Money has changed hands - alea iacta est

W

hat follows has placed me in a bit of a quandary. With the idea of conversion of redundant London Underground D78 stock into diesel-electric multiple units to replace Pacers was first aired by Alan Williams (August issue, p.62), I regarded it as a non-starter. And on the basis of the four-page brochure with an outline design and specification, it was easy to skip. Given the resource on space I left it to my colleague Ian Whilmott, an experienced traction and rolling stock engineer to analyse the proposal in detail. Which he did with some venom, ruffling feathers within and without (p.42, September issue). One of the bidders for the D78 stock, Richard Hammett of the Yorkshire Train Company, defended the principle in the October issue (p.50). While this little drama was unfolding, at the beginning of August I was invited to the bunch of the Westham & Shropshire history. As I was leaving, Adrian Shooter invited me to come back and sit, comparatively put the 8th October in your diary for a meeting to discuss our D78 conversion plans. This was a proposal separate from that of the Yorkshire Train Company.

Naturally, I expressed a certain scepticism and asked why that day? It was when the new venture would know if it bid to buy D78 stock from LU had been accepted and how many trains it had acquired. So confirmed the time and place and forgot all about it until, on 5 October, I got an e-mail from Mr Shooter saying "I trust our meeting on Wednesday is still on? This was followed up with a copy of a highly-detailed 43-page brochure describing the engineering and operations of the Withdrawn D78 trains. And here comes the quandary, because Vixall's board is made up of essential engineering chums who have known and respected for decades. In that time they have been involved with major rolling stock projects in the UK and around the world and have learned a lot from them.

They are supported by a cadre of similarly qualified consultants, including LU original Project Manager for the D78 stock. In short, it's a deal: four units, two - three- and four-car units, that implies that the company has bought at least 300 vehicles. Scrap value would probably be upwards of £2 million. Since Thomas Dickerson is the patron saint of Informed Excess, I'll wait until I can ride in the demonstrator at the end of May next year for a full write up.

confirmed that Vixall had acquired all 150 Driving Motor DMU cars plus enough vehicles to form 73 units. Funding is coming from the Railroad Development Corporation of Pittsburgh. This is the company run by another highly respected locomotive builder, Harry Portner III. With Vixall offering the choice of two-, three- and four-car units, that implies that the company has bought at least 300 vehicles. Scrap value would probably be upwards of £2 million. Since Thomas Dickerson is the patron saint of Informed Excess, I'll wait until I can ride in the demonstrator at the end of May next year for a full write up.

Metro duties fitted: D78 stock interior similar to that in use in London.

I thought readers might find a run through the Frequently Raised Issues with the conversion of interest.

POWER
First of all, the traction power package is so far off the wall as to be in next-door's garden. Each DMU will have two underfloor diesel generator sets. Given that Cummins doesn't do limbo dancing, how has Vixall achieved the necessary urge? By importing technology from another transport mode. Each fully enclosed raft, only 500mm high, houses a 3.2 litre six-cylinder 200hp Ford Duratorq/Puma turbocharged and intercooled diesel engine. This engine was first produced in 2006 and current applications include the Ford Transit van and Land Rover Defender. Also housed in the raft will be the cooler, generator, battery plus the compressor, driven from the engine through the alternator shaft. Each raft will power the two traction motors on a bogie and provide a share of the auxiliary load. Vixall claims that a single raft will be sufficient to power the train in the event of other rafts failing, so there should be plenty of redundancy.

Mountings, hoses and electrical connections will be designed for rapid safe replacement. According to Adrian Shooter, using a pallet truck it will take 10-15 minutes to disconnect and drop a raft - repair by replacement being the philosophy. Exhaust is at track level.

Design and supply of the engine rafts has been subcontracted to NoVio Technologies Ltd. This company does all sorts of clever things, like a dual-axel van that can run on diesel or hydrogen, and off-road military vehicles.

ELECTRIC Power from the alternator will be fed to an inverter giving a 750V DC output. The DMU's existing camshaft control equipment will be replaced by a new state-of-the-art Chopper system, designed and supplied by Strutton Rail of the Netherlands. Strutton is descended from Hector Traction which supplied the three-phase drives for the Hunslet Class 323 EMU and were the first to obtain a DB safety case. Hector was taken over by ABB and when, in 2005, Atoson concentrated their development activity in France, Strutton employed the core of what was then Atoson's Centre of Excellence for light rail vehicle traction packages. Strutton is now a major player in the niche market for IGBT-based traction control equipment for both new and re-engined trains, metro trains and EMUs. The company even makes chunky stuff like 4-LIM electric locomotive traction inverters.

Vixall keeps the D78 stock's existing Brush LT18 traction motors. This motor also powers the LU Piccadilly Line trains. Mrophic braking will be retained.

CRASHWORTHINESS
Since the District Line shunts work with Network Rail, the D78 fleet was required to go through the Rail Safety & Standards Board (RSSB) approval process after the vehicles were re-bidged and refurbished. Vixall says this represents formal approval for operation over Network Rail and the D78 stock is recorded in the Rolling Stock Library. During the conversion to D-train, Vixall will be following the RSSB's guidance for Operating non-Network Rail vehicles on Mainline Infrastructure which was issued this year. In addition, ORR has confirmed that D-trains will not require the first
AUTHORIZATION THAT WOULD APPLY TO A NEW VEHICLE.

ONH has also agreed in writing that only modifications made to the D78 will need to comply with the relevant Technical Standards for Interoperability, the Notified National Technical Rules, and project entry under the EC Common Safety Method for Risk Evaluation and Assessment. Vuwial says it is confident that it will be able to comply with these requirements.

To provide greater collision protection, the cab front centre doorway will be replaced by a 'substantial vertical member, attached to the headstock below and to horizontal members leading to the cartrails behind the cab. Full width horizontal members beneath the cab windows will complete a safety cage for the driver.

PERFORMANCE

Maximum speed will remain at 60mph. Vuwial is arguing that there is limited mileage at higher speed on potential routes and shades of Inter-city Express Programme that the superior acceleration will reduce running times between stations.

Provisional run-time simulations using the Huddersfield-Sheffield route, which includes 15 intermediate station stops, long gradients, and some higher-speed route sections, have indicated savings in sectional running times compared with Class 142 and 150 DMUs. The D78's sliding power doors could reduce dwell times.

Excluding station stops, the Railways simulation shows the two-car D78 train saving six minutes over the Class 142 and 150. For the three-car the saving is four minutes.

COST

Adrian Shooter's target when he initiated the project two and a half years ago was to achieve an all-up operating cost per seat, excluding staffing but including lease rental and maintenance, that was 50% that of a Class 150. According to Mr Shooter that target has been met based on financial payback over 10 years. In fact a 20-year service life is forecast.

There's lots of staff in the prospectus about interiors and layouts - basically 10 variants on high-density commuter and inter-urban versions. For longer distance duties, there is the option of a Universal Access Toilet and the centre doors can be blanked off to provide more seating space and improve the ambiance.

But that can wait until hardware hits the test track at Long Marston in six months' time. Which brings us back to the quandary.

If anyone can make D78 stock conversion commercially viable it is this battle-hardened bunch of veterans. For me, the potential show stoppers are those highly-rated Ford diesels hammering away in their little boxes under the floor.

Yes I know that they have millions of miles of experience thrashing down motorways in white Transy vans at 85mph, but that's a gentle life compared with rail. For a start there is the harsh ride of steel on steel rather than rubber on concrete. The engine raft will need lots of hours on the vibration table.

Then there is the binary driving, with just over three minutes between station stops on Huddersfield-Sheffield. That repeated cycle of idle - full power - idle has knifed some proud engine manufacturers' rail traction aspirations.

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