

# Starter

Job No.

15—0

The two types of starter used in the vehicle are:

- Bosch, Type EED 0,8 / 12 R 30 for left-hand drive models and
- Bosch, Type EED 0,8 / 12 R 32 for right-hand drive models.

These types are fitted with an electromagnetic meshing device; they have a rated output of 0.8 PS, a rated voltage of 12 v, and an armature housing diameter of 90 mm. The starter current flows via the contacts of the solenoid switch, so that only the control current flows via the starter switch on the instrument panel and through the windings of the solenoid switch.

The electric starter is, in principle, a series-wound motor fitted with a drive pinion and a meshing device. The series-wound motor develops the torque necessary to overcome inertia, to accelerate the mechanism and overcome the resistance of the first compression stroke. It then turns the engine at the necessary crankshaft speed until the engine starts. In order to develop the necessary torque to crank the engine, while still keeping the size of both battery and starter within reasonable limits, the starter is fitted with a small drive pinion which engages with the starter ring gear fixed to the engine flywheel. Owing to the high tooth ratio existing between the starter ring gear and the drive pinion, the pinion must not remain constantly engaged with the ring gear, as this would cause both pinion and starter armature to revolve at speeds beyond the permitted limits. It is therefore necessary, once the engine has started, to arrange for this positive coupling between starter armature and engine flywheel to be automatically released. This is done by arranging for the pinion meshing not to be rigid but to be coupled to the armature shaft via a roller bearing free-wheel coupling, and this free-wheel coupling releases the force-lock existing until then as soon as the pinion has ceased actually to drive the flywheel.

The starter leads must be of specified quality and section and must make good contact in order to avoid voltage drop and power-absorbing transient resistances. The voltage drop must not be more than 4 % of the rated voltage, i. e. it must not exceed 0.5 v.

If faults should develop in the starter, the cause may lie not in the starter itself but in the battery, the switches, leads, connections or in a defective ground lead.

## Removal and Installation of Starter

Job No.

15—1

### Removal:

1. Open the hood and disconnect the ground lead at the negative terminal of the battery.
2. Take off the control cable (2) of the solenoid switch, terminal 50, after removing the slotted screw (see Fig. 15—1/2).
3. Remove battery cable 30 and cable 51 (charging cable from generator to battery)

at the contact terminal (2) of the solenoid switch by unscrewing the hexagon nut (Fig. 15—1/1).

The rubber cover cap must be pushed back beforehand.

4. Unscrew the nuts of the fixing screws (5) for the starter. Remove the ground cable (3) of the battery and the ground cable (4) to the front panel.

5. Pull out the starter and remove it upward. Removal should be effected carefully because of the jointing flange.

**Note:** The jointing flange is between the starter flange and the partition plate.

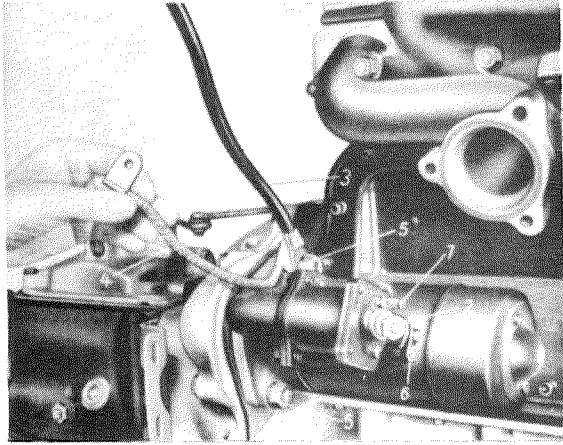


Fig. 15—1/1

- 1 Hexagon screws
- 2 Contact terminal for cables 30 and 51
- 3 Ground cable - battery
- 4 Ground cable to front panel
- 5 Fixing screws for starter
- 6 Cable from field coil to solenoid switch
- 7 Terminal 50 at solenoid switch

#### Installation:

6. Place the starter against the partition plate.
7. Slide the ground cables (3) and (4) with washer and lock washer onto the upper fixing screw (5). Then install the hexagon nut.
8. Install the lower fixing nut with washer and lock washer and tighten both nuts.
9. Connect the battery cable 30 and the red cable 51 (Leads Nos. 53 and 54 of the main wiring harness, see Job No. 54—1, Section A, Circuit Diagram of Main Wiring Harness,

Cable Sheaf 87) to the contact terminal of the solenoid switch.

Push the rubber cover cap over the contact terminal.

10. Connect the black/red control cable (2) (Lead No. 25) by means of the slotted screw to the solenoid switch (Fig. 15—1/2).

**Note:** The black/red control cable (2) must not be passed through the rubber cover cap (1), since this might cause it to rub away its insulation against the contact terminal for battery cables 30 and 51 (Fig. 15—1/2). If this were to happen, the control cable would become alive and operate the starter. The black/red control cable must therefore be wound around cables 30 and 51 and connected direct to terminal 50.

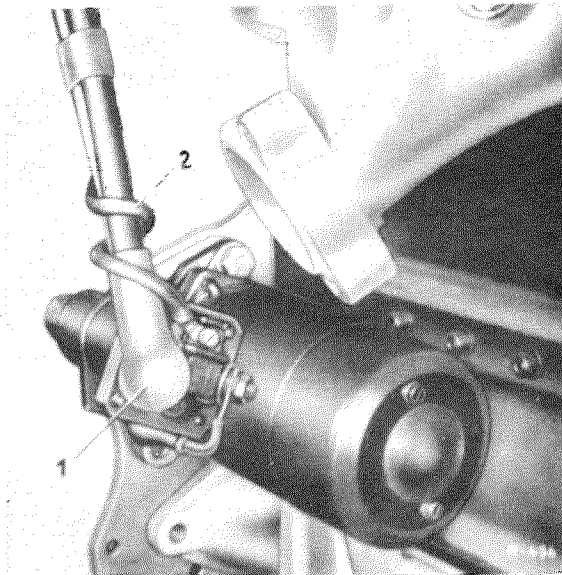


Fig. 15—1/2

- 1 Rubber cover cap
- 2 Control cable

11. Connect the ground cable to the negative terminal of the battery.