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SECTION 4—CONTROL VALVE UNIT

The control valve unit can be removed from the gearbox while installed in the car but the side cover must be removed first as described in Section 3. Draining and removing the sump are recommended to prevent oil spillage when removing the side cover and to avoid the risk of foreign matter entering the sump while work is in progress.

If faulty operation of the control valve is suspected it will probably be due to dirt which has found its way into the valve bores; wear of the valves or bores is unlikely. It is recommended that the unit be renewed rather than dismantled, but if this is not convenient the unit should be dismantled, cleaned, re-assembled and road tested before going into service.

The importance of cleanliness cannot be over-emphasized when handling parts of the control valve unit. Minute particles of fluff from cloth, or even from the hands, are sufficient to prevent correct operation if present in the valve bores. For this reason a brush or compressed air, used in conjunction with a filtered cleaning fluid, is recommended for washing. If the unit is to be removed but not dismantled it must be protected from dirt and other foreign matter by wrapping in waxed paper until required for refitting.

An exploded view of the control valve unit, on which the parts are shown in their relative positions, is given in Figure 48, and the main differences between '1952' and '1953' control valve units are shown in Figures 49, 50, 51 and 54.

Control valve unit — To remove

Remove the sump and side cover as described in Section 3.

Remove the pressure control valve oil pipe from the holes in the control valve unit and the gearbox casing. Light leverage under the bends of the pipe may be necessary to free it.

Check the tightness of the four hexagon-headed setscrews securing the unit to the gearbox casing; slackness may have caused oil leakage between the mating faces and contributed to faulty operation.

Rotate the selector lever until it is possible to fit a spanner to all four setscrews securing the control valve unit; unscrew and remove the setscrews. Draw the unit slightly away from the gearbox face and slide it toward the front end, working it sideways carefully to free the pipes. Withdraw the pipes from their respective holes. Leave the parking brake lever spring on the parking brake lever pin.

If the gearbox is to remain standing during dismantling of the control valve unit, precautions must be taken to prevent the ingress of dust or dirt.

Control valve unit — To dismantle

To avoid damage to the valves or bores, extreme care must be taken when dismantling the unit.

A workbench with a clean, flat surface should be used, preferably covered with clean greaseproof paper; it is recommended that the control valve unit be left flat on this surface for as much of the dismantling operation as possible.

As valves and springs are removed, they should be washed and lightly oiled with clean gearbox oil and placed in a suitable container until they are required for inspection or re-assembly.

In order to assist later assembly, all valves, springs, screws and washers should be kept in their original groups, together with the casting from which they were removed.

As an aid to the identification of the various components of the unit, reference is frequently made in brackets in the following text to the exploded view of the unit shown in Figure 48.

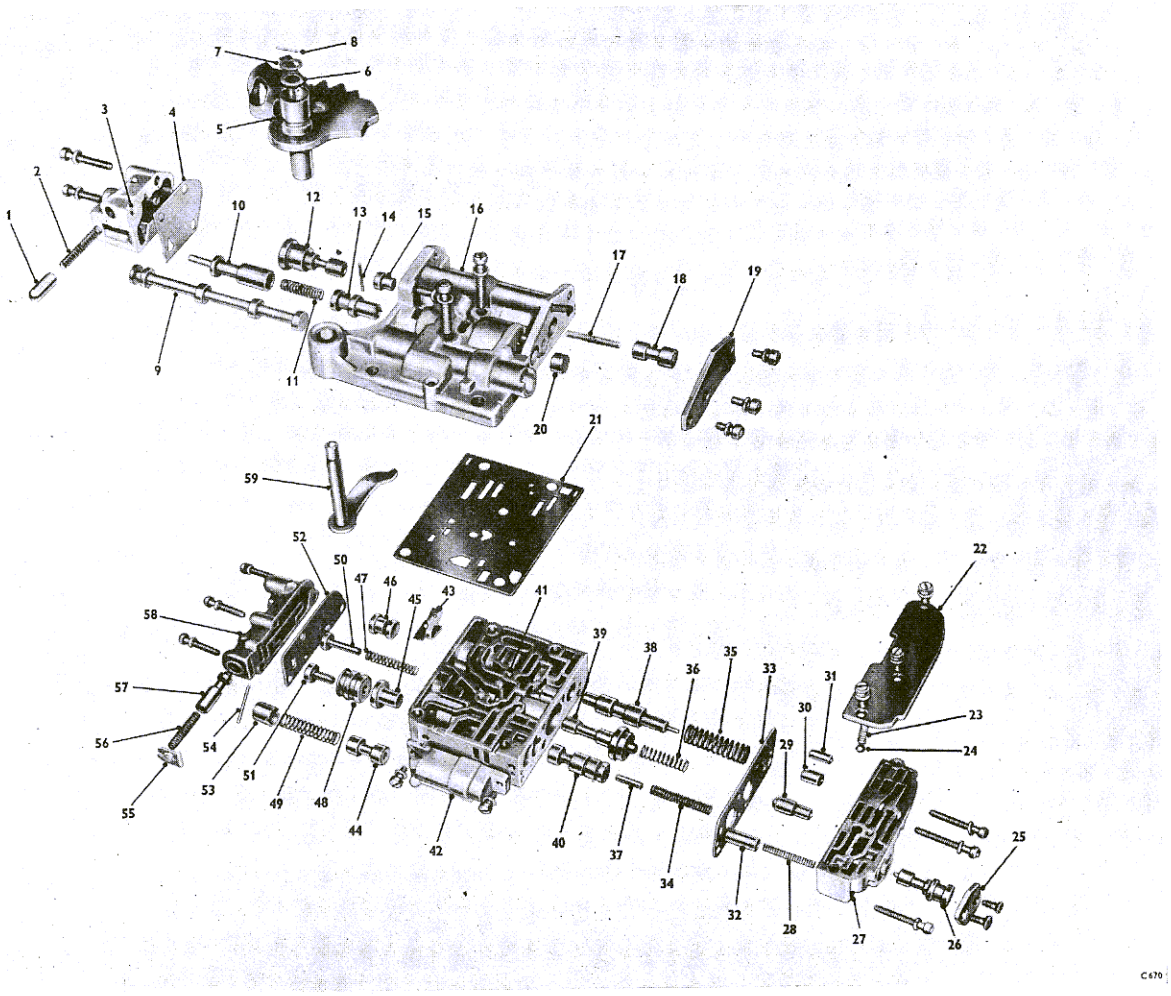

Fig. 48 Control valve unit exploded

1 DETENT PLUNGER
2 DETENT PLUNGER SPRING
3 DETENT PLUNGER RETAINER
4 DETENT PLUNGER RETAINER PLATE
5 SELECTOR LEVER
6 SEALING WASHER
7 WASHER
8 PIN
9 MANUAL CONTROL VALVE
10 T VALVE
11 T VALVE SPRING
12 TRANSITION VALVE
13 THROTTLE VALVE
14 COMPENSATOR PLUG RETAINING PIN
15 COMPENSATOR PLUG
16 OUTER VALVE BODY
17 COMPENSATOR VALVE SPRING
18 COMPENSATOR VALVE
19 COMPENSATOR VALVE PLATE
20 DETENT PLUG
21 OIL GUIDE PLATE
22 FRONT BODY COVER PLATE
23 OIL CHECK BALL SPRING
24 OIL CHECK BALL
25 3–2 DETENT PLUG PLATE
26 3–2 DETENT PLUG
27 FRONT VALVE BODY
28 T.V. REGULATOR VALVE SPRING
29 1–2 REGULATOR PLUG
30 3–4 REGULATOR PLUG
31 4–3 SHUTTLE VALVE
32 T.V. REGULATOR VALVE
33 OIL GUIDE PLATE
34 2–3 SHIFT VALVE SPRING
35 3–4 SHIFT VALVE SPRING
36 1–2 SHIFT VALVE SPRING
37 GUIDE PIN
38 3-4 SHIFT VALVE
39 1–2 SHIFT VALVE
40 2–3 SHIFT VALVE
41 INNER VALVE BODY
42 3–2 TIMING VALVE BODY
43 BY-PASS VALVE
44 3–2 TIMING VALVE
45 2–3 AUXILIARY VALVE
46 3–4 GOVERNOR PLUG
47 2–1 DETENT PLUG SPRING
48 2–3 GOVERNOR PLUG SLEEVE
49 3–2 TIMING VALVE SPRING
50 2–1 DETENT PLUG
51 2–3 GOVERNOR PLUG
52 OIL GUIDE PLATE
53 VALVE SPRING RETAINING CAP
54 RETAINING PIN
55 SPRING RETAINER
56 OVERSPEED VALVE SPRING
57 OVERSPEED VALVE
58 OVERSPEED VALVE BODY
59 THROTTLE VALVE LEVER

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Control valve outer body — To dismantle

Remove the two securing screws and spring washers, then lift the outer body (16) and oil guide plate (21) from the control valve inner body (41). The compensator plug retaining pin (14) is a sliding fit and may fall out during handling of the outer case; care must be taken to ensure that it is not lost.

Remove the spring steel by-pass valve (43) from the outer body, noting its position to assist re-assembly. This valve is fitted on '1953' control valve units but not the '1952' type (see Fig. 54).

Rotate the selector lever (5) as far as possible away from the detent plunger housing (3), then withdraw the plunger and spring (1 and 2).

Carefully withdraw the selector valve (9) from the outer body; the valve is slender and may be bent if carelessly handled.

Unscrew the three securing screws and remove the plunger housing (3) and oil guide plate (4) from the outer case. Note the different lengths of the securing screws to ensure correct refitting.

Rotate the throttle valve lever (59) away from the outer body, then withdraw the T valve and spring (10 and 11). Care must be taken to ensure that the throttle valve lever is not allowed to contact and damage the empty bore.

Carefully shake from the outer body the throttle valve (13) and the transition valve (12).

Unscrew the three securing screws and remove the compensator plate (19). Withdraw the compensator valve and spring (18 and 17) and the detent plug (20).

The compensator plug (15) need not be removed provided that it moves freely in the bore; its movement should be felt when gently shaking the outer body. If the plug is to be removed, first withdraw the retaining pin (14), then using a soft metal rod in each end of the bore, carefully manoeuvre the plug from the port.

If the selector lever (5) or throttle valve lever (59) are to be removed, withdraw the pin (8) from the outer end of the throttle lever shaft. The selector lever can then be lifted from the shaft complete with washer and sealing ring (7 and 6).

Front and inner valve bodies — To dismantle

Place the inner valve body (41) flat on the bench, then firmly holding the front body (27) against spring pressure, remove the three securing screws. Slowly release the holding pressure, then remove the front body and oil guide plate (33). Note the position of the three securing screws for correct refitting.

Withdraw from the front body the T.V. regulator valve and spring (32 and 28), the 1–2 regulator plug (29), the 3–4 regulator plug (30) and the 4–3 shuttle valve (31) if fitted.

Remove from the inner body the 3–4 shift valve and spring (38 and 35), the 1–2 shift valve and spring (39 and 36), and the 2–3 shift valve, spring and guide pin (40, 34 and 37). The difference between the '1952' and '1953' 3–4 shift valve groups, also the T.V. regulator valve, front body and guide plate is shown in Figure 49.

Remove the two countersunk screws retaining the 3–2 detent plug plate (25) and remove the plate and the 3–2 detent plug (26).

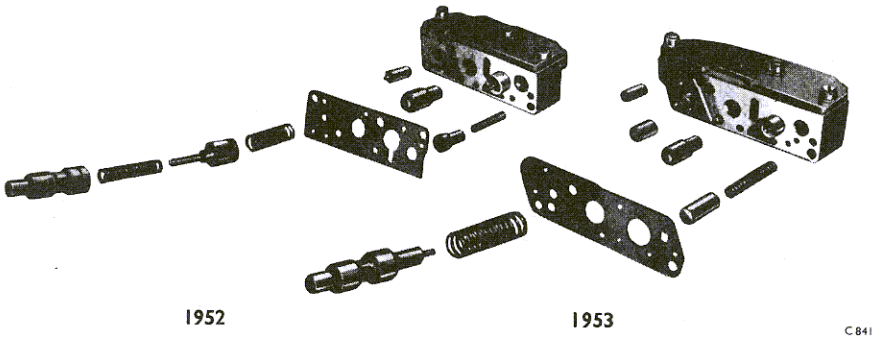

Fig. 49 Front body and valves, oil guide plates and 3-4 shift valve groups

If access is required to the oil check ball valve, remove the three securing screws and cover plate (22) from the front body. The valve ball and spring (24 and 23) can then be lifted from their seating.

Overspeed valve body — To dismantle

Remove the three screws retaining the overspeed valve body (58), then remove the body and oil guide plate (52).

Note the position of the three securing screws for correct refitting.

Using a screwdriver inserted through the slot of the overspeed valve spring retainer (55), compress the spring and extract the retainer. Withdraw the overspeed valve and spring (57 and 56). Figure 50 shows the difference between '1952' and '1953' overspeed valve assemblies.

Tilt the inner valve body so that the valves protrude. Remove the 3–4 governor plug (46), the 2–1 detent plug and spring (50 and 47) and the 2–3 governor plug (51). Early control valve units are not fitted with a 2–1 detent plug spring (see Fig. 51). Note also the difference in the oil guide plates.

Care must be taken in removing the 2–3 auxiliary valve (45) as its bearing surface is small and it may cant over in the bore. The 2–3 governor plug sleeve (48) should therefore temporarily be left in the bore in order to align the 2–3 auxiliary valve; press out the valve together with the sleeve using a soft rod inserted into the opposite end of the bore.

3-2 Timing valve body — To dismantle

Remove the two securing screws and the 3–2 timing valve body (42).

Depress the valve spring retaining cap (53) and withdraw the retaining pin (54). Carefully release the retaining cap and withdraw the cap, valve and spring (53, 44 and 49).

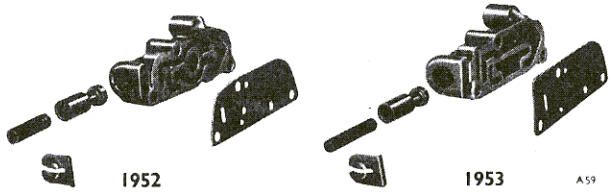

Fig. 50 Overspeed valves and oil guide plates

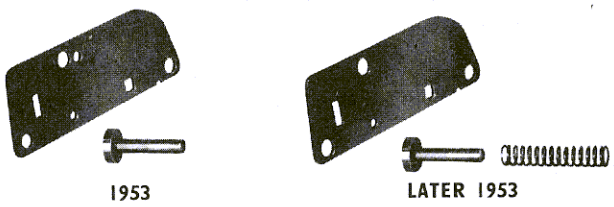

Fig. 51 2-1 detent plug and 2nd speed start spring

Control valve unit — To inspect

After cleaning, inspect the valves and bores for burrs and scoring, also check that the selector valve is not bent. If scoring in excess of faint lining is found it may cause leakage, in which case the control unit must be renewed. Individual parts must not be renewed as each valve is selected to give the correct clearance in the bore. No attempt must be made to polish valves or to scrape bores as the machine marks on these parts are an essential feature and provide the oil pockets in which the valves 'float' for free operation.

Using a surface plate, check the inner and outer valve bodies for distortion. If the faces are distorted, renew the control valve unit.

Clean the joint face of the gearbox casing and examine for damage. Under no circumstances must this face be scraped; the machine marks form an oil seal when the control valve unit is bolted down.

Clean the oil pipes and check them for damage and obstruction.

Check the bores in the control valve unit for scoring and burrs.

Check pipes, which should be a push fit in the bores.

Check all springs for loss of tension and for breakage. Check the 3–2 timing valve spring retainer and the 3–4 overspeed valve spring retainer for damage and distortion.

Using a surface plate, ensure that all spacer and retainer plates are not distorted.

Check all tapped screw holes for stripped threads.

Check the throttle valve operating shaft for distortion and damage.

Ensure that the spring steel by-pass valve is not broken or distorted and is still retainable in the outer valve body.

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Control valve unit — To assemble

Before assembling any part of the control valve unit, ensure that the components are perfectly clean and coated with gearbox oil; valves must not be fitted dry.

As each valve is entered into its bore, check that it slides under its own weight and that it is fully home before another valve is fitted.

Sealing compound **must not** be used between joint faces.

Overspeed and inner valve bodies — To assemble

Insert the overspeed valve, spring and retainer (57, 56 and 55) into the overspeed valve body (58). Centralise the spring in the retainer recess.

Hold the inner valve body (41) in one hand with the valve bores vertical and with the radiused corner lowermost and to the right. Using the free hand, insert together the 2–3 auxiliary valve (45) and 2–3 governor plug sleeve (48) vertically upwards into the 'LO' bore. This method is recommended as the plug sleeve ensures correct alignment of the narrow edged valve, thus effecting a smooth entry into its bore without canting over or picking up on the annular groove. Turn over the valve body and insert the 2–3 governor plug (51) into its sleeve; the plug should come to rest approximately 0·250 in. below the surface of the sleeve, indicating that the 2–3 auxiliary valve is fully home in the bore.

Fit the 2–1 detent plug and spring (50 and 47) (no spring is fitted if model is early '1953') and the 3–4 governor plug (46) into their respective bores, taking particular care when manoeuvring the latter into the larger of the two bores.

Fit the overspeed oil guide plate (52) into position and secure the already assembled overspeed valve unit (58) to the inner body.

Inner and front valve bodies — To assemble

Position the oil check ball valve (24) on its seating in the front valve body (27 and fit the spring (23) and cover plate (22). The valve seating will be found in the passage adjacent to the centre screw hole (see Fig. 52).

Insert the 3–2 detent plug (26) into its bore in the front body and fit the detent plug retaining plate (25); ensure that the plate covers the adjacent oil ports.

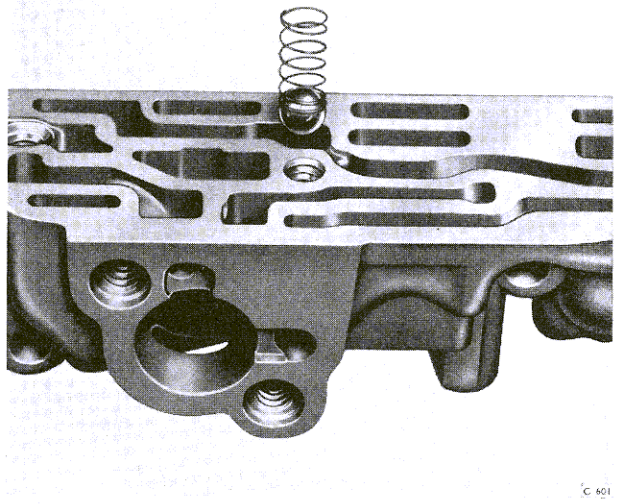

Fig. 52 Positioning oil check ball valve

Fit to the front body the T.V. regulator valve and spring (32 and 28), the 1–2 regulator plug (29), the 3–4 regulator plug (30) and the 4–3 shuttle valve (31). The 4–3 shuttle valve is fitted to cars from late 1953 onwards.

Hold the inner body (41) with the valve bores vertical and the radiused corner lowermost and to the right. Insert into their respective bores the 3–4 shift valve and spring (38 and 35), and if the control valve unit is a '1952' model the '3' range valve and spring, the 1–2 shift valve and spring (39 and 36) and the 2–3 shift valve, spring and guide pin (40, 34 and 37); the guide pin fits inside the spring, within the hollow stem of the valve.

Lay the inner and front bodies flat on the bench and position the front oil guide plate (33) against its mating face on the front body. Bring the assemblies together, ensuring that the 2–3 shift valve spring (34) engages with the 3–2 detent plug (26) and that the 1–2 shift valve spring (36) engages with the 1–2 regulator plug (29). Firmly hold the two assemblies together and fit and tighten the three securing screws.

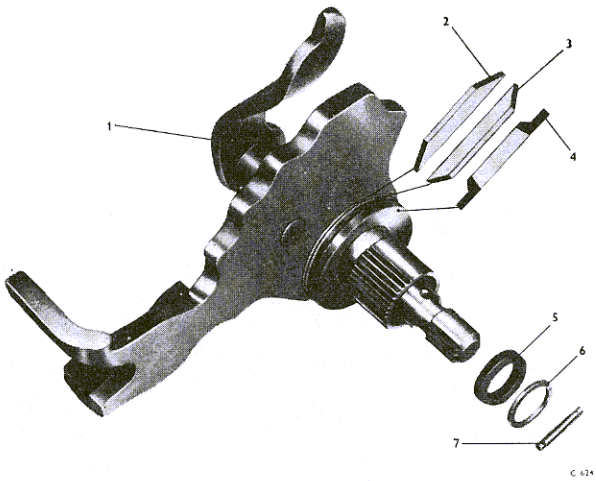

Fig. 53 Selector and throttle valve levers

1 THROTTLE VALVE LEVER
2 INNER WASHER
3 OUTER WASHER
4 RUBBER SEAL
5 SEALING WASHER
6 FLAT WASHER
7 RETAINING PIN

3-2 Timing valve body — To assemble

Insert the 3–2 timing valve, spring and retaining cap (44, 49 and 53) into the timing valve body (42). Depress the retaining cap against the tension of the spring and fit the retaining pin (54) into its oblique drilling in the timing valve body; release the cap.

Secure the timing valve body to the lower face of the inner body (41), ensuring that the oil ports are fully covered.

Outer valve body — To assemble

If the selector lever (5) and throttle valve lever (59) have been removed from the outer body (16), re-assemble them as shown in Figure 53; fit a new sealing ring (6) to the throttle lever shaft.

If the compensator plug (15) has been removed, refit it to its bore, using a rod fitted into the hole in the large end of the plug to assist in manoeuvring it into position. Fit the retaining pin (14) to its drilling in the outer valve body (16), ensuring that it passes across the valve bore to enter the socket at the far side and does not project above the joint face of the body.

Fit the compensator valve and spring (18 and 17) and the detent plug (20) into their bores in the outer body.

Position the compensator plate (19) against its mating face on the outer body (16), then fit and tighten the three securing screws.

Hold the outer body (16) with its valve bores vertical and the selector lever pivot lowermost and to the left. Using the free hand, insert into the centre lower bore as one assembly, the throttle valve (13) and the T valve and spring (10 and 11). Move them gently upwards until the throttle valve (13) butts against the detent plug (20). Turn over the outer body and insert the transition valve (12).

Set the throttle valve lever (59) against the protruding end of the throttle valve stem and hold the selector lever (5) clear of the throttle lever. Check that the throttle valve is home in its bore.

Fit the oil guide plate (4) and plunger body (3), ensuring that the tip of the throttle valve lever is entered into the slot in the plunger body. Secure the assembly with the three setscrews provided; ensure that the shortest screw of the three is fitted through the boss on the outer body (16), otherwise the selector plunger will not enter the housing during later assembly.

Rotate the selector lever (5) away from the plunger body and fit the detent plunger and spring (1 and 2) into their bore in the plunger body.

Insert the selector valve (9) up to the third land into its bore in the outer body (16), then rotate the selector lever (5) until the actuating pin on the lever engages between the top lands of the selector valve. Do not force the pin against the valve, otherwise the valve stem may bend. Depress the selector plunger (1) and further rotate the selector lever until the plunger engages in a notch. Release the plunger and check that the selector lever moves freely into each of the operating positions.

Fit the by-pass valve (43) to the cavity in the outer body (not '1952' model). Figure 54 shows the differences between the two models.

Check that the compensator plug retaining pin (14) is correctly fitted and does not protrude above the joint face of the outer body. Position the oil guide plate (21) on the outer body with its radiused corner towards the selector lever pivot. Align the plate with the aid of the four main setscrews and assemble the

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outer body and plate to the inner body. Leave the main setscrews in position until the two assembly screws have been tightened. Fit and tighten the two securing screws.

Control valve unit — To test

The control valve unit can be tested for correct operation using a special test rig, or by refitting it to the gearbox and carrying out a road test as described under 'Testing the change points' in Chapter 2.

Before refitting the control valve unit to the gearbox, the freedom of the shift valve groups and the overspeed valve in their bores can be checked by means of an air test; this test can also be used however, as an aid to fault diagnosis.

To check the freedom of the 1–2 shift valve group, apply an air pressure of approximately 70 lb/sq. in. to the G1 passage as shown in Figure 55. On '1952' control valve units, air pressure applied to the G1 oil duct will move both 1–2 and 2–3 shift valves but only the 2–3 group on current models. The lower half of the control valve unit must be suitably blanked off to achieve this.

Movement of the 2–3 and 3–4 shift valve groups and of the overspeed valve can be checked by covering area '2', (see Fig. 55) and applying air pressure to the G2 oil duct. If difficulty is experienced in observing the movement of the overspeed valve, a piece of stiff wire inserted through the centre of the spring and allowed to rest on the valve will indicate when the valve moves.

It should be noted that movement of the 2–3 shift valve group occurs when air is applied to either the G1 or G2 oil duct; in the first case air pressure operates on the 2–3 G1 or governor plug and in the second case on the 2–3 G2 or auxiliary plug.

Control valve unit — To fit

Before refitting the control valve unit, examine the mating faces of the unit and the gearbox casing for cleanliness.

Fit the governor oil delivery pipes into the bores in the parking brake bracket. Fit the parking brake pawl return spring in position over the G2 oil pipe, ensuring that the other end is hooked around the parking brake lever pin.

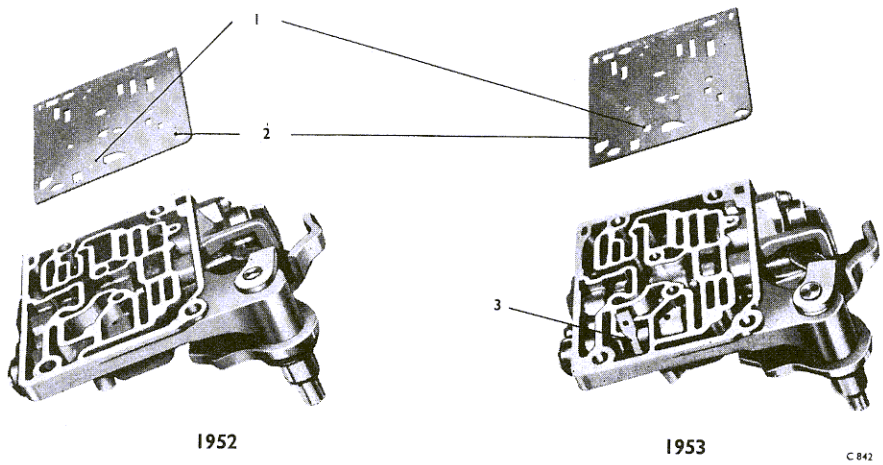

Fig. 54 Outer bodies, oil guide plates and by-pass valve

1 BLEED HOLE 2 OIL GUIDE PLATE 3 BY-PASS VALVE

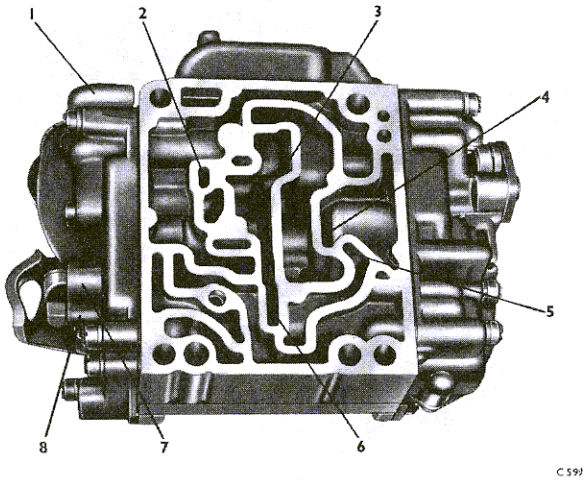

Fig. 55 Air pressure test points

1 OVERSPEED VALVE HOUSING
2 BLANKING AREA
3 2–3 SHIFT GROUP
4 1–2 SHIFT GROUP
5 G1 PASSAGE
6 3–4 SHIFT GROUP
7 G2 OIL DUCT
8 G1 OIL DUCT

Align the reverse clutch oil pipe and ensure that it is home in its bore.

Rotate the selector lever to a position where it will clear the parking brake lever during fitting of the control valve unit.

Engage the three oil pipes in the bores in the control valve unit. Fit the four securing setscrews and spring washers and tighten evenly to the torque loading figure given in the 'Summary of Repair Data'.

Fit the pressure control valve oil pipe into the holes in the control valve unit and the gearbox casing; the short end of the pipe mates with the control valve unit. Gently tap the pipe home using a soft-faced mallet.

Ensure that the selector lever engages with the parking brake lever, also that the conical steel washers and the oil seal on the selector lever shaft are still in position.

Refit the side cover and sump as described in Section 3.

After fitting the control levers, the control settings should be checked before testing the operation of the gearbox as described in Chapter 2.