# FREEWHEEL PROPELLER SHAFT

## CHAPTER U2



**Note: This chapter does not deal with the freewheels fitted to cars E.50001-49.**

## DATA

Freewheel assembly:

| | |
|---|---|
| Make ... ... ... ... ... ... ... | Leyland Motors Ltd. |

Splined shaft assembly:

| | |
|---|---|
| Make ... ... ... ... ... ... ... | Hardy Spicer. |
| Type ... ... ... ... ... ... ... | 1700 series. |
| Universal joint No. ... ... ... ... ... | KL 1708-GB.46. |
| Angular movement of joint ... ... ... ... | 33°/35°. |

Double flange yoke assembly:

| | |
|---|---|
| Make ... ... ... ... ... ... ... | Hardy Spicer. |
| Type ... ... ... ... ... ... ... | 1700 series. |
| Universal joint No. ... ... ... ... ... | KL 1708-GB.102. |

## DESCRIPTION

The propeller shaft immediately after the engine and torque converter in a railcar transmission layout usually incorporates a freewheel unit (Fig. 1). The propeller shaft has universal joints of the trunnion journal and needle-roller type. To allow for longitudinal float when running, the leading part of the propeller shaft is made up of a splined shaft integral with the universal joint, which engages in the splined cam (19) in the freewheel unit, to form a sliding coupling.

### Freewheel

The freewheel (Fig. 1) is simply a one way clutch, and is of the cam and roller type. This type of freewheel will transmit torque in one direction only, and therefore, the transmission parts behind the freewheel can overrun the parts in front of it. Thus the engine can be allowed to idle by closing the throttle, without having to disengage the gears.

The freewheel employs an outer race (13), an inner splined cam (19) and a set of spring loaded rollers (12). The cage spring (8) is to just keep the rollers in contact with the outer race and splined cam when freewheeling, so when the speed of the drive from the engine increases above the transmission speed the drive is immediately taken up.

The freewheel is sealed at one end by an oil seal (2) and at the other by the double flange yoke assembly (16).

### Splined Shaft Assembly

The splined shaft assembly (Fig. 3) is made up of a splined shaft (9) integral with a universal joint.

The universal joint consists of a journal (3), four needle-roller bearing assemblies (2) and two yokes (1 and 8). Each needle-roller bearing is retained in the yoke eye by a seal (6) and retainer (7) assembled to the journal. A lubricator, and oilways drilled through each journal are provided for lubricating the bearings. A pressure relief valve is incorporated on some shafts to prevent damaging the seals when filling with a high pressure gun.

### Double Flange Yoke Assembly

The double flange yoke assembly (Fig. 2) is made up of a universal joint and two yokes (1 and 9).

The universal joint is the same as described in previous heading—Splined Shaft Assembly.

The flanged yoke (1) which is fastened to the freewheel outer race is fitted with two lubricators for lubricating the freewheel.

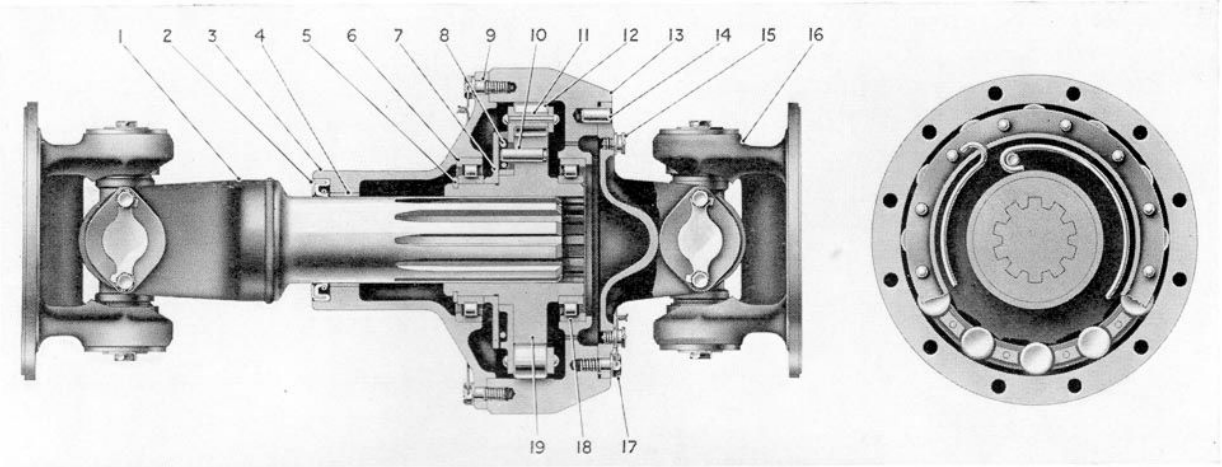


FIG. 1. FREEWHEEL UNIT

1. Splined shaft and universal joint assembly.
2. Oil seal.
3. Cover.
4. Bush.
5. Circlip.
6. Roller bearing.
7. Distance washer.
8. Cage spring.
9. Cover setscrew.
10. Dowel.
11. Roller cage.
12. Roller.
13. Outer race.
14. Dowel.
15. Lubricator.
16. Double flange yoke assembly.
17. Setscrew.
18. Roller bearing.
19. Splined Cam.

## LUBRICATION

Regular lubrication with the correct lubricant is most important.

### WEEKLY

Freewheel

Lubricate through the lubricators provided in the double flange yoke assembly with grease gun. Wipe off any surplus grease which exudes from the seals.

### MONTHLY

Propeller shaft universal joints—grease

Lubricate through the lubricator provided until it exudes through the pressure relief valve situated in the centre of the journal. Wipe off surplus grease after lubrication.

## MAINTENANCE

Check the universal joints periodically for worn needle-roller bearings. This can be done by testing the lift in the joints.

Examine the bolts securing the universal joint coupling flanges for slackness, and tighten if necessary.

If a considerable amount of oil is being thrown out of the joints, check for faulty seals or lost lubricators.

### To Remove

Remove the nuts and bolts from the universal flanges at the ends of the freewheel shaft, move the sliding end along its splines, and remove the freewheel shaft.

## OVERHAUL

### TO DISMANTLE

**Universal Joints**—Fig. 3:

1. Withdraw the splined shaft assembly from the freewheel and double flange yoke assembly.

2. Bend down tabs of the locking plates (5), then take out the retaining setscrews from the bearings caps (4) of the yoke ears.

3. Remove locking plates and bearing caps.

4. On some shafts, remove the circlips securing the needle-roller bearings in the yoke ears.

5. Support the flange yoke (1) and the splined shaft (9) on two wooden blocks.

6. Using a soft-nosed drift, slightly smaller than the outside diameter of the bearing housing, drive out from the top, the underneath bearing housing.

7. Repeat this operation for the opposite bearing, using the soft-nosed drift on the end of the exposed journal. The splined shaft (9) can then be removed.

8. Support the flange yoke on wood and tap out the bearing in a similar manner.

Repeat the above operations to dismantle the double flange yoke assembly Fig. 2, after removing the assembly from the freewheel unit.

### Checking Parts for Wear:

1. Should the bearing race assemblies and journals be a loose fit, load markings, or distortions be observed, they must be renewed complete. It is essential that the bearings are a light drive-fit in the flange and shaft yoke eyes.

2. There should be no more than .010 in. circumferential movement between the splined shaft assembly and the splined cam in the freewheel unit.

**Freewheel**—Fig. 1.

1. Unscrew the setscrews (9) securing the freewheel cover (3) to the outer race (13) and remove the cover.

   The outer race of the roller bearing (6) will remain in the cover, if necessary drive it out using hammer and a brass drift.

2. Taking care not to lose any of the freewheel rollers (12) withdraw from the outer race (13), the splined cam (19) complete with the roller cage (11) and the inner races of the roller bearings.

   The outer race of the roller bearing (18) will remain in the outer race, if necessary drive it out using a hammer and a brass drift.

3. Remove the circlip (5) from splined cam.

4. Lever the two inner races of the roller bearings off the splined cam, using suitable pinch bars; ensure that the inner races are retained with their mating outer races.

5. Remove the distance piece (7).

6. Remove the cage spring (8) followed by the roller cage (11).

**TO ASSEMBLE**

### Universal Joints:

Assembly is the reverse of the dismantling procedure, noting the following points:

1. It is advisable to renew the oil seals and retainers.

2. See that all drilled holes in the journal are cleaned out and filled with oil.

3. Assemble the needle-rollers in the bearing housings, if any difficulty is encountered smear the wall of the housing with oil.

4. Insert the journal (3) in the flange yoke (1).

5. Fit new oil seals, and using a drift described in dismantling, tap one bearing into position. It is essential that the bearing races are a light drive-fit, and are replaced with the slot on top in line with the bearing cap screw holes, so that they are prevented from rotating by the key in the bearing cap.

6. Repeat this operation for the other three bearings.



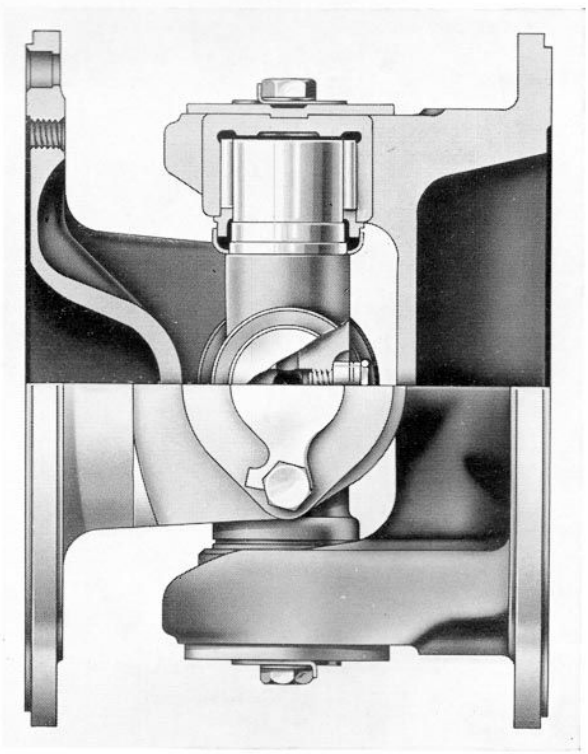

FIG. 2. DOUBLE FLANGE YOKE ASSEMBLY

7. If the universal joints appear to bind when assembled, tap the ears lightly with the drift, to relieve any pressure on the end of the journal bearings.

8. Replace the bearing caps, locking plates and cap screws, bend up the locking tabs.

**Freewheel:**

Assembly is the reverse of the dismantling procedure.

**Complete Shaft Assembly:**

When all three separate components of the propeller shaft and freewheel are complete the following points should be noted

1. When assembling the splined shaft to the freewheel smear the splines with oil.

2. When assembling the double flange yoke assembly to the freewheel, the jointing faces should be coated with a non-hardening jointing paste.

**Note:** All fitting marks on the flanges or shaft must be in line with one another.

**To Fit**

Replacement of the propeller shaft and freewheel is the reverse of the removal procedure, noting the following point:

1. The universal flange nuts and bolts should be tightened evenly.

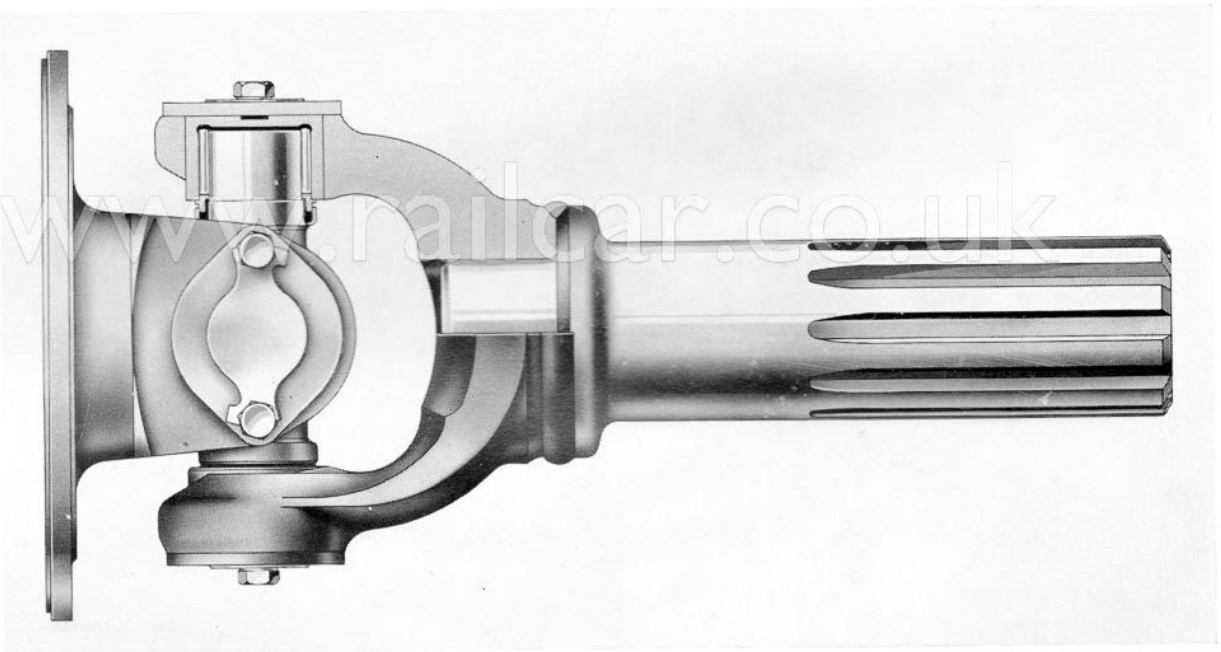

FIG. 3. SPLINED SHAFT ASSEMBLY