

The new U.T.A. multi-purpose diesel railcars

LATEST DIESEL TRAIN TRANSMISSION

WITH TORQUE CONVERTER

FOR ULSTER TRANSPORT AUTHORITY

Railway Engineers throughout the world are watching with interest the progress in service of a new type of diesel railcar stock, operated by Ulster Transport Authority between Belfast and Londonderry.

For years this line, with a falling passenger traffic and a sparse freight traffic has been uneconomic to operate with conventional stock — conditions that have many parallels in present day railway operation.

A possible solution to the problem, prepared by Mr. James Courtney, Chief Engineer of Ulster Transport Authority, was to develop a diesel railcar of increased power and with a transmission system of great flexibility giving it a dual ability to operate either in fast passenger trains or to haul a considerable tail load at lower speeds.

This transmission powered by a "Leyland" engine and supplied to U.T.A. by British United Traction Ltd. consists of a Torque Converter, (Schneider System), an Epicyclic Reversing Unit, a 4-Speed Epicyclic Gearbox and two axle mounted Final Drive Units, all designed and manufactured by Self-Changing Gears Ltd.

The 4-Speed gearbox is automatically controlled by the V.S. system which by selecting the gear ratio appropriate to conditions of speed and torque ensures that the torque converter gives optimum performance over a very extended range of car speed. Thus no matter whether it hauls a freight load at 10 m.p.h. or a passenger load at 80 m.p.h. the torque converter operates in its maximum efficiency range.

It is a characteristic of this transmission that the engine is permitted to run at a constant speed and thus to give a constant power output, resulting in maximum acceleration together with smooth continuous traction in which gearchanging is imperceptible.

This characteristic results in the engine running under uniform thermal conditions conducive to long engine life.

The Epicyclic Reversing Unit provides for faultless and foolproof control of direction by the engagement of the appropriate brake band, and thus obviates risks associated with the meshing of dogs.

Coming after the Reversing Unit the 4-Speed gearbox has been arranged to operate in either direction of rotation. It has robust running gear and controlled air-pressure operation of the brake bands ensuring continuous traction during gear-changing.

It will be seen that the principle features of this transmission are:-

1. High overall efficiency.
2. Optimum acceleration.
3. Smooth continuous traction.
4. Fully automatic transmission.
5. Increased passenger comfort.
6. Ability to have Tail-load, without sacrifice of maximum speed.

We believe that the transmissions remarkable features and versatility in service will prove sufficient inducement for Railway Engineers throughout the world to follow Ulster Transport Authority's example in fitting this type of hydraulic transmission.

The propensities of the Torque Converter allied to the Self-Changing Gears Gearbox as used in this transmission being practically unique.

The train that competes with the plane

SEEING EUROPE

BY EXPRESS RAILCAR

One of the pleasantest ways of seeing Central Europe and its principle cities is to use the new deluxe express railcar network. Its aim is to provide over distances of up to 500 miles a 60 m.p.h. service that will almost compete with the short line air schedules when the times taken in reaching and leaving the airport are taken into consideration.

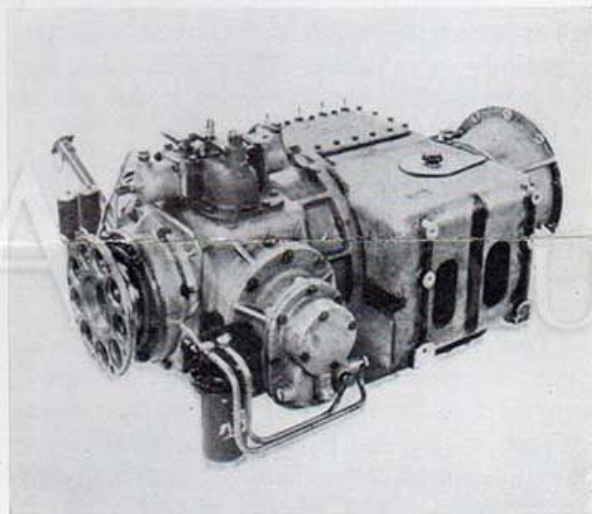
Our interest in the success of this scheme is due to the fact that our five speed gearboxes are used on a number of these express and extremely efficient railcars. The boxes are made under licence by the great Italian railway engineers 'Breda' of Milan. Each power car uses a flat horizontal opposed 12 cylinder engine, hydraulic coupling, a Self-Changing Gears Ltd. gearbox, propeller shaft, a main reduction gear and a secondary reduction gear. The 35.6 litre engine develops 490 b.h.p. at 1500 r.p.m.

These 'Breda' built cars are beautifully appointed. The plumbing and kitchen arrangements no less than the passenger accommodation have been most carefully thought out with a view to providing the traveller with every comfort and convenience.

One of the first sections of the network to go into operation was the Marseille, Nice, Genoa,



Milan, Verona, Innsbruck and Munich services. The regular Milan-Munich service is scheduled at 60 m.p.h. including about 6 stops and the ascent and descent of the 4524' high Brenner pass, no mean achievement. The complete network will link up Amsterdam, Cologne, Frankfurt, Basle, Zurich, Ostend, Brussels, Luxemburg, Paris, Lyons, Dortmund, Hannover, Hamburg and Geneva.



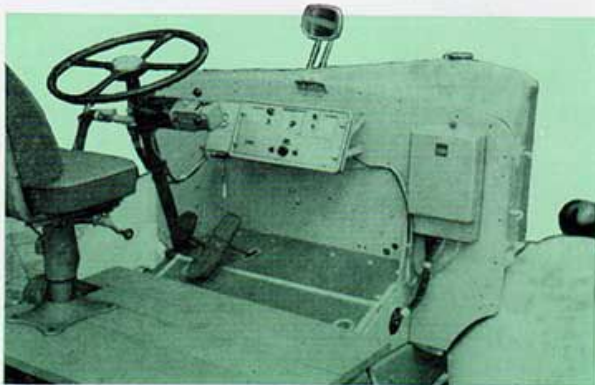
The 5-speed gearbox as fitted to the T.E.E. railcars

FROM STEAM TO DIESEL



Rustenburg Platinum Mines, Rustenberg, Transvaal, is the largest platinum mine in the world. It has an extensive 2' — 0' gauge railway system and also some 3' — 6" gauge track. Two diesel locomotives were recently supplied to the mines by W. G. Bagnall Ltd., fitted with our CA.4 units. They were the first surface diesel units to be purchased by Rustenburg although they have other diesel units working underground.

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AUTOMATIC TRANSMISSIONS ON THE CONTINENT

Ease of drivers control can be appreciated in this view of the drivers compartment

Standard British heavy-duty trucks have been adapted in Holland to meet Continental needs as well as to comply with the new German legislation governing goods vehicles. The modifications have been introduced by the engineering section of Leyland-Holland N.V.

Two adaptations have been made to the bonneted type heavy-duty range of Leyland trucks. The standard models have normal, as opposed to forward, driving controls and were designed specifically for export.

One vehicle in this range, a four-wheeled Super Beaver model with 12ft. 6in. wheelbase, normally used for tipper or tractor work, has been equipped by Leyland-Holland and Self-Changing Gears Ltd., with a 5-speed fully-automatic Pneumo-Cyclic gearbox with electro-pneumatic change speed controls.

Until now the fully-automatic gearbox has been fitted by Leyland Motors Ltd., in passenger vehicles only.

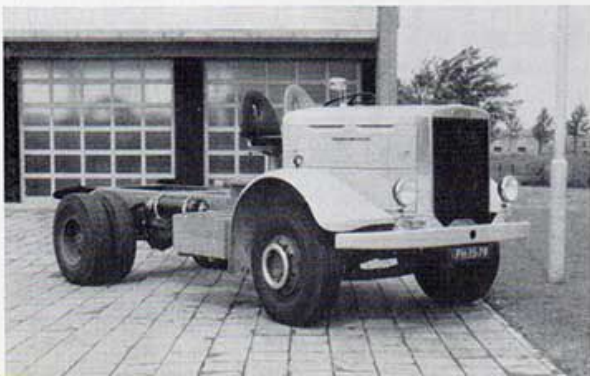
Its extension by Leyland-Holland to goods vehicles marks a decisive step in goods vehicle transmission and emphasises the attitude of Con-

tinental operators to refinements of this type. When the semi-automatic Pneumo-Cyclic gearbox for buses was introduced a few years ago, the first operators to take immediate advantage of it were those in the Netherlands, Belgium and Denmark. It was only later that its popularity spread until it is now commonplace in over 30 countries.

Fitted to the Super Beaver model, the fully-automatic change speed control consists of a small change speed unit mounted on the steering column. When a miniature change speed lever is placed in the fully-automatic position, a control panel takes over the job of changing gears. It automatically selects the most suitable gear for the prevailing conditions. Alternatively, a driver can over-ride the unit and select any gear that he desires. Only two pedals are used — a brake and an accelerator pedal.

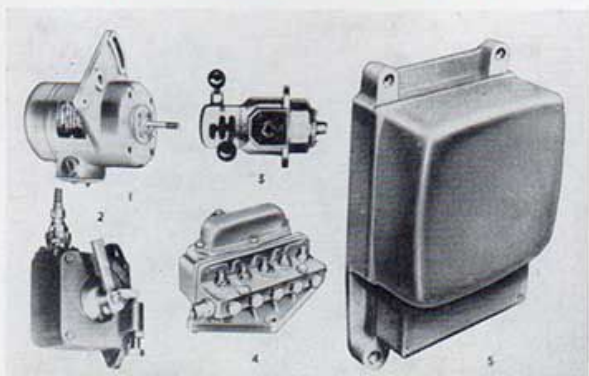
The second adaption that Leyland-Holland has completed is the conversion of a Leyland Super heavy-duty model from the standard bonneted design to a cab-over-engine design with left-hand steering. This has been achieved to meet the new Seebom regulations that recently came into force in Germany and which restrict the length of vehicles.

View of Leyland Super Beaver chassis fitted with V.S. control



Components used in S.C.G. Fully Automatic Control

- 1. Generator. 2. Throttle Switch. 3. Selector Switch
- 4. Magnet Valve Unit. 5. Control Panel.



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ELECTRONIC TESTING OF GEARBOXES

The recording and plotting by hand of results obtained during and after the testing of engineering equipment has always been a laborious process. Self-Changing Gears have recently been experimenting by means of electronic equipment to try to make this task a much simpler and quicker operation. With the aid of electronic equipment, graphs of practically any desired phenomena may be plotted instantaneously and permanently.

One of the many advantages of electronic recording is the recording of transient events (fast moving changes) which take place in say .01 sec., and which would not be capable of being measured by a dial gauge, e.g. transient torque conditions in a shaft.

In the electronic equipment, four graphs of different phenomena such as pressure build up in a cylinder, strain on a brake band, acceleration in a vehicle, torque in a shaft, can be correlated simultaneously by means of pens on recording paper and plotted as the phenomena takes place. These four items are related to time, and events taking place in a period of .05 sec., can be readily examined and

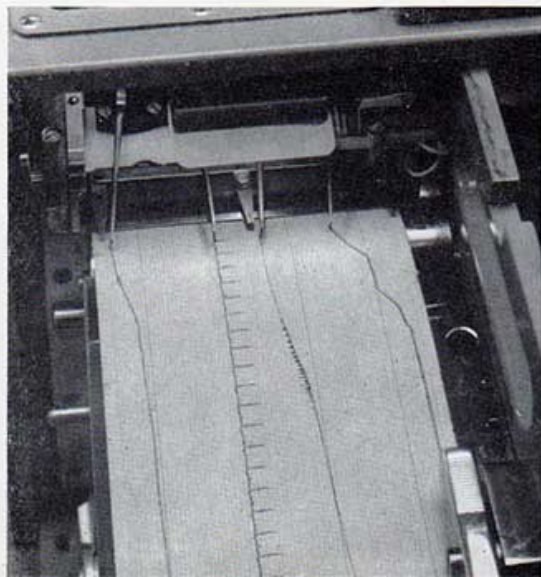
timed. For more accurate and detailed recordings the results are fed to a cathode ray tube and photographed on 35 mm film.

A transducer converts the mechanical phenomena to be measured, say strain or torque for example, into an electrical charge. This small charge is then amplified about 300 times and after passing finally through further electronic amplifiers and filters is of suitable D.C. voltage to operate the recording pens or the cathode ray tube.

The complete equipment consists of a four channel pen unit, four channel electronic unit and power supply, together with a monitoring unit which enables the operator to readily ascertain how each channel is functioning and whether it is functioning correctly.

All these units with the exception of the four channel pen unit have been designed and built in the Electronic Application Laboratory here at Self-Changing Gears to suit our own individual problems associated with the research and development of gear changing and transmissions. The equipment has been designed for a dual role either mobile, for testing the behaviour of gearboxes under road conditions on an actual vehicle, or for use in the main test bay in the Experimental Department.

Four Channel Pen Recording Unit



Four Channel Electronic Unit



IN INDIA

New Indian State Railways Railcar fitted with our transmission



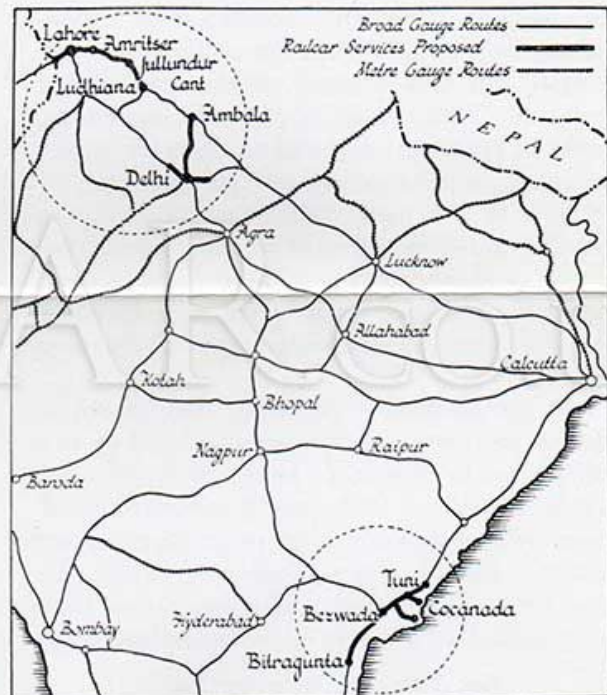
The Indian State Railways have recently brought into service a number of Australian built railcars.

Designed for operation on the broad 5' 6" gauge track these 46½ ton railcars, powered by B.U.T. Leyland 0900 horizontal diesel engines are equipped with Self-Changing Gears SE4 type gearbox and RF.28 reverse and final drive units.

The railcars which are some seventy feet long are equipped with cooling fans and have seating accommodation for 82 third class passengers. An interesting point being the embarkation lights mounted on the exterior of the railcars which automatically light when the train comes to rest and are extinguished when the journey is resumed.

Services operating in the Southern Bezwada and the Northern Delhi areas cover several hundred miles of main and branch lines

It is possible that further services using this type of railcar may be inaugurated as the reliability shown by these power units and transmissions become fully realized.



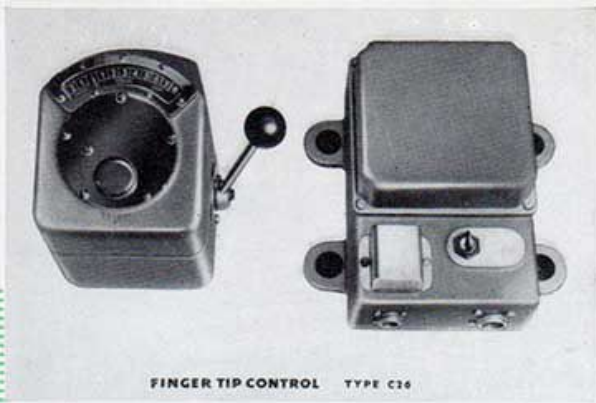
Latest Diesel Railcar Routes

IN AUSTRALIA

Operating as a fishing vessel in Australian waters, this boat is fitted with a Self-Changing Gears oil operated marine gearbox which has already done 10,736 hours of trouble free running. The main catch in this area we are informed by the owner is mackerel weighing 50-60 lb. each.



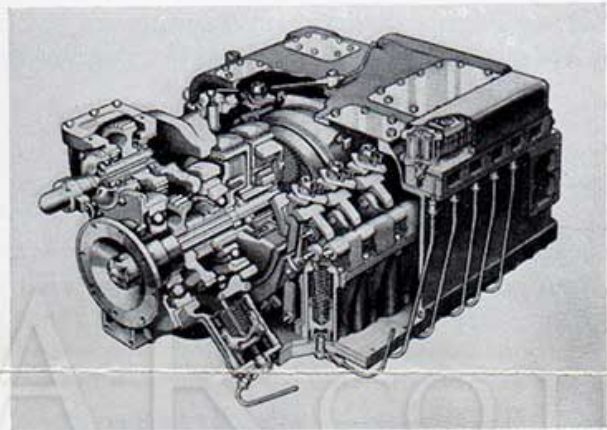
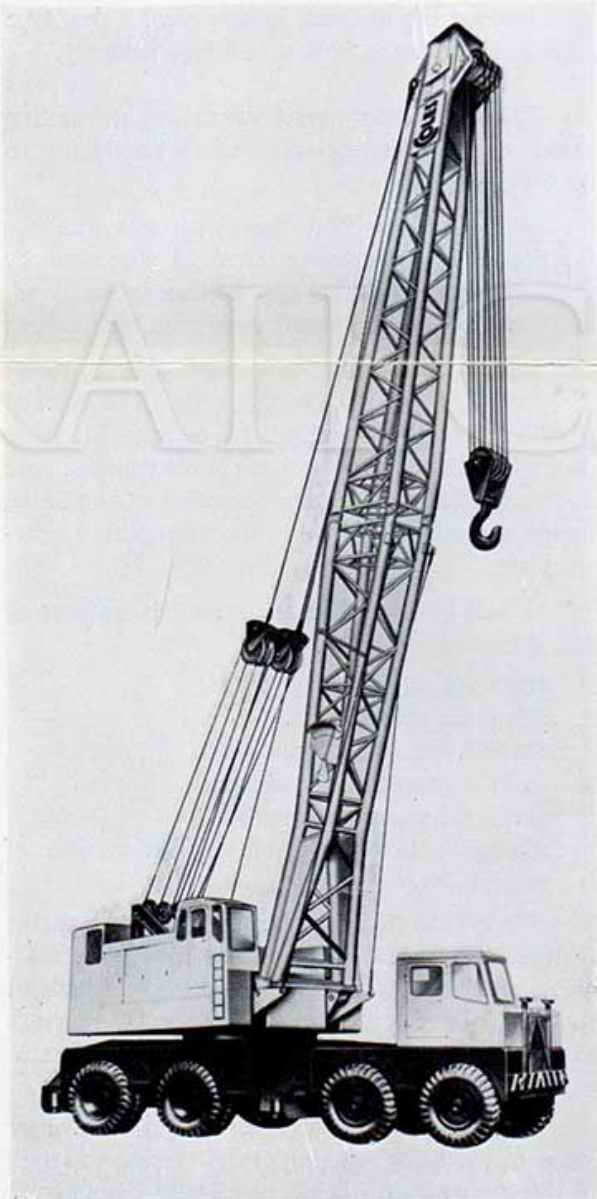
ONE OF THE LARGEST CRANES IN BRITAIN



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This crane manufactured and designed by Steels Engineering Products Ltd., of Sunderland

is the largest Truck Mounted Crane built in this country. It is fitted with our RV.30 eight speed gearbox and C.26 control.



The R.V. 30 eight speed gearbox

