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# Early Main Line Diesel Locomotives of British Railways

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*Rodger Bradley*



A relatively rare photo of 10000 in lined green livery - applied in or around 1956, since in late 1957, it was repainted in just plain green.

*Photo: GEC Traction/RP Bradley Collection.*

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## Introduction

Diesel traction was pioneered in Britain by the LMSR in the 1930s, with a variety of shunting locomotive types, and by the late 1940s steps had been taken towards the arrival of the first diesel locomotive intended for main line work. Under the guidance of the LMSR's C.M.E., H.G.Ivatt, and the co-operation of English Electric Ltd., 1600hp diesel-electric No. 10,000 took to the rails in December 1947.

Here was the first of an entirely new breed - the 16-cylinder English Electric diesel engine operating a generator, supplying power to the six electric motors driving the road wheels of the two bogies. English Electric had long been involved with non-steam design and build, mostly for overseas railways, and were at the forefront of most development and innovation around the world.

The use of traction motor/gear drives had already replaced the jackshaft/side rod drives of the pioneer shunters, but No.10,000 was its ultimate development on the LMS. Diesel power was also the first step towards the elimination of steam locomotives as the principal source of main line motive power. But nobody looked at it that way then; it was the train of the future, something for small boys to marvel at on station platforms.

These first main line diesel types were perhaps considered along the lines of proposed 'atomic trains', a far-off concept in the post-war era. Strangely enough, by the time BR came to embark on its dieselisation programme, diesel locomotives had become smelly tin boxes on wheels, and the seeds of steam nostalgia were sown. It's doubtful that steam era footplatemen were anything other than happy with improved conditions.

So much for the train of the future!



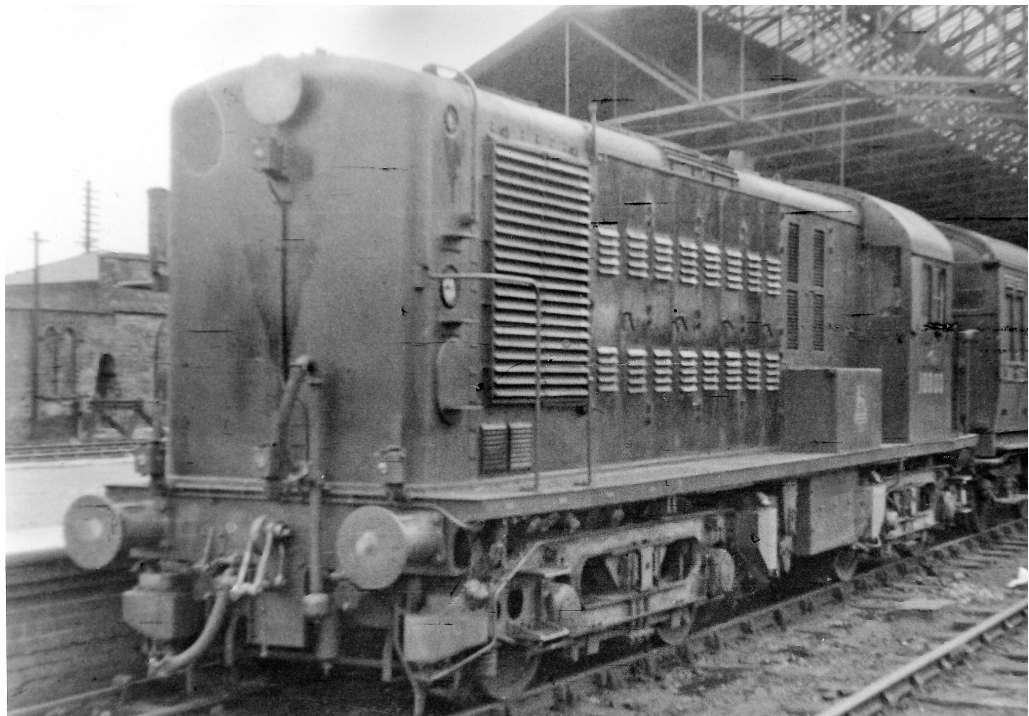
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The Southern Railway too was progressing with main line diesel traction in the post-war era, but it was not to be for a further three years after nationalisation that their locomotive appeared. Meanwhile the GWR had decided as usual to pursue an independent course, with plans for gas turbine types, although these too would not be completed until 1950.

With the shunting locomotives, most BR regions inherited designs produced by their former owners, although they were small in number on all but the London Midland Region. Two further interesting experiments took place on that region in the early 1950s, but perhaps one of these may be seen to have been a step backwards rather than forwards.

10800 on a passenger turn at Rugby, confirming its mixed traffic credentials.

Photo: Ben Brooksbank, CC BY-SA 2.0, <https://commons.wikimedia.org/w/index.php?curid=15102551>



The first example was a purpose-built freight type Bo-Bo No.10800, built by the North British Locomotive Co. with a Paxman engine and entered service in 1951. The oddity however was the last of the seven main line types to appear, No. 10100, the "Fell" diesel-mechanical 4-8-4. It was necessary to describe this locomotive in conventional steam notation, since the driving axles were connected by coupling rods, in true steam loco fashion, with a pair of four-wheeled bogies at each end. In later years it was referred to as a 2-D-2 as in the standard diesel and electric loco notation scheme.

How the wheel arrangements of diesel types should be described seemed to occupy the contemporary press for some time in those early days. Some factions had it that since the diesel shunters were classified as 0-6-0s in the Whyte system, the bogie locomotives like the LMSR's 10,000 would obviously be known as an 0-6-6-0. But, complications would be bound to arise with this system, with the S.R.'s 10201 being described as a 2-6-6-2 rather than 1Co-Co1 - or since the bogies





*Courtesy British Railways*

TWIN DIESEL ELECTRIC 10.0 A.M. 'ROYAL SCOT,' EUSTON-GLASGOW, ON INAUGURAL RUN, 1st JUNE, 1949—200 YARDS SOUTH OF CRAWFORD

each had eight wheels, would it be an 0-8-8-0 ?! The idea becomes even more absurd with the WR's gas turbines, which had the carrying wheels sandwiched between the outer driven wheels. But I digress, though it does illustrate a notation problem that ultimately achieved a reasonable if not wholly satisfactory solution.

In strict chronological order, they appeared as follows: 10000, 10001, 10800, 10201, 10100, 10202 and 10203. Although the LMS locos were thought of in some quarters as an inseparable pair, and 10000 was outshopped sporting a modified version of that company's post 1946 livery scheme, 10001 was built as a BR loco, and outshopped in plain black. I am not suggesting that 10001 was a B.R. design, but it was not wholly LMS either, though the project was initiated by that company.

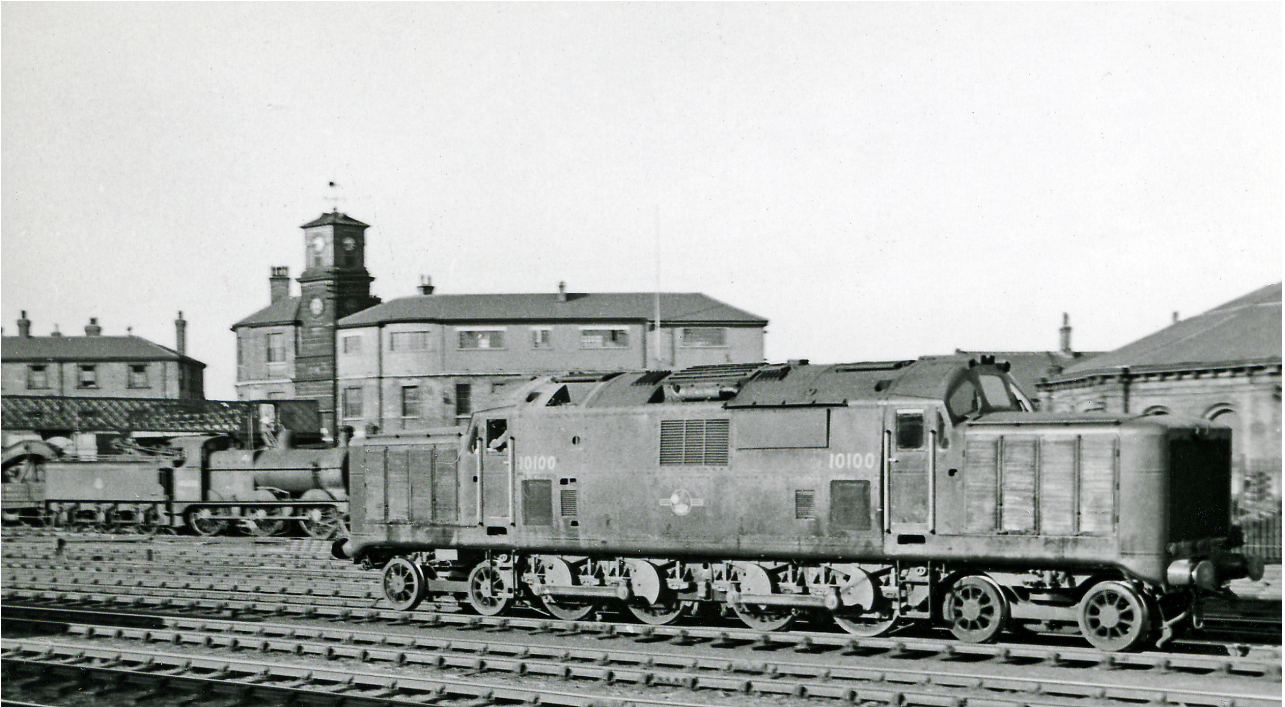
A similar process was followed for the third and fourth locomotives to appear. H.G. Ivatt on the LMS initiated a project for a diesel locomotive for branch line and secondary services, culminating in the appearance from the North British Locomotive Co of Bo-Bo diesel-electric No. 10800 in September 1950. November of the same year saw the Southern Railway designed 1,600hp diesel-electric 1Co-Co1 No. 10201 take to the rails. Power equipment for this locomotive was English Electric, as with the LMS designs, but the Southern's design incorporated a 4-axle bogie with carrying wheels at the leading ends. A sister engine No. 10202 of 1,750hp was built a year later in 1951, and followed two years later still, by a the third of the Southern types, No. 10203.

Back to the odd man out again, the "Fell Diesel". This was rated at 2,000hp, with a mechanical transmission system, and No. 10100 was publicly unveiled on May 23rd



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1951 at Marylebone Station. The unique nature of the transmission system as invented by Lt. Col. L.F.R. Fell, was incorporated in this locomotive, and the whole project developed jointly by the London Midland Region at Derby and Fell Developments Ltd.



**The Oddball** - The 'Fell' Experimental LMR Diesel-Mechanical 4-8-4 at Derby, seen here looking east from Derby Station towards the Locomotive Works. LMS/Fell 2-D-2 Diesel-Mechanical No. 10100 was designed as a prototype 2,000hp locomotive and built in 1950, but only began trials in January 1951.

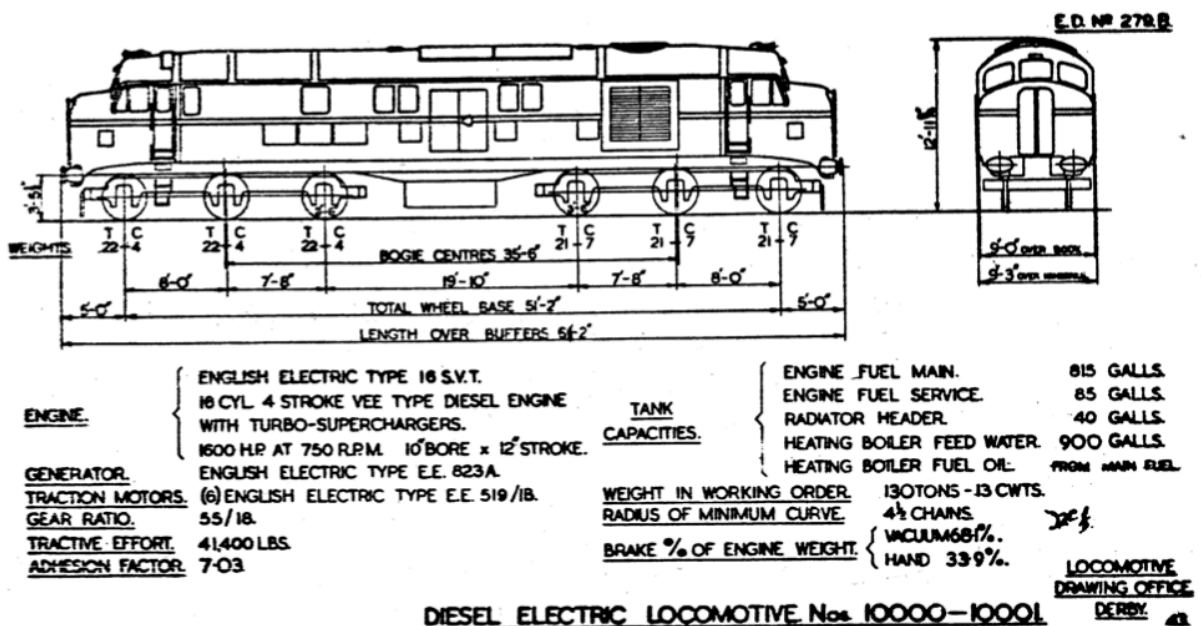
In January 1952 it began scheduled work on passenger trains between Derby and Manchester Central by the Peak Line: it continued, with some prolonged interruptions, on this line until it broke down in October 1958 and was withdrawn, but it was not scrapped until 7/60. Although a comparative success, the design was not perpetuated. Here in 1957 No. 10100 is outside Derby Locomotive Depot - and over to the left is a very much older but very useful Midland 3F 0-6-0 steam locomotive.

*Photo: Ben Brooksbank, CC BY-SA 2.0, <https://commons.wikimedia.org/w/index.php?curid=15108914>*

However, I propose to deal here only with the LMSR originated projects for 10000/10001 and 10800, and the two other designs in later articles. The leading dimensions of 10000, 10001 and 10800 are given in the accompanying tables:-

## Leading Dimensions

	Co-Co Diesel-Electric Nos. 10000 & 10001	Bo-Bo Diesel-Electric No. 10800
<b>No. series</b>	10000 - 10001	10800
<b>Built</b>	1947/8	1951
<b>Withdrawn</b>	1963/6	1961
<b>Wheel Arrgt.</b>	Co-Co	Bo-Bo
<b>Bogie wheelbase</b>	15ft 8ins	8ft 6ins
<b>Bogie centres</b>	35ft 6ins	22ft 6ins
<b>Wheel diameter</b>	3ft 6ins	3ft 6ins
<b>Overall length</b>	61ft 2ins	41ft 10 1/4ins
<b>Overall height</b>	12ft 11 3/16ins	12ft 5 9/16ins
<b>Overall width</b>	9ft 0ins	8ft 9 7/8ins
<b>Engine Make &amp; Type</b>	English Electric 16-cyl, 'V' form	Paxman 16RPHX1, 'V' form
<b>No. of cyls &amp; cycle</b>	16; 4-stroke	16; 4-stroke
<b>Max. rated output</b>	1,600hp at 750rpm	827hp at 1,250rpm
<b>Traction motors</b>	6; English Electric	4; BTH Type 159
<b>Final drive type</b>	Single reduction spur gearing	Single reduction spur gearing
<b>Max. tractive effort</b>	41,400lbs	34,500lbs
<b>Braking system</b>	Vacuum	Vacuum
<b>Fuel capacity</b>	900 gallons	330 gallons
<b>Weight (w.o.)</b>	127tons 13cwt	69tons 16cwt





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## Constructional Details

### 10000; 10001

The design of this locomotive set the pattern for what became almost the standard style of construction for main line diesel types on British Railways, including the majority of designs produced under the Modernisation Plan. Certainly, in external appearance this pair of locomotives had a considerable influence, nowhere perhaps more obvious than in the cab and front-end design.

The body divided into the three main sections or compartments was a typical feature of British design, with the engine and generator compartment sandwiched between the cabs at each end. Though some later designs achieved four divisions by separating the engine and generator compartments.



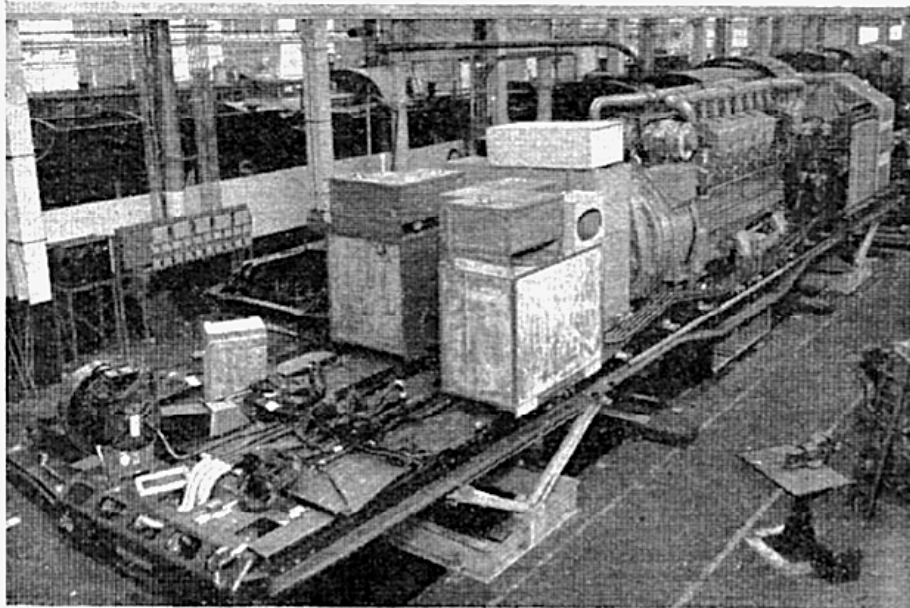
As they were intended to operate - the twins - 10000 and 10001 captured at Rugby on 5th October 1948, one in its final and only LMS scheme, and 10001 without an indication of its origins.

*Photo: RPB Collection/GEC Traction*



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Power was supplied by the English Electric 16-cylinder vee type, 4-stroke, developing 1,600hp at 750 rpm, and which was at that time the largest then built by the company. The crankcases were of monobloc construction and divided into an upper and lower section, with the crankshaft running in nine bearings housed in a cast-iron bedplate. The cylinders themselves were 10 ins diameter with a 12 ins stroke. The main or traction generator was fixed to one end of the engine, having a common armature shaft, with the 'overhung' auxiliary generator. This latter, as its name implies, supplied power for control circuits, battery charging, exhausters, traction motor blowers and lighting.



Nearing completion Main frames with boiler, fuel and water tanks, control cubicle, diesel engine radiator and fan ducting and full tanks mounted.

Adjacent to the generators was the control cubicle, train heating boiler and its associated fuel and water tanks. The boiler was supplied by Clarksons, and provided with automatic feed control, fired by a Laidlaw Drew oil burner. The train heating boiler unit was partitioned from the main engine/generator compartment and full width bulkheads

separated the driving cabs at either end. The interior surfaces of the locomotive body – including the driving cabs – were sprayed with asbestos, for both noise reduction and noise insulation. Whilst this may seem very dangerous and indeed, illegal nowadays, many of the early BR Modernisation Plan diesels and multiple units were treated to this form of insulation. During the 1970s, its removal proved challenging and problematic for the refurbishment programmes that were then in operation.

At the 'free' end of the engine, the drive was taken for the pump sets supplying fuel, water and lubricating oil. The radiator panels were mounted on either side, with a roof mounted fan, and between the radiator units and the other cab bulkhead an 815 gallons capacity fuel tank was located. A smaller gravity feed service tank of 85 gallons capacity was mounted above. The bulbous noses provided accommodation for the traction motor blowers, and, in the event that the locomotives were coupled in multiple, access between locos was possible via the corridor connections located in the nose ends.

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The bogies were fabricated from steel sections, with the locomotive's weight supported at four points on the bolsters and main suspension by a combination of helical and leaf springs, with the centre pivot transmitting traction and braking forces only. The roller bearing axleboxes were fitted with manganese steel liners, and had projections on either side, whose intention was to cushion the effect of excessive side play of the wheels, bearing against spring loaded pads fixed to the inside of the bogie frame. Three English Electric traction motors were provided to each bogie, which were axle hung, nose suspended type – and for many years this was standard mounting for traction motors. The motors were force ventilated, with single reduction bevel gearing for the final drive, housed in a sealed case attached to the outer end of the motor.



The pioneer LMS Diesel on St Pancras - Manchester express near Cricklewood. This view is taken looking south east, towards St Pancras on Midland Main Line at Watling Street Junction, south of Cricklewood.

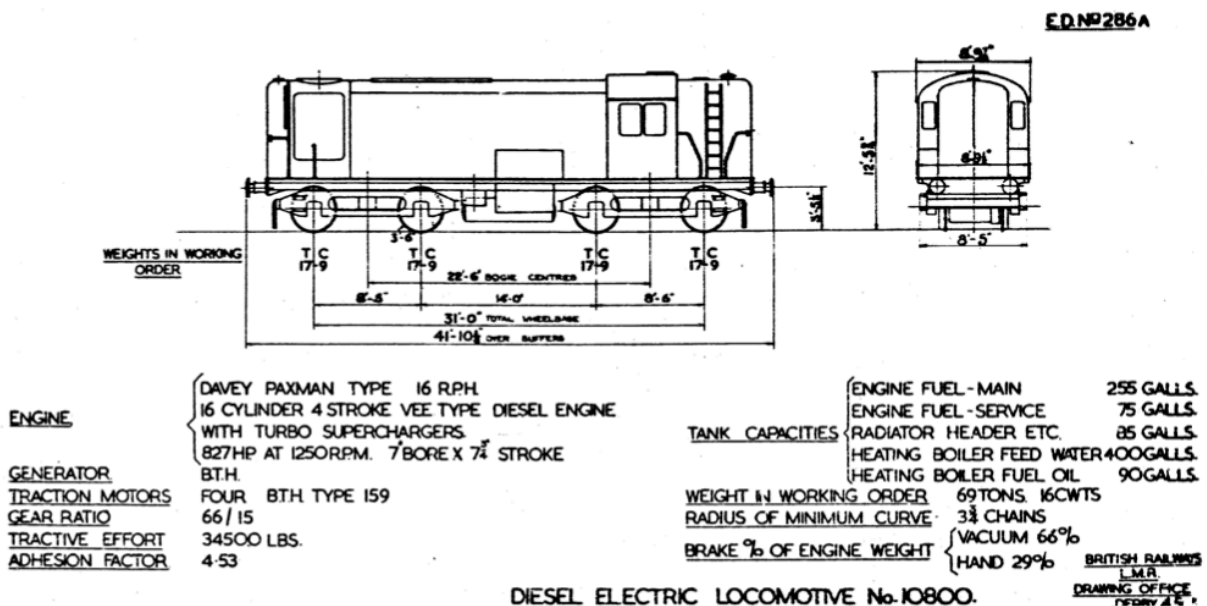
*Photo: Ben Brooksbank, CC BY-SA 2.0, <https://commons.wikimedia.org/w/index.php?curid=15174310>*

In comparison with later designs of main line diesel, what we would consider today as heavy gauge steel, was used in the construction of both body and underframe structures. The basic layout used 'I' section girders running the full length of the locomotive on either side, to provide a spine, and which bore some similarity to steam locomotive construction techniques. Overlaid on this framework, sheet steel decking was fitted on top in the 10000/1 locos. Interestingly, instead of having removable roof hatches, hinged doors were provided for the installation and removal of equipment and engines. In order to provide both insulation and reduce noise levels, the inner faces of the body sides, roof and cabs were sprayed with asbestos.

The driving cabs were fitted with a triple windscreen arrangement, later to become almost universal on main line diesels, and in these two locos the driver and fireman's screens each had air operated wipers. Control of the loco was effected through a pedestal type controller on the driver's side, incorporating a master switch, reversing and main operating handle. Hitherto unknown comforts were provided for the crew; cushioned seats, electric heaters and a toilet. Perhaps though the most significant, and perhaps ominous – at least for steam enthusiasts - feature, of the construction of these locomotives was the replacement of the steam whistle with air operated warning horns.

## 10,800

Strictly speaking, it is perhaps wrong to refer to this loco as a purpose-built freight type, since it was proposed for operation on branch line and local, stopping passenger workings. In appearance this design was totally different from the other designs, and was essentially a 'hood' type, with a single driving cab towards one end. Some contemporary press reports gave the impression that the layout was similar to the standard 350 hp 0-6-0 diesel-electric shunters. The fact the two types were built around an engine/generator power unit covered by a thin sheet steel casing was no basis to consider a similarity. The engines of the shunters were medium speed, whilst 10800 was provided with a high-speed design, and of



course the new North British loco was carried on a pair of 4-wheeled bogies, in contrast to the shunters' six coupled steam type frame.

The driving cab of 10800 was positioned almost over the centre line of the trailing bogie, in front of which sat the engine and generator and behind the cab, the casing was extended to house the train heating equipment. The engine itself was also a vee type four stroke of 16-cylinders, but in this design supplied by Davey



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Paxman as their type 16RPHX1 developing 827 hp at 1,250 rpm. The cylinders themselves were 7ins bore by 7 1/2ins stroke. Bolted to the end face of the engine nearest the cab was the main generator, an 800-kW machine supplied by the British Thomson Houston Co. (BTH). In this case though, the auxiliary generator was not overhung on the same armature shaft but mounted directly above and chain driven from a shaft extension. The traction motors were also supplied by BTH – type 159, axle hung, nose suspended, and driving the wheels via single reduction gearing at a ratio of 66:15. At the leading end of the engine casing the radiators and roof mounted fan were housed.

The bogies themselves transmitted traction and braking forces through the central bogie pivot, suspension being similar to 10000/1; a combination of helical and leaf springs. The bogie frames were built from steel sections, but with a sandbox attached to the outer face of both bogies at their inner ends. Vacuum brakes were used to operate the clasp type shoes fitted to each wheelset, since the loco was intended for passenger train workings as well, rather than just air brakes that came to be standard practice for locomotives in later years.

The locomotive's weight of 69 tons 16 cwt was uniformly distributed across the axles, with 17 tons 9 cwt on each axle. Electro-pneumatic control equipment was supplied by BTH, with the driver's control desk housing the master controller and field control apparatus, together with the necessary alarms, meters and fuses. The power controller itself was provide with seven notches, in addition to the idling position, and a slow speed control was fitted for use in shunting operations.

Unlike the twin units 10000/1, this locomotive was built by the North British Locomotive Co. at its Queens Park Works in Glasgow, who were also responsible for its overall design and appearance. Techniques of construction were broadly in line with that of the larger locomotives, with a substantial underframe fabrication, and fairly heavy gauge sheet steel used for the upper works. Numerous doors were provided in the sides of the engine housing, between the radiator grilles and the cab spectacle plate for access purposes. The cab itself was the full width of the footplate, but projected a little over 18 ins either side of the engine casing, with access doors at the rear.

The steam heating boiler was of the same type as that fitted to 10000/1 and again supplied by Clarkson, and a ladder was attached to the train heating boiler housing, to enable the crew to reach the fuel tank filler. It was an essential provision since the loco was intended to work passenger as well as freight turns, and in fact was officially classified as mixed traffic. In appearance though it set the example for the various freight types built in later years.

## Livery

As built all three locomotives were turned out in black, in the case of 10800 this was applied all over, including the cab and engine casing roofs, though a BR emblem was carried. Bogies were in aluminium, with the roller bearing axlebox covers picked out in black. All underframe detail was black. 10000 on the other hand was given LMS livery, which although basically the same, the main exceptions were the aluminium finished roof and raised bodyside stripe running

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around the loco at what was roughly waist level. The running numbers and company initials were aluminium too, but raised from the body surface, and in the same style as the post-war LMS livery, but larger. The third '0' in the number was unfortunately split by the opening of the cab door. The second of the two locos, 10001 was outshopped in 1948 in plain black, but devoid of an insignia of any kind. By the time 10800 appeared however, the BR lion and wheel emblem had been applied to both, and the letters LMS had been removed from 10000.

Following the major livery changes of 1956, 10000/1 and 10800 all appeared in green livery. But for 10800 it was simply repainted plain green all over in January 1957, and provided with the new crest, buffer beams and stocks in red, with bogie and underframe details in black. The other two however acquired some variations on the green livery.

Lined green was applied to 10000, but then replaced in late 1957 with unlined green, with the numbers and raised stripe picked out in aluminium. At a similar date, 10001 white numerals and a pale green (quoted by some sources as duck-egg blue!!) stripe, also with green livery. It should be noted that at no time were the fairings covering the buffer stocks of either 10000 or 10001 painted in anything other than the main body colour.

10800 was withdrawn from service in standard green in 1965, and used experimentally until 1968 by Brush Electrical Machines, and was repainted in green with half height warning panels and the words "Research Locomotive" added beneath the running number. 10000/1 were finally treated to standard green livery with orange and black lining applied to the raised bodyside stripe and a second stripe painted all around at the lower edge of the body sides. It was in this form that the locos were withdrawn in the mid 1960s, although with the addition, along with 10800, of the half height yellow warning panels.

## Operation

The LMS designed diesel twins 10000/1 were designed to be operated as a pair on the principal expresses, and singly on express freight workings. Allocated to Derby, first workings were on the St Pancras to Manchester route, and supposedly to have accomplished this at speeds of 100 mph. Though that may be a little unfair to the contemporary press, since they had said that it was capable of working the heaviest expresses at this speed, and only when conditions permitted. Multiple working of the two locos was carried out on the London Midland Region, but on being transferred to the Southern in 1953 they were rostered to work only as single units.

Comparison of performances between the London Midland's locos and the Southern's new 10201 were made on both regions. In fact, 10201 was despatched to Derby soon after completion, working only trial runs on its home territory, thereafter for a short period it was set to work on the St Pancras to Manchester trains, after which it was returned to Ashford Works, to be prepared for the Festival of Britain Exhibition. The transfer in 1953 of the two London Midland locos to the Southern routes found them working the "Royal Wessex" out of Waterloo on

occasions – a heavy working of over 400 tons – which duty they were required to perform as single units.

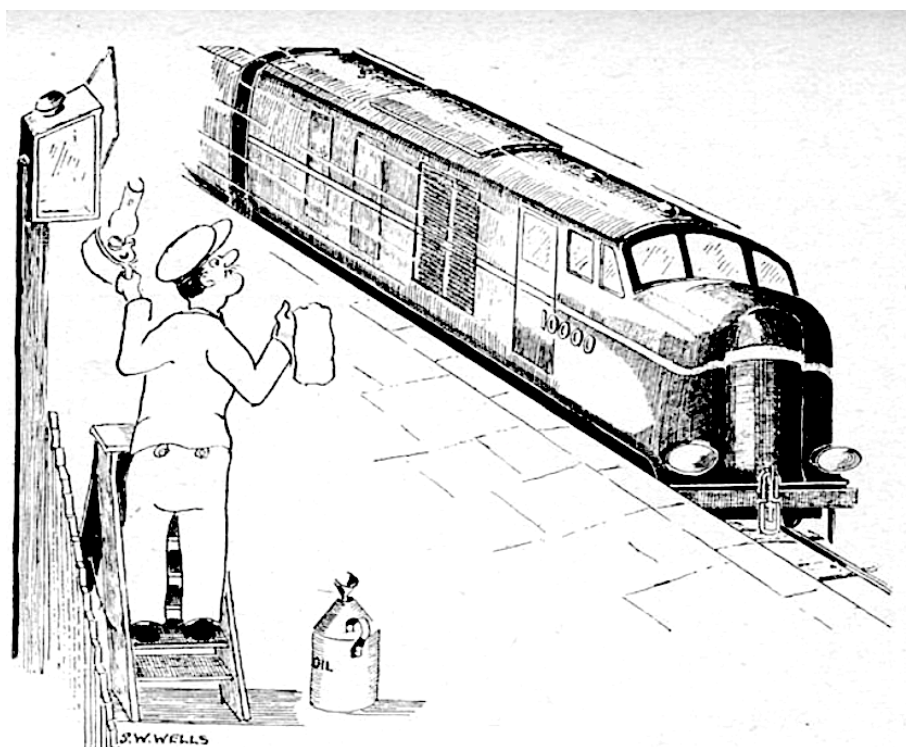
At the time, all new main line diesels were concentrated on the Waterloo to Weymouth, or Exeter routes. On the latter – a distance of 344 miles for the round trip – 10000/1 required refuelling in between trips, whereas the Southern Region loco had enough fuel capacity to make the trip twice.

Returning to their home territory, although for a time the two locos found themselves at the head of the principal West Coast expresses, perhaps ironically, it was the transfer again of the Southern's 10201-3 in the mid 1950s that edged the type off the most important workings. By the late 1950s and early sixties, the changes brought on by the influx of the Modernisation Plan diesels more or less sealed their fate to secondary and freight work. Although, one of their last regular workings as a pair consisted of the down night sleeper from Euston to Glasgow, returning the following day on the up "Royal Scot".

10800 on the other hand, started its own regular workings on a home counties freight roster, involving Banbury, Bletchley, Swanbourne, and Hinksby (WR). Passenger workings were limited to its designed purpose of short haul and branch services, 10800 spending almost all its working life in the home counties on just these duties. Rather surprisingly perhaps, only eight years after its introduction in 1951, consideration was already being given to its withdrawal. By 1961, this consideration had become a reality, and the locomotive, or what was left of it after the traction equipment had been removed, languished at Derby Works. The hulk was later purchased by Brush of Loughborough, and used, as mentioned earlier, for experimental purposes. But, despite being repainted, the name "Hawk" was never applied.

**-oOo-**

This cartoon appeared in the April 1948 issue of the railway's "Carry On" magazine, and reflected the new technology, and its need for heavy fuel oil to power the locomotive, and not coal.



**"Oil!" So What?"**  
(Drawn by Electrician S. W. Wells, Euston).