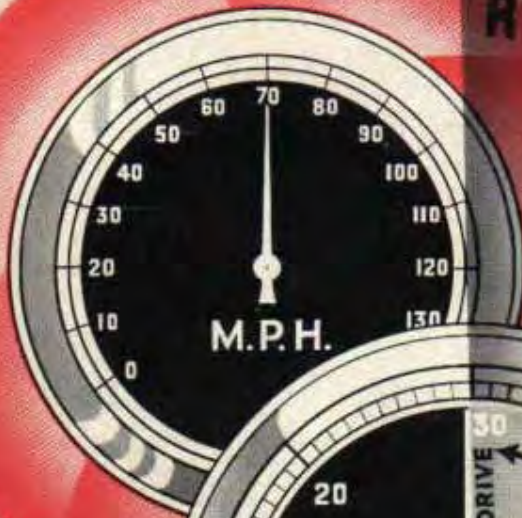


OPERATING AND MAINTENANCE HANDBOOK
FOR THE
**LAYCOCK de NORMANVILLE
OVERDRIVE**

As fitted to the
AUSTIN-HEALEY 100



REDUCED
PETROL

REDUCED
ENGINE
WEAR

The Laycock-de No

“tops” the top gear—giving higher cruising spe

DESCRIPTION

The Laycock-de Normanville Overdrive unit comprises a hydraulically controlled epicyclic gear, housed in a casing which is directly attached to an extension at the rear of the gearbox.

When brought into operation, the overdrive reduces the engine speed in relation to the road speed. This permits high road speeds with low engine revolutions resulting in considerable fuel economy and reduced engine wear.

OPERATION

The overdrive operates in 2nd and top gears and is brought into operation automatically at approximately 40 m.p.h. (64 k.p.h.) by an electrical centrifugal governor and solenoid. On deceleration the overdrive remains in engagement but at speeds below 30 m.p.h. (48 k.p.h.) automatically disengages when the throttle is opened for acceleration. A further switch operated by the gear lever prevents engagement of the overdrive when either 1st gear or reverse is required.



Manual Switch.

Manual Switch. A switch mounted centrally on the fascia panel provides a means for the driver to override the automatic control at speeds in excess of 30 m.p.h. (48 k.p.h.) providing the throttle is more than one-fifth open.

DRIVING.

For **normal cruising** in open country the manual switch should be placed in the **DOWN** position to allow the overdrive to come into operation.

To meet any **sudden power demand** (such as for hill climbing or overtaking), when the overdrive is in operation, the manual switch can be placed in the **CENTRAL** position to bring the car into the normal top gear ratio.

The following table gives the relationship between engine revolutions per minute to road speed in miles and kilometres per hour for the various gears ; the top gear column is divided to show the comparative engine revolutions with and without the overdrive in operation.

Manville Overdrive

eds, or reduced r.p.m. for a given road speed.

ROAD SPEED		ENGINE REVOLUTIONS PER MINUTE				
K.P.H.	M.P.H.	1st	2nd Norm.	2nd +OD.	Top Norm.	Top +OD.
16	10	1250	790	—	558	—
32	20	2500	1580	—	1116	—
48	30	3750	2370	—	1674	—
64	40	5000	3160	2460	2232	1735
80	50		3950	3070	2790	2170
96	60		4790	3680	3348	2605
112	70			4290	3906	3040
128	80			4900	4464	3475
144	90				5022	3910
160	100					4345
176	110					4780

MAINTENANCE

The lubricating oil for the overdrive unit is common with that in the gearbox. To check the oil level, take out the inspection panel in the right-hand side of the gearbox cover when the filler plug will be accessible.



Every 1,000 miles (1,600 kilometers) check the oil level of gearbox and overdrive, and if necessary top-up to the base of the filler plug threads with the recommended grade of oil.

Every 6,000 miles (9,600 kilometers) drain and refill the gearbox and overdrive units. Two drain plugs, one for the gearbox and one for the overdrive unit, are situated at the base of their respective casings. Drain when the oil is warm, after a run, and refill to the level of the filler plug with new oil.

After refilling the gearbox and overdrive with oil, re-check the level after the car has been run, as a certain amount of oil will be retained in the hydraulic system of the overdrive.

Every 6,000 miles (9,600 kilometers) after draining the oil, remove the overdrive oil pump filter and clean the filter gauze by washing in petrol. The filter is accessible through the drain plug hole and is secured by a central setbolt.

RECOMMENDED LUBRICANTS.

						S.A.E. Viscosity.
Vacuum.	Wakefield	Shell.	Esso.	B.P. Energol.	Duckham's	
Mobiloil.	Castrol.	X-100	Essolube.	Energol.	N.O.L.	
A	XL.	30.	30.	30.	"Thirty"	30.
			Imp. Pints.	U.S. Pints.		Litres.
			4½	5.35		2.55

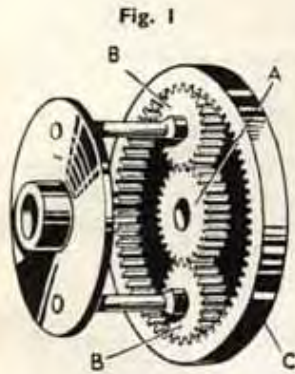
Important.

It is most essential that absolute cleanliness is exercised when filling the gearbox and overdrive units with lubricating oil, as any foreign matter that enters may seriously affect the hydraulic operation of the overdrive.

The oil in the gearbox and overdrive units must always be kept "topped up" to the correct level, otherwise the operation of the overdrive will be affected.

The Laycock-de No

How it



The principle of operation of this unit is simple. Basically it comprises an epicyclic gear train; see Fig. 1, consisting of a sun wheel (A), planet wheels (B) which revolve around the sun wheel, and an outer ring, the annulus (C) cut with gear teeth on the inside. Also there is a hydraulic pump, a hydraulic accumulator or pressure storage chamber, and a uni-directional roller clutch.

This clutch operates as follows. The driving shaft from the gear box carries the inner member on which are cut a number of inclined surfaces. The annulus or outer ring of the epicyclic gear train, which is attached to the propellor shaft carries the outer member.

Between the two are a number of rollers.

When in direct top gear (see Fig. 2) the overdrive is, of course, inoperative. The drive from the gearbox to the propellor shaft is taken through the rollers (A) from the gearbox main driving shaft (B) to the outer member of the uni-directional clutch (C), and so direct drive is transmitted.

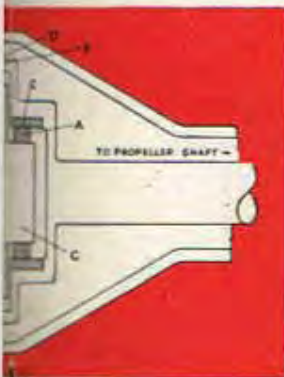
It will be remembered that the Roller Clutch drives in one direction only, and therefore if the car were to over-run the engine, the rollers would be pushed down the inclined surfaces away from the annulus or output member and the drive broken, leaving the car without engine resistance to assist braking. This problem is overcome by means of a cone clutch (D).



Ormanville Overdrive works



This clutch slides on the sun wheel splined extension (E) and it is pushed by springs to engage with the corresponding cone of the annulus (F). This, therefore, locks the sun wheel to the annulus. Between the annulus and the sun wheel are the planet wheels which are carried by the Planet Carrier (G) (Fig. 2) which is mounted on the Driving Shaft (B). The planet wheels are therefore also locked and resistance to over-run is provided by the engine through the gear box and main drive shaft to the planet wheels.



When overdrive is engaged a valve in the unit is opened. Hydraulic pressure contained in the accumulator is thereby applied to two pistons. These pistons operate on the cone clutch member, overcoming the spring pressure and pushing the cone member away from the annulus and against a conical brake ring (A) Fig. 3, built into the main casing.

The sun wheel carries the cone clutch (B), Fig. 3, and is free to rotate on the mainshaft. Therefore, when the cone clutch makes contact with the brake ring (A) it brings the sun wheel to rest and holds it stationary.

The planet carrier and planet wheels are now driven round the stationary sun wheel, causing the annulus to be overdriven at a higher speed than the driving shaft.

In overdrive the outer member of the free wheel over-runs the inner member. Engine braking is provided by the sun wheel being prevented by the cone clutch from rotating in either direction.

The Laycock-de No

Detailed Techn

On these two pages we show a cut-away drawing of the Overdrive and a more detailed technical description of its working.

It will be seen that the input shaft (D) carries first of all a cam (C) operating a plunger type hydraulic pump (G) which builds up pressure against a spring loaded piston (F) in an accumulator cylinder placed across the bottom of the main casing (H).

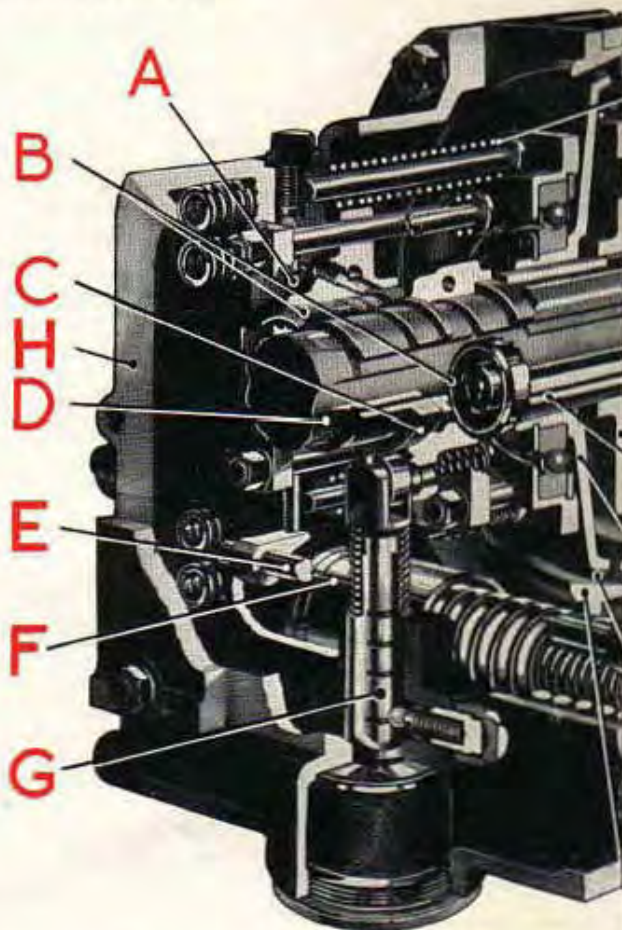
Further back on shaft (D) there is a sun wheel (O) in one piece with a splined sleeve (M) which is free to rotate on shaft (D). Immediately behind the sun wheel and splined to the shaft (D) is a planet carrier (N) in which are mounted the planet wheels (T).

Finally, also splined to the shaft (D) is the inner member (S) of a uni-directional roller clutch which is the driving member in direct gear. The drive is via the shaft (D) the inner member (S) rollers (P) which are forced by spring pressure up inclined faces (R) and wedge between the inner member (S) and the outer member (W) the latter being attached to the combined annulus (U) and output shaft (Q).

Slidably mounted on the splined sleeve (M) is a double cone clutch (K) which, under the influence of springs (V) is pushed to the rear so that its inner lining (L) is in contact with the corresponding cone on annulus (U) thus preventing a freewheel condition when the car tries to over-run the engine. Engine braking is, therefore, always available.

In addition the clutch (K.L.U.) drives the car when in reverse gear which obviously the uni-directional roller clutch cannot do.

To change into overdrive, the operating shaft (E) is rotated a small amount by the operation of the solenoid. This lifts the operating valve (A) allowing the



Manville Overdrive

Technical Description

stored hydraulic pressure in the accumulator to be applied to two pistons (B). These pistons (B) now move the clutch (K) forward away from the annulus (U) overcoming the springs (V). During the forward movement of the clutch (K) the drive from the engine to the wheels is maintained by the roller clutch.



On completion of its forward movement, the outer lining (J) of the cone clutch (K) contacts the brake ring (I). Pistons (B) exert pressure not only sufficient to overcome springs (V) but also to bring clutch (K) together with sunwheel (O) to rest. Note that clutch (K.J.I.) being oil immersed comes to rest perfectly smoothly without shock.

The drive is now via shaft (D) to planet carrier (N) which by rotating the planet wheel (T) round the stationary sunwheel (O) causes the annulus (U) and output shaft (Q) to be driven faster than the input shaft (D). In this condition the outer member (W) of the roller clutch overruns the inner member (S). Because the sun wheel can move neither backwards or forwards there is always engine braking available in overdrive gear.

To change down to direct gear for acceleration, the accelerator pedal is held depressed and valve (A) released. This cuts off the hydraulic pressure to pistons (B) and springs (V) again take charge breaking the contact of clutch (K.J.I.). The load on the engine is therefore relieved and it is consequently able to accelerate until the inner member (S) of the roller

clutch reaches the speed of the outer member (W) and direct drive is taken up in perfect synchronisation. Finally the contact of clutch (K.L.U.) is completed so that engine braking is available when required.

The Only Clutchless Sustained Power Overdrive has come to stay

Here is evidence of efficiency—

Extract from

"MOTOR" Road test 8/52 May 28/1952, of a current production car of 2,088 c.c.

FUEL CONSUMPTION.

	Direct top	In overdrive	
		M.P.G.	M.P.G.
Car driven at constant 30 m.p.h.	29.5	33	= 11%
" " " " 40 m.p.h.	27.0	31.5	= 16½%
" " " " 50 m.p.h.	24.0	29.5	= 23%
" " " " 60 m.p.h.	21.0	25.0	= 19%
" " " " 70 m.p.h.	17.5	20.5	= 17%

Here is evidence of Stamina :—

AUSTIN HEALEY 100 broke 117 International and American Stock Car Records at Bonneville Salt Flats, U.S.A., September 1953. Highlights—24 hours continuously at 104.3 miles per hour. Petrol consumption 21 m.p.g. Measured Mile 142.6 m.p.h. Laycock de Normanville Overdrive was used continuously on these runs.

WHAT THE CUSTOMER SAYS :—

Mr. Barney Clark writing in the American Motoring Journal "Auto Sport Review"
BUT THE REAL DELIGHT IN THE AUSTIN-HEALEY IS THE LAYCOCK-DE NORMANVILLE OVERDRIVE. Unlike anything in America, this unit is controlled by a toggle switch on the dashboard and is absolutely under the driver's command. Set at 'Overdrive' position it shifts itself up or down—instantly—at road speeds of about 40 m.p.h. But at any time the driver can pop the switch back to 'Normal' and get it—instantly—with throttle wide open or shut and without using the clutch. The shift is really instantaneous and there is NO free-wheeling effect in either ratio. Here's an example of how it works :— You are pottering along the highway in overdrive at about 50, trailing another car. A hole opens up in the on-coming traffic and you give it the gun, throttle right into the floor. As you start swinging out, you flick the switch into 'Normal' and—bam!—you're in another gear and the revs start climbing like a rocket. As soon as you have a healthy supply of r.p.m., you flick the switch back up into 'Overdrive' and—bam!—you're back in top ratio and those extra revs hit the rear wheels like a mule's kick. There is no 'clunk' as the shifts take place and the only indication you have is the sudden change in ratio. Real good! This works in 2nd and top gears so you actually have five speeds forward.

Laycock- de Normanville verdrive

MANUFACTURED BY

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Under exclusive licence from
AUTO TRANSMISSIONS LTD., COVENTRY.

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Grams : "Invention," Sheffield

