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SECTION 10 — BAND SERVO UNITS

The band servo units consist of cylinders in which an assembly of pistons move under hydraulic pressure to apply or release the friction bands on the drums of the epicyclic gear trains. Both servos incorporate valves which promote smoother gear changes by synchronising band application with clutch release under various conditions of road wheel torque.

Front servo

The body of the front servo comprises two cast iron casings and an aluminium alloy valve housing. The two casings form a cylinder which is divided into band apply and band release chambers by the ring seals of three pistons (see Fig. 12). The alloy valve housing contains the overrun control valve and the main line exhaust and non-return valves. A further valve, the 4–3 timing valve, is housed in the servo main casing. On early 'R' series cars the main line exhaust valve is fitted in the gearbox casing and not in the front servo.

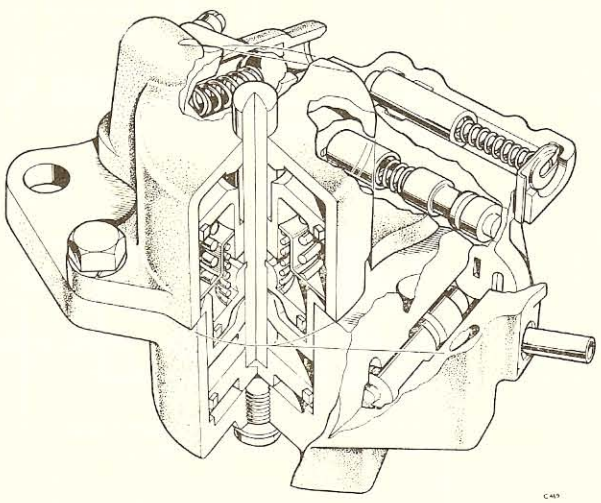


Fig. 12 Front servo

The band apply effort is produced by the action of main pressure in the lowest chamber, augmented by compensator pressure in the centre chamber. During overrun, when the throttle is closed and compensator pressure is removed, there would be a tendency for the band to slip and cause 'hunting' between two gears. This is avoided as governor 1 pressure moves the overrun valve into position to release main pressure into the compensator chamber, thus increasing the piston area over which band apply main pressure is acting (see Fig. 13). As a result, the band is held firmly applied until the road speed has fallen so low as to enforce the down-change.

The 4–3 timing valve is provided to delay band application until the front clutch is released during the down-change. Whenever governor 1 pressure overcomes the main compensator pressures on the valve, the valve moves to close the direct band apply port and force the band apply pressure to by-pass the valve through a 0·055 in. restriction. As a result, band application is retarded and does not take place until the clutch releases.

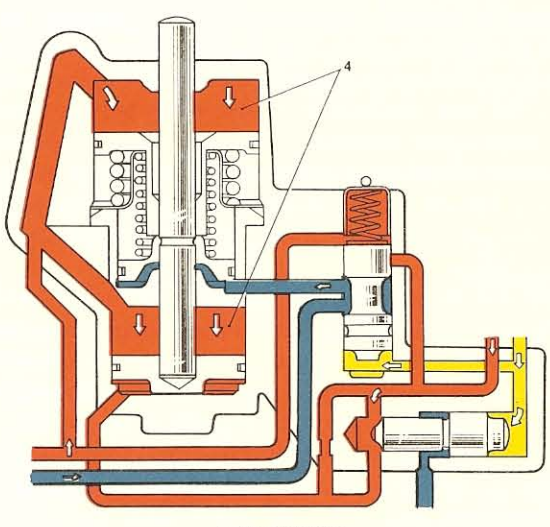
Band apply main pressure is continuously applied in all forward ranges but band release is obtained when required (for second and fourth gears) by allowing main pressure to act over the larger total area of the band release pistons. Band release pressure thus overcomes band apply pressure and the band is released. A point of difference between 'S' series and 'R' series servos is that in early 'R' series servos, the oil feed passage between the band apply chambers contains a quick release valve which passes the oil acting on the large apply piston to exhaust when release oil is fed

to the unit. Oil feeds from one apply chamber to the other via the hollow operating push rod (see Fig. 14).

The front servo valve body is a convenient housing for the main line non-return and exhaust valves. The non-return valve is a simple ball and spring arrangement designed to prevent the front pump from discharging through the rear pump. The exhaust valve opens under light spring pressure to reduce the control pressures quickly by allowing oil in the servos and control valves to exhaust when pump delivery ceases.

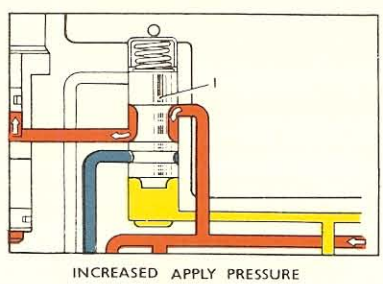
1 OVERRUN VALVE
2 BAND APPLY CHAMBERS
3 4–3 TIMING VALVE
4 BAND RELEASE CHAMBERS

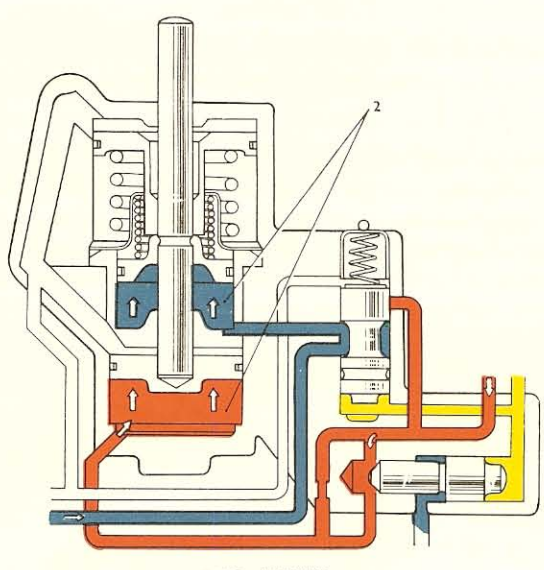
Fig. 13 Front servo operation

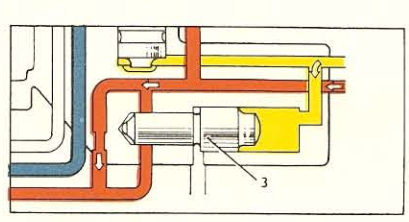


Rear servo

The rear servo (see Fig. 15) is larger than the front unit as the rear band has to be held against the greater torque transmitted by the rear epicyclic gear train. The servo is applied by a powerful pair of coil springs







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assisted hydraulically by compensator pressure; it is released hydraulically by main line pressure alone.

The body of the servo comprises two cylinders divided into compensator and band release chambers by three piston ring seals; the compensator chambers are hydraulically connected through the hollow stem of the operating push rod.

The main band apply springs are retained by a sheet steel strap, the inner spring being contained within the concentric compensator cylinder.

Two valves are housed in the servo body. A spring steel restrictor valve impedes the exhaust of oil from one of the release chambers, thus delaying band application. During band release, the valve lifts and allows unobstructed flow of oil back into the chamber. The second valve is operated by main pressure and it allows oil to by-pass the restrictor valve and promote rapid band application if required, for example, for a fast change from reverse to forward speed, during snow rocking. This valve is closed, however, by main pressure, in second gear and above except on early gearboxes when it functions only when range '2' is selected.

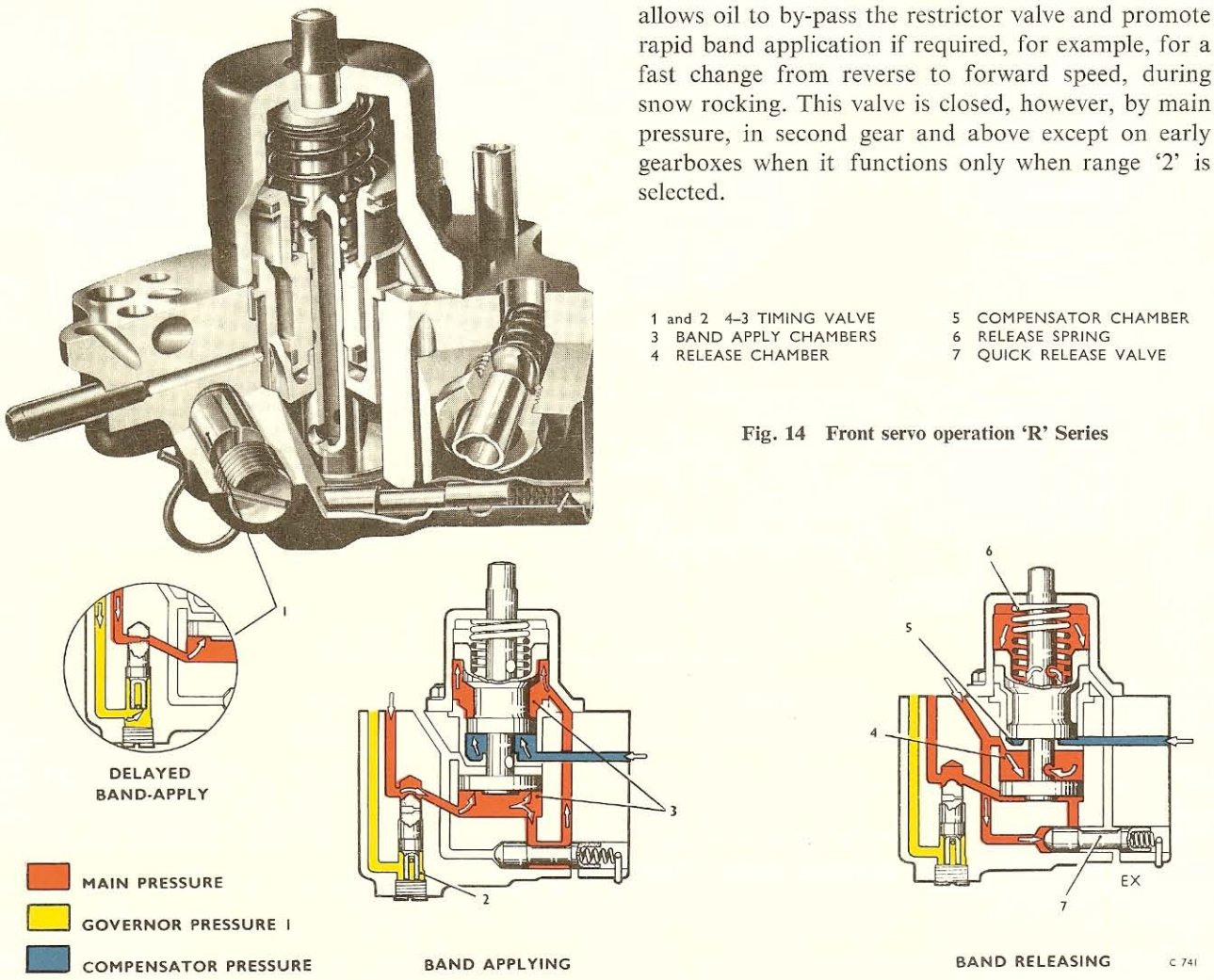

Fig. 14 Front servo operation 'R' Series

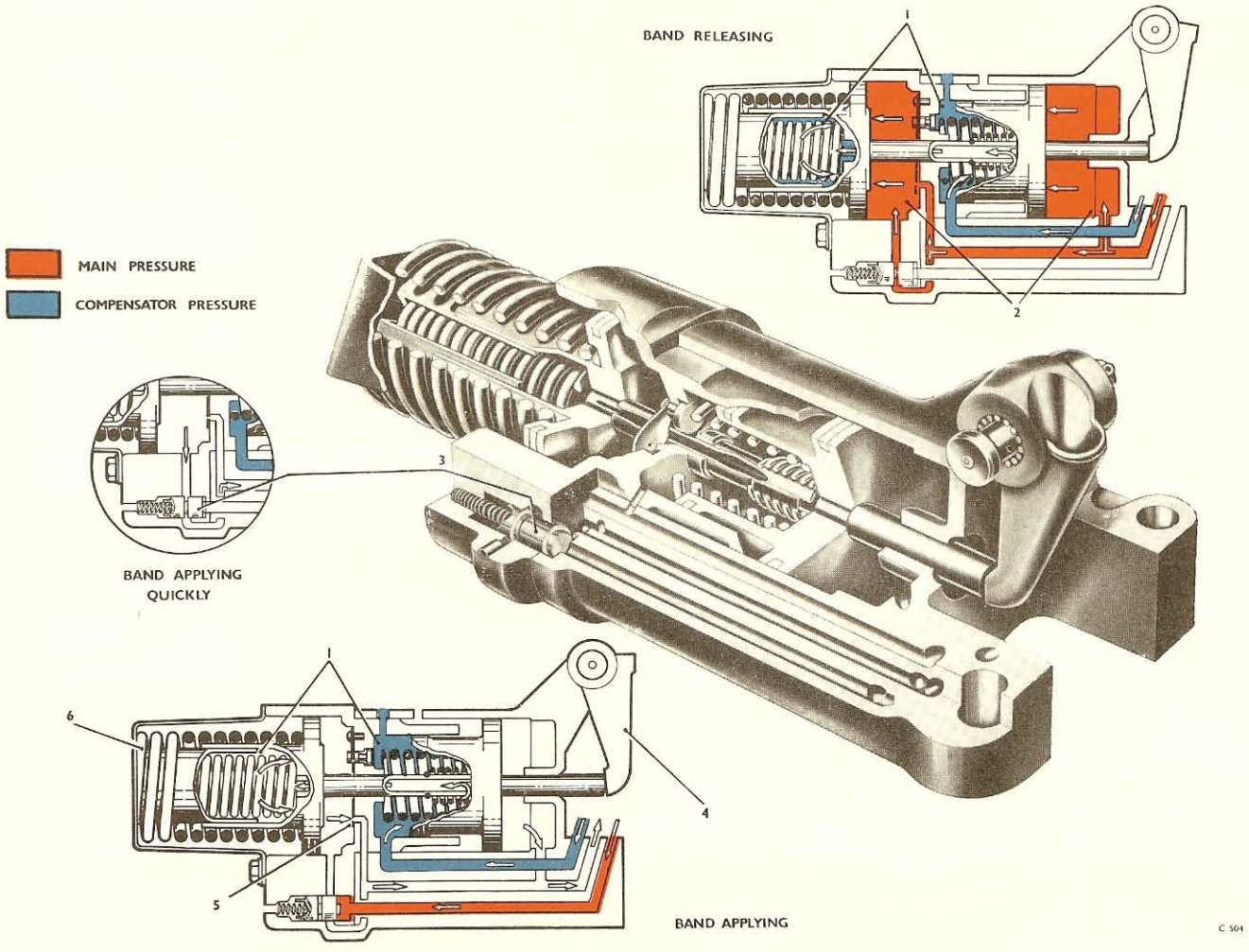

Fig. 15 Rear servo operation

1 COMPENSATOR CHAMBERS
2 RELEASE CHAMBERS
3 EXHAUST VALVE
4 BAND APPLY LEVER
5 RESTRICTOR VALVE
6 BAND APPLY SPRING

On later gearboxes compensator pressure is taken from this servo at a point in its release stroke, to act on the 4–3 valve in the front servo as previously explained.