longer than rear wheel track, clamp it to frame side rails. Use large framing squares to align. Measure distance "X" at each side. If 2 dimensions are not within 1/16" of each other, transmission flange is misaligned horizontally.

Fig. 8: Vertical Alignment of Propeller Shaft



Pairs of flanges should be parallel.

Fig. 9: Horizontal Alignment of Propeller Shaft



Plane of trunnions should be parallel.

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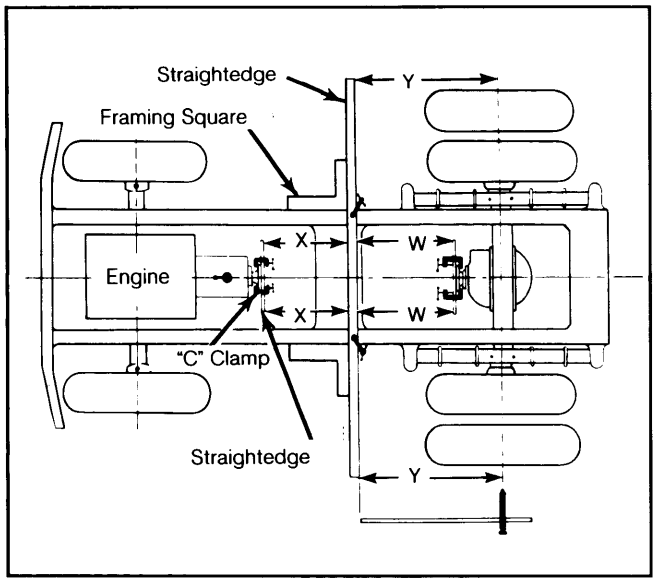
Propeller Shafts

PROPELLER SHAFT ALIGNMENT (Cont.)

12) Measure distance "W" at each side. If 2 dimensions are not within 1/16" (1.6 mm) of each other, pinion flange is misaligned horizontally.

13) Measure distance "Y" at each side, from edge of straightedge to center of axle shaft. If 2 dimensions are not within 1/8" (3.2 mm) of each other, axle housing is misaligned.

Fig. 10: Checking Horizontal Alignment



Using straightedge and framing square, measure at 6 points shown.

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