Service Information

Clutches: Alignment errors

Clutch damage is frequently caused by misalignment between the crankshaft and transmission input shaft. Ideally, both shafts have a common center line, i.e. are aligned, when the drive unit is fitted. Alignment errors are deviations from this ideal case. A distinction is made between parallel and angular offset (Fig. 1).

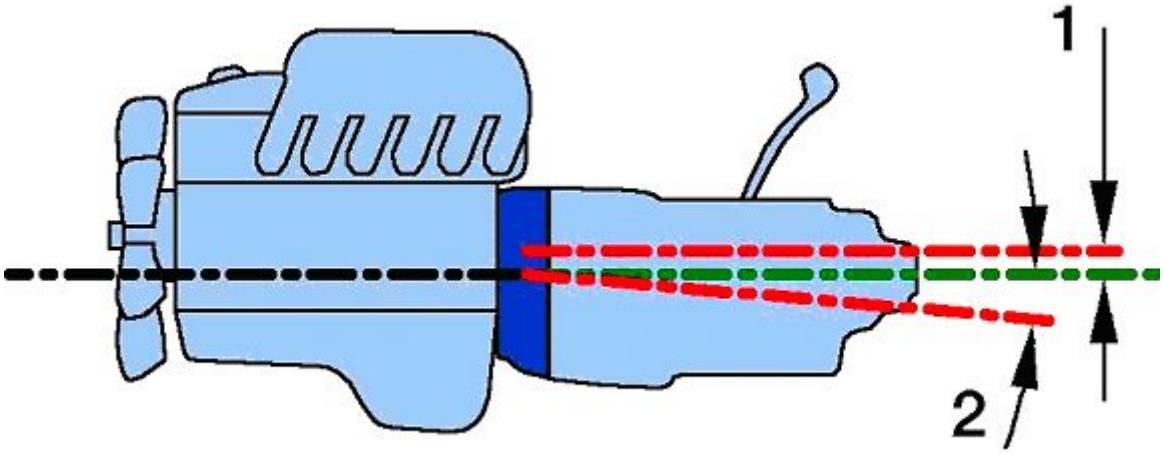

Fig. 1:

1 Parallel offset

2 Angular offset

Possible causes of misalignment:

- Centering (collar, close-tolerance sleeves or pins or the bores) between engine and transmission is not correct, due to deformation, heavy dirt or wear.
- Other parts, e.g. grounding strap, trapped between the engine and transmission during installation.
- Flange bolts loose or not properly tightened.
- Close-tolerance sleeves or pins missing or damaged.
- Clutch bell housing warped because attaching bolts have not been evenly tightened or deformed due to the effect of force such as dropping or striking hard when fitting.
- The transmission input shaft has no guidance because the pilot bearing in the flywheel (if part of the design) is absent or badly worn.

The effect of misalignment is that the hub of the clutch disc performs a rotatory motion relative to the other components of the clutch.
Imagine that the crankshaft, flywheel, cover assembly and facing ring of the clutch disc have a center line in the installed condition. The transmission input shaft with the fitted hub of the clutch disc have a center line which is different from the first one. In order to be able to transmit a rotary motion between two axes with a different center line, a cardan joint is needed.
Since the clutch disc is not designed as a cardan joint, the hub with the torsional-vibration damper is now pushed backwards and forwards in the facing ring on each rotation. It is possible to break a sheet of metal simply by repeatedly bending it backwards and forwards. Exactly this kind of loading now occurs at idling speed, in fact 800 times per minute at the weakest point of the clutch disc, at the interfacing springs between the facing ring and driver plate.

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The thrust face of the realease bearing is also eccentrically in contact with the diaphragm spring tips (release levers). This may cause the following damage to the clutch:

Cause	Consequence
The hub splines become worn, causing the hub to stick or tilt on the transmisssion input shaft	Noise/drag
Torn interfacing spring segments.	No force transmitted/drag
Damaged torsional-vibration damper due to torn retainer plates	No force transmitted/noise
Diaphragm spring tips heavily worn or completely abraded through, ridges on the inner ring of the releaser	Noise/drag

In the surrounding area, the pilot bearing and transmission input shaft can be damaged on the spigot which engages in the pilot bearing and also the transmission input shaft sealing ring and bearing in the transmission can be damaged.

No misalignment occurs during the installation due to an incorrectly centered clutch plate.

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