

**Reading Society
of Model
Engineers
Charity Number
1163244**



**President
John Billard**

**Secretary
Stuart Kidd**
07966 278968

**Editor
John Billard**
john@jegbillard
.plus.com
01189 340381
07834 998971

**Free to members
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The Prospectus

September 2024



The footplate of *Rocket* at Locomotion. 10 August 2024.
Photo John Billard

**CLUB NEWS
THE FELL 4-D-4 EXPLAINED
CLUB AGM 24 OCTOBER**

THE VIEW FROM THE CHAIR

John Billard

As August turns into September, club life continues with efforts on private parties, club and public running and big efforts on Wednesdays to keep the site tidy and to continue with current projects. This includes work on the raised track wagons and the workshop refurbishment. On the latter the job is nearly done and thanks are due to Nigel Penford and his gang to what looks like being a superb job.

The most recent trustees meeting was held on 12 August. There have been a number of continuing items including preparation of a key register and efforts with Barclays Bank to update the club's legal entity to charity status. The time this is taking reflects on the way the bank is now organised.

The accounts for July show that the workshop refurbishment continues to be within budget and the main expenditure for that month was buildings insurance. For the year so far income has exceeded expenditure. The financial report for the charities Commission has been approved and will be submitted to the Commission time to our independent examiner.

On membership we have a list of members who have still not renewed. Whilst this was not a large number it was agreed that they should now be removed for membership. It now stands at 95.

It was agreed that the introduction of the flat rate membership fee had been successful and helps to achieve a high proportion of members renewing. The fee will be an agenda item at the forthcoming AGM.

Natural Penford reported that the refurbishment of the workshop should be complete by the end of August. The trustees commented on the excellent work that had been undertaken that had resulted in a transformation. It was decided to reequip the Myford lathe with a new motor and inverter from Newton Tesla.

The track marshal for August public running reported that there were a number of locomotive failures and as a result the raised track service was operated entirely by battery locomotives and the ground level track by just two trains. However a good service was maintained and traffic was at a high level for the month.

While Peter Culham was not present at the meeting he has indicated that the number of private parties for next year might be significantly reduced. This was because of a lack of volunteers and the need for him to reduce his commitment significantly because of pressure on his life elsewhere. The trustees are greatly indebted to Peter for all the efforts he had put in successfully for many years. It was agreed that a call to the membership for help would be undertaken in conjunction with Peter. The alternative would result in a significant drop in income for the club and disappointment to those who have much enjoyed our birthday parties.

It was noted that the Narrow Gauge Railway Society was due to visit the club on 12th October and a call out will be made to members to make this a

success particularly in bringing engines to run. The NGRS would be making a donation to the club. It was also noted that we have received an invite to hold an annual international miniature locomotive efficiency competition IM-LEC. However it was considered that at present RSME did not have sufficient resources to accept this offer. In addition the raised track is due for refurbishment and it is not known how long this will take.

Furthermore RSME has also received a request for Model Engineer magazine to visit the club and be featured. It was agreed to accept this on the basis that it would take place in 2025 or later.

The next trustee meeting will be on 9 September.

VISIT TO RSME BY THE NARROW GAUGE RAILWAY SOCIETY 12 OCTOBER 2024

The Narrow Gauge Railway Society will be visiting us on Club Running Day 12th October and it will be great if as many members could attend and also bring their engines to run.

The NGRS attracts members who like to ride on the railways; as we have multiple gauges that would be of interest to their members. They like to take photos, and some will happily stand by the lineside all day with a video camera, filming the railway.

We are looking forward to giving a good show to these enthusiasts and hope for a happy day among friends.

Please come if you can. Boiler testing will be suspended for the day.



Urie 4-6-0 30512 passes Basingstoke Station on 2 January 1964 with a down goods maybe destined for Southampton. Photo John Billard

NOT WELCOME?

This is what Authority looks like when about to be told to clear off as your platform ticket has probably expired by now!

Member Stephen Millward remembers a trip from Leicester to Peterborough in December 1977 to spot Deltics, which resulted in an early return when the railway police told them to go home. *(He was 12 at the time, Ed).*

And on another occasion in 1964 I was told to report to the station master's office at Paddington because I was using a tripod to take photos at the station.

Unusual Diesel Transmission Systems – Part 1

by Alec Bray

There are two drawbacks to the use of diesel engines in railway engineering: the diesel engines have to be started when they do not have any load (they have to be “off-line” as it were) and they run at their most efficient within a certain speed range (in revolutions of the crankshaft per minute). The 'modernisation plan' of British Railways (1954) witnessed a very poor procurement policy for diesel, with some types scrapped only 10 years after their introduction. However, two main transmission systems came to the fore:

Diesel-Hydraulic, using lightweight, high revving diesel engines working into an hydraulic transmission system and torque converter. giving high reliability for lower cost.

Diesel Electric, using heavy, low-revving diesel engines driving alternators wired up to traction motors driving the bogie axles (effectively, a power station on wheels).

Eventually, the Diesel Electric transmission system won the day – but there were many other experiments along the way.

Diesel-Mechanical

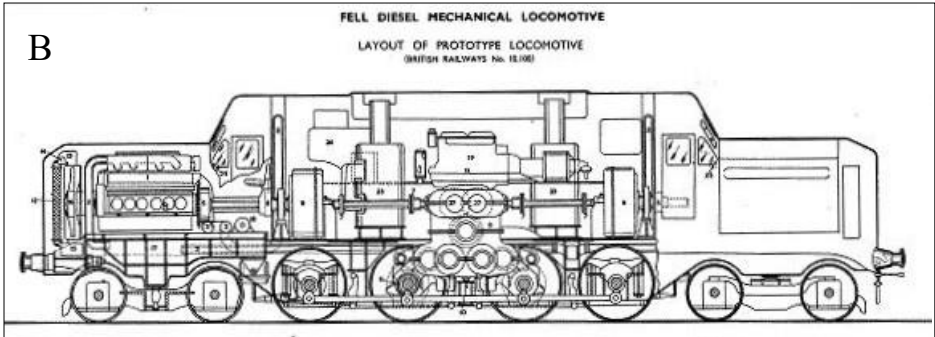
The most straightforward way of getting the power of the diesel engine to the driving wheels of a railway locomotive is some form of direct mechanical connection. To allow the engine to be disconnected from the rest of the drive, some form of clutch is used: to cope with the diesel's optimal power range compared to the power needed at the wheel rim, some form of gearbox is needed – manual, pre-selector or fully automatic – to match crankshaft speed to axle speed. This type of transmission is generally limited to low-powered, low-speed shunting locomotives, lightweight multiple units and self-propelled railcars. A typical example of a diesel-mechanical transmission is that of the GWR railcars.

THE FELL DIESEL MECHANICAL LOCOMOTIVE

Mechanical transmission, although extremely efficient, was generally considered unsuitable for higher-powered operations. As the diesel engine increases in size and power, the clutches need to be increased greatly in size –



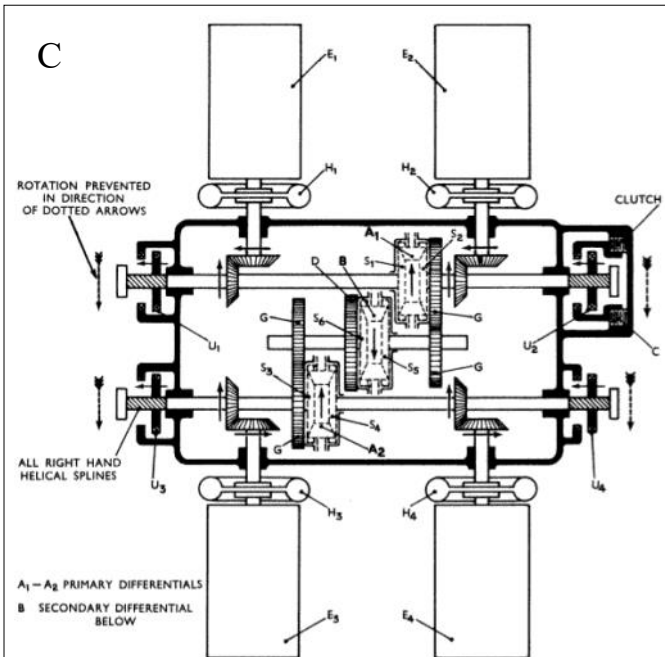
and last less time in service, as they wear out too quickly: in many respects, it is quite impractical. However, what if you could keep the benefits of a mechanical system, but somehow combine low-power diesel engines together to provide a more powerful locomotive (or, why use just one diesel engine for traction



when you could use FOUR (plus TWO auxiliary engines!). Lieutenant-Colonel Louis Frederick Rudston Fell, at this time working for Rolls Royce, came up with a design that delivered (in theory) a constant horsepower at the rail irrespective of the speed of the engines or the speed of the locomotive.

In Fell's design, each main traction diesel engine connects through a Vulcan-Sinclair hydraulic coupling to one shaft of a differential gear – what would normally be the wheel position on a motor vehicle differential. The main engine mounted at the other end of the locomotive was coupled to the other shaft of this differential. The “left-hand” drive (the two left engines and their differential shafts) and the “right hand drive” .had their respective “output”

shafts connected as the input shafts to a third differential. This differential's output was geared to the final drive to the driving using tubular quill shafts – a hollow driving shaft (the quill) with a driven shaft inside it. The quill drives provided some torsional flexibility and relative vertical displacement between the frames and the axles.



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feature was that the Fell system's main traction diesel engines had to be capable of developing very high torques at low rotational speeds. To achieve this, the main traction engines were relatively highly supercharged at their lowest speeds and progressively less highly supercharged as their speed increased. The large volumes of air needed when

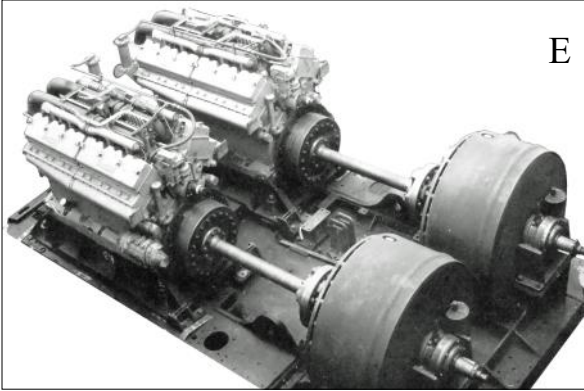
the main engines were running at low speeds was provided by displacement type air blowers driven by the auxiliary engines, themselves supercharged off the same air supply in order to reduce their size and weight. These auxiliary engines were provided with variable speed governors which were in turn influenced by the supercharge pressure so that a fall in this pressure automatically caused the auxiliary engines to speed up to try to maintain air pressure.

The Fell locomotive was an outstanding success in its ability to provide full power even from rest and to maintain that power throughout the speed range. In operation, the fuel consumption for the Fell locomotive was very similar to the much less powerful diesel- electric prototypes under test at the time. During trials over the Settle-Carlisle route the Fell locomotive demonstrated that it could haul a 385-ton train up a 1-in-100 gradient at 50mph, a performance that bettered any diesel then available and which was also superior to the latest 'Britannia' steam locomotives.

But – there had to be a but ... There were problems with cooling the main traction diesel engines, as the radiators were at the very end of the locomotive “noses”, and so the trailing end engines had their radiators near to the first coach of the train. The main engines suffered from fuel starvation due to a design fault with the fuel tanks. The complex system of mechanical drives from the auxiliary engines was a constant source of trouble. Another issue was that the locomotive was incredibly noisy due to all the mechanical components involved in driving the ancillaries – and with 4 off V12 500 hp Davey Paxman traction diesels and 2 off 6 in-line AEC 150 hp diesel engines, the Fell locomotive had a total of 60 cylinders in all!

Although the Fell locomotive was hugely complicated, it worked!

The Fell was an outstanding success in its ability to provide full power even from rest and to maintain that power throughout the speed range, a requirement that has taxed locomotive designers ever since. The type of clutches used in the Fell locomotive were being developed all the time, and a second version of the Fell would have used just FOUR higher powered engines using standard turbocharging working through improved torque converters, eliminating the need for the noisy auxiliary engines and allowing for a redesign of



the radiator layout – however, British Railways lost interest, and it got no further than the drawing board.

The Fell coupling rod bearings tended to fail in service, so eventually the centre section of each of the coupling rods was removed. The locomotive was still, however, a 4-D-

4, since the internal gearing made sure that all four driving axles were powered and coupled together.

It was a sad end for the Fell. After covering more than 80,000 miles, in October 1958 its steam heating boiler caught fire during a layover at Manchester Central station. The severely damaged locomotive was towed back to Derby Works, but no attempt was made to repair it.

Illustrations

A The Fell on a passenger turn

B Diesel mechanical general arrangement

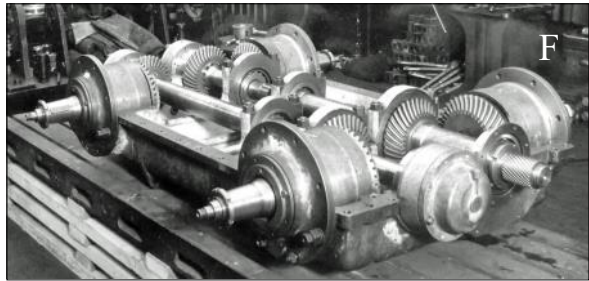
C Plan of the differentials

D 4-D-4 6P/5F locomotive

E Fell engines side by side

F Fell gearbox

G Fell cutaway section



DIARY

SEPTEMBER 2024

Sunday	1st	Public running	Setting up from 09.30 onwards
Thursday	5th	On the Bench Night	19.30
Saturday	7th	Club running	10.30 onwards
Monday	9th	Trustees meeting	19.30
Thursday	26th	Club Talk Bill Richardson Iron Ore Mining in West Cumbria	20.00
Saturday	21st	Club running	10.30 onwards
		<u>Note, not on the 28th as, previously notified</u>	

OCTOBER 2024

Sunday	6th	Public running	Setting up from 09.30 onwards
Thursday	10th	Club Talk David Ford The restoration of 34007 Wadebridge	20.00
Saturday	12th	Club running	10.30 onwards
Monday	14th	Trustees meeting	19.30
Thursday	17th	On the Bench night	19.30
Thursday	24th	RSME AGM	20.00
Saturday	26th	Club running	10.30 onwards

Opinions expressed in PROSPECTUS are the personal views of the contributor and cannot be taken as reflecting the views of the trustees or editor.

The deadline for the October issue is 20 September

Contributions may be submitted in hard or soft copy to the editor.

John Billard Old Station House Twyford Reading RG10 9NA

01189 340381 or 07834 998971

john@jegbillard.plus.com