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BackTrack

END OF THE YEAR AT ASHBY JUNCTION

A light snowfall lends a crisp feel to this view at Ashby Junction, just north of Nuneaton, on 29th December 1962. Two LMS 4-6-0s, Class 5 No.45058 piloting 'Jubilee' No.45592 *Indore,* whisk the late-running Heysham–London Euston 'Ulster Express' past the signal box in a flurry of steam, while 8F 2-8-0 No.48349 waits to bring a freight off the Ashby & Nuneaton line. As the year draws to a close, steam can ponder upon the inexorable march south of the West Coast Main Line electrification.
(Tommy Tomalin)

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SOUTHERN GONE WEST

A busy scene at Halwill Junction on 31st August 1964. BR Class 4 4-6-0 No.75022 is approaching with the 8.48am from Padstow, while Class 4 2-6-4T No.80037 waits to proceed with the 10.00 Okehampton–Padstow. The diesel railcar is an arrival from Torrington. (Peter W. Gray)

THE NORTH CORNWAL

BY DAVID THROWER

The area served by the North Cornwall line has always epitomised the contradiction of trying to serve a remote and sparsely-populated (by English standards) area with a railway. It is no surprise to introduce this portrait of the North Cornwall line by emphasising that railways mostly came very late to this part of Cornwall — and left early. The entire life of the North Cornwall line spanned little more than seven decades.

Followers of this series of articles have seen how railways which were politically aligned with the London & South Western Railway progressively stretched out to grasp Barnstaple and Ilfracombe, and then to reach Plymouth via Okehampton, with a branch to Holsworthy, the latter eventually being extended to Bude. The Holsworthy line included a station at a remote spot, Halwill, which was to become the junction for the final push into North Cornwall.

The LSWR had already long maintained a presence in the Far West, from 1846, in the shape of the ancient Bodmin & Wadebridge Railway, of which more on another occasion. The purchase of the B&WR, deep in the heart of the Great Western Railway's territory, acted as psychological pressure upon the LSWR to link the remainder of the system to it as part of a wider drive into central Cornwall to tap

Smile, please! A moorland sheep poses for the camera, oblivious to SR N Class 2-6-0 No.31846 heading west from Tresmeer with the Padstow coaches of the 'Atlantic Coast Express' on the last stage of their long journey from Waterloo on 22nd August 1964. (Peter W. Gray)

L LINE PART ONE

passenger and mineral traffic in particular. For the rest of the century the LSWR camp therefore had to relentlessly press on westwards to reach the B&WR — and capture as much as possible of the territory which lay between — rather like some advancing but slow-moving army relieving a distant town under siege.

However, much of the way from Halwill, and from civilisation back at Okehampton, was decidedly barren country, being used for hill farming. There was only one town, Launceston, until you reached Wadebridge. Moreover, the coastline was rocky, with few bays, and its geology and remoteness made it unsuitable for major holiday resorts.

The population of this area, even by the mid-twentieth century, was to remain stubbornly low. Between Halwill and Padstow, the four towns and villages were Launceston (4,700), Camelford (1,300), Wadebridge (3,300) and Padstow (2,900). To the west, along the coast, there was Boscastle (900), Tintagel (1,600), Port Isaac (1,000) and the very minor coastal villages of Trevone, Rock

Peace and quiet at remote Ashwater station, looking west on 22nd August 1964. Set in its tranquil wooded valley, the station was only accessible by narrow country lanes.
(Peter W. Gray)

A view looking eastwards along the down platform at Halwill Junction on 16th June 1926, with Southern Railway Maunsell N Class Mogul No.840, at this time still only two years old, standing with the 4.10pm Okehampton to Padstow service, with additional stock (probably for a Bude service) in the down bay platform. The locomotive, as BR No.31840, was withdrawn for scrapping in 1964.
(H. C. Casserley)

Drummond LSWR T9 4-4-0 No.30711 stands at Wadebridge on 18th May 1959 with the 12.45pm Padstow to Waterloo service, due into Waterloo about seven hours later behind a Bulleid Pacific. Small communities such as Padstow and Wadebridge were still enjoying truly excellent long-distance links and comfortable rolling stock, courtesy of the Southern, even if there were numerous stops on the long sections west of Exeter. However, the beginning of the end of the legendary and much-loved 'Greyhounds' was in sight and this T9 was withdrawn just three months later.
(J. S. Gilks)

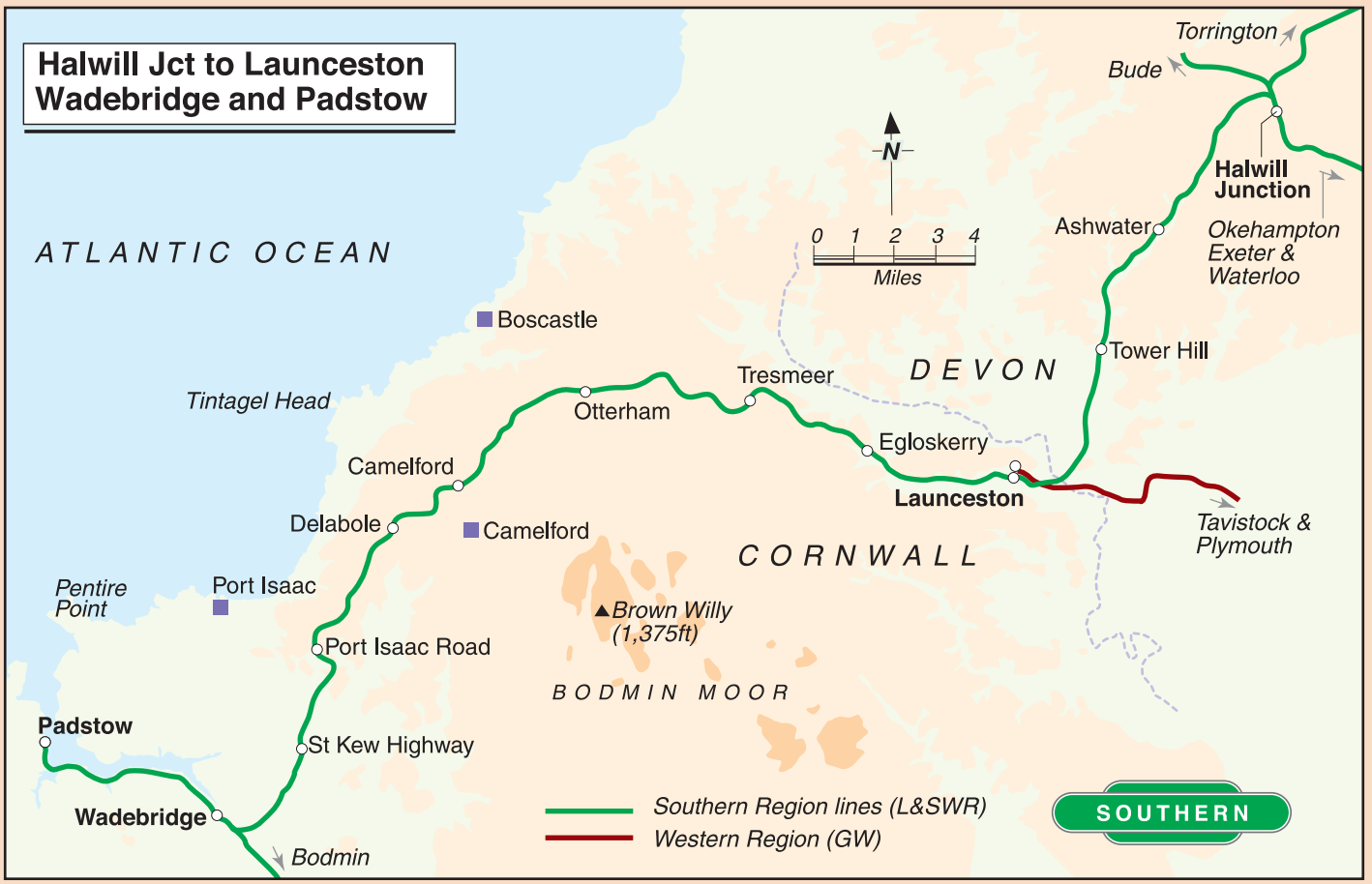
and Polzeath, totalling perhaps a further 4,500 inhabitants. The rest was scattered villages, hamlets and isolated farms. This was thin gruel indeed.

It is therefore no surprise that the LSWR was, in truth, in no real hurry to colonise the territory as its own, nor that the later Western Region of British Railways was to be equally anxious to withdraw from it just as soon as it could. The years of the LSWR, Southern Railway and BR Southern Region were therefore to see the area's all-too-brief golden age of rail travel.

Early days

The LSWR's progress west of Exeter towards its newly-acquired Bodmin & Wadebridge line was to be one of the slowest pieces of railway-building ever, taking the remainder of the century to complete. The company had reached Okehampton by 1871 and in 1879 the completion of the line from Okehampton to Halwill and Holsworthy had given it the chance for a further southward push towards Launceston.

The LSWR had already previously made a lengthy but unsuccessful attempt to reach the town by a wholly different route. From 1864 until 1870 the Central Cornwall Railway had been trying to reach Launceston from Truro, via Ruthernbridge, with LSWR backing as part of an attempt to penetrate the GWR's monopoly west of Plymouth, but the powers had lapsed with the line unbuilt. In 1880 the GWR had also tried its hand at penetrating the area and attempted unsuccessfully to promote a route northwards from Fowey through Ruthernbridge to Delabole. This would have been to transport slate and clay from the area to Fowey. The Mid-Cornwall Railway was proposed to link St. Dennis via St. Columb to



Padstow but this scheme, too, was defeated in the House of Lords in 1882.

The LSWR's response to the Mid-Cornwall scheme was to attempt once more to capture the territory from the north. In August 1882 the North Cornwall Railway was granted Parliamentary powers to build a line from Halwill, on the Holsworthy route, to Wadebridge and Padstow. The route was selected to minimise tunnelling, with a ruling gradient of about 1 in 75. Agreements were reached in the same year between the LSWR and the North Cornwall for the former to work the line. The long-term plan was to eventually press on further westwards from Padstow to Newquay or Truro, but those aspirations ended in 1896–97 when a truce with the GWR was declared.

Finance for the North Cornwall, for what promised from the outset to be a fairly costly and difficult railway to build, with only very modest traffic prospects, was raised by dividing the line into four separate financial undertakings, each covering respectively the Halwill–Launceston, Launceston–Delabole, Delabole–Wadebridge and Wadebridge–Padstow sections. Each of these undertakings then had its own separate working agreement with the LSWR company.

Many years later, in 1912, the new General Manager of the LSWR, Herbert Walker, rationalised these financial arrangements into a single agreement, authorised by Parliament, with the LSWR paying an annual rental for the North Cornwall line of £25,250. Finally, immediately before the three main Southern companies were amalgamated in 1923 to form the Southern Railway, the North Cornwall Railway was absorbed by the LSWR in November 1922, having by this time become its largest shareholder. The North Cornwall company was then wound up in March 1923.

Construction

Returning to 1884, construction of the central section of the North Cornwall line required some heavy earthworks, particularly south of Egloskerry, despite making the best use of river valleys that it could, and the directors of the London & South Western Railway must have wondered at times quite what they had let themselves in for. Construction lasted fifteen years, from mid-1884 till early 1899. The route was built as a single track but (somewhat over-optimistically) with numerous double track clearances.

Construction of the first section, from Halwill to Launceston, started on 20th June 1884. Contractors for the line were Curry and Reeve, usually employing 600–800 men at any one time. The completed line to Launceston was inspected on 15th July 1986 and opened on 21st July 1886. However, there were certain niggling criticisms and a 25mph speed limit was imposed, which must have taken the shine off matters. This lasted until February 1887.

Construction of the next section commenced in November 1890, still with Curry and Reeve as contractors. There were problems in the Tresmeer area, where shale proved unstable, and the subsequent landslip delayed the completion of the Launceston–Tresmeer section. Inspection was on 27th July 1892 and opening followed the next day, though Egloskerry station wasn't opened until 3rd October. Again, there was an initial speed limit of 25mph due to the lack of a turntable at Tresmeer.

Inspection of the next short section, from Tresmeer to Delabole, was on 8th August 1893. Tresmeer to Camelford was opened on 14th August 1893, but the section beyond to Delabole was unfortunately still unfinished. This latter was inspected again by the Board of Trade and opened on 18th October 1893, though this time the authorised initial speed limit was only 20mph. Construction pressed on and Delabole to Port Isaac Road was inspected on 1st August 1894 and once again passed for 20mph operation, this time because of there not being a turntable at Port Isaac Road. Partly due to this, the LSWR chose not to open the section to traffic.

Work proceeded on Port Isaac Road to St. Kew Highway and by November 1894 the sole tunnel on the line, at Trelil, was largely complete. Inspection of Port Isaac Road to Wadebridge took place on 29th May 1895 and Delabole to Wadebridge opened on 1st June 1895. The inspector, however, was still unhappy with Wadebridge's layout and it was rebuilt subsequently for the Padstow extension. The Wadebridge extension was officially opened on 12th June.

In July 1896 powers were granted to extend the line to Padstow, with Curry and Reeve remaining the contractors. Work began in December 1896, the extension was inspected on 20th March 1899 and the line was approved, subject to the provision of a turntable at Padstow. The extension was formally opened on 23rd March 1899, accompanied by a 21-gun salute from the quayside.

Interestingly, in January 1903 a further railway route — the Padstow, Bedruthan & Mawgan — was authorised. No progress was ever made with the scheme, for the first railway age was all but over.

The line south of Halwill

The North Cornwall line left Halwill heading westwards, but then immediately curved southwards to follow the valley of the River Carey almost to Launceston, where the river became part of the Tamar. The line dropped continuously along this section, falling 450ft within a few miles.

Most of the stations to Wadebridge, with the exception of Launceston, only served small local villages, with any substantial population

No.31846 runs past a line of cattle vans towards Halwill Junction with the 8.30am Padstow–Waterloo on 22nd August 1964. In front of it are the Bude coaches which will be added by No.80039. (Peter W. Gray)

usually being either distant or non-existent. In the case of Ashwater, the first station, and with the line incidentally still in Devon, the village of the same name was half a mile west and there was little else to hand other than the hamlet of Ashmill. The station was quite remote from any main road, set in a wooded valley, and could only be reached by narrow rural lanes.

The station layout was for a passing loop (every station to Wadebridge had a passing loop, which has made most of them look confusingly similar to historians ever since), with two platforms and a road overbridge at the Halwill end. The loop was lengthened in 1936, doubtless reflecting the longer freights and peak summer passenger trains by then being run with the Maunsell Moguls. The signal box was situated halfway along the down platform, as was a small waiting shelter. Most of the boxes on the line were to the LSWR Type 3 design, with large areas of glazing, but there were numerous variations on this theme.

The yard at Ashwater was extremely basic, with two sidings serving a loading dock and a small goods shed, with a short headshunt, the yard being accessed by reversing from the up platform line. There was the usual general goods traffic, but nothing of particular consequence.

The basic layout at the next station, Tower Hill, several miles to the south and also still in Devon, was to much the same as that at Ashwater, except that the original signal box was this time halfway along the up platform. There was very little habitation in the area around the station, the nearest being the village of St. Giles-on-the-Heath, some way off. Interestingly, the original decision to build a station at Tower Hill had been controversial, with local interests favouring Boldford, nearer to Launceston.

Tower Hill station in 1939. This served a rather scattered local community and was one of the least-used stations on the North Cornwall line. Note that at the time of the photograph there was only one platform line, the loop having been taken out of use just before the Grouping, though it was reinstated during World War II due to D-Day traffic needs. This is one station which has unfortunately not survived until the present day, having been demolished after closure for reasons that are not known. (Stations UK)

The signal box here was closed in June 1920 and replaced with a ground frame, at the end of the up platform, to control access to the yard. The passing loop went out of use at the same time. The two sidings in the yard served a loading dock and a stone goods shed. In 1943–44 the loop and down platform were reinstated, complete with a new Southern Railway concrete passenger shelter. The yard was also provided at this time with two additional sidings, for War Department use, in connection with the build-up to D-Day. To control access to these sidings and increase line capacity, a new lever frame was installed in the station buildings in March 1943. Despite this flurry of wartime activity, both Ashwater and Tower Hill were always amongst the least-used on the line.

Launceston

After leaving Tower Hill and following the Tamar, the North Cornwall line headed westwards, crossed the river (which marks the Devon/Cornwall boundary) and, after passing over the GWR Plymouth–Launceston route almost at right angles on a lattice girder bridge, entered the SR station at Launceston.

On 15th August 1960 the penultimate summer of the 'Greyhounds' in the West, T9 No.30313 eases slowly off Wadebridge shed and glides across the points at the west end of Wadebridge's platforms to reverse into the station and take over a Padstow service from a Western Region locomotive.
(Alan Tyson Collection/Atlantic Publishers)

SR 'Battle of Britain' 4-6-2 No.34079 *141 Squadron* **waits to leave Padstow with a short train of but three vehicles in August 1963. As a farewell is made on the platform, the fireman checks that his locomotive is well coaled for its assignment.** (Historical Model Railway Society/Colour-Rail BRS1432)

Launceston was the only intermediate station of any consequence between Halwill and Wadebridge and its importance was amplified by the existence next door of the Great Western station. The Launceston & South Devon Railway had been promoted by the South Devon Railway and had been incorporated in 1862 as a broad gauge line but with the Board of Trade authorised to order a narrow gauge (ie standard gauge) rail to be laid if so required. The line had arrived at Launceston on 1st July 1865 and was worked by the South Devon Railway until absorbed in 1873. The LSWR's opening of its North Cornwall line service was to rob the GWR route of any Exeter and London traffic, but it remained the route for Tavistock and Plymouth.

The South Devon/GWR route was converted to standard gauge at the end of the broad gauge in 1892 but, astonishingly, remained unconnected at Launceston to the North Cornwall line. The track layouts of the two stations were in fact not linked until September 1943, again in connection with the build-up towards D-Day. It is inexplicable that it took a world war to connect the two premises, although a link — surely the simplest of schemes? — had been contemplated in 1910. Eventually, common sense and economy fully prevailed and on 30th June 1952 the GWR passenger station was closed and the Western Region's services were routed across into the SR platforms. The Launceston–Plymouth passenger service eventually ceased on 31st December 1962 during the severe 1962–63 winter.

The LSWR side at Launceston comprised a passing loop and two rather short platforms, with a more substantial yard than elsewhere, east of the station and accessed by reversing from the down loop. The main station buildings were on the down side and included a canopy, with the platforms connected by a footbridge at their west end. Both platforms had water cranes of the non-swinging LSWR type, with long bags. The station's main drawback was that it was at the bottom of a very steep hill, with most of the town (until 1838 the County Town of Cornwall) near the top, which was surmounted by the ruins of a thirteenth-century castle.

In its final form the signal box, on the up side and adjacent to a small stone waiting shelter, faced both ways on to both the two stations and had two lever frames, one for each company, back-to-back. This probably made it the most unusual box anywhere on the SR system in the West. The box had originally been built as a standard LSWR Type 3 design, with an eighteen-lever frame. However, as a staff economy during the First World War, the GWR's own box was closed from December 1916 and a sixteen-lever frame to control the GWR signals and points was installed in the LSWR box, which then had to be doubled in depth to accommodate it. The signalman — surely a man with divided loyalties — became jointly-funded.

The North Cornwall yard comprised two headshunt sidings and five further sidings, with two serving loading docks and two more serving the goods shed. Business here was substantial and the yard handled considerable quantities of general goods for the town, livestock from local farms and sundries. There was particularly good business in the forwarding of cattle.

In the middle of the goods yard sidings was located a 50ft locomotive shed and turntable, both capable of accommodating a 4-4-0 tender locomotive. As the LSWR worked its Far West operations with cast-off tender locomotives from further east, these turntables were a necessity, with no fewer than six eventually existing at Okehampton, Halwill, Launceston, Delabole, Wadebridge and Padstow. A 48ft turntable had been necessary from the outset because the station had been a terminus from 1886 until 1893 when services were able to be extended to Delabole. At one time the Launceston shed and turntable appear to have been scheduled for relocation to Delabole but that seems never to have been implemented, perhaps because a continued use was foreseen for them, and new infrastructure was provided at Delabole instead.

The other shed facilities included the usual coal stage, water facilities and a small shed office and mess room alongside the shed building. Access to the turntable was only by passing through the shed. The building was decidedly flimsy, being of corrugated iron with a raised ridge section. It gradually fell out of use during the 1940s but the turntable remained in use until about 1963.

The GWR also had its own locomotive shed and turntable, directly opposite the LSWR premises. After 1943 the Southern Railway locomotives seemed to have used the better-built GWR shed but were still, of course, driven and cleaned by SR staff. By the late 1940s the SR's operations only justified two sets of crews and a cleaner. The GWR turntable ceased use by 1961 and the GWR shed closed in December 1962, but lingered on in day-to-day use until September 1964.

West of the station, after passing underneath the A388 road bridge, there was a further siding serving a small gas works of the Launceston Gas Company, together with a private siding for Trood, a local merchant handling coal and building materials. Beyond Launceston the line climbed at 1 in 77 through the valley of the River Kensey.

Egloskerry and Tresmeer

The stations at Egloskerry and Tresmeer were mirror images of each other. At Egloskerry there was the standard two platforms and passing loop. The station buildings here, as at Tresmeer but unlike all the others on the line, were of brick. The signal box was on the up platform and immediately west of the station was a level crossing, with hand-operated gates. The tablet instruments were moved from the box into the ticket office in 1930. The station was very convenient for the nearby village, but its use was still poor.

The goods yard at Egloskerry was on the north side of the station, accessed by reversing from the up loop. This made it inconvenient for down freights which therefore did not call there, with traffic being reversed via Wadebridge and then worked north again or delivered to other more convenient stations. The yard comprised two dock sidings and a short headshunt. The sidings closed earlier than

A general view of Tresmeer in 1963, looking in the up direction towards Launceston, Halwill and Exeter. (Stations UK)

at other stations, on 9th May 1960, and had been lifted by 1961 when the station was still under SR control.

The landscape in this area was, and still is, noticeably much more barren than that east of Launceston, with far fewer trees, as the uplands are exposed to the full force of the Atlantic gales. Farms are protected from the weather by stone walls and ragged lines of hawthorns. The railway here alternated between cuttings and embankments, some very high, and with numerous long curves.

At Tresmeer the station was located in a hamlet called Splatt, a name mercifully not adopted by the LSWR. The station layout was again to the standard format, but this time with the goods yard on the down side, west of the station. The two platforms were linked by a road overbridge and the signal box, with its seventeen-lever frame, was at the west end of the up platform. The yard consisted of the usual two dock sidings, one of which served a small goods shed, and a headshunt. There was a small abattoir serving local farms. Traffic handled in the yard was the usual mix of cattle and pigs, coal and other general goods.

Beyond Tresmeer the line crossed an 86ft-high embankment. A viaduct had been planned, but the local material was unsuitable and there were bedrock problems.

Otterham and Camelford

At Otterham the North Cornwall line had reached a height of 800ft above sea level, almost as high as Meldon Junction. The nearby Davidstowe airfield, two miles south of the station and open from 1942 until 1945, was the highest in Britain. This was an area where the enclosed cabs of 'West Country' Pacifics and Standard 4MT tanks were appreciated in winter and where the open footplates of the T9s

'BB' No.34110 *66 Squadron* **leaves a smoky haze over the platform at Halwill Junction as it runs in with the Padstow coaches of the up 'Atlantic Coast Express' in September 1962.** (Bruce Chapman Collection/Colour-Rail BRS1226)

Otterham was yet another station which followed the semi-standardized pattern on this line, making it difficult for enthusiasts to readily distinguish one from the next. The station is seen here in 1963, looking towards the up direction. It was 800ft above sea level and almost two miles from the settlement it served, making it a bleak place to await a train in winter weather. (Stations UK)

afforded little protection for crews from whatever the weather threw at them, often near-horizontally.

Otterham station, nearly 750ft above sea level, one and a half miles from the village and on the A39 — making it vulnerable to bus competition — was of the usual loop and two platforms, connected again by an overbridge. The main buildings were on the up platform, with a small stone shelter for down passengers. The signal box was at the London end of the up platform. It was one of the most exposed stations on the LSWR, perhaps its equivalent of Dent on the Settle–Carlisle line. The yard here was just a little larger than the basic minimum, with three sidings, two of these serving a dock, and a headshunt. Traffic included cattle, pigs, coal, fertiliser, sand and potatoes.

Beyond Otterham the line reached its summit of 850ft, barely more than two miles from the coast, and passengers could briefly glimpse the Atlantic from the train. This was the mystical coastline which visitors had come to see, of ancient legends and hopefully not-too-ancient hotels and boarding houses. As Tennyson had written (albeit not with promoting long-distance rail traffic in mind):

But after tempest, when the long wave broke
All down the thundering shores of Bude and
Bos,
There came a day as still as heaven, and then
They found a naked child upon the sands
Of dark Tintagil by the Cornish sea;
And that was Arthur; and they fostered him
Till he by miracle was approven King

The above process may seem highly undemocratic today, and might also lack historical fact, but this was the romantic myth which enabled the Southern Railway to market North Cornwall and to play the Great Western at its own game.

The mystique was further reinforced to potential SR holidaymakers by naming the 11.00am down express the 'Atlantic Coast Express' from July 1926 and by conferring the excellent series of Arthurian legend names upon the Maunsell and earlier Urie N15 4-6-0s from 1925 onwards. Thus did the sight of *Sir Dodinas le Savage* or *Excalibur* or *Maid of Astolat*, storming through grubby Clapham Junction or mock-Tudor Raynes Park with green expresses bearing roofboards with 'Atlantic Coast Express' and faraway-sounding words such as 'Padstow', arouse urban yearnings to examine maps and holiday guides and save up for those all-important railway tickets for a week of exploring the magic of Merlin.

The approach to Camelford station was where King Arthur was reputed to have fought his last battle, in the year 542. 'Camelford for Tintagel and Boscastle' was another two-platform passing loop, with the station building

A panoramic view of Camelford station in its setting high on the sweeping landscape of North Cornwall. The station nominally served Boscastle (of more recent flash-flood fame) and Tintagel, two of the local coastline's more romantic destinations. Camelford was another location where waiting for a train in deepest winter might deter the less hardy, but at least it was staffed and had proper passenger facilities. (Stations UK)

complete with canopy located on the up platform, and again in a wild location with rain and mist, or worse, sometimes sweeping between the buildings. The signal box, with seventeen-lever frame, was at the London end of the up platform and there was a small stone shelter on the down side. The station was the railhead for Boscastle and Tintagel which, of course, had to be reached by bus.

The yard here was again a little more than the basic minimum, with two dock sidings, a line running through the goods shed and a headshunt. There was also a small slaughterhouse for despatching fresh meat to Smithfield Market and elsewhere in the days before refrigeration.

From Delabole southwards

The Delabole layout was more elaborate than most of the other stations on the line. There was the standard loop with two platforms and the station buildings were this time on the down side. The signal box was immediately off the up end of the up platform. The goods yard, on the down side, enjoyed two accesses, one enabling trains to run directly into the yard and the other enabling them to reverse in from the down loop.

There were eight sidings, two of which served the loading dock and goods shed. The longest sidings were for the transhipment of slate, with one standard gauge siding laid on either side of a three-track narrow gauge (1ft 11in) terminal, the latter linked to the nearby slate quarry where there was a complex network. For down LSWR trains, the sight of the quarry just preceded entry into the station. Quarry traffic reached entire trainloads in the early years, but gradually went into decline before finally transferring to road. One very interesting traffic in later years was slate dust which was transported by rail to West London and used to make 78rpm records in the days before plastic.

Because Delabole was to act as a temporary terminus, the station yard was also equipped from the outset with an engine shed and turntable. These were located east of the station, in between the goods yard and transhipment sidings. The shed was smaller than that at Launceston and the turntable was 50ft diameter, so could take a 4-4-0 or Mogul. As at Launceston, the turntable was reached by passing through the shed. There were also water facilities.

The corrugated iron shed building was dismantled and sold-off to the local Co-op by 1900, for the very reasonable sum of £20, after the line had been pushed through to Padstow. The turntable was also removed and the shed and turntable area were then redeveloped as further goods sidings.

The precise details of the earliest motive power on the quarry system are not available (can any reader help?), but apparently comprised seven steam locomotives, at least some of Bagnall origin. The system was later modernised with three diesel or petrol-powered units (evidence is conflicting), Nos.1–3, built by Motor Rail of Bedford in the 1920s. By the 1970s one was still active, another out of use and one either scrapped or sold, probably the former.

Port Isaac Road was located, as its name implied, at the intersection of a road rather than at Port Isaac Bay, which lay less than two miles to the west, though the village was nearly twice

A busy scene at Otterham: T9 No.30313 stands at the up platform with the 3.15pm Padstow to Exeter service on 15th August 1960, as unrebuilt 'Battle of Britain' No.34058 *Sir Frederick Pile* **rumbles in with a down train. The T9 was to be withdrawn in July the following year. No.34058 spent the years 1951–63 allocated to Exmouth Junction and was to be rebuilt just a few weeks after this photograph was taken, surviving only until October 1964. By some miracle of fate it is still very much with us, courtesy of Dai Woodham's scrapyard, but has yet to steam in preservation.** (Alan Tyson Collection/Atlantic Publishers)

that distance. The station was very much to the standard layout once again, as was the goods yard at the Wadebridge end, on the up side. The main buildings and signal box, to the usual LSWR Type 3 design, were on the up side and a small stone shelter was located on the down platform. Freight traffic here was moderate, mainly coal and fertiliser, but there were also two private sidings serving Betty and Tom's premises, a stone quarry. The sidings lay on the Delabole side of the station, with access controlled by a ground frame. They closed in 1964.

Beyond Port Isaac Road, half a mile towards St. Kew Highway, was the only tunnel on the entire North Cornwall line, the curving 352yds Trelil Tunnel, passing beneath the hamlet of the same name. The lack of tunnels reflected the line's success in following river valleys, but a price for this had to be paid in terms of indirectness, with the route twisting and turning.

There is a story about Trelil Tunnel. A driver of an LSWR passenger train was dismissed by the fearsome Dugald Drummond because his locomotive slipped in the tunnel, allegedly on fish oil leaking from a preceding train, and bent a rod. The incensed fellow-drivers of the Far West rallied round and formed a protest deputation. When Drummond came to hear of this defiance, the deputation's leader was promptly summoned to London where he probably anticipated some sort of public execution at Waterloo. But Drummond appreciated courage. Peace was restored and the driver whose engine slipped got his job back.

St. Kew Highway was another station that marked the intersection of a road, the A39 trunk road from North Somerset and Barnstaple to Truro. The standard two platforms and loop were again provided, with the same minimalist yard on the up side, at the south end of the station. The access to the yard was remodelled and simplified in July 1939. The signal box was at the Wadebridge end of the up platform, with its back to the yard. Traffic here was even lighter than at Port Isaac Road.

Beyond St. Kew Highway the railway descended the valley of the River Allen, having fallen for a continuous fifteen miles, mostly at a steady 1 in 75, until it reached the River Camel, east of Wadebridge.

Wadebridge and the Camel

When the North Cornwall line originally entered Wadebridge it joined the single line from Bodmin, with a signal box at this location, Wadebridge Junction. However, the box was closed in February 1907 and a second track established into Wadebridge station.

By Wadebridge, trains which had started at Waterloo had covered 254 miles. Wadebridge, of course, had begun life as the western terminus of the Bodmin & Wadebridge Railway. This gave it an extraordinary history which will be considered in more detail in a future article covering the BWR era, the line eastwards to Bodmin (later Bodmin North), the connecting line to Bodmin General and the two branches to Wenford Bridge and Ruthernbridge. In the meantime a basic description of the station must suffice.

Very briefly, the Bodmin & Wadebridge was incorporated in May 1832, a bare seven years after the opening of the Stockton & Darlington and the Canterbury & Whitstable. It opened as far as Dunmere in July 1834 and to Bodmin in September of that year. As we have seen, the LSWR finally connected up with the line in 1895. The LSWR's purchase of the BWR in 1846 had never been sanctioned by Parliament and that was only achieved in 1886. As part of the price for non-opposition over this from the GWR, the latter was allowed to run its trains westwards from Bodmin Road into Wadebridge, via a terminus at Bodmin General.

In the twentieth century the station therefore eventually assumed the form of a reasonably important country junction, with three platform faces. The single line from Wadebridge East Junction was doubled in 1910, so that the two routes into the station from Okehampton and from Bodmin ran as parallel reversible single lines, an unusual arrangement (readers will recall the wintertime arrangement between Ryde St. Johns Road and Smallbrook Junction in this respect, pre-1967).

In addition to the station itself, there was a small goods yard on the down side and additional sidings on the up side, both accessed from the east. There was also a small but important engine shed which serviced locomotives on the North Cornwall line before they returned east to Exeter and their base at Exmouth Junction. The shed was coded 72F under the Southern Region of BR and had a very small allocation of its own including, of course, the famous Beattie well tanks, of which more on a future occasion.

West of Wadebridge, and passing the sidings to the quayside just downstream from the town's famous bridge, the line followed the Camel estuary the entire way to Padstow, hugging the water's edge on a low embankment. This made the route relatively straightforward to construct.

There was a major obstacle near the west end, at Little Petherick Creek. This was spanned, on a curve, with three 150ft girder bridges carried on 8ft diameter piers. The location became one of the most famous in the West and the image of a T9 crossing it with a couple of green SR coaches as it passes Dennis Hill and nears Padstow terminus has become immortal.

In truth, the whole route from Wadebridge was one of the most picturesque on what became the Southern system, the SR equivalent of the Great Western line through Dawlish but much more unspoilt, with the azure-blue water of the Camel estuary and the silvery-gold sands across the water. A trip along this route on a hot summer afternoon, with a travel-stained Bulleid Pacific and the last remnants of an express which had left urban Waterloo in the middle of the morning, and with a hotel tea awaiting and a fortnight's holiday ahead, was an unforgettable experience.

Padstow station

Padstow was to become the very furthest outpost of the old London & South Western Railway empire, with its buffer stops being just under 260 miles from Waterloo's, about the same distance as London to Newcastle but an infinitely more challenging route. This 'beyond-the-sunset' role has always given Padstow a very special place in the affections of Southern enthusiasts.

The port had originally been known for its fishing industry, but became popular as a resort during the nineteenth century. Even so, its population at the time of the railway's arrival was still only 1,500. The town has also long been famous for its hobby-horse tradition on 1st May, described at the start of the twentieth century as "rude merry-making". However, the LSWR's entry to the town did not prompt an inrush of large numbers of holidaymakers as the second class fares, even at the start of the century, were £2 6s 8d (£2.33p), a prohibitive sum for most, with a first class ticket being £3 14s 6d. (£3.73p). A third class return was £2 2s 7d and there was also a special rate long-weekend return, travelling out on Friday or Saturday and returning up until Tuesday, at £1 6s 9d third class which might have been tempting for a few. A hotel, the South Western Hotel, later renamed the Metropole, opened adjacent to the station in 1900.

The passenger terminus was very simple, comprising a single platform and run-round loop plus a carriage siding, and was built on the site of a former boatyard. The station building, again of stone, included a canopy and the stone-built eighteen-lever signal box was of the LSWR Type 4 design, unlike the boxes along the North Cornwall line. On the south side of the passenger station was an extremely small goods yard, with a loading dock, goods shed and headshunt.

The most important part of the station layout was the sidings serving the fish quay and fish shed, where the baskets were piled and the fish sold. The fish sidings reached as far west as the Custom House, by the old walled harbour, with one siding running out on to the mole of the harbour.

Initially, the fish station was served by just two long sidings, including a scissors crossover. The main fish quay was built by the Harbour Commissioners under powers obtained in 1910. The LSWR subscribed £30,000 to the bonds which were issued to raise the capital and also provided other assistance. In 1912 the LSWR Chairman, Sir Charles Scotter, and the new General Manager, Herbert Walker, visited Padstow and authorised a further extension of the dock wall (which reached nearly 800ft in length), the fish shed and the sidings serving it. Gradually, the LSWR took over more and more of the port's running. At busy times for passenger traffic, these fish sidings were also used for berthing coaching stock.

The fishing traffic wasn't the only freight business to be had at Padstow and the small goods yard on the down side dealt with large numbers of parcels and consignments of general merchandise or mineral traffic to and from the area. Other mineral traffic handled on the quayside lines included china clay for shipping by coaster, but this traffic died away between the wars.

In 1933, due to the effects of adverse weather upon moored fishing boats, a new pier, the 450ft South Jetty, was constructed to provide additional moorings and further sidings were built out onto this quay. The earlier quayside was also extended to create a more enclosed harbour. The harbour still belonged to the Padstow Harbour Commissioners but the Southern Railway was responsible for the design and for supervision of construction of the South Jetty.

There was no locomotive shed at Padstow, but the LSWR built a locomotive siding and water tower and installed a 50ft turntable, capable of handling a 4-4-0. The SR moved this turntable slightly south east when the fish dock was being expanded, in 1933. After the war the SR constructed a new 65ft turntable close to the water's edge, at the station throat, just large enough for a Light Pacific.

(to be continued)

St. Kew Highway, looking in the up direction, in 1939. This was another romantically-named wayside stop en route to the Far West and was reasonably located for the local community. Today it is a private residence. (Stations UK)

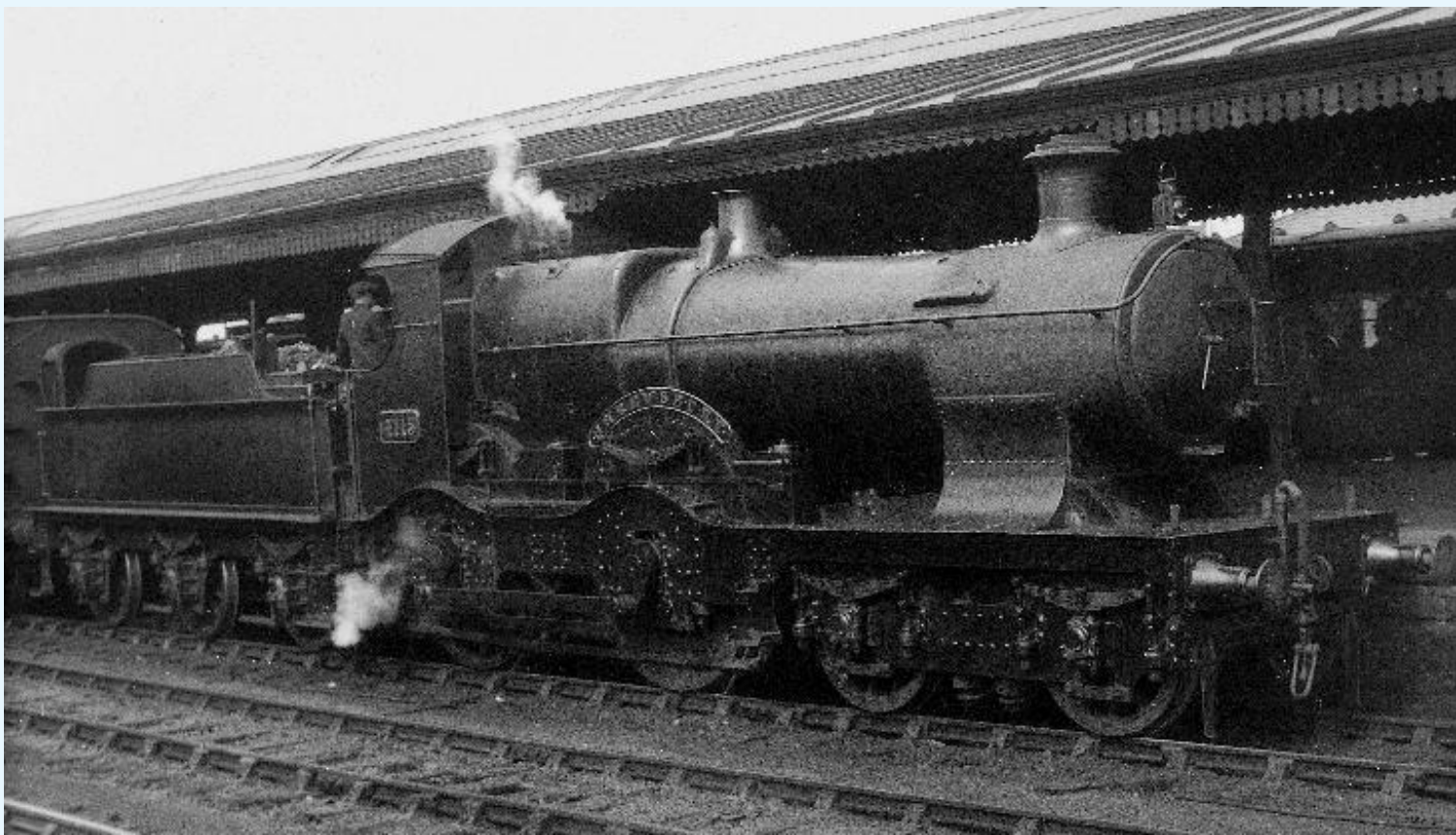
'Duke' No.3323 *Mendip* **as originally built in 1899 with round-top boiler: what Hamilton Ellis described as the 'OIde English' style. It received a Belpaire boiler in 1907, reverted to a round-top boiler in 1910 (the only one to do so) and gained another Belpaire version in 1912. It was withdrawn as No.3288 in 1936.**
(Pendragon Collection)

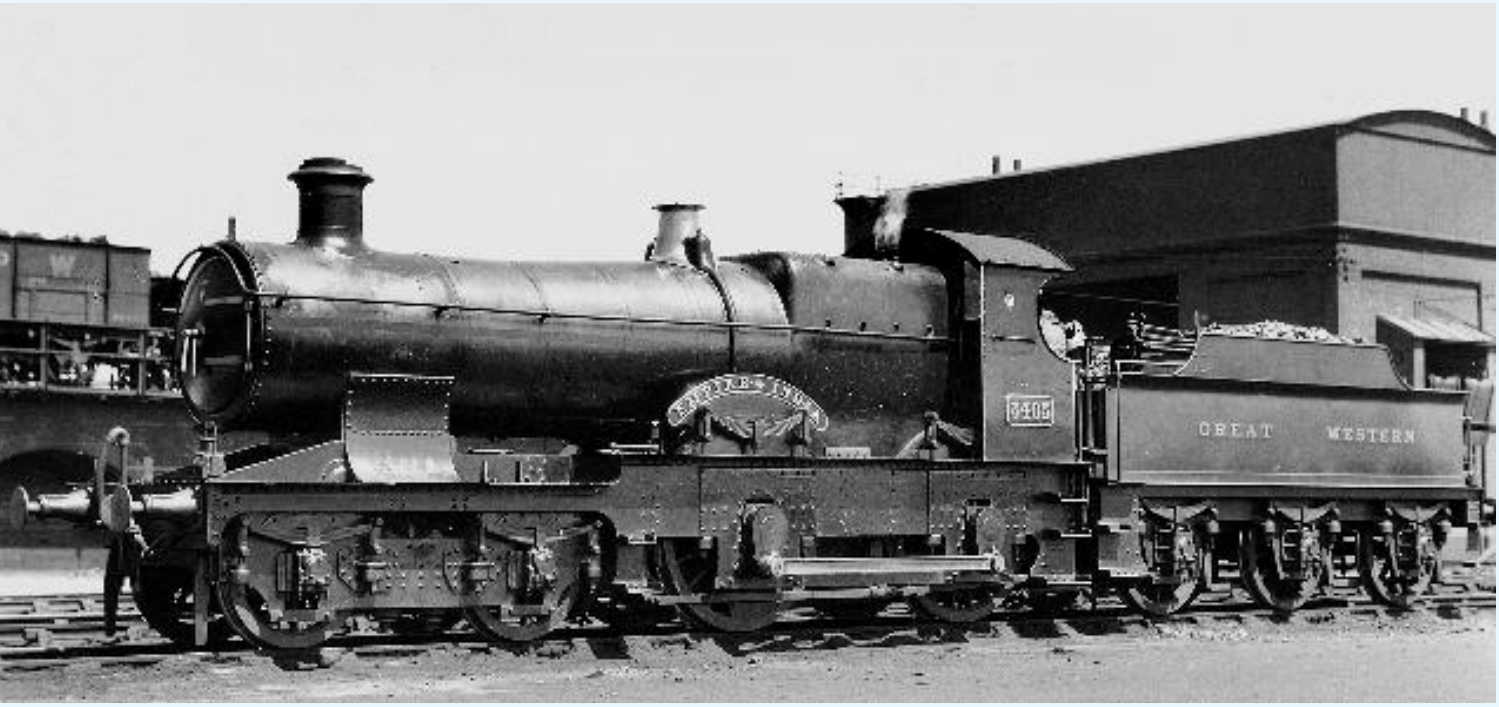
At Cardiff General 'Badminton' Class No.4115 *Shrewsbury* **is waiting to depart with a stopping train. The date is around 1922, when the engine had been thoroughly updated. The standard No.2 boiler is superheated and equipped with top feed. The extra six inches in the wheelbase is quite obvious when comparing this shot with photographs of the other classes. Unusually, the front coupling has been left hanging down. This engine had previously been numbered 3307, but its name was not removed until 1927. It was destined to be the last 'Badminton' in service.**
(LCGB/Ken Nunn Collection H3396)

FLOWERS AND THE

An earlier article ('Twilight of the Dogs', Vol.21 No.5) traced the relationship of the small-wheeled 4-4-0 classes which culminated in the famous 'Dukedogs'. This was one strand of an intriguing lineage that had its origins in designs inspired by William Dean for the Great Western Railway at the end of the nineteenth century. The impetus at that time was to provide the railway with a fleet of competent locomotives which could carry it forward into a new era following its abandonment the broad gauge and conversion to standard gauge. Immediately prior to that act, which was completed in 1892, the GWR's locomotive policy had been somewhat sterile, stifled by the need to build locomotives which were adaptable and capable of conversion from broad to narrow gauge. In resolving the problems associated with this peculiar requirement, the adaptability of double frames was exploited. In broad gauge mode the wheels were mounted outside the frames then moved to a position between the frames to convert them to narrow, or standard, gauge. That the results appeared ungainly might be thought an understatement, but photographic evidence suggests that many of these ugly ducklings did indeed fail to become swans. Fortunately a few did metamorphose with great success, yet even with the benefit of hindsight it is sometimes difficult to believe that gawky convertibles were transformed into the stately Dean Singles.

Double frames remained a feature of





'Bulldog' No.3405 (ex-3467) *Empire of India.* **Built in 1904, it was fitted with this long-coned boiler in 1907 and superheated in 1913. It was withdrawn in 1937.**
(Pendragon Collection)

CITY

JOHN REOHORN TRACES THE GENEALOGY OF THE GREAT WESTERN RAILWAY'S EXPRESS PASSENGER 4-4-0 CLASSES.

Swindon design long after the need for convertible engines had passed. Although they were not used in every design, it was a fact that during Dean's tenancy the company operated the largest fleet of double-framed engines in the world. What was once an expedient became a feature.

The Singles were double-framed, although this is not immediately obvious, there being no external motion. Their performance was brilliant and while trainloads remained modest they provided more than adequate power on the principal trains between Paddington and Newton Abbot. However, the Singles did not hold total sway. In 1894 four broad gauge oddities were taken into Swindon to emerge as standard gauge express engines. Very little of the original engines remained after the rebuild and what resulted was a quartet of 4-4-0s of astonishing beauty. Frames matching the Singles' profile were fitted with the same 7ft 1in driving wheels to produce the 'Armstrong' Class, all named after legendary Great Western men: *Brunel*, *Gooch*, *Armstrong*[1] and *Charles Saunders*. In all other respects the construction employed components similar to the Singles. These four engines entered service numbered 7, 8, 14 and 16, but ended their lives as 4169–72 as a result of the 1912 scheme which attempted to put some sense of order into the numbering system. It is these post-1912 numbers that are used throughout this article.

It was not only numbers which underwent change: this foursome metamorphosed almost as many times as Doctor Who, yet managed to remain one of the most attractive locomotive designs ever to emerge from Swindon. These were powerful engines, but still double framed,

'Flower' Class No.4156 (previously 4105) *Gardenia* **working a parcels train through Cardiff in 1922. Note the grand curve of the nameplate necessitated by the large diameter driving wheels and the deep frames adopted to resist the problem of cracking.**
(LCGB/Ken Nunn Collection H3407)

No.3373 *Atbara* **as built, outside Westbourne Park machine shop. The first twenty of the 'Atbara' Class came out with combined name and number plates.** (Pendragon Collection)

and were possibly an influence on what followed.

Four engines, no matter how splendid, could not dominate the day-to-day working pattern and the Singles continued to rule virtually unchallenged. What was good on the main line, however, did not suit the steep banks of Devon and Cornwall. In meeting this need Dean provided a machine which echoed the image of the Armstrongs without perpetuating their dimensions, selecting instead components which could provide the requisite hill-climbing power. Enter the 'Duke of Cornwall' Class.

These 4-4-0s of roughly the same size as the Singles bore just a passing resemblance to the 'Armstrongs'. The new engines, eventually abbreviated to 'Dukes',[2] were double-framed with Stephenson-type valve gear between the inner frames driving slide valves situated beneath inside cylinders. Driving wheels of 5ft 8ins were mounted between the frames with fly-cranks and coupling rods on the outside. Those smaller wheels and greater adhesion provided the capacity to haul loads up hill. To modern eyes grown accustomed to Gresley elegance or the purposeful Stanier/Riddles style, the 'Dukes' can appear quaint and peculiar. They perpetuated a style which Hamilton Ellis affectionately labelled 'Olde English',[3] a style that would have seemed ornate even to contemporary observers who were accustomed to the clean elegance favoured by Dugald Drummond and Samuel W. Johnson, or the simple austerity of F. W. Webb.

But handsome is as handsome does and the 'Dukes' must be judged against contemporary standards and on the basis of their performance. The evidence suggests that they were efficient and respected machines, used with effect throughout the GWR system.

The decades spanning the turn of the nineteenth and twentieth centuries saw a hotbed of development, with all kinds of permutations emerging as new ideas were tested, improved, discarded or adopted. Swindon was no exception, for the evidence portrays Dean as an adventurous designer in his own right complemented by Churchward's focussed objectivity. All the types emerging from Swindon in those years underwent progressive development with individual machines being used as vehicles for experimentation.

At some stage the notion of using the 'Duke' geometry to produce an improved 'Armstrong' was born. The result was the creation of a engine which applied 6ft 8ins drivers to a 'Duke'-style chassis, but carrying a boiler which was similar in size and shape to that fitted to No.3211 *Bulldog*, effectively the BR4 type. The first built was No.4100 (3392) *Badminton*, appearing in 1897, with nineteen more following quickly. Being express engines they received names, but not adhering to any obvious theme. The new class was known as 'Badmintons', following the then current GWR policy of adopting the first constructed as the class designator. In their original form with domed boiler and narrow cab set within the overhung springing, they closely resembled the 'Dukes', albeit with large wheels and a driving wheel-base of 9ft, the only members of the 4-4-0 family to use this dimension. *Badminton* was unique in having small windows set in the cab side sheets.

Two other members of the class displayed significant differences. The penultimate engine, No.4119 (3310) *Waterford*, was fitted from new with a domeless boiler after the fashion of *Camel*, completed in the same year. And just as *Camel* was the prototype for a new class, so did No.4119 presage a further change.

The other 'Badminton' involved in experimentation was No.4105 *Earl Cawdor*. Initially this was paired with a special high-capacity tender to equip it for use on the Royal Train. A suggestion by one of GJC's assistants saw the engine fitted with a large diameter boiler incorporating a round top firebox with a view to increasing the steam capacity, echoing the trends then being advocated by J. F. McIntosh with startling results on the Caledonian Railway. To accommodate this massive boiler the engine was fitted with a large side-windowed cab of distinctly North Eastern Railway profile. This was not apparently popular with the Great Western enginemen; their complaints are alleged to have provoked Churchward's wrath, forthrightly expressed in the comment, "Then let the buggers freeze." Large cabs did not appear again until Collett's day. The large boiler showed no definite advantage over Churchward's free-steaming design and so these experiments with boiler and cab were terminated and *Earl Cawdor* was subsequently refitted to conform to the rest of the class.

In service the 'Badmintons' quickly established themselves as fast, dependable engines, taking on the working of the heavier principal trains, supplementing the bogie Singles. However, this was only the opening paragraph in an unfolding saga.

Waterford's special boiler was one of the stage developments in the programme leading to the Standard No.2 boiler. By 1903 the design had reached an advanced stage, including the iconic taper, but development did not stop there. A larger version, the Standard No.4, was in production. In November 1903 *Waterford's* original boiler was replaced by one of these larger types, possibly to provide comparison with *Earl Cawdor*. In the years following, all but three[4] of the class were fitted with the Standard No.4 boiler, making the class effectively equivalent to the later 'Cities'. Subsequently the larger boilers were removed and replaced by long-coned Standard No.2, which leads us naturally into the next development.

The driver is oiling round 'Atbara' Class No.4148 (previously 3417) *Singapore* **before departure from Cardiff with an express. The 4-4-0 passenger classes were strongly represented in South Wales at this date, 1922.** (LCGB/Ken Nunn Collection H3403)

70 years ago 'Bulldog' No.3383 leaves Dawlish with an eastbound stopper. The date is 2nd September 1936 when the engine was fitted with a Standard No.3 boiler which necessitated the fitting of an extended smokebox; it reverted to the No.2 type in 1941 and remained in service until 1949, being withdrawn from Newton Abbot. The engine was built in 1903 as No. 3444 *Ilfracombe,* **losing its name in 1930.** (LCGB/Ken Nunn Collection 6673)

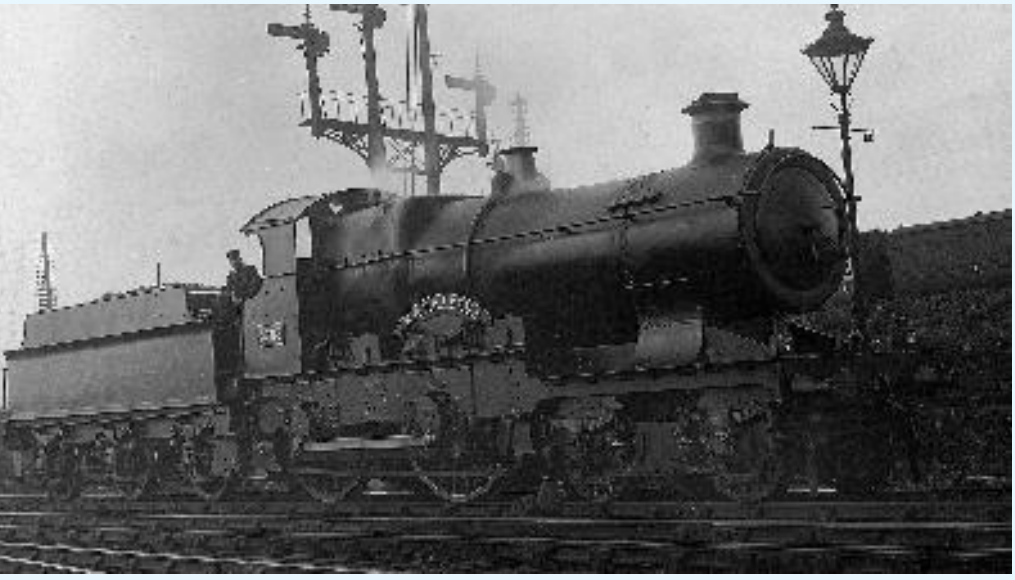
The success of the 'Badmintons' resulted in further building of 6ft 8ins engines with Standard No.2 boilers, commencing in 1900 with a series of 40 engines under Lot Nos.125 and 126 all carrying the parallel version of the boiler. The date and specification made them contemporary with the Lot 124 'Bulldogs' to which they were similar except in terms of the driving wheel diameter. These engines therefore differed from the true 'Badmintons' in having straight frames and an 8ft 6ins wheelbase. The first engine to be constructed, No.4120, Works No.1826, was allocated the name *Atbara*. This also became the class name and derives from the name of a river which flows into the Nile near the township of the same name in Sudan, the locality being associated with Lord Kitchener's campaign of1898. By 1900 Kitchener was engaged in the Boer War in South Africa and the naming of the first batch drew strongly upon the places and personalities involved in both conflicts. The names selected for Lot 126, however, were those of ports associated with Empire trade.

Although the wheelbase dimensions remain consistent for all of Swindon's double frame 4-4-0s, namely 6ft 6ins + 7ft 6ins + 8ft 6ins, there were detail differences in the profiles of the frames used on the 5ft 8ins and the 6ft 8ins versions resulting from the need to accommodate the different diameters.

Initially the 'Atbaras' were set to work alongside the 'Badmintons' running the principal West Country trains, but roaming further afield into South Wales, up to Wolverhampton and on to the North and West route to Shrewsbury, thus reflecting the greater flexibility in rostering afforded by a larger number of powerful express locomotives. Their interim parallel boilers were rapidly substituted by the more advanced coned versions: short cone and long cone being used as available. These modifications took place between 1904 and 1916. Piston valves were generally fitted from 1915 onwards but, as with the 'Bulldogs', not every engine was modified in this way. Accounts suggest the 'Atbaras' to be free-running locomotives, achieving fame for their sparkling performances. As such they were much favoured for special workings in the course of which several engines acquired new, more appropriate names.[5]

While the 'Atbaras' and 'Badmintons' had together set the tone for the resurgence of the GWR as a premier railway, it must be remembered that the 4-4-0 types were in the way of being an expedient, pending the finalisation of Churchward's standard locomotive range which lay a few years in the future. Yet it can be imagined that GJC would not be content with second-rate performances even from a stop-gap. This was the high zenith of railways with demand for speed keeping pace with expanding traffic; there was a need for even greater output.

'Atbara' No.3705 *Mauritius* **was rebuilt with a Standard No.4 boiler in 1903, becoming the prototype for the 'City' Class.** (Pendragon Collection)



In 1903 'Atbara' No.3705 *Mauritius* was taken into the works to be fitted with a Standard No.4 boiler, exploring the proposition to make the class the equal of the re-boilered Badmintons'. This rebuild became the prototype of the legendary 'Cities'. In 1904 ten engines were newly constructed to the same specification under Lot 141 to emerge carrying the names of cities served by the Great Western. Then, between 1907 and 1909, nine further 'Atbaras' were converted to bring the total of 'Cities' to twenty. The conversions retained their original names.

For a brief period the 'Cities' held sway on the fastest and best passenger trains. The exploits of *City of Truro* have been long debated and examined to prove and disprove the claimed record. The evidence reveals that the overall run was very fast and coupling this to the knowledge that the 'Cities' regularly turned in dramatic performances suggests that it was conceivably possible. There can be no doubt that the engine's speed down Wellington bank must have been very high indeed and given this, the question of one mph more or less becomes academic. Quite remarkable is the fact that at that time *Truro* was without superheating. Like the rest of the family, that modification was applied only slowly and haphazardly to the class between 1910 and 1925, as were piston valves.

As before, the West Country main line provided the arena for the debut of the 'Cities', but it was a short-lived glory. Churchward's new 4-6-0s were issuing from Swindon in a steady stream, supplemented by the 'County' 4-4-0s. Thus the days of the elegant double-framers were numbered and the 'Cities' soon found themselves relegated to the outer fringes of the GWR empire. *City of Truro* ended its career in South Wales working out of Radyr, an ex-Taff Vale shed.

There was a final chapter in the 4-4-0 story. In 1909 two further Lots, 176 and 177, were put in hand at Swindon. Both lots employed frames of deeper section, lending the engines a much sturdier, heavier appearance. The twenty engines of Lot 176 were essentially 'Atbaras' with Standard No.2 boilers on 6ft 8ins wheels, being named after popular garden flower varieties. Lot 177 on 5ft 8ins wheels provided the fifteen 'Bird' series of the 'Bulldog' Class. Even at this late date the 'Flowers' were built without superheat, the majority receiving it when undergoing routine boiler changes from 1910 onwards. Piston valves were also applied post-construction, four of the batch never attaining this modification.

In due course all the remaining double-framed 6ft 8ins 4-4-0s, with the exception of

'City' No.3712 *City of Bristol* **(built 1903). When introduced the 'Cities' took over the West of England expresses, then moved to the Birmingham and South Wales routes, on all of which they gave way to the 'County' 4-4-0s, Atlantics and 4-6-0s. They were the last of the double-framed line, withdrawal of the class being completed in 1931.** (T. J. Edgington Collection)

the 'Cities', were consolidated into one class known as the 'Flower' Class numbered 4100–4172. This consisted of the 'Badmintons', converted back to Standard No.2 boilers, the remaining 'Atbaras', the 'Flowers' proper and, amazingly, the four 'Armstrongs' now re-wheeled to 6ft 8ins diameter and sporting Standard No.2 taper boilers! In this way this honourable cohort laboured, filling unglamorous but essential duties on the secondary cross-country routes. This sort of work suited the smaller 5ft 8ins engines and they recorded many more years of useful life. However, the 'fast ladies', the high-stepping express engines, quickly became redundant and were retired in the late 1920s. The last 'Badminton' was No.4115 *Shrewsbury*[6] from Tyseley in March 1931 and the last 'Atbara' was No.4148 *Singapore* from Severn Tunnel Junction in May the same year. The last 'Flower' was No.4150 *Begonia* from Didcot in April 1931, the last 'Armstrong' was No.4169 *Charles Saunders* from Cardiff in July 1930 and the last 'City' was No.3712 *City of Bristol* from Reading in May 1931.

Fortunately, No.3717 *City of Truro* was not scrapped. It retired in 1931 to an honourable home in distant York from where it emerged to be restored to running order in 1957. In resurrection it was popular as power for enthusiasts' specials, but also operated service trains out of Didcot. After a sojourn at Swindon it eventually returned to York as an exhibit in the National Railway Museum and has recently been returned to active duty once again.

A remarkable feature of the double-framed family was the extent to which standard components were picked and mixed to provide a range of locomotives suited to differing traffic demands. Any backward look at GWR locomotive history tends to be overshadowed by Churchward and it is easy to mistakenly conclude that he was responsible for introducing the concept of standardisation. Churchward's contribution was to exploit the concept established under Armstrong's regime by applying it as a planning strategy within a comprehensive analysis and projection of the company's motive power requirements. William Dean had moments of inspired genius. The range of designs produced under his supervision was enormous and the best were outstanding. One of the strengths of his work was the development and use of carefully tailored standard components which offered ease of maintenance coupled with economical manufacture: an application of economy of scale. Modern thinking is tempted to seek signs of tension between Dean and Churchward. However, it is unlikely that GJC could have flourished so readily unless he had enjoyed the full confidence of his chief and the ability to exercise great tact in return.

While Dean's designs can appear small compared with Churchward's, they have to be viewed within the context of their age and in direct comparison with the work of his contemporaries, Dean's best engines were strong and efficient as well as being works of art. *City of Truro's* achievement was Dean's triumph as much as Churchward's: a free-running chassis and engine (Dean), supplied by a free-steaming boiler (Churchward). While attention naturally focuses on the Exeter to Bristol leg of the record run, equal merit must be given to the astonishing final leg into Paddington by *Duke of Connaught*, a Dean Single, one of the most elegant designs ever to grace Great Western rails. Now *there's* a thought for a new build project.

TABLE A — Construction dates of the Express Passenger 4-4-0 classes

Lot Number	Completion dates	Running Nos.**	Works Nos.	Remarks
	1894	4169–72	—	'Armstrong' class
109	1897	4100	1592	*Badminton*
109	1898	4101–17	1593–1609	'Badminton' Class
109	1899	4118/9	1610/1	'Badminton' Class
125	1900	4120–38	1826–45	'Atbara' Class
126	1901	4139–48	1846–65	'Atbara' Class
	1902	3705		*Mauritius* rebuilt
141	1903	3710–19	1993–2002	'City' Class
	1907–8	3700–3709		'City' Class Rebuilt from 'Atbara'
176	1908	4149–68	2330–49	'Flower' Class
177	1909/10	3441–55	2350–64	'Bird' Series

**Post-1912 numbering.

TABLE B — Relationships within the Dean/Churchward 4-4-0 dynasty
S: fitted throughout life — I: fitted initially — L: fitted subsequently.

	Frames			Drivers		Boiler type				
Class	Curved	Straight	Deep	5'8"	6'8"	S4	Domed Belpaire	Domeless Belpaire	Std. No.2	Std. No.4
'Duke'	S			S		I	L			
'Badminton'	S				S		I		L 2nd	L1st
'Camel' series	S			S				I	L	
'Bulldog'		S		S				I (some)	S	
'Atbara'		S			S			I	S	
'City'		S			S					S
'Flower'			S		S				S	
'Bird' series			S	S					S	
'Dukedog'		S		S			S			

References

1. Which of the 'Armstrongs' was not defined.
2. Initially the class was referred to as the 'Pendennis Castle' Class. In one of Swindon's moments it was the second engine of the Lot, *Pendennis Castle*, which was released first into service. *Duke of Cornwall* followed later.
3. C. Hamilton Ellis: *Some Classic Locomotives.* London, 1949. Allen & Unwin Ltd. Ch.5.
4. The engines excluded were Nos.4109 *Monarch*, 4110 *Charles Mortimer*, 4112 *Oxford.*
5. For example, *Atbara* was renamed Maine for a military special in 1900 and *Queen Sovereign* when hauling Queen Victoria's funeral train in 1901. Some renamings remained fixed, eg *Ophir* to *Killarney* in 1907.
6. The name had been removed to avoid confusion.

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This evocative view of the interior of the ticket office at Rhyl was taken officially in the late 1960s and illustrates perfectly the contents of an unreformed 'Edmondson' office. Two booking windows were in regular use here, that nearer the camera for the down direction (towards Llandudno and Holyhead), the one in the background, where the clerk is standing, for up stations to Chester and beyond. Relevant tickets would have been arranged in the racks to suit these two positions: note the greater number of tickets stored near the far window which served more destinations. At the extreme left notice that the bottom row of the rack is arranged to store a greater number of tickets for popular destinations (which would have included Colwyn Bay and Llandudno). The customary layout of equipment, including dating presses, cash drawers, calendar and the ubiquitous bulldog clips holding special notices are seen. In this picture alone some 400 different types of ticket are visible. All this complexity can now be deal with by a single, simple machine. (Author's Collection)

'PLEASE SHEW ALL TICKETS!'

THE LONG LEGACY OF THOMAS EDMONDSON

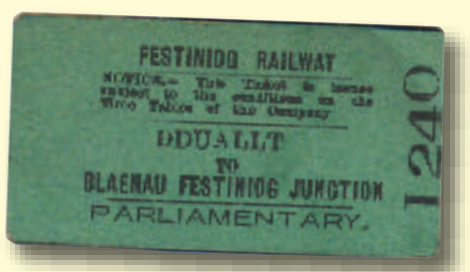
BY GEOFFREY SKELSEY

It is given to few people to have their family name immortalised as a generic title: W. H. Hoover, László Biró and John Loudon McAdam (*sic*) come to mind, but in railway circles one name stands out, that of Thomas Edmondson (1792-1851). If railways were 'Britain's gift to the world', Edmondson's ticket system was almost as universal. Apart from British-influenced undertakings in the Empire, Edmondson tickets found at least a toehold in the republican Americas and were widespread in Continental Europe. 170 years after the system was first established, this article outlines its distinguishing features and some of its many applications.

In their early days Edmondson-style tickets were austere and contained the minimum information. This elegant Manx Northern Railway ticket would have been printed by Waterlow & Company in far older style some 70 years before its issue in September 1960, long after the railway had been absorbed by the larger Isle of Man Railway and indeed after Peel Road station had been closed! The ticket carried an advertisement on the back and was dated with impressed characters rather than printed ones.

The theory of ticketing

Any transport ticketing system needs to ensure that a remote official accounts for journeys sold and hence cash received, transactions often being unsupervised. The system also needs to ensure that a passenger is certified to undertake travel, as well as any other entitlements, to the extent only of the value purchased. Both principles need to be capable of systematic audit and the ticketing process needs to be speedy, reliable and cheap. Each ticket must therefore be designed to inform the passenger — and railway staff — of the exact itinerary for which payment has been made and other considerations such as the class of travel, the category of traveller, and the tariff applicable. To facilitate regulation of traffic and prevention of fraud, the ticket should be



Class of travel was a vital aspect of the passenger ticket and was important in an era of more pronounced social distinction, when three or more classes were normal throughout the railway network. This Festiniog Railway ticket is prominently marked 'Parliamentary', the cheap fare mandated by the Railway Regulation Act 1844. Section VI of the Act required the operation of the so-called 'Parliamentary Train' over all lines opened after 1st November 1844, running at not less than 12mph inclusive of stops, at a third class fare of no more than one [old] penny a mile. The FR issued Parliamentary tickets until 1924, but seldom discarded its withdrawn stocks before 1955.

The ticket dating press was a long-lived part of the Edmondson process, using removable type and an inked ribbon to print the date. Alternative versions, which impressed the date unalterably, were also produced by Edmondson and other firms. (Author)

designed to be easily read and identified by inspecting staff, sometimes hastily and in poor light.

The Edmondson ticket fulfils some of these purposes better than others. For example, the limited size, especially of two-coupon return tickets, prevents a full or even partial statement of the conditions of issue and also limits the extent of routing and other information which could conveniently be displayed, one reason for the use of large-format paper tickets in some circumstances. On the other hand the small size facilitated safe-keeping (in earlier times at least) in hat-bands and gloves!

Transition between successive railway administrations inevitably meant a period of design instability for passenger tickets. After 1948 the old GWR printing works produced tickets largely to pure GWR form apart from the title. Even the compositor's initials (in this case 'W.D.', for William Davis) still appear, as a precaution against fraud. The duplication of the station names in small type made it possible to cut the ticket diagonally for issue at half fare to a child. Railways were generally required to state fares on tickets from 1889 (but they were often not subsequently corrected, as here).

Simple transport applications require little elaboration of ticketing: payment can be certified by reusable metal tokens and these were employed in canal and turnpike operations and on some early railways such as the Leicester & Swannington and London & Greenwich. This principle continued on some flat-fare rapid-transit systems of North America where no ticket, as such, was required but a token activated entry gates. Conversely complex travel itineraries, with other entitlements such as meals and accommodation, required a sequence of vouchers certifying each perquisite: this remained the practice throughout the lifetime of ocean passenger shipping and was used for much (but not all) international railway travel. Between these extremes lies the territory colonised by Edmondson, journeys involving one or more operators, usually between fixed points, with provision for different tariffs, classes of travel, eligibility and conditions of use. Such interrelated factors are all expressed in the appearance of the tickets themselves. What is most remarkable is that the original concept expanded into what would later be called a complete business system, for the simple, standardized ticket was, as we shall see, adapted to certify a multitude of purposes apart from travel.

Edmondson's life and invention

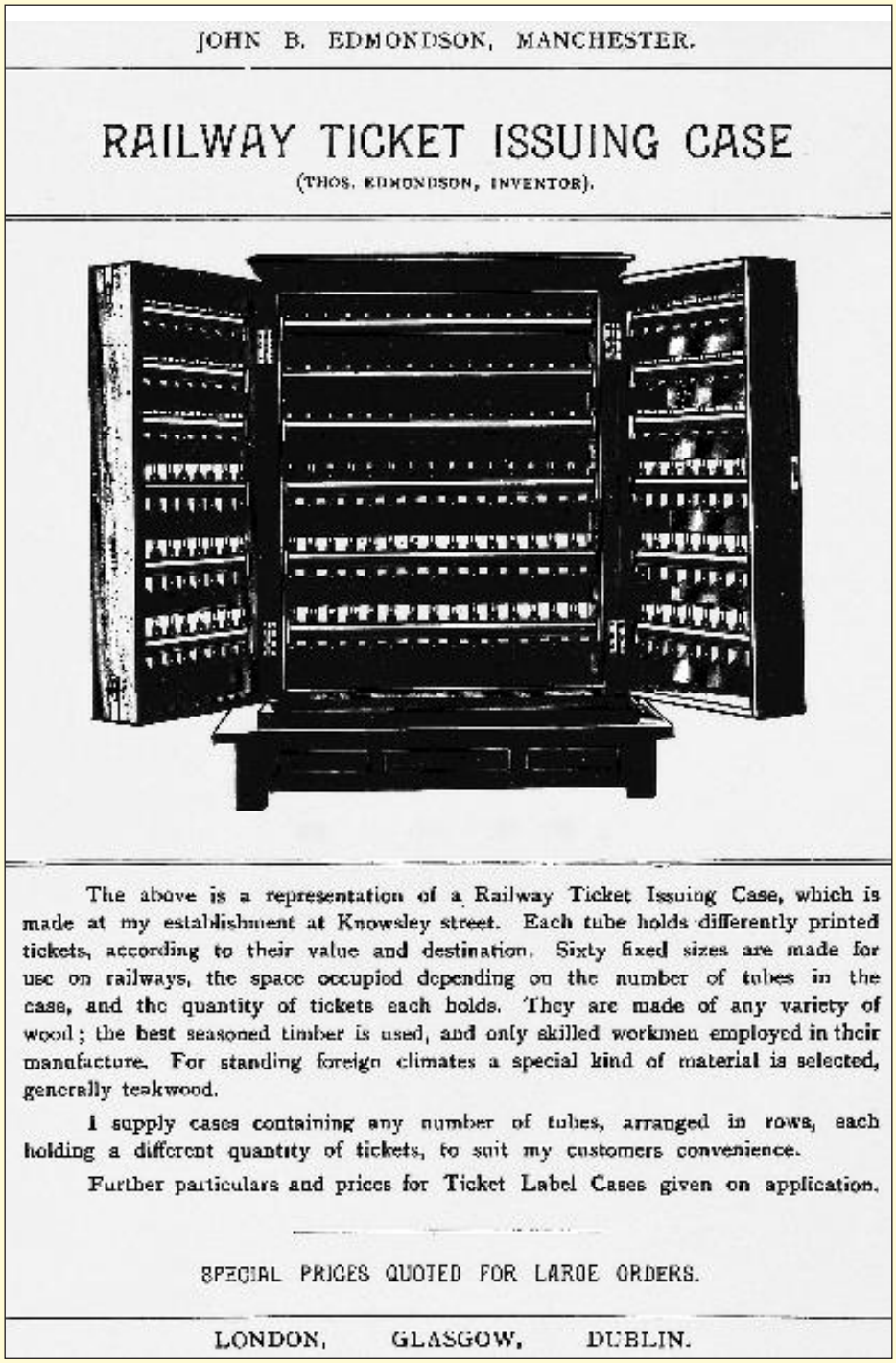
Only the salient details need be given here of Edmondson's rich personal, business and religious life. Born to a Quaker family, his career began with apprenticeship to a cabinet-maker in Lancaster, but his subsequent business failed and at the relatively late age of 44 — seeking to repay his creditors — he became in 1837 clerk-in-charge at recently-opened Milton station on the Newcastle & Carlisle Railway. (Milton became Brampton Junction in 1870 and remains open.) Most early railways presumably followed the established ticketing techniques of road and shipping operators, and the turnpike trusts and canals, in issuing paper permits or receipts analogous to waybills. The station clerk wrote out particulars of the passenger, the train, the destination, the fare paid and the date on vouchers printed in multiple on each page of a ledger. He tore a voucher out for the traveller, repeating the data on a counterfoil which was retained in the ledger. Apart from its weakness from an audit point of view, the drawbacks of the ledger system were practical ones: the volume and pace of railway traffic far exceeded that of predecessor modes, requiring rapid issue of tickets if the whole system wasn't to grind to a standstill. In addition, as the length of journeys and range of destinations grew, more certain certification of receipts and a means of rapidly determining fares became essential.

Edmondson's undemanding duties at his remote station left him time to consider these emerging techniques, especially as the N&CR's counterfoils gave no positive check on the journeys sold, nor the cash received, which was simply handed to the guard of the relevant train. His Quaker probity perhaps jibbed at the laxity of this and he set up a personal procedure of pre-prepared vouchers, serially numbered to act as audit receipts and inscribed with the origin, destination and fare. With this and the associated 'hardware', he effectively founded the 'Edmondson system'. This aided both speed and accountancy: tickets were ready to hand and could be issued and dated rapidly. Each tube bore the fare, so that the clerk instantly knew what a journey cost and, as the serially numbered tickets were recorded as stock, their sale could be accurately attested. Tickets could above all be issued quickly and reliably: one nineteenth century account, perhaps apocryphal, recounts that a single London & North Western Railway clerk at Chester General station in 1884 issued mixed tickets to 800 passengers in an hour, or about thirteen tickets each minute. Modern systems are intrinsically slower, but the main impediments to speed today are sclerotic systems of electronic charging in place of cash.

At first Edmondson's tickets were handwritten and cut from thin card, but it occurred to him whilst out walking (he remembered) that, using a simple wooden plate or 'forme', he could produce elementary printed tickets. He next turned to a Carlisle clockmaker who helped him devise a metal dating-press and a printing machine which also serially numbered the tickets. His skills as a cabinet-maker produced issuing racks, storage cabinets and associated furniture. At first his racks operated on the converse of the familiar system, that is to say tickets were pressed upwards, with the first to be issued on top. Later the ticket 'tubes', each holding a stock of one type of ticket to a destination, worked by gravity and the clerk removed the bottom ticket. Edmondson introduced the ingenious principle of beginning the numbers of each batch of ticket at '000', so that the last ticket visible in each tube indicated the number of tickets actually sold. By checking the tubes after each traffic day (originally after each train) and writing the closing numbers on a slate strip inset above each tube, it was easy to calculate the number of tickets sold and hence the cash accountable. Skilled clerks had a clever trick: as they pulled the bottom ticket out of a particular tube, their adjacent finger pulled the next one slightly forward. Scanning the racks at the end of the shift, they could immediately identify amongst the hundreds or thousands of ticket tubes the types of ticket they had issued. This procedure survived for 150 years: it can be seen in short but evocative scenes in the British Transport Films productions *Terminus* (1961) and *This is York* (1953), the latter also including a sequence showing a clerk 'calling off' closing ticket numbers for entry in the daily proof book.

The use of cardboard instead of paper not

British Railways adopted a clear and elegant standard style, such as this child's single with an unusual routing. The red 'child' overprint was especially prominent and the design perhaps owed most to the former GWR designs. British Railways centralised all Edmondson ticket printing at Crewe in 1967 and in 1956 'second class' replaced third.



JOHN B. EDMONDSON, MANCHESTER.

RAILWAY TICKET ISSUING CASE

(THOS. EDMONDSON, INVENTOR).

The above is a representation of a Railway Ticket Issuing Case, which is made at my establishment at Knowsley street. Each tube holds differently printed tickets, according to their value and destination. Sixty fixed sizes are made for use on railways, the space occupied depending on the number of tubes in the case, and the quantity of tickets each holds. They are made of any variety of wood; the best seasoned timber is used, and only skilled workmen employed in their manufacture. For standing foreign climates a special kind of material is selected, generally teakwood.

I supply cases containing any number of tubes, arranged in rows, each holding a different quantity of tickets, to suit my customers convenience.

Further particulars and prices for Ticket Label Cases given on application.

SPECIAL PRICES QUOTED FOR LARGE ORDERS.

LONDON, GLASGOW, DUBLIN.

The ticket rack was an indispensable part of the booking office scene for 150 years. This illustration, from Edmondson's catalogue, shows one of the mid-range designs, with folding, lockable 'wings'. Usually racks were six or seven ranks high (as far as an average clerk could reach) and contained up to 427 different tubes and about 25,000 tickets. A large office might have several dozen such cases. (Author's Collection)

only produced more durable tickets but also facilitated their insertion into the patented dating press, with its biting action as the ticket is pressed into the aperture. Edmondson's various patents, granted from 1839 onwards, covered ticket printing and serial numbering apparatus, dating presses and issuing racks.

One distinctive feature of ticketing in these islands was almost universal staffing of even minor stopping places and hence absence of on-train issuing of tickets. The 'conductor' who 'worked' a train was largely unknown, not least because most trains were non-corridor, and there was never a widespread practice of ticketing designed for on-train issue. Although unstaffed halts, notably on the Great Western Railway, required 'fareboard'-type tickets echoing street tramway practice, these were exceptions. The huge paper tickets used by American railways to cater for passengers boarding at the many 'non-agency' stops never appeared.

The topology of Edmondson tickets

Let us look at some of the properties of Edmondson tickets, remembering that they were all contained within a single system so that the storage, issue and recording of each form of ticket followed one set of procedures.

Size

The tickets produced for the Manchester & Leeds Railway in 1839 measured 2 in by 1 in (30.5mm x 57mm). An explanation of this peculiar size is, perhaps, that it enabled tickets to be cut economically from a single 'demy' sheet, a handy and easily procurable size. This dimension, amazingly, became and remained almost universal.

Classes of travel

Easy verification of class of travel (originally four or more) was a prime requirement of passenger ticket design. Passengers had to be clearly distinguishable both on trains and, in earlier times, for admission to separate waiting and refreshment rooms. After 1889 fares also had to be stated on tickets.

Types of tariff

A wide range of ticket types was offered, reflecting the growth in the number of exceptional tariffs and requiring instant recognition of varying restrictions imposed. Apart from the 'ordinary' ticket, single and return, the range of discounts was astonishing, beginning with the 'parliamentary' tariff introduced in 1844, the 'Workmen's' — later 'Early Morning' — Return of 1883, the cheap 'Monthly Return' of 1933 and extending to the many variant fares of recent times. The Railway Clearing House promulgated agreed exceptional tariffs, including both those publicly advertised and generally available on particular trains (such as Day Excursions), and special fares which required vouchers or other authority. The RCH's annual 'buff statement' listed a bizarre range of some 90 different categories of special traveller, ranging from hand bell ringers to mourners, all qualifying for differing discounts. In theory each category required appropriately-printed tickets. Even in 1958 British Railways offered nearly 60 different types of reduced fare. As will be seen from the illustrations, these variants were all reflected in ticket design. For different periods of validity to be checked, tickets had to be dated on issue.

Colour

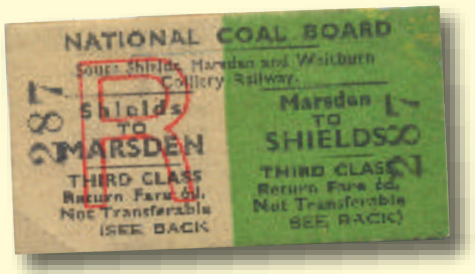
Different colours, sometimes for different parts of the same ticket, and stripes were the clearest features denoting class or availability and had the merit of being instantly recognizable even if the ticket could not be read, either in bad light or through illiteracy. Edmondson's early patent specifications refer to distinctive colours and patterns, with the system introducing colour-coding to business practice. The GWR used ten different card colours in 1910, British Railways fourteen in 1957, but more garish variants were widespread, especially for abnormal tariffs. Numerical or other overprints were further distinguishing features.

Layout

Horizontal layouts were common but not universal and the arrangement of lettering and direction of printing varied from company to company. A vertical format for return tickets was favoured by the North Eastern Railway (amongst others) and remained widespread in continental Europe. The provision of two (or occasionally three) perforated parts for return tickets was also not universal and 'one piece' return tickets were well known in Europe and were used in special circumstances in Great Britain.

Accompanied traffic

Victorian travellers were more encumbered than their modern counterparts and the range



The normal British return ticket was in two-coupon, horizontal format, perforated to facilitate detachment of the outward portion at destination. Varied-coloured outward and return halves was once common, as was the skeleton overprinted letter denoting ticket type, but on this ticket are non-standard colours. The National Coal Board inherited the South Shields, Marsden & Whitburn Colliery Railway from the Harton Coal Company in 1947 and continued a public passenger service (with appropriate Edmondson tickets) until 1953. In South Shields two different nationalised industries sold railway tickets!

and nomenclature of their impedimenta is fascinating. In particular there were stringent exceptions to what might be counted as luggage and thus be carried free: supplementary tickets were sold to cover the carriage of an incongruous list of items, including various animals, perambulators in all their forms, cycles of several kinds, bass viols and even coffins. Sometimes these tariffs were set on a zonal basis with charges for each range of distances from the station of origin.

Supplementary activities additional to rail carriage

There was a plethora of activities for which advance payment could be made at the time of booking and for which supplementary tickets were issued. These had to be clearly distinguishable from travel tickets. Some examples are illustrated.

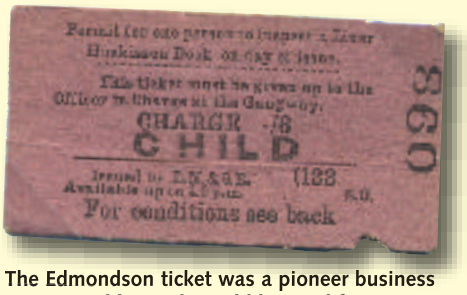
Edmondson prevails

Edmondson's contribution — and the source of his fortune — came from being in the right place at exactly the right time to promote his invention. The Newcastle & Carlisle Railway did not, as sometimes stated, wholly spurn him — it adopted his system late in 1838 — but he was offered better terms by the Manchester & Leeds Railway in 1839 and it was there that his system was fully developed. Other companies soon learned of it: one may perhaps guess how when we find that it was a deputation of Quakers who came from the Birmingham & Gloucester in 1839 to inspect the "system of ticketing [which] is both more economical and a greater security against frauds …" By 1847 74 of the 80 principal British railway companies had adopted the Edmondson system and he had left the railway industry to set up in business with his brother, son and nephews in Manchester, London, Glasgow and Dublin. Apart from the sale of equipment and tickets, Edmondson charged the participating companies a licence fee of ten shillings (50p) per mile of track. Edmondson's system also spread abroad, initially to France, and through the then Crown Agents for the Colonies to British possessions overseas, thus turning this into a worldwide system .

The establishment of the Railway Clearing House in 1842, which included amongst its functions the apportionment of receipts for passenger journeys involving two or more member companies, encouraged standardisation of ticket forms to ease the gargantuan task of sorting and accounting. If Edmondson provided the technical innovation, the RCH set up the institutional framework which in practice confirmed the dominant system throughout these islands. The RCH's system of revenue allocation also facilitated single-coupon ticketing between two or more companies' lines and avoided the need (as in the United States at the time) for separate tickets for each company's sector. Edmondson never had a monopoly, though. Many larger companies printed their own tickets, of distinctive style but variable quality, and there were other big printers, but the universal presence of ticket racks and dating presses of Edmondson's dimensions in effect mandated indefinitely his original concept and design. The Edmondson printing firm itself continued in existence until 1960 but the principles outlasted the company.

416 tons of paper

The survival of a ticket ledger from Shipley (Great Northern Railway) station illustrates the scale of ticket stock required at a modest station. With traffic in May 1882 of just over 9,000 bookings a month (around 400 a day),



The Edmondson ticket was a pioneer business system and its cards could be used for many purposes apart from travel. Before security obsessions became overwhelming, a popular activity encouraged by steamship companies was to arrange tours of the public areas of ships in port, with a view to awakening interest in future cruises. This ticket was issued by the LMSR in association with Cunard-White Star for a visit to a liner docked at Liverpool. The 'audit number' at the lower right (133) indicates that the ticket was issued at Birmingham New Street.

the office issued printed tickets that month to 46 different destinations and in 72 different forms. The great majority of these (50 out of 72) were issued less than once a day and six only once in a month. Most bookings were to four local stations, at fares of 3d or less. Generations later, records from Kegworth (BR London Midland Region) give a similar picture. In the 1950s the station held printed tickets to 59 destinations in 192 different forms, but only fourteen stations accounted for nearly all the station's traffic and some printed tickets were sold less than once a year, a few never. In 1962 alone 31,450 pre-printed tickets were delivered to Kegworth, several times the number of annual passengers; many were never used. At the diminutive end of the scale the little station at Waenfawr (*sic*) on the North Wales Narrow Gauge Railway, with six departures a day, held printed tickets to eight destinations in 30 different forms.

Even after considerable simplification the British Transport Commission in 1958 specified nearly 200 different forms of standard ticket, with about 300 different titles; in theory all these could have been available at any one major station, printed to each of a wide range of different destinations in both adult and child forms. Taking only ordinary single and return tickets, of two classes and for both children and adults, a relatively modest list of five hundred destinations requires stocks of at least 4,000 different forms of printed ticket, to

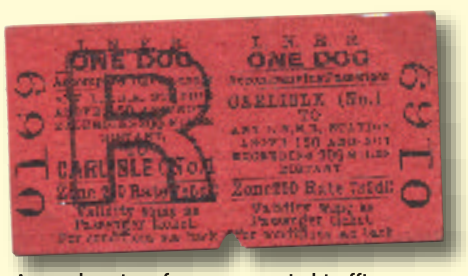
Brampton Junction station (photographed in 1967), where Thomas Edmondson began his railway career in 1837. (Stations UK)

which must be added many hundred more types of special (such as privilege, forces and accompanied traffic), reduced fare and blank tickets. The scale of holdings at major stations, such as Crewe with its wide range of directly-reached destinations, beggars belief.

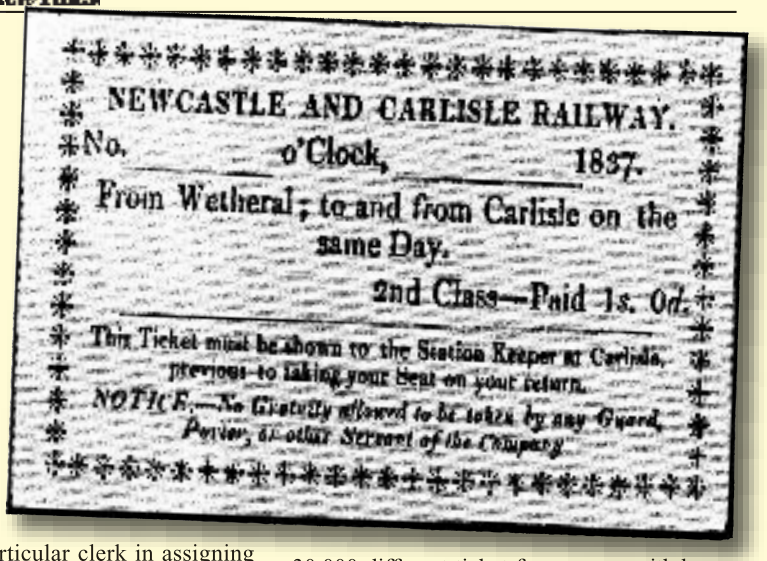
In 1957 British Railways printed 524 million tickets (weighing 416 tons!). When BR's Camden Town, Paddington, Dorking and Glasgow plants were closed and ticket printing was centralised at Crewe in 1967, 250,000 different ticket formes were still required. The Crewe printing works, using 36 modernised machines, initially printed about 300 million tickets each year. Many were wasted: in 1957 it was found that 40% of all tickets in stock were 'non-moved' in the winter months and a survey showed that one typical agency sold only from one to 23 of a range of printed ticket types in a month.

Because even in these cases most possible journeys had to be catered for by the use of 'station to blank' tickets, each booking office also needed registers of fares to other stations and had to correct these regularly as fares increased or conditions changed. The supporting documentation behind the Edmondson ticket was equally vast. The little station at Llangedwyn on the Tanat Valley Light Railway, whose fare book dated October 1923 survives, maintained fares of different types and classes to 58 different stations, while at the other extreme the Southern Region's 'via London' fares manual of the 1960s contained data for calculating about 6,500 fares, including the wide range of variable routings for which different rates were chargeable.

These particulars indicate some of the major shortcomings of the Edmondson system. Ordering, printing, storing and auditing ticket stocks on this scale called for an army of experienced and reliable staff at considerable recurrent expense. The blank ticket procedure, in particular, required the issuing clerk not only quickly and legibly to complete the ticket itself but also to complete by hand two or three additional records, and demanded constant policing if abuse was to be avoided. The massive task of sorting and tabulating used and collected tickets was a necessary part of the audit process. Printed tickets could represent a sizeable cash value and their theft and misuse — for instance, by appropriating tickets out of order and disposing of them illicitly — was hard to guard against. Measures were needed to prevent fraud by printers, who could lucratively dispose of high-value over-runs. In a busy office it was difficult to identify the actions of a particular clerk in assigning responsibility for error or fraud. Alteration and forging of tickets by travellers were not unusual. Such problems were never entirely eliminated.



A zonal system for accompanied traffic simplified ticket-issuing and recording and reduced ticket stocks. This is an LNER ticket for a dog's return journey of 150 to 200 miles from Carlisle. Other 'small animals' were also catered for: the SECR issued tickets for cats. Further to complicate the ticketing system, and enlarge the stocks required, reduced rate tickets were produced for issue to railway staff for items accompanying them.


NEWCASTLE AND CARLISLE RAILWAY.
No. o'Clock, 1837.
From Wetheral; to and from Carlisle on the same Day.
2nd Class—Paid 1s. 0d.
This Ticket must be shown to the Station Keeper at Carlisle, previous to taking your Seat on your return.
NOTICE.—No Gratuity allowed to be taken by any Guard, Porter, or other Servant of the Company.

In 1939 Leopold Wiener produced this illustration of a Newcastle and Carlisle Railway ticket, which shows that even in 1837 minor stations on the line were supplied with ticket ledgers. Edmondson didn't invent railway ticketing, but he transformed it. (Author's Collection)

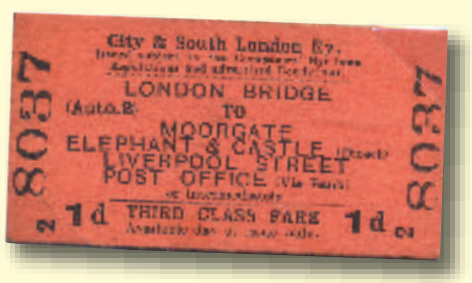
On the other hand the basic simplicity, adaptability and comprehensiveness of the Edmondson system, and above all its speed of operation, were compelling advantages.

Mechanisation and the end of the Edmondson

The sheer bulk of the pre-printed ticket system, and the vast audit and accountancy work associated with it, encouraged mechanisation once suitable systems became available. The growing volume of railway passenger traffic made such an expedient more urgent. As early as 1909 the International Railway Congress sought the views of member railway administration on the problems arising from what threatened to be the overwhelming volume of pre-printed tickets. The survey found some 47,000 different ticket forms in stock at the Anhalter station in Berlin and recommended mechanisation "… to reduce as far as possible the number of tickets …" Their prize exhibit was the Regina machine installed by the Prussian-Hessen State Railways at Kalk station on 1st September 1907, capable of printing 1,280 different forms of Edmondson-sized tickets to 324 different destinations. Such machines were installed at the new Birmingham Snow Hill station of the GWR in 1911.

In Great Britain the Underground Electric Railways of London pioneered general mechanisation, driven by volume of traffic and the practical impossibility of accommodating all necessary pre-printed tickets in the confined space of their ticket offices. Coin-operated devices issuing a single pre-printed ticket form from each machine, on the model of chocolate machines, were introduced from 1904. 165 such machines were in use by 1928. Quicker manual booking was facilitated by adopting a simpler ticket form, abandoning the straight 'station to station' format which had characterised Edmondson systems. Starting in 1911 the 'Bakerloo' railway adopted the so-called 'scheme' ticket, which stated a list of stations from a particular origin which could be reached for the same fare. This system was extended in 1914 to the City & South London and between 1922 and 1927 to the rest of the Underground system, including the independent Metropolitan Railway. Some 30,000 different ticket forms were withdrawn in consequence. Scheme tickets were eventually replaced by 'Station of Origin' tickets stating only a fare applicable from the issuing station and the Underground adopted coin-operated machines and mechanised booking office equipment, although a large range of conventional tickets was required for higher fares and special issues.

Remarkably little development occurred on the British main line network before 1939, although platform tickets were an early subject of mechanical issue: in 1925 'penny-in-the-slot' machines of two types were in use at 96 LMSR stations. The LNER introduced AEG Multiprinter machines at Newcastle upon Tyne in 1931 and a Westinghouse equivalent at Liverpool Street in 1935. However, as early as 1926 1,200 AEG and Siemens machines were in operation at principal stations in Germany, each housing up to 2,500 printing plates, and by 1945 the Reichsbahn used such equipment very extensively, mainly manufactured by AEG or Pautze. Despite intelligence investigations and reports by the Allied Control Commission early in 1946, there was no immediate British response. The long survival of the pre-printed ticket in Great Britain can be accounted for by the almost invariable practice of ticket sale at stations and the relatively high cost and complexity of machines which would be unjustified at the majority which handled relatively little traffic. In 1957 it was optimistically expected that the Edmondson ticket would be eliminated in five to ten years and from 1959 British Railways at last adopted the Multiprinter at some principal stations and



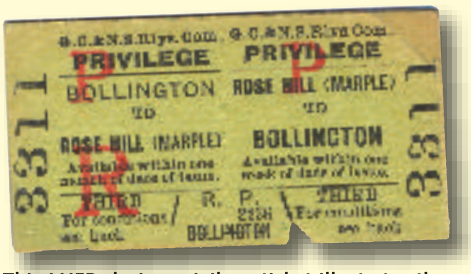
It is difficult to imagine now that the huge volume of travel on London's underground railways was once catered for by the issue of dated card tickets: it's not surprising that they were an early field for mechanisation. 'Scheme' tickets were introduced on the City & South London Railway in 1914 to minimise printing and storage and this one covers a range of destinations, two of them involving a change of line.

The most widespread reduced-fare tickets were 'Workmen's Returns', issued almost universally at fares generally mandated by Parliament under the Cheap Trains Act 1883. Renamed 'Early Morning Returns' they survived until a general restructuring of fares in 1959–62. Although long-period season tickets were printed on larger card, weekly 'Early Morning' tickets were issued on some lines using normal Edmondson-type tickets. The large numerical overprint on this BR ticket printed to Southern railway design is the 'secret' week number, which identified valid tickets clearly to the ticket collector. In 1950 most people worked a six-day week.

other forms of issuing machine, especially in suburban service. From 1965 the busy Southern Region widely installed cash register-like NCR 21 machines to print date and price on pre-printed Edmondson-type tickets. Such machines greatly simplified accountancy by recording details of sales and totalling cash received.

The crucial preliminary to full mechanisation was a means of electronically storing a substantial volume of fare data, thus eliminating at a stroke most of the laborious paper records previously mentioned. Not until economical microprocessor-based issuing machines became available, and the majority of remaining stations were unstaffed, did the universal introduction of mechanisation become practicable. The credit falls to the ever-innovative Ffestiniog Railway for pioneering such equipment in Great Britain in 1981. After trials beginning in 1980 the British Railways Board authorised in 1983 a sophisticated computer-based Accountancy and Passenger Ticket Issuing System (APTIS), in a range of capabilities both station- and conductor-operated. After initial difficulties this was widely introduced in 1986, with most of the surviving staffed stations converted in 1988-9 at a cost exceeding £38 million.

The last BR-printed Edmondson tickets were produced at the end of 1987 and the last were sold (by a travel agent) in 1990.



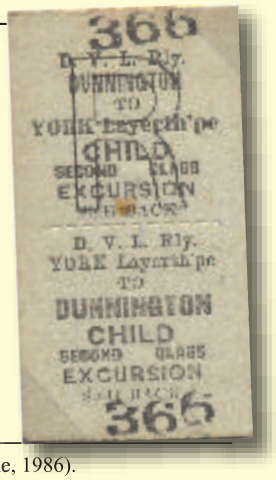
This LNER-design privilege ticket illustrates the long survival of the inter-company 'joint lines' and their managing committees, in this case the Great Central & North Staffordshire joint line between Macclesfield and Marple, after 1923 administered by the LNER and LMSR but using the former's style of ticket. More than 30 of these 'joint committees' survived to be listed in Schedule III of the Transport Act 1947 and many of them were named on tickets printed by one or other of the partners.

Elsewhere in Western Europe some 'Edmonsonsche' (*sic*) tickets remained in use at least into the late 1990s, being finally displaced from Germany (for instance) in 1999 by the accounting cataclysm accompanying the introduction of the Euro. The spread of mechanisation around the world, with at least a hundred different systems, destroyed for ever the remarkable and long homogeneity of the Edmondson system. However, in India the Edmondson system continues in parallel with modern computer-based systems: in January 2006 an example was issued, and dated using a traditional dating press, at Bolpur-Santeniketan station on the Eastern Railway, 170 years and many thousands of miles removed from Brampton. The shade of Thomas Edmondson would surely be gratified.

Acknowledgements and bibliography
Robert Darlaston kindly reminded me of the celebrated sign at the entrance to GWR stations (and its spelling), reflected in the title.

My thanks are due to Mr. R. L. Courtney, station master at Northfield (LMR) in the late 1950s, who instructed me in the mysteries of traditional ticketing not long before they began to disappear, and to innumerable booking clerks who tolerated my persistent enquiries for unusual tickets from their racks. A few of those acquired are illustrated here. I am grateful to my colleague David Hall for background information on the Society of Friends and its close connection with early railways, and to Cambridge University Library, London Guildhall Library, the National Archives, Kew, and the St. Bride Library.

The Transport Ticket Society has been most helpful. The Society provides a wide range of publications and information, details of which are given on its website: www.transport-ticket.org.uk

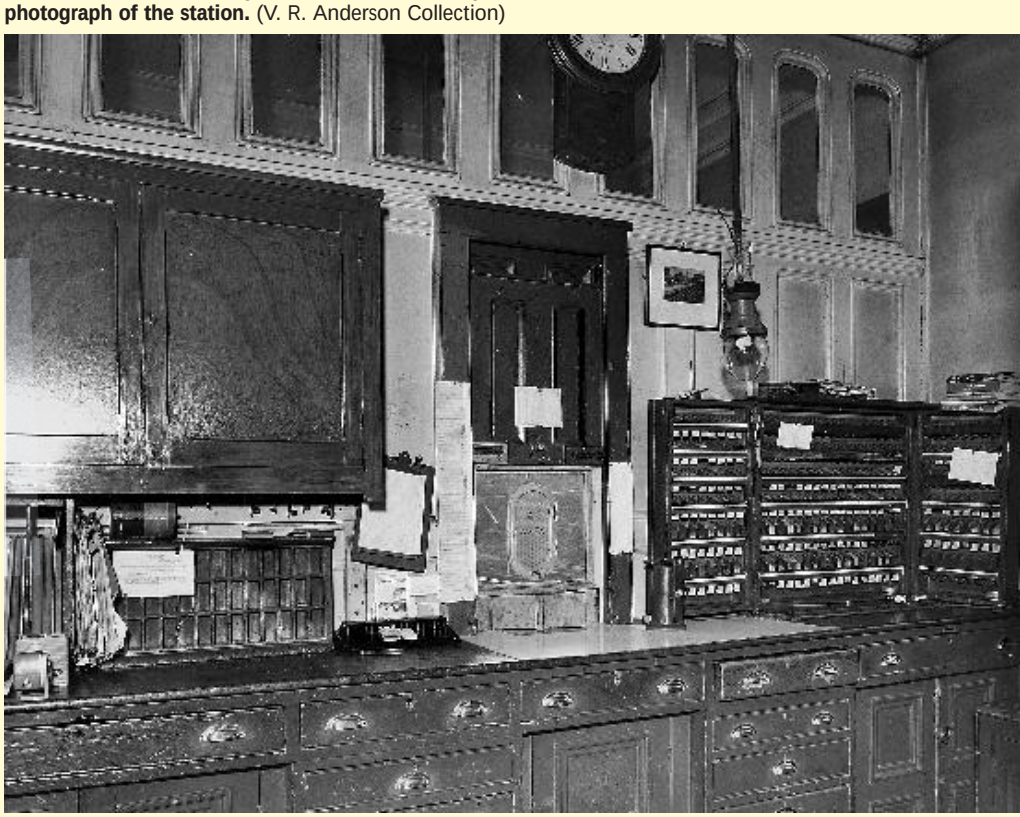


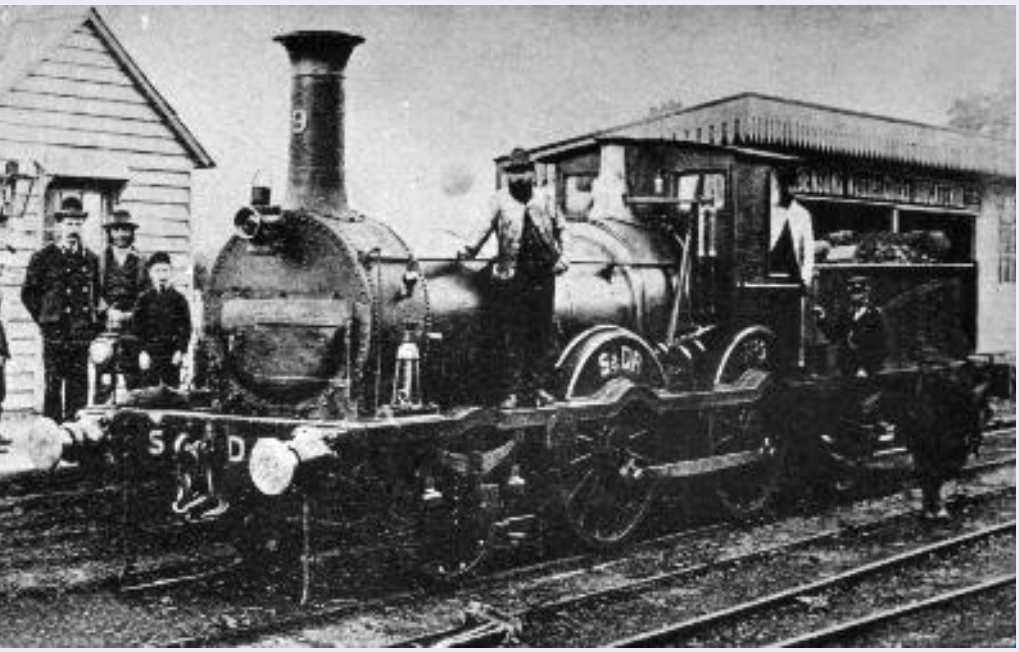
The Derwent Valley Light Railway, south of York, was closed to passengers as early as 1926, although the railway survived as an independent entity into modern times. Its tickets were evidently produced by the neighbouring North Eastern Railway and resembled its standard designs, in this case in a vertical format.

There are several informative general monographs on railway ticketing, amongst them:
Maurice I. Bray: *Railway Tickets Timetables and Handbills* (Ashbourne, 1986).
Gordon Fairchild and Peter Wootton: *Railway and Tramway Tickets* (Shepperton, 1987).
Derek Harris: *Collecting Railway Tickets From the British Mainland* (Colchester, 1989).
Lionel Wiener: *Passenger Tickets* (London, 1939).
The final parts of Wiener's monumental work were not included in the edition reprinted by the *Railway Gazette* in 1939, but are contained in three later editions of the *Monthly Bulletin of the International Railway Congress Association New Series*, Vol.XXI (1939) pp673–733, Vol.XXIII (1946) pp267–285 and 325-341, and Vol.XXIV (1947) pp685–704.

Other works consulted have been:
John B. Edmondson: 'To Whom are we indebted for the Railway Ticket System?' in *English Mechanic and World of Science*, Vol.XXVII, No.697, pp524–6 (2nd August 1878).
Michael Farr: *Thomas Edmondson, Transport Ticket Pioneer* (Weston-super-Mare, 1982).
Michael Farr: *Thomas Edmondson and His Tickets* (Andover, 1991).
D.G. Geldard: *The First Fifty Years* (n.p., 1984).
Charles E. Lee: *Passenger Class Distinctions* (London, 1946).
Edward H. Milligan: *Quakers and Railways* (York, 1992).

Smaller stations would hold tickets for fewer destinations and thus needed relatively small ticket racks. This is Ince, near Wigan, on the former Lancashire & Yorkshire line, photographed on 1st April 1965; the scene is little changed from pre-grouping days, even down to the gas lighting. Ticket stocks would be kept in the drawers and cupboards beneath the counter. Note the framed photograph of the station. (V. R. Anderson Collection)





S&DR 2-4-0 No.9 at Evercreech station c1870. Built by George England & Company at Hatcham Iron Works, New Cross, London, in 1863 at a cost of £2,550 each, Nos.9 and 10 differed from the original series of eight locomotives in that they had wider cylinders, a longer wheelbase, a larger raised firebox and, most noticeably, they were blessed with a spacious cab which offered protection against the elements. The original Somerset Central line was broad gauge and worked by the Bristol & Eexeter Railway, but when the SCR headed toward standard gauge amalgamation with the Dorset Central the BER forced the SCR to lay a broad gauge third rail to Bruton. This picture clearly shows that the third rail had since been removed — the last BER train ran in 1868 — and that point rodding had taken its place, but it is difficult to discern whether the remaining rails rest upon a baulk road or cross-sleepers. The tracks to the right look to be converging, thereby suggesting that a middle road was in existence. Station staff and crew pose by the engine positioned (on the wrong road) beside the store and up platform shelter, possibly during shunting duties given that the engine displays the head code for goods working. Positioned by the smokebox is one of the re-railing jacks whilst the second jack lies between the rails, hinting at a possible mishap.

150 YEARS OF THE SOMERSET & DORSET RAILWAY

BY MIKE BEALE SOMERSET & DORSET RAILWAY TRUST
Photographs from the SDRT with captions by Russ Garner and David Milton

Mention of the Somerset & Dorset Railway conjures up scenes of two locomotives struggling over the steep gradients of the Mendip Hills with heavy trains conveying workers from the industrial cities of the Midlands and North of England on their annual holidays to Bournemouth. But when the railway was conceived 150 years ago, foremost in the minds of the promoters was a route linking the capital cities of Wales and France.

On 10th August 1857 Royal Assent was given to an Act of Parliament authorising the Dorset Central Railway's extension from Blandford to Cole, the objectives of which were stated as: "…not only to accommodate the traffic of the district, but by means of other lines to complete a continuous line about 70 miles in length, from the English Channel at Poole and Southampton to the Bristol Channel at Highbridge".

"Other lines" referred to the Somerset Central Railway, whose extension from Glastonbury to Cole had been authorised a year earlier, and the two lines would subsequently link to become the infamous Somerset & Dorset Railway or S&D (known affectionately as the Swift & Delightful or Slow & Dirty). This would fuel a gauge war generating ill-feeling between the S&D and Great Western Railway, which ultimately contributed to the untimely end of the former.

When the first section of the Somerset Central Railway from Highbridge to Glastonbury opened on 28th August 1854 as a broad gauge (7ft 0 in) branch operated by the Bristol & Exeter Railway, it was described as "going from nowhere to nowhere over a turf moor, with but one town on the whole line and that having less than 4,000 people". The intermediate stations at Ashcott and Shapwick were two miles from the villages they served and the intervening moors were sparsely

0-6-0 No.35 entering Blandford, probably during August 1892. The first batch of six locomotives (Nos.33–38) was built by Neilson & Co. of Glasgow in 1878 and they were known as 'Scotties', a nickname attributed to the whole of the class even though the following 22 locomotives were all built by the Vulcan Foundry. In 1889 No.35 received a Johnson boiler of a similar pattern and by the end of 1890 it had been vacuum fitted, as was the whole class, so as to cater for passenger duties. With their 2,200 gallon tenders they would have an approximate water radius of 55–65 miles and, based on passenger duty classifications for 1917–1923, the 'Scotties' were capable of hauling up to 140 tons. The ten-coach Bath to Bournemouth West fast passenger train, with two Midland Railway passenger brake vans and a possible saloon at the rear, draws into Blandford. The signalman and the fireman successfully exchange their tablets, the 'pouch' duly looped over their respective arms, each suitably packed with newspapers, or the like, to dampen the impact, decreed to be at 10mph (4mph at night). With two minutes allotted for stops at the main stations along the route, it is possible that water might have been taken on before the scheduled 4.05pm departure. During 1892–3 parts of Blandford station were being remodelled. The up platform awning was in the process of being extended and awaits its roof, whilst the squat S&DJR Type 1 signal box would be superseded by a new S&DJR Type 2 box at a position almost opposite on the down platform in September 1893.

An unidentified rebuilt Fowler 0-6-0 poses beside the up platform at Blandford with station staff and a handful of passengers, whilst the shunting horse straddles the down line c1900. In 1874 six 0-6-0 goods locomotives were ordered from John Fowler & Co. of Leeds in readiness for the opening of the Bath Extension, but by the early 1890s these locomotives were working the easier gradients south of the Mendips. Apart from No.19 (rb.1888) these locomotives were rebuilt during 1892–3 using Midland Railway fittings, whilst retaining their distinctive Stirling-style cabs. Devoid of shadows, it is difficult to identify the up goods in question, but only one of three goods services would allow sufficient time for the cameraman and shunting horse to be safely manoeuvred on to the running lines, thereby depicting the Wimborne to Templecombe (Lower) through goods. Arriving at 10.43am, it allowed the down stopping goods to enter the yard at 10.52am before having to make way for the Bournemouth to Bath fast passenger to call at 10.55, after which the through goods could safely continue its journey at 11.10am. Perched above the down platform the signal box sits upon a tall narrow brick base, which commands greater visibility than its 1893 predecessor, whilst allowing the goods line at the rear to pass without hindrance. At 10.45pm on 23rd June 1906 a lightning strike and subsequent fire burnt out the signal box — the signalman, Charlie Whiting, was rumoured to have been in the local pub at the time as there were no trains due — and in its place, using the brick base, a contemporary S&DJR Type 3 signal box was rebuilt. During 1901 the station layout underwent further modifications when the line to the south was doubled as far as Bailey Gate. In 1919 a 1 mile spur was laid immediately south of the station complex to serve a military camp to the north east but was little used after 1921 and was subsequently lifted in 1928.

populated. It was therefore not surprising that the directors' minutes for 7th October 1854 referred to the possibility of extensions to Burnham and Wells, which were authorised by an Act of 30th July 1855.

At a special general meeting held on 30th October 1855, the directors of the SCR proposed developments to the port of Highbridge and revealed their ultimate objective: "The connection of the Bristol and English Channels has for many years been considered to be of great importance particularly with a view to the more rapid conveyance of the produce of South Wales to the ports of the South Coast of England."

The meeting considered two alternative proposals for extension eastwards:

1. Through Wells (as authorised by the Act of 30th July 1855) and Shepton Mallet to the Wiltshire, Somerset & Weymouth line at Frome;
2. To Week Champflower (*sic*) to make a junction with the Wiltshire, Somerset & Weymouth line near Bruton.

In addition to providing a rail link to London, both plans ostensibly envisaged reaching the south coast at Southampton by way of Westbury and Salisbury, but the second alternative was specifically and significantly recorded as "having for its object an ultimate connection with the proposed line from Poole". This can only refer to the scheme for the Dorset Central Railway, whose prospectus proclaimed it as "Junction of English and Bristol Channels". The case was argued against the route from Wells to Frome on the grounds of high costs and steep gradients. Despite strong opposition from the Wells faction, the Bruton proposal carried the day and the extension from Glastonbury to Cole was authorised by an Act of 21st July 1856.

Meanwhile the Dorset Central Railway was emerging from meetings in Blandford and Poole in 1854, although part of its heritage comes from the abortive South Midlands Union Railway of 1852, leaving the Midland Railway's Birmingham to Bristol line at Mangotsfield and following a route through Keynsham, Radstock, Holcombe, Stoke St. Michael, then close to the route ultimately followed by the S&D through Blandford to Poole. The scheme was abandoned due to considerable opposition and physical difficulties, though the preliminary survey was claimed as available in the Dorset Central's prospectus.

Despite the protests of Dorset landowners against the desecration of 'the sacred valley of the Stour', an Act of Incorporation authorising the construction of 10 miles of single line, from the London & South Western Railway at Wimborne up the Stour Valley to Blandford, was obtained on 29th July 1856, eight days after the Somerset Central had obtained the Act for its Bruton extension. The directors of the Dorset Central included Sir Ivor Guest of Canford Manor, the son of an ironmaster from Dowlais, South Wales, and George Reed of Burnham, under Chairman H. D. Seymour MP, who had already become a director of the

Wincanton station looking north toward Cole c1900. A handful of passengers and strategically placed items of luggage await the next arrival whilst station staff pose under the platform canopy. Close to the down home signal two gangers inspect the track. By the time the station was built Wincanton already had a town gas supply and the station took advantage of it for lighting. Prior to this part of the line being doubled in 1884, the original station layout had staggered platforms where passengers crossed at rail level. When the station layout changed the up platform was lengthened and access was by the wooden lattice bridge, although station staff still used the original rail level crossing — with obvious care and under the watchful eye of the signalman — the location of the milk churns enforcing the point. During the 1920s a pre-cast concrete hut appeared on the loading dock whilst metal fencing replaced wood on the platforms, the bridge being replaced during the first half of 1937 with a Southern Railway pre-cast structure. Over the years sidings were added, culminating in the double Cow & Gate siding in 1933, which increased the number of levers in the signal box to 14. As well as milk traffic, Wincanton also handled a number of horse boxes with the opening of the racecourse in 1929, races before then being point-to-point.

Rebuilt small Johnson 4-4-0 No.68 approaches Platform 1 at Bournemouth West with a stopping passenger on Monday 28th March 1910. Built at Derby for the S&DJR in January 1896, the small (5ft 9ins coupled wheels) 4-4-0 was rebuilt in May 1908 when it received a shortened Johnson 'H' pattern boiler (so as to cater for the smaller design) albeit with the Deeley vertical tube layout, Ramsbottom safety valves, the dome placed well forward, a flowerpot chimney with capuchon and Johnson's final pattern smokebox door with wheel and polished strap hinges. The frames were also lengthened at the rear, which accommodated a cab that was a hybrid of Johnson-Deeley design. The tender also underwent modification, having its capacity increased to 2,600 gallons, whereas the provision of coal rails may have occurred just before — possibly when the change to a simplified Deeley-style livery took place from late 1906. The leading five vehicles were a typical six-wheel S&DJR main line 'set' (van, third, first, third, van) to which a Midland Railway bogie composite and six-wheel van from Derby were attached at the rear, forming the 1.25pm service from Bath which arrived at 5.47pm. The appearance of six-wheel 'sets' on the main line diminished during the lead-up to World War I by which time the S&DJR had built eleven bogie 'sets' (brake third, composite, composite, six-wheel van), all being of non-corridor design; nevertheless, the old six-wheelers could still be pressed into service when circumstances dictated.

Somerset Central. Also sharing a Secretary, Robert A. Read, an Engineer, Charles Gregory, solicitors and London offices, and publishing half-yearly reports which were identical in format, the Somerset Central and Dorset Central were clearly hand-in-glove from the outset. The Dorset Central was planned as a standard gauge (4ft 8 ins) line, a factor of great importance to the ultimate fate of the two companies.

The 'gauge war', at its height at that time, resulted from the controversy sparked by Brunel building the Great Western Railway to the broad gauge. The Gauge Act of 1846 limited the building of new broad gauge lines to the Great Western sphere of influence which included the Somerset Central Railway by virtue of it being a branch from the broad gauge Bristol & Exeter. The writing was clearly on the wall for the broad gauge, but the Great Western and Bristol & Exeter were reluctant to accept this and expended tremendous energy in defending their gauge and attempting to block invasions of their territory by standard gauge concerns, adding additional bite to normal competition between railway companies in the same area. The association of the Somerset Central with the Dorset Central was therefore bound to evoke the gauge controversy.

The cutting of the first sod of the Dorset Central on 13th November 1856 was described by *The Illustrated London News* as follows: "On Thursday, the 13th inst the first turf of the Dorset Central Railway was cut at Blandford St. Mary, by the Lady of Sir John James Smith, Bart, of the Down House, in the presence of a vast concourse of people from the surrounding district, graced by a brilliant array of rank and fashion.

"The first section of this railway already sanctioned by Parliament is the South Western railway at Wimborne to Blandford, and it is proposed in the coming session of Parliament to apply for powers to extend the line through the vale of Blackmore, to join at Bruton the authorised extension of the Somerset Central Railway, and thus establish a direct communication between South Wales and the Bristol Channel on the one hand and the whole of the South Coast and the English Channel on the other.

"From an early hour in the morning the town of Blandford had all the appearance of a fete day — carriages of all descriptions, from the barouche and four — to the market cart, brought in their load of holidaymakers, and at noon the Corporation of Blandford received Lady Smith, the High Sheriff of the county, and several of the nobility and gentry; the Mayors and Corporations of Poole and Glastonbury, the directors and officers of the Dorset Central and Somerset Central Railway.

"These all formed in procession, headed by the local schools and benefit societies with banners, navvies bearing spades and picks, and two wheeling in barrows barrels of strong beer.

"The field of operations was very tastefully decorated under the direction of Mr. M. K. Welsh of Poole, with banners, triumphal arches etc.

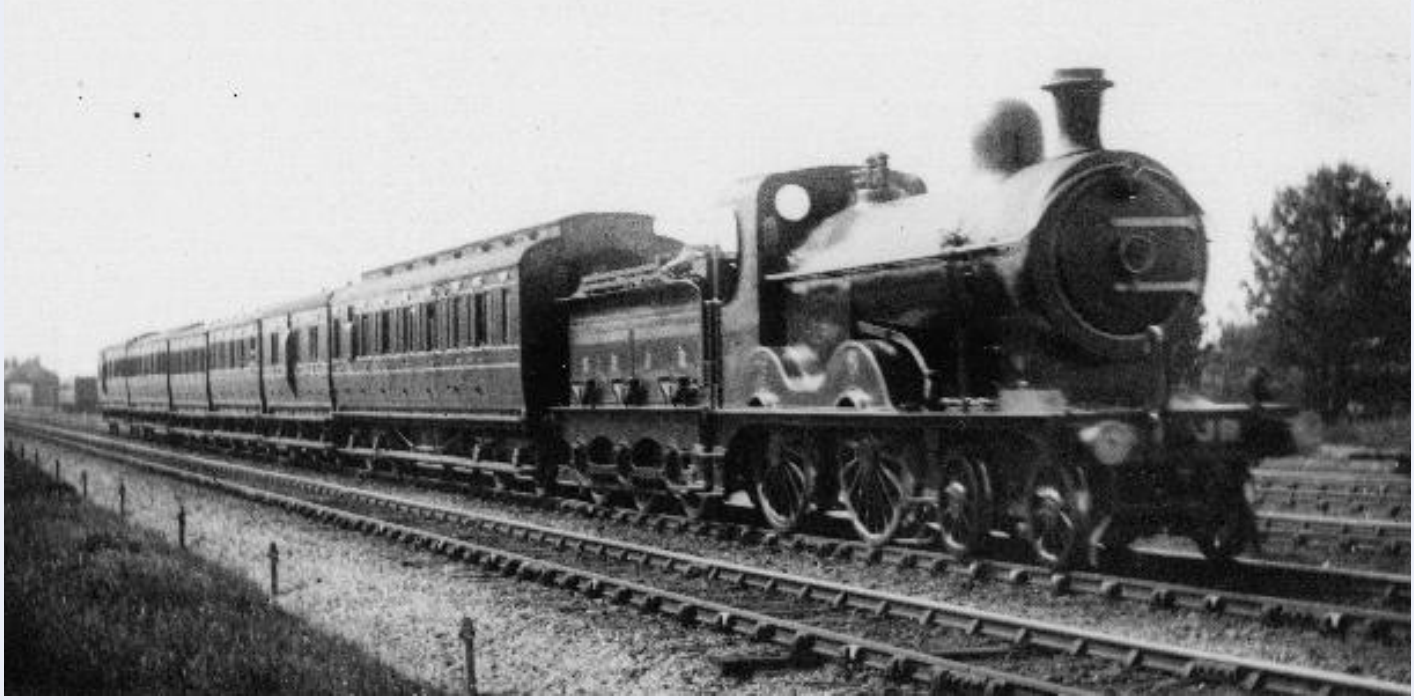
"The barrow is of polished mahogany, with bunches of corn and poppies carved on the panels and the handles carved as Indian corn. The blade of the spade is of polished steel, the ornamentation is very beautiful and the handle of tulip wood, carved with ivy leaves.

"Lady Smith cut the turf in a most business-like manner and caused great admiration in the minds of the navvies when she tipped the barrow, turned round between the handles and drew the barrow back behind her along the planks.

"Three hundred of the company afterwards sat down to an excellent 'dejeneur à la fourchete' in the Assembly Rooms, supplied by Mr. Eyres of the Crown Inn."

The wheelbarrow and spade used were presented by the contractor, Charles Waring, and can be seen on display in the museum of the Somerset & Dorset Railway Trust at Washford, West Somerset. The expenses of the ceremony amounted to £224 13s 2d, including £71 for wine, a tidy sum in view of the company's uncertain financial prospects.

The Dorset Central had already set its sights on higher things, its new Act of 10th August 1857 authorising the building of an extension to meet the Somerset Central at Bruton to complete the Channel to Channel link. No such link could materialise so long as there was a difference in gauge, but at its own general meeting of 28th February 1857 the Somerset Central had already announced its intention of laying standard gauge in anticipation of the link-up and this was authorised by an Act of 1st August 1859. It then realised that a complete conversion to standard gauge would save £30,000 on the cost for providing mixed gauge, so it approached Parliament with a Bill to abandon the broad gauge in addition to extending the time to complete the Glastonbury–Bruton extension. But it was not to be so easy to shake off the broad gauge connection: Parliamentary opposition by the broad gauge parties resulted in modifications to the Somerset Central's Act, which received



Rebuilt small Johnson 4-4-0 No.18 passes the carriage sidings on its descent towards Bournemouth West with a through passenger on Saturday 31st May 1913. No.18 was one of the four original small 4-4-0 locomotives to be built by Derby for the S&DJR, arriving in May 1891. They immediately took on the heavier passenger workings which had been previously entrusted to the thirteen 0-4-4T locomotives, subsequent Derby deliveries relegating the latter to local and branch lines duties. No.18 was first rebuilt in December 1904, surprisingly with a similar sized boiler, before being rebuilt again in June 1911, this time with the shortened 'H' boiler and fittings as per No.68 albeit with the Johnson horizontal tube layout. The term 'through passenger' for this particular service may be misleading as S&DJR carriages regularly worked into Bristol at both St. Philips and Clifton Down, usually having an additional Midland Railway carriage attached, as in this instance. On this occasion the train had departed Bristol St. Philips at 11.18am and arrived at Bath at 12.07pm, subsequently departing at 12.14. A noteworthy feature about the S&DJR 'set' is not so much the mixed nature of vehicles but the appearance of bogie composite No.37; the first bogie vehicle constructed by the S&DJR in 1898 and the only one with an arc roof. In the background is the S&DJR locomotive shed located within the Branksome triangle.

Royal Assent in July 1861, stipulating that mixed gauge must be laid on the Bruton extension and the connection with the broad gauge Wiltshire, Somerset & Weymouth line near Bruton must be built as originally authorised. Throughout the negotiations, the Bristol & Exeter directors showed a most kind and neighbourly spirit, but had every reason to feel aggrieved by the Somerset Central's complete change of front over the Bruton extension and its barefaced attempt to sever the broad gauge connection.

The Somerset Central's Burnham branch had been passed by the Government inspector on 22nd August 1857, but difficulties were being experienced in forming a cut to admit coastal steamers to lie by the causeway and a new landing slip was opened for public traffic with the Burnham branch on 3rd May 1858. Wells, with a population of about 7,500, had shown enthusiastic support for the extension from Glastonbury at a public meeting in 1852. Disappointment followed when the 1855 Act provided only for a branch instead of the through line to Frome and the 1856 Act by-passed the city. There was reluctance to subscribe to the Somerset Central's extension and the inhabitants began to look towards the East Somerset Railway and encouraged it to add a Wells extension, which was authorised on 27th July 1857. This threat brought further pressure on the directors of the Somerset Central to complete the branch before its powers lapsed. The formal opening took place on 3rd March 1859, followed by a Board of Trade inspection and the opening to the public on 15th March.

The first section of the Dorset Central from Wimborne to Blandford opened on 1st November 1860 and was worked by the LSWR under a five-year agreement. An extension of time was obtained for the completion of the Blandford to Bruton section, with priority given to Templecombe to Bruton. Work on the Somerset Central's Glastonbury–Bruton extension commenced in May 1859, after the Wells branch had been completed. The contractor, Rigby, had 470 men and 50 horses at work, which increased to 600 men and 70 horses by February 1860. Work was held up by bad weather, a serious slip on Pylle bank and the requirement to lay a third rail to provide mixed gauge. In addition a new station and workshops were required at Highbridge, offices provided at Glastonbury, new staff to be trained and above all a considerable quantity of standard gauge locomotives and rolling stock had to be purchased and paid for. The Bruton to Templecombe section was ready for use by November 1861, but it was not until 18th January 1862 that the formal opening from Glastonbury to Templecombe took place and public traffic over the complete standard gauge railway from Burnham to Templecombe began on 3rd February 1862.

In February 1861 the Somerset Central directors were stressing the mutual advantages of the two companies being worked as one and by August they were strongly in favour of amalgamation to secure unity of action and economy in management. A special general

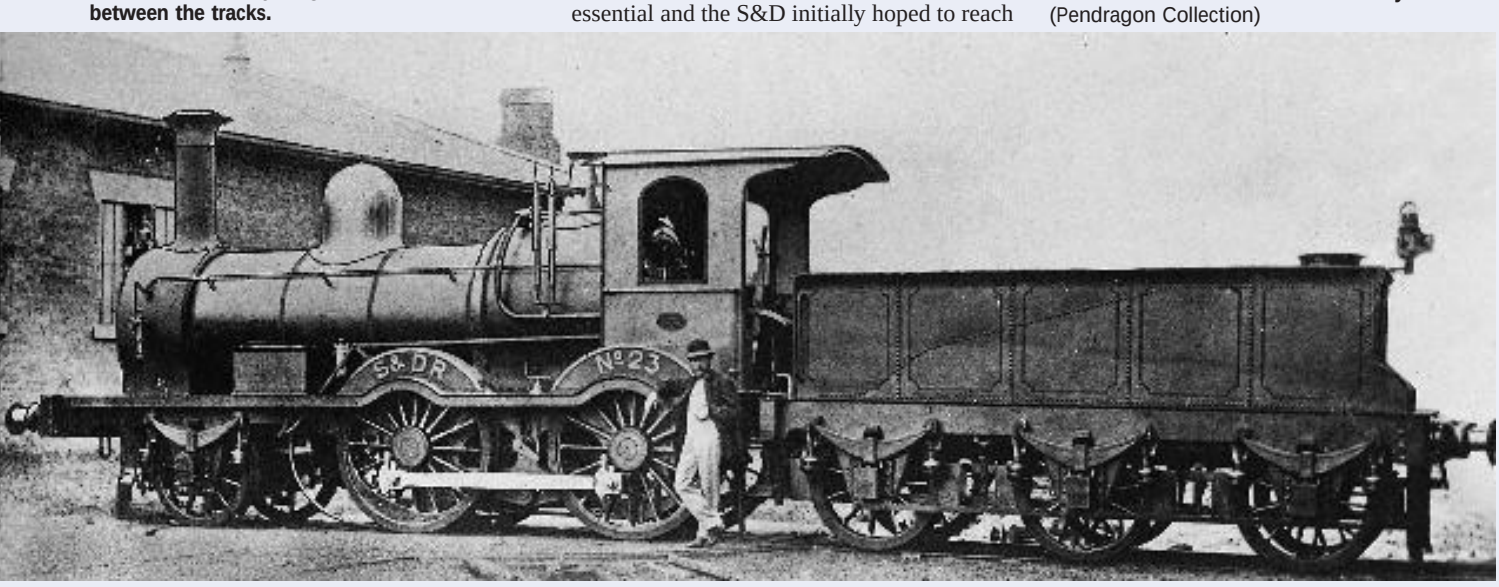
Rebuilt small Johnson 4-4-0 No.67 entering the south eastern throat of the Branksome triangle on Saturday 31st May 1913. No.67 shared the same details as No.68 apart from being rebuilt in October 1907 with the Johnson tube layout and having its Ramsbottom safety valve enclosed, the casing being painted and lined thereby making it unique amongst the other small Johnson class. The appearance of five S&DJR bogie carriages is a rarity, so had the 5.45pm stopping passenger for Bath suddenly become popular?

Rebuilt small Johnson 4-4-0 No.68 simmers at Platform 4 at Bournemouth West on Saturday 9th August 1913. For No.68 three years have passed whereupon it has acquired steps forward of the coupled wheels, whilst the upper lamp iron has moved down to the top of the smokebox door. The service in question is not known and the time of day is not discernable, but the attachment of an S&DJR milk van on such a lengthy train is unusual, unless it was doubling as a luggage van. No.68 would be working hard as its permitted hauling capacity (as at 31st December 1917) was 170 tons. The previous weekend, including Sunday, had been extremely busy countrywide with August Bank Holiday traffic. Bournemouth saw (Cook's) excursion traffic, as detachments or as whole trains, from all parts of Britain emanating from the following company lines: G&SWR (Kilmarnock), HBR, LNWR, LSWR, LYR, MR, NER, NSR and the Severn & Wye. Most, if not all, would have arrived at Bath in Midland Railway carriages and for the journey south the S&DJR would have supplemented services with its own stock. Empty carriages would have been marshalled at Bournemouth and/or returned to Bath (empty trains not to exceed eighteen carriages). The assortment of goods vehicles in the yard to the left includes a conflat that is sadly illegible. Note the litter between the tracks.

meeting on 9th May 1862 approved the Bill for Amalgamation. The Dorset Central directors also approved the proposal for amalgamation in August 1861 and met the Somerset Central directors in July 1862 at the Westminster Palace Hotel before their final board meeting on 31st July 1862. The Bill for Amalgamation received Royal Assent on 7th August to take effect from 1st September 1862 when the Somerset & Dorset Railway was born. The final link in the chain was completed on 31st August 1863 with the opening between Templecombe and Blandford and the company, by virtue of running powers to Hamworthy, controlled a railway stretching between the Bristol and English Channels and, with the inclusion of its shipping services, from Cardiff to Cherbourg, with connections to Paris.

Traffic was not heavy because much of the route only served scattered rural communities, while Burnham was found incapable of being transformed into a major port without considerable expenditure. Even so, receipts exceeded the working expenses and the financial position would have been tolerable had it not been for the excessive debts from equipping the line. A further traffic outlet was essential and the S&D initially hoped to reach Bristol by virtue of the Bristol & Exeter laying a standard gauge rail. However, this did not materialise and the S&D was forced to construct its own route north. In 1874 an extension was opened from Evercreech Junction to Bath, linking the standard gauge Midland and London & South Western Railways with a line which passed through the territory of their broad gauge rival, the Great Western. However, the extension to Bath drained the S&D finances so that it was not able to cope with the rapid increase in traffic generated and in 1875 the line was leased jointly to the MR and LSWR, becoming the Somerset & Dorset Joint Railway and causing further irritation to the GWR.

The line from Bath to Bournemouth rapidly developed as a main through route from the north and led to the growth of Bournemouth as a holiday resort, the original Somerset Central route reverting to "going from nowhere to



Vulcan Foundry 2-4-0 liveried as S&D No.23. The locomotive was one of a batch of six ordered in 1866. In practice only two were taken into S&D stock because of financial problems; the other four were finally sold by Vulcan to the Alsace-Lorraine Railway. (Pendragon Collection)

nowhere over a turf moor". In 1883 a cut-off was opened between Corfe Mullen and Broadstone so that S&D trains could reach Poole and Bournemouth without reversal at Wimborne. Most of the original single track from Templecombe to Bath was doubled in the late nineteenth century, followed by Corfe Mullen to Blandford, although Blandford to Templecombe, Corfe Mullen to Broadstone and the Somerset Central west of Evercreech Junction remained as single line to the end. The steep gradients, sharp curves, tunnels and viaducts required to cross the Mendip Hills on the Bath extension contrasted with the original line which ran through the flat Somerset Levels and gently undulating Blackmore Vale.

Freight was always important, particularly between Bath and Templecombe, with both through trains and local coal and stone traffic from the Mendips. A special type of 2-8-0 goods locomotive was designed for the line, the first being built in 1914. Passenger traffic was seasonal and, apart from the 'Pines Express', through trains from the Midlands and North of England to Bournemouth ran only in summer. On busy Saturdays every available locomotive was often pressed into service to double head the heavy trains on gradients between Bath and Evercreech Junction.

The run-down of the system began in the 1950s with the closure of the branches to Wells, Bridgwater and Burnham-on-Sea and intensified after the Western Region of British Railways, the GWR's successor, gained control of the majority of the line in 1958, which many thought was payback for past ill-feeling. Through traffic, including the 'Pines Express', was diverted to other routes in 1962 and the Somerset & Dorset closed completely amid much controversy on 5th March 1966.

Rebuilt 2-4-0 No.16A at Blandford in August 1892 on a down Templecombe to Wimborne goods. This locomotive was built by the Vulcan Foundry in 1866 as No.20, rebuilt in 1881, and renumbered 16A in 1891.

A variety of remains of the railway can be seen in many locations, from virtually complete stations to a small ridge running across a field, and many towns and villages still have a Station Road or Railway Hotel, over 40 years since its closure. In addition to Shillingstone, the only remaining Dorset Central station building, Somerset Central station buildings remain in private ownership at Evercreech Junction, Pylle, West Pennard and Polsham. Sections of the Dorset Central trackbed form public footpaths from Spetisbury to Charlton Marshall, north of Blandford and south of Sturminster Newton, and part of the Somerset Central trackbed is used for access to areas of peat extraction. At Blandford the railway is marked by a buffer stop, at Sturminster Newton by the railway garden in a filled-in cutting, and the Somerset & Dorset Hotel still exists just across the road from the site of Burnham-on-Sea station.

The individuality of the S&D gave it a reputation far greater than its size or importance in the British railway network and as evidence of the extent of interest, its memory lives on today through several societies. The Gartell Light Railway is owned and operated by three generations of the Gartell family. The railway runs on 2ft gauge track, part of which runs along the route of the S&D just south of Templecombe, and was first opened to the public in 1990. Two S&D stations owned by the local authorities have societies dedicated to their restoration and maintenance. The Somerset & Dorset Railway Heritage Trust was formed in 1992 to restore Midsomer Norton station and a section of working railway along the route of the S&D. The North Dorset Railway Trust, formed in 2000, aims to restore Shillingstone station to how it was in the early 1960s.

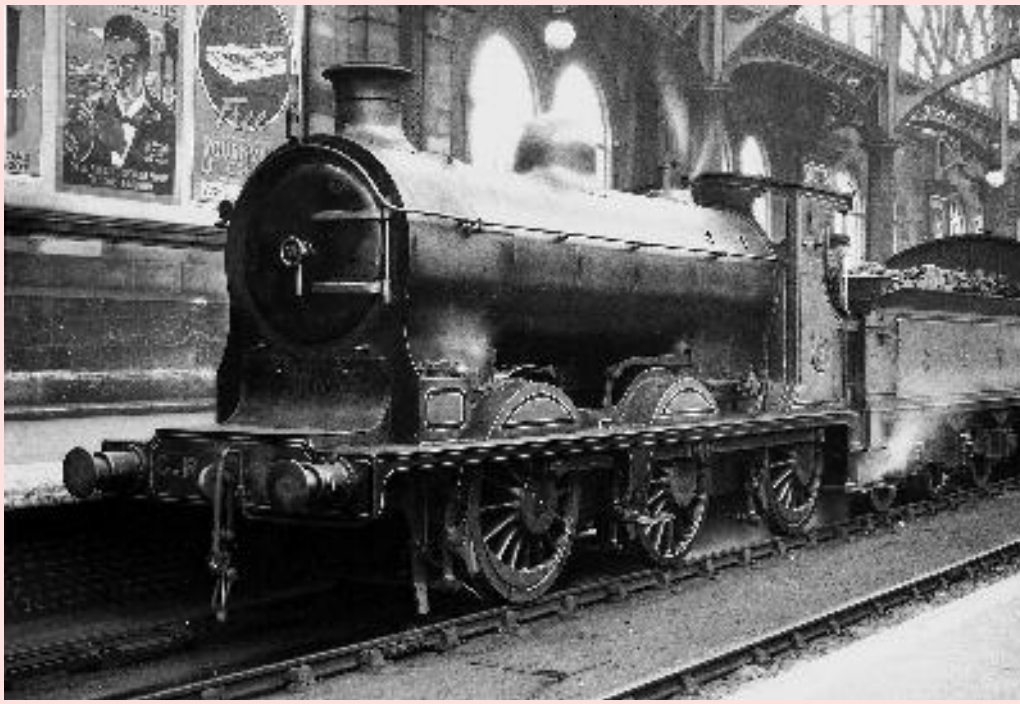
One society which encompasses all aspects of the S&D, the Somerset & Dorset Railway Trust, has been in existence for over 40 years. Originally formed in 1966 as the S&D Railway Circle with the prime aim of collating and circulating information on the S&D, it now has a membership of around 800 worldwide. The Trust maintains a museum at Washford, which includes a working replica of Midford signal cabin, wagons and coaches, and other memorabilia of this much loved line. The pride of the Trust's collection of rolling stock is No.53808 (S&DJR No.88), built in 1925 by Robert Stephenson & Co. One of the famous S&D 7F 2-8-0 goods locomotives, No.53808 was withdrawn from service in 1964 and sold to Woodham's scrapyard, Barry, from which it was purchased by the Trust in 1970 and returned to working order in 1987.

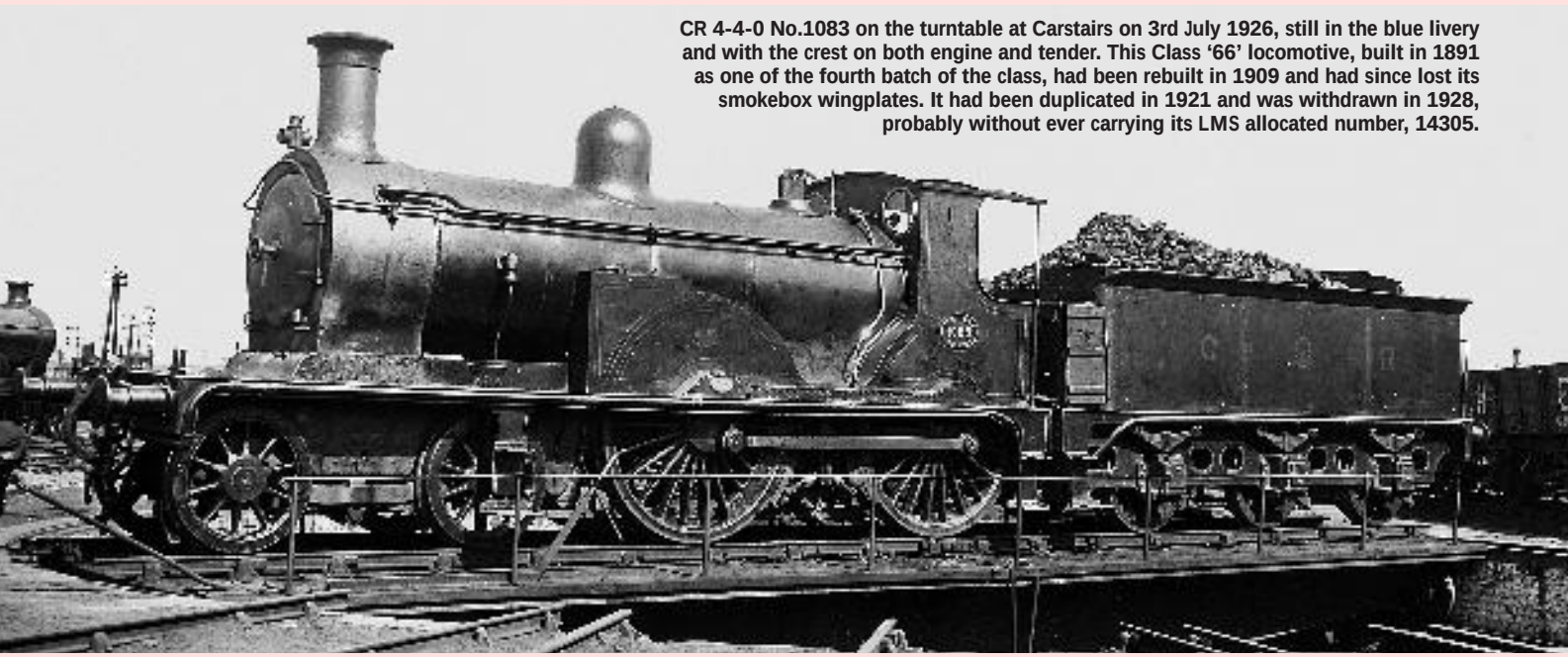
To commemorate the 150th anniversary of the formation of the S&D, the Trust is planning a series of activities between 2007 and 2013. Exhibitions, conventions, displays of memorabilia and photographs, trackbed walks and visits are proposed at relevant locations to mark particular events, such as the opening of each section of the route. A talk titled '150 Years of the Somerset & Dorset Railway', illustrated with slides and recordings, is available for presentation to any interested group and can be varied to suit the location, technical understanding and interests of the particular audience. Anyone interested in volunteering to keep the memory alive, or wanting further information on the talk or other events, should contact the Somerset & Dorset Railway Trust, Washford Station, Somerset, TA23 OPP (or email info@sdrt.org).

A CALEDONIAN THREESOME

Photographs by **R. D. STEPHEN**
Notes by **JIM MacINTOSH**

The previous selection (in Backtrack *Vol.20 No.12) featured locomotives photographed at Perth, one of the regular locations favoured by Ranald Stephen and relatively close to his early home, the manse at Inverkeithing. This selection of Caledonian Railway locomotive photographs was taken further afield.*

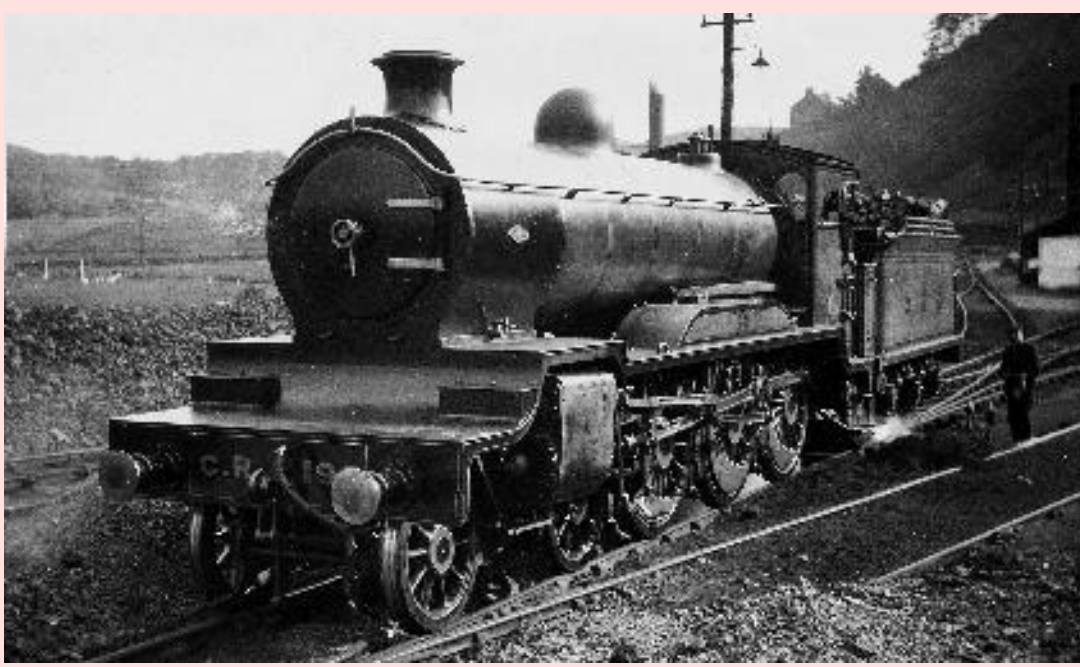




CR 4-4-0 No.1083 on the turntable at Carstairs on 3rd July 1926, still in the blue livery and with the crest on both engine and tender. This Class '66' locomotive, built in 1891 as one of the fourth batch of the class, had been rebuilt in 1909 and had since lost its smokebox wingplates. It had been duplicated in 1921 and was withdrawn in 1928, probably without ever carrying its LMS allocated number, 14305.

TOP: **CR 0-6-0 No.32 at Platform 13 of Glasgow Central station with a Gourock train, as shown by the semaphore code in front of the chimney. A passenger/goods locomotive in the blue livery, it is one of four engines built in 1912 as a superheated development of the '812'/'652' Classes, with the boiler pitched 6in higher. Note the spare locomotive lamps on their storage brackets and the coach immediately behind the locomotive without white upper panels, which was a feature of some suburban and workers' train coaching stock up to the grouping.**

RIGHT: **CR 4-6-0 No.195 at Oban shed, the third design of 'Oban Bogie', following McIntosh's Class '55' and Brittain's '179' Class. These were the last locomotives built before grouping and were delivered by the NB Locomotive Co. in December 1922. The eight locomotives were withdrawn between 1939 and 1945, a relatively short life compared with their predecessors the Class '55', the last of which was withdrawn in 1937 after 32 years of service.**



MR. PEPPERCORN'S A2 PACIFICS

In Vol.21 No.10 last October a colour feature looked at the early stages in the creation of the mixed traffic 4-6-2 on the London & North Eastern Railway under Edward Thompson, a process which, after a couple of designs of somewhat average performance, led to his successful A2/3 Class. That was intended as a new standard design but on Thompson's retirement his successor, Arthur Peppercorn, decided that the last fifteen locomotives on order would be built in 1947/8 to an improved design. The result was a new A2 Class, photographed here by DEREK PENNEY.

ABOVE: **The resulting Peppercorn A2 was a much neater design, more in the classic LNER tradition. The most significant improvement in appearance over the Thompson engines arose from a shorter wheelbase with the gap between bogie and driving wheels being eliminated and the cylinders moved forward, while a less bulky type of smoke deflectors was provided. No.60530** *Sayajirao* **passes Hilton Junction, leaving Perth with a Dundee–Glasgow express.**

BELOW: **Nos.60528** *Tudor Minstrel* **and 60530** *Sayajirao* **at Dundee Tay Bridge shed. The Kylchap double blastpipe and chimney was abandoned on the A2s in favour of single chimneys, although the double chimney arrangement was fitted to the last of the class and later to five others.**

ABOVE: **Although at first the A2s were placed on the Eastern and North Eastern Regions, it was not long before the Scottish Region acquired an allocation and the class began to establish a reputation on the difficult Edinburgh–Aberdeen route where their power was used to good effect on its gradients. No.60532** *Blue Peter* **is heading the 13.30 Aberdeen to Glasgow Buchanan Steeet at Bridge of Allan in July 1966.**

BELOW: **No.60528** *Tudor Minstrel* **shakes the slumbering skeletons in the graveyard as it coasts down past the cliffs to Burntisland with the 12.10 Dundee–Edinburgh Millerhill express goods on 28th August 1965. With the spread of diesel traction in the early 1960s the A2s saw much of their envisaged work disappear and eight were withdrawn towards the end of 1962. The last A2s were employed in Scotland until 1966, the final survivor being No.60532 which was withdrawn at the close of the year and, of course, subsequently preserved.**

THE GREAT WESTERN RAILCARS

Although internal combustion railcars had been tried in various forms and with varying degrees of success, it was on the generally conservative Great Western Railway that the concept of the diesel railcar flowered and developed in the 1930s. A prototype car from Hardy Motors Ltd. in association with AEC Ltd. was constructed in 1933 and after evaluation the GWR ordered a production series to an improved design which appeared in 1934 with a rather stylish streamlined outline. The first three were, with a small buffet, for express service between Birmingham and Cardiff. The next two batches were of higher seating capacity, the last (No.17) being a dedicated parcels vehicle. Another experimental vehicle, No.18, in 1937 was built with a more substantial underframe with a view to it being able to haul a trailing coach and became the basis for the last batch in 1940/1, though these were of a more 'angular' appearance, with one of them again being a parcels van.

ABOVE: **Seen in the up bay platform at Newbury is No.W12W, showing the rather dashing streamlined styling of the pre-war railcars. Built in 1936, it is one of three intended for longer-distance work, having a lavatory and consequently fewer seats — 63 — rather than the 70 in the cars for local services which were not provided with lavatories. The GWR painted them chocolate and cream but they still cut a dash in the carmine and cream of British Railways.** (C. Banks Collection/Colour-Rail DE943)

BELOW: **No.W22W at Leamington Spa after arrival from Stratford-upon-Avon on 25th April 1955. Entering service in 1940, this was one of the later build with the capacity to haul a trailing load, as in this case. These cars were fitted with conventional drawgear, seating capacity was 48 and the luggage area contained a boiler to generate steam heating for the trailing coach. The angular lines contrast with the earlier streamliners! This vehicle, happily, survives in the care of the Great Western Society at Didcot.** (T. J. Edgington)

TOP: **Most of the final batch of non-streamlined railcars were for use on branch lines and local services and after their introduction they operated most of the timetable on the Gloucester–Ledbury branch. No.W19W sees a few passengers coming and going at Newent in July 1959 during the last couple of weeks of the branch which expired on the 13th of that month. A bus in matching colours waits outside the station: integrated public transport 50 years ago!** (W. Potter/Colour-Rail DE650)

MIDDLE: **On the same branch No.W19W calls hopefully at little Barbers Bridge station on a working from Gloucester in May 1959.** (T. B. Owen/Colour-Rail DE649)

BOTTOM: **The parcels railcars were intended to convey traffic in the London area and out to Reading, so reducing the stopping time for passenger trains on which parcels were previously carried. Here is No.W17W, the streamlined version from 1937. Seen at Tyseley depot in June 1960 nudging up to one of the passenger cars, it shows that all-over crimson was the BR colour for the parcels vehicles.** (P. J. Hughes/Colour-Rail DE1634)

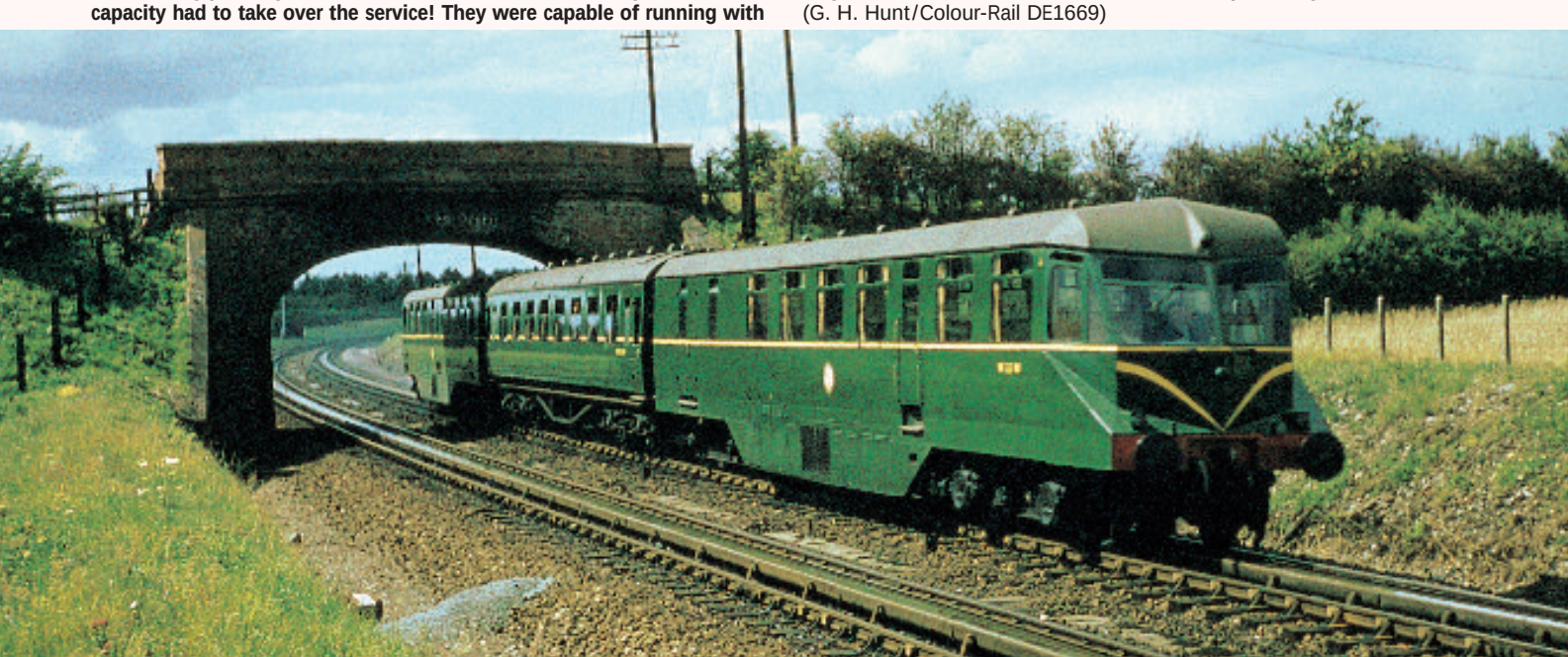
ABOVE: **While a streamlined finish for a non-passenger utility vehicle was perhaps a little extravagant, even in the late 1930s, it was clearly a success in its purpose since a second such car came out in 1941. Here is the non-streamlined version No.W34W demonstrating the pulling power of the species by having two vans in tow near White Waltham, between Twyford and Maidenhead, in August 1959.** (T. B. Owen/Colour-Rail DE859)

BELOW: **No.W22W at Kidderminster in May 1959. By then the first generation diesel multiple units were entering service and some of the GWR railcars were given the same livery as the new BR stock – dark green complete with 'speed whiskers' at the front.** (P. W. Gray/Colour-Rail DE487)

Back to Newent on the Gloucester–Ledbury branch and what seems to have been the regular railcar, No.W19W. In this July 1959 photograph there are mailbags and a barrow of parcels for loading, even though closure is only days away. A retreating dog expresses its view... (J. M. Wiltshire/Colour-Rail DE2500)

Local services around the West Midlands were ideal for the GWR railcars. Streamliner No.W8W calls at the improbably named Swan Village with the 3.00pm Dudley–Birmingham Snow Hill on 1st June 1957. The railcars, including the pioneer example and the two parcels vans, totalled 34 and the last was not withdrawn until late 1962. (T. J. Edgington)

BELOW: **The logical next step was to produce a twin-car unit and the Great Western introduced two such pairs in 1941/2, Nos.35/36 and 37/38. These featured a buffet counter and were intended to replace single cars on the Birmingham–Cardiff run but in fact were so successful in attracting passengers that conventional steam trains of greater capacity had to take over the service! They were capable of running with an intermediate standard carriage. Railcar No.W33W was rebuilt as a single driving unit with vestibuled end in 1951 to replace fire-damaged No.37 and is seen here with No.W38W and intermediate carriage passing over Aldermaston troughs as the 12.37pm Newbury–Reading in August 1959, the whole ensemble in BR multiple unit green.** (G. H. Hunt/Colour-Rail DE1669)



The view from the driver's side of an unrebuilt 'Royal Scot' 4-6-0 No.6137 *The Prince of Wales's Volunteers (South Lancashire)* **heading an up express on the four-track stretch north of Crewe.**

THE EARLY PHOTOG LARGE PASSENGER THE 1930S

BY MARTIN S. WELCH

Amongst the ranks of railway photographers there was probably no-one better known and respected than Eric Treacy. More than any other, his work portrayed the sheer drama and 'full-on' action of steam locomotives at work. His skills were first learned in Liverpool to where his calling had led him.

Eric was a native of North London whose early employment in the City as an insurance clerk had been seriously unfulfilling. He had a background of Sunday School teaching and youth work in his home parish and this led him to successfully apply for the job of running a boys' club in Scotland Road, Liverpool, a charity founded and sponsored by Shrewsbury School to benefit local youngsters.

Part of Eric's duties involved a fortnightly visit to Shrewsbury by train from Liverpool Lime Street via Crewe to account for his progress. No doubt he occasionally went from Birkenhead Woodside to Chester and on to Shrewsbury via the Great Western Railway, but he preferred the London Midland & Scottish, particularly if he had to change at Crewe and spend a little time there watching steam's hustle and bustle. Eric claimed that it was the sight of the rays of sunlight piercing through the smoke and steam underneath the great roof of Lime Street station that first inspired him to take railway photographs.

Eric was energetic in arranging trips for his young charges and, more ambitiously, camping holidays usually involving more travel by train. One of the regular camping sites used was on the North Wales Coast to the east of Penmaenmawr where a dip in the sea meant crossing the Chester to Holyhead main line. Eric took many pictures of his charges enjoying these trips. Photographing people was to become one of his skills, not least because he had the gift of charm to get people to laugh and relax. However, one of his first railway shots depicts an unrebuilt 'Royal Scot' on the 'Irish Mail' passing the North Wales camp site, heralding the start of an interest that was to grow and happily occupy his leisure hours for years to come. Some of Eric's early shots with a Box Brownie were not too good, so he managed to fund the purchase of a 35mm Leica camera. Many of his pre-World War II photographs were taken with this camera, including those illustrated here. Eventually the necessity of obtaining better sharpness induced him to invest in plate cameras.

Eric felt a calling to be ordained and, with the help of the Liverpool Diocese, he attended the necessary training on the Birkenhead side of the river, regularly cycling through the Mersey Tunnel to do so! He completed the training and after serving the diocese as a curate, he was appointed to the Vicar of St. Mary's, Edge Hill, in 1936 at the age of 29. LMS staff made up a large proportion of his congregation at the church for his parish included Edge Hill and Wavertree stations, several goods yards, carriage sidings and the famous 'Gridiron' sorting sidings. Above all, a stone's throw from the church was Edge Hill locomotive shed. Someone upstairs had found him the most suitable parish!

As Eric's connections with his railway flock grew, he began to be accepted in the railway environment of his parish and would often appear on his bike at the various depots "doing his rounds", always with his camera to hand to take any photographs of interesting subjects which might present themselves. He often took pictures of the railwaymen on duty and always gave them copies. His enthusiasm and friendliness led to him getting on to the lineside to photograph moving trains, having first obtained a lineside permit from the LMS Public Relations Department to which he sent some photographs for the company's use.

Eric became particularly involved with the staff at Edge Hill MPD, almost as an industrial chaplain. In May 1937 one of the depot's top link crews suffered fatal burns in a blowback incident when their Liverpool-bound train entered Primrose Hill Tunnel, north London, shortly after leaving Euston. Eric held a memorial service at St. Mary's for the two men. The service became an annual event and Eric dedicated a memorial tablet to the men at the shed.

Through his contacts at the depot and with the PR Department Eric had managed to experience occasional footplate trips, usually between Liverpool and Crewe. His first journey on a 'Royal Scot' was memorable for being an extremely rough ride. On another trip in the down direction with a 'Royal Scot' driven at high speed by Camden driver Laurie Earl, Eric had visions of going through the buffer stops at Lime Street and across the road into St. George's Hall. However, Laurie brought the train safely to a stand at precisely the right spot having gained ten minutes on the schedule from Crewe.

Driver Laurie Earl of Camden (left) and a shed official at Edge Hill depot. In the background is the spire of St. Mary's Church where Eric Treacy was vicar. Note the sludge residue (the white material behind the driver, loaded into wagons and an old loco tender) from the use of lime soda in softening the shed's water supply to preserve copper fireboxes.

RAPHS OF ERIC TREACY — LMS IN LOCOMOTIVES ON MERSEYSIDE

Driving a 'Royal Scot', No.6137, on a Liverpool to Crewe turn.

Brand-new Pacific No.6202 — the 'Turbomotive' — attracts the scrutiny of railwaymen at Liverpool Lime Street as it awaits departure on a running-in turn, the 12 noon Liverpool–Plymouth. The first coach is a GWR vehicle.

Consultation of the summer 1939 LMSR timetable provides some information on the likely trains involved in this running-in diagram. A number of semi-fast non-stop trains ran from Crewe, usually departing from Platform No.2 north bay, to Liverpool Lime Street in the morning peak at 7.50am, 8.35am and 9.15am — journey time, 68 minutes. The locomotive on this turn would, after arrival at Lime Street, go on to Edge Hill MPD for turning, checking-over and servicing. It would then return to Lime Street to join the midday departure to Plymouth which it would work as described to Shrewsbury, arriving at 1.56pm. A Manchester London Road to Cardiff and Kingswear portion was picked up at Crewe, the combined train splitting again at Hereford. Meantime, the locomotive being run-in would turn on Shrewsbury triangle and then stand in the station centre road until the balancing northbound train arrived. There was time for a quick visit to Shrewsbury shed, if needed. The northbound working is thought to have been the 3.29pm Shrewsbury to Liverpool via Crewe, this train having come through from Plymouth. This train is shown to include a Glasgow portion plus coaches from Cardiff and Paignton to Manchester London Road, these sections to be detached at Crewe. This train would eventually arrive at Lime Street at 5.21pm. There would then have been ample time for the locomotive to make a second visit of the day to Edge Hill MPD before returning to Crewe on an evening semi-fast, the 7.20pm from Liverpool seeming to be the likely candidate.

To the end of steam days, this working for the running-in of new and repaired engines seems to have been perpetuated. The author recalls seeing his first 'Princess Coronation' No.46230 *Duchess of Buccleuch*, obviously just turned out from Crewe Works in the British Railways experimental blue express locomotive livery, as he passed through Shrewsbury returning from his 1948 summer holiday in Wales. Simmering quietly in the centre road, the

New 'Princess Coronation' Pacific No.6227 *Duchess of Devonshire* is checked over at Edge Hill depot on 24th June 1938 before working the 12 noon Liverpool Lime Street–Plymouth as far as Shrewsbury on a running-in turn under the supervision of the bowler-hatted inspector. Note the special design of 'streamlined' headlamp.

Having photographed No.6227 being prepared, Eric Treacy then enjoyed a footplate ride and recorded the view from the fireman's side on the approach to the Runcorn Viaduct over the Mersey.

locomotive was awaiting its train from the West of England, a fine spectacle to be witnessed again on various occasions through the early 1950s. South of Shrewsbury the workings were the province of GWR 'Castles'.

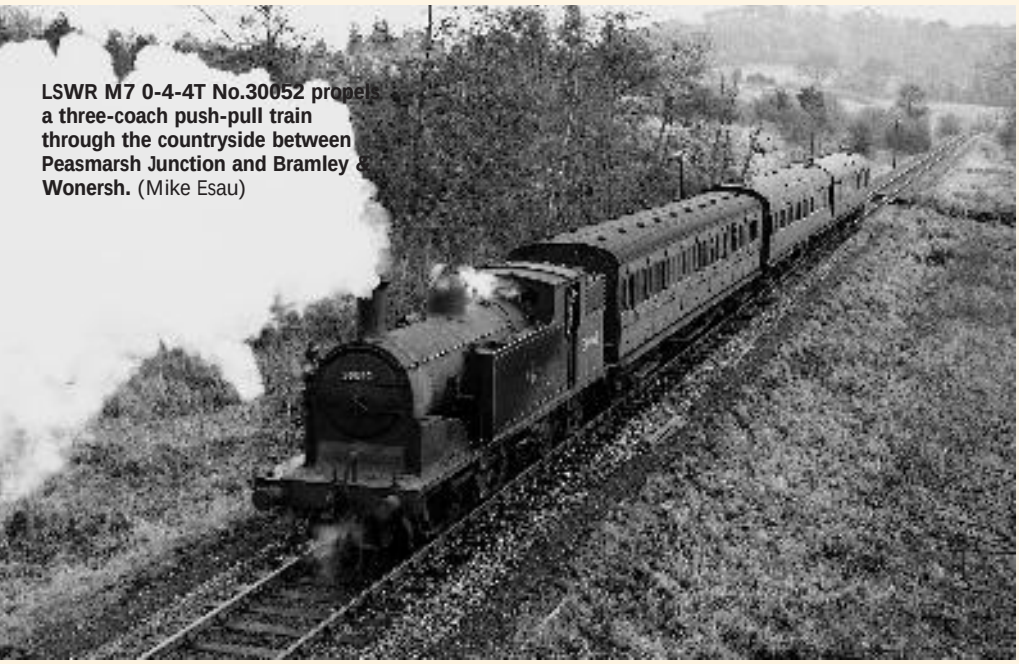
Pacifics were also run-in on the Crewe to Manchester local trains, the locomotives being turned on the turntable installed by the LMS at London Road station. This turntable was removed in the early days of electrification work to make way for the remodelling of the track layout. Therefore, as the turntable at Longsight MPD was not long enough to take the Pacifics, it was the practice to work them back to Stockport to turn via the 'Khyber Pass', south of the station, using the Davenport–Cheadle line link. The Crewe to Holyhead passenger services were also used for running-in purposes from time to time in later days.

One of Eric Treacy's first experiences of the running-in turn seems to have been in 1935 when he observed the new 'Turbomotive' Pacific, No.6202. Consecutive photographs from his camera show it coupled to the same GWR coach at Lime Street and then at Crewe, indicating that he probably travelled on the train to see how the locomotive performed. The Lime Street photograph shows the new engine being given a close inspection by curious railwaymen who had not seen the like before. Over the following years Eric was to photograph this locomotive many times, as it appeared every day on Euston and Liverpool expresses.

Eric's happy and fulfilling period at Edge Hill came to a sudden end in 1939 at the outbreak of the war when he decided to offer his services as an army padre to a local artillery regiment. At the end of hostilities he was not able to return to Liverpool Diocese but was offered the living of the Parish of Keighley in the West Riding of Yorkshire. He was happy to accept the post and so a new but equally rewarding prospect lay before him.

The author is a member of the LMS Society and these prints are from negatives in his collection.

'A 'Princess Royal' 4-6-2 pounds up the 1 in 93 gradient from Lime Street in the vertical rock-sided cutting through the city of Liverpool.



LSWR M7 0-4-4T No.30052 propels a three-coach push-pull train through the countryside between Peasmarsh Junction and Bramley & Wonersh. (Mike Esau)

A WASTED OPPORTUNITY

ALISTAIR F. NISBET reflects on the neglect and demise of the Horsham to Guildford route.

Readers may that recall back in April 1999 *Backtrack* included a good history and description of the Horsham & Guildford Direct Railway. After re-reading this and some earlier histories published in *The Railway Magazine* 30 and more years ago, together with various official documents such as public and working timetables, it seems inescapable that the way in which the line was run for most of its existence was a sheer waste of an opportunity. Let us examine the evidence for this sweeping statement and then it will be up to you to decide for yourselves whether you agree with me or not. With the Editor's indulgence I propose also to include a few snippets of information about the closure of the branch which have come to light in the National Archives at Kew. First, however, it will be as well to recap a little on the history of the line and its topography.

Horsham was at the time of the Guildford line's inception a largish town on what later became the London, Brighton & South Coast Railway's (LBSCR) Portsmouth route while Guildford was, and still is, the county town of Surrey. Railway-wise it lies on the London & South Western Railway's (LSWR) Portsmouth Direct line.

The branch itself was built by a nominally independent company, the Horsham & Guildford Direct Railway (H&GD), although it is often regarded as being an LBSCR-inspired creation which should have formed part of a very useful cross-country route between Brighton and Surrey, albeit without the opportunity for direct through running for most of its existence. Indeed, the original vision had been for it to form part of a through route from the Midlands to the South Coast — the villages along its route were to be served more because they were there rather than by any real desire to be a local railway.

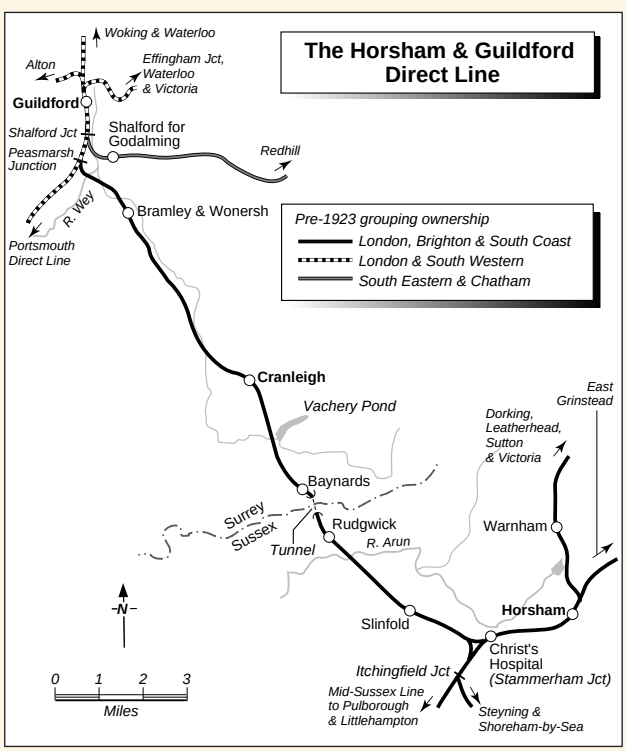
The promoters had to keep in with both the LBSCR and LSWR because they needed running powers over both companies' Portsmouth lines but relations between these two were less than friendly at this time, mostly on account of the opening of the LSWR's Portsmouth route. There were other irritations for the LBSCR, however, these all being connected with the LSWR's desire to reach the Sussex coast which had included its support for a doomed project to build a direct railway from Dorking to Shoreham-by-Sea. The LBSCR did not want its rivals anywhere near Horsham and 'its' territory while the South Western was certainly not prepared to have the Brighton Company in 'its' town of Guildford.

The railway was authorised to run from Stammerham, just to the south of Horsham, to meet the LSWR Portsmouth main line at Peasmarsh, with running powers from there for almost two miles to Guildford. Stammerham was then just a point on the Horsham to Pulborough and Petworth branch, the Portsmouth main line not having been completed yet. The Guildford branch itself was a fraction over 15 miles in length and, after much delay, opened on 2nd October 1865. It was built as single track throughout except for passing places at some stations. The intermediate stations were at Slinfold, Rudgwick, Baynards, Cranleigh and Bramley & Wonersh.

Many of these stations served very tiny populations — Baynards, for instance, seems to have been built mainly to serve the owner of Baynards House. Rudgwick station was only three quarters of a mile from Baynards and had been built to serve the villages of Rudgwick and Bucks Green. By the 1930s a competing bus service ran the whole length of Rudgwick village; the station was at the least populated end and it was therefore not unknown for the booking office to sell no more tickets all day after the departure of the first train to Horsham. At Slinfold there were some picturesque old cottages but they produced very little passenger traffic; the same applied to the hotel which had been built beside the station but did not prosper.

A second branch had been built from Horsham, or rather Stammerham, and this went southwards via Steyning to Shoreham by Sea, trains via this route terminating at Brighton. It had already been in operation for some four years by the time that the Guildford route actually opened for traffic but no consideration seems to have been given to the possibility of combining the two branches, either by ensuring through running (albeit with a reversal at Stammerham) or even by ensuring that connections there were good and practical. With 20/20 hindsight, of course, the most sensible thing to do would have been to ensure that the Guildford route started from Horsham in the opposite direction, looping round to reach its built alignment from a different direction. This would have allowed through running between Guildford and Brighton, something which was never achieved on a daily basis — in the 1950s and early 1960s there was provision in the Working Timetable for Sunday excursions to work through from the Western Region to Brighton but only on a few high summer weekends.

Interestingly, although the original intention had been to serve Horsham, when the LBSCR's Chief Engineer (Robert Jacomb-Hood) prepared his drawings it was found that the junction



at Stammerham had become south-facing instead of towards Horsham — perhaps he had also thought it madness not to provide a through route to the coast. Nevertheless he confessed to the board on 28th March 1862 that he had overlooked the Horsham section but agreed to amend the final plans accordingly. It seems that the H&DG's Engineer, Edward Woods, was blamed for this 'oversight' and was summarily dismissed at the same meeting. Strangely, in view of this, when the line was built a spur line had actually been built to create a triangle which permitted through running to the south but this was closed as early as 1st August 1867, the spur having had almost no use made of it. In 1864, even before the line had been completed, the Horsham company was absorbed by the LBSCR. As a matter of interest the contractor managed to lose £30,000 on the works, his estimate having been rather inaccurate, perhaps a symptom of the way in which the line was conceived and operated.

One factor which killed off the idea of a through route, however, was the good relations between the LBSCR and the London & North Western Railway which meant that through services were worked over the West London Railway and thence down the Brighton Company's main line. On the face of it, therefore, there was no reason for the Horsham & Guildford to be other than a purely local branch. However, the LNWR was not the only company serving the North and Midlands, for the Great Western Railway also ran services to Birmingham, Wolverhampton and Birkenhead via Reading and Oxford. With some encouragement it could perhaps have been persuaded to run through services from those parts to the South Coast via Reading, Guildford and Horsham and then Brighton via the Sussex Coast, or indeed to Bognor, Littlehampton and Portsmouth, but instead those that they did run went via the SECR route from Guildford to Redhill.

Also with that famous hindsight it is clear that so much more could have been done to ensure that the Horsham & Guildford Direct was a really useful railway but, as was the way of these things, the original politicking seemed to bedevil the line for the whole of its existence and so it was run very much in isolation, hardly even having any connection with the Horsham to Brighton service. Thus it never reached the status it could have done with more imaginative management. Even when the Southern Railway went ahead with its massive electrification schemes of the 1930s, no effort was made to improve things on the Guildford line — even if the business case was not there for laying conductor rails, surely some sort of effort could have been made to ensure that there were useful connections at both ends of the line? Possibly a better service would have attracted custom from a wider area.

Now let us look at some of examples of the services actually provided over the line. It would be tedious to list every change in service pattern so a few sample years are related. Once the railway opened there were about six trips in either direction between Guildford and Horsham on weekdays with two each way on Sundays. Each called at all stations and took about 50 minutes to complete the journey. Right from the beginning the connections at Guildford were poor; the LSWR claimed that the station was already overcrowded as its excuse and the situation did not change until the station was rebuilt and extended. Even then connections did not improve substantially, it not being unknown for lengthy waits at Cranleigh and Bramley & Wonersh to ensure that a path would be available from Peasmarsh Junction.

Leaving Bramley & Wonersh for Horsham LMS-designed Class 2 2-6-2T No.41299 is in charge of the 18.05 from Guildford in June 1965. (Author)

Between 1917 and 1919 the Ministry of War Transport constantly demanded reductions in train services in order to save coal and train miles to supply the Fleet and the LBSCR's contribution to this economy drive was to withdraw all (ie both) Sunday services on the Guildford line.

The line had been very busy during the earlier part of World War I when many troop trains were routed this way to Littlehampton and Newhaven, but the occupation of France in 1940 prevented a repetition and instead an emergency timetable was introduced which saw a reduced level of service. By May 1943 the passenger service from Horsham was 7.59, 9.30am, 12.42, 1.40SO, 3.23, 4.53, 6.00, 7.12 and 9.30pm (this latter only ran until 2nd October) plus 7.19 from Cranleigh. On Sundays there were two journeys at 10.19am and 8.23pm. Weekday Guildford departures were at 8.05, 9.18, 10.34am, 1.09 SO to Cranleigh, 1.42, 5.04, 6.07, 6.34 to Cranleigh only, 7.34 and 8.34pm. The only Sunday services were at 8.54am and 7.22pm and generally the pattern of services did not alter much thereafter except to be reduced even further.

The connections between services on the Steyning and Guildford lines have never been particularly good; in fact, to make some of them at Horsham one would need to be very agile, assuming there were no delays en route. Changing at Christ's Hospital (as Stammerham became with the opening of the Bluecoats School there) should have given a better chance of making it but not all trains for the Steyning line called there. The fact that there were fewer journeys on the Guildford route than on the Steyning one meant less choice immediately and ensured that one could wait for two or three hours for a connection. For instance, in July 1922 the 9.44am from Brighton reached Horsham at 10.48 but the Guildford service had already left at 10.20 and the next was not until 1.05pm. Going south the first train from Guildford with any sort of connection for Brighton was the 8.08am with a mere 70 minutes to kill at Horsham.

In the last year of the Southern Railway one could, if lucky, make a four-minute connection at Christ's Hospital from the 3.57pm from Brighton into the 4.53pm from Horsham for Guildford. Late running, however, meant a wait for the 6.16pm from Horsham. The last train from Brighton by which one should have been sure of reaching the Guildford line the same day was the 4.58pm because the 6.15pm gave only a three-minute change at Christ's Hospital.

At the end of the 1950s the Steyning line boasted almost an hourly service with seventeen daily departures but the Guildford line still had its same old infrequent random selection with lengthy gaps between trains. Even though some connections improved a little, most still gave lengthy waits between trains at the junction or at

No.41287 arrives at Slinford with a service from Guildford on 4th May 1963. (D. W. Winkworth)

M7 No.30124 has arrived at Cranleigh at the head of the 1.09pm from Guildford on 22nd March 1958. (D. W. Winkworth)

Horsham. Connections on the Mid-Sussex line were still not wonderful although the repetitious pattern of main line service meant that even if, for instance, the 05 minutes past the hour service to Bognor had gone on arrival at Horsham there would be another at the same time past the next hour. The same applied to the XX.15 to Portsmouth and the XX.35 for Littlehampton.

Throughout much of the line's history few services were run which would have encouraged regular use by commuters to London — for instance, in 1959 the only one which would have allowed arrival at Waterloo at a time suitable for starting a working day was a 6.51am from Baynards, which enabled any passengers to admire the delights of Cranleigh station for thirteen minutes before ambling northwards.

Neither the Southern Railway nor British Railways did anything to improve the service on offer. For many years a parallel bus service had run at hourly intervals serving all stations and villages en route apart from Slinfold and this had a separate direct service to Horsham anyway. The result was inevitably that traffic continued to ebb away. Bus competition after World War II had threatened the survival of the branch and the enterprising station master at Cranleigh, a Mr. Goodsell, had suggested building new halts at Butley, south of Bramley, and Elmbridge Road in Cranleigh but nothing came of this any more than of his other suggestion — the use of diesel units. There had been an earlier proposal to try the ACV railbus on the branch but that never came about. Management inertia?

Services were again reduced with the September 1962 timetable change, both the 9.22am from Guildford and the 9.30am from Horsham being replaced by a Guildford to Cranleigh working although this was extended to Baynards three months later. The last Saturday working was withdrawn, leaving the latest departure for Horsham as 6.00pm. Sunday services had only run in the summer for some years and these were discontinued permanently. Even more surprising was the closure of the line at Christmas and Easter and on all Bank Holiday Mondays, just when it could have been promoted for rambles in the Surrey and Sussex countryside as was happening on lines in other parts of the Southern. This, of course, was all slightly prior to the publication of the infamous *Reshaping of British Railways* report but still signalled the authorities' intention to make the line as unattractive as possible to ensure a quick closure with little hardship to consider.

As mentioned previously, the line could be used on Sundays for excursions and in summer 1962 there was an outward excursion path booked to leave Guildford for Brighton at 9.45am or thereabouts depending on the origin of the train — this varied from week to week and included 7th July Great Malvern, 14th July Stratford-upon-Avon, 28th July Kidderminster, 4th August Warwick, 11th August Hungerford and 8th September Oxford. The return paths from Brighton to Reading left Horsham at 7.56 and 8.42pm, again depending on the destination.

Both the Brighton and Guildford branches from Horsham tended to be run as separate operations with little interchange of locomotives or coaching stock between the two although by 1946 some rationalisation had taken place. Nevertheless the push-pull sets were not used intensively — indeed, one made only a single return journey each day.

When the Southern Region announced on 2nd September 1963 that it intended to close the line, this sparked off many objections, both by individuals and by local councils. Whether these individuals actually travelled on the line very frequently is a moot point although there were by then a few London commuters. The Surrey County Surveyor told BR that if the line closed it would be necessary to bring forward into the next five year programme two road improvement schemes — one at Shalford and a bypass for Bramley at a total cost of £850,000. There was already insufficient parking space at Guildford station and the County would need to construct numerous bus bays alongside the A281 and B2128. What would it have cost to continue to keep the railway open (ie 'subsidise' in Ministry of Transport speak)? A fraction of the sum spent (ie 'invested') in the local roads, no doubt.

The Transport Users' Consultative Committee held an inquiry and, although it was recognised that there would be some hardship, the Minister agreed to closure once a few additional bus services had been provided. Within six months these were proving to be almost worthless for on 4th November 1965 the MoT told the British Railways Board that, as the additional buses between Baynards and Cranleigh were carrying an average of one passenger in either direction between 14th June and 28th August (and in no case had there been more than three), these services could be discontinued. Within two years almost all the extra buses had been discontinued because of lack of custom.

A file at the National Archives reveals how BR had tended to approach such closure hearings. It seems that a senior civil servant in the Treasury had attended the inquiry, presumably as a resident and objector, and had written down his impressions of how their case had been presented. "The Chairman asked the BR representative if he had any comments on the evidence given. He was an unimpressive little man who, from the first, adopted a hostile and querulous attitude … He said bluntly that BR, because of the small numbers in the small community near Barnards (!) station, did not propose to offer any alternative arrangements. This decision may be perfectly justified but it was exposed with a degree of malicious glee which roused most of the audience to fury." The BR representative had obviously not been well briefed for he shot himself in the foot a number of times through lack of knowledge of facts and when he started to say how the Aldershot & District Bus Company could improve its services the chairman told him to "mind his own business and not the bus Company's". Such behaviour only infuriated the general public but ultimately the BRB had its way, complete closure coming on 14th June 1965.

All the goods yards were disconnected from the through lines when the freight service was withdrawn (while passenger services were still in operation) but the connection at Baynards had to be hastily reinstated when it was realised that block trains were still running to a chemical factory there! They finally ceased when the branch closed completely.

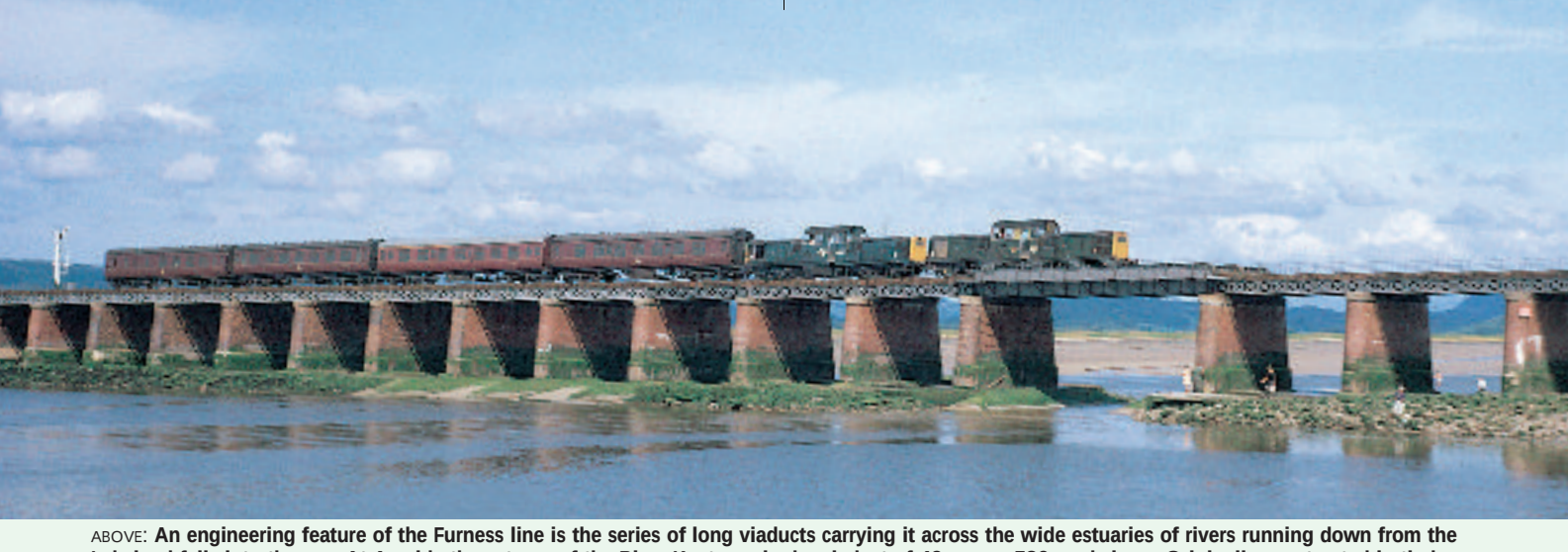
M7 No.30110 propelling the 1.34pm Guildford–Horsham meets '700' Class 0-6-0 No.30700 on the 1.40pm Cranleigh–Guildford at Bramley & Wonersh on 27th February 1960.
(D. W. Winkworth)

ON FURNESS LINES

One of the most scenic — and for too long overlooked — lines in England is the Furness Railway route from Carnforth around Morecambe Bay to Barrow and along the Cumbrian Coast to Whitehaven. Its development was protracted and piecemeal but the route was complete by 1857. The discovery of huge iron ore deposits led to the rapid development of Barrow-in-Furness as an iron and steel centre; the railway constructed new docks and shipbuilding arrived; steamers sailed for Belfast and the Isle of Man. The boom years were not to last, though, and a long decline followed during the twentieth century. The railway, fortunately, has survived and this feature looks at some of the scenes on the southernmost section between Carnforth and Barrow. A second feature later in the year will take us north towards Whitehaven.

ABOVE: **Close to Morecambe Bay's shore is attractive Kent's Bank station, neatly constructed in stone and timber. One of the early 'Derby Lightweight' diesel multiple unit trains leaves after its call on a service to Barrow in May 1967, as the porter wheels a sizeable barrow away; what *can* have been loaded there?!** (J. S. Gilks)

BELOW: **LMS 8F 2-8-0 No.48670 approaches Dalton Junction with a freight to Barrow on 13th April 1966. The train is taking the route to Barrow but the junction signal marks the divergence of the 1858 Millwood curve enabling trains from the Carnforth direction to run direct towards Whitehaven without reversal and later to avoid the long circuit through Barrow. The load includes a nuclear flask being taken to the United Kingdom Energy Authority's plant at Windscale, now known as Sellafield, where irradiated nuclear fuel elements are reprocessed. The conveyance of these flasks between Sellafield and other nuclear power stations on special 'Flatrol' wagons has been a controversial traffic on the line but has contributed significantly to its survival.** (David Idle)



ABOVE: **An engineering feature of the Furness line is the series of long viaducts carrying it across the wide estuaries of rivers running down from the Lakeland fells into the sea. At Arnside the estuary of the River Kent required a viaduct of 49 spans, 520 yards long. Originally constructed in timber, it was renewed in the 1880s and again rebuilt during World War I. Two Clayton Type 1 diesels combine their meagre resources to cope with the four coaches of a local passenger train from Barrow on 2nd August 1968.** (David A. Hill)

ABOVE: **A Preston–Barrow DMU passes Plumpton Junction, east of Ulverston, in July 1975. The junctions here were for the Lakeside branch and for the old Conishead Priory branch on which the passenger service had ended in 1917 but which remained for a short distance for freight from the Glaxo works.** (J. S. Gilks)

BELOW: **BR Class 4 4-6-0 No.75019 approaches Grange-over-Sands at Blawith Point with a down goods in June 1968. A little further back along Morecambe Bay there used to be a siding at Meathop where sea-washed turf was once loaded for use in bowling greens!** (J. S. Gilks)

ABOVE: **The branch to Lakeside (Windermere) lost its year-round service in 1938 after which (apart from a wartime interruption) it ran only in summer until 1965. Goods traffic *did* continue, however, and the yard at Haverthwaite seems busy on 31st May 1960 when Midland Railway 2F 0-6-0 No.58287 was shunting the sidings. The station was last used for passengers at the end of the 1946 season but was not officially closed until 1955.** (J. S. Gilks)

The neat little terminus at Lakeside was next to the landing stage for the Windermere steamers. This was the scene ` as the pick-up goods from Ulverston arrived behind No.58287 on 31st May 1960, with the station ready to awaken for a new season. (J. S. Gilks)

Continuing around Morecambe Bay the Leven estuary was crossed by a similar viaduct to that at Arnside, again with 49 spans. In 1903 the carriages of a Carnforth to Barrow mail, which had been forced to stop on Leven Viaduct, were blown over during a 100mph gale! (J. S. Gilks)

ABOVE: **Grange-over-Sands developed as a minor but modestly fashionable resort once described, with unerring accuracy, in the** *Westmorland Gazette* **as "not gay, not fast, not boisterous, not overcrowded". Nevertheless the station was uncommonly busy on 23rd May 1976 when the National Collection's LNWR 'Precedent' 2-4-0 No.790** *Hardwicke* **arrived on a special run from Carnforth.** (Roy Hobbs)

BELOW: **LMS 3F 0-6-0T No.47373 passes Dalton Junction on a trip freight to Barrow on 13th April 1966 under the scrutiny of three railwaymen. Curving sharply round to the right is the Millwood curve to Park South Junction where the loop through Barrow rejoins the line on to Whitehaven. Furness signal boxes were invariably of pleasing design and this one has features of interest: note the brick-lined staircase leading to a 'shed' beneath the entrance landing and the two-bay coal bunker.** (David Idle)

Ashington station c1920, with a North Eastern Railway BTP 0-4-4T arriving with a local passenger train. (Author's Collection)

SECRETS OF THE LOG BOOKS

ALAN WELLS *describes how entries in Occurrence Books held in signal boxes can provide a glimpse behind the scenes and reveal a lot of background information. He shares what he has discovered about Newsham North and Hirst Junction on the former Blyth & Tyne branches in Northumberland.*

Today the East Coast Main Line between King's Cross and Edinburgh is controlled by just nine signalling centres and track is known to be clear unless it is shown electronically to be occupied. Prior to modernisation in the 1960s and '70s every route was divided into sections, each controlled from a signal box. This was the Absolute Block System which assumed the line was blocked until it was proved to be clear by the use of block bells and block instruments. In this way trains were passed in safety from one section to the next.

Newsham North was a typical North Eastern Railway signal box situated towards the northern end of the Blyth & Tyne branch in south east Northumberland, built of bricks and with plenty of windows in wooden frames above. In its day it contained coloured levers in a large lever frame — red for working home signals in the vicinity of the box, yellow for distant signals, black for points, blue for the mechanical locking of points, white for spares. Distant signals gave drivers advance notice of whether they had a clear run into the next section or not.

Above the frame, on a substantial wooden shelf, were fastened the sturdy block bells and block instruments, electrically operated, also signal repeaters which showed whether the relevant signals were working correctly, particularly when they were out of sight. Suspended from the roof beams, behind and above the levers, was the large, framed track diagram which showed the position of all points and signals and their corresponding numbers on the levers. There were handlamps and flags, also detonators for use in emergencies or in fog or falling snow.

Beneath the cabin floor were rods which prevented conflicting movements — the interlocking. For example, signals could not be 'pulled off' (ie cleared) until the points were correctly set; similarly a distant signal would remain locked in the frame until the home signals showed the line was clear. Speaking generally, points and signals were not interlocked until the 1870s.

Outside were rods which connected the levers in the signal box to the various points and wires to work the signals. All mechanical pieces of equipment were maintained by fitters over a given area; electrical components such as block equipment and telephones were installed or repaired by linemen.

The North Eastern Railway, followed by the LNER and British Railways, kept an Occurrence Book in which anything out of the ordinary was recorded by the signalman. These were examined and signed by the station master or signalling inspector on their regular visits. With so much equipment things *could* go wrong, but if human misjudgement, rules being ignored and severe weather were added — then they *did!* These records, even though often mundane, can provide valuable information about railway operation on a particular route or branch at some periods in its history. In the 1950s and '60s it was possible to find Occurrence Books going back to the early 1900s which had lain for many years in a signal box drawer or cupboard and some of these have found their way into record offices, local history society archives or private collections.

The 3.00pm train from Blyth to Monkseaton on the 'pass-by' line at Newsham with NER G5 0-4-4T No.67323 on 4th June 1958. Once clear of the points the locomotive would draw the train into the branch platform. (Ian S. Carr)

To set the scene before delving into the log books of Newsham North, it is necessary to explain its location and environment. When collieries were situated near a navigable river it was a comparatively simple task to transfer coal to ships, but as pit shafts were sunk further inland coal had to be transported over greater distances. Because Blyth harbour had limited loading facilities in those early days, waggonways were laid to the River Tyne. Gradually the output of more collieries in south east Northumberland was fed into these routes, culminating in the formation of the Blyth & Tyne Railway in 1853. As more staithes were built on both sides of the river at Blyth a great deal of coal traffic and general merchan-dise travelled through Newsham.

Newsham, a junction on the former Blyth & Tyne Railway, had a down platform for services to Morpeth or Newbiggin, both of which were termini at the northern limits of the branch. The up platform handled passenger traffic to Monkseaton or Newcastle, while coal for the Tyne and elsewhere passed through. The branch

LNER Q5 0-8-0 No.644 (NER Class T) passes Ellington Colliery c1930. (Author's Collection)

platform was used for trains to and from Blyth. Alongside this platform were loops and sidings and there were four tracks as far as Newsham South, two through lines and two 'independents'. An anomaly at Newsham was that there was no direct connection into the branch platform from Blyth which meant that passenger trains had to run through the station on the 'pass-by' line and reverse into the platform or, as was sometimes expedient, into the up platform. This caused incidents which will be explained later. Replacing a trailing crossover with a facing one would have solved the problem — but for some reason it was never done.

Browsing through the pages of Occurrence Books from Newsham North, what can be found? What can we learn about what happened all those years ago? Newsham North signal box worked to three others, namely Newsham South, Plessey Road and Isabella, each of which had a level crossing included in its operations. An early entry dated 10th April 1910 simply recorded "Opened to Isabella Jct. New Box 7 a.m. No. 12 from Staiths Distant dispensed with."

Alterations to track, signals or interlocking were recorded, for example, in 1911, 1912, 1922, 1930 … but this was on-going. When signals were disconnected flagmen were used, working closely with the signalmen. Entries indicated that maintenance, renewal and repairs were done on a regular basis, as would be expected. When the engineer took possession of the tracks all traffic movements were suspended apart from engineers' trains (known as P. Way workings) until the job was completed. If block instruments or bells failed, communications between signal boxes were done by telephone and trains were sent forward *at caution* after the drivers had been made aware of the situation.

On 22nd December 1927 an entry read as follows: "Special Mineral Train Ashington to New Bridge Street (Newcastle) Eng. No.2340 passed here at 3.33 a.m. and stopped at South Box for water. Unable to obtain water. Wrong Line Order Form issued at 4.17 to enable engine to go to Blyth."

Several derailments were recorded together with minor accidents. 25th October 1929 is an example of a signalman trying to describe what happened as briefly as possible: "The 6.40 Goods, Morpeth to Heaton Jctn. arrived here at 7.49 in Up Independent and set back clear into the Pass By to attach and detach traffic to and from the sidings and owing to the darkness and other trains shunting at the same time the Goods Engine No.962 came out of the Pass By without a signal and fouled No.2 Up Independent and caused a mineral train engine No. 1940 working a train from Bedlington to Heaton Jctn. to collide with Goods engine 962 and blocked the Main Up line whereas single line working had to be established on the Down lines between Newsham North and Isabella and Plessey Road at 8.45 p.m. Tool vans sent for and arrived here at 10.4." In short, engine No.962 moved forward again at a signal at danger and was hit by number No.1940 hauling a coal train!

Earlier, in December 1916, it was noted that "Engine 1227 working a mineral train from the North, while attaching and detaching mineral wagons on the full road, the rear portion of the train ran away on the Down mineral line to New Blyth, the engine having to go down after the rear portion and propel it to New Blyth and return on the proper line." Similarly, four years later: "While Morpeth to Blyth Pilot (ie local goods) 1998 was shunting his train at 6.40 p.m. on the empty mineral line part of his train consisting of Van and four wagons ran away facing road to New Blyth Branch causing accident to Engine and Brake at Mill Pit, proceeding to Newsham."

How do these vehicles run away? Perhaps the guard failed to couple up at the first attempt and the nudge of buffers was sufficient to set the standing wagons moving. It could have been a broken coupling — or that the guard failed to apply the brakes on his stationary brake van. Some guards would rather take the risk of vehicles running away if it saved them from walking alongside the train to release the van's

Another of the NER's powerful 0-8-0s — T2 Class No.1247. (Author's Collection)

brakes. It was easier to signal the driver to move forward then jump on the brake van as it passed! Fast forward to January 1945 … "Coal train ex Crofton arrived 8.13 p.m. Informed by guard that train had divided. 'Vehicles running away on wrong line' sent to Isabella Box 8.13 p.m. Rear portion collided with engine and van 2354 following up from New Blyth." (The actual cause of this accident is not known.)

From 1905 the North Eastern Railway favoured the use of autocars where the locomotive was coupled to one coach or between two and used as a push-and-pull unit. It was mentioned previously that trains from Blyth had to reverse into the platform at Newsham, which caused confusion to some passengers. One signalman drew attention to the possible danger as follows: "During the past few weeks, in the dark, many carriage doors have been opened on the wrong side, especially when a Branch train sets back into the Main Up Platform; there is a great danger to the passengers, and also doors have been broken by trains on the Main Down. I have written to the Station Master today, asking that something should be done in the matter."

As if fulfilling the prediction, the following was recorded on 28th June 1919: "As the 7.36 p.m. Car was leaving the station I observed a carriage door being opened by a girl. I immediately placed the Up Advanced Starting Signal to danger and stopped the car. Before the car was brought to a stand the girl jumped out and fell in the six-foot way. I promptly ran to her assistance and on reaching her found her rather shaken but not seriously hurt. The Car was delayed about three minutes in consequence."

Steam railcars, named after stagecoaches, were introduced by the London & North Eastern Railway in 1927 for use on some branches. They were generally regarded as being very reliable but on 18th June 1929: "The 3.52 p.m. ex Central, Steam Coach 'Brilliant', arrived here at 4.39 p.m. and was unable to go forward and had to be shunted to the short end of Down Independent. Left here again at 5.59 p.m. for Central, light, via Backworth." Also, on 14th March 1943, "The 8.43 O.P. (ordinary passenger) ex Blyth derailed at No. 36 points at 8.50 p.m. when setting back into Branch Platform. Steam Coach 'Industry' 2271."

Several reports relating to World War I and II were included. Although not railway related, the signalman thought it important enough to write down on 23rd August 1916 that an English airship had passed over Newsham station in the direction of Blyth from Percy Main. Perhaps he first thought it was a German Zeppelin as there had been previous raids on the River Tyne. Joy and euphoria could not be contained on 11th November 1918 … "End of war news at 10 a.m. Peace flags flying, buzzers blowing, rockets fired from ships in Blyth Harbour."

It all happened again when a terse entry on 3rd September 1939 read "War declared, notified 11.15 a.m. Air Raid Warning Red received 11.40 a.m. Green received 11.52 a.m." This would be to test sirens in the town. Houses were hit near the line to New Blyth in February 1941 and single line working was in operation between Newsham North and Bebside as the up line had been damaged by a bomb. Two months later a mine was dropped near the entrance to Blyth station. All lines were blocked and a signalman was killed. On another occasion the book denoted that the guard and fireman were "supplied with rations". Train Control was advised: engine No.428, cattle.

What other reports were found at Newsham North? In October 1925 the fireman of engine No.1842 informed the signalman that a wagon was on fire in No.1 siding. It was taken to the water column by engine No.1933. When another wagon fire occurred on a separate occasion the guard and enginemen of engine No.257 were asked to attend and deal with as necessary! Engine No.257 was detained from 3.05 to 3.55pm. Each signal box was given a ration of coal, usually half a wagon load at a time, but if the supply was inadequate firemen were usually willing to fill a large scuttle from their engine. A 'delivery' of a different kind was made in January 1930 — "Received nine pen nibs today for cabin use."

Animals straying on to the line were obviously a potential danger. Sheep, horses and pit ponies were mentioned, but a note in the Occurrence Book of 1911 gave scant attention: "Horse killed at Isabella Jct. by 9.58 p.m. Down Passenger. Little delay to train."

Drivers also reported 'pitfalls', where holes appeared in the ballast. These were caused by mine workings underground. If the track was deemed to be unsafe, speed restrictions were imposed until the faults were rectified.

Plessey Road signal box, which was about mile away, was recorded in the log of Newsham North as being involved in several mishaps where trains — or, as on one occasion, a bus — crashed into the gates. A large crate caused some consternation when it was blown on to the line, but it was quickly removed. Plessey Road ceased to operate as a block post from 5.08pm on 9th July 1930 and became a 'gate box' only, opening and shutting the level crossing gates on instructions from the signalmen in the North box. Once the change was made Newsham North worked through to Bebside, the next station. A report in the Occurrence Book of Newsham North indicated a derailment at Bebside on 28th December 1955 when both up and down lines were blocked. The 'Obstruction Danger' bell signal was received at 2.54pm but the 'Obstruction Removed' was not given from Bebside until 8.59pm.

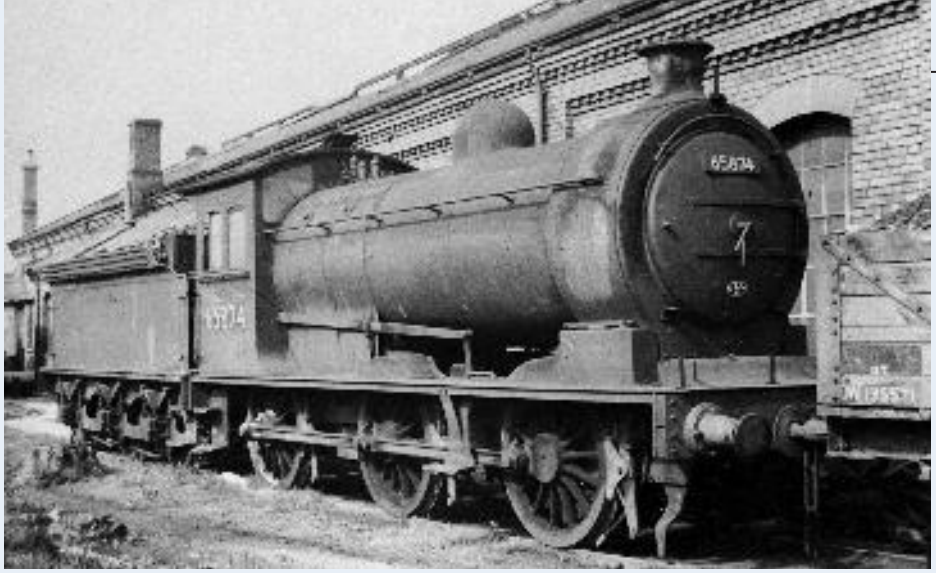
From time to time signal boxes were subjected to an analysis of the number of moves made with the levers each hour over a full day or two days. This may have been done to re-assess the classification of the cabin for wages purposes, or it may have been an appraisal of how well the equipment was working. Such a record referred to Newsham North on 18th and 19th June 1924 and revealed the following:

Number of lever movements:	5,234
Train signalling (ie bell signals):	971
Hand signals, etc:	140
Number or trains over the two days:	250

It is worth recording that the first signal box on the Blyth & Tyne Railway was at Newsham and it was there that two of the formidable NER snowploughs were stationed to be used on the branch and elsewhere when required. During fog or heavy snow platelayers were deployed as fogmen. They were stationed at distant signals where a detonator would be clipped to the rail. If the detonator exploded when a train passed over, it warned the driver that the next home signal could be at danger. If the fogman heard the signal wires move he would know the signal above was 'off' and he would remove the detonator and replace it when the train had passed. Standing there in those freezing conditions was not a job for the faint-hearted!

40-ton and 20-ton coal wagons at Ashington Colliery. (R. Miles Collection)

Six miles north of Newsham was Ashington station, called Hirst until October 1889. It was one of two intermediate stations on the Blyth & Tyne branch to Newbiggin, the other being North Seaton. Hirst had facilities for passenger traffic and a modest goods yard



The NER Class P3, LNER Class J27, 0-6-0s were the backbone of coal movements on the Blyth & Tyne branches. Introduced in 1906, these sturdy locomotives lasted until the end of steam. No.65874 is seen at South Blyth shed. (Author)

capable of handling general merchandise, livestock and road carriages brought in on flat trucks. Coal from the collieries in the area had to be taken via the East Coast Main Line for a few miles to Morpeth, then on to the Blyth & Tyne to Blyth if it was for export.

In 1886 a new connection from the Ashington collieries complex was made with the NER at Hirst station and this became known as the Linton branch. It enabled enormous tonnages of coal to be taken to staithes at North Blyth by a much more direct route. From the chaldron wagons carrying 2 tons 13 hundredweights there evolved wagons to carry 8, 10, 17, 20 or 32 tons; then, in 1903, bogie vehicles were introduced to convey 40 tons each between Ashington collieries and Blyth. Locomotives to handle this lucrative trade were largely 0-6-0 tender engines of various classes, but there were variations. Most of these were shedded at North Blyth, South Blyth or Percy Main.

Inevitably, many entries in the Occurrence Books from Hirst related to the Linton branch of which these are three examples. On 19th August 1902 it was noted that, "As coal train loco 1961 was entering Linton branch five wagons became derailed at 3.55 p.m. and were put on again by colliery engine. Tool vans sent for but stopped at Bedlington as not required."

Later that year "Mineral train no. 937 over-ran the From Branch safety points at entrance to colliery at 8-50 p.m. blocking the Down Main line to Newbiggin. The 8-40 p.m. ex Bedlington to Newbiggin was detained here until single line was commenced between here and Woodhorn Colliery cabin at 10 p.m." Normal working was not resumed until 9.53am the following day. On 30th July 1903 "Train of coal empties, engine 1694, derailed all wheels on points when entering Linton Branch at 2-20 p.m. Still off at 7 p.m." As will have been noted, some signalmen kept their reports very short and did not go into detail!

It must be remembered that colliery track was never to the same standard as that maintained by the railway company. The engine 1694 referred to above was a T Class 0-8-0, a very powerful locomotive introduced in 1901 and weighing (with tender) over 100 tons. As far as possible, NER drivers kept their own engine and the driver of T Class No.651 seems to have been quite a character who was involved in several incidents:

17th December 1903:	Divided train
16th February 1904:	Engine struck Down platform
13th August 1906:	Loco broke colliery gate
10th October 1907:	Side rod dropping off. Repaired by driver!

In 1901 it was reported in *The Engineer* that a T Class had hauled a demonstration train weighing 1,326 tons at Tyne Dock. It covered eleven miles in 52 minutes. Similar trials followed at Blyth — and the engine? It was No.651.

Reference has been made to single line working as a way of keeping traffic moving following a derailment. When this was introduced a responsible official, such as the station master or an inspector, acted as conductor. He wore a red armband with the word PILOTMAN in white letters. No train was allowed over the single line working unless the pilotman was on board the engine or had personally given the driver authorisation to proceed. He would do this if there was more than one train in the same direction.

Mention has also been made to 'Tool Vans', a railway term for the breakdown train. On the Blyth & Tyne branches it was usual for the train based at Percy Main to attend incidents and, when called out, it took precedence over other traffic. The standard North Eastern Railway formation consisted of a crane, packing van (carrying wooden blocks of various sizes), tool van and a mess van in which the crew rode and had their breaks. In British Railways days the 75-ton crane based at Gateshead was used when required.

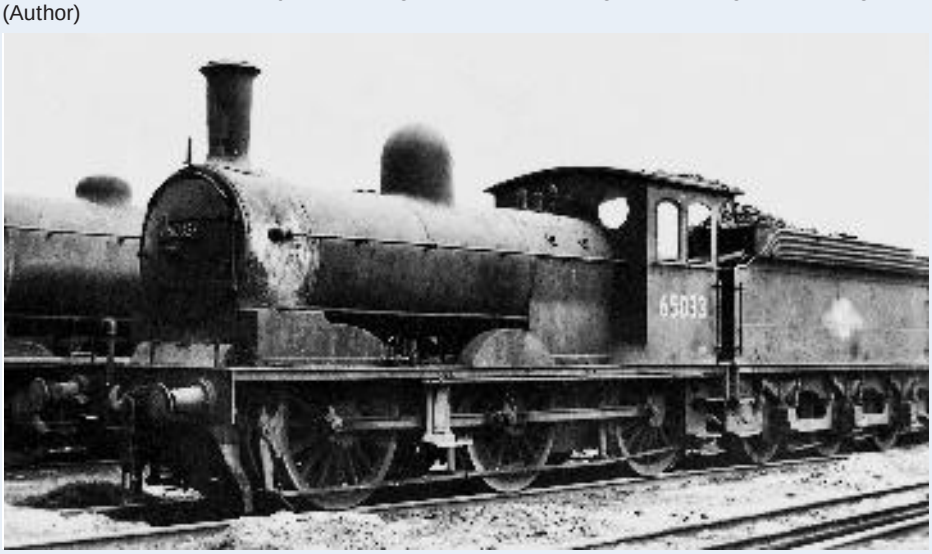
It was not only the Linton branch which featured in the log books of Hirst. On 15th November 1905 one pair of driving wheels of an 0-4-4 tank engine, No.387, derailed on points. The driver was able with care to re-rail himself then departed with a theatrical special to Bedlington. In September 1906 sister engine No.1919 mounted a rail on a crossing when detaching a carriage truck and was derailed. At the end of December 1908 the goods pilot was stuck in a snowdrift between Woodhorn and Newbiggin until it was rescued by snowploughs.

An entry on 18th July 1916 noted "As goods engine number 1961 was pushing into goods yard from the Up line, engine burst a tube. Phoned No. Blyth and [was] instructed to put 1183 standing here to goods and send 1961 home. Driver refused and left at 2.38 p.m. taking 1961 with him to North Blyth." No.1183 was one of the powerful Y Class tank engines capable of hauling 1,000-ton loads.

Two further entries are worth recording. 28th October 1905 relates that "Policeman Briggs informed me at 11.17 p.m. that driver of the 11.13 p.m. Passenger had struck something on line between Bedlington and No. Seaton. I telegraphed to Bedlington and was answered back that he had struck some sleepers laid across the line and that the keys were out of the rails." This would have been a deliberate act which could have had serious consequences. Another incident could also have caused injury on 31st October 1914: "As goods was leaving for Newbiggin at 9.43 a.m. Porter R. Gibson went through the bridge with a one-wheeled barrow. He was turning the corner when goods passed him. Engine cleared him, but the handle of a wagon brake caught the barrow and turned him over and over to the middle of the bridge. Barrow smashed and Gibson bruised on head and legs. Goods stopped to see if he was alright and left at 9.48 a.m."

From very modest beginnings in the mid-nineteenth century Blyth was Europe's coal-handling port in 1961 when 6,889,317 tons were despatched. The former Blyth & Tyne branch remains but a shadow of its former self. Newsham North signal box was demolished, though Ashington still handles traffic into and out of the Alcan terminal nearer the coast. All the collieries in Northumberland have now gone, though Woodhorn Colliery is now a museum.

Four Class J21 0-6-0s remained in service in 1960 but were withdrawn shortly afterwards. No.65033, shown at South Blyth, was a regular visitor to Bedlington on local goods workings. (Author)



RAILWAY REFLECTIONS

No. 138

A PERSONAL ASSESSMENT OF SOME ASPECTS OF RAILWAY HISTORY

BY MICHAEL RUTHERFORD

'EXPORT OR DIE!' BRITISH DIES AND MODERNISATION PART

ABOVE: **Three 1,600hp diesel-electrics were ordered by the Southern Railway which had a post-war plan to dieselise non-electric routes. These locomotives were not rushed out and had improved engines. The first two (Nos.10201 and 10202) of 1,760hp were built at Ashford in 1950/51 whereas No.10203, built at Brighton in 1954, was held back, redesigned and fitted with the MKII engine of 2,000hp, becoming the prototype for the EE Type 4. It was captured here when new in April 1954 on a test train at Waterloo.** (S. C. Townroe/Colour-Rail DE629)

This year, 2008, marks the 50th anniversary of the first batch of Type 4 main line diesel-electrics delivered as part of the British Railways Pilot Scheme of the Modernisation Plan of 1955 and this was alluded to in the colour spread included in last month's *Backtrack*.

Those ten locomotives (Nos.D200–209) were built by the English Electric Co. at the Vulcan Foundry, Newton-le-Willows, which had become part of the English Electric Group in 1955 although having had close ties with the Preston-based organisation since 1946. In its turn the Vulcan Foundry had taken over Robert Stephenson & Hawthorn's two years previously although that company had only been formed in 1937 when one-time Newcastle upon Tyne neighbours Robert Stephenson & Co. and R. & W. Hawthorn, Leslie & Co. amalgamated. By that time Stephenson's had transferred to their new factory in Darlington which began production in 1901–02 and Hawthorn, Leslie's had Forth Banks works expanded into Stephenson's former Forth Street premises.

The ten Type 4s were not the first of the Pilot Scheme orders to be delivered. Twenty Type 1s had also been ordered from English Electric (Nos.D8000–8019) and were built concurrently with the Type 4s at the Vulcan Foundry, sixteen being delivered from July 1957 to the end of that year and the rest in the first quarter of 1958.

Further deliveries of the latter began in September and October 1959 with batches from both Newton-le-Willows and Darlington, the Lancashire factory also producing more Type 4s

One of 32 Bo-Bo 660hp locomotives built for the 3ft 6in Tasmanian Government Railways between 1950 and 1952, twenty by the Vulcan Foundry and twelve by English Electric, Preston. (Author's Collection)

The LMS 1,600hp pair in later, green livery with the up 'Royal Scot' at Lichfield in May 1959. (E. S. Russell/Colour-Rail DE480)

EL-ELECTRIC MANUFACTURERS
ONE: ROOTS

too, in far greater numbers than the Pilot Scheme had envisaged.

The Type 4, in essence, was very little more than a modified version of the Southern Region No.10203, redesigned for quantity production and with the inclusion of substantial 'noses' at both end on the insistence of Mr. R. C. Bond, BR's Chief Mechanical & Electrical Engineer, who thought such structures were useful as 'crumple zones' in an accident and would also reduce the effects of 'sleeper-dazzle' at speed whereby a driver's vision is distracted and eye fatigue increased.

It is now nearly eight years since I looked at some early British diesel-electrics[1] and especially the use of the Beardmore engines and also the valiant attempts of the rail traction department of W. G. Armstrong Whitworth & Co.'s Scotswood Works on Tyneside. The Beardmore engines were supplied both with complete traction units or railcars separately and manufacture was also licensed to the Westinghouse company in the USA. A large range of units was supplied for export by the Scotswood factory and it is just possible, had circumstances been a little different and investment capital more readily available, that British industry could have established a compehensive worldwide diesel traction market before the Electromotive Division of General Motors began production in 1937 at La Grange, Illinois (west of Chicago), a greenfield site in 1935 when the first sod was turned over.

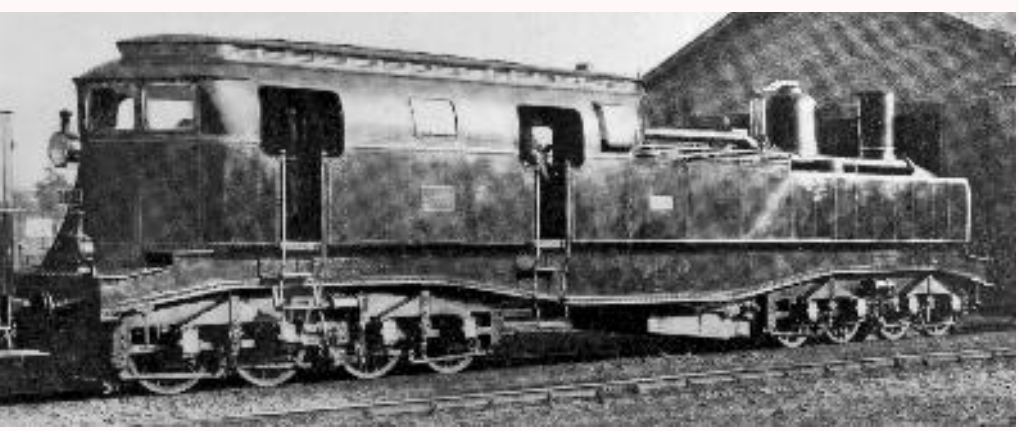
The English Electric Co. received but little mention in those articles because its main contribution in the period was concerned with diesel-electric railcars and some diesel-mechanical shunters and railcars carrying the Drewry Car Co. badge. Likewise a two-part article on modernisation in Ireland (both North and South) added little because once again English Electric were not greatly involved.[2]

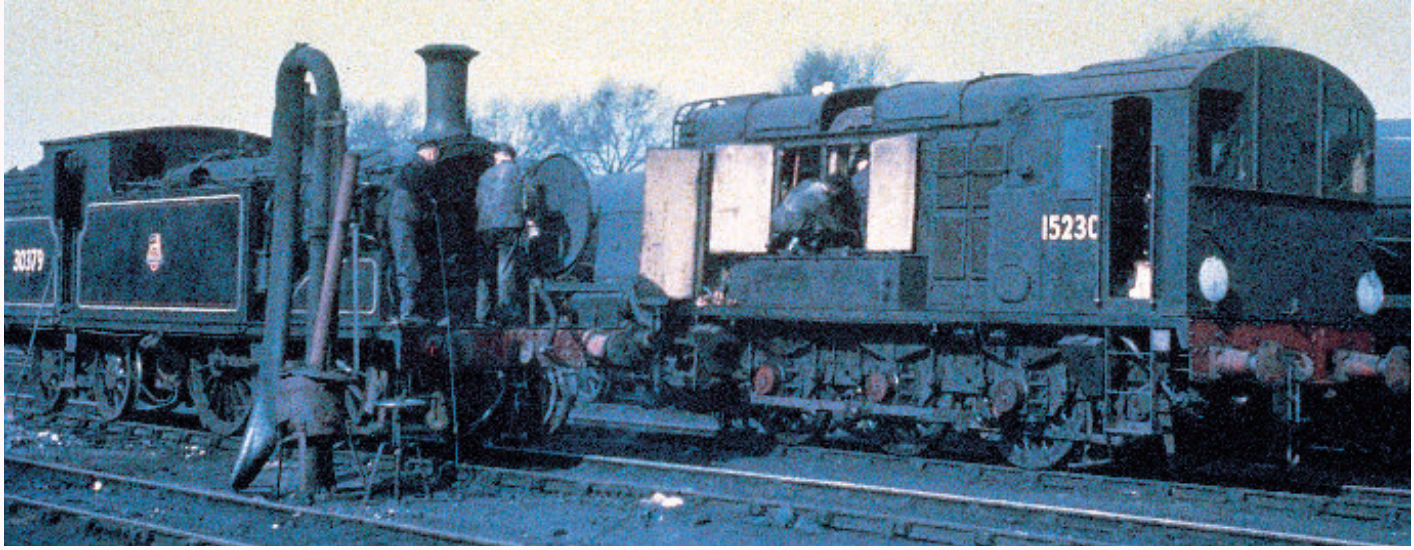
This series therefore will start by concentrating on the English Electric contribution following some relevant historical background. Although the company's first essay into main line diesel-electric traction was a trio of metre gauge machines built for Brazil in 1938 which, like contemporary diesel-electric shunters, were only fitted out at Preston — the mechanical parts and running gear having been built at Hawthorn, Leslie & Co.'s works in Newcastle — we must never forget that between the two world wars English Electric built a considerable number of powerful straight electric locomotives for many parts of the world and was thus not without considerable experience and awareness of the many likely problems which would occur.

The potential of electric traction was recognised as soon as the earliest working motors had been lashed up but they invariably obtained energy from early forms of battery, although electrical storage technology grew rapidly along with the spread of the earliest applications of electricity such as the telegraph. Fortunately, unlike the hit-and-miss development of the steam engine and steam locomotion which pre-dated and indeed instigated the development of thermodynamics as a scientific discipline, the fundamentals of electromagnetic theory were understood and electrical engineering already a specialism with many successful commercial applications by the time electric traction became viable.

Michael Faraday's ground-breaking work in electro-magnetism was presented in a paper read to the Royal Society on 24th November 1831, little more than a year after the opening of the Liverpool & Manchester Railway. The following decades saw a great deal of inventive work undertaken on dynamos and motors but it was the electric telegraph which became the first important commercial application of electricity, powered of course by batteries, a source too heavy and costly for general traction purposes, although successfully demonstrated by Robert Davidson in the 1840s.[3]

The two Heilmann steam-electrics used on the CF de l'Ouest of France in 1897 (Nos.8001/2) were a remarkably bold experiment attempting to obtain the benefits of electric traction without the infrastructure costs. There had been a prototype (*le Fusée*) in 1894 which had been used to test the concept. These two engines were the forerunners of all later diesel-electrics and steam- and gas-turbine electrics. The engines were of the Willans central valve type built at their Rugby works which turned to steam turbines and diesel engines a few years later. The early English Electric traction diesel engines were designed and built there. (Author's Collection)





The introduction of diesel traction into a steam fleet produced 'The Problem' clearly seen here as smokebox char is shovelled from an M7 0-4-4T alongside a standard EE diesel shunter (No.15230, built at Ashford in September 1951). The latter has its inspection doors open and fitters perhaps look for the cause of a failure when it's behind them! This little scenario was photographed at Eastleigh in April 1953. (S. C. Townroe/Colour-Rail DE616)

Inventors and entrepreneurs in electrical engineering developments came from all walks of life, from academics to backyard tinkerers and snake-oil salesmen. They also came from most countries in the western world and, because of greatly improved communications, technological transfer from country to country and diffusion of new techniques from industry to industry was much more rapid than in the first industrial revolution.

There is no place in this article for a survey of electrical engineering landmarks nor full details of electric traction developments but it should be sufficient to mention a few names of pioneers; these should not be regarded as the most significant or important, however.[4]

Zenobe Gramme was a Belgian who combined several earlier separate inventions into a practical dynamo (direct-current generator) in 1870 and in 1873, at the Vienna Exhibition, demonstrated that the same machine could operate either as a motor or a generator, with energy converted from mechanical to electrical and vice versa and transmitted by wires.

A number of different patented designs of dynamos and motors was produced and sold by commercial firms but the most notable application was the demonstration of a small locomotive by Werner von Siemens at the Berlin Trades Exhibition in 1879; a similar machine was demonstrated at the Crystal Palace and other trade exhibitions in various countries.

It would be wrong to credit Siemens with being a sole inventor with a priority in the invention of electric (rail) traction; the whole subject is very complicated and defies a simple summary. Nevertheless his little locomotive(s) have been regarded as 'the catalyst' of the electric traction era. They led directly to small narrow gauge electrically-powered industrial railway systems at mining installations as well as inspiring operators of existing street tramways (powered by horses, cables, steam and occasionally — and briefly — more exotic sources of power) to look to electricity as a practical alternative.

Siemens (1816–92) was by that time a very successful inventor, engineer and entrpreneur. Born into farming stock at Lentha, near Hannover, he was knighted in 1888; hence the 'von'. He invented the pointer telegraph in 1846 (nine years after Samuel F. B. Morse's invention of the writing telegraph) and in the same year discovered that gutta-percha (the dried sap of the Malayan palaquium tree) was the best material for electrical insulation and because of its water-repellant properties was ideal for insulating underground cables.

In 1847, with J. G. Halske, he set up the Siemens & Halske company in Berlin to manufacture telegraph equipment and sent his two younger brothers, William (1823–83) — later knighted by Queen Victoria — and Friedrich, to Britain to represent the firm and protect its interests and a factory (Siemens Brothers & Co.) was opened in Woolwich, Kent, in 1865.

Back in Germany Siemens & Halske developed the electric actuation of railway signals and one of Siemens' associates, Carl Frischen, developed automatic block signalling in 1870–72, two decades before the first such application in Britain (on the Liverpool Overhead Railway in 1891–93).

The problems of electrification centred on generation and distribution. These were costly and required good commercial reasons to install. Electric lighting in the form of arc lighting had been very effective in large spaces such as railway stations and goods depots but was too bright and unsuitable for the small rooms found in domestic homes or in office and shop buildings. The development of the incandescent light bulb by Joseph Swan in England and Thomas Edison in the USA was to change everything and occurred concurrently with Werner Siemens's little locomotive demonstrations, giving great impetus to investors, entrepreneurs and visionaries.[5]

Traditional stationary steam engines were far

A Timken roller-bearing advert featuring a Queensland Government Railways Co-Co in 'Sunlander' livery. Ten of these single cab streamliners were built by the Vulcan Foundry in 1954 and were designed to work in pairs where necessary in true US manner. There is a hint of the livery of *Deltic* of December 1955. (Author's Collection)

too slow to run the generators of the time and the speeds necessary to generate sufficient current and so the two machines were connected by ropes or belts, the large pulley fixed to the flywheel of the steam engine driving a much smaller one on the generator — in effect 'gearing up' the rotation of the engine. This was not really the answer, however; the engines were very big and needed to be housed in large buildings, the loss of power due to friction was very high (up to 10% of the power of the steam engine) and thus both capital and running costs were high.

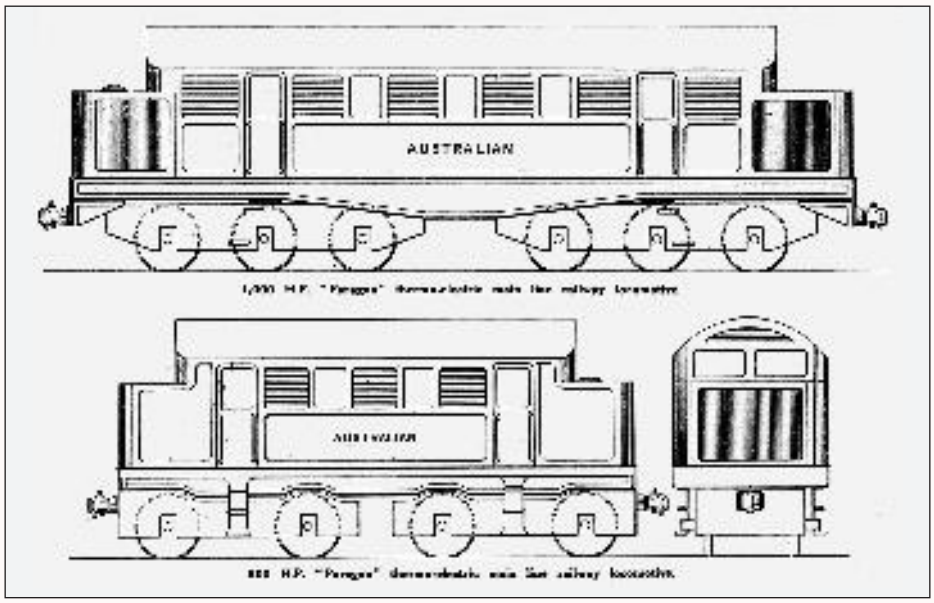
Very quickly two fields of development revealed themselves: one was to produce generators which did not need to be run so fast (multi-pole types were evolved) and the second was to produce high-speed steam engines.[6] The result was direct drive of generators by engines, the whole arrangement being much smaller than the earlier set-up. Such steam engines required light, high-precision components and exceptionally good lubrication. They were usually multi-cylinder machines, often single-acting with totally enclosed crankcases, but when A. C. Pain, a draughtsman working for G. E. Belliss (later Belliss & Morcom), patented in 1890 and 1892 a system of forced lubrication to all parts, it became possible to use double acting engines without knocking from the crankpins. Oil at between 10 and 30psi was delivered via an oscillating pump, driven from the valve eccentric, through passages drilled through the crankshaft to the big ends and then through external pipes to the little ends which also had passages drilled through them.

Generating sets were soon being supplied to a myriad of users in a range of industries as well as establishments such as hospitals, laundries and large hotels. From the very beginning, however, one make of engine was quickly adopted for power station work, especially those generating direct current (dc) where the sets could be run in parallel. Those engines were built to the designs and patents of Peter Willans who had a factory at Thames Ditton in Surrey — Willans & Robinson Ltd.

His earlier engines were three-cylinder single-acting types including some compounds but in 1884 he introduced the central valve engine. In that design the high pressure piston was mounted in tandem on top of the low pressure one (mounted vertically in this case: usually called 'steeple' form). Both were single acting and the common diameter piston rod was a large diameter tube in which inlet and outlet ports were cut. Within the tube was a multi-headed piston valve worked from an eccentric on the crankpin and this valve controlled the flow of steam.

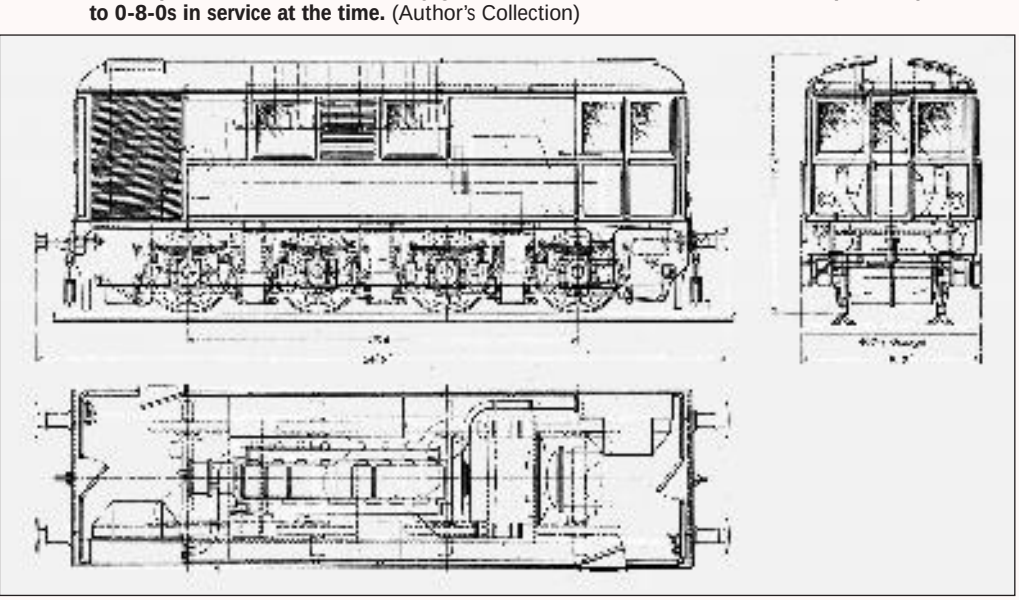
These engines were supplied in several sizes and multiples of cylinders and proved so popular a new factory was planned on a greenfield site at Rugby in 1894. The Victoria Works was opened in 1897 and became part of the English Electric Co. in 1919. The green field site was chosen in December 1894.

Such an efficent, compact generating set as the central valve engine came to the attention of Jean Jacques Heilmann who, realising the flexibility and advantages of electric drive but wishing to avoid the high capital costs (and distribution problems) associated with possible main line electrification, sought to combine an on-board prime-mover with an electrically driven train.



William Peter Durtnall was one of the pioneers and early champions of electric transmission for ships, road vehicles (from buses to racing cars) and railway traction. His ideas were packaged under the 'Paragon' badge and were taken up by R. & W. Hawthorn, Leslie & Co. Ltd. of Newcastle upon Tyne around 1910. The firm quoted for the locomotives for the Trans-Australian Railway but the First World War ended these revolutionary proposals and steam traction was used in association with a very costly programme of drilling for water in the desert. (Author's Collection)

This Beardmore proposal of 1927 illustrates how similar such schemes were to its steam engine counterparts. This was to be a heavy goods locomotive of 1,000 installed horsepower equivalent to 0-8-0s in service at the time. (Author's Collection)



It is often said that certain designs or prototypes in many areas of activity were 'ahead of their time' and thus not fully appreciated and developed. There can be no past locomotive developments which deserve this appellation more than the steam-electric locomotives of Jean Jacques Heilmann and the Société Industriel de Moteur Electrique et à Vapeur.

Heilmann, like a number of great French engineering innovators, was from Alsace. He saw, as did the other members of his company, that electricity would revolutionise the world and that it was the ideal way to power the railway system. He also saw, in the days before public power supply networks, that electrification was to be a high-cost business requiring generation and transmission systems to be included in the calculations which would limit the application of electric traction to specialised railways — particularly in urban areas, for high-density traffic on short routes. His plan, therefore, was to build electric locomotives which generated their own power, allowing that power to be used more effectively and over a much wider range of speeds than was possible with the conventional direct-drive steam locomotive.

Members of Heilmann's team included Charles Brown, an Englishman and former manager of the Swiss Locomotive Works at Winterthur (he designed the engines installed in the prototype locomotive), and Charles E. Brown (son), formerly of the Oerlikon works in Zurich and co-founder of Brown, Boveri & Co. of Baden (he designed the electrical equipment).

The prototype was named *Fusée* (*Rocket*).[7] A Lentz-type boiler with a stayless corrugated firebox supplied steam to a two-cylinder compound engine driving a dc generator (or dynamo) and this in turn fed eight electric motors each of which was axle-mounted, the running gear forming two eight-wheeled bogies in a Do-Do configuration. At first Heilmann conceived a multiple unit train with powered axles throughout and a mobile power plant at one end but this was 1892, five years before Frank Sprague's American

Beardmore advertised its engines to no avail after 1930 (this one comes from 1933) — the depression killed off much interest — but the whole range had a power : weight ratio of two to three times that available in the few diesel engines then available for rail traction purposes in the USA. (Author's Collection)

patent for multiple unit control (using low voltage control signal wires) was first applied — on Chicago's South Side Elevated Railway — and so a locomotive it was to be.

There was much publicity surrounding *Fusée*'s trials in 1893 and also much criticism; it was too costly, it was too heavy, it was too complicated, it required too many specialists to cherish it etc., etc. These were all the arguments brought up against the diesel-electric half-a-century later (and probably by some of the same Jeremiahs!). It was an experiment, it did inevitably have teething troubles, but it produced its power using less coal than a conventional locomotive. It also had great speed potential (it reached 67mph, nearly the French limit), had all its weight available for acceleration and braking and rode like a Pullman carriage. A Westinghouse air brake system operated an early type of disc brake.

Electrical developments overcame problems in that area; ironically it was the steam side of things that was retrogressive, even though the overall fuel saving in service was 15%. Heilmann envisaged operating his locomotives as a hire package, supplying locomotives, maintenance and crews; opposition to this radical stance by entrenched power within the railway establishment was inevitable. Even so, the Cf de L'Ouest thought the system held enough promise to try and a pair of 'production prototypes' was designed and built, becoming Nos.8001 and 8002 on that system.[8]

The new locomotives had larger, conventional boilers with Belpaire fireboxes, wide grates and generous ashpans. The Willans & Robinson Rugby-built central valve engines were of the six-crank type with a maximum rating of 1,600bhp; the maximum continuous rail horsepower was stated to be 1,350hp.

According to *The Engineer*, "The stability and steadiness are especially noticeable, and it appears that one can write with comfort on the locomotive while it is running at 100kph."

The newspapers, too, seemed impressed. The Paris correspondent of the *Morning Post* wrote, "It seems that the praiseworthy efforts of the French Western Railway Company to construct a really practical electric locomotive have at last been crowned with success. A perfect Heilmann machine has been produced, which is far superior to the steam locomotive from every point of view. Next spring travellers from Paris to Granville, Laval and Angers will make the journey in three hours without a stop. One of the chief problems to be solved was how to get rid of the trepidation (*sic*) which, in the case of a locomotive weighing 120 tons, would have rendered the metals unsafe. The Heilmann machine can start a train weighing 450 tons without the slightest jerk, and on St. Cloud Hill, after a stop, it restarted quickly and easily, though only using a sixth part of its power — 950 ampères instead of 6,000 (*sic*). Regular speeds of 110 or 120 kilometres (*sic*) are assured with such machines as this new one. Its power in ordinary working circumstances is 1,600 horsepower."

The Heilmann locomotives had an advantage over future diesel-electrics in that one of the fundamental characteristics of the steam engine is that it gives maximum torque at starting and so the control arrangements between engine and dynamo (in this case a modification of the Ward-Leonard system) could be much more straightforward than those required for an internal combustion engine/generator combination which had to avoid the possibility of stalling.

The company behind these locomotives soon ran out of money, even though there was a great deal of interest in its schemes as far apart as Russia and the USA. The locomotives were dismantled and each bogie used as the running gear for some straight electric 0-8-0 locomotives to work the 4km between St. Germain Ouest and St. Germain Grande Ceinture in Paris, which mostly lay underground.

Thus the mother and father of all main line diesel-electrics were a pair of steam locomotives built way ahead of their time, looking like something from a Jules Verne or H. G. Wells science fiction adventure story of the era. Ten years or more later, with the application of high superheat and mechanical stokers or light fuel oil firing, they might have made a commercial breakthrough but that was not to be.[9]

The high speed steam engine for electricity generation gradually gave way to the steam turbine of Sir Charles Parsons (and an early steam-turbine electric obviously inspired by the Heilmanns) and the Rugby factory of Willans & Robinson built its first diesel engine in 1906, a single cylinder machine of 130bhp containing the seeds of the later 'K' series.

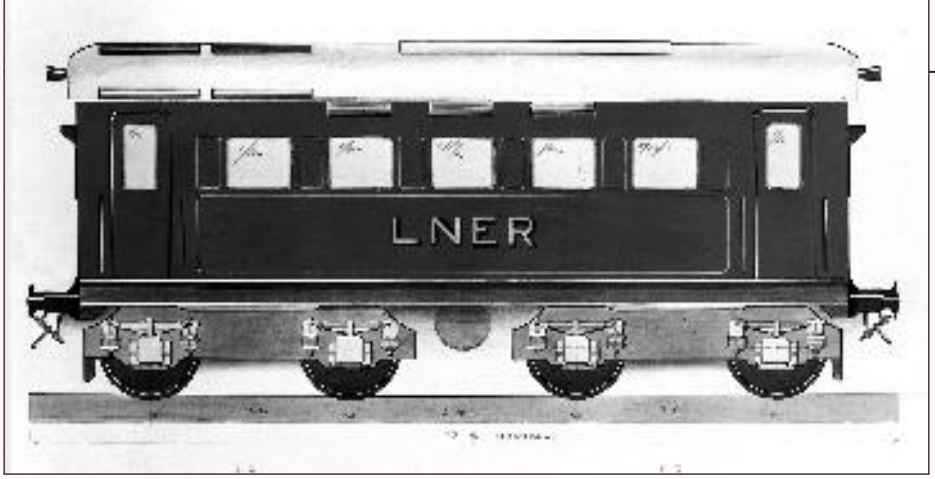
Internal combustion engines had been produced in Britain for several decades by the turn of the century mainly using coal gas either as a by-product from within an industry or from the town gas systems as they were introduced and extended. Gas engines obviated the need for boilers with all the associated firing, overseeing, maintenance and insurance although their application was limited. They were built under licence[10] to the patents of Jean Lenoir and were soon complemented by Nicolaus Otto's 'silent engine' and then his four-stroke cycle in 1877 which by 1885 had been adapted to burn petroleum (gasoline) using a carburettor as a vaporiser.

Petrol was a volatile and dangerous by-product of the rapidly expanding oil industry whose main yield was oil for lighting and heating; gradually, lubricating and other specialised oils were developed, often to replace those obtained from vegetables and animal fats. There were many attempts elsewhere to burn less volatile fuel oils but numerous difficulties were encountered: in starting, in vaporisation and in preventing the build-up of carbon deposits.

One of the first men to address the difficulties was William Priestman of Hull.[11] Priestman was educated at Bootham School in York and served an apprenticeship with Sir W. G. Armstrong & Co. in Newcastle and later worked at the North Eastern Railway's Gateshead Works before returning to his father's Holderness Factory in Hull. He applied for his heavy oil engine patent in 1885 and production engines were soon driving machinery and barges the world over. In 1894 a shunting locomotive was built which was given a trial on the Alexandra Docks lines of the Hull & Barnsley Railway and three years later an oil-engined lorry was built. Transmission problems delayed acceptance of both concepts.

A contemporary of Priestman was another Yorkshireman, Herbert Akroyd Stuart, who was

The 2,660hp (2'Do1') + (1'Do2') twin-unit locomotive running on the Canadian National Railway when new in 1927. Each unit was fitted with one of the Glasgow-built Beardmore 1,330hp V12 engines. This was the first of the type to run in North America, the next being a pair of General Motors Bo-Bos (built by the St. Louis Car Co.) used for the new 'Super Chief' service of the Atchison, Topeka & Santa Fé at the end of 1935, eight years later and eight years wasted as far as British exports were concerned. (CNR/Author's Collection)



The Harland & Wolff Company of Belfast set up a diesel traction department in the 1930s using the Danish Burmeister & Wain engine technology which it built under licence. The company sent out details of various proposals to many companies complete with drawings coloured to the companies' livery. This Bo-Bo was sent to the LNER with no response. (Author's Collection)

working on oil engines and took out a patent in 1890.[12] In it he described a four-stroke cycle, the induction stroke drawing in air only and compressing it on the second stroke into the combustion chamber into which the fuel oil was then sprayed by solid injection. The engine was not cold starting; the combustion chamber was first heated with a lamp — the 'hot-bulb principle' — but once running enough heat was retained for no other ignition to be required. One of the first engines (built at his father's Bletchley Works) was sent to F. W. Webb at Crewe but what was done with it is not known.

Richard Hornsby & Sons of Spittlegate Ironworks, Lincoln, took over manufacture of Stuart's engines under the label Hornsby-Ackroyd and it was that firm which developed the engine further — Ackroyd Stuart emigrated to Perth, Australia, in 1899 due to ill health which had kept him divorced from developments at Lincoln. Those were carried forward by Robert Edwards, chief engineer.

A total of 32,417 engines was built, including the first oil-engined agricultural tractor and several oil-engined locomotives for the 18in gauge Royal Arsenal Railway at Woolwich and the 30in gauge Chattenden & Upnor Railway at Chatham Dockyard. Six locomotives in all were supplied between 1896 and 1903.[13]

One interesting test performed in 1892 was the raising of the compression ratio and blanking off the vaporising chamber with a plate; the engine was then started on compression only (as in a diesel) and run for six hours. This treatment inflicted heavy wear and knocking and the experiment was neither repeated nor used as a basis for the full implications to be followed up. Nevertheless, in practical terms Rudolf Diesel's engine had been anticipated. It is always worth remembering that the Hornsby-Ackroyd engines used solid fuel injection, essential in the diesel's lightweight and medium and high speed form as employed for traction purposes, whereas Diesel used the complex and energy consuming air-blast method for many years, usually one associated with the slow-running, heavy 'A' frame engines typified by those used in slow speed marine service.

On a personal note, I was given a 'courtesy car' a few years ago after the easily accessible firm which normally serviced my car (and which was easily reached on foot from home/work/the city centre) closed down, its successor being three miles out of town 'conveniently' near the outer ring road. The car was a 'diesel'. Not having been anywhere near one before I was told to 'wait until the light went out' before fully switching the engine on. Going through this procedure, I suddenly shouted "Ackroyd Stuart!". Fortunately the windows were closed so no-one heard me and removed the keys, but I have since pondered on how many so-called diesel engines in cars, lorries, buses and locomotives actually use a heating element or 'glowplug' for initial start-up and should therefore be called Akroyd Stuart engines. From then on I realised that the persistent use of the term 'oil' or 'heavy oil' engine in Britain was not just because of jingoism or anti-German feeling but was based on a reality often clouded by the myths and legends surrounding Dr. Diesel and his engine.

One of the earliest schemes based on an internal combustion engine with electric transmission for large, main line traction was for the Trans-Australia Railway, planned in the years preceding the First World War.[14] The locomotives were to be built by R. & W. Hawthorn, Leslie & Co. to the ideas of Captain William P. Durtnall who was a champion of electric transmission for road vehicles, ships and railway traction. His ideas and patents were marketed by a company under the 'Paragon' banner.[15] Unfortunately the war delayed the building of the railway and although the line crossed the arid Nullarbor Plain, steam was preferred for traction, water being supplied from a number of deep wells bored down into the desert. Hawthorn, Leslie only ever built one modest 'Paragon' locomotive — a 320hp Bo-Bo — but it was purely experimental and never left the works.[16]

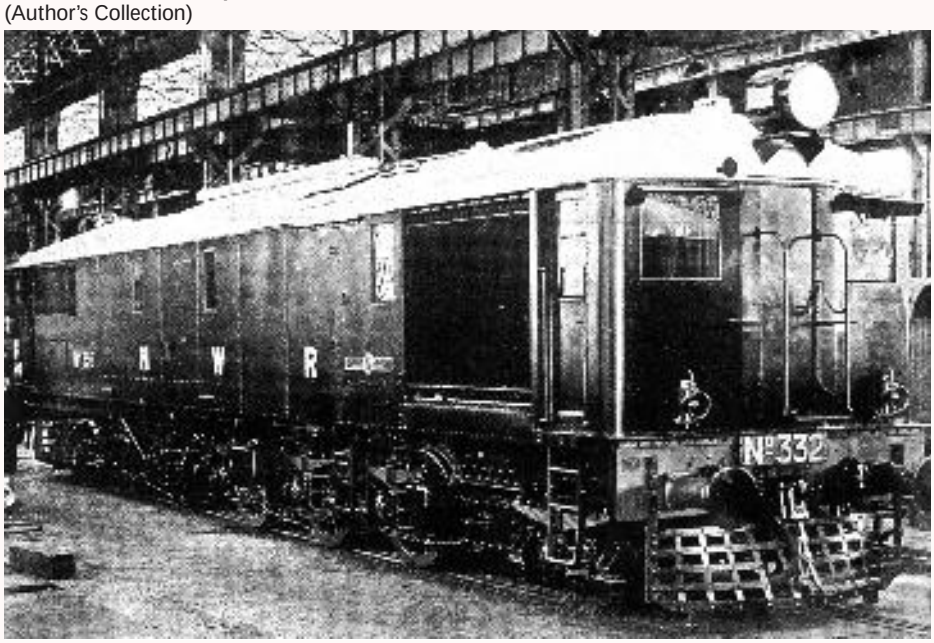
The major upheavals during the war and post-war period, as far as we are concerned was within the electrical and the locomotive building industries. In the early years of the twentieth century all the main players in the British electrical industry, except one, were wholly or partially subsidiaries of foreign ones; thus British Westinghouse was an outpost of the US Westinghouse firm, the British Thompson-Houston Co. was a subsidiary of the US General Electric Co. and Siemens Brothers' parent company was in Berlin.[17]

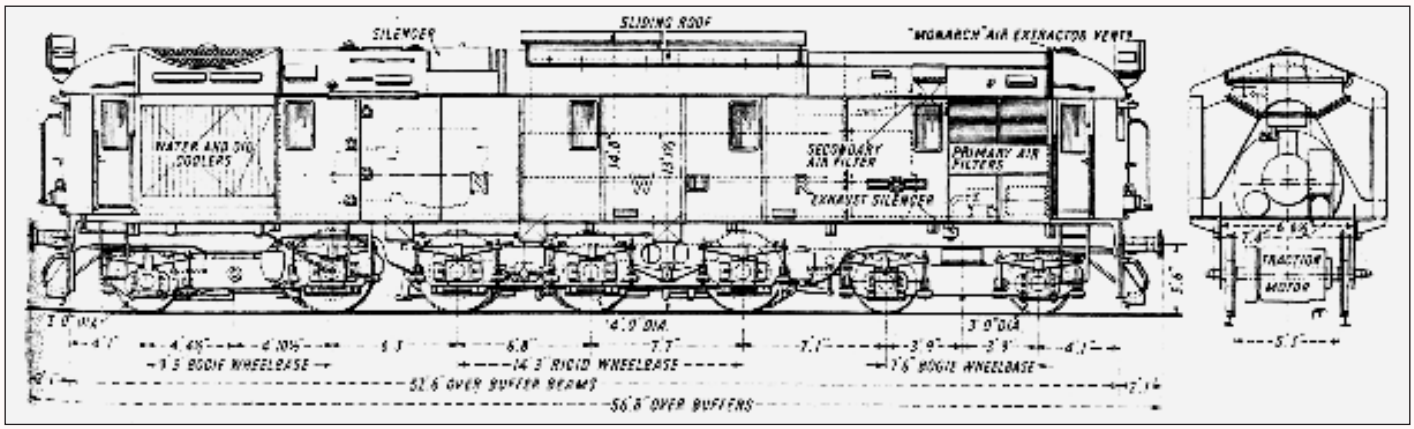
The exception was Dick, Kerr & Co. of Preston, a name known in our day more for its rightly famous and groundbreaking Ladies Football Team than for its work and products.

W. B. Dick & Co., based at the Britannia Engineering Works, Kilmarnock, a general engineering firm, typical of the period (and of Kilmarnock), became Dick, Kerr & Co. Ltd. in 1883 and began to specialise in tramway equipment, including the patent Morrison & Kerr steam tram (as supplied to the Alford & Sutton Tramway), as well as becoming contractors for complete tramway projects. The company was the contractor for the extensive Edinburgh cable tram system and the Liverpool Overhead Railway.

The North of England Railway Carriage & Iron Co. was in business in Preston from 1863 until it went into liquidation in November 1878 and the premises remained unoccupied for twenty years before being taken over by The Electric Railway & Tramway Carriage Works Ltd. in 1897 which also extended the works into some undeveloped areas of land. At the time there were few specialist tramcar builders in Britain, excess demand usually being supplied by some of the

The largest diesel-electrics built in Britain were two (1A)' Co2' for the North Western Railway of India in 1935, intended to work the mail trains from Karachi to Lahore over the Sind desert. The number of axles and electric motors was the same as for the CNR locomotives. There were teething troubles with these locomotives which were never overcome and Armstrong, Whitworth ceased rail traction work whilst the traction equipment was at Scotswood under repair and modification. The project ceased but the railway continued with its experiments with other railcars and locomotives. After partition Pakistan obtained Alco locomotives from the USA. (Author's Collection)





The diagram for the Armstrong, Whitworth 1,200hp (Sulzer 8LD34 Type engine). The post-war English Electric 1,600hp main line locomotives for Egypt of the (1A) 'Do (A1)' type were almost certainly influenced by this design. Note the positioning of metal 'N.W.R.' letters on the side sheeting, something adopted on No.10000 — 'L.M.S.' in 1947. (Author's Collection)

traditional carriage and wagon builders. The ER&TCW, promoted by Dick, Kerr, was prescient in that it was ideally set up for the electric tramway boom which followed in the years up to the First World War.

The manager of the firm was E. A. Stanley who had had training in the USA where the streetcar boom pre-dated the British one and initially it was intended to import the motor-driven trucks from the USA from such makers as Brill and Peckham. In 1900 a new works was built alongside — the English Electric Manufacturing Co. Ltd. — to make miscellaneous electrical equipment relevant for tramways and related contracts and in 1905 the ER&TCW changed its name to the United Electric Car Co. Ltd.

In 1902 Dick, Kerr & Co. obtained the contract to electrify the Liverpool to Southport line of the Lancashire & Yorkshire Railway and in the following year absorbed the EEM Co. completely and that works took on the name of its parent company — Dick, Kerr & Co. Ltd. The United Electric Car Co. was finally taken over in 1917.[18]

The (new) English Electric Co. was formed in 1919 from Dick, Kerr & Co., the Phoenix Dynamo Co. of Bradford and Willans & Robinson of Rugby. The Siemens Dynamo Works in Stafford was purchased (it had be compulsorily acquired by the Government as enemy property during the war). The Phoenix Dynamo Co. of Bradford had been set up in 1900 in order to manufacture small motors and dynamos specifically for the textile industry but found wider markets and later became the centre of electric motor and generator design for English Electric.

In 1916 British Westinghouse was refused admission to the newly-formed Federation of British Industries because the company was American controlled and so the board decided to break away and asked for help from Frank Dudley Docker, a Birmingham financier and the boss of BSA and the Metropolitan Carriage and Wagon Co. He managed to pay off the Americans but his plans for a giant British electrical combine fell through and British Westinghouse and Metropolitan C&W were sold on to Vickers, the large electrical works at Trafford Park in Manchester, becoming Metropolitan Vickers (Metrovick).

One of the features of main line diesel-electric traction which was to become clear in 1920s and was to be a major arbiter for any firm trying to get in the market was the tri-partite nature of the job: diesel engine, electrical equipment and the mechanical contruction of the locomotive. Whoever signed the main contract had to guarantee the whole package to the customer and even a single locomotive was very expensive. It would certainly not have been a wise move for any of the traditional locomotive builders to take on such contracts and any of them that *were* interested tended to look to other forms of transmission, of the sort they could eventually construct themselves (hence many mechanical, pneumatic and hydraulic schemes in the 1920s and 1930s, eg the Kitson-Still 2-6-2, LMS 0-6-0 No.1831 etc.). If any contracts were to be undertaken it was best that the company named on the contract could supply at least two of the functions and perhaps, through associated companies, all three.

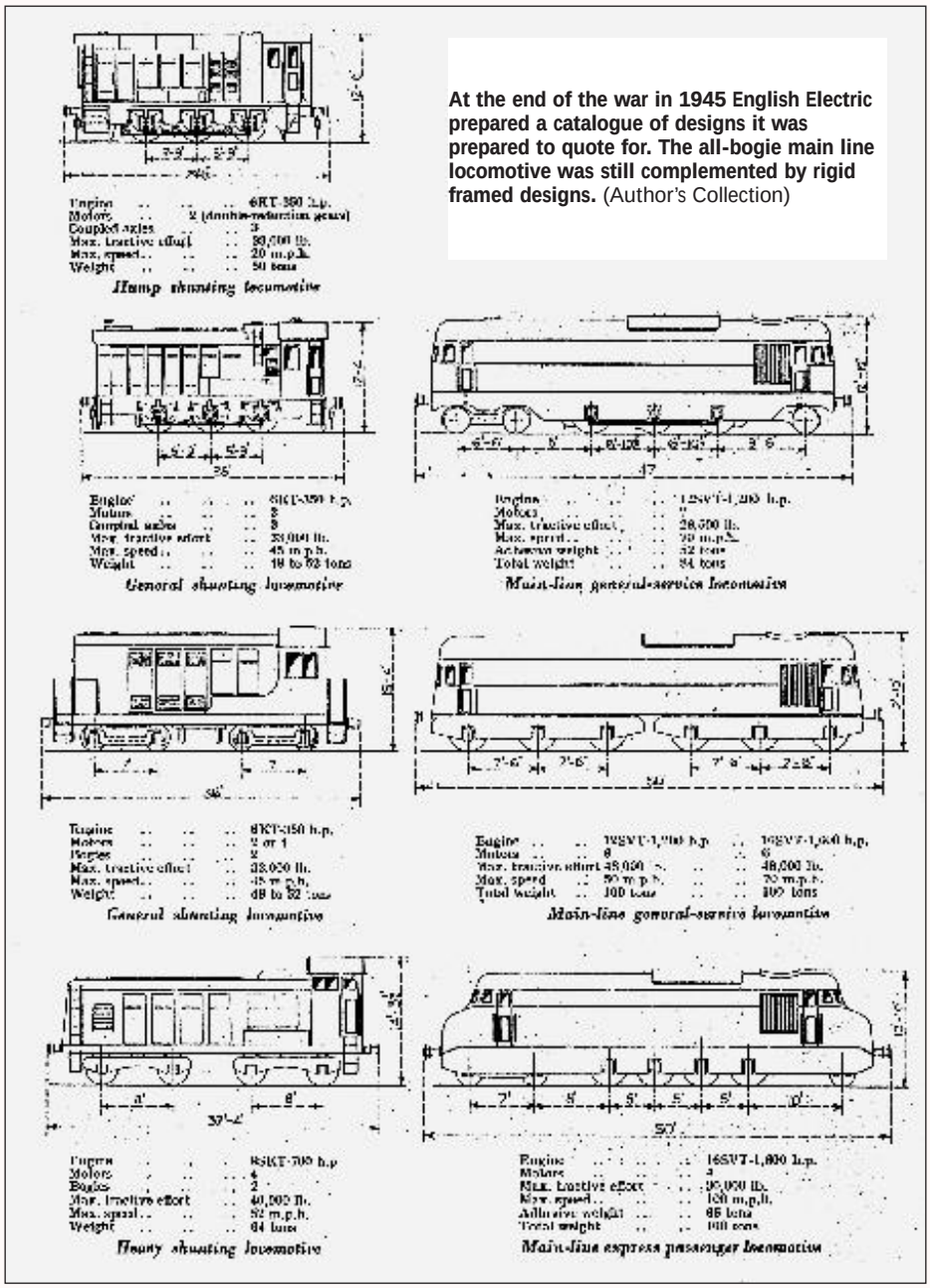
This explains to some extent how and why traditional locomotive builders such as the Vulcan Foundry were fairly effortlessly later absorbed into the dominating electrical companies.

Despite all wishful thinking that it should be otherwise, the British electrical industry in the inter-war period came to be dominated by American managers and American money and it seems that English Electric was saved from going under after a poor showing in the 1920s by US help.[19]

The most expensive unit part of a diesel-electric locomotive was the diesel engine itself and the development of a suitable engine for railway traction, especially in the higher power ranges was a slow business; both land and marine applications were too large and heavy at first.

Two Swiss firms, Sulzer and Saurer, took the lead, the former in large railcars and early locomotives and the latter producing the first engines suitable for buses and lorries and which were easily adaptable for lighter railcars and railbuses. The First World War saw considerable developments in the internal combustion engine, particularly those used in aircraft, and those technical developments found their way into the engines used in sports and racing cars after the war. The airship, already regarded as a fire risk because of its hydrogen-filled gasbags, required engines which were more fuel-efficent and burned a less volatile fuel than petrol and so a great deal of effort went into developing powerful diesel engines with high power-to-weight ratios.

The first English Electric main line diesel-electric was this 1' BB1' design for the metre gauge Eastern Railway of Brazil. Many features are those of the 0-6-0 shunter then becoming something of a standard, the design and manufacture of which was undertaken by Hawthorn, Leslie & Co., English Electric only supplying the engine and electrical equipment. The Brazilian locomotives were the last to be erected at Forth Banks before being sent to Preston (the venue in the photograph) for fitting out. Note the cab is still like the shunter whereas the long hood is taking on the form best known in the British Railways EE Type 1. (EE/Author's Collection)



At the end of the war in 1945 English Electric prepared a catalogue of designs it was prepared to quote for. The all-bogie main line locomotive was still complemented by rigid framed designs. (Author's Collection)

The end of the hostilities left a number of large munitions companies looking for new product lines and alternative markets to exploit. In Britain several of such firms turned to the locomotive building field much to the alarm of the existing builders, most of which were members of the Locomotive Manufacturers Association.

Four of the big armament works stated their intention to move into locomotives. They were William Beardmore & Co. of Dalmuir, Sir W. G. Armstrong Whitworth & Co. Ltd. of Scotswood, Vickers Ltd. of Barrow-in-Furness and the Royal Arsenal, Woolwich.[20]

Vickers Ltd., after undertaking some miscellaneous steam repair work and building some Bo-Bo electrics for the Metropolitan Railway, dropped its plans. The Government-owned Royal Arsenal's scheme was ill-thought out and little more than a political gesture. The resulting fiasco cost the taxpayer over £1,000,000 for the 100 locomotives produced, some complete, many only in parts, before the Government withdrew from locomotive building.[21]

The two remaining firms — Beardmore and Armstrong Whitworth — offered severe competition to the traditional steam locomotive builders and were to become important pioneers in main line diesel-electric traction. Beardmore consisted of a number of different works and departments and built a wide variety of things from ships to aircraft and taxi-cabs to steam locomotives, production of the latter commencing in 1920. It was at Beardmore that Alan Chorlton developed his diesel engines for airships and it was from this range that came the earliest railcar applications — on the Canadian National Railway — in 1925.

There were others in various parts of the world, notably the conversion of a four-car set from the ex-Bury to Holcombe Brook 3,500V dc trial installation of 1913 (a Dick, Kerr contract). This was done in 1927–28 at the time when Crewe-trained Alan Chorlton[22] (later Sir Alan) was President of the Institution of Mechanical Engineers where he would have regularly met Sir Henry Fowler of the LMSR. The set was intended for main line trail running but ended up on stopping trains, sufferring from a great number of teething troubles and lack of interest by local operators (who probably knew nothing about it until it appeared on their patch).

The railcars, built for or by railways in various parts of the world, which carried Beardmore engines were overshadowed by a twin-unit main line diesel-electric (2'Do1') - (1' Do 2') of 1927 for the Canadian National Railway.[23] Each unit carried a Glasgow-built 1,330hp V-12 engine running at 800rpm. One of the engines was supercharged at the makers and gave 1,500hp but the equipment was removed as it was found to be too noisy.

The main contractor was the US company Westinghouse and large cast steel underframes were used on each unit supplied by the Commonwealth Steel Company of Granite City, Illinois (later the General Steel Castings Corporation famous for cast steel 'engine beds' for steam locomotives and patentee of the Commonwealth bogie). Unfortunately this resulted in an all-up weight of 290 (English) tons for 2,660 installed horsepower, hardly competitive when compared with the 'Superpower' steam of the era.

It has been suggested that this was a deliberate ploy by Westinghouse, a firm which was aggressively marketing full main line electrification schemes and did not want any competition from high-power diesel locomotives; railcars and switchers it could live with and indeed it took out a manufacturing licence to make a number of the Beardmore designs, although the first sixteen Westinghouse-plated engines were actually built in Glasgow. Railcars and switchers were built in the WEM Co. shops in East Pittsburg.

In the nine years from January 1928 to January 1937, Westinghouse produced 26 locomotives domestically and three in Canada as well as Beardmore engines for use in railcars and switchers built elsewhere.[24] The company had developed the engines with many design improvements. The four-, six- and eight-cylinder in-line engines with 8 in x 12in cylinders, giving 200, 300 and 400 horsepower respectively, were enlarged to 9in x 12in and increased in speed. The six-cylinder engine gave 400hp at 900rpm and a turbo-charged version produced 530hp at the same speed. Westinghouse produced a V12 version (800hp not turbo-charged) and two of these engines were installed in the largest locomotive built, a centre-cab Bo-Bo of 1,600 hp weighing 118 (English) tons and completed in January 1934.[25]

Westinghouse did not build any of the 1,330hp V12 engines (they had 12in x 12in cylinders) which is a pity; it may have enlarged the design into a turbo-charged V16 of 2,000 hp and pre-empted General Motors.

In June 1936 the locomotive builder Baldwin entered into an agreement with Westinghouse whereby it would actively enter the manufacture and sale of main line diesel-electrics solely using Westinghouse electrical equipment. Rather than obtaining rights to the Westinghouse-Beardmore engines, however, Baldwin developed the DeLaVerne series of engines which was built in Baldwin's Eddystone Plant, that company having been acquired amongst a number taken over in 1931. This is no part of our story other than to say that its predecessor, the DeLaVerne Refrigerating Machine Company, in 1891 acquired the sole American rights to manufacture engines to the British Hornsby-Ackroyd designs. Its first engine, built in 1895, was the first compression ignition engine to be built in the USA and is preserved in the Smithsonian Institution in Washington.[26]

Beardmore's rail department had not proved

profitable despite being the fourth largest builder of steam locomotives in Britain between January 1924 and June 1929, as the table below reveals:

Firm	Quantity
North British Loco. Co.	595
Vulcan Foundry	410
Sir W. G. Armstong Whitworth	340
Beardmore & Co.	186
Beyer, Peacock & Co.	113
Robert Stephenson & Co.	109
Total	1,753

The steam side of things was thus closed down in 1930 after outstanding contracts had been completed although the British interest in Caprotti valve gear was retained and the diesel rail traction section continued its work.

The crash of the airship R-101 on her twelfth flight on 4th September 1930 had a *Titanic*- type effect on the British public and what had been regarded as a potentially lucrative market for high power-to-weight diesels was lost overnight. The last flight of the R-101 was the last flight made by a British rigid airship.[27]

In 1933 the Beardmore board decided to rationalise all its diesel work (air, marine, rail traction and road vehicles) and asked Sir Henry Ricardo to produce an independent report; this appeared in the following year. He found that the company was offering fourteen different high-speed engines with four cylinder sizes and that nine of them were for rail but there had been no new orders since 1930. He suggested that there had been a misplaced emphasis on rail and that the company should focus on engines for road vehicles. The company therefore rationalised diesel manufacture and closed the rail traction section although a spares service still operated. A number of engineers and designers from this department found their way to English Electric.

One of the Egyptian (1A)' Do(A1)' 1,600hp locomotives under construction at Preston. Engines for this order were transferred to the LMSR Derby Works in order to expedite the construction of Nos.10000 and 10001 and in particular No.10000 so that it could be completed before nationalisation. (EE/Author's Collection)

Armstrong Whitworth[28] entered the locomotive industry in a thoroughly well-planned manner in 1919 with two big orders: 50 0-8-0s for the North Eastern Railway and 200 2-8-0s for Belgium. The company had a full design and drawing office facility and could if necessary prepare completely new designs from an outline specification.

The earliest diesel orders were as sub-contractors to Sulzer Brothers of Switzerland and an order to the Buenos Aires Great Southern Railway of Argentina. In 1931 the company set up a diesel traction department in earnest and began building Sulzer and Saurer engines under licence.

Three diesel-electric railcars were purchased by the LNER: *Tyneside Venturer*, *Lady Hamilton* and *Northumbrian*, the latter working as *Armstrong-Shell Express* from London Euston to Castle Bromwich on the LMSR for the British Industries Fair in early 1933 before going to the LNER.[29] An 800hp 1-Co-1 'Universal' type mixed traffic design saw trials on the LNER in the summer of 1933[30] and further examples along with railcars and shunters were exported.

The biggest locomotives built were a pair of 1,200hp machines for the North Western Railway of India, intended to haul the heavy mail trains north from Karachi across the arid Sind desert. These locomotives had the unusual (1A)'Co 2' wheel configuration and although the 8LD34 engines gave no trouble, there were many problems with the generators and motors.[31]

Armstrong Whitworth withdrew from locomotive building on completion of a massive order for LMSR 'Black Fives' — 227 built in 1936–37.[32] This followed a large batch of 100 in 1935 and this steam work may have offset a little of the cost of running the diesel traction department. George McArd spent the last 25 years of his career with A-W and related that well over 100 draughtsmen and designers were employed on diesel work from 1934–36.[33]

The Defence White Paper of 16th March 1935 recommended re-armament and in particular a large Naval programme. Beardmore and A-W turned to this work (Scotswood as part of Vickers Ltd.) and there was also some reorganisation in the British locomotive building industry in 1937.[34]

Some staff from Armstrong Whitworth moved to English Electric and in 1937 the latter firm obtained its first main line diesel electric order, three 1' BB 1' rigid frame machines for the metre gauge Eastern Railway of Brazil. The firm also received a large order for railcars from Ceylon.[35]

The English Electric Co. had developed two distinctly different engines in 1933–4 from mainly, it appears, the work of Beardmore. The 'K' type with 10in x 12in cylinders first appeared in six-cylinder form in the first 0-6-0 diesel-electric shunter placed in service in April 1934. The engine was built at the old Willans works at Rugby and the locomotive erected at Hawthorn, Leslie & Co., Newcastle.[36]

This contrasted with the similar Armstrong Whitworth shunter which was first tried from 11th July 1932 in various LNER good yards in the Newcastle area. The most obvious difference between it and the English Electric version was jackshaft drive and inside frames. The LMS ordered a similar locomotive and then ten of each, A-W and EE, to slightly improved designs.[37]

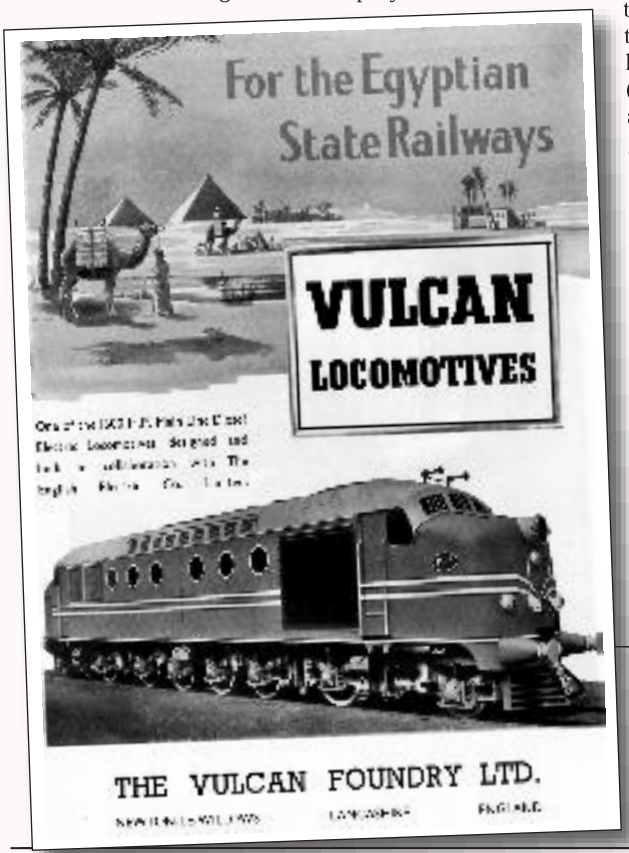
The other EE diesel was the 'H' type which first appeared in 1934 in the single diesel-electric railcar *Bluebird* which was tried on the LMS.[38] This engine, specifically designed for railcars, was of 200hp and had six cylinders running at 1,500rpm as opposed to the 650rpm of the first 6KT installation which gave 300hp (that soon became 350hp at 700rpm in the first production batches and 350hp became the standard rating in British service).

The 'H' type was used in the 1937 order for railcars for the 5ft 6in gauge in Ceylon but after the war the 'K' type came to be used in many railcars in the classic layout typified by the Southern Region's Hastings units.

The first eight-cylinder 'K' was the 8KT used for the three Brazilian 1' -BB - 1' and was rated at 450hp. There were two traction motors, the driving wheels being connected through coupling rods and fly cranks in two groups. The frames were, of course, outside.

to be continued

References will be listed at the end of this series.



Twelve 1,600hp locomotives were built for Egypt, six at the Vulcan Foundry which was quick to advertise its experience and capacity in this new, modern field. (Author's Collection)