

CHAPTER 1

DESCRIPTION

SECTION 1 — GENERAL DESCRIPTION

The Rolls-Royce and Bentley Automatic Gearbox (see Fig. 1) transmits tractive power from the engine to the propeller shaft in one reverse and four forward ratios. The gear changes are made automatically and are obtained through a fluid coupling and three hydraulically controlled epicyclic gear trains. In all forward ranges, the driving torque is applied continuously to the road wheels during the changes from one ratio to another.

A gear range selector lever is provided on the steering column of the car and can be used by the driver, within certain speed ranges, to overrule the automatic mechanism and to select the gear he considers most suitable for the road and traffic conditions as he sees them. The selector lever has five positions: 'N', '4', '3', '2' and 'R'; representing Neutral, three forward ranges and Reverse. A gate is provided between positions '3' and '2' to identify these ranges and on all cars, except those intended for use abroad, stops are provided which prevent the lever being moved into or out of Neutral or Reverse unless a button in the end of the selector lever is pressed.

In all ranges except Neutral, when the engine is running, the drive is engaged. At low throttle openings and with the hand brake applied, the car will remain stationary due to slip in the fluid coupling; at higher engine speeds the coupling becomes more efficient and the car will move off whenever the brakes are released.

**Range 4**

For normal motoring the selector lever should be placed in range '4'. The car will then start from rest in first gear at low throttle openings, but when accelerated, will change progressively through second and third into the fourth or 'top' gear. Further depression of the accelerator pedal causes the changes to be progressively delayed so that they occur at higher road speeds and facilitate more rapid acceleration of the car.

If at any time the accelerator pedal is depressed beyond the full throttle position (kick-down), a full throttle down-change occurs which increases driving torque and so further increases acceleration.

**Range 3**

Under normal motoring conditions, only first, second and third gears are obtainable in range '3'. A 'safety' up-change to fourth gear is provided, however, to prevent the engine from being 'over-revved' in third gear. The 3-4 change is delayed until a speed of approximately 78 m.p.h. to 80 m.p.h. is reached and thus maximum acceleration can be obtained in third gear. For this reason, range '3' is often known as the performance range.

If at any time the driver requires a change from fourth to third gear under less than full throttle conditions, for example to obtain increased engine braking, he can promote the 4-3 change by moving the selector lever to range '3'.

## ROLLS-ROYCE AUTOMATIC GEARBOX

Similarly, in traffic which enforces for any length of time speeds between 9 m.p.h. and 25 m.p.h., the driver can move the selector lever to range '3' to avoid the continual changes which might otherwise occur between third and fourth gears.

The change point figures given for range '3' are applicable to 'S3' cars. As the change points differ slightly between 'S' series and 'R' series cars a table of change points has been included in 'Chapter 2—Servicing.'

### Range 2

In range '2', under normal circumstances only second gear is engaged. The car will start from rest in second gear and will remain in that gear until the selector lever is moved to a higher range. **There is no safety up-change and therefore a speed of 50 m.p.h. must never be exceeded in range '2'**; otherwise serious damage to the engine may result.

First gear is obtainable temporarily by means of full throttle 'kick-down', or should extreme loading on the engine at low speeds require it. Such circumstances are extremely rare and will probably never be met under road test conditions.

As described above for range '3', the selection of range '2' will prevent continual changes between second and third gears in extremely slow traffic conditions. Furthermore, range '2' is most useful for ensuring maximum engine braking when descending steep or dangerous gradients.

### Neutral

In Neutral 'N' the drive is disconnected, allowing the planet gears to idle without transmitting torque. The selector lever is also made to interrupt the electrical supply to the starter motor except when in Neutral; this is a safeguard to prevent the engine being started with the car in gear, where it would have a tendency to move forward, especially if the automatic choke caused the engine to run at a fairly high idling speed when starting from cold.

### Reverse

It is possible to select Reverse while the car is moving forward below a speed of approximately 8 m.p.h. to 10 m.p.h. This action puts great stress upon the transmission and therefore should not be attempted.

Reverse has an important secondary effect in this transmission. When the selector lever is moved to position 'R' while the engine is stationary, a pawl is caused to engage with an annular gear on the reverse unit in the gearbox which effectively locks the transmission and prevents the car from moving, even when parked on the steepest gradients. When parked on a hill, the hand brake must be firmly applied before the selector lever is moved to another range; the parking lock would then be released and the car could move if not held by the brakes.