

Hints and Tips

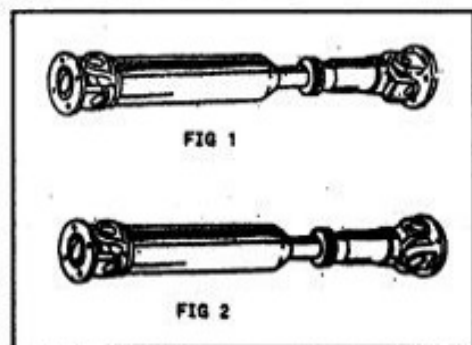
PROP SHAFT PHASING

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Those of you who change gearboxes and axles or merely replace the UJ kit in your propshaft may find it worthwhile reading

After a recent rebuild of my Land Rover I encountered a vibration which many Range Rover owners complain about. I had both prop shafts fully rebuilt and balanced including new slip joints and universals. Brand new tyres were fitted and balanced but a vibration still existed which I felt came from the front end. On removal of the front prop shaft the vibration ceased.

I inspected the shaft and found that it was in phase. When U-joint yokes are assembled to their shafts in the same plane they are in phase.

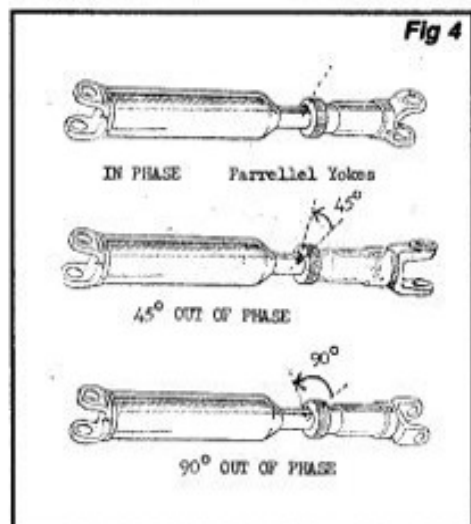


The prop shaft in Fig 1 is out of phase whilst Fig 2 is in phase.

Whenever a prop shaft is rebuilt it will always be set up In Phase, this allows the universal joints to work in unison with each other and to avoid vibrations and excessive wear. Nearly every motor vehicle ever made uses prop shafts that are in phase with the exception of, you guessed it, the Range Rover and 110 Land Rover. I am quite sure that prop shaft rebuilders and even some Land Rover workshops are

unaware of this? which is why the shafts are reinstalled incorrectly In Phase. This applies to the front shaft only and is not mentioned in the workshop manual.

Fig 4 shows more clearly the difference in joint yoke alignment which determines the shaft phasing. The



prop shaft phasing can very easily be adjusted by undoing the dust cap separating the splines and turning the sleeve in relation to the shaft and refitting. As there are 16 splines each turn of one spline corresponds to a change in phasing of 22.5 degrees as per Fig 5 (ie 360 degrees - 16)

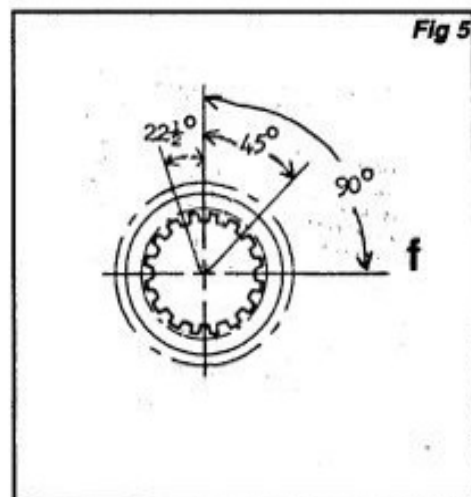


Fig 6 shows where an In Phase propshaft is used the drive flange yoke and the diff flange yoke are in parallel, regardless of the severity of angle of the shaft the universals are turning through the same plane and therefore MUST be In Phase. This is the case in 99% of vehicles.

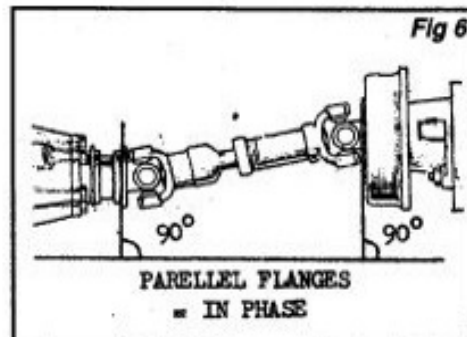
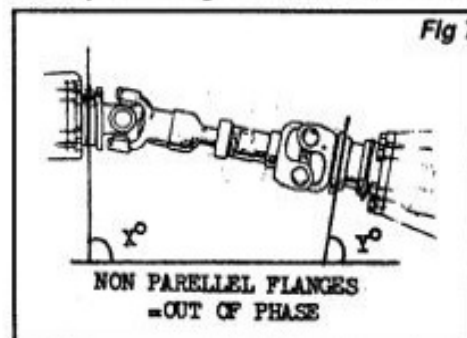


Fig 7 shows why the Range and 110 front shaft is out of phase. For some obscure reason the engineers at Rover decided to point the front differential pinion upward toward the transfer case. This upward angle would be about 15



degrees from the horizontal rendering the diff flange and drive flange no longer parallel. The universals are no longer turning in unison and are working against each other causing vibration. If the shaft is set Out Of Phase by 45 degrees as shown in Fig 7 then the balance is restored. If your Range is vibrating then there is a good chance that front shaft is In Phase.

This upward pointing diff syndrome often occurs when a Salisbury diff is fitted to a shortie. The backyard mechanic will often point the diff up toward the transfer case apparently to save wear on the UJ (actually makes no difference) but does not set the shaft out of phase. In this case the difference needed may be only 22.5 degrees.

In most cases where a rebuilt front Range shaft is supplied it will have been balanced In Phase and setting it at 45 degrees Out of Phase may require it to need rebalancing, but the problem on my Landy was solved simply by resetting the phase to 45 degrees Out of Phase (My Landy used a Range front end). No matter what type of 4WD you own it would be in your interest to inspect your shafts using the rule of In Phase, except Range and 110 FRONT shaft which is 45 degrees out. Also check to make sure that the shafts are not 90 degrees Out Of Phase which deceptively looks like it is In Phase as per Fig 1 and Fig 2.

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