

ROLLS-ROYCE AUTOMATIC GEARBOX

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SECTION 3 — FAULT DIAGNOSIS

Reliable fault diagnosis and rectification necessitates following the correct order of servicing and testing, recording the results of each test and then consulting the following paragraphs.

The recommended sequence of tests to simplify diagnosis of obscure defects is as follows

- 1 Check oil level and for leaks.
- 2 Lubricate and check control linkage.
- 3 Fit pressure gauge and carry out road test, recording oil pressure and change points; adjust bands if necessary.

The following Fault Diagnosis Table is set out in three columns.

The first column gives the conditions under which the fault may occur.

The second column gives the probable cause of the condition in the most likely order of occurrence, whilst the third column gives the action to be taken to remedy the fault.

In this way it is hoped the reader will be able to pinpoint a suspected defect more quickly than hitherto.

DIAGNOSIS

CONDITION	CAUSE	REMEDY
High upshifts 1 All upshifts	1 Throttle linkage too long. 2 Governor valves sticking. 3 Broken or sticking governor oil seal rings.	1 Adjust throttle linkage. 2 Remove side cover, parking bracket and governor. Check governor valves. 3 Remove side cover and parking bracket. Check governor rings.
Low upshifts 1 All upshifts	1 Throttle linkage too short. 2 Governor valves sticking. 3 Leaking throttle pressure. 4 Broken or weak shift valve spring.	1 Adjust throttle linkage. 2 Remove side cover, parking bracket and governor. Check governor valves. 3 Remove side cover and control valve unit. Overhaul control valve unit. Also check regulator plug. 4 Remove side cover and control valve unit. Check shift valve springs.

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DIAGNOSIS—continued

CONDITION	CAUSE	REMEDY
Misses upshifts 1 No upshift above 1st	1 Shift valves sticking. 2 Governor valves sticking. 3 Low oil pressure due to oil delivery sleeve rings broken or sticking. 4 Inoperative rear pump due to failure of bronze driving gear.	1 Remove side cover and control valve unit. Overhaul control valve unit. 2 Remove side cover, parking bracket and governor. Check governor valves. 3 Remove sump, side cover and control valve unit. Air test oil delivery sleeve for excessive leakage. 4 Remove sump to check. Remove gearbox to overhaul.
2 Misses 1st and 3rd	1 Front band incorrectly adjusted. 2 Broken front band. 3 Front servo rings broken or sticking. 4 Missing or loose plug in front servo. 5 Front unit locked.	1 Remove sump and adjust front band. 2 Remove gearbox and renew front band. 3 Remove sump, side cover and control valve unit. Air test front servo for operation and overhaul if necessary. 4 Remove sump to check then refit and tighten plug. 5 Remove gearbox. Overhaul front unit.
3 Misses 2nd and 4th	1 Excessive leak from oil delivery sleeve.	1 Remove sump, side cover and control valve unit. Air test oil delivery sleeve for excessive leakage, and check correct fitting of centre bearing cap.
Slips during upshifts 1 Slips — light throttle upshifts	1 Throttle linkage incorrectly adjusted. 2 Bands incorrectly adjusted. 3 Low oil pressure. 4 Throttle valve forced out of bore.	1 Adjust throttle linkage. 2 Remove sump and adjust bands. 3 Fit pressure gauge and check oil pressure. 4 Remove side cover and control valve unit. Overhaul control valve unit
2 Slips — heavy throttle upshifts	1 Throttle linkage incorrectly adjusted. 2 Bands incorrectly adjusted. 3 Low oil pressure. 4 Throttle valve forced out of bore. 5 Sticking T.V. plug in regulator valve. 6 Damaged oil seals in regulator valve. 7 Rear servo rings broken or sticking. 8 Oil delivery sleeve rings broken or sticking. 9 Clutch plates worn or burned.	1 Adjust throttle linkage. 2 Remove sump and adjust bands. 3 Fit pressure gauge and check oil pressure. 4 Remove side cover and control valve unit. Overhaul control valve unit. 5 Remove regulator valve and check T.V. pressure plug. 6 Remove regulator valve and check seals. 7 Remove sump, side cover and control valve unit. Air test rear servo for operation and overhaul if necessary. 8 Remove sump, side cover and control valve unit. Air test oil delivery sleeve for excessive leakage. 9 Remove gearbox and overhaul front and rear clutchpacks.
3 Slips 1-2, 3-4	1 Low oil pressure due to oil delivery sleeve rings broken or sticking. 2 Front servo rings broken or sticking. 3 Front unit clutch plates worn or burned. 4 Broken or collapsed oil seal in front clutch piston.	1 Remove sump, side cover and control valve unit. Air test oil delivery sleeve for excessive leakage. 2 Remove sump, side cover and control valve unit. Air test front servo for correct operation and overhaul if necessary. 3 Remove gearbox and overhaul front clutch pack. 4 Remove gearbox and overhaul front clutch pack.

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DIAGNOSIS—continued

CONDITION	CAUSE	REMEDY
Slips during upshifts—continued 4 Slips 2-3	1 Throttle linkage incorrectly adjusted. 2 Front band incorrectly adjusted. 3 Restriction or heavy leak in oil circuit. 4 Sticking control valves. 5 Rear clutch plates worn or burned.	1 Adjust throttle linkage. 2 Remove sump and adjust front band. 3 Remove sump, side cover and control valve unit. Air test oilways to check front servo, rear servo and rear clutch. Check for sticking 4-3 timing valve in front servo. 4 Remove side cover and control valve unit. Overhaul control valve unit. 5 Remove gearbox and overhaul rear clutch pack.
Intermittent slip 1 All ranges	1 Low oil level. 2 Incorrect oil pressure. 3 Intermittent sticking regulator valve.	1 Check oil level and top-up as required. 2 Fit pressure gauge and check oil pressure. 3 Remove regulator valve and check for freedom of movement.
Rough changes 1 Rough upshift 2 Rough 3-2 closed throttle downshift 3 Rough 4-3 downshift .. 4 Rough neutral to drive ..	1 Throttle linkage incorrectly adjusted. 2 Bands incorrectly adjusted. 3 Incorrect oil pressure. 4 Control valves sticking. 1 Throttle linkage incorrectly adjusted. 2 Incorrect oil pressure. 3 Bands incorrectly adjusted. 4 Excessive oil leak, or broken or sticking, check valve in rear servo. 5 Engine revs. too high in closed throttle position. 6 Control valves sticking. 1 Incorrect oil pressure. 2 Bands incorrectly adjusted. 3 Control valves sticking. 4 Sticking 4-3 timing valve in front servo. 1 Engine slow running set too fast in closed throttle position. 2 Bands incorrectly adjusted. 3 Sticking rear servo apply piston.	1 Adjust throttle linkage. 2 Remove sump and adjust bands. 3 Fit pressure gauge and check oil pressure. 4 Remove side cover and control valve unit. Overhaul control valve unit. 1 Adjust throttle linkage. 2 Fit pressure gauge and check oil pressure. 3 Remove sump and adjust bands. 4 Remove sump and servos. Overhaul rear servo. 5 Adjust correctly the engine slow running speed. 6 Remove side cover and control valve unit. Overhaul control valve unit. 1 Fit pressure gauge and check oil pressure. 2 Remove sump and adjust bands. 3 Remove side cover and control valve unit. Overhaul control valve unit. 4 Remove sump and servos. Check timing valve. 1 Correctly adjust the engine slow running speed. 2 Remove sump and adjust bands. 3 Remove sump, side cover and control valve unit. Air test rear servo and, if necessary, remove rear servo to overhaul.
No forced downshift 1 No. 4-3 forced downshift .. 2 No 3-2 forced downshift ..	1 Throttle linkage incorrectly adjusted. 2 Control valves sticking. 3 T.V. pressure plug sticking. 1 Throttle linkage incorrectly adjusted. 2 Sticking 3-2 timing valve or control valves sticking. 3 T.V. pressure plug sticking.	1 Adjust throttle linkage. 2 Remove side cover and control valve unit. Overhaul control valve unit. 3 Remove regulator valve and check T.V. pressure plug. 1 Adjust throttle linkage. 2 Remove side cover and control valve unit. Overhaul control valve unit. 3 Remove regulator valve and check T.V. pressure plug.

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DIAGNOSIS—continued

CONDITION	CAUSE	REMEDY
Reverse malfunction		
1 Slips in reverse	<ol style="list-style-type: none"> 1 Low oil pressure. 2 Damaged reverse piston oil seal. 3 Reverse piston supply restricted or leaking. 4 Front band incorrectly adjusted. 5 Stationary cone key missing. 	<ol style="list-style-type: none"> 1 Fit pressure gauge and check oil pressure. 2 Remove gearbox and check reverse piston oil seal in rear extension. 3 Remove side cover and check reverse feed pipe for correct fitting or obstruction. 4 Remove sump and adjust front band. 5 Remove gearbox and check rear extension to see if cone key is locating stationary cone.
2 Locks in reverse	<ol style="list-style-type: none"> 1 Reverse piston sticking or reverse cone sticking to stationary cone. 2 Reverse parking pawl incorrectly fitted. 	<ol style="list-style-type: none"> 1 Try to free clutch by burnishing as described in Chapter 2—Reverse epicyclic unit. If this fails, remove gearbox and check piston in rear extension. 2 Remove side cover and check for correct operation of parking pawl.
3 Jumps out of reverse	<ol style="list-style-type: none"> 1 Selector lever incorrectly adjusted. 2 Locking pawl in selector lever badly worn. 3 Parking brake lever return spring is too strong. 	<ol style="list-style-type: none"> 1 Adjust selector controls. 2 Remove selector controls from steering column and overhaul controls. 3 Remove side cover. Check that the gear selector lever will remain in reverse notch; if not, check parking brake lever return spring, also detent plunger spring.
4 Cannot select reverse	<ol style="list-style-type: none"> 1 Selector linkage incorrectly adjusted. 2 Reverse blocker piston sticking out. 3 G1 valve sticking out allowing G1 oil to hold reverse blocker piston out. 4 Link pin connecting gear lever to operating tube on steering column in misplaced position. 	<ol style="list-style-type: none"> 1 Adjust selector linkage. 2 Remove side cover and parking bracket. Check reverse blocker piston. 3 Remove side cover, parking bracket and governor. Check G1 valve. 4 Remove selector controls on steering column and overhaul controls.
5 Will go into reverse above 8–10 m.p.h.	<ol style="list-style-type: none"> 1 Reverse blocker piston sticking in. 	<ol style="list-style-type: none"> 1 Remove side cover and parking bracket. Check reverse blocker piston.
6 Clashes when changing to reverse	<ol style="list-style-type: none"> 1 Reverse blocker piston sticking in. 2 Incorrectly fitted parking pawl. 	<ol style="list-style-type: none"> 1 Remove side cover and parking bracket. Check reverse blocker piston. 2 Remove side cover and check parking pawl for correct operation.
7 No forward drive after changing from reverse	<ol style="list-style-type: none"> 1 Reverse piston sticking or reverse cone sticking to stationary cone. 	<ol style="list-style-type: none"> 1 Try to free clutch by burnishing as described in Chapter 2—Reverse epicyclic unit. If this fails, remove gearbox and check reverse piston and cone in rear extension.
8 Inoperative parking brake ..	<ol style="list-style-type: none"> 1 Parking blocker piston sticking out or parking pawl binding. 	<ol style="list-style-type: none"> 1 Remove side cover and parking bracket. Check parking blocker piston and parking pawl.
Car fails to move		
1 No drive	<ol style="list-style-type: none"> 1 Selector linkage incorrectly adjusted. 2 No oil pressure. 3 Low oil level. 4 Manual control operating pin not engaged with manual control valve. 5 Regulator valve sticking. 	<ol style="list-style-type: none"> 1 Adjust selector linkage. 2 Fit pressure gauge to check then measure oil level, also check for excessive leaks. 3 Check oil level and top-up as required, also check for excessive leaks. 4 Remove side cover and check operation of manual control valve. 5 Remove regulator valve and check for freedom of movement.

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DIAGNOSIS—*continued*

CONDITION	CAUSE	REMEDY
Car fails to move—<i>continued</i> 2 No drive when engine is first started	1 Low oil pressure. 2 Badly leaking torus check valve. 3 Reverse piston sticking or reverse cone sticking to stationary cone.	1 Fit pressure gauge and check oil pressure. 2 This will be revealed by an abnormally high oil level in the gearbox due to the check valve failing to hold oil in the torus assembly. In such a case, remove gearbox and overhaul check valve in driven torus. 3 Try to free the reverse clutch by burnishing as described in Chapter 2 — Reverse epicyclic unit. If this fails, remove the gearbox and check reverse piston and cone in rear extension.

OIL PRESSURE DIAGNOSIS

It will be seen by reading the Fault Diagnosis Table that a considerable number of defects can be caused if oil pressure is too high or too low.

The following list of causes of high and low oil pressure is useful when used in conjunction with the fault diagnosis table.

Low oil pressure

- 1 Oil level low.
- 2 Boost plug sticking.
- 3 Pressure regulator or spring defects

- 4 Blocked filter.
- 5 Oil foaming or air locks.
- 6 Internal leaks.
- 7 Pump slide sticking.

High oil pressure

- 1 Pressure regulator valve sticking.
- 2 Boost plug sticking.
- 3 Pump relief valve sticking.
- 4 Blocked oil passages.