No. 35017 and the 1948 Exchange Trials

My comments connected with Ben Brooksbank's photograph of No. 35017 leaving Kings Cross for Leeds with one of the test runs made over the route during the trials were noted in the "Bluebell News" of 27th October 2013. Thanks to the editor I have been given the opportunity to expand a little on trips made by this and other engines on that route, but also have considered the background and circumstances of the event.

The trials were quite fully documented in various contemporary railway magazines and by that doyen of railwaymen/journalists Cecil J. Allen in his book *The Locomotive Exchanges* published by Ian Allan Ltd. in 1949. This volume covers not just the exchanges of 1948 but also includes the pitting of LNWR engines against those on the Great Northern and Caledonian in 1909 and the GWR in 1910.

The historic exchange of 1925 involving an LNER class "A1" pacific and Great Western "Castle" came about because the two had been mounted side-by-side at the British Empire Exhibition of the previous year with the GWR claiming the "Castle"—the obviously smaller engine—as the most powerful express locomotive in Great Britain. Purely on the basis of that most deceptive of measurements, tractive effort, the claim was correct but Gresley challenged Collett to prove it. The results spoke for themselves, major changes being made in consequence to the valve gear of the "A1" to provide long travel as well as longer lap and lead. These relatively simple alterations raised the efficiency of the engine, such that average coal consumption came down from 50lbs per mile to about 38lbs.

The 1948 trials were instigated by the newly-formed British Railways supposedly as a means of establishing the best practice the four pre-nationalisation companies could offer that might then be incorporated when BR's own designs were being drawn up. However, this great jamboree was really quite unnecessary for the new locomotive testing plant at Rugby was actually brought into operation in late-1948. As was shown in later years, much more useful and objective data could be gathered in the controlled environment of the test plant, as well as from similarly controlled trials made "out on the road", than ever came from the "Exchanges".

Three locomotive categories were tested during the exchanges, express passenger, general purpose, and freight. Those in the express passenger category almost chose themselves: LMR, Duchess and "rebuilt" Royal Scot: ER, A4; WR, King: SR Merchant Navy. It is a pity that what one may term "2nd rank" express engines never entered the fray, the "Castle" for example and an SR "Nelson" with Bulleid's modifications. It would have been particularly interesting to see how the "Nelson" might have fared given its generally doubtful reputation. But with the right crew and S C Townroe's preparation……!!!

The general purpose engines were 4-6-0s with the exception of the SR "West Country". I find it difficult to see how the WR "Hall", the ER "B1" and the LMR "Black 5" could be directly compared to the "light pacific", all being in a lower power class. But then I wasn't doing the choosing! That said these three classes were all extremely competent though the driving generally rather less so, at least so far as good timekeeping was concerned.

On the other hand the Southern had no heavy freight engine to compare to the LMR "8F", ER "O1", WR "2800" or the two varieties of Austerity engines. Thus no SR loco appeared in this group. Allen makes the point that when his book was published no details of freight loco workings had been released. But a body of experienced train-timers, not least Allen himself, provided plenty of detail about the work done by the two other types of engine.

The express locomotives were tested over the following routes: Kings Cross-Leeds; Euston-Carlisle; Waterloo-Exeter, Paddington-Taunton and Bristol-Plymouth. The last route was also covered by the general purpose engines which, in addition, travelled two routes to Manchester, Midland from St Pancras and Great Central from Marylebone, as well as the Highland Perth-Inverness line. One point made early on was that all the "foreign" crews naturally needed to be accompanied by an experienced pilotman who sometimes appeared to be rather heavy-handed when a permanent speed restriction had to be observed. The Southern appointed

only two men for this purpose and the performances of the visiting engines over the Waterloo-Exeter route were probably the most consistent for that reason.

One real problem was that "like could never be compared with like" so long as no instructions had been given to crews about how their engines should be driven and fired. The late Bert Hooker was adamant that that was the case and Southern men were keen to show what their engines could achieve rather than work out how fuel and water might be saved. Here again the controlled conditions at Rugby provided far more valuable and meaningful results. As it was, there is clear evidence of some crews making little attempt to keep to time or particularly to make up any lost through delays, even on the easy schedules pertaining after the war as maintenance arrears were still being made good. Consequently any useful data that may have come out of the tests were nullified by that very inconsistency.

The Southern crews detailed to work away from home were driver George James and fireman George Reynolds, and their opposite numbers, driver Jack Swain and fireman Bert Hooker. The "Merchant Navy" pacifics, no 35017, "Belgian Marine" and no 35019 "French Line CGT" were both used throughout the "away" trips. (Allen made no report of work done by engines on home ground, on the basis such could be seen in everyday service.)

The first thing these men had to contend with was an unfamiliar tender because the SR ones were not fitted with a water scoop. Despite Bulleid tenders then having a capacity of 5000 gallons, even brim full it is doubtful running the 105.5 miles non-stop between Kings Cross and Grantham hauling in excess of 500 tons would have been readily achievable. The maximum possible consumption of only 47½ gallons per mile was clearly much too close for comfort. Moreover, coal capacity amounted to only five tons, adequate for any scheduled journey on SR metals but probably not so over the sort of distances involved in the trials. Thus all Southern engines acquired Stanier tenders holding nine tons of coal but only 4000 gallons of water, so picking up from troughs had to be mastered.

Secondly, despite the presence of a pilotman throughout the tests, routes were traversed beforehand to acquire at least a modicum of familiarity. In general, three return trips were made during the week prior to the test runs taking place. According to Bert Hooker a list of permanent speed restrictions and a gradient profile were made available, particularly useful when preparing a fire for the climbs over the Pennines or through the Highlands.

So far as the Leeds route is concerned Allen timed northbound runs for the contestants with the exception of the "MN" and perhaps for that reason only provides summaries of each run rather than displaying them in tabular form. However, he considers the four southbound runs more interesting and the times are tabulated in full. The train concerned was the 0750 to Kings Cross with calls at Holbeck – ridiculously only ½ mile from the start – followed by Wakefield where the four coaches from Bradford were added to the nine taken out of Leeds. The York coach was added at Doncaster and one from Lincoln at Grantham following the Retford stop, making a tare weight of between 489 tons (no 6018) and 500 tons (35017), (gross 530-545 tons), to be hauled to Kings Cross non-stop in 122 minutes. The logged trips took place between 30th April and 28th May.

Allen notes that all four trains were stopped by signals outside Wakefield while the Bradford portion was drawn clear. He comments rather acidly that the 0750 could have left Leeds at 0800 and still comfortably picked up its schedule at Grantham, a piece of timetabling he considers certainly required amendment. As though that set the mood throughout, with just one exception caution signals greeted the trains before every stop. Despite that, all four improved on the 44-minute timing from Retford to Grantham.

The intermediate times posted by "Belgian Marine" on its 28th May trip with James and Reynolds in charge were 3m 20s to Holbeck (schedule 3 minutes), then 21¼m to Wakefield (21m), 24¾m to Doncaster (26m), 23m to Retford (24m) and 41¼m to Grantham. From here 35017 took the honours, cutting a minute off the 55-minute booking to passing Huntingdon, and continued to lead the field to Finsbury Park despite a permanent way restriction after Wood Green. (It should be noted an overall speed limit of 60mph prevailed south Hatfield

and of 70mph to the north of it.) But then came a lengthy signal check down to 5mph so that the last 2½ miles into Kings Cross took 7½ minutes, though the overall time from Grantham was 120m 20s, 1¾ minutes inside schedule. The "King", which had all but matched the MN to Hatfield, - where it was actually five seconds ahead! – faced two moderate signal checks before New Barnet as well as the pwr at Wood Green, and arrived in 120m 57s.

However, Allen calculated the "King"s net time at 116 minutes while "Belgian Marine" was adjudged to have taken one minute more net. In fact the three other engines were credited with a faster net time than 35017, the "Royal Scot" with the redoubtable driver Brooker in charge, being given a time of 113¾ minutes. This appeared to be on the basis of two moderate permanent way speed restrictions but in places normally taken at speed, at Little Bytham on the fastest part of Stoke Bank, and in the dip between Stevenage and Knebworth. The "Duchess" was similarly restricted by the former but not the latter and neither the "King" nor the "MN" were affected by either.

Nevertheless, I think some readjustment is necessary, if only because the "Scot" was breaking the overall speed limit as it came down from Potters Bar with 71½mph timed at New Barnet and brakes on to reduce speed to 64mph at Wood Green, which implies little effort to adhere to it beforehand. Besides those a speed of 77½mph was recorded at Huntingdon, well in excess of the 70mph limit and something Allen calls "lively", though whether referring to the speed or the riding he doesn't say.

So, I would agree with his net for the "King" but in view of the signal check to walking pace at Belle Isle I'd reduce the net for 35017 by at least ½ minute and possibly to the same 116 minutes. To that point George James had been keeping very nicely to his booked intermediate times and gaining a little in hand for the pwr at Wood Green. Above all else this illustrates the innate sensitivity of Southern crews to keeping to schedule, an absolute necessity when passing through the densely trafficked suburban electrified area of London.

The "Duchess" was also affected by a similar but lesser signal check, so taking 5¾ minutes in from Finsbury Park. As well as the pwr at Little Bytham it was slightly checked by signals after Huntingdon but in my view the 114¼ minute assessed net time is a little generous and I'd add at least another ¾ minute to it.

Having said all that I would still concur Allen's view that the "Royal Scot" was the stand-out powerhouse on these runs. For one thing it was the smallest engine of the four but hauling the heaviest load at 545 tons, the train being packed with fans going to Wembley for the Rugby League Cup Final on April 30th. Nevertheless, I think a net timing comparable to the "Duchess"s 115 minutes is fairer.

These runs were, of course, just one of the three each engine undertook in each direction and the only ones Allen himself timed. One comment he does make puts the performance of 35017 and her crew into greater perspective. He writes, "It was left to the last two engines to show us how to climb from Grantham to Stoke Summit". [After a level half-mile off the platform end the climb is five miles long at 1 in 200: the summit incidentally is exactly 100 miles from London.] "When the Western 'King Henry VI' did it in 10 min 8 sec on May 21st I thought we had secured the record for the trial, but a week later, to my surprise, Swain [actually James] with the Southern *Belgian Marine* beat this with a superb ascent on which he attained 47½ m.p.h. on the 1 in 200 grade and passed the summit box in 9 min 37sec. I have not succeeded in discovering among my past records any start with a comparably loaded LNER Pacific quite as fast as this".

Just one other note of praise to back this up: on Friday 14th May "Belgian Marine" was involved in another bit of record-breaking. As Allen describes it, "Starting away from Carlisle with a 16-coach load of 503 tons tare and 525 tons gross .... after Penrith Swain treated us to a most spectacular piece of uphill running. For roughly three miles the start is fairly easy. On this we reached 46mph. Then begins the gruelling ascent to Shap station – 7 miles from milepost 48¼ to milepost 41¼ unbrokenly at 1 in 125, followed by 1¼ miles at 1 in 142 to milepost 40, with the station immediately beyond.....on ¾ mile of level track, after which 1¼ miles at 1 in 106/130 lead to the summit. On the 1 in 125 we settled down to a steady 41mph, which continued unvaryingly for mile after mile.

The exhaust was shooting straight up from the chimney into a brilliant blue sky, and its sonorous music must have carried far across the Westmoreland moors.... the whole experience was unbelievably thrilling. Before we had reached the end of the 1 in 125 speed was beginning to rise; on the 1 in 142 we attained 46mph and the Shap level carried the rate up to 51mph. By the end of the 1 in 125, with the rising speed, the engine was exerting fully 1700hp at the drawbar continuously..... [and] we were passing the Summit cabin in one second over 20½ minutes from the dead start at Penrith, a gain of 6½ minutes on schedule".

In his reminiscences Bert Hooker, who fired the engine on this occasion, said that "Mr Sharpe in the dynamometer car" was jubilant at the experience. But while in the enginemen's hostel at Carlisle the previous evening Bert had asked a "top link" Crewe driver how long he thought it would take to pass Shap summit from a Penrith start with 500 tons of train. "22 or 23 minutes" was the reply, "certainly not less". Bert told him he forecast 35017 could do it in twenty minutes and he wasn't far out.

With performances such as this Nigel Gresley would no doubt have been both rather pleased and a little envious at the success of his *protégé,* although in fact his own "A4" pacifics did very well in almost all departments, if one discounts the couple of failures of the inside big end. But that begs another question: why did the ER authorities go for a pair of ten year-old "A4"s rather than two of the very up-to-date and spanking new Peppercorn "A1"s? Curious!

By Jeremy Clarke