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AUTOMATIC GEARBOX SERVICE MANUAL**

February 1962

GEARBOX REMOVAL AND INSTALLATION — S1 CARS

GEARBOX REMOVAL AND INSTALLATION — S2 CARS

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The procedure for the removal and installation of the gearbox on SI cars is very similar to that described in Chapter 3, Section 1 of TSD 471, Automatic Gearbox Service Manual. As this is the case, it will only be necessary here to note major differences so that the procedure for SI cars may be obtained by reading these notes in conjunction with TSD 471.

Gearbox — to remove

Place the car over a pit or upon a ramp or stands; this is necessary to enable the gearbox to be lowered when disconnected from the engine. To prevent the car from moving, chock both of the front wheels and one of the rear wheels with wooden blocks. Jack the other rear wheel clear of the ground so that the propeller shaft can be rotated.

Disconnect the battery.

Exhaust pipes

It is not necessary for the exhaust pipes to be removed.

Control rods and brake servo motor

Each of the rear shock dampers is controlled by a solenoid; no ride control rod or lever is therefore fitted.

Disconnect the handbrake cable at the lever adjacent to the master cylinder and tie the cable clear of the servo motor.

Propeller shaft

Remove the four nuts securing the propeller shaft to the gearbox. [To prevent the propeller shaft from turning whilst these nuts are released, select reverse gear by turning the selector shaft on the gearbox as far as possible towards the rear of the car (anti-clockwise.)]

Remove the split pin and castellated nut securing the propeller shaft centre bearing support bracket to the chassis frame; slide the shaft towards the rear of the car.

Rear mounting

Before disconnecting the rear mounting, drain the fluid from the gearbox and fluid coupling as follows:

Remove the gearbox drain plug and aluminium sealing washer; drain the fluid into a suitable container then refit the plug.

Remove the six setscrews retaining the flywheel lower cover, then remove the cover. Rotate the engine flywheel to bring the fluid coupling drain plug to its lowest position, then remove the plug and sealing washer. Drain the fluid from the coupling into a suitable container and refit the drain plug.

On left-hand drive cars, remove the nut and washer securing the rubber-mounted isolating stay to the left-hand side cover of the gearbox; withdraw the isolating stay from its anchor bolt.

No tie rods or transverse torque reaction brackets are fitted to these cars and the procedure for removing the rear mounting is as follows:

Place a jack under the rear of the engine sump, using a piece of wood between the jack head and the sump to spread the load. Raise the jack sufficiently to take the load off the gearbox rear mounting.

Disconnect the gearbox rear mounting by removing the centre bolt. Remove the two mounting bolts from each end of the support bracket and remove the bracket.

Before finally disconnecting the gearbox from the engine, support the gearbox in a cradle attached to the lifting platform of a trolley jack (similar to that shown in Figure 8, Chapter 3, Section 1 of TSD 471).

Fluid coupling and bell housing

Disconnect the two halves of the bell housing by removing the six setscrews. To gain access to the two setscrews at the top of the bell housing, remove the two rubber covers which are a press fit in the front floor of the car. Remove the two dowel bolts (one fitted at the bottom of each side of the bell housing) by unscrewing the nuts and driving out the bolts.

Changing a Gearbox or Engine

The notes on this subject in Chapter 3, Section 1 of TSD 471 apply equally to S1 cars.

Gearbox — to install

Gearbox rear mounting

Raise the gearbox sufficiently to permit the transverse mounting bracket to be fitted to the chassis frame. Secure each end of the bracket to the chassis with two bolts. Lower the gearbox onto the bracket and locate it with the centre bolt. The trolley jack may then be lowered and withdrawn from beneath the car.

Throttle and selector controls

The gearbox selector controls are adjusted, if necessary, in a manner similar to that described in 'Gearbox Removal and Installation — S2 Cars' (see Page 3).

Set and adjust the throttle control linkage as described in Section K5 of TSD 729, S1 and S2 Workshop Manual.

Road test

Before testing the car on the road, fill the gearbox with Automatic Transmission Fluid as described in TSD 471, Chapter 2 and run the engine for a few minutes with the gear range selector in Neutral. Check the underside of the gearbox for leaks of fluid.

Test the car on the road as described in Section K5 of TSD 729, S1 and S2 Workshop Manual.

If correct automatic changes are not obtained after adjustment of the controls, it will be necessary to remove the gearbox sump and adjust the bands as described in TSD 471, Chapter 3, Section 6.

When automatic gear changes are obtained satisfactorily, check finally that there are no fluid leaks, then top-up the gearbox and refit the undershields.

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Gearbox — to remove

Place the car over a pit, or upon a ramp or stands; this is necessary to enable the gearbox to be lowered when disconnected from the engine. To prevent the car from moving, chock both of the front wheels and one of the rear wheels with wooden blocks. Jack the other rear wheel clear of the ground so that the propeller shaft can be rotated.

Disconnect the battery.

Remove the setscrews and plain washers securing the inner left and inner right-hand undersheets to the chassis frame and remove the undersheets; it is not necessary to remove the outer right-hand undersheet.

Gearbox and throttle controls

Note: Under no circumstances must the length adjustment of the control rods be altered when they are removed.

On left-hand drive cars, refer to Figure 1 for identification of the levers, joints, etc.

Remove the nut and washer retaining the rubber mounted isolating stay (4); withdraw the isolating stay from its anchor bolt.

Release the lock-nut and ball joint adjusting screw on the control rod (6); disconnect the ball socket from the lever. The gearbox control assembly can then be lifted clear of the gearbox onto the chassis frame.

Release the pinch bolt securing the throttle lever (5) to its shaft; withdraw the lever.

Remove the nut, bolt and washers at the lower end of the connecting link (3).

Release the pinch bolt and adjusting screw at the upper end of the throttle control rod (1) and disconnect the ball socket from the control lever.

Remove the split pin and remove the castellated nut and washers securing the throttle lever (2) to the bell housing.

The throttle controls can now be lifted clear of the gearbox without further dismantling.

On right-hand drive cars, refer to Figure 2 for identification of the levers, joints, etc.

Remove the gearbox control cross-shaft from beneath the gearbox by releasing the lock-nut and adjusting screw on each of the four ball joints (3, 4, 6 and 8); disconnect the lever ball pins from the ball sockets.

Remove the setscrews securing the gearbox control assembly stay (2) to the chassis right-hand side-member.

Remove the nut, bolt, washers and distance tube from the gear selector control pivot (1); remove the control assembly.

Disconnect the rear end of the T.V. rod (5) by removing the split pin and clevis pin.

Disconnect the rear end of the coupling rod (7) by removing the split pin.

Release the pinch bolt and adjusting screw fitted at the lower end of the control rod (10) and withdraw the socket from the ball pin.

Remove the nut, bolt and washer at the cross-shaft bracket (9) and so disconnect the rubber-mounted connecting link.

Brake control rods and servo motor

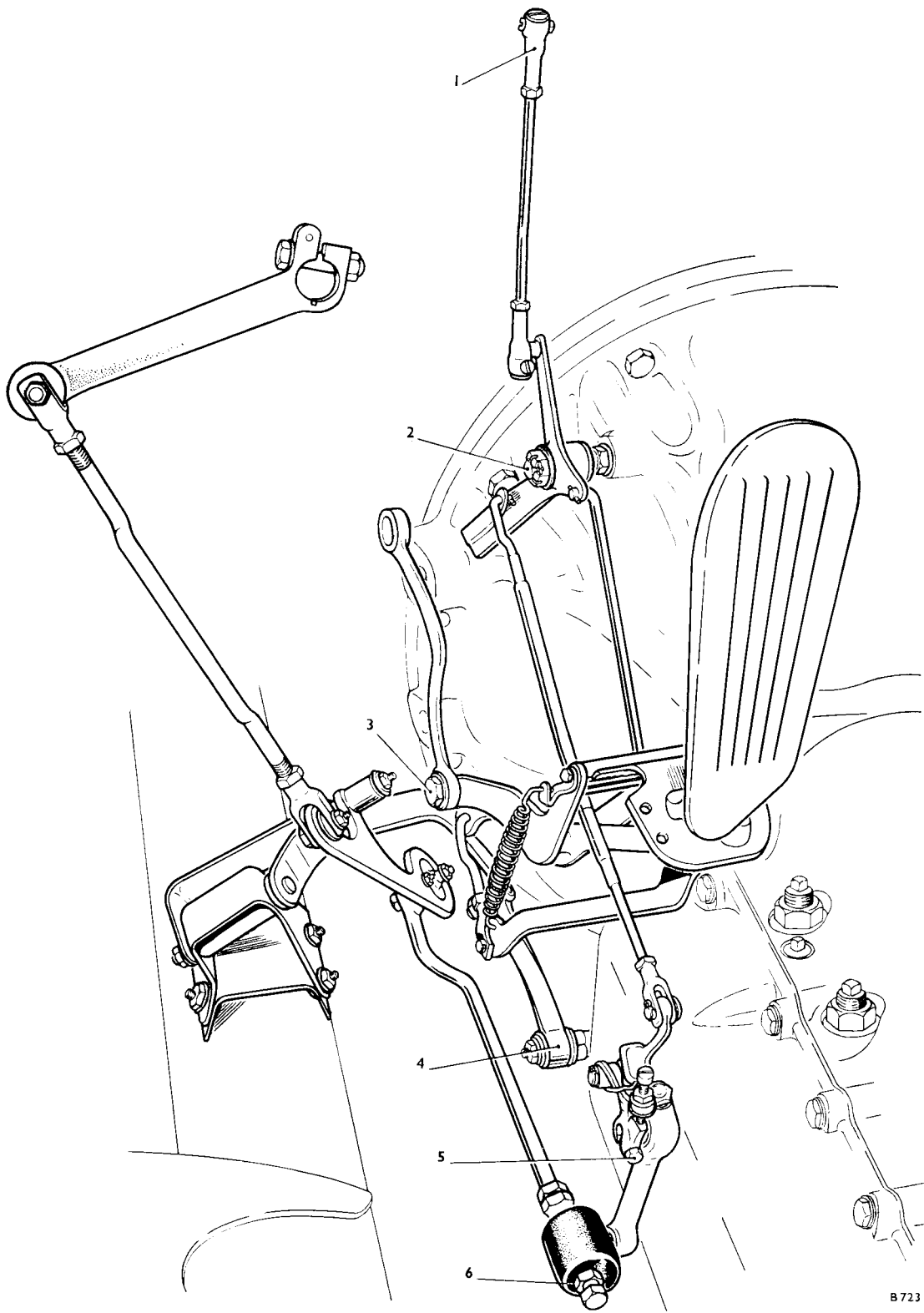
Refer to Figure 3 for identification of the control rods and levers.

On left-hand drive cars, remove the intermediate rod (12) as follows:

Remove the split pin and clevis pin from the bell crank lever fitted on the chassis left-hand side-member.

Release the lock-nut and unscrew the intermediate rod from the jaw (13) fitted to the bell crank lever on the chassis right-hand side-member; the lock-nut must be retained approximately in position relative to the intermediate shaft to facilitate adjustment on re-assembly.

On right-hand drive cars, unhook the pull-off spring (9) from the on-stop bracket (6).



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Fig. 1 Gear selector and throttle controls — left-hand drive — late S2 cars

On all cars, uncouple the handbrake cable from lever (3) by removing the split pin, washer and clevis pin.

Remove the 2 B.A. nut and bolt securing the handbrake cable clip to the engine right-hand rear mounting and lift the cable clear of the servo motor and adjacent components.

Disconnect the brake rod (7) as follows:

Remove the setscrew retaining the locking plate on the rear end of the brake rod (7) and remove the locking plate. Withdraw the clevis pin and lift the brake rod clear of the servo levers.

Disconnect the rear brake linkage control rod (4) at the outer servo lever (5) by removing the setscrew retaining the locking plate and withdrawing the clevis pin. Lift the control rod clear of the servo levers.

Disconnect and remove the forward and reverse brake rods (fitted between the servo levers and the master cylinder operating lever) as follows:

Remove the setscrews retaining the locking plates on the forward ends of the upper and lower brake rods; remove the locking plates and withdraw the clevis pins.

Remove the nut, bolt, washers and distance pieces securing the rear end of each of the brake rods to the master cylinder operating lever, noting the positions of the distance pieces.

Scribe a mark showing the alignment of the chassis frame and the on-stop bracket (6). Remove the nut and bolt from the front of the on-stop bracket, slacken the rear nut and bolt and swing the on-stop bracket clear of the servo levers.

Remove the setscrew securing the servo motor to the gearbox and remove the servo motor complete with its sealing washer.

Engine and gearbox components

Release the worm drive clip securing the rubber hose to the engine induction manifold and detach the hose. Unscrew the two nuts and bolts securing the air cleaner to the bonnet, then remove the air cleaner.

Uncouple the two fuel breather pipes at the unions adjacent to the distributor.

Remove the setscrew securing the distributor wiring clip to the left-hand cylinder head and move the leads aside to gain access to the crankcase breather.

Remove the two setscrews securing the crankcase breather to the crankcase, then remove the two setscrews securing the breather pipe assembly to the flywheel bottom cover; withdraw the breather pipe assembly from beneath the car.

Remove the six setscrews retaining the flywheel bottom cover and remove the cover.

Remove the gearbox drain plug and aluminium sealing washer; drain the fluid into a suitable container then refit the plug.

Rotate the engine flywheel to bring the fluid coupling drain plug to its lowest position, then remove the plug and sealing washer. Drain the fluid from the coupling into a suitable container, then refit the drain plug.

Disconnect the speedometer drive at the gearbox.

Remove the four nuts securing the propeller shaft to the gearbox output flange. (To prevent the propeller shaft from turning whilst these nuts are released, select reverse gear by moving the selector lever on the gearbox as far as possible towards the rear of the car.)

Remove the split pin and castellated nut securing the propeller shaft centre bearing support bracket to the chassis frame: slide the shaft towards the rear of the car.

Disconnect the starter motor lead at the motor. Remove the three setscrews retaining the starter motor, then remove the motor.

Remove the setscrews securing the fluid coupling outer cover to the engine flywheel, taking care not to misplace the balance weights (if fitted).

Remove the nuts, bolts and washers securing the engine rear mountings to the chassis frame.

Place a jack under the engine sump, using a piece of wood between the jack head and the sump to spread the load. Raise the engine by means of the jack until the metal and bonded rubber plate can be removed from between each of the engine rear mountings and the chassis frame. On some cars, metal packing pieces are fitted between the chassis frame and the mounting plates for alignment purposes; in these cases, the metal packings should be marked so that they can later be refitted in their original positions.

Remove the two nuts, bolts and washers securing each of the engine rear mounting blocks to the mounting brackets on the bell housing.

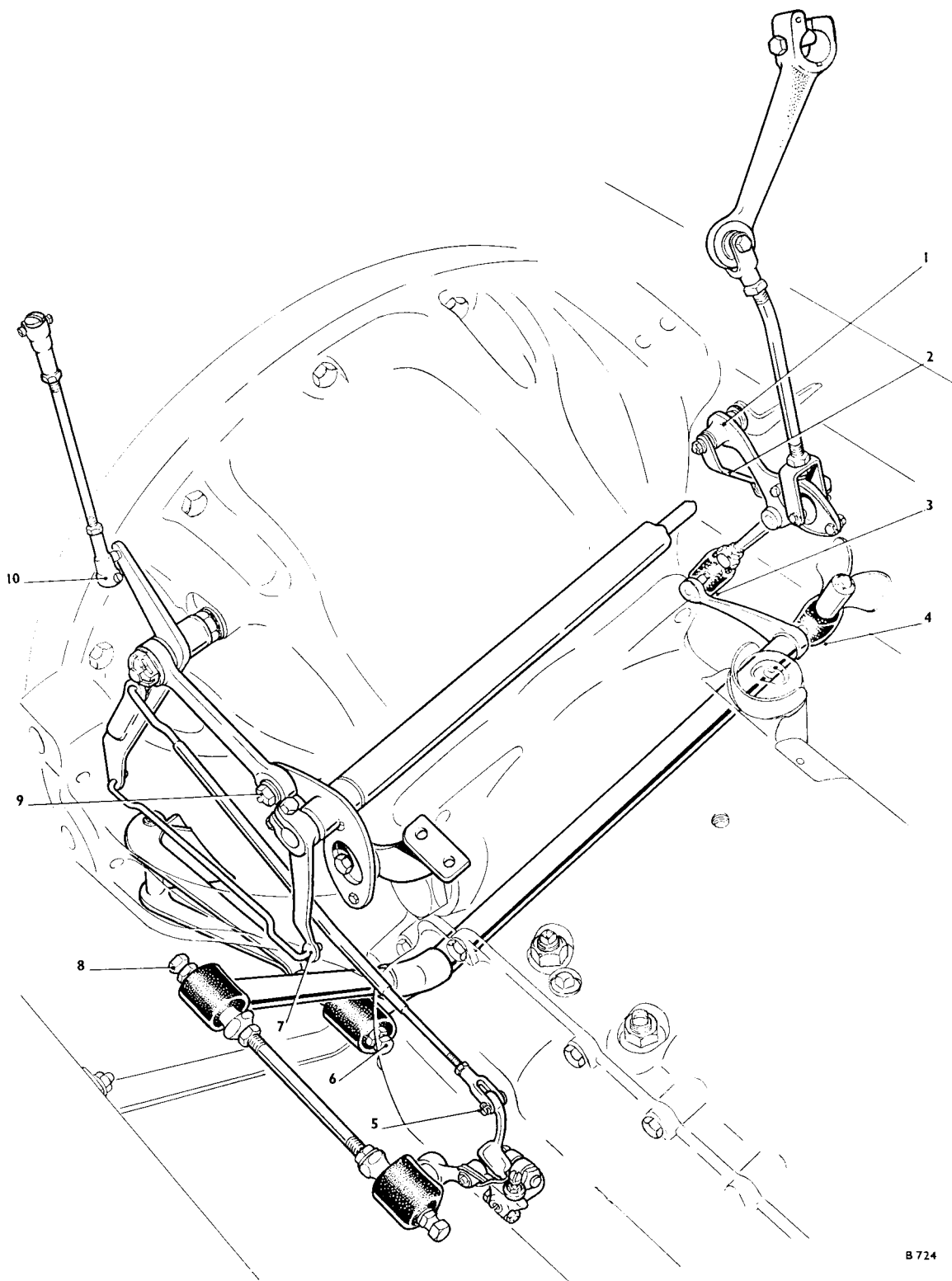


Fig. 2 Gear selector and throttle controls — right-hand drive — late S2 cars

Remove the two setscrews and washers retaining each of the engine rear mounting brackets, then remove the brackets.

Before finally disconnecting the gearbox from the engine, support the gearbox in a cradle attached to the lifting platform of a trolley jack (similar to that shown in Figure 8 of TSD 471, Chapter 3, Section 1).

With the gearbox supported in the cradle, remove the eight setscrews securing the bell housing and gearbox to the engine.

Carefully ease the gearbox away from the engine until the fluid coupling assembly is clear of the two dowels in the engine flywheel and the centre spigot is clear of the flywheel bearing. Note that two dowel pins in the bell housing joint face locate in holes in the rear joint face of the engine crankcase.

Remove and discard the joint fitted between the flywheel and the fluid coupling outer cover.

When the gearbox is fully withdrawn, lower it and remove it from beneath the car.

Notes on Changing a Gearbox or Engine

A replacement gearbox is supplied without its fluid coupling and bell housing. The fluid coupling outer cover is fitted to the engine flywheel for crankshaft balancing purposes and therefore, when fitting a replacement gearbox, the bell housing, fluid coupling outer cover and the driving and driven torus members must be transferred from the old gearbox to the replacement unit, as described in TSD 471, Chapter 3, Section 2.

If the gearbox is to be retained and the engine replaced, the fluid coupling outer cover must be retained with the engine flywheel with which it was originally balanced; remove the cover as described in TSD 471, Chapter 3, Section 2.

The need to maintain a balanced assembly requires that the components of the flywheel assembly be kept together. Should it be necessary to renew a component such as the starter ring, a replacement unit may be fitted provided that the vibration characteristics prove satisfactory on engine and road test.

Gearbox — to install

Assemble the fluid coupling as described in TSD 471, Chapter 3, Section 2.

Fit the fluid coupling and gearbox drain plugs using new sealing washers. Care must be taken not to overtighten the plugs.

Note that to ensure correct balance of the crankshaft assembly, the fluid coupling outer cover can only be fitted to the engine flywheel in one position, one dowel being larger than the other.

Ensure that the joint faces of the engine flywheel and the fluid coupling outer cover are clean and free from burrs. Smear a little Retinax 'A' grease onto the joint face of the flywheel and fit a new flywheel gasket.

Rotate the flywheel until the small dowel and fouling pin are in the lowest possible position, then rotate the fluid coupling outer cover until the dowel sockets are aligned with the dowels.

Support the gearbox in a cradle attached to the lifting platform of a trolley jack, then raise the gearbox to a position in line with the engine. Ease the gearbox forward until the centre spigot is located in its bearing and the dowels in the bell housing and the engine flywheel are located in their respective sockets. Check that the flywheel gasket has not been disturbed, then fit two setscrews into horizontally opposed holes in the fluid coupling outer cover and flywheel; tighten them evenly.

Fit the eight setscrews securing the bell housing to the engine. Note that the two lower setscrews on the left-hand side and the lowest setscrew on the right-hand side of the bell housing are larger than the other five screws.

Fit the remaining fluid coupling outer cover setscrews and tighten them evenly to a torque loading of 16–18 lb.ft. (2.21–2.49 kg.m.). If balancing weights are to be fitted, they must be attached with the fluid coupling setscrews, paying particular attention to the numbers stamped on each weight and on the coupling cover.

Remove the cradle and jack from beneath the gearbox.

The gearbox and engine can now be manoeuvred as a unit to facilitate assembly of the rear mountings.

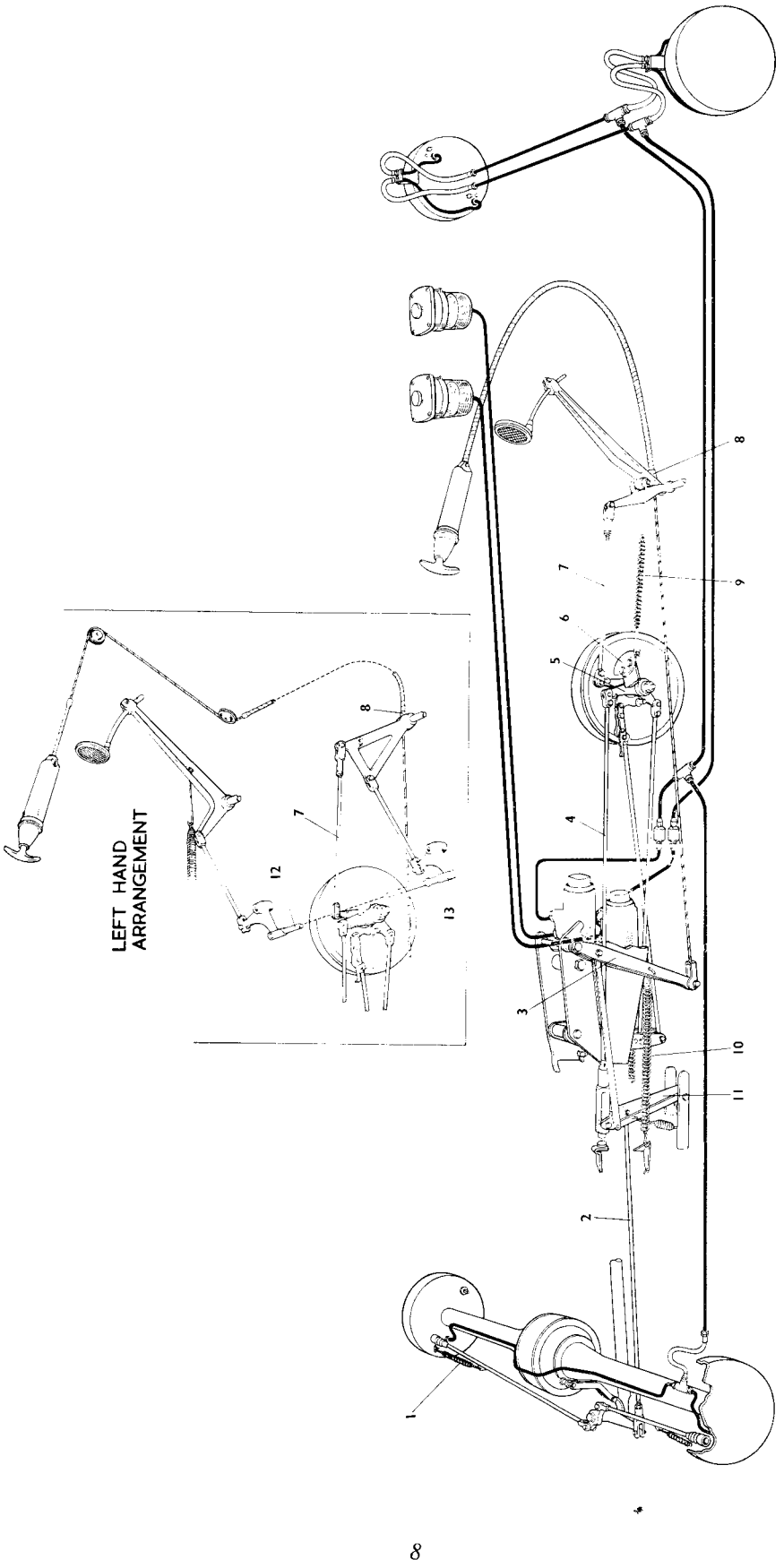


Fig. 3 Brake linkage diagram

Fit each of the engine rear mounting brackets to the bell housing, then fit the mounting blocks to these brackets.

Fit one 'L'-shaped metal and bonded rubber plate between each of the engine rear mounts and the chassis frame, with the upturned portion towards the front of the engine. Ensure that if metal packing pieces were originally fitted under the engine rear mountings, they are refitted to the same mountings from which they were removed.

The remaining components may be fitted by reversing the procedure described for their removal, noting the following points.

Control rods and servo motor

When fitting the servo motor to the gearbox, ensure that the sealing washer and drive pins are correctly located before tightening the centre setscrew.

All control rod ends and pivot pins should be greased on assembly and the pivot pins locked with locking plates or with new split pins, as applicable.

When connecting the control rod between the upper servo lever and the lower connecting point of the master cylinder operating lever, the shorter distance piece must be fitted between the control rod and the right-hand member of the master cylinder operating lever (when viewed from the rear of the car); the longer distance piece must be fitted between the control rod and the left-hand member of the lever.

The control rod from the lower servo lever must be fitted to the upper connecting point of the master cylinder operating lever with the shorter distance piece between the control rod and the left-hand member of the lever; the longer distance piece must be fitted between the control rod and the right-hand member of the lever.

After fitting the servo motor and controls, check the adjustment of the servo as described in Section G4 of TSD 729, S1 and S2 Workshop Manual.

Breather pipes

To simplify the fitting of the breather pipe assembly, slide the right-hand fuel breather pipe from the assembly clip.

Ensure that the joint face of the engine breather and its mating face on the crankcase are clean, then fit a new 'Klingerit' joint to the breather.

Working from beneath the car, place into position the left-hand fuel breather and engine breather pipes. Similarly, position the right-hand fuel breather and slide it into the assembly clip adjacent to the flywheel cover. Connect the fuel breather pipe unions and fit and tighten the setscrews securing the engine breather to the engine.

Throttle and selector controls

Grease the control joints during re-assembly; they must be free but without excessive movement.

On right-hand drive cars, assemble the gear selector control pivot (see 1, Fig. 2) as follows:

Insert the pivot bolt through the chassis frame bracket from the outer side. Fit in the following order one plain washer, distance piece, pivot bracket and second plain washer onto the bolt, then tighten the nut. The pivot must be free but without excessive movement.

On all cars, connect the remaining gear selector controls, then check their adjustment as follows:

Set the selector lever, mounted on the steering column, to its Neutral position. Ensure that the selector lever on the gearbox is in its most forward position, then check that slight 'sponge' exists on either side of the Neutral stop position of the lever on the steering column.

On right-hand drive cars, if the selector lever on the steering column is hard against the top of its stop in the Neutral position, adjust the control rods as follows:

Release the lock-nut on either side of the ball socket (3, Fig. 2); unscrew the ball joint adjusting screw and disconnect the socket from the ball end. Lengthen the control rod by unscrewing the socket until the correct adjustment is obtained, then re-assemble the joint and tighten the lock-nuts; the joint must be free but without excessive movement.

After connecting the controls, check that there is slight 'sponge' on either side of each position of the selector lever mounted on the steering column.

On left-hand drive cars, if the selector lever on the steering column is hard against the top of its stop in the Neutral position, adjust the control rods as follows:

Release the lock-nut on either side of the ball socket (6, Fig. 1); unscrew the ball joint adjusting screw and disconnect the socket from the ball end. Shorten the control rod by screwing the ball socket up the rod until the correct adjustment is obtained. Finally, re-assemble the ball joint and tighten the lock-nuts, ensuring that the joint is free but without excessive movement.

After connecting the controls, check that there is slight 'sponge' on either side of each position of the selector lever mounted on the steering column.

On all cars, set and adjust the throttle control linkage as described in Section K5 of TSD 729, S1 and S2 Workshop Manual.

Road test

Before testing the car on the road, fill the gearbox with Automatic Transmission Fluid as follows:

Remove the dipstick cover and dipstick and pour 12 Imperial pints of fluid into the gearbox. The fluid coupling and the sump are filled through the same orifice.

With the selector lever in the Neutral position and the handbrake applied, start the engine and run it at 'fast idle' for approximately five minutes. Stop the engine and add a further 6 Imperial pints of fluid to the gearbox. Restart the engine and whilst running it at 'slow idle' check the oil level with the dipstick and add sufficient fluid to bring the level to the 'F' mark. Take care not to overfill.

Check the underside of the gearbox for leaks of fluid.

Test the car on the road as described in Section K5 of TSD 729, S1 and S2 Workshop Manual.

If correct automatic changes are not obtained after adjustment of the controls as previously described, it will be necessary to remove the gearbox sump and adjust the bands as described in TSD 471, Chapter 3, Section 6.

When the automatic gear changes are obtained satisfactorily, check finally that there are no fluid leaks, then top-up the gearbox and fit the undershields.