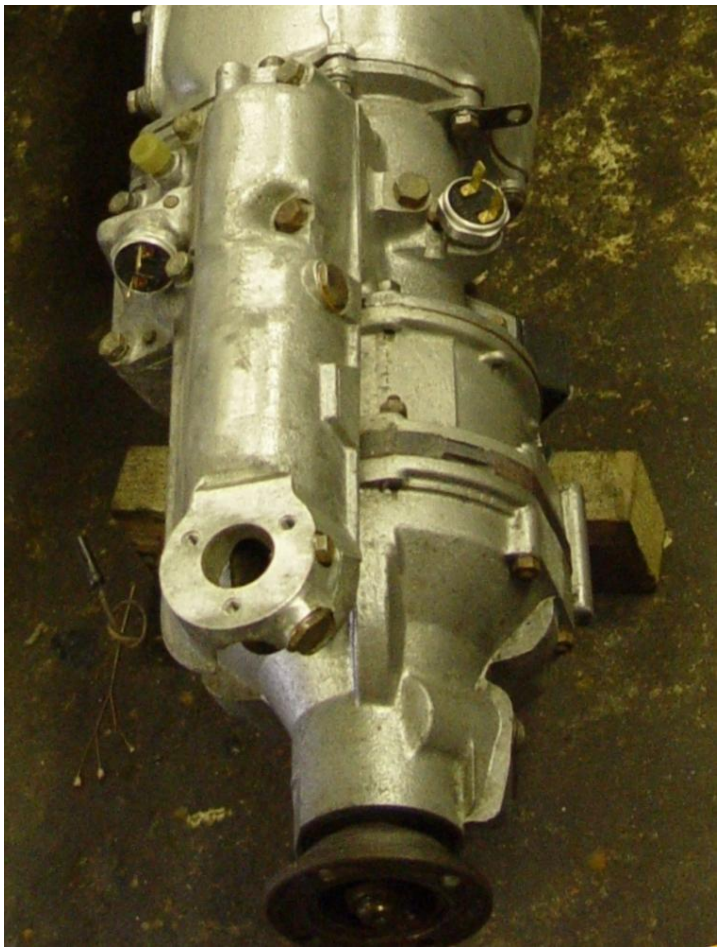


Solving a problem with an LH overdrive cycling in and out

A fault experienced by some MGB and V8 enthusiasts with a Laycock LH overdrive unit is that when the multi-function stalk switch has been operated to engage overdrive, the overdrive then begins to cycle in and out – engaged and disengaged and engaged again – and continues to do so as the car is driven at a steady speed. The essential question is “what can cause an overdrive to malfunction and how do you cure it?”

The likely causes for an overdrive cycling in and out are a faulty overdrive inhibitor switch, a low oil level in the gearbox, an ageing seal causing an oil pressure leak, a faulty seating for the valve ball bearing, a faulty multi-function stalk switch operating the overdrive or an electrical fault related to the solenoid. Generally it is more likely the fault will be electrical, but two of the early steps in the diagnosis are to check the inhibitor switch and the oil level.

Checking the inhibitor switch

Ron Gammons mentioned in an earlier “Problems Solved” column in Safety Fast! that on the MGB gearbox fitted with an overdrive there is a switch on the lefthand side of the gearbox remote casing (see above) which acts as a cut out so the overdrive can only be operated in third or fourth gear and not in other gears. The similar switch on the righthand side is the reversing lights switch. With the stalk switch moved to bring in the overdrive, the action of selecting fourth gear by moving the gear lever to right of the quadrant, pushes the switch into contact and allows an electric current to flow through to the solenoid which then operates thereby engaging overdrive. When second or first gears are selected the switch opens breaking the circuit to inhibit the overdrive from engaging in those gears. The mechanism is slightly crude and the continual action of the switch being pushed whenever third or fourth gears are selected wears the operating faces. The inhibitor switch is screwed into position on a taper thread with spacer washers under the head. The first thing to do is verify whether the switch is the fault.

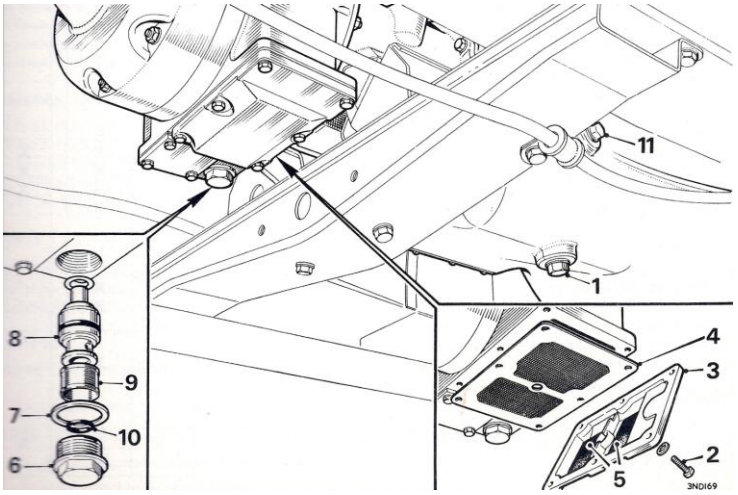
With the ignition on, select fourth gear and then with the stalk switch moved to engage overdrive, check with a test meter whether you have a current on the lead to the solenoid. If no current flows then get your assistant (fair or otherwise!) to pull the gear lever firmly towards the driver’s seat (on a righthand drive car). It is most likely that a current will then flow indicating an adjustment to packing washers is needed. It is possible to remove and adjust the packings with the gearbox in situ by dropping the gearbox crossmember and pushing the gearbox across to one side. Access to the switch is then possible. It is certainly easier with the car on a ramp, but it is possible from underneath at ground level.

A variant of this test is an on the road check suggested by Dave Wellings who says with the car at a steady speed and overdrive selected, “hold the gearstick firmly” in fourth gear by pulling it to the right “to check the inhibitor action. If contact is marginal, the vibration at even a modest speed could easily interrupt continuity, especially if the gearstick is a close fit with the hole in the transmission tunnel.” If by pulling the gear lever over the overdrive engages and when the pressure on the gearstick is released it disengages, a fault on the switch is revealed.

It’s worth noting that on later chrome bumpered V8s and the rubber bumpered models, the overdrive option on third gear was removed during the Factory production run and the gear linkage modified. It is possible that a gearbox from an earlier car may have been changed under warranty to remove the availability of overdrive on third as the Factory encouraged dealers to do that to avoid further warranty claims. It’s also possible that subsequently a later replacement gearbox may have be fitted to the car with overdrive only available on fourth, hence the suggestion that the test is made in fourth gear!

Checking the oil level and filter

The second check would be the oil level in the gearbox since it also serves the overdrive and a low oil level could cause the overdrive to be slow to engage, fail to engage or cycle in and out. A related issue may be the oil is dirty, so if it's been in there a while, drain



Drain plug (1), Cover (3), Filter & gasket (4), Magnets (5), Relief valve filter plug (6), Sealing washer (7), Relief valve (8), Filter (9), Seal (10) and Combined filler & oil level plug (11).

down through the sump drain plug (1) below. The filter and gasket (4) are located under the flat plate (3) on the underside of the overdrive. Also clean any metal fragments attached to the two magnets (5) and replace the plunger O-Ring too. The service manual says the gearbox and overdrive unit should be drained and the overdrive sump filter (4) and relief valve (6) cleaned every 24,000 miles or 24 months.

Draining down the existing gearbox oil is best done when the gearbox oil is hot after an energetic run in the car! If the oil is dirty then flushing may be necessary. If flushing is needed then use fresh oil, take the car on a 10 mile run where good speed can be achieved to get the oil hot, and then on your return drain the gearbox and overdrive before refilling with fresh oil again. Ron Gammons notes that if there is lot of debris in the filter it's normally indicative that the friction bands are breaking up so it's definitely a removal job for an overdrive rebuild.

You also need to remove the relief valve filter plug (6) and the sealing washer (7), withdraw the relief valve (8) and remove the filter (9). Replace the seal (10) fitted in the plug and wash the filter, plug and sealing washer in petrol. Insert the seal (10) into the plug, fit the filter to the relief valve, push the valve upwards and refit the plug and sealing washer.

David Halliday traced his overdrive malfunction to a hardened O-Ring and cleared the fault with a replacement. He bought an O-Ring kit for less than £2.00. The old ones were hard, the new ones soft. Once changed, the overdrive worked perfectly and is still doing so three years later. He got his O-Rings from MGB Hive at the time, but he has noted that Moss list a kit as part number NKC99S.

To top up and check the oil level, remove the plug on the righthand side of the gearbox (11) and top up until the level is on the underside of the opening. With the correct level of clean oil in the combined gearbox and overdrive, the smooth operation of the hydraulic functions of the overdrive unit should be restored.

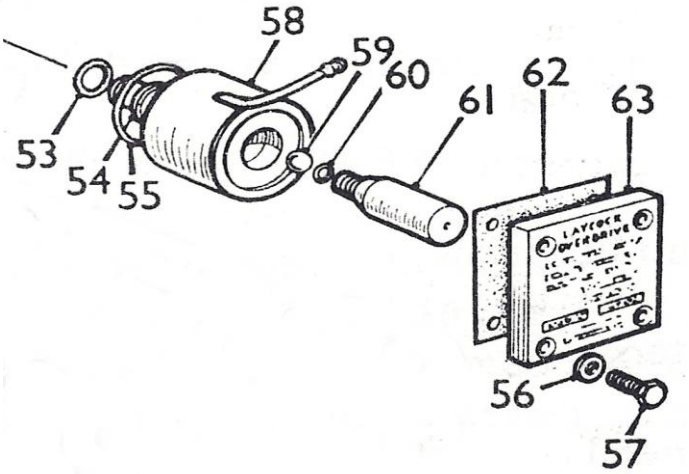
Checking the multi-function stalk switch

Barrie Jones describes in his illustrated V8NOTE408 how he had been experiencing problems with the overdrive switch on his V8 – when switched to engage overdrive it would sometimes disengage momentarily but in that case it was traced to a fault in the mutlti-function stalk control on the steering column. Another member, David Stonehouse also mentioned he had the same fault with his switch but chose to live with it rather than go for a replacement switch. Later rubber bumper MGBs had the overdrive switch on top of the gear knob. The wires to this switch run down a groove in the gear lever. Both switch and wires are very flimsy and regularly cause problems.

Checking the solenoid

The solenoid plays an important role in engaging and releasing the overdrive. One specialist with long experience of servicing Laycock LH overdrives feels it is a weak solenoid with not a great deal of energy, so if the O-Ring (60) becomes hard over time or the ball valve seat deteriorates producing a leak, that can contribute to a slow operation when engaging overdrive.

Bob Owen says "in checking through the possible sources of the overdrive cycling, removal of the solenoid for bench testing will enable the unit to be examined and its correct operation checked". But he feels that when "testing the solenoid on the bench, it's a less clear cut situation when a fault is intermittent or present in some situations and not in others. Yes, it's easy to verify that a unit is faulty but it's not easy to verify that it will work properly under all circumstances. A bad connection could be inside the solenoid – for example at the point where the coil wire is bonded to the external



connection. It's possible for a bad connection to be temperature dependent – for example if it's riveted and the rivet expands with heat so relaxing the clamping force".

O-Ring (53), Solenoid valve body (54), O-Ring (55), Washer (56), Screw (57), Solenoid coil (58), Valve ball (59), O-Ring (60), Solenoid plunger (61), Gasket (62), Solenoid cover (63), Sump filter and gasket (64) and Filter magnets (65).

Where the option of "changing the solenoid is chosen that necessarily involves re-making connections so a bad external electrical connection problem would be solved by changing the solenoid and could be wrongly ascribed to a solenoid fault. A garage mechanic may be less likely to test a component, generally preferring replacement as this gives a lower labour cost, more certainty of reliability, gives them a margin on the spare part and usually results in a happier customer as they have a specific reason for the malfunction". However the solenoid replacement route, although not one for the purist mechanic, may result in a good outcome through associated replacement parts like the O-Ring or revived connections solving the problem with the possible bonus of a lower fault finding labour charge from the garage.

Checking the seating for the small ball in the solenoid valve

Peter Egglington of Overdrive Repair Services in Sheffield, run by an ex Laycock team, mentioned "the repeated action of the ball (59) on the valve seating can work harden the seat and lead to a reduced seal. The seat can also shows signs of pitting and scoring. With pressures of around 550psi that deterioration can lead to pressure losses. It's an item they check when servicing overdrive units.

Other possible causes

Barrie Jones says "over the past twelve years of MGBGTV8 ownership I have had several problems with the overdrive solenoid dropping out and immediately cutting back in again. I also have two friends with V8s and I have helped them to trace similar problems. Yes, the solenoid is the obvious culprit, but no, it has never needed replacement. In every case but one, I traced the fault to the solenoid power supply. I have diagnosed weak contacts on the column-mounted multi-function switch (on two occasions), a fault with the insulating sleeve covering a bullet connector slipping off slightly allowing the actuator wire to short out to the gearbox cross-member, a loose overdrive inhibitor switch which merely needed tightening, a corroded bullet connector where the overdrive/reverse light wiring loom meets the main loom by the side of the heater unit (three times) and a tiny damaged O-Ring which is operated by the solenoid.

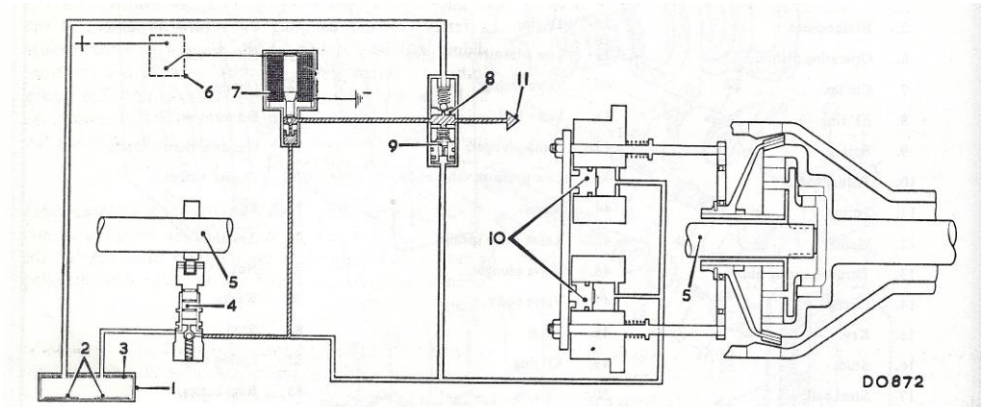


Fig. Fc.1
Direct drive

1. Sump.
2. Magnet filters.
3. Gauze filter.
4. Pump.
5. Third motion shaft (gearbox).
6. Control switch.
7. Solenoid operating valve.
8. Low pressure valve.
9. Relief valve.
10. Operating pistons.
11. Oil return to sump.

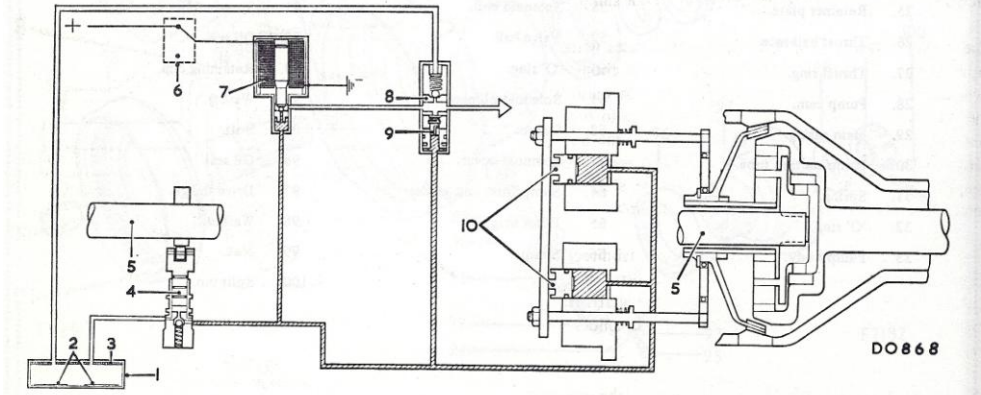


Fig. Fc.2
Overdrive engaged

How does a Laycock Type LH overdrive work?

The Laycock Type LH overdrive fitted between the gearbox and propeller shaft is a self-contained gear unit which provides a higher overall gear ratio than that with the final drive. The overdrive gears consist of a central sun wheel and three planet gears which mesh with an internally toothed annulus. Fitted inside the annulus is a uni-directional clutch. A sliding clutch member is secured to the sun wheel and is free to move forward and backward on the sun wheel splines. Attached to a ball bearing, secured to the sliding clutch by a circlip, is a static thrust ring. The thrust ring is actuated by two hydraulic pistons and returned by primary and secondary return springs. An electronically operated solenoid valve, mechanical pump, relief valve and low pressure valve comprise the main components of the hydraulic system.

Looking at the overdrive disengaged, so direct drive applies, and then with overdrive engaged with the diagrams alongside.

Overdrive disengaged

With the overdrive switch in the “off” position the operating solenoid is de-energised and the valve ball is free to move away from the valve seat. Oil from the pump discharge lifts the valve from its seat, flows to the low pressure valve and is used for lubrication. This action relieves the oil pressure maintaining the pistons operative. The return springs act to close the pistons and the oil returning from the piston chambers is forced to mix with the pump flow, this causing a restriction and damping the return movement of the sliding member. Action of the secondary return springs force the clutch (in the overdrive unit) sliding member backward and its inner brake surface contacts the annular brake ring. The sliding member and annulus start to revolve in unison. As the sun wheel is splined to the sliding clutch member the complete gear train is locked.

Thrust from the input shaft locks the uni-directional clutch against the outser bearing surface, inside the annulus, and direct drive (from the 3rd motion shaft of the four speed gearbox) is applied to the propeller shaft through the annulus extension on which the propeller shaft coupling flange is mounted.

During overrun and reverse additional load is imparted to the clutch sliding member by the helix thrust of the sun wheel, thus helping to retain direct drive.

Overdrive engaged

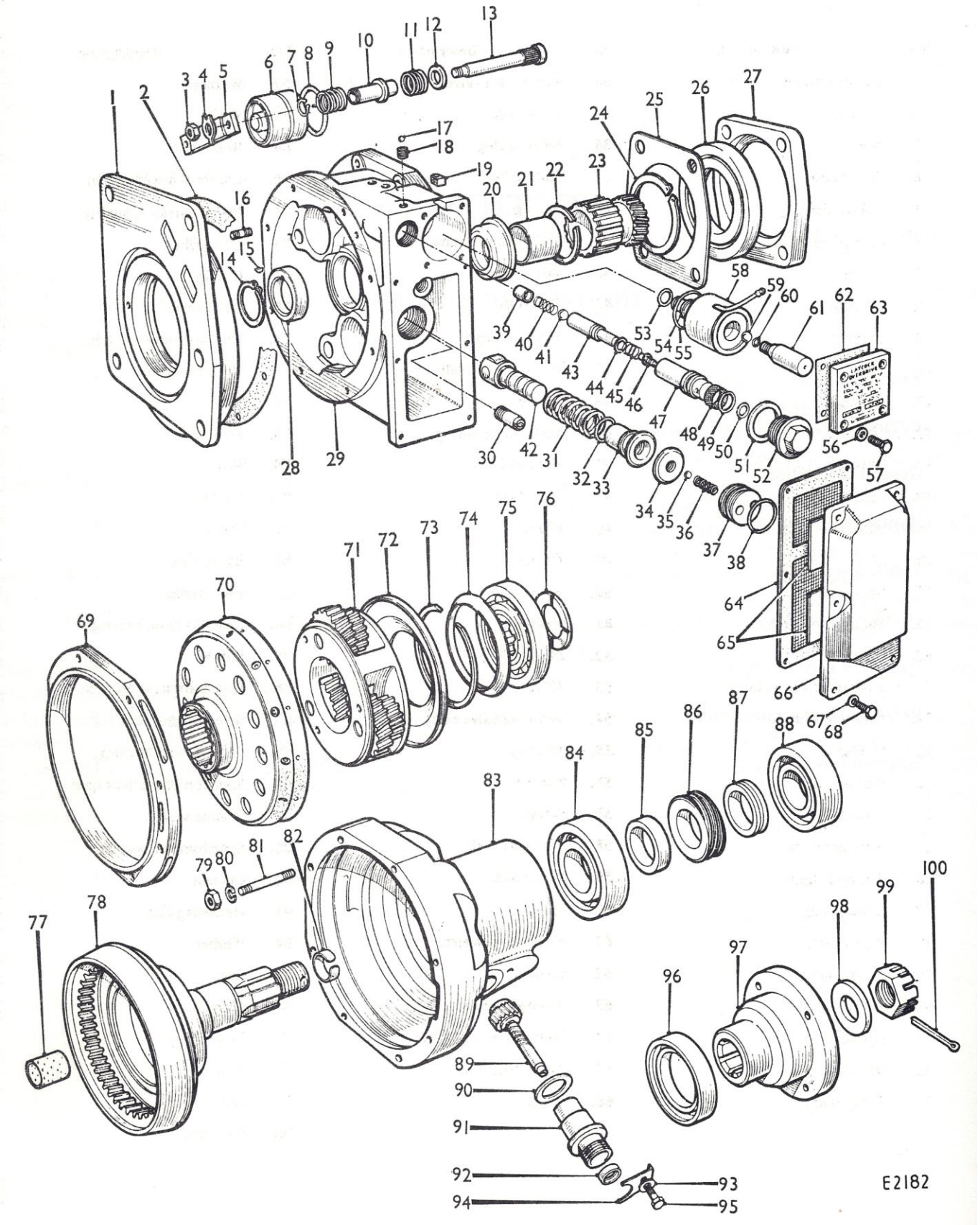
With the overdrive switch in the “on” position the solenoid is energised and the ball valve is held in the closed position by the solenoid rod. The input shaft to the overdrive unit carries a cam which operates the overdrive oil pump. The pump draws oil from the sump [gearbox sump as there is a combined gearbox and overdrive lubrication system] and the oil from the pump discharge is ducted to the two operating pistons of the clutch sliding member. A build-up of oil pressure operates the two pistons and moves the sliding clutch member, its outer brake surface contacts the stationary brake ring and the complete sliding member and sun wheel cease to rotate.

At a predetermined spring pressure the relief valve operates and relives any pressure, in excess of the pressure required to keep the pistons operating, into the low pressure lubricating system. Build-up of pressure in the low pressure lubricating system is relieved by the operation of a low pressure valve and the oil so relieved by the operation of the low pressure valve and the oil relieved returns to the sump.

The planet gear carrier is splined to, and rotates with, the input shaft. The planet gears, forced to turn about their own axis by the movement of the carrier, while in mesh with the stationary sun wheel, impart a driving force to turn the annulus. Because of the gearing arrangement the annulus turns faster than the input shaft. The propeller shaft, coupled to a flange rigidly secured to the shaft of the annulus, revolves at the same speed as the annulus.

In overdrive the outer bearing surface of the uni-directional clutch inside the annulus, overrides the rollers, cage and clutch, attached to the slower moving input shaft. In this condition the uni-directional clutch is in the unlocked or free condition.

The solenoid valve acts as a safety valve. If the pressure becomes excessive the ball would be blown off its seat against the load of the solenoid.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KEY TO THE OVERDRIVE COMPONENTS (TYPE L.H.)

No.	Description
1.	Adaptor plate.
2.	Gasket.
3.	Nut.
4.	Tab washer.
5.	Bridge-piece.
6.	Operating piston.
7.	Circlip.
8.	'O' ring.
9.	Spring.
10.	Thrust rod.
11.	Spring.
12.	Washer.
13.	Thrust housing pin.
14.	Circlip.
15.	Key.
16.	Stud.
17.	Steel ball.
18.	Plug.
19.	Grommet.
20.	Sun wheel thrust bush.
21.	Sun wheel bush.
22.	Circlip.
23.	Sun wheel.
24.	Circlip.
25.	Retainer plate.
26.	Thrust ball-race.
27.	Thrust ring.
28.	Pump cam.
29.	Main casing.
30.	Pump suction tube.
31.	Spring.
32.	'O' ring.
33.	Pump body.
34.	Non-return valve seat.
35.	Valve ball.
36.	Valve spring.
37.	Pump plug.
38.	'O' ring.
39.	Low pressure valve plug.
40.	Valve spring.
41.	Valve ball.
42.	Pump plunger.
43.	Low pressure valve body.
44.	Washer.
45.	Relief valve spring.
46.	Valve plunger.
47.	Valve body.
48.	Filter.
49.	'O' ring.
50.	'O' ring.
41.	Washer.
52.	Plug.
53.	'O' ring.
54.	Solenoid valve body.
55.	'O' ring.
56.	Washer.
57.	Screw.
58.	Solenoid coil.
59.	Valve ball.
60.	'O' ring.
61.	Solenoid plunger.
62.	Gasket.
63.	Solenoid cover.
64.	Sump filter and gasket.
65.	Filter magnets.
66.	Sump.
67.	Washer.
68.	Screw.
69.	Brake-ring.
70.	Clutch sliding member.
71.	Planet carrier assembly.
72.	Oil catcher.
73.	Circlip.
74.	Oil thrower.
75.	Uni-directional clutch.
76.	Thrust washer.
77.	Bus.
78.	Annulus.
79.	Nut.
80.	Washer.
81.	Stud.
82.	Spring ring.
83.	Rear casing.
84.	Annulus front bearing.
85.	Spacer.
86.	Speedometer drive gear.
87.	Selective spacer.
88.	Annulus rear bearing.
89.	Speedometer driven gear.
90.	Sealing washer.
91.	Speedometer bearing.
92.	Oil seal.
93.	Retaining clip.
94.	Washer.
95.	Bolt.
96.	Oil seal.
97.	Drive flange.
98.	Washer.
99.	Nut.
100.	Split pin.