

Reduction gear and reverse gear for ALBIN marine engines AL-23, 0-41 and 0-411

Follow the instructions below if dismantling and reassembly of reduction gear, reverse gear or raised rear crank start are required.

Dismantling of reduction gear

If only the reduction gear is to be dismantled, and not the reverse gear, be careful that adjustment nut 14 (fig. 2) and lockwasher 13 are not disturbed during dismantling; otherwise, reassembly will be more difficult. This can be checked through the reverse gear inspection cover.

Dismantling of 2.06:1 reduction gear

- 1 Drain oil from reduction gear case.
- 2 Release coupling flange 10 (fig. 1), removing propeller shaft.
- 3 Remove bracket 2 and unscrew two nuts 26 and four bolts 28.
- 4 Remove gear case cover 1. Output shaft 18 with gear 22 and inner race for roller bearing 19, and outer race and rollers for roller bearing 3 will accompany cover 1.
- 5 Unscrew bolt 6 and remove lockwasher 5 and retainer 4.
- 6 Using puller tool in the tool kit, remove pinion 23.
- 7 Unscrew two bolts 27 and remove gear case 21 and key 24.

Dismantling of 2.93:1 reduction gear

- 1 Drain oil from reduction gear case.
- 2 Release coupling flange 10 (fig. 1), removing propeller shaft.
- 3 Remove bracket 2.
- 4 Unscrew nut 11 and remove lockwasher 12, washer 13 and seal 14.
- 5 Remove coupling flange 8, using a puller.
- 6 Unscrew two nuts 26 and four bolts 28.
- 7 Remove gear case cover 1.
- 8 Remove bolt 6 together with lockwasher 5 and retainer 4.
- 9 Remove pinion 23, using the puller tool in the tool kit.
- 10 Remove output shaft 18 together with bearing 17, gear 22 and inner race for roller bearing 19.
- 11 Unscrew two bolts 27 and remove gear case 21 and key 24.

Dismantling of reverse gear

In case of engines with reduction gear, dismantle reverse gear as follows from point 6 below, after reduction gear has been removed and reverse gear case drained.

- 1 Drain oil from reverse gear case.
- 2 Release coupling flange 3 (fig. 2), removing propeller shaft.
- 3 Unscrew nut 4 and remove lockwasher 5.
- 4 Unscrew bolt 9 and remove coupling flange 8 (washer 6 and seal 7 will accompany flange).
- 5 Remove retainer 10 from ball bearing 12 and take out key 11.
- 6 Remove inspection cover and extract oil dipstick.
- 7 Unscrew four bolts 22 holding case 18.

- 8 Put reverse lever to "forward" and, if necessary, tap lightly with a lead mallet or similar tool on the projecting control lever shaft (in direction away from the engine) so that the reverse gear case is shifted slightly from the intermediate casing. N.B. Strike the shaft itself, not the sealing ring retainer!
- 9 Move lockwasher 13 to the rear and unscrew adjustment nut 14. Put the reverse lever in neutral.
- 10 The reverse gear case may now be completely removed by tapping in an aft direction on the lever shaft 15. As soon as ball bearing 12, which accompanies the case, clears the reverse gear shaft tilt the case a little downwards to free fork end 16 from engagement cone 17. (On engines of type 0-411 the cone is provided with a ball bearing and the fork has two carriers for the ball bearing. Make sure when dismantling that the carriers are released from the ball bearing.) Friction band accompanies reverse gear case 18 when dismantled.
- 11 Remove lockwasher 13, adjustment nut 14 and cone 17, which remain on the reverse gear shaft.
- 12 The gear housing can be removed after unbolting the split securing collar 21. Be careful to remove the dowel pin 19, from the shaft. (In case of engines without crank starting, intermediate casing 23 may be dismantled before removing the gear housing.)

#### Dismantling raised rear crank start

The raised crank starting may be dismantled after the reverse gear has been removed.

- 1 Unscrew five bolts 25 (fig. 2) retaining intermediate casing 23. Remove intermediate casing 23 and pillar 26 from cylinder block, simultaneously removing chain from sprocket 24.
- 2 Sprocket 24 can be removed after unscrewing two bolts 1.

#### Reassembling raised rear crank start

- 1 Fit sprocket 24 (fig. 2) together with pawl 2. Turn the sprocket so that the pawl is at its lower position and so that a line between the two bolts 1 is horizontal (as shown in fig. 2).
- 2 Fit gasket between cylinder block and intermediate casing.
- 3 Offer up intermediate casing 23 complete with pillar 26, the chain being previously fitted to sprocket 27. Simultaneously, pass chain over sprocket 24. Position crank vertically downwards during fitting, as in fig. 2.
- 4 Fit five bolts 25. N.B. The short bolt (see fig. 2) should be fitted at top, inside intermediate casing.

#### Reassembling reverse gear

In the case of engines with reduction gear, reassemble reverse gear as described below up to point 7. Follow thereafter instructions under heading "Reassembling reduction gear".

- 1 Fit key 20 (fig. 2) and locate gear housing and securing collar 21 in position. Secure gear housing with collar 21. Check that dowel pin 19 is fitted into hole in shaft. (On engines without crank start the intermediate casing 23 may be fitted after gear housing and securing collar 21.) N.B. If intermediate casing has been dismantled from an engine without crank start, check when refitting that the short bolt 25 is fitted uppermost.
- 2 Remove ball bearing 12 from reverse gear case 18 and locate engagement cone 17 in control fork end 16. (On engines of type 0-411 the cone and ball bearing are placed in the two ball bearing carriers with which the fork end is provided.) If the tension of the brake band has been altered for any reason check when refitting the reverse gear case that the band is not excessively tightened.
- 3 Fit the gasket between the reverse gear case and the intermediate casing.
- 4 Offer up the reverse gear case 18, with reverse lever in neutral.
- 5 Fit four bolts 22.
- 6 Move reverse lever to forward position and fit adjustment nut 14 and lockwasher 13. Fit nut 14 with its chamfered face rearwards, and screw it as far as possible along the shaft. See before fitting that no locking tabs are turned down on lockwasher 13.
- 7 Fit ball bearing 12.
- 8 Fit key 11.
- 9 Fit cover 10 with its accompanying gasket. Check that seal ring in cover 10 is free from defects.

- 10 Fit coupling flange 8 tight up to ball bearing 12 but not yet tighten bolt 9.
- 11 Fit gasket 7 and washer 6.
- 12 Fit nut 4 but do not yet fit lockwasher 5.
- 13 Ensure that crankshaft is hard up against rear main bearing by striking the forward end of the crankshaft a couple of times with a lead mallet. Tighten nut 4.
- 14 Screw back adjustment nut 14 along the shaft so that lockwasher 13 and nut 14 lie tight against ball bearing 12.
- 15 Remove nut 4 and move coupling flange 8 a couple of millimetres back along the shaft by tapping it lightly in that direction.
- 16 Screw adjustment nut 14 a further  $\frac{1}{2}$  turn back along the shaft, ensuring at the same time that one of the grooves in the nut comes exactly opposite a locking tab on washer 13. Turn down the tab to secure the nut, using a small screwdriver, for example.
- 17 Tap coupling flange 8 lightly a couple of times to move it forward on the shaft, against ball bearing 12. Fit lockwasher 5 and tighten nut 4 finally.
- 18 Set reverse lever to neutral and check that coupling flange 8 on the reverse gear shaft can be turned by hand. If not, repeat adjustment as per points 15, 16 and 17, but move nut 14 only very slightly further back along the shaft - e.g. corresponding to one groove on the nut 14.
- 19 Tighten bolt 9.
- 20 Insert oil dipstick and fill reverse gear case with oil.
- 21 Fit inspection cover. Join propeller shaft to engine by fitting coupling flange 3.

#### Reassembling 2.06:1 reduction gear

Points 5 to 11 in the following instructions need be carried out only if the reverse gear has also been dismantled or if the adjustment nut 14 (fig. 2) has changed position for any reason.

- 1 Fit key 24 (fig. 1).
- 2 Fit gear case 21 together with associated shaft seal 25 and gasket between gear case and reverse gear case. Tighten the two bolts 27 with accompanying lockwashers.
- 3 Fit pinion 23 together with inner race for ball bearing 3, so that pinion 23 is tight up against ball bearing 12 (fig. 2).
- 4 Fit retainer 4 (fig. 1), lockwasher 5 and bolt 6.
- 5 Check that crankshaft is tight up against rear main bearing by striking it at the forward end with a lead mallet. Tighten bolt 6.
- 6 Screw back adjustment nut 14 (fig. 2) along the shaft so that lockwasher 13 and nut 14 lie tight against ball bearing 12.
- 7 Remove bolt 6 (fig. 1), lockwasher 5 and retainer 4 and pull pinion 23 a fraction of an inch back along the shaft, using the puller tool.
- 8 Screw adjustment nut 14 a further  $\frac{1}{2}$  turn back along the shaft, ensuring at the same time that one of the grooves in the nut comes exactly opposite a locking tab on washer 13. Turn down the tab to secure the nut, using a small screwdriver, for example.
- 9 Bring pinion 23 (fig. 1) back up against the ball bearing 12 (fig. 2). Fit retainer 4 (fig 1), bolt 6 and lockwasher 5. Tighten bolt 6 finally.
- 10 Move lever to neutral position and check that pinion 23 can be turned by hand. If not, repeat adjustment as per points 7 to 9, but move nut 14 (fig. 2) only very slightly further back along the shaft - e.g. corresponding to one groove on nut 14.
- 11 Insert oil dipstick and fill reverse gear case with oil. Fit inspection cover.
- 12 Fit gasket between cover 1 (fig. 1) and gear casing 21.
- 13 Fit cover 1 together with outer race and rollers for roller bearing 3, output shaft 18 and ball bearing 17, gear 22, roller bearing 19, axial bearing 15, sealing ring 7 and coupling flange 8. N.B. If axial bearing 15 has been dismantled from cover 1 see that it is correctly placed when refitting; the rear race has a smaller inside diameter than the forward one.
- 14 Fit two nuts 26 and four bolts 28.

- 15 Fit bracket 2. Join propeller shaft to engine by fitting coupling flange 10.
- 16 Fill reduction gear case with oil.

Reassembling 2.93:1 reduction gear

Points 6 to 12 in the following instructions need be carried out only if the reverse gear has also been dismantled or if the adjustment nut 14 (fig. 2) has changed position for any reason.

- 1 Fit key 24 (fig. 1).
- 2 Fit gear case 21 together with associated shaft seal 25 and gasket between gear case and reverse gear case. Tighten the two bolts 27 with accompanying lockwashers.
- 3 Fit output shaft 18 together with ball bearing 17, gear 22, roller bearing 19 (secured by circlip 20) and key 9.
- 4 Fit pinion 23 together with inner race for ball bearing 3, so that pinion 23 is tight up against ball bearing 12 (fig. 2).
- 5 Fit retainer 4 (fig. 1), lockwasher 5 and bolt 6.
- 6 Check that crankshaft is tight up against rear main bearing by striking it at the forward end with a lead mallet. Tighten bolt 6.
- 7 Screw back adjustment nut 14 (fig. 2) along the shaft so that lockwasher 13 and nut 14 lie tight against ball bearing 12.
- 8 Remove bolt 6 (fig. 1), lockwasher 5 and retainer 4 and pull pinion 23 a fraction of an inch back along the shaft, using the puller tool.
- 9 Screw adjustment nut 14 a further  $\frac{1}{2}$  turn back along the shaft, ensuring at the same time that one of the grooves in the nut comes exactly opposite a locking tab on washer 13. Turn down the tab to secure the nut, using a small screwdriver, for example.
- 10 Bring pinion 23 (fig. 1) back up against the ball bearing 12 (fig. 2). Fit retainer 4 (fig. 1), bolt 6 and lockwasher 5. Tighten bolt 6 finally.
- 11 Move lever to neutral position and check that pinion 23 can be turned by hand. If not, repeat adjustment as per points 8 to 10, but move nut 14 (fig. 2) only very slightly further back along the shaft - e.g. corresponding to one groove on nut 14.
- 12 Insert oil dipstick and fill reverse gear case with oil. Fit inspection cover.
- 13 Fit gasket between cover 1 (fig. 1) and gear casing 21.
- 14 Fit cover 1 together with outer race and rollers for roller bearing 3, springs 16 (3 off), thrust bearing 15 and seal 7. Tighten two bolts 26 and four bolts 28. If thrust bearing 15 has been dismantled from cover 1 see that it is correctly placed when refitting: the rear race has a smaller inside diameter than the forward one.
- 15 Fit coupling flange 8 so that it is flush against ball bearing 17.
- 16 Fit gasket 14, washer 13, lockwasher 12 and nut 11.
- 17 Fit bracket 2. Connect propeller shaft to engine by connecting coupling flange 10.
- 18 Fill reduction gear with oil.

Fig. 1  
Cross section of  
reduction gear

- 1 Cover for gear case
- 2 Bracket
- 3 Roller bearing
- 4 Retainer for roller bearing
- 5 Lockwasher
- 6 Bolt
- 7 Sealing ring in cover
- 8 Output shaft coupling flange
- 9 Key
- 10 Propeller shaft coupling flange
- 11 Nut
- 12 Lockwasher
- 13 Flange retaining washer
- 14 Joint
- 15 Thrust bearing
- 16 Bearing locating spring
- 17 Ball bearing
- 18 Output shaft
- 19 Roller bearing
- 20 Circlip
- 21 Gear case
- 22 Output shaft gear
- 23 Reverse gear shaft pinion
- 24 Key
- 25 Shaft seal
- 26 Nut (2)
- 27 Bolt (2)
- 28 Bolt (4)

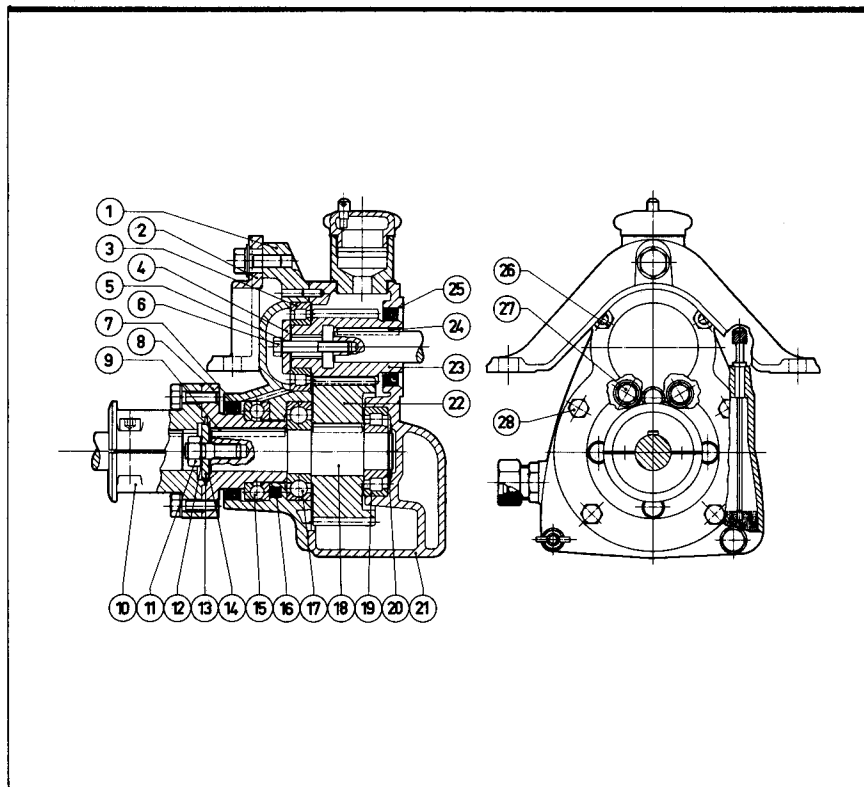


Fig. 2  
Cross section of reverse  
gear and raised crank start

- 1 Bolt (2 off)
- 2 Pawl
- 3 Coupling flange for propeller shaft
- 4 Nut
- 5 Lockwasher
- 6 Retaining washer
- 7 Gasket
- 8 Coupling flange for reverse gear shaft
- 9 Coupling securing bolt
- 10 Ball bearing retainer
- 11 Key
- 12 Ball bearing
- 13 Lockwasher
- 14 Adjustment nut
- 15 Control lever shaft
- 16 Control fork end
- 17 Engagement cone
- 18 Case
- 19 Dowel pin
- 20 Key
- 21 Securing collar
- 22 Bolt (4)
- 23 Intermediate casing
- 24 Lower sprocket
- 25 Bolt (5)
- 26 Pillar
- 27 Upper sprocket

