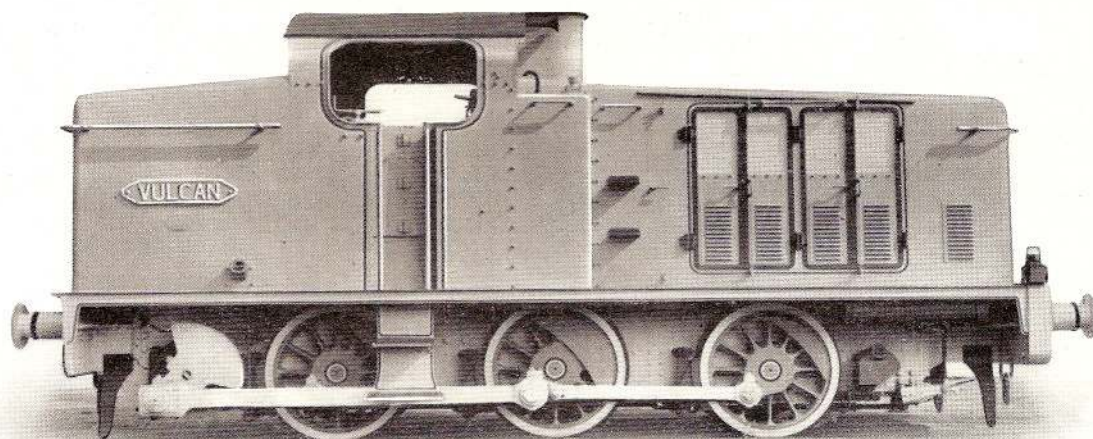




275-300 B.H.P. DIESEL MECHANICAL 0-6-0 LOCOMOTIVE.
4 ft. 8½ in. Gauge.



275-300 B.H.P. Diesel Mechanical 0-6-0 Locomotive.

Engine : 6 Cylinder 275/300 B.H.P. Vulcan
Frichs 4 stroke.

R.P.M. : 775 maximum.

Cylinders : 8.5 ins. (215 mm.) bore x 11 in.
(280 mm.) stroke.

Starting : Compressed Air at 440 lbs. per sq. in.
(30.9 Kg. Cm²).

Maximum Tractive Effort : 20,300 lbs.
(9,208 Kgs.).

Fluid Coupling : Vulcan Sinclair Ring Valve Type.

Gearbox : Wilson Pre-Selective Self-Changing,
4 speeds, pneumatically controlled.

Reversing : Bevel and Spur Drive to Jackshaft.

Diam. of Wheels : 4 ft. 0 in. (1,219 mm.).

Wheelbase : 12 ft. 0 in. (3,657 mm.).

Length over Buffers : 29 ft. 7¾ in. (9,036 mm.).

Maximum Width : 8 ft. 0 in. (2,438 mm.).

Maximum Height above Rail : 12 ft. 11 in.
(3,936 mm.).

Brake : Compressed Air and Hand.

Fuel Tank Capacity : 320 gallons (1,454 litres).

Lubricating Oil Capacity : 50 gallons (227 litres).

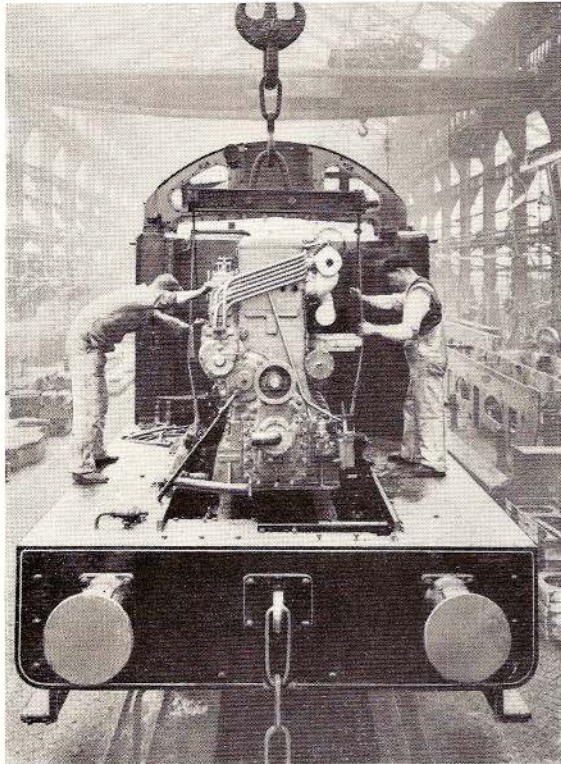
Adhesion Ratio : 5.24.

Maximum Axle Load : 17.25 tons.

Weight in Working Order : 47.5 tons.

THE six coupled Locomotive illustrated herewith was the first Diesel Locomotive to be built by the Vulcan Foundry, the design work being commenced in 1932. It is suitable for shunting work in marshalling yards and can also be utilised on Local Goods Train workings. The frames and mechanical parts are very robust and follow closely on standard steam practice, one of the main frame stays forming the bedplate for the Diesel Engine.

DIESEL ENGINE : Power is provided by a Diesel Engine of the Vulcan Frichs six cylinder, four stroke, solid injection 6215 CL type, developing a continuous output of 275 B.H.P. at 775 r.p.m. and capable of a short time rating of 300 B.H.P.



Lifting the Engine into the Frames.

The cylinder block is a steel casting with cast iron liners, held rigidly at the top and free to expand at the bottom. The crankshaft is carried on seven bearings having white metal linings on steel bushes and the big ends have white metal linings on bronze bushes.

The engine is safeguarded against overspeed when running downhill by a centrifugal governor which can release the pressure of the air engaging the transmission clutches, at the same time applying the Locomotive brakes. It is also protected against damage from a failure in the lubricating oil supply, since the governor controlling the fuel delivery is servo-assisted by the lubricating oil pressure, and the fuel by-pass valves remain open if this pressure falls too low.

Starting is effected by compressed air at 440 lbs. 30.9 Kg. Cm²) provided by an auxiliary petrol-driven compressor.

The engine is cooled by a radiator and fan, arranged at the side of the Locomotive. No special cooling arrangements are necessary for the lubricating oil as the whole of the oil (50 gallons) is in circulation.

TRANSMISSION : The mechanical transmission consists of a Vulcan Sinclair ring valve fluid coupling, a 4 speed Wilson pre-selective self-changing epicyclic gearbox, a reverse box with double reduction gear, and a jackshaft with driving and coupling rods.

The ring valve coupling forms a fluid transmission between the engine and the gearbox and allows the drive to be taken up smoothly, at the same time minimising shocks.

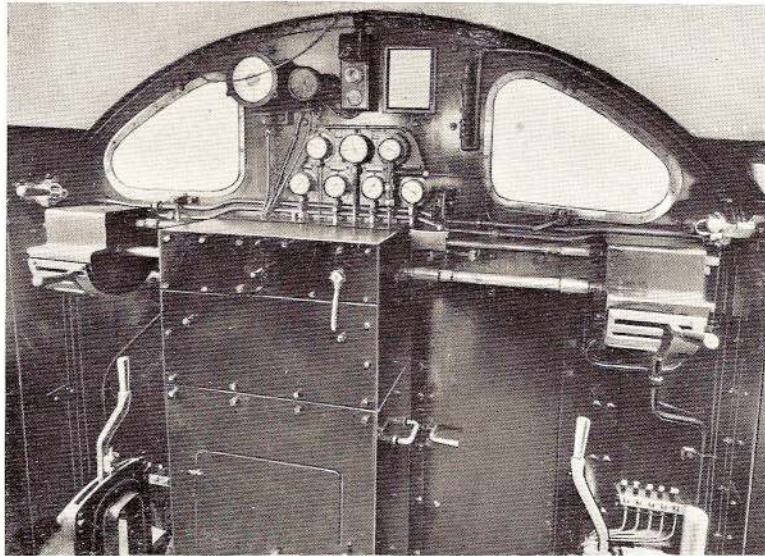
The Wilson gearbox gives speeds of 4.57, 11.4, 21.2 and 32.6 m.p.h. (7.3, 18.3, 34.1 and 52.5 k.p.h.) with the engine running at 775 r.p.m. The band tightening struts in the gearbox and the gearbox clutches are all air operated and there is a larger air piston for raising the bus bar.



The reverse gearbox consists of a totally enclosed bevel reverse and final reduction gear unit provided with nickel-chrome case-hardened steel spiral bevel and spur gears.

The final drive to the connecting and coupling rods is by a solid forged jackshaft with cranks at each end, supported on roller bearings of heavy design.

Flexible couplings are provided between the units of the transmission to allow for any flexing of the Locomotive frames.



View of Interior of Cab and Controls.

CONTROLS : The driving controls are ingenious and simple. Apart from the brake valve and reversing lever, there is only one main control handle and this is duplicated on either side of the cab. This handle regulates the engine speed, pre-selects the gears, puts the gears into operation and also actuates the ring valve of the fluid coupling. With the exception of the engine throttle, the movements are all servo-operated by means of compressed air. The main control handle can be moved downwards, and in four definite positions it can also be moved sideways in slots provided in the guide plate.

Side movement controls the engine speed whilst up and down movement performs the remaining operations automatically, a complete cycle taking place between each horizontal slot. A checking device is provided which prevents the lever being moved straight down through the various gear positions, it being necessary to move the lever horizontally, i.e. accelerate the engine at each successive gear step before it is possible to pass on to the next higher gear. It is, however, possible to return straight from top to bottom or to any intermediate gear as desired.



In changing from one gear to the next higher ratio, the operations, which are all carried out by means of the one lever in the correct sequence, are as follows :

- (1) The engine is reduced to idling speed.
- (2) The ring valve of the hydraulic coupling is closed.
- (3) The next gear ratio is pre-selected.
- (4) The next gear is engaged.
- (5) The engine is then accelerated in the new gear ratio.
- (6) The ring valve is opened.

AUXILIARIES AND ACCESSORIES : In addition to the separate petrol-driven compressor for starting, an engine-driven compressor provides air at 110 lbs. (7.73 Kgs. Cm^2) for operation of the Wilson Gearbox. By means of a reducing valve lowering the pressure to 60 lbs. (4.22 Kgs. Cm^2), the air brake, ring valve, horn, and sanding gear also obtain their pressure from this line.

A hand brake is provided and the driver's cab is equipped with all the necessary instruments and gauges including a speed indicator and mileage recorder.

THE LOCOMOTIVE IN OPERATION : When early trials had been completed at the Vulcan Foundry it was arranged that the Locomotive should be taken over by the L.M.S. Railway for service tests. It accordingly commenced work at Warrington in January, 1937, and was subsequently transferred to Bolton and Crewe, carrying out shunting operations and trips over a period of 18 months in the marshalling yards at these centres.



Shunting with a train of forty loaded wagons at Warrington, L.M.S. Railway.



At Crewe the Locomotive successfully handled work of a similar nature to that performed by the L.M.S., 350 H.P. Diesel Electric Locomotives and the average fuel and lubricating oil consumptions were stated by the Railway Company to be as follows :—

Fuel : 1.35 gals. per mile (3.8 litres/km.) ;
2.45 gals. per hour (11 litres/hour).

Lub. Oil : 0.112 pints per mile (0.063 litres/km.) ;
0.32 pints per hour (0.18 litres/hour).

During the War the Locomotive was taken over by the Ministry of Supply and utilised for hauling traffic on the Melbourne Military Railway and also for the instruction of Military drivers in the operation of Diesel Locomotives at No. 2 Railway Training Centre R.E. Derby. It has recently been working on behalf of U.N.R.R.A. at Trieste.