Glow Plug Starter and Stop Switch

Job No. 15-33

I. Model 180 D

The mechanical-electrical glow plug starter and stop switch is a rotary switch with four switch positions, i. e. stop position, drive position, pre-heating position, and starting position. The glow plug starter and stop switch is provided with a locking mechanism which makes it impossible to remove the key unless the switch is in the stop position.

Fig. 15-33/1 shows the wiring diagram for the individual components involved in the starting process. In this wiring diagram the glow plug starter and stop switch is shown in its drive position (0).

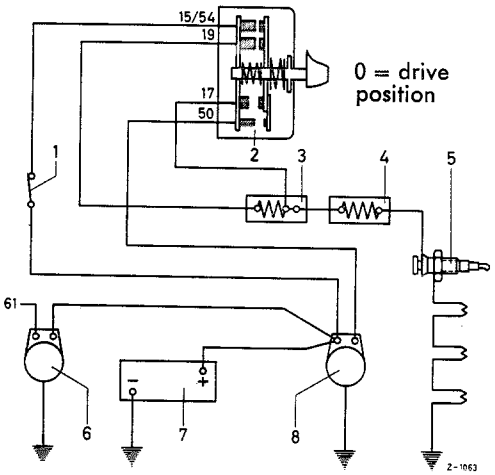

Fig. 15-33/1

1 Main switch
2 Glow plug starter and stop switch
3 Glow plug indicator resistor
4 Series resistance
5 Glow plug
6 Generator
7 Battery
8 Starter

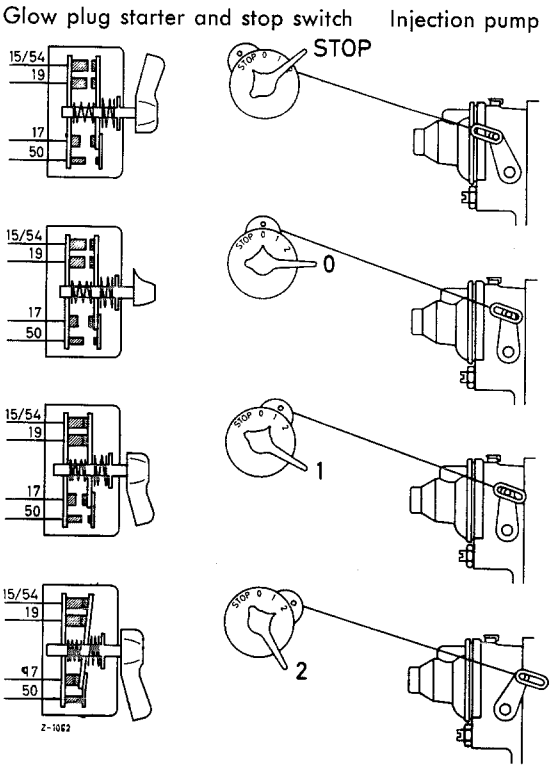

Fig. 15-33/2

S = Stop position
0 = Drive position
1 = Pre-heating position
2 = Starting position

Description of the Four Switch Positions (see Fig. 15-33/2)

The whole system can only be operated after the main switch (1) has been closed, which is done by turning the key to the position "Fahrt" (drive).

a) Stop = Stop Position

In the stop position the handle of the rotary switch is pressed upward toward the left; the Bowden cable pulls the adjusting lever on the injection pump as far back as it will go. In this

position of the adjusting lever, the control rod is in the stop position, the pistons are at the no-delivery position, the engine is no longer supplied with fuel and stops. In this position, terminals 19, 50, and 17 are dead.

The main switch key can be removed.

b) 0 = Drive Position

In the drive position the Bowden cable in relation to the slot on the adjusting lever is in such a position that the bolt of the adjusting lever is approximately in the center of the slot so that the adjusting lever is not being actuated. In this position terminals 19, 50, and 17 are dead.

The main switch key **cannot** be removed in this position.

c) 1 = Pre-Heating Position

From the drive position turn the handle of the rotary switch toward the right to position 1 until a certain resistance is encountered. The switch must be held in this position until the pre-heating process is finished, which depends on the outside temperature and the working temperature of the engine. In this position of the switch terminal 19 is supplied with current and causes the glow plugs (5) to glow via the indicator resistor (3) and via the series resistance (4) (Fig. 15-33/1). Terminals 50 and 17 are dead.

In the pre-heating position the Bowden cable in relation to the slot on the adjusting lever is in such a position that the slot does not rest against the bolt of the adjusting lever so that the lever is not being actuated.

d) 2 = Starting Position

When the pre-heating is finished the handle of the rotary switch is turned fully toward the right as far as the stop (the small resistance must be overcome) and it is held in this position until the engine starts.

In the starting position the bolt of the adjusting lever rests against the other side of the slot (in contrast to the stop position) and pushes the adjusting lever right forward. As a result the control rod is shifted in the direction "voll" (full load) beyond the full load stop and the injection pump supplies the amount required for starting.

In the starting position not only terminal 19 but also terminals 50 and 17 are supplied with current. The starter (8) is actuated via terminal 50. Via terminal 17 the glow plugs (5) continue to be supplied with current also in the starting position but the glow plug indicator resistor (3) is by-passed by lead (17) and therefore inoperative (see Fig. 15-33/1). By-passing the indicator resistor prevents the glow plug output from dropping too much during starting.

When the handle of the rotary switch is released after the engine has started, it returns to the 0 position (drive position).

II. Model 190 D

On Model 190 D the glow plug starter and stop switch takes the form of a push-pull switch and not of a rotary switch as on Model 180 D. However, this new push-pull switch cannot be installed in cars with right-hand drive so that these are equipped with the rotary switch used on Model 180 D.

The mechanical electrical glow plug starter and stop switch has four switch positions, i. e. stop position, drive position, pre-heating position, and starting position. The glow plug starter and stop switch is provided with a locking mechanism which makes it impossible to remove the key unless the switch is in the stop position. The push-pull switch works on the same principle as the rotary switch previously installed.

Fig. 15-33/3 shows the wiring diagram for the individual components involved in the starting process. In this wiring diagram the push-pull switch is shown in the drive position (F). The whole system can only be operated after the main switch (1) has been closed which is done by turning the key to the position "Fahrt" (drive).

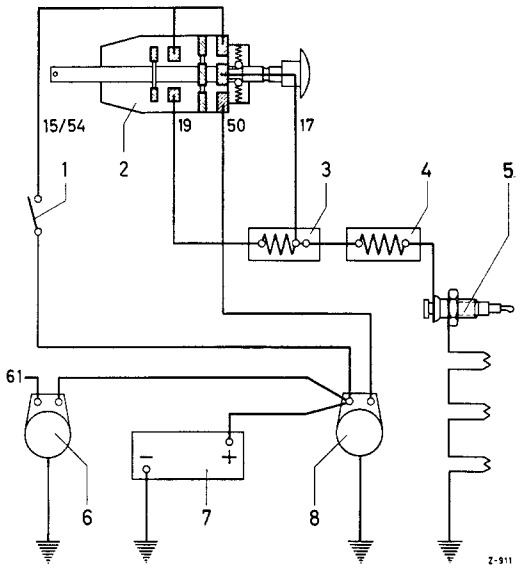

Fig. 15-33/3

1 Main switch
2 Push-pull switch
3 Glow plug indicator resistor
4 Series resistance
5 Glow plug
6 Generator
7 Battery
8 Starter

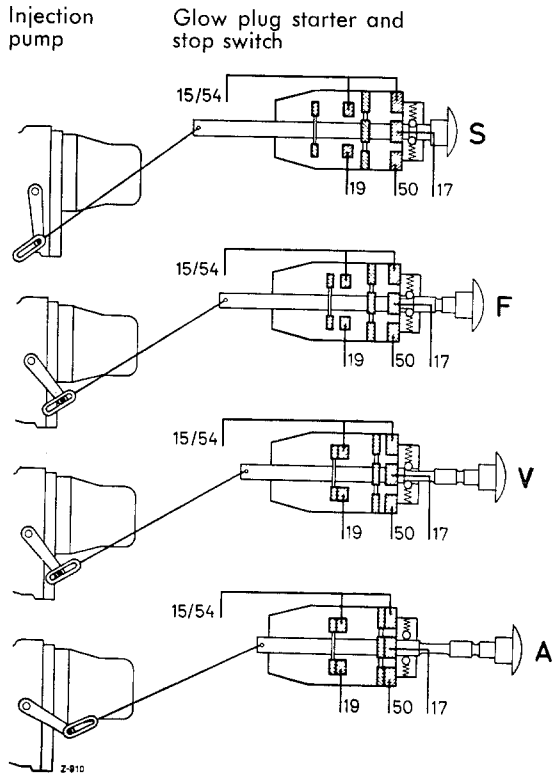

Fig. 15-33/4

S = Stop position
F = Drive position
V = Pre-heating position
A = Starting position

Description of the four switch positions:

1. S = Stop position

In the stop position the knob of the push-pull switch is pressed in completely and the Bowden cable pulls the adjusting lever on the injection pump right forward. In this position of the adjusting lever the control rod is in the stop position, the pistons are at the no-delivery position, the engine is no longer supplied with fuel and stops. In this position terminals 19, 50, and 17 are dead.

The key in the steering lock can be removed.

2. F = Drive position

In the drive position the Bowden cable in relation to the slot on the adjusting lever is in such a position that the slot does not rest on the bolt of the adjusting lever so that the lever is not being actuated. The switch knob, when pulled out of the stop position, engages in the next notch and remains in this position as long as the engine is running. Terminals 19, 50, and 17 are dead.

The key in the steering lock **cannot** be removed.

3. V = Pre-heating position

In the pre-heating position both Bowden cable and adjusting lever operate in the same way as in the drive position F.

When the knob of the push-pull switch is pulled from the drive position to the pre-heating position a small resistance becomes noticeable. The knob must be held in this position until the pre-heating process is finished, which depends on the outside temperature and the working temperature of the engine. In this position of the switch, terminal 19 is supplied with current and causes the glow plugs (5) to glow via the indicator resistor (3) and the series resistance (4) (Fig. 15-33/3). Terminals 50 and 17 are dead.

4. A = Starting position

When the pre-heating is finished, the knob of the switch, by overcoming the small resistance, is pulled out as far as it will go and is held in this position until the engine starts.

In the starting position the bolt of the adjusting lever rests against the other side of the slot (in contrast to the stop position) and pulls the adjusting lever right back. As a result the control rod is moved in the direction "voll" (full load) beyond the full load stop and the injection pump supplies the amount required for starting.

In the starting position not only terminal 19 but also terminals 50 and 17 are supplied with current. The starter (8) is actuated via terminal 50.

Via terminal 17 the glow plugs (5) continue to be supplied with current also in the starting position but the glow plug indicator resistor (3) is by-passed by lead (17) and therefore inoperative (see Fig. 15-33/3). When the glow plug indicator resistor is by-passed, the glow plugs are supplied with more current and as a result the starting process is improved.

When the knob of the push-pull switch is released after the engine has started, it returns automatically to the drive position.