

INFORMED SOURCES e-preview February 2021

It's a stropy start to the Informed Sources year as I take objection to people doing daft things - well, I think they are daft. But there's also a look at what is being done to make diesel multiple units more environmentally friendly as the Government continues to drag its feet on electrification.

ORR's wrong signal

LNER procurement - welcome to the '80s

Boring battery hybrids challenge Hydrogen hype

New Train TIN-watch

Back in January 2020, the Office of Rail & Road announced that it was mounting a Market Study into rail signalling systems. This set the alarm sirens wailing in the Informed Sources early warning bunker.

If there is one thing that a professional lifetime's observation of railway procurement has taught me, it is that market studies of equipment supply are bedevilled by equivalence - the assumption that all companies, their products, their competence and their experience can be assumed to be equal.

This is not unique. Doctrinaire procurement, the scourge of Britain's railways both before and after privatisation, is based on the same belief.

Anyway, the Covid crisis saw the market study suspended. But by November ORR had decided that 'now is the right time to open this market study as industry personnel and evidence is now likely to be available'. As if 'industry personnel' didn't have enough on their plate already with the lockdown tightening and infection spreading.

According to ORR, 'given the projected spend and the rollout of the digital railway, we consider now is the right time to carry out a market study. It will give us the opportunity to identify issues in the 'conventional'/existing signalling market that could be preventing Network Rail from obtaining value for money, and assess whether such issues have the potential to hinder the efficient delivery of the digital railway programme'.

ORR wants to understand the extent to which 'alternative OEM suppliers can bring alternative technology to the GB market and effectively compete with the existing suppliers'.

Dear heaven! Where have they been? That was what Railtrack was looking for when it told its signalling suppliers that if they continued with Solid State Interlockings (SSI) they were heading down a 'blind alley'. Two decades on it looks as if the people responsible for the Market Study aren't really up to speed on UK signalling history, technology, supply chain or nomenclature.

To fill this gap I run through a Series of Captain Deltic's Greatest Hits, including the unhappy histories of Railtrack's pilot installations of Computer Based Interlockings (CBI) from three different suppliers. Having got rid of its engineers, Railtrack managers didn't realise that SSI was the original CBI.

There are some similar misunderstandings at ORR on issues such as Control Centre technology and signalling technology in general. In particular, the apparent belief that the European Train Control System (ETCS) is some form of 'new technology'. I provide a potted history of ETCS in the UK which shows that far from being some exotic new technology, ETCS is just the latest development in signalling which has been operational on Thameslink for nearly three years now.

Bombardier, Siemens and Hitachi are installing ETCS in new trains. The first-in-Class retro-fitment to legacy trains and locomotives is underway. Five manufacturers are already active in the UK market. If you want more competition than that, then CAF were promoting their signalling capabilities at pre-Covid events.

Overall you have to wonder what this market inquiry is meant to achieve.

LNER - doctrinaire procurement lives

We all need some light relief in these grim times and LNER has provided it with an OJEU Notice announcing that it is 'seeking to procure a minimum fleet of ten InterCity trains based around specific technical and operating characteristics'. I don't want to spoil your enjoyment, but potential suppliers are asked to provide details of their experience of designing and manufacturing a fleet of multi-mode trains, including 'battery-electric, diesel-electric, hydrogen-electric, battery-diesel, dual-fuel or tri-mode'.

In reality, what fleet engineer in his or her right mind wants to add a unique sub-fleet of 10 high speed trains to an existing successful fleet, even if they are hydrogen-electric tri-modes from North Korea's renowned Kim Chong-t'ae Electric Locomotive Works?

Sadly, there is no option for bids based on the long-term deployment of remanufactured IC225s. I rather fancy the idea of a hydrogen-electric Class 91 hybrid.

Battery hybrids to cut emissions

With electrification apparently off the Government's spending agenda given these financially difficult times, and the Prime Minister bloviating as only he can over a hydrogen-with-everything wind-powered future, this month I report on practical ways the Rolling Stock Companies, train operators and manufacturers are doing their bit to actually decarbonise today's railway. Pending the start of a rolling programme of electrification, of course.

When it comes to CO2 emissions a diesel engine is the least polluting form of portable power you can use to propel rail vehicles. They are even better if you don't shackle them to remove other pollutants, such as nitrous oxides (NOx), but even then they are pretty efficient.

But diesel traction can be made even more efficient. Clearly fuel-saving driving strategies, implemented through Driver Advisory Systems (DAS) can reduce fuel consumption. As can 'smart' DMUs shutting down one or more engines when running at line speed.

But, as my colleague Ian Walmsley reminded us in Pan Up! last month, EMUs with regenerative braking are achieving energy savings up to the low 20%. Wouldn't it be a good idea if DMUs could do the same?

However, a DMU can't return this recovered energy to the fuel tank. But what if it could store the energy for subsequent use? Enter the battery hybrid DMU with two demonstrators scheduled to start running in 2021.

Transport Minister Jo Johnson's February 2018 dog-whistle aspiration to eliminate diesel trains by 2040 was nuanced. What he actually said was 'I would like to see us take all diesel-only trains off the track by 2040'. 'Diesel-only' note. Network Rail's Traction Decarbonisation Network Study (TDNS) also highlights the continuing role of the most efficient DMUs in reducing emissions as the electrified network expands.

Porterbrook, which dominated the post privatisation DMU market, is focusing on its Turbostar fleet. In conjunction with train operator Chiltern, it is fitting MTU hybrid power packs to a Class 168. The MTU power pack has been featured in earlier columns.

In addition to the benefits from hybrid operation, the engine in the power pack meets Euro Stage V emissions standards, whereas the initial engines were to Stage II. Rig test simulations indicate a reduction in fuel consumption and CO2 emissions by 25%, NOx by up to 70% and particulates by 90%. Battery operation entering and leaving stations should reduce noise and further improve air quality.

Where Porterbrook is using an off-the-shelf replacement power pack, Angel Trains HyDrive conversion of a Class 165, also in conjunction with Chiltern, involves replacement of the drive train. At the heart of the new drive is a 180kWh Lithium Ion battery feeding an inverter supplying power to a body-mounted traction motor connected to the existing final drive.

What are described as 'small diesel generators' in a 'modular hybrid configuration' charge the battery. The modular design will allow generators to be upgraded if lower emissions engines become available.

Completing the ROSCOs' drive to hybrid diesel is Eversholt. In December 2020 the company signed a deal with Hitachi to add a traction battery to a five-car Class 802 bi-mode. With its ability to run on 25kV ac electric, diesel or battery power it is strictly a tri-mode. However, away from the wires it is effectively a hybrid.

Under the project a battery pack will replace one of the three MTU Auxiliary Power Units in the five car train. According to Hitachi, the batteries will 'supplement the power of the engines to reduce fuel usage and carbon emissions by more than 20%'.

Voyagers

Highlighting the lack of an holistic approach to traction decarbonisations, the replacement Cross Country franchise agreement includes the commitment to a trial fitment of batteries to a Voyager. This is aimed at improving air quality in stations by shutting down the engines when entering and leaving stops.

Half-hearted or what? In my analysis of TOC CO2 emissions (December 2019), the top polluter, generating 18% of the total, was Cross Country. This was not surprising given its all-diesel fleet and the fact that the Class 22x Voyagers, with a 700hp Cummins diesel under every car, are the most powerful DMUs on the network. !

You may recall that there was a proposal to turn the Voyagers into bi-modes, with the addition of a pantograph/transformer car. It seemed a good idea at the time, and an even better idea now. However, it struggled on the grounds of cost and industry politics. Eventually the Department for Transport lost interest and Thor faded away.

But, with hybrid DMUs all the rage, perhaps it is time to launch Project Volta? Instead of focusing just on station air quality why not go the full hybrid and replace one engine raft in a Class 220 with a maximum capacity battery pack? This would leave adequate diesel grunt while providing regenerative braking in addition to reducing air pollution in stations. Assuming a 20% reduction in fuel consumption, the conversion could save around 50,000 tonnes of CO2 a year across the fleet.

Readers might also be interested in an American trial of heavy haul battery locomotive traction due this year. BNSF and Wabtec are cooperating on a demonstration of Wabtec's FLX drive project.

This is based on a GE Evolution Series locomotive platform. The 4,400hp diesel engine is replaced with a 2,400 kWh battery pack, which provides the same tractive effort as the diesel version.

Marshalled between two diesel locomotives, the FLX drive will provide regenerative braking which is expected to give fuel savings of 'at least 10%'. At first sight this seems of limited relevance to UK freight operations. But watch this space.

New Train TIN-watch

This month's big news is the that the days of MTIN are numbered. While a useful tool for engineers, it has been criticised for not reflecting the impact of all failures on the fare paying passenger.

As a result the Rail Delivery Group has introduced a new metric which is now running in parallel with Miles per Technical Incident (MTIN). The new measure is 'Miles per 701D'.

TRUST reports a Technical Incident (TIN) when a train is stopped for 3 minutes. To be precise, 'a TIN is counted when a fault on a train causes a total primary delay of three or more minutes at any point on one journey for a single root cause, where the root cause is a technical or maintenance defect on the train'.

However TRUST includes a wider range of causes of failure than those selected for MTIN. More details in the column and I will be having a full brief on the 701D metric shortly.

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Video previews

Each month we produce two video previews explaining more about what's in the new issue of the magazine.

Go to our Facebook page (www.facebook.com/modernrailwaysmag) to see the Editor talk to me and Ian Walmsley in a 'Zoom' call, or head to our YouTube page (<https://rb.gy/jog4f7>) where Ian Walmsley hosts a longer video with individual contributions from the magazine's writers. Both videos are usually published on the day the magazine goes on sale, normally the fourth Thursday of the month.

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Roger's blog

Well, the personal good news is that our GP Practice took a pragmatic view on the last minute change of policy to single Covid vaccinations and Mrs F and I got our second jabs. We're still taking the maximum precautions, but when my professional life changes from Zoom and Teams to analogue face-to-face briefings and even press visits, I'll be good to go.

Meanwhile our industry has made the transition to on-line events and it's now become a case of choosing which ones to stream if I want to have time for writing. At Modern Railways we are also using Zoom for interviews as well as our Facebook preview. This can have advantages over the classic one-to-one physical meeting with the interviewee.

For example, this week the editorial team will be discussing decarbonisation with Network Rail. Zoom means that three of us can take part. On the other hand we have to provide our own refreshments.

Having dealt with diesel hybrids this month, the March column will include an update on what I call 'alternative traction' - batteries and hydrogen. I don't know about you, but I still find it difficult to visualise what's involved and what these power sources can deliver in practical terms.

To provide a simple yardstick I have come up with what I hope is both an accessible concept and a bit of fun. Think DP3.

And on that cryptic note, stay safe and I hope you enjoy this month's Modern Railways

Roger