

Overdrive Transmissions

When Less is Better

By Bob Vitrikas

At the dawn of the gasoline or diesel powered automobile age, the transmission output shaft and the driveshaft to which it was attached typically rotated at the same speed as the engine, 1:1. Numerically higher ratio lower transmission gears allowed the engine to more easily accelerate the vehicle until top gear (1:1 ratio) was attained. The differential, usually found on the rear axle, reduced the driveshaft rotational speed to the wheels. The numerically higher the differential ratio, the faster the engine had to turn to achieve the same vehicle speed but the faster it accelerated. A transmission with overdrive gearing (less than 1:1) turns the driveshaft more rapidly than the engine speed, e.g. "overdriving" the driveshaft, thus lowering the engine speed for a given vehicle speed. This in turn reduces fuel consumption, engine wear and noise. All good things! Like many things in life there is a downside...

To achieve maximum vehicle top speed, the engine needs to be able to achieve its maximum horsepower, usually at the high end of its rev range. I should point out that horsepower is what determines the vehicle's top speed but torque is what you feel when the vehicle accelerates. Horsepower figures get all the press but really it's torque that you feel as performance when the vehicle accelerates. The ability of an engine to power a vehicle to its top speed is related to the rear differential ratio, rolling resistance and aerodynamic drag of the vehicle in addition to the engine's horsepower. When engine speed, maximum horsepower, rear differential ratio, rolling resistance and aerodynamic drag are optimized, a vehicle is capable of attaining its maximum speed. Typically an overdrive gear in a transmission, and today's transmissions may have more than one overdrive gear, will not allow a vehicle to achieve its maximum speed in top gear due to the tradeoff for better gas mileage, less noise and engine wear. Life is full of compromises. Sigh.

Before we had five, six, seven, eight, nine and yes even ten speed transmissions, we had to make do with three and four speed transmissions. American cars typically had big torquey engines compared to their European cousins and three speed manual tranny's were the norm. The popular Chevy Powerglide automatic made do with just two speeds. GM's Hydramatic gearbox had four speeds. In my opinion it was far superior to the Powerglide but I diverge. Four speed manual gearboxes were commonly found on the likes of MGs, Austin-Healeys, Triumphs, Jaguars etc. As engine power increased manufacturers added a fourth or fifth gear to allow a higher top speed while maintaining the lower gears for acceleration. Best of both worlds.

Well there was a downside to adding all these additional gears inside the transmission case. Space for one thing. Hmm... how to get around this.... Enter American engineer William B. Barnes who is credited with the idea of mating a secondary overdrive unit to a manual three speed gearbox. Borg-Warner's Muncie Gear Division saw its merits and sold Chrysler on the idea and voila the overdrive option was made available, at

extra cost of course, on the 1934 Chrysler and De Soto Airflow passenger cars. The marketing guys sold it on the merit of reducing gas consumption, an important consideration during the depression years. Between 1934 and 1972, Borg-Warner sold over 10 million overdrive units for use on passenger cars and trucks. Spurred on by the oil crisis of 1973 and skyrocketing prices of gasoline, automatic transmissions began to incorporate overdrive gears and manual gearboxes with five speeds were popular on European and Japanese cars. Corvette and Porsche had seven speed manual transmissions. Not sure I could keep up with which gear I was in with all those possibilities!

Meanwhile back in Blighty a clever engineer by the name of Edgar de Normanville came up with an electrically actuated, oil pressure powered overdrive unit that relied on solenoids and pistons to drop engine revs by around 22% with a commensurate drop in fuel consumption. Because it operated independently from the transmission gears, it could be used on the intermediate gears as well as top gear. The de Normanville design was adopted by Laycock Engineering and used widely in British and Volvo cars. The first to adopt the Laycock overdrive units was the 1948 Standard Vanguard Saloon.

Perhaps more familiar to us Yankees, Laycock overdrives were a popular option on Jaguars, MGs, Triumphs, Austin-Healeys, Aston Martins etc. American Motors and Chrysler cars as well as Ford Transit vans also offered the Laycock overdrive. The reduced wear and tear on engines and increased gas mileage made the overdrive a popular option for American drivers favoring long distance drives and using our newly developed interstate highways. As five speed manual gearboxes became commonplace, the Laycock Overdrive faded into history. During its 40 years of production, Laycock sold over three and a half million overdrives, over one million of which were used on Volvo cars.

"We all cruise with ease"

1. Austin-Healey 100
2. Bristol 2-litre
3. Ford Consul and Zephyr
4. Jensen Interceptor
5. Standard Vanguard
6. Triumph 2-litre Sports
7. Triumph Renown
8. Vauxhall Velox and Wyvern

In addition to the above the Laycock-de Normanville Overdrive is available on
Austin A70, Austin A90 and Austin Sheerline

Concessionaires for Austin Conversions are:
JENSEN MOTORS LTD., WEST BROMWICH
And for Vauxhall Conversions:
G. E. NEVILLE & SONS, LTD., MANSFIELD, NOTTS.
to whom enquiries should be made.

Notable successes in the international sporting world during 1953, with cars fitted with the Laycock-de Normanville Overdrive were—LE 1902S, Nash-Healey 110s in general classification; Austin-Healeys, 2nd and 3rd in the up-to-three-litre class.
A Sunbeam Alpine achieved 119.402 m.p.h. over a Flying Mile on the 1/4-mile Highway at Oulton.
A Triumph 2-litre Sports achieved 124.095 m.p.h. over a Flying Mile.

If you have been unable to get to the MOTOR SHOW, and therefore did not see the OVERDRIVE demonstrated on our STAND 266 write to the address below for leaflet.

Laycock-de Normanville overdrive

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LAYCOCK ENGINEERING LTD
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