

Railways in Wartime

By the same author:

Unusual Locomotives

ERNEST F. CARTER

Railways in Wartime

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How it all began

IT is generally recognized that the railway era began in the year 1825, when the British Stockton and Darlington Railway was opened in the County of Durham. Fixed and locomotive steam engines were used to provide power for haulage. For eight years the company did not cater for the transport of passengers, so in a sense, the unquestioned right to be regarded as the originators of the railway age, as the term is understood today, does not fall to the Stockton and Darlington Company, but to the Liverpool and Manchester Railway, which was opened on 15th September, 1830 – three years before the Stockton and Darlington Company took over the passenger business from outside contractors.

But in those far-off days, the very geographical position of the United Kingdom led to far greater importance being attached to the freight and passenger transport conveniences of railways than to their possible strategical and tactical uses in the event of war or invasion. Even the transport of a British regiment from Liverpool to Manchester in two hours, instead of the two days which would have been required to accomplish the thirty-four mile journey on foot, did not seem to make any great impression on the Duke of Wellington or on the Secretary of State, Sir Robert Peel; both of whom had been passengers on the inaugural trains.¹

Some far-seeing men, however, must have been greatly

¹ Troops had been transported by train in the United States in 1831, when Brigadier-General Steuart and 100 volunteers left the Baltimore and Ohio Railroad Station at Mount Clare Street, Baltimore and travelled the fourteen miles of line then opened to Ellicott's Mills, where they quelled a riot of railway workers by arresting fifty who were striking for back pay due to them.

impressed by George Stephenson's spectacular thirty-six-mile-an-hour dash back to Liverpool on the locomotive 'Northumbrian' running light, with the mortally maimed Liverpool Member of Parliament William Huskisson, who had been knocked down at Parkside by the world-famous locomotive 'Rocket'. The covering of fifteen miles in twenty-five minutes must have seemed incredible – even in such an emergency.¹

But the obvious importance of railways in relation to warfare, even in connexion with any scheme for the defence of the country in the event of invasion, did not seem to dawn on the 'powers-that-be' of the time. Twenty-four years earlier, in December, 1806, the canal system of Britain had introduced an innovation which should have impressed the Government. A considerable number of troops travelled by barge on the Paddington Canal from London to Liverpool in seven days – half the time it would have taken had they marched that distance. They were *en route* for Dublin, and their canal journey was expedited by the provision of relays of fresh towing horses at all stages.

No doubt it was the very remoteness of the possibility of an invader ever being able to set foot on British shores that lulled Parliament into a sense of complacency over the vital usefulness of railways in wartime. On the European Continent, however, national rivalries and uncertain frontiers, together with grim recollections of recent conflicts, resulted in much closer attention being given to the great importance and possibilities of the new speedy and less fatiguing form of transport. In Germany, in particular, the strategical and tactical advantages were early recognized.

Two years before the opening of the first railway in Germany – the Ludwigsbahn from Nuremberg to Furth – on 7th December, 1835, Westphalian Friedrich Wilhelm Harkort put forward definite proposals for building a line to connect the rivers Weser and Lippe, stressing the value to Germany of such a railway from a military point of view.

¹ Huskisson's death constituted the first railway fatality and the trip from Parkside to Liverpool the first ambulance 'train'.

A very able engineer who had been a participant in the Napoleonic wars, Harkort had written in 1825 about British progress in railways and had the following year constructed a working-model line in the grounds of Elberfeld Museum. He had also witnessed the spread of the railway 'fever' from Britain to France, where M. Beaunier had built a horse-drawn line from St. Etienne coal-mines to the River Loire in 1823, and Marc Seguin another line from St. Etienne to Lyons; steam locomotives being substituted for horses on both lines two years before Harkort put forward his proposals. In Belgium too, railway enthusiasm was running high, for in May, 1834, the Government put forward projects for a series of railways to be built at State cost on land acquired by the Government under compulsory Royal Decrees.

With railway developments thus going on around Germany, Harkort's argument that it would be possible to concentrate large bodies of troops at a given point speedily and without excessive physical strain, was very sound and gave rise to great controversy in Germany. His proposed Rhine-side line from Mainz to Wesel would, he claimed, effectively prevent any crossing of that river by the French, but this scheme, like many other of his ideas, were officially condemned out of hand as 'nonsensical fancies', and contemporary periodicals and newspapers curried favour with the Government by making him the butt of their ridicule.

But Harkort's book *The Railway from Minden to Cologne*, had French General Rumigny very worried. As adjutant to King Louis-Philippe, the book foreshadowed the possibility of a sudden invasion by a German army reaching the frontier at lightning speed by rail. Indeed, French General Lamarque had told the Chamber of Deputies that the strategical use of railways would inevitably bring about a revolution in military science as devastating as that brought about by the use of gunpowder. From the point of view of defence, he asked the Chamber, what advantages do railways not possess. Railways, he claimed, would make France invincible.

But in spite of the fears of the French generals and equally

strong declarations in the Chamber by MM. Dufaure and Marschall in 1837 and 1842, respectively, France seemed to have no urge at the time to build railways for purely military purposes. Even the fact that Germany was in 1842 converging a formidable railway system from Cologne, Mainz and Mannheim which would permit a concentration of their forces on the Rhine within twenty-four hours, did not seem to shake the French Government into action. Whilst Germany was building railways, France was merely discussing them, so that by 1844, whilst Germany was operating nearly 3,300 miles of strategically located railways, France was running only just over 1,000 miles.

In Britain, 1842 saw the passing of the Railway Regulation Act, which, under the title 'An Act for the better regulation of Railways and for the Conveyance of Troops,' provided for the movement of officers and soldiers by any railway, together with ammunition, stores, and arms. There was the proviso, however, that trains at the usual hours of starting should be used, and that fares and conditions should be determined by contract between the Secretary for War and the railway companies on the production of a signed pass by the proper authorities. This, the first provision to be made for the conveyance of troops in the United Kingdom, was followed two years later by another Act requiring companies to furnish trains as and when required by the Government at fares not exceeding a scale set out in the Act.

Apart from the small-scale experience at the opening of the Liverpool and Manchester Railway, no nation had actually transported any large body of troops – even experimentally. This did not take place until 1846, when the Prussian 6th Army Corps of over 12,000 men, together with guns, ammunition and road vehicles travelled by rail to Cracow. At the Congress of Vienna, in 1815, Prussia, Austria and Russia had formed the city into an independent republic and guaranteed its perpetual neutrality, and it was the seizing of the city by insurgents during an attempt at revolution that caused the protecting powers to concentrate a large force on the city and its environs. Speed was essential, and the railway

transport provided enabled the troops to deal the revolutionaries a crushing blow in the autumn of 1846.

The Russian forces in Poland, consisting of 30,000 men, were, in 1849, moved by rail to Göding, near Vienna, where it linked up with the Austrian Army, and during the Schleswig-Holstein revolt and subsequent hostilities during 1848-50, German troops were moved to the scene by rail over the sixty-three-mile Altona and Kiel Railway, which was opened in September, 1844, to connect the River Elbe with the Baltic Sea.

But of greater importance than these instances was the transport by rail of an Austrian army of 75,000 men, together with 1,000 road vehicles, guns, and 8,000 horses from Vienna to the Silesian frontier during the winter of 1850-51. Due to shortage of rolling-stock and staff, bad weather and lack of previous arrangements, the 150-mile journey took twenty-six days. The troops could easily have marched the distance in the time, but, none the less, the movement of such a large body of men by rail was very instructive, and was the indirect cause of a more intensive study being made of the use of railways for military purposes in emergency. Indeed, it led to the drawing up in Austria, in May, 1851, of a special scheme for the construction of strategical railways in that country and a complete reorganization of the methods to be used in the future, should occasion arise – which it did, in 1853, when a considerable movement of Austrian troops took place without upsetting ordinary traffic on the lines concerned. A division of 14,500 men was also moved by rail from Cracow to Hradish in 1851, together with 464 road vehicles, 48 pieces of artillery, and 2,000 horses; the 187-mile journey taking only two days, instead of the fifteen days the movement would have occupied if it had been made by road.

Incidentally, the first instance of an organized attempt to delay the advance of an enemy by interrupting railway communications, was in 1848, when the Venetians, under Daniel Manin, threatened with bombardment by the Austrians, blew up some of the arches in the railway viaduct connecting their island city with the mainland. Their destructive work,

however, only had the effect of lengthening the siege of the city, which ultimately fell to the Austrians on 22nd August, 1849.

All the foregoing instances relate to the transport of troops and military equipment over normal civilian railways, which were temporarily taken over by the military authorities during times of national emergency. The earliest instance of a purely military railway being constructed to specifically serve the purpose of a campaign occurred during the Crimean War, when a precedent was established which was destined to be followed in later years.

Although the distance between the Anglo-French camp at Sebastopol and their supply base at Balaclava was only about six miles, lack of roads caused fatigue parties to take twelve hours or more to do the double journey during the appalling winter of 1854-5. The 'Royal Wagon Train' which had been formed half a century earlier as a transport corps for the British Army, had been disbanded in 1833 and no new corps had been created to take its place; hence the Crimean Campaign, the most ill-managed campaign in British history, was devoid of organized transport until the hurried formation of the Land Transport Corps in January, 1855.

Horses, mules and carts were at first available, but too few could be used for transport owing to shortage of forage; and the quagmire route between base and camps was lined with the starved bodies of animals that had died and frozen. Such were the awful conditions that the pioneer military railway was planned to remedy. *The Times* had suggested the superiority of a corduroy, or plank road, but the Duke of Newcastle governmentally decided that a tramway, or railway would be easier to construct under the abnormally difficult conditions prevailing, because it required only about one-twelfth the amount of timber.

By the middle of January, 1855, several hundred of Sir Morton Peto's famous British navvies arrived in the Crimea with all their paraphernalia. They looked awful, but boasted a stamina founded on English beefsteak and beer – stamina long since lost by the soldiers, seven-eighths of whom were

dying of cholera and only one-eighth of wounds. They set upon the work with good heart, in spite of the absence of beef and beer, and did more work in a day than a regiment could have done in a week.

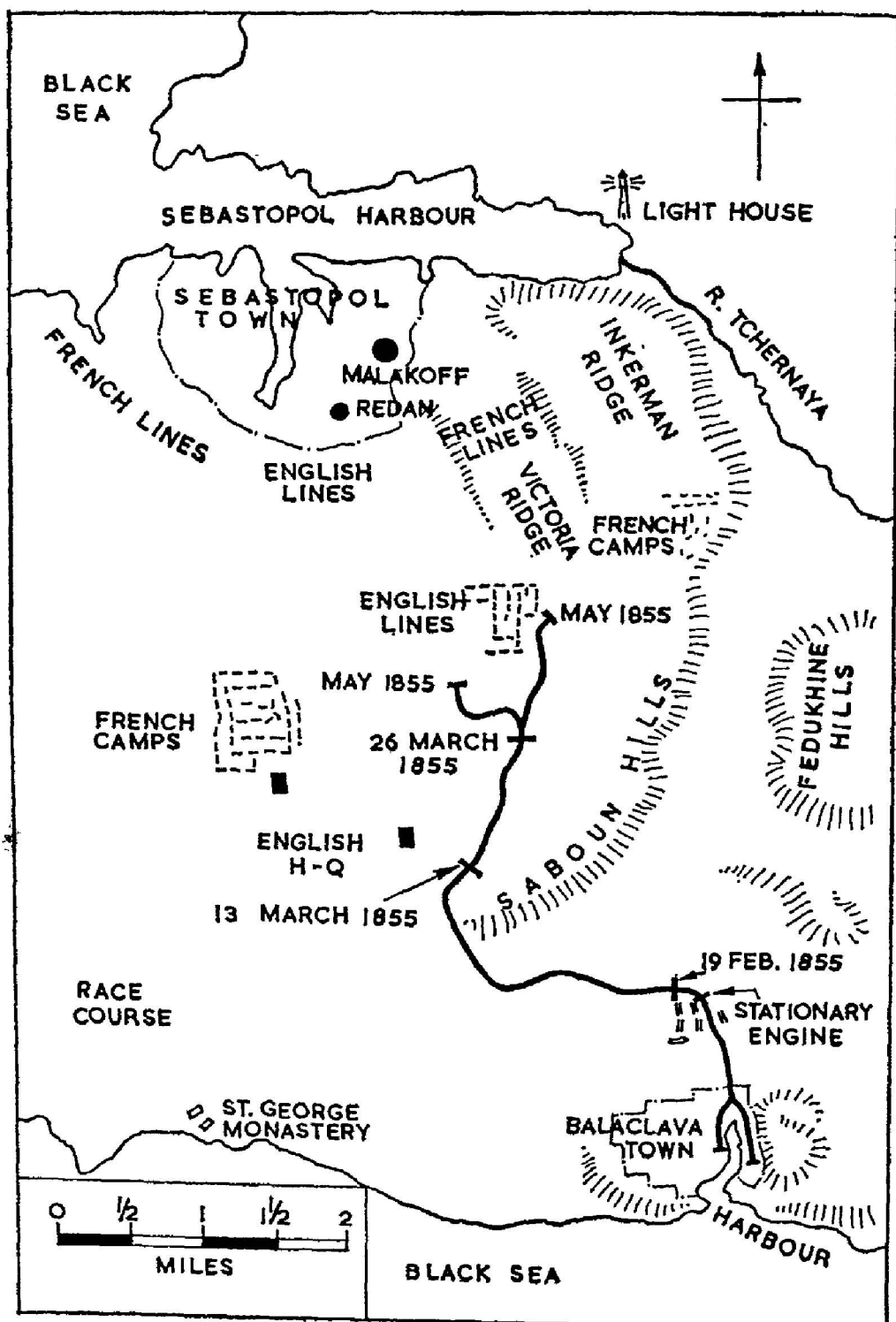
Working conditions were appalling, the men battling with spades, forks and wheelbarrows in two and three feet of slimy mud into which hundreds of unfortunate horses, mules and dromedaries had plunged to their death. But none the less, by mid-February, one and a half miles of single track had been completed and the depot at Kadekoi reached on the 19th. Some of the houses in Balaclava had been demolished to make way for the terminus, but as many were pulled down to provide fuel for the gang's camp-fires.

By now, nearly 900 men were at work, including some Turks from Constantinople, and although the 'railway company' only boasted two saddles and bridles, the Turks and the navvies managed to load and empty the contractor's wagons to the tune of 112 tons of freight per day, thus saving the use of 2,000 horses and mules which would have been required to handle the same traffic by road.

The first two miles from Balaclava eventually was worked by five 12- to 18-ton steam locomotives, then the side-tip wagons were drawn up eight at a time by a steam stationary engine at Kadekoi. This was followed by another gradient entailing the use of six horses to haul two wagons at a time, then after a fairly level stretch, two gullies were crossed where each wagon coasted down and by its own momentum climbed the other side. Thence horse-haulage was used to the end of the line on the upland camp-sites, which had been reached by the constructors by the end of March.

But though the navvies had proved their worth at constructing the line, when they were called upon to work it, they were found to lack discipline and had to be replaced by men from the newly-formed Land Transport Corps, with Mr. Beattie as Chief Engineer and Major Powell as Chief Superintendent. Under these able men, during the last bombardment of Sebastopol, the railway worked continuously, 1,000 men, 400 of whom were Turks, handling 200 tons of

RAILWAYS IN WARTIME



The Crimean Light Railway

ammunition, stores, and wounded each twenty-four hours. The line also did excellent work during the re-embarkation of troops at the end of the campaign.

Unfortunately, however, the line was never more than of a most primitive character and there were no means of adapting the contractor's tip-wagons to carry the wounded, unless they were sitting-up cases; but even so, the little Balaclava way was indeed the first occasion on which a railway was used for the conveyance of sick and wounded soldiers from an actual fighting 'front' to a base at the rear of the lines.

All these uses of railways in wartime were, however, of a more or less makeshift nature, and it was not until the Italian War broke out in 1859 that railways played a strategical and tactical part in actual warfare. In this two-and-a-half-month campaign, which commenced with the Austrians crossing the Ticino River on 27th April and the French entering Genoa a week later, thousands of men of the latter country were carried daily through France to Marseilles, Toulon and the foot of Mont Cenis, and forward to the very battlefields of Montebello, Palestro, Magenta, Marignano and Solferino; whence injured men were carried swiftly back to hospitals. In this respect, distinction must be given to this campaign in military history.

Unfortunately, however, the advantage gained by the quick transport of French troops to the seat of war by the successful operation of the railways concerned, was largely offset by the serious defects in the army administration, which resulted in grave deficiencies in the dispatch of food, fodder, and ammunition. Indeed, after the defeat of the Austrians at Solferino, the French troops, and their horses, being without food for twenty-four hours, were unable to follow the enemy in his retreat beyond the Mincio River.

None the less, in spite of defective administration, during the attacks on Montebello and Casteggio, the French soon showed a superior force which was continually maintained and increased by trainloads of soldiers arriving from Voghera. To this successful threat the Austrians retaliated by tearing up the allied railway lines and destroying bridges, but repairs

were so speedily carried out that the lines were ready for running again by the time they were required.

In the case of the Austrians, who had learnt no lessons as a result of their experiences in 1850, no attempt at organization was made. Vienna station was choked with supplies for the troops, but there was hardly any rolling-stock available to transport it to the front; and for the same reason troop trains southwards could not be made up until empty stock was returned. The heavy gradients of the famous Semmering Pass also caused delays due to each train having to be split into three sections, which were worked over the summit individually. Then, to add to their troubles 40,000 men and 10,000 horses had to travel by road between Innsbruck and Bozen on their journey from Prague to Vienna, because the line was not finished between the former towns. Government and railway authorities alike were completely unprepared, yet it must be recorded that some 20,000 men, 5,500 horses, 300 road wagons, guns and ammunition, were taken by rail from Vienna to Lombardy in a fortnight – four and a half times quicker than if they had travelled by road.

Both the Austrians and the French used the railways for the removal of their wounded and sick from the battle-line, but no special facilities for comfort were provided; goods or cattle trucks being pressed into use for the more serious cases, and ordinary un-upholstered third-class coaches for the remainder. The sufferings of the inmates, on their journey to Milan and other base hospitals, must have been truly incredible.

So it will be seen that the Italian campaign of 1859 marked a turning-point in the early development of the use of railways in war, but as we shall see, far greater results in that direction were to be brought about a little later by the American Civil War of 1861–5. Admittedly, a German doctor, E. Gurlt, realizing the ghastly inefficiencies of rail ambulance transport arrangements during the Italian campaign, suggested that hammocks should be suspended from hooks screwed into the roof of the vehicles used, and that mattresses should be used for the sufferers instead of them

having to lie on straw spread on the floor. But his ideas failed in practice because the roofs of the goods vans collapsed under the weight of the occupied hammocks, which themselves swung with the motion of the train and dashed the wounded men against the sides of the vehicle.

Later (1861), Prussian War Minister Von Roon ordered that in the future less serious cases should travel in normal first-, second-, or third-class carriages, whilst those badly wounded should lie on straw-filled sacks on the floor. A supply of medical equipment was to be carried, and a doctor and attendant was to travel with each train. Thus far had the European countries progressed by the time the American Civil War broke out, so now let us examine the state of affairs on the other side of the Atlantic.

Railways in the American Civil War — I

LESS THAN four months after the Allies' victorious battle of Solferino and the end of the Italian campaign, the ideological struggle between the Northern and Southern States of the United States of America was raised to blood-heat by the capture and execution of famous Captain John Brown for his share in an expedition for freeing slaves in Virginia. His daring night attack on the Government arsenal at Harper's Ferry with a party of seventeen white men and negroes on 15th October, 1859, resulted in its seizure. Then, in the flush of success, he decided to hold up the Baltimore and Ohio Railroad's Wheeling to Baltimore Express, and in the excitement of the blockade, Station-master Beckham and porter Sheppard were killed and a freight-train brakesman seriously wounded. These three casualties were, in fact, the first in the, as yet, undeclared war between North and South.

Incidentally, when the express was at last allowed to proceed on its way, it was its conductor, Phelps, who telegraphed a report to his company's head office at Baltimore, where Railway President J. W. Garrett immediately contacted Secretary of War John B. Floyd, who instantly dispatched Colonel Lee and ninety marines to capture John Brown and his party. Some further loss of life ensued during the recapture of the arsenal, Brown himself being severely wounded and taken prisoner. After being tried for high treason, he was hanged on 2nd December, 1859.

From the time of the Harper's Ferry incident until the starting-point of actual warfare on 12th April, 1862, there was an ominous lull in warlike activities, though Abraham Lincoln had been elected President and many of the Southern

States had withdrawn from the Union. Even the officials of the Baltimore and Ohio and Congress worked in a sense of false security, but Lincoln himself had no misgivings as to the smouldering hates lying just beneath the surface. Then suddenly, came the fall of Fort Sumter, Charleston, Carolina – a bloodless victory for the Confederates (Southerners), and a week later Harper's Ferry arsenal was blown sky-high. The war was on.

It is not generally realized that the area of military operations in the Civil War was almost equal to that of the Continent of Europe. But in spite of its size, the territory was then so sparsely populated and largely unexplored that the conflicting armies had little or no chance of living entirely on what foodstuffs they could find as they marched. Swamps, lakes, floods and execrable weather had to be coped with when food and forage had to be brought hundreds of miles to the scene of operations along almost non-existent roads over mountains and through trackless forests bigger than an average English county. Under such incredible conditions it is no small wonder that the combatants depended for their transport facilities more upon river, canal, and coastwise shipping – together with what railways had been constructed, than upon such a skeleton system of so-called roads.

Poorly ballasted and laid with light-weight rails, the American railways of those days were being built by private enterprise as cheaply as possible with the sole idea of pushing the lines ahead as far as available finances would allow. Progress had been phenomenally rapid. In 1830 there were only 41 miles open; in 1840, there were 2,818; ten years later, 9,021; and when the war broke out, 30,635 miles. But the majority of the lines boasted only a single track, often laid on 'ties' (sleepers) of unseasoned wood which soon rotted in low-lying districts, causing endless derailments. Bridges and viaducts were also constructed of the same material and thus constantly gave trouble.

But in spite of the roughness of their construction, when war broke out, the railways were so strategically important

that many sanguinary battles were fought, either to safeguard them or to gain their control; thus determining to a large extent not only the location of the main battles of the war, but their ultimate outcome.

As we have seen, however, the real development of rail-power as a new arm in war had not yet been fully exploited – even if its greater use had been fully considered as either possible or desirable. The expeditious movement of troops and their impedimenta according to the strategical requirements of the military authorities was all that had been expected of the railways, and this function they had carried out with some measure of efficiency and regularity, in spite of the combined disadvantages of single lines, inadequate staff and rolling-stock, and lack of preparatory liaison between the military and railway authorities. But the American Civil War, while it soon established in no uncertain manner the possibility of carrying on military operations at a considerable distance from a supply base, also showed the great necessity for adequate organizations to cope with the repair of lines damaged by enemy action and the systematic disorganization of his own railway communication. The question also soon arose in Governmental circles as to who was to control and operate the railways of the country during the war.

A fortnight before the fall of Fort Sumter, the Federal Government took possession of the Philadelphia, Wilmington and Baltimore Railway, preliminary to the passing, in January, 1862, of an Act authorizing President Lincoln to take possession of certain important railway and telegraph lines. This sweeping Act included rolling-stock, locomotive shops, buildings, offices, and all ancillary equipment, together with wide powers to prescribe rules for using and maintaining both railway and telegraph lines and placing all railway employees under military control.¹

During the first year of the war, however, rail traffic along the thirty-eight-mile Baltimore and Ohio main line was

¹ All Government-possessed railways were formally restored by the Executive Order of 8th August, 1865.

generally unmolested, trains running approximately to their peacetime schedules in spite of the Federal and Confederate troops frequently bivouacked alongside the track. But the line was a strategic east-to-west link for the Federals, and soon there began to be occasional line-side clashes, which continued at a rising tempo until 25th May, 1861, when destruction hit the railway with a vengeance. During the night the Confederates climbed the cliffs overhanging the line at Point of Rocks, ten miles down the Potomac River from Harper's Ferry, and blasted down a locomotive-sized rock overhanging the track. Rail chaos followed, which was added to the next week, when two wooden trestle-bridges at Buffalo Creek, Virginia were blown up and burnt to the ground. With nearly a hundred miles of the B. & O. main line solidly in the hands of the Confederates, the railway war had started in earnest, with each side trying to outdo the other in the severity of their attacks on railway property.

Then, in mid-1861, the Southern Forces fell on the Martinsburg yards of the B. & O. with fire and sword, smashing the cast-iron wheels of forty-two locomotives with sledge-hammers before consigning them to the flames of a pyre of sleepers and telegraph poles. Fourteen engines were horse-hauled away to the south, then, crazed with the destruction they were wreaking, the soldiers turned their attention to the passenger and freight rolling-stock, 386 vehicles of which were burnt or wrecked beyond repair. Even a few out-of-service locomotives on a dead-end were manhandled down the line alongside the Potomac River, where they were derailed and sent rolling sideways down the embankment into the water. This was no ordinary train-wrecking, but sheer wanton destruction for destruction's sake. The Martinsburg railway yards were a shambles. Hardly a stone was left standing in what had been the 'Swindon' of the B. & O. Railroad.

But the railway company met the unprecedented crisis with remarkable perseverance, buildings being re-erected, rolling-stock patched up, and new rail-rolling mills and locomotive sheds put into service. Restoration was, however,

only temporary, for in October the following year (1862), all was again destroyed in a lightning Confederate raid, and this time they were more thorough and vandalistic than ever. Huge bonfires were made of sleepers, on to which lengths of rail were tossed, then when red-hot, the precious rails were savagely corkscrewed round tree-trunks until they were unsalvageable and utterly useless.

But the Martinsburg raid, though it reduced the Baltimore and Ohio transportation services in the vicinity to a state of utter chaos, was only a foretaste of what was to come – such as the wholesale destruction carried out by the Confederates on the Fredericksburg Railway, a strategically located line connecting Richmond, Virginia and Washington, D.C., as well as the Federal Armies of the Potomac and Rappahannock. Realizing that these two Northern Armies could not act without each other and that neither could join forces without rail communication, the Southern Command decided to carry out a well-planned campaign of railway destruction.

The attack on the railway, which took place in April, 1862, was no repetition of the destruction-crazed methods used at Martinsburg the previous year. Twisting up red-hot rails was far too slow a destructive process, so an iron claw was devised by which half a dozen men could rip up and twist rails at such a speed that 500 men could completely destroy a mile of single track in a few hours. Similarly, why go to the trouble and effort of rolling locomotives into the river when the firing of a single cannon-ball through the boiler was a speedier and far more effective method of putting it out of action? In such drastic sabotage work, time was as important a factor as surprise.

Bridge and viaduct destruction had also become an art, the cruder method of piling brushwood around the main piers, pouring tar or paraffin over the pile and burning the structure down, gave place to that of inserting an 8-in.-long gunpowder-filled torpedo into a hole drilled in the main timbers and exploding it by a fuse. In this way, three men working on each bridge-span could bring down the largest structure in about ten minutes.

RAILWAYS IN THE AMERICAN CIVIL WAR

The planned mass destruction of the Fredericksburg Railway brought matters to a head and at the most urgent request of the Secretary of War, bridge-builder Herman Haupt undertook the immense task of getting the line running again in the shortest possible time. Unfortunately, the only men he could get together as a working party were Federal soldiers unaccustomed to heavy physical labour or who thought that railway work was outside the province of a soldier's duties. Such men were useless to Haupt, but after endless arguments with the army officers in charge, he at last prevailed upon them to allot him healthy men, interested in railway work.

Working with his devoted 'Construction Corps', Haupt proceeded at an amazing speed, in spite of the scarcity of food and tools, and spells of atrocious weather. The 30-ft.-high, 120-ft.-long single-span trestle bridge at Akakeek was rebuilt in only fifteen working hours; 414-ft.-long, 82-ft.-high Potomac Creek bridge was reconstructed in nine days, over six miles of rough-hewn timber being used on the job – timber cut from woods one and a half miles away and used with its bark still on to save time. Three more days sufficed to cut 3,000 ties, or sleepers, and in twelve days from ten to twenty heavy army trains per day were rolling over the rebuilt structure, which withstood several severe storms without injury.¹

In appreciation of his successful work, Haupt was appointed Chief of Construction and Transportation at Rappahannock on 28th May, 1862, with the rank of Colonel. But before Haupt started repairing railways, dashing, hard-riding Confederate General John H. Morgan already had been making a name for himself as bearded king of all the railway destroyers. No single leader – not even the redoubtable General Sherman – compared with him in sheer strategy and audacity when it came to railway wrecking.

Morgan's Christmas-night raid on the Louisville and Nashville Railroad will go down in history as one of the most

¹ This bridge was again destroyed in May, 1864, when it was again rebuilt in forty hours.

incredible of all the many rail destruction raids of the Civil War. He had had an eye on this railway for some months, as it not only linked Louisville and Nashville but connected Frankfort and Lexington with the north, and as such provided a strategic railway route which he guessed the Federal forces might be planning to use to speed up their push southward to Georgia.

By the evening of Christmas, 1862, all Morgan's plans were made. The weather was vile, the rolling Kentucky hills shrouded in flurrying snow driven before a biting east wind, but he was not a man to be put off by bad weather – on the contrary, the worse the weather, the better chance of surprise. What better, too, than the choice of Christmas Day for such an attack?

The small railway township of Upton, sixty miles south of Louisville, was destined to receive the first blow of Morgan's attack. He gambled that its townsfolk would probably be sleeping peacefully, unsuspecting that at dawn 4,000 horsemen would be shooting the little Federal garrison into silence. His gamble worked – the garrison was unprepared.

With the little fort in his hands, Morgan's next move was to take over the railway station, whence he sent a telegram to Federal General Boyle at Louisville. Craftily, he used the name of one of the Federal commanders, with the result that Boyle gave him much valuable information about the position of the Federal Forces. At the same time, however, Morgan was shrewd enough to give Boyle deliberately misleading information as to the strength of 'Morgan's Gang' and its whereabouts. Boyle fell into the trap and Morgan carried on his destructive work unhindered by any major Union Forces.

Bacon Creek bridge¹ was the first to be demolished as he marched north-east from Upton to Shepherdsville, bowling over dozens of 500-strong garrisons one after another on his way to Nome, where another bridge was destroyed. Then, pressing forward again, he smashed his way into the heavily fortified brick warehouses at Elizabethville,

¹ The station at Bonneville, Kentucky now occupies this site.

where the Illinois troops fled in terror before him; and on again to Muldraugh's Hill, where 700 Indian Federals were routed at the stockades before two long trestle-bridges were blown up and fired. Finally, in spite of a surprise counter-attack by some 3,000 Federal troops, 500 of his men completely destroyed the bridges at Rolling Fork after burning down the stockades protecting the structures. That was the end of Morgan's famous railway raid, and by 2nd January, 1863, he had withdrawn beyond Alexandria, Tennessee.

But in one short week, Morgan and his ridiculously small band of devotees had completely wrecked the Louisville and Nashville Railway from Upton to Shepherdsville. Vital railway materials and a vast amount of 'enemy' property had been destroyed and nearly 2,000 prisoners taken. Indeed it took Colonel Haupt best part of six months of continuous night and day work to get the line into some semblance of operation again.¹

The Northern ('Yankee') saying of the time that 'Yankees can build bridges quicker than the "Rebs" (Southerners) can burn 'em down' seemed to be hardly true in the case of the Louisville and Nashville fiasco, but soon Colonel Haupt began to collect formidable supplies of repair and reconstruction materials, including interchangeable bridge truss parts in 60-ft. spans. These were so prepared that they could be taken on flat cars or by oxen to the scene of destruction and there be hoisted into position by machinery and fitted together with great speed. For example, five Confederate-destroyed bridges over Goose Creek were rebuilt in one and a half days and five others with 60- to 120-ft. spans renewed in one day.

Similarly, during the three days' battle of Gettysburg, Confederate Generals Lee, Longstreet and Ewell destroyed no fewer than nineteen bridges and viaducts on the Northern Central Railroad and its branch lines around the city. Haupt's Construction Corps, however were soon on the job

¹ The total damage sustained by the Louisville and Nashville Railroad during the Civil War, amounted to almost a million dollars.

and hard at work with repairs, even while the battle was still raging around them; so that both rail and telegraphic communication between Gettysburg and both Baltimore and Washington were re-established by noon after the Confederates had commenced their retreat to Pennsylvania and Maryland.

The successful completion of such a task – and many others like it – in such a short time is made all the more amazing when it is realized that there were at that time, track gauges of 6 ft., 5 ft. 6 ins., 5 ft., 4 ft. 10 ins., 4 ft. 9 ins., and many others, yet narrower, in use.¹ Indeed, one of the greatest disadvantages of the American railways at the time of the Civil War lay in the differences of their gauge, and such lack of uniformity often complicated military transport by enforcing trans-shipment of men and materials from one railway to another.² Hence, one of the obligations also falling upon Colonel Haupt was that of relaying the lines of companies using any other gauge than ‘standard’ (4 ft. 8½ ins.) to the latter gauge, so that locomotives and rolling-stock could be used freely and sub-standard stock abandoned. Many lines also, the construction of which had been commenced before the war started, were completed by the Construction Corps, which also constructed many track-miles of sidings for wartime use.

But to revert to the railway wrecking raids of the Civil War, April, 1862 also witnessed the reckless and incredibly audacious attack by 22-year-old Federal James J. Andrews on the Confederate-run Western and Atlantic Railroad between Chattanooga and Atlanta, where he envisaged a very full programme of wholesale destruction, including that of the strategic Chickamauga Bridge. Andrews deserves mention, if only because some of his exploits were, perhaps, even more spectacular than those of his opposite number, Morgan, who may have found Andrews’s methods helpful

¹ Russia adopted her broader gauge so that, in the case of invasion, the invader would not be able to run his rolling-stock over her lines.

² In 1871 there were twenty-three different gauges in use on U.S. railways.

when planning his raid on the Louisville and Nashville line later in the year.

While Morgan travelled in uniform, however, Andrews chose to disguise himself and his twenty-one-strong gang as civilians, and on 12th April, 1862, they boarded a north-bound train at the tiny Georgian township of Marietta, twenty miles north of Atlanta, without rousing any suspicion. Indeed, as they huddled round the wood-burning stove in the passenger coach, no one would have guessed that they were picked soldiers of the Northern Army under General Mitchell's command. Their conversation did not betray their identity as they chatted freely about the brutal way they had been treated by the Federal armies. After all, everybody knew that General Mitchell's forces were far away in mid-Tennessee.

At Big Shanty, seven miles north of Marietta, train-conductor Fuller stopped the train and gave the usual twenty minutes for breakfast. Everything went perfectly normally, but Andrews and his gang were well aware that on ahead, between Big Shanty and Chattanooga, there were no less than fifteen bridges and trestles of various sizes. Some way of ensuring their destruction had to be devised, but, fortunately for Andrews, fate was to take a leading hand in subsequent events.

Now it chanced that not far from Big Shanty station was a Confederate camp where some 3,000 new recruits were being put through their paces, so when the train rolled into the station, the platform was swarming with men, many of whom were being sent to Chattanooga. Soldiers, civilians and luggage were inextricably mixed up and chaos reigned supreme. This was Andrews' golden opportunity – and he took it.

Above the shouting and general pandemonium, Fuller looked up startled when he heard the staccato bark of the exhaust of his train engine on the move. To his surprise and chagrin, it was rapidly leaving the station with some freight cars in tow, leaving the detached passenger cars – with Andrews and his gang – at the platform! A highly

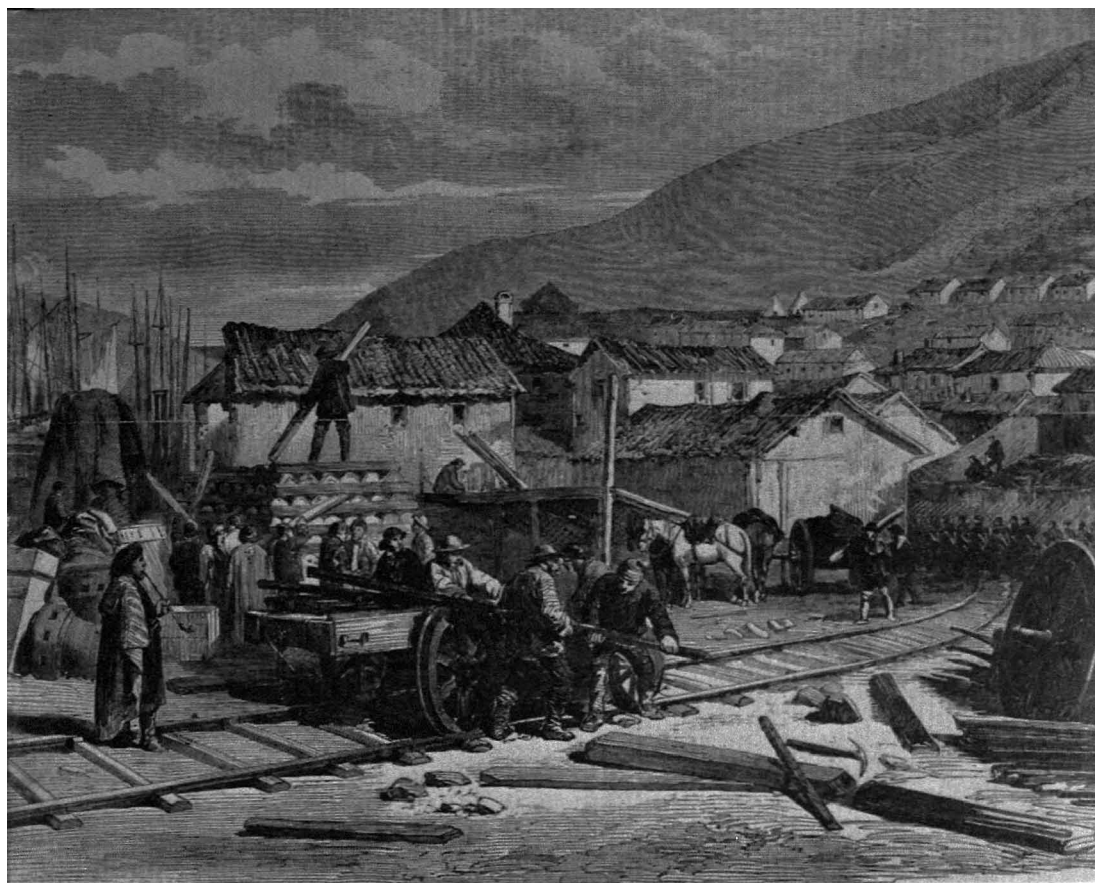
irregular movement, even by wartime railway working standards.

Then fate again stepped into the picture on Andrews's side, this time in the form of a report of some deserters from the near-by camp, for whom the officer in charge of which had previously asked Fuller to keep a sharp look-out; telling him that he would arrest any soldiers attempting to board the train without proper passports. Obviously, thought Fuller, it was these deserters who had stolen his engine and freight cars; and acting on the assumption that they would clear the camp, abandon the locomotive and take to the woods, he forthwith set off on foot and ran the two miles to the next station – Moons. But still no sign of the engine and cars. The locomotive in question was none other than seven-year-old 'General', and like most products of the famous Rogers Locomotive Works at Patterson, New Jersey, she could show a clean pair of heels to most older engines. So by the time Fuller panted into Moons, 'General' and Andrews's gang were well out of sight round the bend ahead.

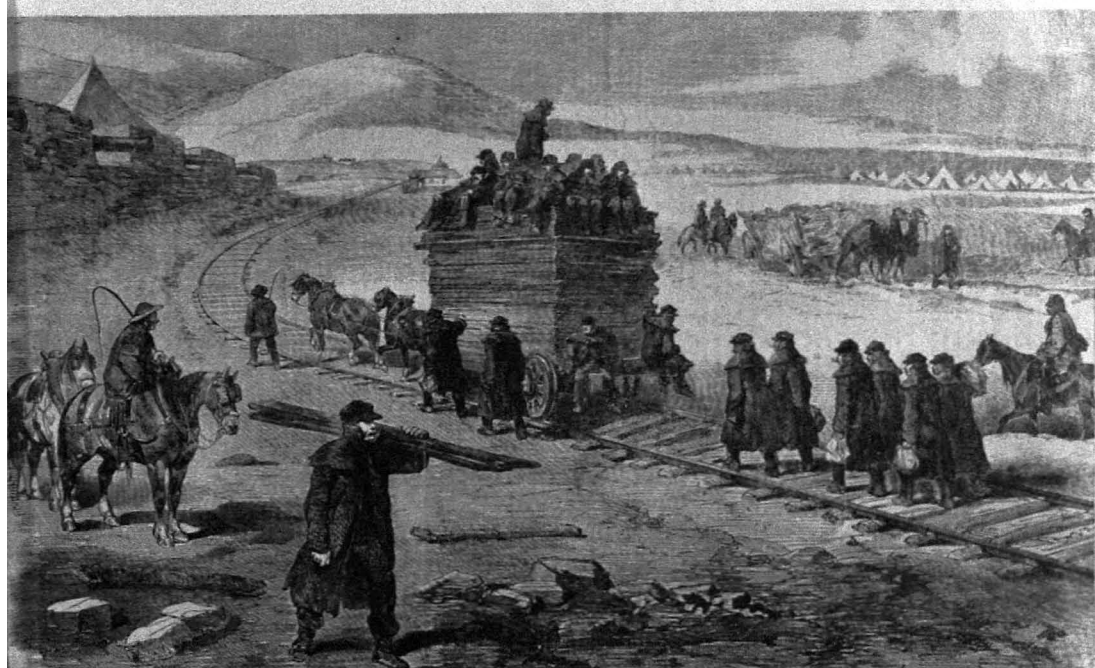
Livid with rage that his engine and half a train had been filched from under his flowing black beard, Fuller angrily cross-questioned a gang of platelayers near by. Yes, the train had passed them with over a score of men riding it and the engine. They had even loaded track-repair tools on board and cut the telegraph wires before they left. Sabotage, thought Fuller; and for the first time he realized that the thieves were probably Federals in disguise.

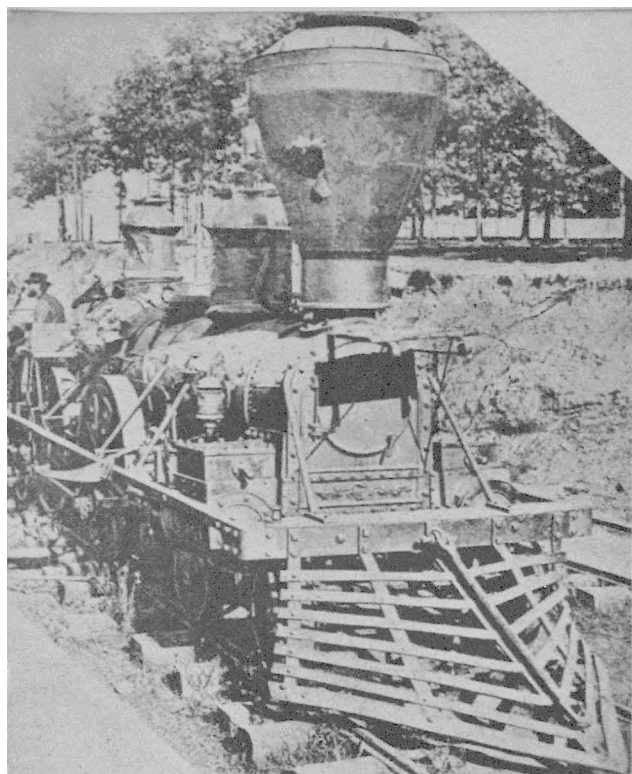
Then shop foreman Murphy and engine-driver Cain panted up alongside from Big Shanty, suggesting that they should get a hand-lever-driven platelayers' trolley on to the track and follow the runaways. Fuller agreed, being certain that if they 'pumped' the trolley levers hard enough, they could reach Etowah River as the saboteurs arrived at Kingston, where he knew that they would have to wait in the siding whilst the scheduled freight train passed in the opposite direction. It was a good idea, so the intrepid three set off in fine style.

Trouble struck them two miles out, where a section of



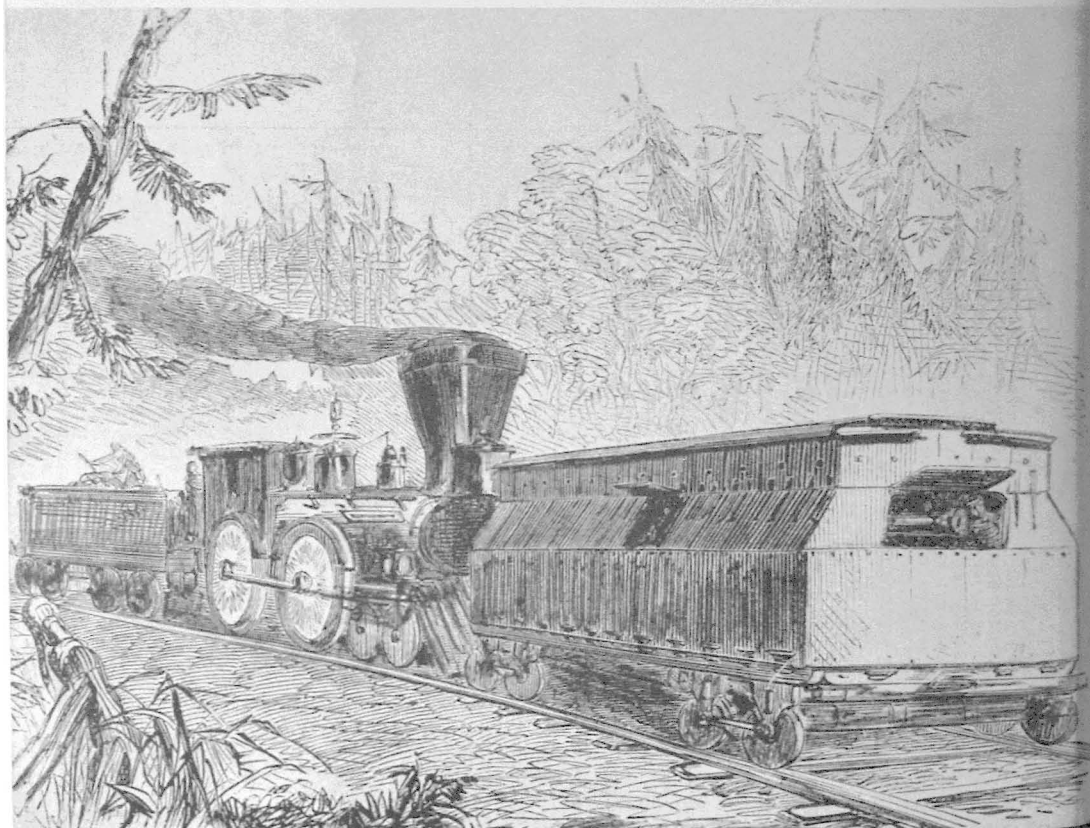
Above: Work begins on the Balaklava railway. Below: Progress further up the line. (Both reproductions from the Illustrated London News)





The Union locomotive 'General' damaged by the explosion of a Confederate ammunition train

An iron-car battery on the Philadelphia railway during the American Civil War. (*Illustrated London News*)



track had been torn up and sleepers wedged under the rails on either side of the gap. Nothing daunted, they dragged the trolley through the ballast and pumped their way to Acworth, where they picked up a couple of civilians and some rifles. Five up now, they shot down grade round the bend into Etowah, only to suddenly catapult into the bushes through a gap in the rails. Tired, bruised and bleeding, once again they blundered through the ballast with the heavy trolley, then panted and pumped along to roll eventually into Etowah.

In the Iron Works siding there stood veteran locomotive 'Yonah' with steam up. That she was facing the wrong way did not matter. Half a dozen Confederate soldiers standing guard at the Iron Works decided to join in the chase, and with engineer Cain at the throttle and averaging nearly 60 m.p.h., old 'Yonah' proved her mettle – even though she was running tender first!

Arriving at Kingston, Fuller learned that the tall, top-hatted leader of the runaways – Andrews – had said that he was a Confederate officer running three carloads of ammunition to General Pierre Beauregard at Corinth. And swallowing the story hook, line and sinker, the station agent had even ordered the southbound freight train to be shunted into a siding to allow Andrews's 'special' to proceed unhindered. 'General' and her three-car train had about a quarter of an hour's start, he told Fuller, who, now thoroughly mad with rage, boarded engine 'Texas', which was standing in steam on a northward-facing siding and set off hopefully in pursuit; his gang having now grown to eleven armed men.

They had not gone a couple of miles before they began to run into sleepers which had been conveniently dumped from time to time by Andrews as his kidnapped train raced towards Chattanooga. Every half-mile or so his pursuers had to stop to clear the rails, but finally, about four miles from Adairsville, sixty yards of missing track forced them to halt. There was nothing for it but to desert the bogged-down engine and start running, which they did, and at the end of the first half-mile Fuller had left the others out of sight.

For two more weary miles he loped along the sleepers, only to be met head-on by a fast freight train. Desperately he tried to attract the driver's attention by firing his revolver, but the man was wary of strangers and refused to stop until he had shot past Fuller and recognized him. Then Murphy came puffing up, and together, he and Fuller raced down the train to its rear end and signalled to the driver to start backing-up into a siding, where they uncoupled the train before mounting the engine and heading off 'light' down the main line after the runaways.

Twelve minutes dead sufficed to cover the ten miles to Calhoun, where Fuller spotted the 12-year-old station telegraphist standing on the platform. Slowing down, he grabbed the youngster aboard mail-bag fashion, then turning to engineer Bracken, yelled to him for top speed and started drafting a telegram to General Ledbetter, Commanding Officer at Chattanooga, briefly explaining the desperate situation and asking him to stop the renegades at all costs at Chattanooga.

Working up to a dangerously risky top speed, they lurched drunkenly round a curved cutting, only to be faced with the terrifying sight of 'General' standing stationary on the track ahead, with the disguised soldiers scattered around frantically ripping up the rails. Instinctively, Bracken slammed the throttle shut and jammed on the brakes in a frantic effort to avoid a collision, but Andrews's party had spotted them at the same moment and desperately uncoupling the rearmost freight car, scrambled aboard 'General' and started rolling.

Faced with a 10-ton standing box-car, Fuller made a snap decision: to keep moving, pick up the car at quarter-throttle, and push it ahead of the engine. This was done, but then the trouble was that he couldn't see what was ahead for the hulk of the car, so making his way along the swaying engine, he crossed to the car and mounted its roof, scanning the track ahead and hand-signalling his orders back to Bracken. All went well for three or four miles, then another freight car loomed up ahead, and once again they crashed into it, but this time without hardly reducing speed. There was a terrific

crash on impact, but neither freight cars nor locomotive left the track. They kept rolling and no running time had been lost.

At Resaca, they shunted the two cars into a siding and set off in pursuit again; the engine still steaming in reverse with the intrepid Fuller grimly hanging on to the tender rear grab-iron. Suddenly as they careered along at well over a mile a minute, he spotted a piece of rail wedged between the rails ahead. It was too late to stop. They crashed into the hunk of steel at full speed, flinging it with a clanging crash fifty yards into the line-side bushes. Once again Fuller had gambled with fate – and won the toss.

At the next-but-one station, Fuller dropped the young telegraphist, telling him to get the telegram through at all costs, then they raced over the fifteen miles to Ringgold at breakneck speed without further incident. Between Ringgold and Graysville, on the Tennessee-Georgia border, they were suddenly faced with death – in the form of a blazing box-car rushing towards them down a grade. It was Andrews's last frantic attempt to stop the oncoming 'Texas', and it failed. 'Texas' was still running in reverse, and from his observation post on the tender, Fuller signalled Bracken to reverse and gently pick up the blazing car, then bringing it to a stand without damaging the engine. It was a tricky manoeuvre, but it worked perfectly.

In the meantime, Andrews had used too many sleepers in his desperate attempt to stop his pursuers, and had not left sufficient to satisfy 'General's' voracious appetite. He had run out of fuel, and the game was up. Abandoning 'General', he and his gang took to the woods, only to be rounded up several days later; Andrews and seven of his twenty-one henchmen being hanged on 7th June, 1862.¹

¹ Ironically, in 1891, a monument was erected to James J. Andrews in the National Cemetery, Chattanooga.

Railways in the American Civil War—2

SUCH DRAMATIC episodes as the raids of Morgan and Andrews were by no means the only methods used for rail destruction, commanding officers of both armies wreaking havoc as they began to appreciate, towards the end of the war, the great importance of railway communications. Some railways were decidedly unlucky in this respect, particularly the little Nashville and Chattanooga Railroad, on which the Federals had built extensive storehouses filled with materials for dealing with railway repairs of every kind wherever necessary.

The Northern Army of General Sherman left Chattanooga on 1st May, 1864, with a force of 100,000 men and 35,000 horses, and from then until the capture of Atlanta, it was entirely dependent on three railways: the Western and Atlantic, the Louisville and Nashville, and the Nashville and Chattanooga; which between them constituted a 470-mile supply line from Louisville to Atlanta. For 196 days (1st May to 12th November) the lines were periodically destroyed by the Confederates and repaired by the Federal Construction Corps.

Even before Sherman's struggle for Atlanta began, however, the Nashville and Chattanooga had already suffered heavily, when early in September, 1864, Confederate General Wheeler tore up seven miles of its track. Trains were got running again in a few days, but within three months, Confederate General Hood decided to try his hand at disorganizing Sherman's tenuous supply line and ripped up eight miles of track at the same place – between Nashville and Murfreesborough, destroying 530 ft. of bridges for good

measure. The Western and Atlantic also suffered heavily when Hood again cut Sherman's supply-line by tearing up and twisting out of recognition some seventy miles of rail,¹ representing thirty-five miles of track, together with the destruction of over 1,000 ft. of bridges, including the 780-ft. long, 92-ft. high Chattahochee Viaduct, near Atlanta; which latter was rebuilt in four and a half days by Chief Engineer Wright and E. C. Smeed, and their two divisions of bridge-builders.

General Hood had done his work well, not only corkscrewing the rails but burning the sleepers, together with destroying the Federal's railway supply depot at Chattanooga. Fortunately, however, the units of the Construction Corps were so disposed along the line that even while Hood was tearing up a twenty-five-mile length of track north of Resaca, two strong working parties were hard at it cutting down line-side trees to form new sleepers at the ten-mile section Hood had destroyed at Big Shanty. Even the new rails had to be brought to the scenes of destruction from railways south of Atlanta or north of Nashville, yet, in spite of all this, through supply trains were again running over the twenty-five miles of relaid track in a few hours over one week.

General Sherman indeed had great faith in the railway at his rear, and his confidence was fully warranted by the results accomplished, but by the time he had reached Atlanta, he had collected supplies by rail sufficient for 600,000 men, and was more than fully aware of the immense importance of railways in wartime. Realizing that it would be tempting Providence to depend upon the railways during his further 300-mile march to the sea at Savannah, he dispatched to the rear all men and material that he did not need, then completely destroyed some sixty miles of the Western and Atlantic track behind him so effectively that the Confederates never attempted to repair the lines and pursue him.

¹ Iron rails were first rolled in the U.S. at Mount Savage Mill, Maryland, in 1844. Steel rails were first used in 1864, between Altoona and Pittsburgh, Pennsylvania.

At Savannah, he contacted the Federal fleet before dividing his forces into three columns and turning northward to contact Federal General Grant at Richmond. On this march there was no need for Sherman to directly attack Charleston, he merely destroyed some sixty miles of track around an important junction on the South Carolina Railroad thus cutting off the town from its supply sources and forcing the Confederate garrison there to surrender.

During Sherman's brilliantly successful campaign, his troops destroyed many hundreds of miles of railway, and the Construction Corps had meantime repaired and reopened nearly 300 miles in North Carolina in order to assist his later progress northwards. This apparently haphazard destruction and construction of railways as required by the vicissitudes of war, contributed very greatly to General Sherman's success, and indeed, to the final triumph of the Federal cause. From this time, in fact, it may be said that the organized interruption of railway transport became a recognized phase of warfare the world over; special forces being created to deal with the construction, destruction and restoration of lines which are, or are thought to possibly be, of any military importance.

Some idea of the immensity of task of the Federal Constructional Corps can be gained from the fact that during the whole war they laid or re-laid no less than 641 miles of track and built or rebuilt bridges and trestles the lineal footage of which totalled almost twenty-six miles. Yet, without those very railways, it has been stated that the Confederate Southern States would have proved unconquerable.

But not only did the railways more than often provide a supply life-line to troops massed for action, they also carried troops to the fighting areas and brought back the sick and wounded from the Eastern States battlefields to hospitals in the larger cities. The vastness of the railway effort in the latter respect can be appreciated when it is borne in mind that the total number of men of both sides killed, wounded, and dying of disease, is estimated at 530,000.

Yet the early arrangements for the railway transport of sick and wounded were at first very primitive – not much in advance of those of the Italian War of two years earlier. Palliasses, hay, straw, or even pine boughs or leaves were strewn over the floor of the box freight cars which had been already used to bring supplies to the fighting front. Usually, twenty stretcher cases were crowded into the limited floor space available, ventilation being provided by cutting holes in the car ends or sides. Under such primitive conditions, however, the railway companies worked with great speed. For example, after the battle at Gettysburg, no fewer than 15,000 wounded were dispatched by rail from field hospitals to Harrisburg, Baltimore, New York and Philadelphia; the whole operation being completed in twenty days. Similarly, nearly 10,000 wounded victims of the Federal disaster at Chancellorsville were carried by the little Aquia Creek Railroad from Aquia Creek to Washington between the morning of 12th June, and the evening of 14th June, 1863.

By early 1863, blankets were being provided, together with one or two tiers of wooden bunks supported by upright posts. This was further improved by the use of strong rubber rings fixed to the posts, into which the handles of the stretchers could be inserted; thus giving the sufferer a much more comfortable ride. By the autumn of the previous year, however, the affluent Philadelphia Railroad Company had re-designed a sleeping-car for ambulance work, arranging the supports so that stretcher cases could be slipped in and out easily. Fifty cases were thus accommodated, with a seat for an orderly at each end of the vehicle; which also contained other amenities such as a water-tank, stove, and locker. The only thing against the mass adoption of this principle, which allowed the injured man to remain on one stretcher from start to finish of his journey, was the then lack of uniformity in the dimensions of the stretchers in use.

The next phase of development consisted in running an ambulance car in train with ordinary passenger vehicles, which scheme was soon succeeded by the ambulance train of nine or ten 'ward cars', as they were called, supplemented

by other vehicles specially equipped as store rooms, dispensary, kitchen, and surgeons' and orderlies' quarters. This was virtually a hospital on wheels, and the first such train was run on the Orange and Alexandria Railroad, upon which several other complete trains soon started running; thus establishing the ambulance or hospital train as an institution of warfare.

Such is the short history of the evolution of the ambulance train during the American Civil War, and it will be appreciated that the commonly accepted idea that it was a British invention is entirely without foundation, though admittedly much was later accomplished in the United Kingdom to improve its constructional methods, medical equipment, and method of operation. As we shall see, European combatants of the 1860s in no way followed the well-tried American methods, their transport of sick and wounded during the Danish War of 1864 and the Austro-Prussian campaign of two years later, being described by American Doctor Evans, of Paris, as deplorably defective; grievously wounded soldiers suffering unspeakable tortures whilst travelling on bare boards thinly strewn with straw for days on end without their wounds being even dressed. But now from ambulance trains to armoured trains, which were first used in the American Civil War, though they had been suggested in 1859 by English Railway Authority William Bridges Adams, the inventor of the fishplated rail joint.

Adams's suggestion was no doubt inspired by the fact that in 1859, violent attacks were being made on England by the French Press and Britain appeared to be faced with the prospect of an invasion. Coastal defences being in a ridiculously defective state, a Royal Commission was hurriedly appointed to inquire into the feasibility of many suggestions put forward. Among these was Bridges Adams's brilliant idea of 'mounting a 20-ton gun on a revolving platform on an eight-wheeled railway truck', and, he claimed, 'such a battery would be practically a moving fortress.' Brilliantly conceived as the idea was, it was pigeon-holed, and was still 'under discussion' in Britain, when the Americans set the rest

of the military world agog by actually introducing an armour protected vehicle mounting a breech-loading gun. The armoured train was *fait accompli*.

Built at the Baldwin Locomotive Works at Pittsburgh, Pennsylvania, the first 'ironclad railway battery car' was constructed of locomotive boiler-iron fixed to 2½-ins.-thick oak planking mounted on a 30-ft.-long flat car. The sides were 2 ft. 6 ins. high and the main arm was a 6-in. cannon mounted on a revolving platform – more or less as suggested by Bridges Adams three years earlier. It was sent by Assistant Secretary of War Watson to Alexandria for Colonel Haupt's approval in August, 1862, with the suggestion that he arranged for a locomotive to also be protected by armour. On seeing the vehicle however, Haupt was not very impressed and shunted it into an old siding. But the idea was not to be thus lightly dismissed, for more similar cars were later constructed in the Newberne, North Carolina Shops of the Atlantic and North Carolina Railroad, their armour consisting of a field-gun mounted behind a shuttered port-hole through old rails spiked on the outside of the car's side and end planking. A second car was similarly built, but mounted a naval howitzer.

These armoured cars were pushed ahead of the locomotive and were used during reconnoitring the line west of Newberne. Later, in August, 1864, a train of six such cars, powered by an armoured locomotive, was brought to a stand by an unlucky Confederate cannon-shot, which pierced the boiler. It was then an easy matter to destroy the train by stacking sleepers around it and setting fire to them.

It was during the winter of 1862–3 that Haupt was forced to revise his opinions about the usefulness of the armoured train, for, writing to the Director of Military Railroads, he suggested that locomotive crews would have more confidence if cabs were made bullet-proof and the outside motion and more delicate parts of their locomotives better protected. No doubt, experience had shown him bullet-riddled cabs in which engineers and firemen had escaped with their lives by

lying flat on the footplate. Fire from guerrillas hidden in the line-side brush could indeed be devastating to morale.

During the war, the accomplishments of railwaymen of both the North and South are scarcely believable, such was the part played by them and their railways, locomotives and trains. An outstanding example of such magnificent co-operative work is that of the transport, in September, 1863, of 22,000 men of General Hooker's command and their full equipment the 1,168 miles from Washington, D.C. to Bridgeport, some thirty miles from Chattanooga. The route lay via Baltimore, Wheeling, Columbus, Indianapolis and Jeffersonville, and when it is considered that it took the men almost two months to march from Bridgeport to Chattanooga, the fact that their rail journey took only seven days seems little short of miraculous. Not only speed, however, was achieved during this outstanding troop movement, for by provision of adequate cooking arrangements, the soldiers were kept well-fed and thus arrived at Bridgeport in good health and spirits.

Railways in the European Tide of War

WITH THE outcome of the American Civil War still in the balance, and President Lincoln calling for a further draft of half a million men over three years, German troops under Marshal Wrangel entered Holstein; the Prussians took Schleswig; and Jutland was pillaged for not paying war indemnity to the invading forces. War had indeed crossed the Atlantic.

As we have seen, Prussia and most larger European countries had already evolved theoretical methods by which their troops could be transported by rail, but there was soon found to be a great difference between theory and practice, railway arrangements during the Prusso-Danish War proving dismally unsatisfactory; particularly in respect of the conveyance of the wounded, which were carried in ordinary passenger coaches or on straw-filled sacks laid on the floor of goods wagons, according to the severity of their wounds. Admittedly Prussia, influenced somewhat by the wartime developments of the American Civil War, had made a small-scale reorganization by forming, in 1864, a General Staff Railway Section, which speeded-up troop movements, even if at the expense of their comfort in transport.

As has been mentioned, transport conditions for sick and wounded remained primitive in Europe during the Austro-Prussian-Italian conflict of 1866, after the conclusion of which a Prussian Commission composed of military and medical authorities was appointed to fully investigate the subject. For three months the Commission slowly and pompously deliberated, then decided against the American system of rubber-suspended stretchers in favour of straw-filled

palliasses, claiming that patients would feel uncomfortable if carried one above the other! They did, however, adapt fourth-class coaches as vestibuled trains, so that doctors, nursing orderlies, cooking utensils and medical stores were always ready to hand anywhere along the train, without it having to stop.

The findings of this Commission were widely reported throughout Europe and were largely responsible for the series of experiments carried out at the Paris Exposition Internationale of 1867, where, under the auspices of the Chemin de Fer de L'Ouest, which company supplied a short length of track and a goods van on which a number of systems involving a great variety of internal fittings were tried out, including a model of one of the rubber-ring-fitted, stretcher-carrying American coach. If they achieved nothing else, these trials were directly responsible for renewed interests in the well-being of sick and wounded in transport, eventually resulting in the appointment of yet another Prussian Commission on the subject; and its serious discussion at the International Congress of Red Cross Societies in 1869. As a result of the findings of this second Commission, the Prussian Government decided to adopt a 'standard' system, which was mainly used on their trains during the Franco-Prussian War of 1870-71. But first let us see how railways assisted during the prosecution of a 'minor war'¹ in a roadless, uncivilized country - the British Abyssinian Campaign of 1867-8.

Sent to effect the release of British Consul Cameron and others whom King Theodore of Abyssinia was holding prisoners at Magdala, Sir Robert Napier sailed from Bombay with a pioneer force on 14th September, 1867, to arrive at the port of Zoulla, 300 miles from Magdala, the following month. They brought a mile of second-hand tramway track with them with the idea of laying it from the rather ramshackle landing-stage at Zoulla to a depot it was proposed to establish inland. The scheme was no doubt a good one, but those in charge had overlooked one very important point:

¹ The campaign cost Britain £8,000,000.

that not only was their ultimate objective 300 miles from the coast,* it was a hill fortress on a 9,000-ft.-high plateau. So, in November, it was decided to scrap the idea of a short tramway and substitute an eleven-mile railway from Zoulla to Koomayleh, whence the route of the expedition would lead up through the Soroo Pass. Once again, the scheme was a good one – if only it had worked out as planned; which it did not.

When the rails arrived from Bombay they were soon found to be second-hand and of many different patterns, weights and lengths – evidently collected by the Government of Bombay from several different Indian railway companies. But this was not all. Some rails were of bull-head section and others of vignolle, the latter having been drilled for fishplates with holes too small for the bolts to pass through! Moreover, to add to the difficulties of the Corps of Royal Engineers, no spikes came with the rails! More waiting, then, when the spikes eventually arrived no augers were sent to drill holes in the sleepers for their reception.

At last some augers were made on the spot and some track laid to the then standard Indian gauge of 5 ft. 6 ins., but then came more trouble. Out of the six 16- to 20-ton tank-engines shipped from Bombay, only four were ever put into service, due to landing and assembly difficulties at Zoulla. Then some sixty wagons arrived – miserable vehicles, having no springs, grease-boxes, or spring buffers. Within a fortnight, 40 per cent of them were out of commission, either due to driving sand getting into the bearings or to their draw-bars being torn out. Coupling chains snapped wholesale and when new ones were sent, they were buried deep in the ship's hold under hundreds of tons of army equipment. No wonder progress was slow – six months to construct eleven miles of very indifferent railway! So slow, in fact, that Magdala had fallen before it was finished; the troops climbing over 7,000 ft. in some sixty miles by way of mountain tracks, with elephants, camels, mules and ponies as transport. None the less, the railway gave great assistance to the expedition,

particularly in respect of the transport of troops for re-embarkation after the cessation of hostilities.

Very obviously, the outstanding lack of success experienced by the railways of European states in wartime was largely due to lack of adequate peacetime organization and the fact that vital materials were not collected and dispatched to the scene of action. Also, there was a complete lack of system in respect of the actual construction of the lines, which was, in the case of the Zoulla-Koomayley line, carried out by Indian natives and gangs of Chinese labourers from Bombay; though, admittedly, it is true to assume that the heat of the climate was so intense that English railway navvies would have found it impossible to work and the line would never have been built.

In the case of the next European conflict, which was a major one – the Franco-German War of 1870–1 – there was no lack of prior railway planning and organization, particularly on the part of the German Government and General Staff, who by now seemed to have assimilated the lessons to be learned from the railway tactics employed during the American Civil War.

War was declared by France on Germany on 19th July, 1870, and nine days later, the Emperor Napoleon assumed the Chief Command of the 3rd Army Corps under Marshal Buzaine at Metz; which led the Germans wrongly to assume that the city would offer stubborn resistance and that its defenders would not hesitate to attempt to cut the German lines of railway communication. To counter this theoretical strategy, the Germans put some 4,000 men to work building twenty-five miles of military railway – a twenty-two-mile line from the Saarbrück Railway at Remilly to connect with the Frouard-Metz line at Pont-à-Mousson, and a three-mile line to by-pass the tunnel at Nanteuil, which had already been blown up by the French. Most of this construction work, which was carried out during an actual campaign, was done by 3,000 miners who worked alongside 1,200 army pioneers and railway builders.

In spite of the number of men working on it, the twenty-

two-mile line took a month and a half to complete. Autumn rains took a heavy toll of the newly-built track, bridges being washed out and the line being rendered so frail that it was dangerous to attempt to cope with any but the lightest traffic. Indeed, repair work entailed the use of more men than did actual construction. On the whole, this line was no great engineering constructional achievement, with its shallow cuttings, low embankments, and four rough timber bridges of about 15 ft. span.

Similarly, the Nanteuil Tunnel by-pass line, the construction of which was so important to the Germans in that it re-established the important Strasburg-Paris line for the siege of the latter city, took much longer to build than had been anticipated. The decision to by-pass the tunnel was only taken after it was found that the hurriedly-formed French Railway Construction Corps had effectively blocked its western end by exploding six mines and bringing down thousands of cubic yards of sand, which the continued rains made it impossible for the Germans to clear.

But the blockage of Nanteuil Tunnel is only one example of the destruction carried out by the French during the panic of retreat, and if such destruction had been as well planned and scientifically carried out as had been the case in the American Civil War, it would have been more successful in contributing to the transport difficulties of the invaders in their advance on Paris. For example, only two arches of the seven-arch bridge at Fontenoy-sur-Moselle were destroyed, which the advancing armies restored to traffic by filling the gap with hard-core and earth in a fortnight. Tunnels through the Vosges Mountains were mined, but before the mines could be laid and instructions obtained to explode them, the Germans had arrived on the scene and taken charge.

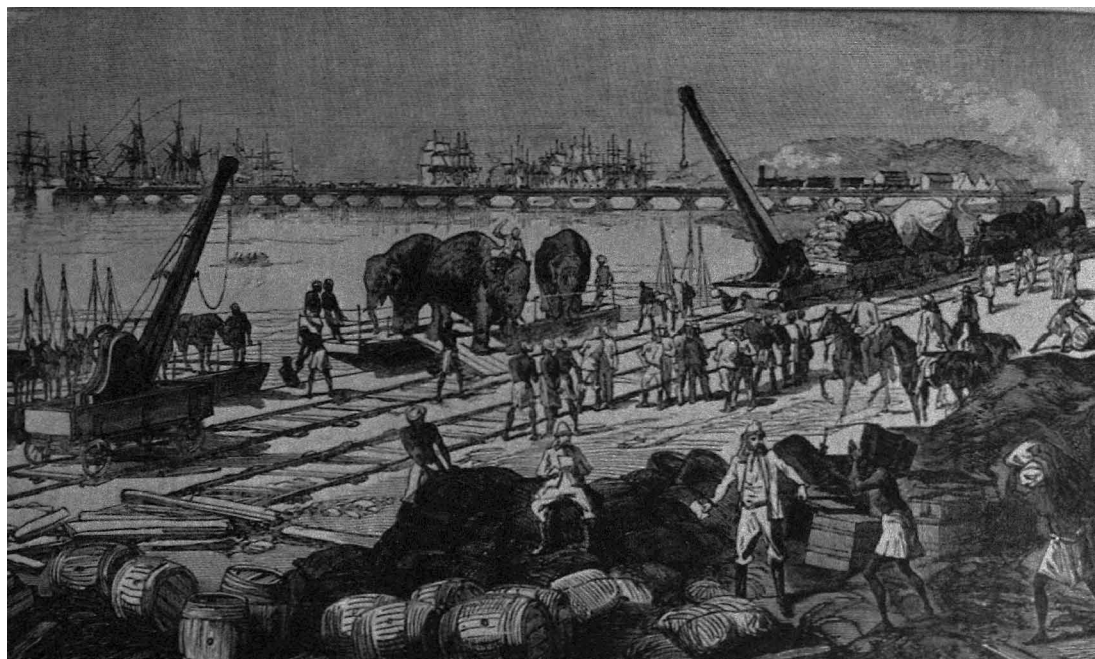
However, the twenty-two-mile link-line paid off good dividends, the vanguard of the advancing German Army were brought by it to the battle of Gravelotte, or Rézonville, where Marshal Bazaine's forces were imprisoned in the lines by the combined armies commanded by the King of Prussia.

Soon the Prussian headquarters were moved from Pont-à-Mousson to Bar-le-Duc, only 125 miles from Paris; Strasburg was being bombarded; and by mid-September, Paris was under siege, to be completely invested on 19th September.

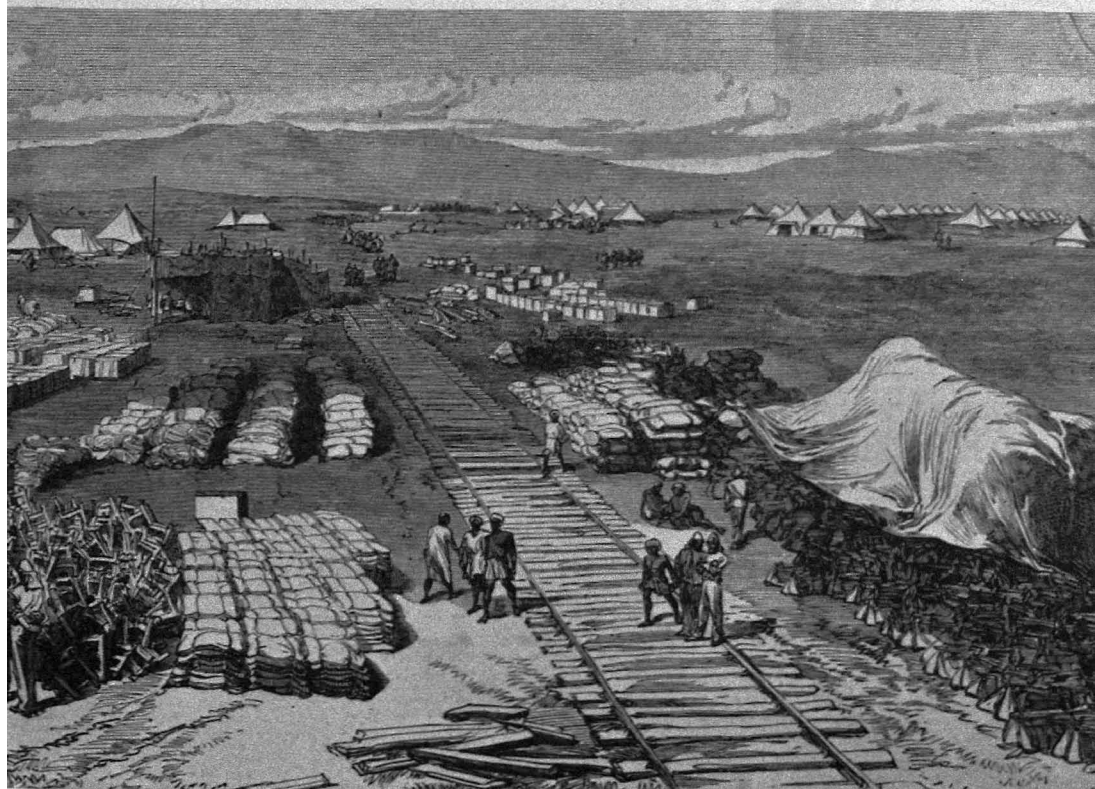
The very speed and efficiency of the German advance on their capital spurred the French civilian population into action, bold and highly successful sabotage on railways being carried out by parties of *franc-tireurs* in the absence of any organized or successful attempts of the Army Railway Construction Corps to interrupt German railway communications across France. One outstanding feat of such sabotage was the destruction of a forty-coach train containing some 400 Prussian troops at Lanois, between Mons and Rheims, half a hundredweight of explosive being buried out of sight under the track and fired by a shell percussion-cap so arranged that the weight of the locomotive would depress the rail on to it. The scheme was successful, Prussians who escaped the explosion and resultant train wreck were shot down by the seventy-five strong party of *franc-tireurs*.

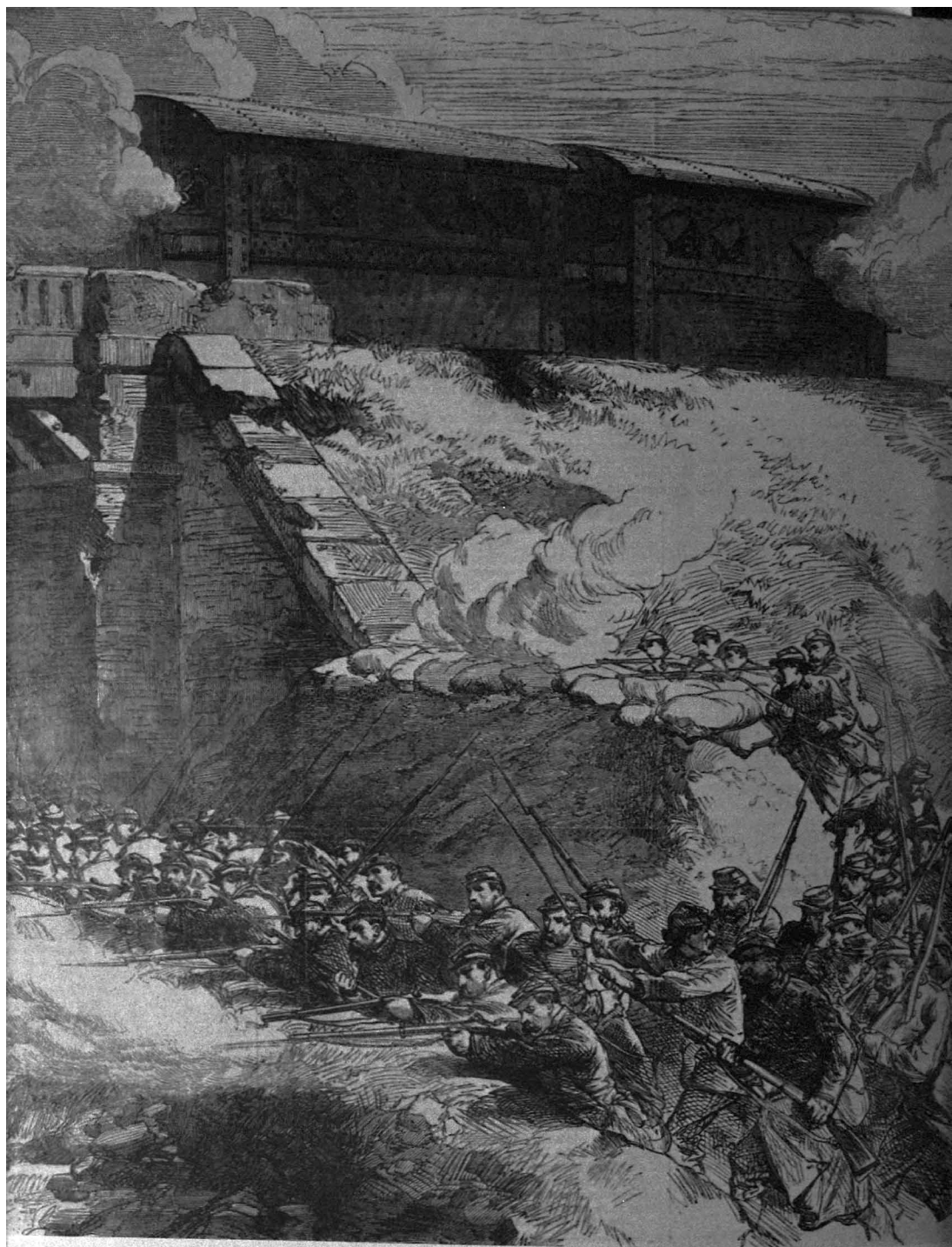
But the sabotage was not the only thing with which the Germans had to contend as they took possession of, and guarded by 100,000 men, some 2,500 miles of French railways. The French either destroyed or took with them as they retreated towards Paris, locomotives, rolling-stock and railway personnel, with the result that to keep the railways functioning for their own use, the Germans had to 'import' from Germany not only engines, coaches and wagons, but between three and four thousand railwaymen from German railway companies. Lack of familiarity with French railway equipment by these men was the cause of much bungling and inefficiency – much to the satisfaction and amusement of French civilian onlookers. The addition of an Eisenbahn-bataillon, or Railway Battalion to the Prussian Army in May, 1871, came too late to be of any use during the war.

On the other hand, due to the untimely death of Minister of War, Marshal Niel, who in March, 1869, wisely appointed a Central Commission for Railways, the scheme drawn up by that body for military transport arrangements in wartime



Above : The start of the railway built at Annesley Bay during the Abyssinian Campaign. *Below :* The railway running west from the Zulla Camp. (Both reproductions from the *Illustrated London News*)





An armour-plated 'locomotive battery' in action during the siege of Paris in 1870. (*Illustrated London News*)

was more or less forgotten; and France embarked on the war without adequately organized military transport – transport as bad, or worse than that used during the Italian campaign of eleven years earlier. Railway managements and their staffs worked miracles, but their efficiency was nullified by complete lack of liaison with the military authorities, who made chaos more chaotic by having no idea of traffic handling and organization.

On 15th July, 1870, the big main line companies were directed by the Minister of Public Works to place all their equipment and personnel at the entire disposal of the War Minister, and so brilliantly did they respond to the call that the first troop train left Paris the following day. The train was due to start at 5.45 p.m., but such was the lack of liaison on the part of the army authorities that the troops waited for four hours at the station, and by the time the train was due to leave the soldiers were too drunk to notice that they had had their ammunition stolen by friends as souvenirs!

During the following nineteen days, nearly a thousand trains left the capital, carrying 300,000 men, 65,000 horses, 7,000 guns and road vehicles, and nearly 5,000 wagon-loads of supplies and ammunition – and throughout the whole period, the same lack of liaison continued with chaotic results for all concerned. Long trains were provided for small regiments and vice versa, with the result that some trains left Paris packed solid with men, whilst others were nearly empty. Confusion became more confounded by the station military authorities refusing to support the railway staff in its efforts to get the soldiers entrained in an orderly fashion. As a result, artillery, cavalry, infantry, mobilized troops, reservists, horses, small arms, and supplies of food, got inextricably mixed up. Generals lost touch with their officers; officers got separated from their men; and even the soldiers did not know their destination! Within a few days, tens of thousands of soldiers – nominally 'lost' – were eating and sleeping in a score of station restaurant rooms on the railway to the front, and when local food supplies ran short, they banded together

in their thousands and raided supply wagons standing in the sidings on their way to the front.

At Metz, where most of the traffic from all parts of France had been directed, four miles of sidings soon proved completely inadequate to handle the immense number of vehicles which had to stand by in absence of officers in possession of orders as to the ultimate destination of the arriving troops. As vehicles piled up in the sidings, impossible and contradictory orders were issued by anybody and everybody remotely connected with the military authorities. Chaos reigned. Sidings became turned into arsenals by the artillery, and into food stores by the commissariat. The station platforms were blocked by trains, which arriving hours or even days late, had to pull up half a mile down the line; possibly only to find that the battalion of infantry it contained was met with an ample store of forage provided for the supply of a squadron of cavalry which the local military authorities thought the train to contain.

In the end, even the main lines and those leading to the engine-sheds were choked with unloaded wagons and empty passenger trains. Everything was inextricably confused. Nobody knew where anything was, for no wagons were labelled as to their contents for obvious security reasons. At the height of this chaos, there was thought to be no biscuits, bacon, coffee, sugar, rice, brandy or salt in Metz; yet all these necessities were in wagons in the sidings – the question was: ‘which wagons?’

Eventually, all these loaded wagons at Metz fell into the hands of the Germans, whose total haul eventually became some 16,000 vehicles – it would undoubtedly have been far greater had not their speedy advance decided some of the railway companies to dispatch their rolling-stock to places of greater safety. As it was, there was a great wagon shortage in France, the 16,000 wagons being used by the Germans, both in Germany and France, for the duration of the war.

Armoured trains were not used by either side in the Franco-Prussian War until January, 1871, by which time the position of the French was desperate in the extreme, with

Paris being bombarded for days on end and its population demoralized and starving. It was under such incredible conditions that Engineer-in-Chief for Naval Construction M. Dupuy designed and had fitted-up in the workshops of the Paris-Orleans Railway, four armour-plated vans, which were covered with a 2-in. thickness of wrought iron. Two armour-plate protected locomotives were also specially equipped; one to propel the gun-carrying train and the other to convey men with tools and materials in a bullet-proof van, to repair the track if necessary. These two trains only saw action during the last days of the siege of Paris: at Choisy-le-Roi, Brie-sue-Marne, Le Bourget, and at Generals Ducrot and Vinoy's last despairing sortie at La Malmaison, towards Montretout. The vans were several times dented by shells, but the locomotives were not damaged at all.¹

As has been mentioned, the Prussian Government's arrangements for the transport of sick and wounded was virtually that suggested by the experimental trials at the Exposition Internationale at Paris, their twenty-one 'sanitary trains' being planned and constructed on the Grund system so successfully that it is estimated that no less than 89,000 wounded were transported during the war. Transport from the army encircling Paris to Berlin, however, occupied a week, owing to exceptional traffic congestion.

With the war over, France decided to leave nothing to chance in matters of military transport, and decided to augment her schemes of national defence by planning and using her railways along the lines laid down by Marshal Niel's Central Railway Commission; unifying their control and integrating their technical and military elements. So effective were the findings of the Superior Military Commission of 1872, that no less than seventeen laws and decrees were passed dealing with military rail transport, during the following nine years. France had indeed learnt at her cost the same lessons that the American Federals and Confederates had learnt a decade earlier – also at great cost. All these

¹ In May, 1871, armoured trains were again used by the Communists on the Western Railway between Batignolles and Asnières.

decrees, laws, orders and regulations were collected into a 700-page volume in 1902,¹ which, with minor alterations and modifications, remained in force until the outbreak of World War One in 1914.

In the Russo-Turkish War of 1877-8, the adoption by Russia of the 5-ft. gauge for the reason of strengthening her position with regards to defence, proved a great disadvantage when she herself was the invader; thus the difference in gauge between her own railways and those of Romania, through which her troops had to pass on their way to Turkey, caused great inconvenience and delay due to transshipment at Galatz, on the Russo-Romanian frontier. The transfer of 200,000 men, 1,250 guns, ammunition and other war materials constituted no light task.

From Galatz, the troop route was by way of Bucharest to the Danube at Giugevo, where the river was crossed and the journey continued by the Bulgarian railways to the Turkish supply base at Varna, on the Black Sea. Over the Romanian lines, badly maintained track, insufficiency of rolling-stock, and illiterate railway personnel caused more delays, which, coupled with the protracted defence of Plevna by Turkish Osman Pasha, were responsible for the miscarriage of the Russians well-laid plans. Indeed, the siege of Plevna cost the allied Russian and Romanian armies some 65,000 men.

From the Russian angle, there was only one answer to the problem set by the prolongation of the campaign – the construction of new railways. This they did, building a 190-mile one from Bender, on the Dneister, to Galatz; another of forty miles, from Fratesi to Simnitza, on the Danube, which was crossed by a bridge; and a third of seventy-five miles from Sistova to Tirnova, in Bulgaria, which was not completed before the end of hostilities. None the less, some 230 miles of railway was built whilst the war was in progress, and some 120 locomotives, together with more than 2,000 vans and wagons were purchased from different countries to equip the new lines. A train ferry steamer was also provided to cross the Danube between Simnitza and Sistova.

¹*Military Transport by Railway.*

The speed of railway construction, however, had improved since the Franco-Prussian War, for trains were running over the Bender-Galatatz line 100 days¹ after its construction had started at the end of July, 1877; and the Fratesti-Simnitzer line, with its three long bridges, was under traffic in two and a half months – quite a contrast to the performances of the German Railway Construction Corps in 1870.

By and large, the Russo-Turkish War was responsible for offering an actual example of what could be done by way of rapidly providing emergency railways in wartime, and also furnished to the war departments of other European Powers concrete proof that the use of a track gauge wider than 'standard' was a definite disadvantage to a nation having offensive invasion in mind. The lesson was there to learn that the widening of a narrow-gauge line to broad gauge was attended by more reconstructional difficulties than the reduction of broad gauge to narrow. Narrow-gauge rolling-stock could easily be run over converted broad-gauge tracks, but the reverse procedure could not be carried out without the almost complete reconstruction of the civil engineering features of the line.

¹ Actual working time was only fifty-eight days; Sundays, saints' days and labour difficulties accounting for the balance.

The Sudan Military Railway and the Boer War

WITHOUT GOING into the complicated political pattern which led up to the construction of the Sudan Military Railway, it is interesting to see the way in which the line developed rather fortuitously over the years from 1875 to 1885, to serve not only military, but eventually peacetime purposes; to become, indeed, the first railway in the Sudan.

The idea for a single-line railway from Cairo to Khartoum, with a branch to a Red Sea port at Massowa, had been put forward as early as 1856, to open up isolated Sudan to civilization; but the cost of the scheme caused it to be abandoned until it was revived in severely modified form in 1871, when it was optimistically decided to build a 558-mile line from Wadi Halfa to Shendy (Matemmah), about 100 miles north of Khartoum.

Begun in 1875, after two years work this 3 ft. 6 ins., single-track line managed to reach Sarras, thirty-three and a half miles from Wadi Halfa, when funds ran out after almost half a million pounds had been spent on its construction. Six years later, with General Gordon at Khartoum and a British expedition thereto contemplated, it was decided to facilitate the troops' journey up the Nile valley by extending the original line from Sarras to Khartoum. A start was made in the autumn of 1884, working from the stores of railway material still available at the railhead, camels and coolies being pressed to work in the absence of locomotives and European labour. By the end of October, when only forty miles had been laid, the 700 native labourers deserted, but nevertheless, the line from Sarras to the new railhead was put into traffic early in December, with the 8th (Railway)

Company of Royal Engineers doing the best they could with five worn-out locomotives and sixty goods vehicles of all kinds.

The following month (January, 1885) came news of General Gordon's death and the fall of Khartoum, and after a month's cogitation, it was decided to institute a further campaign, to assist which the line was to be extended 103 miles to Firket, together with a purely military railway from Suakin to the Nile at Berber to provide an alternative line of communication for the army of Lord Wolseley. To build this 103 miles of line, however, only fifty-two miles of permanent way materials were ordered from England, but with left-over materials ready to hand, 300 Indian platelayers and railway mechanics managed to extend the line the eighty-seven miles to Akasha by 7th August, 1885.

In the meantime a change of British Governmental policy had resulted in Lord Wolseley ordering the retreat of the troops to Wadi Halfa and the abandonment of the railway, all unused material for the construction of which was forthwith brought back to England. With regard to the Suakin-Berber line, its construction was finally abandoned after the unscientific and uneconomical laying of only twenty miles had been completed.¹ The reason is not difficult to understand, for the heterogeneous working party of Indian coolies, Company of Royal Engineers, and a few members of the English Corps of Volunteer Engineers, had to cope with constant attacks on themselves and the line they were building; several fierce actions being fought, including one near Suakin which resulted in a serious loss of British lives. Indeed, towards the end of their struggle in June, 1885, it was only by resorting to the incessant use of a small armoured train carrying a twenty-pounder breech-loading gun, that track-laying work could continue.²

¹ A line linking Suakin and Port Sudan with Berber (via Atbara Junction) was not finally opened until 1905-6.

² A sand-bagged and boiler-plated armoured train manned by 200 sailors and mounting a Nordenfelt and two Gatling guns, had been used effectively two years earlier to augment the defensive works at Alexandria. A sand-bagged locomotive was sandwiched between the two armoured vehicles.

Nine years later, in 1896, the British Government again reversed its decision as to the construction of the Nile Valley Railway. Sir Herbert (later Lord) Kitchener in command of the Egyptian Army was instructed to advance southward from Wadi Halfa, which he did, reaching the old railhead at Akasha in a week in spite of the fact that over fifty of the eighty-seven miles of railway consisted of twisted rails and burnt sleepers. All however was, in time, restored, and with the help of the line, Kitchener assembled at Akasha 9,000 troops and equipment and advanced to Firket, where he awaited the further extension of the line to Kosha, 116 miles from Wadi Halfa. Later the railway was continued to Kerma, at which point Kitchener instructed the cholera-decimated staff of Royal Engineers to survey the possibilities of crossing the Nubian Desert direct from Wadi Halfa to Abu Hamed – a 232-mile direct route to Khartoum.

This fantastic railway was started on 15th May, 1897, and by the end of July, almost exactly half of it had been completed, Abu Hamed being reached on 31st October. Its military value being immediately proved, the line was pushed on in the direction of Berber, and thence to Atbara, which was reached in July the following year.¹

It is interesting to note that the victory of the Anglo-Egyptian Army at Omdurman; the occupation of Khartoum; and the subsequent overthrow of the Mahdi and conquest of the Sudan, would never have taken place had it not been for the completion of this military railway to Atbara – the railway upon which Kitchener and his 22,000-strong force depended entirely for their supplies. Indeed, his perilous position during the tail-end of the construction of the railway across the Nubian Desert, was never fully realized by the British public of the time.

In 1900, the 576-mile railway built by Kitchener was handed over by the British Government to that of Sudan, and formed the nucleus of the Sudan Railways system, which today offers connexion with the railways of Kenya and

¹ After the battle of Omdurman the railway was still further extended to Khartoum, which was reached on the last day of the year 1899.

Uganda in conjunction with a river-steamer link on the Nile. Thus, in this case, a railway which was built under the stress of war, continued in use to play an important part in developing the peaceful prosperity of the country it traverses; its unquestionable advantages in wartime being only surpassed by those offered by permanent freight and passenger communication in time of peace.

A year had hardly passed after the occupation of Khartoum, before the Boers declared war, involving well over 4,000 miles of 3-ft.-6-in.-gauge railways in South Africa. Three months before war was declared, however, the uncertainty of events in the Transvaal had led to the formation in Britain by the British Government of a Department of Military Railways, of which Canadian-born Major-General Sir E. Percy C. Girouard, of Nubian Desert Railway fame, was put in charge, as Director of Railways for the South African Field Force.

Within a month after declaring war, the Boers had taken possession of important lengths of lines in Natal and Cape Colony, and it was to the railways of these provinces that Girouard first applied the then new principle of military control by his department. Similarly, he converted the railways captured from the Boers in Transvaal into a system called Imperial Military Railways, for the repair and operation of which his department assumed responsibility. Under the elaborate system of co-ordinated administration put into operation by him, many of the pre-conceived notions as to the maximum number of troops which could be transported and maintained by a single-line railway, had to be severely revised. Indeed, by the end of August, 1900, Girouard and 18,000 officers and men of the Imperial Military Railways had transported 177,000 passengers, 86,000 animals, and over half-a-million tons of freight.¹

War was not declared by the Boers until 11th October, 1899, but the British Department of Military Railways had

¹ Many of Girouard's staff had previously been employed by the Boers and could not be relied upon, and many were soldiers with little or no railway experience.

long ere that date decided that the frail single-line railway from Cape Town northward to the outpost of the British Empire at Mafeking, would surely be the prime objective of the Boers should war break out. Not only so, Mafeking was defenceless and an easy prey, with its stores of railway material and workshops as a valuable prize. The railway had come to the town from Kimberley in 1894, via Vryburg, being originally a terminus and depot before the extension of the line northward to Bulawayo to replace the old coach service.

With the view that Mafeking might well become involved in large-scale military operations, Baden-Powell was dispatched to South Africa, where he landed at Cape Town on 25th July, 1899. Though war was imminent, he landed without men, money, or supplies, but he made his way north by train as far as Bulawayo, where he started raising troops, eventually arriving at Mafeking and placing a regiment – armed, but in mufti – as guard over the railway and provision stores there.

Soon after his arrival, the number of freight trains arriving from the south began to increase, and at the end of September, a train arrived from over the Bechuanaland border to disgorge men, horses, arms and equipment. To hold the city against all odds was the common resolve, and Mayor Whiteley found no difficulty in enrolling a 300-strong Town Guard, supplemented by another 100 volunteers from the staff of the railway depot.

At Baden-Powell's instigation, the hundred railwaymen, known as the Railway Volunteers, collected together all the spare rails set aside for normal track repair work and with them, armoured a number of eight-wheeled bogie wagons; the rails being bolted horizontally, one above the other along the sides of the vehicles, with shorter lengths arranged to provide firing-holes. Shelter slightly above breast-height was supplied by vertical stanchions carrying splinter-proof boiler plating.

These makeshift, but very serviceable armoured vans were made up into three trains, which were at once christened by

the old sailors among the Volunteers as H.M.S. 'Firefly', 'Mosquito', and 'Wasp'; locomotives for moving them being at first drawn from those available at Mafeking depot, but later these were supplemented by a very sturdy, outside-cylinder, 4-4-0 engine from the workshops at Kimberley. This latter locomotive was completely encased in steel plating, only its chimney and dome being visible.

With this heterogeneous equipment Baden-Powell at first started to patrol the line for some miles north and south of the town, then a mile-long curving spur was added to the north of the station, running towards the hospital and convent, eastwards towards the race-course. This latter line covered the direct approach to Mafeking from the Transvaal, the moving armoured train itself being protected by troops behind earthworks.

While all these preparations were going on, £30,000 worth of stores and provisions had been accumulating in the town goods yard, most of it having been stopped on its way to Rhodesia. Then a goods train pulled in from Cape Town with several London newspaper correspondents and two rusty, muzzle-loading seven-pounder guns, which were intended to bring up the town's artillery force to four pieces. Baden-Powell took one look at the cannon and pronounced them museum pieces made in 1820, but none the less added them to the town's armament.

With war now inevitable, Mafeking station platforms were crowded with women and children preparing to leave the doomed town in response to Baden-Powell's official pronouncement that those wishing to leave should contact the stationmaster. No fewer than 600 women and children, however, remained; reluctant to break up their families. The first evacuation train left on the morning before the declaration of war, with 170 refugees and the last one at noon – then the telegraph wires were cut by the Boers. It had gone as far as Maretsani, a distance of twenty-four miles, where it was stopped by Baden-Powell's scouts, who warned its engine-driver against proceeding further south. The driver would have taken the chance, but his passengers,

fearing capture, insisted on returning to Mafeking, where they arrived some three hours after they had left.

Events now began to move quickly. The Boers started tearing up track six miles from the town, thereby isolating armoured van 'Mosquito', a wagon, and an unarmoured locomotive, which had been sent southwards with Lieut. Nesbitt and twenty men to meet a second armoured engine coming up from Kimberley. Night fell, then, next morning (13th October), an armoured train composed of 'Wasp', a locomotive, and 'Firefly' steamed out of Mafeking to rumble slowly over the iron bridge across the Malopo River. Five minutes later came the distant tat-tat-tat of Maxim and Hotchkiss gunfire, interspersed with ragged rifle fire. Then silence, followed soon by the reappearance of the train. The war was indeed 'on'.

But if the redoubtable 'B.P.' was short of most things, he was not short of dynamite. Even after laying minefields round the town, he had plenty left over, and this he had loaded into two vans, which were fitted with detonators. A locomotive was coupled up and steamed out of Mafeking pushing its deadly load ahead out across the hazy, sunlit veldt. Baden-Powell waited patiently for five minutes – ten minutes – a quarter of an hour, then there came the thunderous rumble of a terrific explosion, and before the great mushroom cloud in the distance had cleared, the locomotive was making a clattering, but triumphant entry into Mafeking station; with Irish driver Ferry tugging joyfully at the whistle-cord.

Mission accomplished, Ferry told Baden-Powell what had happened. He had contacted the Boer rail-wreckers about six miles out. He stopped and uncoupled the two vans, then raced back a couple of miles to watch events. The Boers must have thought they had captured an armoured train, for they dismounted and closed around the vans, opening a hail of fire. Then up went twenty-two tons of dynamite in one colossal bang, blowing a hole big enough to put a church in, and almost blasting Ferry's engine off the track.

Spectacular though this ruse was, it had little effect other

than boosting the morale of the townsfolk, who were now completely cut off from the outside world. Later the same day the 'Firefly'-'Wasp' train went out to reconnoitre, only to find that the enemy were wrecking more track and cutting down more telegraph wires. Native runners and scouts were now the only means of getting news through in either direction. Then came a period of silence – a lull in the battle, during which the little garrison was tensed to breaking-point. No sight of the enemy. Night after night passed with Baden-Powell's outposts on the alert and the gentle hiss of escaping steam from the engine of the armoured train in Mafeking station. Then at last the silence was broken by the sound of distant rifle-fire, and in the grey dawn, the 'Wasp'-'Firefly' train, with fifty soldiers, two machine-guns, and a one-pound Hotchkiss gun, slipped out to rumble over the Malopo bridge.

For five and a half miles they rattled along in the half-light, then ran into heavy fire from a scattered party of some 400 Boers, who retreated down the line under return fire, until the guns of the train could no longer be brought to bear on them. To Baden-Powell, listening back in Mafeking, the firing sounded so heavy and insistent, that he boldly decided to send another train in support of the first; a move which almost resulted in the second train and its troops being encircled and cut off. Only after a desperate four-hour action did it return – little worse for the experience, but with several men wounded. Later, an engine and passenger train were sent out to recover the dead.

But the railway round Mafeking had more troubles in store, for later the Boers derailed 'Mosquito' and punctured the boiler of the unarmed engine, taking Lieut. Nesbitt and his men prisoners after a stubborn fight. Then they tried for four hours to shell the station with high-velocity Krupp guns, but only succeeded in hitting the convent twice, in spite of its Red Cross flag. Finally, however, they were stopped by the armoured train being brought close enough to the guns to kill the gunners with machine-gun fire. By this time, armoured trains were getting to be much feared by the Boers,

for as the war went on, the use of that type of weapon underwent its greatest development; both for the purpose of attack on the enemy and for line protection. In the early days of the war, however, inefficient operation had tended to throw some doubt on its usefulness for war purposes.¹

Before the war, in anticipation of their usefulness, five armoured trains were built at Cape Town and another at Natal, more being constructed at Bloemfontein railway workshops after the occupation of that town by the British, bringing the total up to twenty trains. But in the early days of the war, the conditions necessary to their successful operation were not rightly understood, with the result that one was wrecked by the Boers on the first night of the war; two more were isolated in Ladysmith; and many others had narrow escapes from sharing the same fate.

Within the first month of the war, an armoured train was dispatched on a reconnoitring mission from Estcourt northwards towards the Tugela River, to ascertain the condition of the line and to try and pick up some news of beleaguered Ladysmith. But insufficient support was given for a journey of such length, and the result was quite disastrous; though the story of the trip is now famous, for an entirely different reason.

The train was made up, from front to rear, of an armoured van, car locomotive, another armoured van, a van mounting a seven-pounder muzzle-loading gun, and an ordinary van carrying a breakdown gang and their tools. The two armoured vans had a crew of 120 men of the Dublin Fusiliers and the Durban Volunteer Light Infantry, commanded by Captain Haldane, D.S.O., of the Gordon Highlanders; and by way of extra aid to possible wounded and adviser to the party, there was also included the dashing young wartime correspondent of the *Morning Post* – none other than Winston Spencer Churchill. The two armoured cars were built along orthodox lines, with sides of steel with loopholes to allow of

¹ The two armoured cars devised by engineer Labram, of the Netherlands South African Railway Company, contributed not a little to the saving of Kimberley; being a product of local enterprise.

firing a rifle broadside. The locomotive was boxed-up with armour-plating, and the seven-pounder gun was manned by four sailors.

At 5.30 a.m. on 15th November, the train steamed out of Estcourt station towards Frere, which was reached in good time without incident; and as there was no sign of the Boers, they proceeded cautiously towards Chiveley, expecting every minute to hear rifles cracking from the flanking hills and the rat-tat of Mauser bullets on the armour-plating. All was silent as they slowly rolled through Chiveley station. No Boers. Not a rail had been removed – not a telegraph pole out of place. Encouraged by their success, Haldane sent a wire back to Estcourt, and to his chagrin received the urgent reply: 'Return to Frere immediately.'

So reverse they did, and started rolling back to Frere with the tool-van at what was now the front of the train. Not a thought of trouble in their minds as the train rumbled round a long curve, then someone spotted the Boers on a hilltop. Quickly the infantry loaded rifles and manned the loopholes and the sailors loaded their antique gun. Then came trouble. Shells crashed around the train and bullets hailed on to its plating from a range of only about 600 yards. It was pretty obvious that the Boers had either seen or heard the train on its outward run and had determined to cut it off by sending field-guns and machine-guns across country behind the cover of the hills flanking the line.

One shell could have wrecked the locomotive. The only thing to do was to get out – and get out quickly. The engine-driver knocked the throttle full open, and with sparks shooting from skidding driving-wheels, they gathered speed down the grade to lurch round another curve, there to meet disaster in the form of a huge rock, neatly planted in the middle of the track. Stopping was out of the question. The tool-van hit the rock with a sickening thud and rearing high in the air, crashed down the embankment. The van with the old gun and the four sailors overturned, and the armoured van coupled to it was wrenched from its solebars and twisted round at right-angles to the track.

Elated that their ruse had been so successful, the Boers rode up and a fierce fight ensued, during which the train crew tried to clear the line of the two derailed vehicles, so that the engine and uninjured part of the train could get away. Things were looking black by the time young Churchill took command of the well-nigh hopeless situation, telling the civilian engine-driver that the lives of many men depended upon his skill and daring. With bolstered morale, the driver and eight men volunteered to clear the line of wreckage, the engine pulling the van out of the way and the men, two of whom were killed, helping to heave it down the embankment. At last the line was cleared, and wiping the blood from face and body, the driver climbed aboard his engine, clapped on full steam and started off down the line with Churchill by his side on the footplate.

But they had not gone far before they noticed that the uninjured vans had been left behind. Somehow they had become uncoupled in the crash. So back they crawled, towards the scene of the fracas amid a hail of lead, only to find that they could not squeeze past the partially-derailed van. The driver was afraid they would get immovably jammed. It was impossible to get back to couple-up the stranded vehicles, so they lifted some wounded men up on to the tender, Churchill himself jumping from the engine saying that the locomotive should carry only wounded – those who could walk should go on foot.

Then, as the driver made a second start, and was speeding away from the Boer rifles, a strange thing happened. A soldier or a volunteer, it is not known which – tied his handkerchief to his rifle and waved it. In an instant, up came the Boers to receive a surrender. And surrender it was, for all were captured and taken to Pretoria – including Winston Spencer Churchill. How he escaped from Pretoria; boarded a train to Delagoa Bay and finally returned to Natal, is an epic story of courage and bravery which is well known.

Coming now to the use of ambulance and hospital trains in the Boer War, it may be said that two were prepared by

conversion of passenger rolling-stock at Cape Town in September, 1899, and one in Natal before the outbreak of war. The former trains were constantly in use, running right up to the front during the actions at Magersfontein, Modder River, and Graspan, whence they speedily conveyed wounded and sick to hospitals at Cape Town, De Aar, and Orange River; whilst the latter train, which proved most satisfactory during Sir Redver Buller's Natal campaign, was soon supplemented by a second train, which was followed by another – the 'Princess Christian' hospital train – which was specially designed and constructed for the British Central Red Cross Committee by the Birmingham Railway Carriage and Wagon Company, Ltd., and sent to South Africa in February, 1900.

Constructed at a cost of some £14,000, which was mainly raised by Her Royal Highness Princess Christian supplemented by a handsome contribution from the townsfolk of Windsor, this splendidly equipped train of seven, 36 ft. long, 8 ft. wide, 3-ft.-6-ins.-gauge coaches, boasted four ward coaches for invalids carried on three-tier beds; another coach carrying two nurses and two orderlies, together with linen and other stores; yet another housing a dining-room, dispensary, and two doctors (medical officers); and a seventh vehicle comprising a kitchen, pantry and guard's compartment. It was, indeed, completely self-contained, and carried everything conceivably necessary for patients and staff to enable it to survive, even though cut off from supply sources for a fortnight.

When it reached Cape Town, this remarkable train – the first of its kind – was sent in sections to Durban, where it was reconstructed in the workshops of the Natal Government Railway under the eye of Sir John Furley, who jointly designed it with W. J. Fieldhouse. Under Sir John's charge, the train was the first to enter Ladysmith after the siege of that town, having made its way thereto by way of a temporary trestle-bridge across the Tugela River at Colenso. Later it travelled over 42,000 miles during 108 journeys in Natal, carrying a total of over 7,000 sick and wounded officers and

men; and it is a tribute to its design and the efficiency of its staff, that only three sufferers died *en route*.

On the Boer side, four complete ambulance trains were contrived from passenger rolling-stock in the central workshops of the Netherlands South African Railway at Pretoria, but on the whole, their pre-war railway activities were more concerned with stationing line-side guard-posts and the preparation of strategical bridges for instant demolition.

With regard to wartime Boer railway transport arrangements, these never developed to the same intensity as those of the British. This appears to have been largely due to the preference shown by the Boer burghers for adopting the time-honoured custom of marching or going on horseback with their ox-wagons to the place of assembly.

With the petrol-engined motor lorry still in its infancy, the functioning of railways during the South African War proved conclusively that even a single line passing through enemy territory, could be maintained in a serviceable condition sufficiently reliable to allow of a campaign being conducted at a point many hundreds of miles from a supply base. It also showed that, given co-ordination between military and civilian technical personnel, together with an efficient force of railway construction and destruction engineers, the value of railway communications in wartime were of the greatest importance in both attack and defence.

The Trans-Siberian Railway (Russo-Japanese War) and Military Railways Pre-World War One

THE BOER WAR ended with the surrender of Pretoria on 31st May, 1902, but within a year and nine months, another war had broken out – this time between Japan and Russia, in which, once again, the really decisive factor was means of communication rather than sheer military strength. Japan broke off diplomatic relations with Russia on 6th February, 1904, and within a few months, the communication lines provided by her fleet had enabled great victories to be won at Yalu River, Port Arthur, and Vladivostok – 5,300 miles by railway from Moscow.

With the fighting front at such an immense distance from supply bases, it is no small wonder that Russia found the frail and economically constructed Trans-Siberian single line of railway totally inadequate for either the concentration or maintenance of an army in Eastern Siberia; in spite of the fact that some reinforcements for her forces in the Far East had previously been dispatched by sea. Indeed, prior to the outbreak of war, she had been distinctly behind other Western European nations in matters of railway transport – civil or military, and when Japan struck, she found herself in a far worse position with regard to transport than she had been fifty years earlier, at the time of the Crimean War.

Way back in the 1860s, long before there was any thought of a war developing in the Far East, the construction of a Trans-Siberian railway to Russia's eastern seaboard had been under discussion, but apart from a Governmental

Committee's discussions fifteen years later, nothing practical was done until 1891, when actual construction commenced. By 1896, the western shore of the great inland sea, Lake Baikal, was reached; the twenty-five mile trip across the lake to Tanchoi Station, on the eastern shore, being made in the Armstrong-Whitworth-built railway ferry steamer 'Lake Baikal'. From Tanchoi eastward, the Trans-Baikal section of the line carried on to Port Arthur, connecting with the Eastern Chinese Railway *en route*.

At the time war broke out, the capacity of the line was ridiculously small, having been worked up to three trains in each direction every twenty-four hours by the time the war had been going on for three months. Speeds were also slow – not much faster than walking-pace, in fact. Indeed, it is recorded that in the early days of the war, the journey from Warsaw to near Port Arthur took no less than fifty days – an average speed of five and a quarter miles per hour!

The greatest obstacle to the building up of an intenser traffic was undoubtedly the interruption caused by Lake Baikal, which is frozen to a depth of ten feet in midwinter, when it had to be crossed by sledge; railway lines on specially long sleepers being laid across when the ice had attained a thickness of 5 ft. Constructed as it was for purely military purposes, this twenty-five-mile ice-railway is unique in the history of railways in wartime.

But as the war continued, it was realized by the Russian Government that the only way of effecting an improvement in railway transport facilities to and from Manchuria would be by building a 160-mile line round the southern end of the lake. This was done at a cost of no less than £52,000 per mile, and the link-line was opened some seven months after the outbreak of the war – on 25th September, 1904. However, it must not be overlooked that before the construction of the line round Lake Baikal, sixty-five locomotives, twenty-five coaches, and over 2,000 wagons had been worked over the water on the ice-railway, power being provided by a stud of 1,000 horses. This rolling-stock, together with that

carried by the train-ferry, served a useful purpose on the Trans-Baikal section of the Siberian Railway and on the Eastern Chinese lines.

There were, however, other difficulties. The rivers of Manchuria freeze absolutely solid in the winter, and those of the Western Siberian section of the line were excessively saline; both these eventualities causing serious difficulty in providing water for even the few locomotives which were available. Not only so, fuel was scarce; locomotive depots few and far between; and permanent-way materials in short supply.

Only one 5,000-mile-long single-line from civilization to the 22° F. below zero wastes of Manchuria, was available for the transport of troops, munitions, railway materials, and hospital trains; yet by the time the war ended, this slender line of communication had been responsible for transporting an army of a million men and their full equipment. As Russian General Kuropatkin aptly said of this fantastic railway achievement: 'Wonders were effected – but it was too late.'

But not only did the Trans-Siberian railway carry out successfully the things expected of a railway in wartime, it also transported 5,400 miles eastward the materials for constructing a 350-mile network of narrow-gauge field railways, which were built by 11,000 Russian railway troops, with the assistance of Chinese labourers. Each of the three Russian armies had its own narrow-gauge system, on which troops and munitions, sick and wounded, were taken and brought back from the front; horses and mules being employed for traction power. Indeed, during the course of the war, these little lines carried some 58,000 tons of munitions and stores; nearly 25,000 soldiers to the front; and brought back over 75,000 sick and wounded.

As to the Japanese, their navy provided all the necessary transport from Japan to the scene of the war, but they were not well provided with railway troops. They were, however, quite active in their efforts to destroy the Russian lines of railway communication, being eventually successful in

completely isolating Port Arthur, which fell to them on 2nd January, 1905.

As was the case in the American Civil War and the Franco-German War, there were times when lack of liaison between the civilian and military authorities led to confusion, traffic chaos and the complete blocking of junction stations. At Harbin Junction, for example, in December, 1904, traffic had to be halted for twelve hours whilst an attempt was made to sort out the tangle of trains. This was imperative, for only a couple of months earlier it had taken some trains of reservists a week to travel the 337 miles from Harbin to Mukden – an average speed of only two miles an hour!

As is common knowledge, Japan won the war, the Peace of Portsmouth (U.S.A.) being signed on 5th September, 1905. Ironically, Russia had ten times the number of men on a war footing available, but the overtaxed Trans-Siberian single-line of railway had not the traffic facilities to allow her to get them to the theatre of war in sufficient numbers – and in time.

By-passing the destruction of many hundreds of miles of track and the burning or dynamiting of bridges and stations by the anti-President ‘rebels’¹ of Mexico, between 1910 and 1913, let us now turn our attention to the events in Europe culminating in World War One of 1914–18, as they concern railway administration and operation.

Towards the end of the nineteenth century, all European Governments began to attach great importance to the question of railway transport in the possible event of war, and did their best to organize it. In Great Britain, however, where the railways had been constructed, and were being run, by private enterprise, the antecedent conditions differed widely from those existing on the Continent.

Under the provisions of the National Defence Act of 1888, the companies, large and small, could be called upon by the Secretary of State for War to suspend or modify

¹ The Mexican revolution of 1910 under Francisco Maderio, and the counter-revolution, eventually developed into a civil war.

ordinary traffic and devote their lines to military purposes. In other words, railway officials and workpeople alike would become, for the duration of hostilities, servants of the State. Such was the scheme – in theory, but it is a singular fact that although the Government had acquired the necessary legislation to enable it to exercise control over the railways so far back as 1871, some forty years were to elapse without any precautionary creation of the necessary machinery by which such control could be put into effect in the event of a sudden emergency.

A half-hearted attempt at experimenting with an armoured train was made in the early 1890s by the combined efforts of the Artillery Volunteers and the London, Brighton and South Coast Railway Company at Newhaven, Sussex; a wagon being fitted up by Locomotive Superintendent R. J. Billinton. Full trials took place on 19th May, 1894, when several rounds from a forty-pounder Armstrong breech-loading gun were satisfactorily fired at a target 2,500 yards distant. Much valuable experience was gained, which was put to good use, as we have seen, during the Boer War.

After the Sudanese War, in which the railway played a very prominent part in moving Lord Kitchener's troops and supplies across the desert, the importance of instructing the Royal Engineers in the details of railway construction and maintenance work came to be better understood by the Government. The 'Engineer and Railway Volunteer Staff Corps' was formed, among whose officers were to be found most of the leading railway engineers and managers of the day. Two companies (the 8th and 10th) of the Royal Engineers, known as the 'Railway Department', were stationed at Woolwich and Chatham, at which depots there were fully-equipped railway lines and rolling-stock.¹ Specialized training was also given by placing engineers of the department on six-months' courses with the different railway companies – three months in the locomotive shops

¹At Woolwich there were no less than sixty miles of 4 ft. 8½ in. and 1 ft. 6 in. tracks, and at Chatham, about half that length of 2 ft. 6 in. track.

RAILWAYS IN WARTIME

and a similar period in the shops or running-sheds. Selected trainees were also given a further three months as firemen on a locomotive in actual main-line service.

Then, during the extensive military manœuvres of 1898 in Wiltshire and Dorsetshire, the London and South Western Railway ran 142 'specials' from Porton, Grateley and Salisbury district, conveying troops, horses, guns, baggage and stores, without interfering appreciably with ordinary traffic. Irrespective of the troop and other military horses used for these manœuvres, hired horses were conveyed to and from L.S.W.R. stations, together with 850 road wagons of all descriptions and nearly 1,000 men—in fact, the numbers of men, animals and accessories conveyed on this occasion represented two completely equipped Army Corps. How these special trains coped with the collection and dispatch of the troops to these manœuvres will be seen by the following:

British Army Military Manœuvres, 15th August–10th September, 1898. Special Troop Trains

	<i>Officers</i>	<i>Men</i>	<i>Horses</i>	<i>Guns and Wagons</i>
15th August	16	219	187	12
16th "	112	2,789	474	66
17th "	274	7,755	604	72
18th "	313	8,388	996	128
19th "	35	726	116	20
26th "	598	16,369	212	8
27th "	173	4,003	118	13
8th September*	214	6,694	96	11
9th " "	808	21,103	340	56
10th " "	275	7,307	765	55

The following year, 1899, although the military manœuvres were not on so large a scale, a greater number of troops were brought by rail from all parts of England to

* Return of troops from manœuvres.

Porton and Ludgershall, together with seventeen batteries of artillery and many companies of Army Service Corps and Royal Engineers. This time, however, most of the cavalry proceeded to the Wiltshire camps by route marches.

When the War Office opened up Salisbury Plain for military manœuvres, the small, but little-known Midland and South Western Junction Railway secured enormous military patronage by reason of the fact that its largest passenger station at Ludgershall* was situated within a quarter of a mile from Perham Down Camp and within a stone's throw of the Army Headquarters Staff at Tidworth House. Covering some sixteen acres of land, and equipped with five platforms and four roads fitted with special loading docks, the station was an important one to the military. Its goods-yard being lighted with electric lamps – quite an innovation in those days.

During the year 1900, the London and South Western Railway were constructing a light railway from their main line south-west of Grateley, via Amesbury to Shrewton. Passing near Stonehenge to the approximate centre of the large area purchased by the Government on Salisbury Plain, this little line, when completed, saved men and horses from the long, weary tramp across the dusty downs of Wiltshire. At Bisley Camp also, the L.S.W.R. provided a driver and fireman for the National Rifle Association's little 0-4-0 tank locomotive 'Wharnecliffe', which worked on a narrow-gauge line about the camp.

In October, 1899, the railway companies of England – particularly the L.S.W.R. – had ample opportunities for illustrating the value of railways from a military point of view. This was in connexion with the transport of troops and equipment to South Africa, and although many thousands of men left England by way of Liverpool and London docks more than half sailed from the L.S.W.R. docks at Southampton, and it may be of interest to see the amount of railway transport work carried out on this occasion:

* Now closed.

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Troops and Stores Transported by the London and
South Western Railway for Embarkation to South Africa,
20th October–17th November, 1889

	<i>Officers and Men</i>	<i>Horses</i>	<i>Guns</i>	<i>Road Vehicles</i>
20th October	4,566	16	5	38
21st ,,	5,048	103	20	84
22nd ,,	4,859	524	9	27
23rd ,,	4,255	437	5	38
24th ,,	1,541	272	9	41
27th ,,	409	405	12	23
29th ,,	968	716	7	14
31st ,,	349	232	6	21
3rd November	504	429	2	24
4th ,,	3,652	344	2	8
9th ,,	1,528	450	1	3
10th ,,	241	282	3	8
11th ,,	2,222	6	1	5
15th ,,	828	406	12	42
16th and 17th ,,	1,395	249	—	—
Totals:*	32,405	4,870	94	376

What happened to 'Tommy Atkins' and all this equipment on arriving in South Africa has already been told in the previous chapter.

Further evidence as to what the railways of Britain could accomplish in a war emergency was shown by the ease with which some 4,000 vehicles were marshalled into 200 troop trains for the army manœuvres in East Anglia in 1912. All this was done by the Great Northern, the London and North Western, and the Great Eastern railways; which managed to disperse the forces at the conclusion of the manœuvres in just over two days.

* By January, 1900, the L.S.W.R. had handled over 40,000 troops, 5,000 horses, 100 guns and 400 road wagons of various descriptions, not including ammunition, stores, food and clothing, which were daily dispatched from London, Woolwich, Aldershot and elsewhere, for embarkation from Southampton.

In 1912, the War Railway Council was succeeded by a Railways Executive Committee, constituted of the General Managers of the leading railway companies, who were to act as an executive body for working the lines on behalf of the State by receiving the orders of Government departments and translating them into effect; thus facilitating the working of the provisions of the Act of 1871.

Critics had long advised the building of strategical coast lines, but maybe it was Britain's insularity and the consequent remoteness of the possibility of invasion which caused the Government to ignore the importance of European railway military organizations during the latter half of the nineteenth century. Admittedly, the conveyance of troops by rail had been provided for in Section 20 of the Railway Regulation Acts of 1842 and 1844, and maybe the pathetic outbursts of the Duke of Wellington and Sir Charles Napier in 1847 and 1852 respectively, resulted in the awakening of the Government to the realization of the weakness of the position in which the country stood; for in 1867, the provisions of the first two Acts were extended to include the Army Reserve, and in 1871 the Regulation of the Forces Act was passed, under the powers of which the Government took control over the railways on the outbreak of World War One.

The preparation of the French railways for the exigencies of war is an entirely different story. Here it was a question of building invasion lines and lines to facilitate the transport of troops and munitions *en masse* on a neighbour's frontier. There was no friendly narrow sea between which could be held by naval patrols.

As we have already seen, the inevitability of the Franco-German War was greatly responsible for the setting up of Marshal Niel's Central Commission of 1869 and the Ministry of War's Superior Military Commission on Railways three years later. Then, with the lessons of the war well in mind, the Superior Commission was reconstructed in 1886 and 1889 to be composed of six generals, three representatives of the Ministry of Public Works, and members from each

of the great railway systems. It was under the auspices of this Commission that laws were passed (in 1889, 1899, and later), dealing with the technical instruction of railway troops in the operation, repair, and systematic destruction, if need be, of railways. Moreover, all plans concerning the transport of troops and supplies, from the moment of mobilization, were prepared, examined and provided, as far as possible, in advance.

The French laws which were passed in support of the findings of the Superior Commission stood the country in good stead during the railway strike of 1910, when the Minister of War summoned the strikers for a 'period of army exercises', requiring them to assume the role of soldiers doing railway work under military control.

It is not generally known that from 1889 until 1902, so many laws, orders, instructions and regulations were issued by the French Ministry of War, that even the smallest details of railway operation, repair and destruction were catered for. The 'Big Five' private railway companies and the State Railways were compelled to submit an annual contingent of their employees to the Ministry, together with officers from among their officials; a railway regiment comprising three battalions was formed; and a most complete and systematic course of technical instruction in all branches of railway work was given, including the regular peacetime working of forty miles of railway between Orleans and Chartres. Finally, there was the railway school, equipped with a library, tools, materials, workshops, and even a track-laying practice-ground set apart exclusively for the railway student troops.

By further modification by Decrees passed in December, 1913, the French military rail transport organization was made even more effective by the provision of a Line Commission attached to each of the large railway systems, each commission controlling a combined railway technical, and railway military staff. Under the Line Commissions were Sub-Line Commissions and Station Commissions, and, should the necessity arise, powers were to hand to summon

all, or any number of these commissions to a joint conference. Finally, France was divided into two railway zones: Interior Zone and Army Zone, with transition stations at the points where railways passed from one zone to the other. There were also organized mobilization stations, meals stations, detraining stations, base supply stations, supply depots, traffic regulation stations, stores on wheels, railhead stations, evacuation hospital stations, infirmary stations, and distribution stations – a very comprehensive scheme aimed at preventing the re-occurrence of the terrible defects which characterized rail transport in the Franco-German War. And such was the organization of French railways when war broke out in 1914.

With regard to the railways of Germany, nationalization had conferred on the Government the great advantage of building strategical lines ostensibly as part of the existing railway system and of adapting ordinary lines to military purposes should occasion arise, and this was the policy actively adopted during the closing years of the nineteenth century. Moreover, inter-state rivalry had the effect of causing the construction of purely military lines under the pretext of meeting the industrial needs of the Rhineland and Westphalia. Railways of this latter class were particularly in evidence during the first decade of the present century, and their presence played an important part in the German military transport scheme when the 1914–18 War broke out; by which time there had been built an almost unbroken system of innumerable lines north and south, parallelling the Russo-German frontier.

Similarly, on the Franco-German frontier, the nine main routes leading thereto at the outbreak of the war of 1870–71 were continuously added to since that time, particularly in the north-eastern and eastern regions. Indeed, by 1911, they had rail crossings of the Rhine at no fewer than nineteen points, out of which sixteen were double-track lines running from east to west and north-west. Fresh invasion of French territory by way of Belgium was also catered for by lines being constructed in the German–Belgian frontier in the

region of Malmédy, Weismes and Aix-la-Chapelle, where light railways were first built which were gradually converted into double-track lines in 1908-9, when sidings out of all proportion to the local traffic were also built. Finally, a new line was constructed from Malmédy to Weywertz as a purely military line with large siding and long-platformed stations for the accommodation of troop trains.

Similar steps were taken at the Dutch frontier, where an alternative route for troop transport from Cologne and Aix-la-Chapelle to the German frontier station at Dalheim was provided by a new line from Jülich to Dalheim; whence the Belgian Railways double-track main line through Moll and Herenthals provided direct access to Antwerp by way of the level Campine country. Thus, from Treves to Nijmegen the Germans had arranged for high-pressure rail transport across Belgium, Holland, and the Duchy of Luxembourg by no fewer than fourteen different routes, which could be used simultaneously in the event of aggressive invasion of those countries with a view of reaching France.

Such is a brief outline of the pre-First World War railway arrangements made by the German War Office, which even went so far as to attempt to secure an extension of the Weismes-Malmédy line as a 'light railway' across the frontier to Stavelot, with a view to opening up the approach to Liège, Louvain, Namur, and Brussels. Ironically enough, the Belgians themselves even assisted in building most of this connecting line, which was opened for traffic only ten months before the Germans invaded their territory by that very deadly route. Truly it has been said that in the construction of this short piece of line, the Belgians dug their own grave, for so well was this 'light railway' built that trains could use it at speeds of up to forty miles an hour, instead of the recognized light railways speed of a maximum sixteen miles an hour.

CHAPTER SEVEN

Railways in the 1914-18 War

ON 4TH AUGUST, 1914, the day war was declared on Germany by Britain, the British Government took over control of all the railways by the issue of an Order in Council made under Section 16 of the Regulation of Forces Act of 1871; control being exercised through an Executive Committee composed of the General Managers of thirteen of the most important railway companies in the Country.

Within a few days, 80,000 Germans were attacking Liège by the light railways they had constructed as an extension to the trans-frontier Weismes-Malmédy line. Soon the Belgian city was destroyed, Louvain was captured, and in just over a fortnight the advancing German armies entered Brussels. It was indeed a lightning attack which proceeded at such a pace that the British Government could hardly believe it was actually happening.

In the meantime, the German Ambassador and his suite left Liverpool Street Station to board the Great Eastern Railways steamship *St. Petersburg* at Parkeston Quay; the Turkish Ambassador left Charing Cross Station by the Folkestone Boat Train, to which special vehicles had been attached, on his way to Constantinople (Istamboul) via Flushing; and Austrian Ambassador Count Mensdorff left Paddington *en route* for Genoa, by a train described as the most luxurious that had ever steamed out of that station. South-westward bound, to meet the liner *Aaro* at Falmouth Harbour, it was a twelve-coach train hauled by the locomotive 'Princess Mary'.

From the outbreak of war onwards, the story of the work

and growth of the military transport provided alike by railways, canals, roads, and docks, bears the normal imprint of British campaigns. It was begun on much too small a scale and no provision was made for expansion. It was thought that the war would be over in a few months, whereas it dragged out for four years; hence the expansion of the country's transport resources had eventually to be extemporized against time at fabulous expense.

None the less, in spite of under-estimation of the colossal task ahead of them, the railways of Britain worked miracles of transport during the last days of July, 1914, and the early days of August, when mobilization of the Navy, Territorials, and Expeditionary Force were put into effect, and the latter concentrated at Southampton for embarkation to France.

As it happened, the large prior movements of Territorials to their annual training camps greatly complicated the mobilization transport programme which had been drawn up by the Railway Executive Committee in conjunction with the managers and superintendents of the larger railway companies. Moreover, August Bank holiday civilian traffic, which attained its peak two days before the declaration of war by Great Britain did not make military transport in the emergency any easier; for on the evening of 3rd August, the War Office issued orders that regular soldiers and Territorials alike should immediately return, and that the railways should arrange for their transport. But in spite of the short notice, Territorials, Reservists, Naval Reservists, Special Reservists, and thousands of horses for the Regular Army, travelled to their headquarters or depots with perfect smoothness – either by special or ordinary trains.

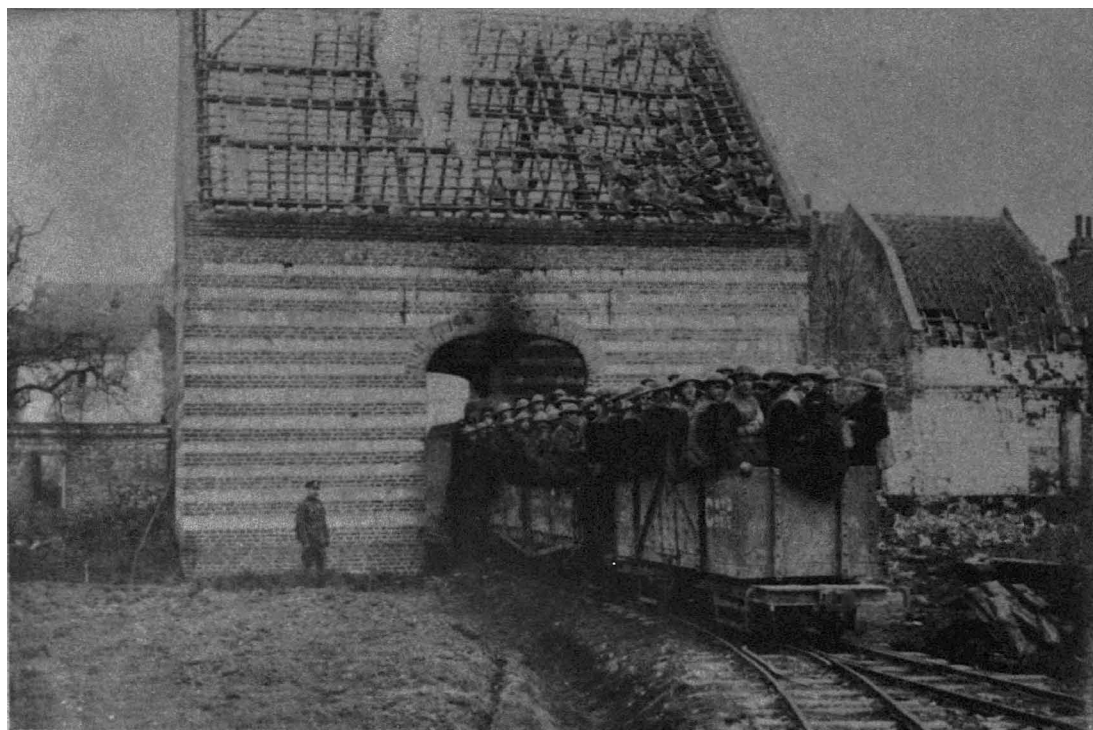
Timetables were re-adjusted at short notice, and the collection of the Force from stations all over the country commenced on 9th August, the first trainload arriving at Southampton over half an hour early at 8.15 a.m. on Sunday, 10th August. During the eight following days, no fewer than 334 trains arrived at that port, bringing nearly 70,000 personnel, 22,000 horses, 2,400 guns, 1,200 bicycles, 97



French troops taking shells to the batteries at Gallipoli by horse-drawn light railway

British troops moving supplies to the Balkan Front in 1917 on a mule-drawn light railway





A Royal Engineers working party being conveyed by light railway at Arras

British tanks at the Fins railhead returning from the Battle of Cambrai on railway trucks



motor-cycles, and 2,550 tons of stores. By 18th August, the whole Force and its equipment had been safely landed on French soil without a hitch or casualty. Reinforcements of the original Expeditionary Force soon followed and proceeded continuously until the end of the month, by which time 670 troop trains had been dealt with at Southampton and over 118,000 troops embarked overseas. Thus it was that railway organization played a vitally important part in transporting the 'First Army' to France in time to fight the famous delaying retreat action at Mons on 23rd August, 1914.

So far, the railways of Britain had been called upon to handle hundreds of thousands of men, but during the hectic days that followed, their military passenger traffic ran into millions. No doubt the troop movements of the first few weeks of the war had been considerably simplified by the wise selection of Southampton as the port of embarkation, for every unit of the Expeditionary Force had to travel over some section of the London and South Western Railway. Fortunately, the experiences gained by that company during the South African war, together with the improvements made at their docks at Southampton, were of inestimable value in helping them to meet the stringent requirements of the War Office with alacrity and precision.

There is no doubt, however, that military train routing from north to south and vice versa, in the London area, was not so simple as it might have been had the Northern Junction Railway been constructed. This eminently practical link-line, which could have done for London war transport what the Grande Ceinture did for Paris in the 1870s, was promoted in 1911, but was abandoned due to the intense opposition the scheme was met with by the main-line railway companies. It is interesting in that it would have connected the Great Northern Railway at Wood Green, with the London and South Western Railway at Brentford, where a junction with the North and South Western Junction Railway would have been made. The Great Western Railway would have been connected near Brentnan Halt; the Metropolitan-

District Railway near Hanwell; and the Metropolitan-Great Central at Wembley.

As it was, the fourteen-mile-long North London Railway; the North and South Western Junction Railway; the West London Railway; the East London Railway; the West London Extension Railway; and portion of the Metropolitan Railway; were pressed into service to form trans-London routes which were an absolutely vital, if not a very direct linkage between the Metropolitan ends of the lines forming the trunk systems of various main-line companies.

Such were the ramifications of the lines of the North London Railway and the links it provided between the L.N.W.R., the Midland, Great Northern, and Great Eastern systems, that fantastic demands were made upon the little line during the war; well over 7,000 loaded, and over 6,000 empty troop or military trains passed over its lines and those of the contiguous North and South Western Junction Railway, which latter connected with the L.S.W.R. at Kew Bridge and Richmond, and with the G.W.R. and the Midland Railway at Acton. It was, indeed, a vital link-line between army camps in the south and south-west of England and the important coastal points in East Anglia.

In the case of the section of the Metropolitan Railway referred to, this was the duplicated, or widened section between Kings Cross and Moorgate Street, which gave connexions at Farringdon Street to the South Eastern and Chatham Railway and the London and South Western Railway via London Bridge or Loughborough Junction. On this short length of almost wholly underground line, 26,000 special trains, carrying over a quarter of a million tons of freight were run during the war – and that in spite of the severe limitations imposed on traffic by the ‘switchback’ character of the line and its abnormal gradient.

The all-important West London, and West London Extension railways, linking as they did, the L.N.W.R. at Willesden, with the L.B. & S.C.R. and the S.E. & C.R. (at Clapham Junction and Longhedge Junction, respectively), provided a welcome alternative route to that of the Metropolitan’s

'widened lines'. Over its short lines passed vast quantities of heavy war traffic from the L.N.W.R. and the G.W.R. to Chatham, Dover, Folkestone, Newhaven, Portsmouth, Sheerness, and to Richborough, Kent, after the train ferry had been constructed there. The West London was, indeed, always chosen for the transport of out-of-gauge or very heavy loads; for the tunnels of the Metropolitan were not only too small, but impossible to work 'double-headed', the men on the footplate of the train engine being in danger of suffocation by the smoke and fumes emitted by the pilot engine necessary to haul even a short train over the steeply-graded line.

Favoured by loaded ambulance trains – particularly in the latter years of the war, was the little seven-mile East London Railway, which plunges under the Thames between Rotherhithe and Wapping stations on its way from New Cross and Surrey Docks to Shoreditch and St. Mary's Whitechapel, where the Great Eastern and London, Tilbury, and Southend railways, respectively, were connected. Over a thousand loaded ambulance trains, and a similar number of empty ones, used this route during the war; shelter being provided by the Thames Tunnel section whenever a German air-raid was in progress.

Just as link-lines in the Metropolitan area were heavily pressed into use during the exigencies of war, so it was with scores of little-used connecting branches between the main-line systems of one company and another; these also combining to offer great advantages in the speedy handling of Government traffic without necessity for trans-shipment. As examples of such lines may be mentioned the Cambridge Branch of the London and North Western Railway; the Banbury Branch of the Great Central; Bushbury Junction, Wolverhampton; and the Midland, Great Central, and Great Eastern connecting link at Neasden.

Most of these important links had been constructed during the previous decade, but four new ones were built at the outbreak of war at the request of the War Office to cater for a strategical emergency, should one have arisen. Such a junction was made between the Great Northern Railway

at Harringay and the Tottenham and Hampstead Junction Railway at Crouch Hill. Another was constructed at Peterborough, to connect the Great Northern and Midland lines. Neither of these connexions were ever used and were removed after the war. Similarly, the half-mile connecting the Great Central at Whetstone, Leicester, with Blaby, on the L.N.W.R., and the double junction at Gospel Oak (London), provided important alternative routes for military traffic, enabling simultaneous transport to be arranged for vast quantities of munitions as could not have been handled by a single route.

But the railways of Britain were asked to do much more than transport military personnel and equipment. The utter worthlessness of modern fortifications had been amply proved during the first few weeks of the war, and in October, the War Office ordered two identical armoured trains from the L.N.W. railway works at Crewe for use on the east coast should the emergency arise.

Under the lash of urgency, drawings were hastily prepared which incorporated vehicles suitable for conversion and armouring, regardless of the railway company owning them. Thus, in each four-vehicle train, the two vehicles each mounting a twelve-pounder, rotating-platform-mounted gun, were originally Caledonian Railway 30-ton, bogie boiler trolleys; the two infantry vans were converted Great Western 40-ton bogie coal wagons; whilst the locomotive, which occupied the centre of each train, was a Great Northern 0-6-2 tank, with 18-in. by 26-in. cylinders.

Conversion and armouring with half-inch steel plate was done at Crewe, each gun vehicle having a gun platform, a Maxim gun compartment, and an ammunition compartment; firing and observation loopholes being provided in the sides and ends of the vehicles. In the case of the infantry vans, which were described as 'nothing less than luxurious caravans mounted on flanged wheels', everything was provided, including a coal cooking stove and coal bunkers, tanks for drinking-water, lockers, folding tables, and rifle racks. One van in each train was partitioned for officers'

quarters and the other was open throughout. Lighting was by acetylene gas and the outside of the trains was camouflage-painted.

Two such trains were constructed, and after being tested were dispatched to within easy reach of the east coast, one being stabled on the Midland and Great Northern Joint Railway near the Norfolk coast, and the other on the North British Railway, north of Edinburgh. Steam was kept up in readiness for the repelling of any attack or attempted invasion, but the emergency never came.

In the case of ambulance trains, Britain was not, at the outbreak of war, without some experience in their construction and operation; indeed, the famous 'Princess Christian Hospital Train' already mentioned, had been constructed some thirteen years earlier for use in South Africa, and the London and South Western Railway had, during the same war, fitted up five coaches for hospital work in England, these having been maintained in workable condition from the turn of the century onwards.

Between the South African and the 1914-18 wars, drawings were prepared by the L.N.W.R. in co-operation with the War Office, so that by the time the First World War broke out, plans for ambulance trains for use in the Home Country were already in existence. It was a matter of how many were to be built, and by whom. As it transpired, the Government's first order was for twelve trains, the construction of which was spread over seven railway companies: the Great Central, Great Eastern, Great Western, Lancashire and Yorkshire, London and North Western, London and South Western, and Midland; each train comprising mainly bogie vehicles adapted from existing corridor coaches, parcel vans, dining-cars, and composite brake vans. Each train was numbered for identification purposes, and was dispatched to Southampton as soon as ready.

Unfortunately, the first shipload of war casualties to reach Southampton Docks, arrived on 24th August, 1914, before any of the trains were ready, and the invalids were taken over the special spur-line from Netley to Netley Hospital by the

nondescript train already mentioned, which was composed of odd vehicles supplemented by some L.S.W.R. corridor coaches for the sitting cases. Later the same day, the first of the two trains built by the Great Central arrived at Southampton, and four days later it took wounded soldiers to Netley Hospital from the Great Western steamship *St. Andrew*, which had been commandeered by the Admiralty and converted into a hospital ship at the outbreak of war.

All twelve of the ambulance trains ordered arrived at Southampton by the end of August, which was fortunate, for a continuous stream of incoming vessels bringing wounded from the Continent started to arrive; the rush of wounded culminating with the fall of Antwerp, when Belgian casualties brought the numbers to what were then considered to be formidable.

Early the following year, the situation began to get desperate, and in order to meet the steadily rising rush of wounded, four more ambulance trains were ordered, with instructions that each of the sixteen trains then running should be supplemented by the addition of two ordinary corridor coaches and a dining-car. Emergency trains of ordinary corridor stock and dining-cars for non-stretcher cases were also ordered. Fourteen trains were stationed at Southampton and six at Dover Town to cope with the use of these two ports by hospital and other ships bringing thousands of wounded to England, the latter station having been converted into an ambulance depot.¹

Obviously, the Government had, at the outset of the war, no conception of the enormity of the overseas struggle, for soon the number of wounded arriving in England necessitated their transport by ambulance train to hospital destinations all over the country – even as far as Scotland. This demanded the provision, on the trains, of sleeping and feeding accommodation for both patients and staff. Bigger and better trains were obviously needed to achieve this end, and eventually, ‘Standard’, ten-coach trains were constructed

¹ See Appendix Three.

which included dining- and sleeping-cars, together with additional kitchens and equipment.

While the ambulance train arrangements in Britain had been improved considerably by the end of 1914, the position overseas was a very different one. When the first Expeditionary Force was sent abroad, it had been left to the French railways to provide for their transport to the fighting front and their conveyance if wounded to a Channel port. So sudden and severe, however, were the earliest stages of the conflict, that the French authorities soon became aware of the inadequacy of their supply of 'sanitary trains' (as ambulance trains were called in France) to transport British as well as their own wounded men. Heavy casualties, losses of rolling-stock to the invading Germans, and the dearth of French railwaymen were the four main reasons for the appeal of the French Government to the British War Office for a British ambulance train to be sent to France at once, for the use of the British Army.

By mid-November, one of the hospital trains already running in Britain had been fitted up and specially adapted for running on French lines by the London and North Western and the Great Eastern railways. Composed of eleven bogie coaches, the train was corridored, steam-heated, and electrically lit, together with a kitchen, operating room, and a pharmacy. In the words of the Medical Correspondent of *The Times*, the train was 'probably the most perfect hospital train in the world'.

By the end of the year, more trains were needed in France, and soon three more ambulance train sets were shipped abroad, two sets being paid for by the flour millers of the United Kingdom and one by Lord Michelham. The millers' trains were specially adapted from existing rolling-stock by the Great Western and Great Eastern companies, while Lord Michelham's train was supplied by the L.B. & S.C.R. At the same time an Ambulance Train Committee was formed in France to effect co-ordination between medical and military requirements as they existed in France, and the supply of such equipment from Britain.

As a result of the findings of the Ambulance Train Committee, the sixteen-vehicle, 920-ft.-long 'standard' overseas ambulance train was evolved, in which there was provided accommodation for 320 stretcher cases, seventy-six sitting cases, thirty-nine personnel, and eight staff. The make-up of the trains was as follows: one staff coach, one kitchen-cum-sitting sick-officers' coach, nine coaches for lying-down cases, one pharmacy coach, one personnel coach, one combined brake coach catering for infectious diseases, one brake-cum-stores van, and one combined kitchen and mess coach.

Twelve ambulance trains from Britain were running between the Front and the various French ports in February, 1915, and early in April, Lord Michelham's train and the two 'Millers' Trains' had arrived in France, together with 'Princess Christian's train'. Yet, within a few weeks, eight more trains were asked for, and by October, 1915, six more were needed. A still later order included one each for use in Salonica and Egypt, together with four ordinary trains and some special vehicles for use on the Mediterranean Lines of Communication. Of these, the train for Salonica, which was composed of four-wheeled North London Railway stock, managed to find its way to France, but finished up in Italy, where it was put to good use. The Egyptian train was sent to supplement one which the Egyptian State Railways had built in their own workshops for the Egyptian Red Crescent Society (Red Cross).

Some slight idea of the immensity of the task carried out by the ambulance trains of Britain can be gained from the fact that during the period 2nd January, 1915-28th February, 1919, no fewer than 1,260,000 wounded, brought over by 4,000 boats, were handled by 7,781 ambulance trains from Dover Marine Station alone. Every one of these trains had also to return to Dover, thus the total number of 'ambulance specials' dealt with was actually 15,562. Similarly, between 24th August, 1914, and 31st December, 1918, Southampton Docks alone dispatched 7,822 ambulance trains conveying 1,234,000 wounded and sick men, which included nearly 29,000 wounded German and Austrian

RAILWAYS IN THE 1914-18 WAR

prisoners. In all, from the outbreak of war until 7th April, 1919, the immense total of sick and wounded received at British ports and conveyed by ambulance trains to hospitals scattered over the length and breadth of the country was 2,680,000. A marvellous performance, in spite of the fact that by the cessation of hostilities, forty-nine ambulance trains,¹ composed of 822 vehicles, were at work in Britain and overseas.

¹ Of these, nineteen trains (304 vehicles) were for the American armies in France.

British Railways in France

NOT MANY months had elapsed after the outbreak of hostilities, before the French Railway Authorities began to experience an increasingly desperate shortage of motive-power and rolling-stock. So incredibly swift had been the advance of the invading armies through Belgium and into Northern France that there was not always time to put into action any plans for withdrawing locomotives and rolling-stock before the Germans could commandeer them; in which case they were ruthlessly sabotaged where they stood to render them useless to the enemy, but while such crippled stock was no gain to the Germans, it was also a dead loss to the Allies. In terms of wagons and vans particularly, these losses were very formidable, running into many thousands within a few weeks of the commencement of hostilities.

Even as far back as the American War it had been clearly proved that permanent way sabotage was too easily made comparatively good for emergency use under wartime traffic conditions to be of much avail. Similarly bridges and viaducts of which one arch had been blown up, were rendered usable again by slow-speed traffic in an incredibly short time. Permanent way sabotage alone was not enough to disrupt enemy rail transport. Sabotage of locomotives and rolling-stock was essential, and real technical skill was required to effect the most vital damage to a locomotive in the shortest possible time, whilst also bearing in mind the necessity of being able to repair such damage quickly should the engine again fall into Allied hands. It was more a question of immobilization than simple destruction. In the case of wagons and vans, however, those which were sabotaged and

left behind inevitably had the finishing touches put to their destruction by mutual shell-fire.

During the first month of the war the French Nord and Est railways alone had provided nearly 400 trains for the initial covering movement of the French armies, whilst the Nord and Etat supplied about 350 trains each for the concentration of the British Expeditionary Force when it landed in France. The provision of these trains was made more difficult by the fact that French mobilization itself had involved the marshalling and dispatch of 3,000 trains comprising about 147,000 vehicles, and the mass flight of Parisian citizens as the Germans advanced relentlessly towards their city had demanded the use of many hundreds more. Indeed, on one day, 4th September, 1914, over 50,000 passengers left the Gare d'Orleans for the south of France, whilst at the same time the French railways were losing locomotives and rolling-stock at an alarming rate, 45,000 vehicles and 83 locomotives being out of service at that date. Two months later, nearly 1,300 trains were used for troop transport from Amiens to the sea at Calais and Boulogne. No small wonder there was a shortage of locomotives and rolling-stock.

Increasingly heavy demands coupled with diminishing resources, compelled the French railways to depart from their original arrangement to retain in their own hands the working of all trains and the provision of all the rolling-stock that the British Forces and their own would require. Similarly, the 'Locomotive Pool' conceived by an International Commission, also proved inadequate to meet the overwhelming demand for motive-power.

As the months went by, matters got steadily worse. In 1915, the Paris, Lyon, Méditerranée (P.L.M.) handled 70,000 Ghurkas and Sikhs from fifty-two troop-ships at Marseilles, and the Paris-Orléans Railway conveyed some of the Indians from Toulouse to Orleans in 400 trains. But by June, 1916, the strain on the French railways had become unbearable, for between February and June that year, events at Verdun had resulted in a call being made

upon the Est Railway for the dispatch of no fewer than 3,592 trains to transport 1,500,000 men and their battle equipment. Similarly, during the battle of the Somme, nearly 7,000 trains were run, with loads in each direction.

Matters came to a head in November, 1915, when the French Director of Military Transport intimated to the British Ambassador in Paris that the terrible shortage of wagons had reduced the French railways to a very critical position. This alarming information was duly passed on to the British Railway Executive, so that when the French Railway Administration asked the British railway companies the following January if they could supply 2,000 wagons immediately, it occasioned no surprise.¹

To this 'S.O.S.' the Railway Executive Committee replied that all types of rolling-stock were already being pressed into service in Britain and that home traffic arrangements and trade would be prejudiced if wagons were sent to France. But so desperate was the position that the French railways could not let the matter drop so lightly, and towards the end of May, 1916, put forward the suggestion that Britain should at least make provision for the transport requirements of its own armies on the Western Front. Within a matter of weeks, this definite suggestion had the desired effect, the British War Office acquainting the British Railway Executive Committee with the stark fact that it was highly improbable that the Belgian and French railways together could not hope to provide all the locomotives and freight rolling-stock necessary to meet the requirements of their own troops as well as those of the British Railway Operating Division (R.O.D.), which were working parts of some of the French lines.

With typical British protocol, the matter was referred to a sub-committee, which eventually acquainted the Ministry of Munitions with the requirements of the War Office – viz. up to 200 locomotives and approximately 1,500 wagons for dispatch to France if and when desired. Sugges-

¹ Similar assistance had been asked for in March, 1915, when it was given, but on a very small scale.

tions and counter-suggestions ensued, with the British railway companies in an embarrassing position, for by this time their locomotive shops had been placed at the disposal of both the War Office and the Ministry of Munitions. It was a case of more munitions or more locomotives and rolling-stock being produced—a very complicated situation indeed, which caused a temporary deadlock, while troop, ammunition, and ambulance trains on the Western Front were staggering under their terrific loads. Obviously, the magnitude of the transport crisis in France was not realized by the British Government, the Railway Executive Committee, or the Home Military Authorities.

The British railway companies, on the other hand, took a more realistic view of the situation and appreciating its gravity, compiled and presented to the Ministry of Munitions detailed lists of the materials they would require for the construction of 300 new locomotives necessary to replace those sent overseas. This gesture of the railway companies, eminently practical though it was, brought no response or tangible assistance from the Ministry of Munitions, the War Office, or the Railway Executive Committee, who could not make up their minds as to who should take the responsibility for the decision to go ahead; the Board of Trade, however, made the unpopular suggestion that the required locomotives might well be found by still further reductions in passenger traffic on the railways of Britain.

Apart from an undertaking made by the London and North Western Company to provide, on their own recognizances, seventy engines for the British troops in France, matters remained virtually at a deadlock until the middle of November, 1916, when Ex-Deputy General Manager of the North Eastern Railway, Eric C. Geddes (who had become Deputy Director-General of Munitions and had received the honour of knighthood), was appointed in October by Prime Minister Lloyd George as Inspector-General of Transportation to the British Army in France; a post in which he was assisted by Midland Railway General Manager, Sir W. Guy Granet.

Together the two practical railway officers went to France to see for themselves the actual state of affairs on the railways there, and on 24th November, 1916, they sent home a joint report, stressing the undeniable fact that the forty-five British locomotives already working there were totally inadequate to meet the undoubted future requirements of the British Army in France. They were also of the opinion that from 200 to 300 locomotives and from 10,000 to 20,000 10-ton wagons were necessary if the transportation system of the British Army in France was not to completely break down within the following three months. Best part of 1,000 miles of new track would also have to be made available in France, together with crews for the engines and wagon repair staff.

With the Geddes-Granet report in his hands, Lloyd George wasted no time in getting things moving. He received the report on 24th November, 1916, and four days later held a consultation at the War Office, to which the President of the Board of Trade was invited. The following day the members of the British Railway Executive Committee were acquainted with the contents of the Geddes-Granet report at a conference with the President of the Board of Trade, and on 30th November the Executive Committee summoned a meeting of the Goods Managers of the leading railway companies, when it was decided forthwith that, after all, 20,000 wagons could be provided for overseas use, by a stringent reduction in the acceptance of all unessential freight traffic. The 1st December saw a similar conference of Superintendents of the Line, where various detailed schemes were formulated with a view to releasing more locomotives and rolling-stock.

It was this latter meeting which resulted in the drastic changes affecting railway travel in Britain – changes which came into force on 1st January, 1917, and which included the following: The curtailment, alteration and deceleration of passenger services; the discontinuance of seat reservation; a great reduction in the number of sleeping-cars, dining-cars, and through coaches; the prohibition of the transport

of all types of road vehicles by rail; a 50 per cent increase in passenger fares; and the complete cancellation of all cheap fare facilities. At the same time, the Government decided to take over control of the railways of Ireland, on the same basis as the British lines; and 225 stations and halts in Britain were closed, some completely, some to passenger traffic only. Others were closed to passenger traffic on Sundays, but in some instances they remained open only for munition workers or munition freight traffic.¹

By a few days before Christmas, 1916, the full number of locomotives required for overseas had been increased to 370, of which twenty of the seventy promised by the L.N.W.R. had been dispatched, but during the following year the remaining 350 were duly collected by the various British companies and sent to France. Unfortunately, however, the full quota of 20,000 wagons had not been delivered by the end of 1917.

As to the provision of the minimum of 200 miles of permanent way material suggested by the Geddes-Granet report, eleven of the major British companies were prepared to find slightly more than that quantity between them, either from stock; by converting double-track branches to single track; or by completely dismantling certain branch-lines. The total length of complete single track at first actually supplied ran into just over 200 miles, some of the branch-lines closed and denuded of track to provide this mileage including the Basingstoke and Alton Light Railway (fourteen and a half miles); the Brighton and Dyke Railway (L.B.S.C.R.) (three and a half miles); the G.W.R. branches: Alcester-Bearley, Titley-Eardisley, Moorswater-Caradon, Monmouth-Colford, Uxbridge (High Street)-Denham, and Bridport (East Street)-Bridport (West Bay); and the S.E. & C.R. Nunhead-Greenwich Park-Crystal Palace line.²

It was not until the end of April, 1917, that this first

¹ Stations closed at the beginning of 1917 included: N.B.R. (56), L.N.W.R. (48), Caledonian Railway (46), G.W.R. (29), L.B.S.C.R. (13), L. & Y. (11), Cheshire Lines Committee (9), S.E.C.R. (7), L.S.W.R. (4), Midland Railway (2). (A few others were closed subsequently).

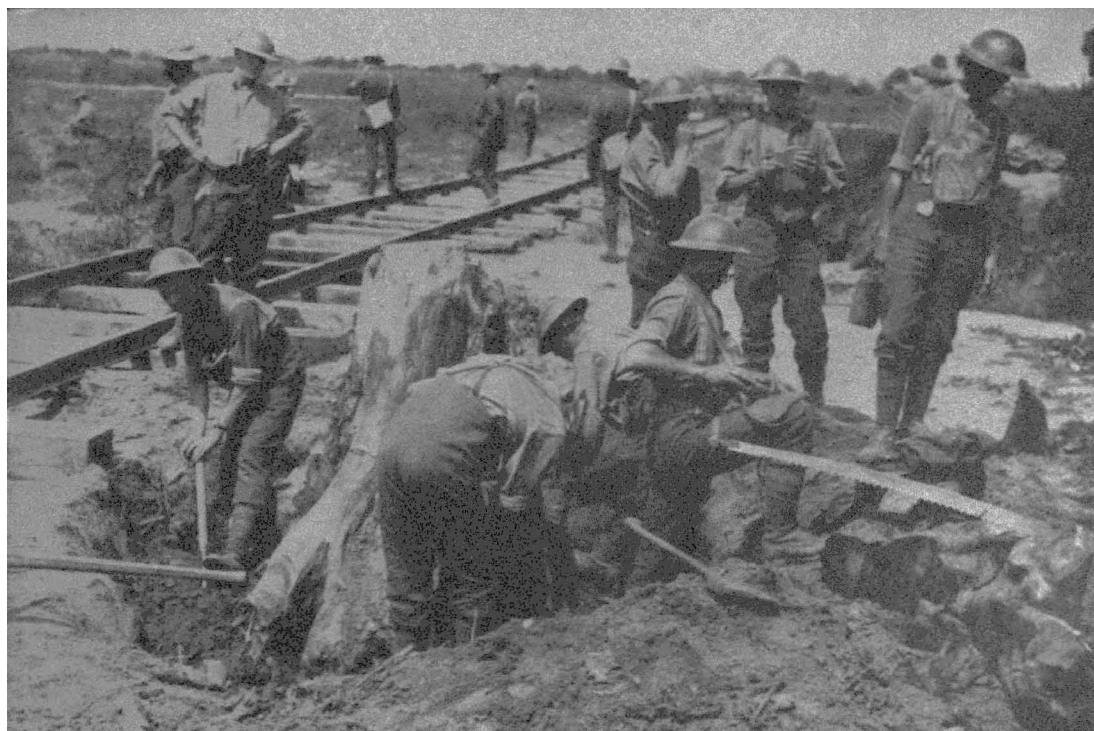
² Some of these branch-lines were subsequently relaid.

order for standard gauge track was completed, though the first shipments were dispatched in January. The German 'U-boats' were sinking at sight any Allied ship coming within range of their torpedoes, thus causing the great delay in the provision of cross-Channel transport that is generally blamed for the delay in the whole operation.

Meanwhile, in February, 1917, came another urgent demand from the French Government for fifty more locomotives – this time of the powerful 0-8-0 type, which could only be supplied by the larger British companies, of which two undertook to meet the demand. Even with the 700-odd main-line engines promised by Britain, the locomotive position in France had steadily worsened, yet more engines being required to ensure the fluidity of the Allied Forces. Moreover, a 1,500-mile Trans-European overland railway route was being organized from Cherbourg to Taranto, by way of Mexidon, Tours, St. Germain au Mont d'or (Lyons), Mont Cenis tunnel, Faenza and Bari; and for this 180-hour run, no less than 113 locomotives would be required.¹ Other demands for additional locomotives were made in June, 1917, for campaigns in Egypt, Mesopotamia and Salonika.

Of the 700 engines promised to France, 420 had been dispatched by February, 1917, and of these many were 1911-built, Great Central 2-8-0s, designed by J. G. Robinson. The original engines, which weighed seventy-three tons, were fitted with steam and vacuum brakes, but the later ones, which were introduced in 1917, had Westinghouse and steam brakes, to conform with Continental practice; together with steam heating apparatus for troop-train working. Owing to the great shortage of copper in Britain, steel fireboxes were fitted to the wartime engines, which added considerably to the amount of servicing they required. The type was eventually adopted as standard by

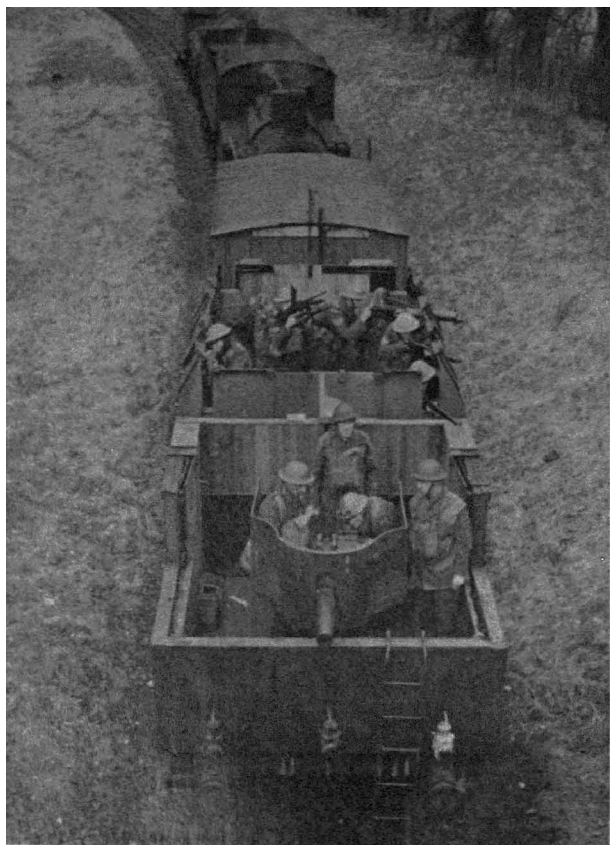
¹ This service, which duplicated the sea line of communications to the Mediterranean, was started in 1917, and by February, 1919, no less than 184,000 tons of freight and 400,000 passengers had been transported by it. At its peak working period, seventy trains were dispatched in one month.



British troops laying a light railway near Boesinghe in 1917

A First World War light railway 'engine' made from parts of a discarded motor car





An armoured train used by the Scottish Home Guard during World War Two

An A-20 Havoc passes over the German railway junction at Busigny during a raid in 1944



the War Department for working heavy freight and troop traffic; 521 engines of the type being built for the R.O.D. for overseas service by Messrs. Kitson & Co., the North British Locomotive Co., Robert Stephenson & Co., Ltd., and Naysmith, Wilson & Co., as well as by the Great Central Railway.¹

Of the British locomotives sent to the more distant theatres of war – Salonika, Egypt, Palestine, and Mesopotamia, a brief record of their fortunes overseas is interesting. In 1916, five London and South Western, Adams 66-ton tender 0-6-0s of the '395' and '496' classes were sent to Serbia, together with some G.W.R. freight engines, for use on the Serbian State Railways, in connexion with the Salonika campaign. Fourteen similar L.S.W.R. engines were dispatched the same year to Palestine, and a further fourteen the following year, when nine more went to Mesopotamia. 1918 saw four more going to Mesopotamia via Palestine, and a further four (Nos. 105, 165, 404 and 406) sunk in transit when S.S. *Arabic* was torpedoed in the Mediterranean.²

During the war many locomotives were handed over on loan to the Government for service overseas, but out of 516 engines loaned, all but 53 were returned by early in 1921. The L.N.W. provided more than one fifth of the total (111), being followed by the Midland Railway (78), and the Great Western (73). Lower down the list came the North Eastern Railway (50), the Great Eastern (43), the Great Central (33), and the Lancashire and Yorkshire (32). The Great Northern loaned 26 engines, the Caledonian and North British, 25 each, the L.B.S.C., 12,³ and the S.E. & C.R. 8.⁴ Of the 53 engines not returned, 47 belonged to the L.N.W.R. and 16 to the Great Western.

¹ After war service (1919), many of these engines were sold to the G.W.R. [(20) Nos. 3000-19] and the L.S.W.R., but they were not kept long in service.

² See Appendices.

³ See Appendices.

⁴ Ten 'T' Class Kirtley tank locos (Nos. 600-609) worked in and around Boulogne.

With the dispatch to France of the 200-odd miles of British track already mentioned, a posse of some 3,000 British civilian platelayers was recruited from various railway companies and formed into three working divisions under the command of L.N.W. Divisional Engineer E. H. Townsend. Leaving Folkestone a fortnight after the receipt of the Geddes report, for urgent temporary permanent way construction and repair work outside the danger zone, the men remained civilians, but were fed, lodged, and tooled by the British Government. The two companies formed wholly of L.N.W. men were immediately employed at Audruicq, an important junction between Calais and St. Omer, and also on a fourteen-mile track-widening job between Arques and Berguette and at Vendroux, near Calais; on all of which work they had the assistance of 800 German prisoners, who did all the carrying work.

By the end of September, 1916, over 600 miles of standard gauge British permanent way had been sent to France. Most of it was used for sidings, but running-lines were laid by British platelayers between Hazebrouck and Ypres (nineteen miles); between Candas and Acheux (fourteen and a half miles); as well as an eight-mile line near Contay and extensions of existing lines in the Somme area to open up railheads in the direction of Montauban and Guillemont. All this constructional work brought the available stock of British track in France down to about sixty-five miles.

Towards the end of 1916, the locomotive and rolling-stock position was extremely critical, practically all being provided by the French; for although Britain was in the course of supplying 13,000 wagons towards the 22,000 required for an advance through Belgium, only thirty-four steam, and seven internal-combustion engines were running in France for the Railway Operating Department (R.O.D.) of the British Army. Indeed, at the end of September, 1916, though 100 locomotives were on demand, the actual short-notice supply of engines from Britain only amounted to a mere seventy. Fortunately some Belgian locomotives were being used for working the lines behind the British Army zone,

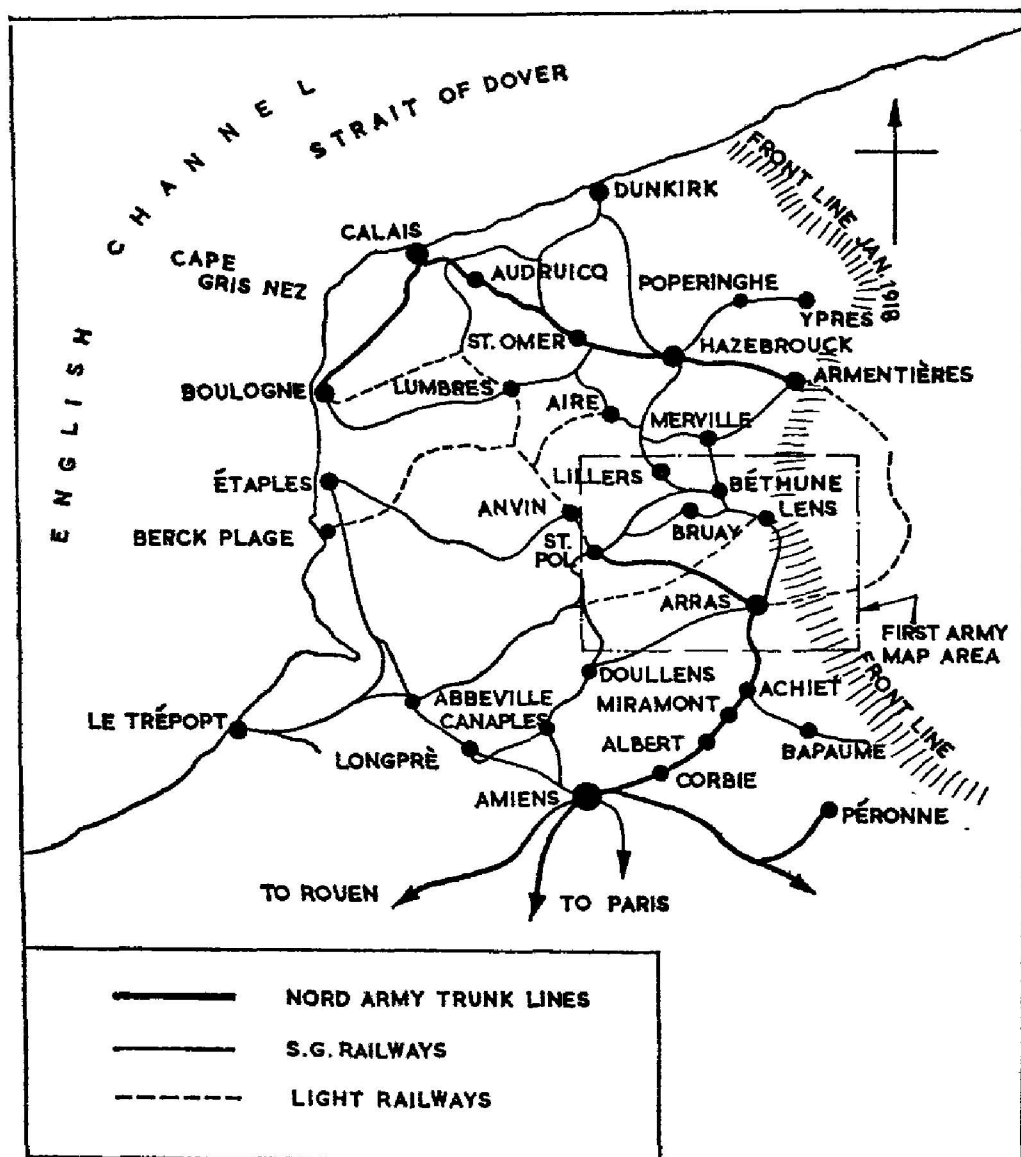
though these did little to relieve the desperate transport situation.

The French Army authorities then suggested that Britain should undertake the handling of all British Army trains up to a line drawn from Hazebrouck to Maubeuge, calling for the immediate provision of 900 additional locomotives, 20,000 more wagons, 1,000 miles of track, together with all the necessary repair facilities and personnel. These requirements, which were made known on 24th November, 1916, placed a still greater burden upon the British Transport Directorate, to whom it was abundantly clear that the existing organization and facilities in France would never stand up to the strain of the estimated requirements of the 1917 operations.

During the year 1916, only 417 miles of track had been laid by British troops – but an average of about thirty-two miles per day being maintained on the 442 miles laid during March, April and May of the following year, at the heels of the retreating enemy. But on the last desperate enemy advance of 1918, when Amiens, St. Pol, and Hazebrouck were threatened, the permanent way situation again became extremely grave. The maintenance of three separate routes for north-south traffic independent of Amiens became imperative, so old tracks were doubled and quadrupled and new ones constructed – a major work which entailed the laying of some 200 miles of track under enemy aircraft fire. In fact, the deviation line avoiding Etaples viaduct had only just been completed when the viaduct was wrecked by bombing. Fortunately, however, as our troops fell back, there was time to withdraw most rolling-stock and engines before the lines were effectively destroyed.

When the Allied counter-offensive commenced in August, 1918, the transport position was completely reversed, for as the Germans withdrew they blew up all bridges and locomotive water-supplies, as well as placing delayed-action mines under the tracks. Damage was also wrought as far back as Namur by burning rolling-stock and blowing up whole trainloads of ammunition, to say nothing of completely

RAILWAYS IN WARTIME



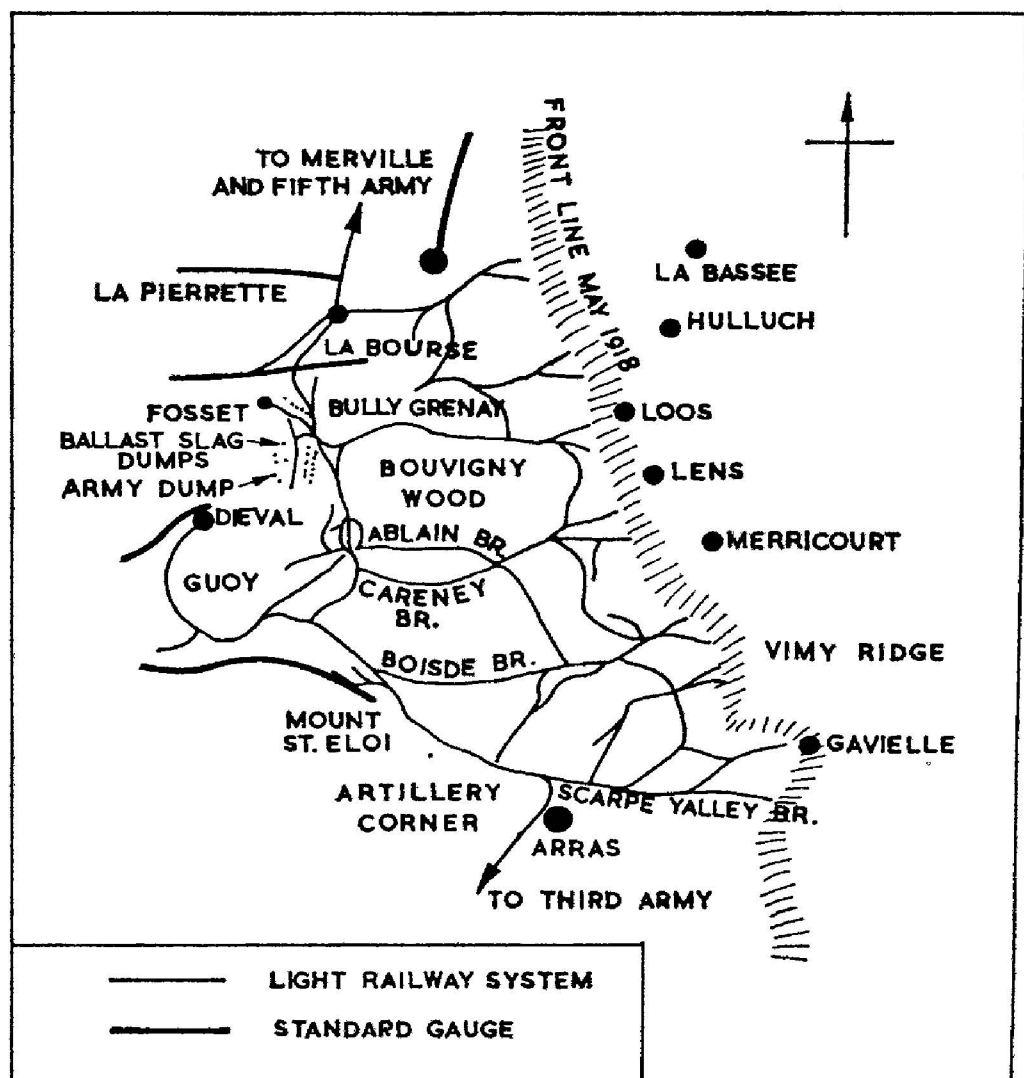
Railways of the Western front in France, World War One (Jan., 1918).

wrecking stations and freight-yards. Some of the worst of this damage was done at Charleroi and Monceau, and, after the enemy had retired, it was found that the railways had been totally destroyed up to a line, Sotteghem-Grammont-Ghislenghein-Jurbise-Mons-Fontaine-Valmont.

During the last quarter of 1918, over 1,100 miles of track¹ were reconstructed and over 100 miles dismantled, and even

¹ During 1918, over 1,340 miles of new track was laid by British and Canadian construction troops, working day and night.

BRITISH RAILWAYS IN FRANCE



First Army light railways in France, World War One (May, 1918).

after the armistice of 11th November, this permanent-way work never ceased, for it was of greater importance than ever to provide for the armies and civilian population by linking up the railways of France and Belgium. Ironically enough, on the same day that the armistice was signed, twenty miles of the Arras-Douai-Valenciennes-Mons line was totally destroyed, together with thirteen bridges totalling a length of 650 ft., yet by working continuously day and night, a single-line was pushed through to Mons in a fortnight and through traffic to the armies recommenced.

RAILWAYS IN WARTIME

With regard to the motive-power position overseas, while at the end of 1916 only sixty-two standard-gauge engines had been received from Britain for army use, during the following year the number was increased to between seven and eight hundred; thirty-two more being available for use and sixty-two awaiting erection from parts sent out from the home country. This latter method was used as it was impossible to ship engines easily before the Richborough train-ferry was opened. At the end of 1918 the total number of locomotives operating on standard-gauge French lines totalled 1,205, exclusive of those captured or hired from French or Belgian railways. The following table shows the motive-power and rolling-stock positions during the last three years of the war:

		<i>31st December</i>	<i>31st December</i>
	1916	1917	1918
Standard-gauge locomotives:			
Imported	62	753	1,205
Hired	198	215	229
Captured	—	—	6
British-built petrol tractors	—	7	8
Wagons (Imported or built from scrap)	3,840	34,845	52,597

With the advent of a more adequate supply of motive-power, a consistently greater proportion of Expeditionary Force trains in France were being handled by the R.O.D., until, by the end of the war it was responsible for over hauling 60 per cent of the British troop trains over the 820 miles of line under their control.¹

Supplementing the standard-gauge railways, which were operated up to within a few miles behind the fighting lines, were the 60-c.m.-gauge 'Decauville' light railways with their 9 lb.-to-the-yard rails upon which 'tramway' traffic was worked by manpower. These lines were not developed to

¹ Mostly on the Nord lines.

any extent until mid-1916, when heavier rails were substituted and it was decided to construct a complete network for the distribution of ammunition and stores from the standard-gauge railheads to gun positions and the actual trenches. Over 1,000 miles of 20-lb.-to-the-yard rail were ordered, with a large number of steam locomotives, petrol tractors, and wagons, and by the end of 1916, ninety-six miles had been laid, which grew to 815 miles a year later, some miles being lost in battle, but about eight hundred miles remaining in use when the armistice was signed. As the Allied armies advanced in 1917-18, whole sections were dismantled and placed in storage in case of future needs.

Motive-power on these vitally important semi-temporary lines consisted mainly of six types of steam tank engines: Hunslet 4-6-0T; Hudson 0-6-0WT; Baldwin 4-6-0T; Barclay 0-6-0WT; and American 2-6-2T; these being supplemented by 20- and 40-h.p. 'Simplex' petrol tractors built by the Motor Rail and Tramcar Co., of Bedford, by the British Westinghouse Co., and by Dick Kerr, Ltd. These latter engines were used mostly in heavily shelled areas and were available in open, 'protected', and armoured types.

Rolling-stock was a rather heterogenous collection of vehicles: open bogie wagons 12 to 17 ft. long; open box wagons 6 to 8 ft. long; well wagons 17 ft. long for ammunition; Bogie tank wagons for water holding 1,500 gallons; together with thousands of odd wagons built overseas and 'contractor's' tip-wagons. There was also a very attractive covered inspection car lettered 'F.A.L.R.' upon which many an important V.I.P. travelled over the First Army sector of the front.

Owing to the constant shelling they received, the lines got in a terrible state – particularly in bad weather, so if a fifteen-wagon train loaded to 10 tons per wagon, dared to go more than about 10 m.p.h., a derailment was a foregone conclusion; though when running light, if the enemy shelling was bad, speeds of anything up to 25 m.p.h. were reached – and no wonder!

Train movements were largely dictated by the exigencies

of the moment. There were no time-tables, save for those relating to large troop movements, neither were there any fixed signals along the lines, which were controlled by telephone, and any number of trains could go in the same direction at the same time from one phone-station to the next. A train crew consisted of driver, fireman and guard, for which latter unfortunate gentleman, no brake-van was provided, he having to ride the headstock of the last vehicle in the train. When on passenger-carrying duties, thirty-five men were considered as the complement for one open bogie wagon – standing, at that!

Generally, the loads carried consisted of shells – and still more shells, ‘elephant’ roofing, and bags of cement for dugout and pill-box construction, iron screw-stakes and barbed wire for defence, timber and pre-cast concrete slabs. Poison-gas cylinders also travelled by the thousands of trainloads and salvaged material from captured trenches made up hundreds of trainloads taken to dumps at the standard-gauge railheads.¹

The Germans also had their light railways behind the lines, the most important being from Lestrem to Fournes, on the La Basse-Lille road, by way of Laventie and over the Aubers Ridge. This portion of the track the enemy did not damage much as he retreated, and the line from La Bassee to Lomme via Harboudine was left intact for four miles of double track with semaphore signals, brick-built signal-boxes, and the large freight-yard at Lomme electrically lighted – surely examples of typical Teuton thoroughness!

Locomotive and rolling-stock overhauls and repairs were carried out at the British Expeditionary Forces shops at St. Étienne du Rouvray (half-way between Rouen and Oissel) alongside the standard-gauge main lines. Operations there commenced in February, 1917; lathes and other machinery began to arrive two months later and by July, the first two imported locomotives had been completely assembled and put into traffic. In 1917, 135 engines were erected and 5

¹ The main marshalling yards of the First Army were located at Gouy.

repaired; in 1918, 97 were erected and 365 repaired; making totals of 232 and 370, respectively. An analysis of the repairs to 400 engines passing through the shops in 1918, reveals that general repairs accounted for 249 jobs; collisions for 87; running accidents and derailments for 42; and burnt-out fireboxes for 22 jobs. During the war, from the opening of the shops, 602 locomotives were serviced and made ready for duty again.

Britain's Railways under World War One Air Attacks

FROM THE time of the first German air-raid on Britain, when, on Christmas Eve, 1914, a lone aeroplane dropped a single bomb in a garden near Dover Castle, until the last raid of 17th July, 1918, there were 108 aircraft raids made on Great Britain.

Though the strength of our defensive air forces was at a pitifully low ebb, and though it was obvious that the enemy would attempt to destroy and disorganize strategic railway stations, tracks, piers and harbours, no arrangements were made by the Government to direct the railway companies as to the precautionary measures they were to adopt until the war had been under way for some three months. By then it had been found by our own pilots that lighted trains on their way to London made excellent guides to that city, accordingly, the Admiralty made the suggestion to the Railway Executive that notices should be pasted in each coach compartment asking passengers to keep the blinds drawn at night. This was a request, not a command, and was thus often ignored.

Then came the Dover raid of 24th December, 1914, and another one the following day over Erith, Kent, followed a month later by the airship raid of the night of 19th-20th January, 1915, when the Zeppelins made their first appearance and dropped bombs on Norfolk. But the Great Eastern Company were not caught unawares, for, on the rational

¹ During the war, 2 raids were made in 1914; 24 in 1915; 38 in 1916; 33 in 1917; and 11 in 1918.

BRITAIN'S RAILWAYS UNDER AIR ATTACKS

assumption that the enemy aircraft would assuredly take the shortest route to London over East Anglia, they had forestalled Governmental direction almost concurrently with the outbreak of war and taken their own precautions against air-raids and resultant disorganization of the railway organization.

Among the prudent defensive measures adopted by the company was the one instructing station staffs to watch and listen for hostile aircraft and instantly telegraph the information to the Head Office at Liverpool Street Station, London, whence it was passed on by telephone to the company's Superintendent of Operation and also to the General Headquarters of the Home Forces. Soon after the air-raids began in real earnest, a Military Office was instituted at Liverpool Street Station where the progress of raiding aircraft anywhere on the Great Eastern system was marked on a cork-covered map-board with coloured pins.

The Great Eastern company also took the lead in designing signal-light screening hoods and fitting them to all their signals near the coast and facing the sea. So effective was this arrangement that it was recommended for adoption by other companies by the Railway Executive Committee at their conference of 2nd April, 1916.

This conference, incidentally, was held to try and straighten out a multiplicity of complications and questions which had arisen as a result of complete lack of uniformity in the anti-air-raid schemes of the various railway companies – particularly the Great Eastern, the North Eastern, and the South Eastern and Chatham. Furthermore, by the middle of August, 1915, there had been fourteen Zeppelin raids in which nearly a hundred persons had been killed and twice as many injured; and as result of this 'black list', the Admiralty, Metropolitan Police, and Commissioner of Works decided to discontinue the existing air-raid warning system and also not to pass on to the railway companies any warning which came from the Admiralty or any other official source.

Then, on 17th August, 1915, came the Zeppelin raid over

Essex, Kent, and London, during which all station and train lights (with the exception of engine headlights, train tail-lights, and fixed signal lights) were extinguished for two and a quarter hours over the entire systems of the Great Eastern and South Eastern and Chatham railways, which jointly comprised 1,731 miles of lines. This precaution was not, however, considered adequate by the governmental authorities, which almost immediately suggested that during the next raid all traffic on all lines converging on London from the coast should be stopped – trains actually in motion pulling up where they stood and remaining there until the raid was over.

This proposal was viewed by the Railway Executive Committee with some dismay, because they knew full well that any stopping of traffic on the two eastern companies' lines would have repercussions on other lines well beyond the air-raid danger zone – a state of affairs which took place on several occasions during a succession of raids during the Spring of 1916.

For example, during the Midland Counties raid of 31st January traffic was entirely 'frozen' in London for over two hours, with thousands of would-be passengers waiting under the useless shelter of glass roofs for the trains to start running again. Indeed, some idea of the great confusion caused by this scheme can be gained by appreciating that, during this particular raid – in which the only railway damage caused was a small fire at Dudley – trains of the Great Western Railway alone were delayed in aggregate no less than 845 hours.

But Governmental lethargy was rudely disturbed on 19th March, 1916, when in a comparatively minor aeroplane raid on Dover and Ramsgate, damage was done to naval and military equipment, and the latter authorities immediately proceeded to take precautionary measures far in excess of anything needed by the 'incident', which, in reality, only involved the Sheerness area. Their precautions caused more railway chaos than the German raiders themselves did, for all lights were ordered to be extinguished and all trains

stopped on the London, Brighton and South Coast, the South Eastern and Chatham, the Great Eastern, and the London, Tilbury and Southend railways. The General Headquarters, Home Forces order also held up all trains running into or out of London on the Great Western, London and North Western, London and South Western, Midland, Great Central, Great Northern, Metropolitan, and Metropolitan-District railways. Fortunately, it was a Sunday night, and the inconvenience and delays caused by the 'freeze-up' were not so serious as they might have been. That such a system was wildly defective was also clearly shown ten days later, when during a Zeppelin raid over Essex, Lincolnshire and Suffolk, urgent instructions issued by the Home Forces Headquarters resulted in 'lights out' and complete stoppage of traffic in places as far away from East Anglia as Portsmouth, Oxford and Gloucester. Timetables ceased to mean anything to either railway staff or the public, trains arriving and departing up to eight hours late. Wholesale cancellations resulted, even of the all-important freight trains, and even 'ocean specials' were not immune from the chaotic conditions, two London-bound ones being held up at a tiny station on the L.S.W.R. while bombs were falling 200 miles away.

Such was the state of affairs existing when the Railway Executive, the War Office, the Royal Flying Corps, and the General Headquarters, Home Forces representatives met in conference on 2nd April, 1916, when it was decided to reduce the speed of, not stop, trains during an air-raid. England, Wales, and the southern part of Scotland were divided into fifty-four districts to which General Warning Control could, in the event of a raid, send four prescribed messages: (1) air-raid warning only (with district number); (2) take air-raid action (with district number); (3) resume normal working (which cancelled No. 2); and (4) all clear (which cancelled Nos. 1, 2, and 3).¹ This scheme was put into action in May, 1916, and as future raids were to amply prove, it

¹ Later, these messages were changed to code-words: (1) Green; (2) Red; (3) Yellow; (4) White.

not only gave the railways the earliest possible warning, but by localizing the area or areas of imminent danger and consequent railway immobilization, allowed the railway authorities in non-affected areas to pass on vital information to General Headquarters, Home Forces by way of the Railway Executive Offices in London. Everybody responsible was acting in consort; vital seconds were often saved; and thus the railways were largely instrumental in securing for the raiders the reception they deserved from our own aeroplanes and anti-aircraft guns. Indeed, so good was the system that the year in which it was instituted witnessed the defeat of the Zeppelins as the enemy's major air striking force.

In the raid of 2nd-3rd September, 1916, a Zeppelin was shot down at Cuffley, north of London by Lieut. W. Leefe Robinson; two more were brought down in Essex twenty days later; and another was destroyed by Lieut. Tempest at Potters Bar on the night of 1st-2nd October, 1916. And it is well to remember that the 'Extraordinarily powerful defences' referred to by the Germans in their official reports on these raids, would not have been so devastatingly effective had it not been for the incredible integration of vital information attainable by the whole-hearted co-operation of every member of the widely-scattered, yet closely united staffs of the railways of Great Britain.

In May, 1917, the Germans started daylight aeroplane raids, of which eight had been made by the end of August and a further eight during September. Then, the following month they sent their ten-Zeppelin 'Armada', which crossed the coastline near Flamborough Head, in Yorkshire and resulted in 'warnings' being sent to places as far as Aberystwyth and South Hampshire. The first warning of the 'Armada's' approach was given by Great Eastern Railway's Walsingham Station. Many bombs were dropped but little damage done and the airship was gradually discarded as a fighting machine in favour of aeroplanes, some of the raids of which caused heavy casualties and railway damage during the latter half of 1917 and until 17th June the following year.

For the first eighteen months of the war the arrangements for the defence of London were pitifully inadequate, the War Office not assuming general control and direction of the city's anti-aircraft defences until February, 1916. Liverpool Street and Broad Street Stations were bombed on the night of 8th September, 1915, when the suburban and main lines at the former station received direct hits and the main signal-box had a narrow escape from destruction. As it was, the damage was only slight, sufficient repairs being effected to allow of the resumption of the full train service by noon the following day. Of the nine London air-raids in which Broad Street Station suffered damage, the worst was that already mentioned, during which Camden Town, Canonbury, Dalston, Bromley-by-Bow and Haggerston Stations were also hit.

The following year, 1917, Liverpool Street Station again became the objective of the German raiders – this time during daylight hours – with much more damage resulting. A train was wrecked alongside No. 9 platform as well as two coaches in the dock between platforms Nos. 9 and 8. It was something of a fiasco, for the Great Eastern Company, for out of fifty-two casualties thirty-three were members of the staff, of which ten were killed.

During 1917, Bishopsgate Goods, and Stratford Stations were damaged by bombs, blast and unexploded shells from our own anti-aircraft guns, as was the South Eastern and Chatham Company's Cannon Street Station, where a bomb fell on the permanent way immediately outside No. 2 signal-box, but did not explode. The station was fortunate to get off with hundreds of broken glass-panes in its huge roof. On the L.N.W.R. too, September, 1917, saw the dropping of bombs on Willesden, Harlesden, Haydon Square Goods, Queen's Park, and Worship Street Goods Stations; but without causing any serious dislocation in traffic.

Waterloo Station (L.S.W.R.), which had a narrow escape during an aeroplane raid on 29th September, 1917, suffered more broken glass during three consecutive raids on 16th, 17th, and 18th February the following year. On the L.B. &

S.C.R., Victoria Station had a narrow escape when a bomb fell on Grosvenor Road Bridge on 1st October, 1917, damaging 100 ft. of the bridge and setting fire to the gas from three large shattered gas-mains. Streatham Common Station suffered in a Zeppelin raid on the night of 23rd September, 1916, and New Cross a year and two days later.

On the Midland Railway, in the London area, the most serious air-raid incident occurred on the night of 17th February, 1918, when five bombs dropped on St. Pancras Station, killing twenty and injuring thirty-three people who were sheltering under the roadway entrance arch. The hotel building was considerably damaged, but once again, the rail traffic of the station was not interrupted.

The first railway to suffer from the deliberate attention of the German raiders was the London, Tilbury and Southend Railway,¹ on the lines of which, between Stanford-le-Hope and Low Street Stations, a bomb was dropped on Christmas Day, 1914. The result was trivial, a sleeper being split and two others scorched. Apart from a solitary incendiary bomb on 10th May, 1915, the L.T. & S.R. suffered no further material damage until 1st April, 1916, when Rainham Station (Essex) received a single bomb. Thereafter, until the end of the war, Upton, Bromley (Essex), Campbell Road Junction (London), Abbey Mills (London), Southend-on-Sea, Westcliffe-on-Sea, Barking, Plaistow, Hornchurch, and Little Ilford received slight damage – mainly to signal-posts, signal-wires, telephone wires, cable conduits and telegraph poles; all of which were quickly repaired without seriously discommoding traffic.

On the Great Northern Railway, in the London area, minor damage occurred at Hornsey, King's Cross, Finsbury Park and Totteridge Stations; in the case of the Great Central Railway, however, no material damage was experienced in the metropolis. Indeed, it may be said that the three railways which suffered most during the war were the Great Eastern, North London, and London, Tilbury and Southend section of the Midland railways; the greatest damage occurring in

¹ Taken over by the Midland Railway, August, 1912.

the Stratford-Poplar-Dalston-Blackwall-Liverpool Street areas. On these railways, particularly on the North London and Great Eastern, air-raid destruction and damage to standing rolling-stock was proportionately heavy; thirty-three vehicles suffering out of a total of almost 10,000 running or standing in the areas mentioned.

With regard to railway air-raid damage in the provinces, this was mostly of a trivial or very moderately damaging nature. On the Great Eastern Railway, Lowestoft, Yarmouth, Stowmarket, Felixstowe, Southend, Parkeston, Harwich, Fairlop, Bury St. Edmunds and Rayleigh received unwelcome visitations. On the South Eastern and Chatham, Deal, Margate, Ramsgate, Sheerness, Folkestone and Dover suffered most, 370 bombs falling on the latter town during the war. On the London and North Western Railway, bombs were dropped on Wednesbury, Tipton, Northampton and Bedford, while on the Great Western Railway, a fire in Dudley goods-shed was all the railway damage resulting from 350 bombs dropped by four Zeppelins which wandered at will for seven hours over the Midland Counties of England. Indeed, the Dudley incident was the only instance of air-raid damage to Great Western property throughout the entire period of hostilities.

On the London and South Western Railway, Guildford and Kew Bridge Stations were damaged on 13th October, 1915, and 29th January, 1918, respectively, whilst on the London, Brighton and South Coast Railway, no damage whatever to rolling or fixed stock was done by the raiders, outside the Metropolitan Area. On the Midland Railway, air-raid damage to permanent way, signals, and electrical gear took place at Bennerley Junction (Ilkeston), Trowell (Notts.), Burton-on-Trent, Nottingham, Weldon and Bedford. Portions of the roof of the Derby carriage and wagon shops were destroyed, together with not inconsiderable damage to other parts of the works; but in spite of the material damage to Midland Railway property, very little interruption to railway working was caused over the whole system. Freedom from air-raid damage in the London area

did not free the Great Central Railway from suffering in the provinces. Victoria Station, Nottingham, received a direct hit by a Zeppelin bomb, and bombs were also dropped on Grimsby, Immingham, Frodingham, and Sheffield. On the North Eastern Railway, Hartlepool, Scarborough, Seaham and Whitby suffered sea bombardments, while Hull received thirteen, and York three air-raids during the war; Hull Paragon Station receiving a direct hit on 5th March, 1916.

The decision of the Home Office to allow trains to run at very reduced speed during air-raids was responsible for engine drivers having many remarkable experiences. In one instance, the driver of the 4.30 p.m. Charing Cross-Folkestone express, spotting a Zeppelin and some aeroplanes ahead, slowed down while bombs dropped in the fields around his train at Smeeth. Then slowly drifting along to Sandling and hearing bombs bursting in Folkestone, he steamed gently into the tunnel, and there he remained with his train and passengers in safety until the danger was past.

During the 108 air-raids which took place over Britain during the war, 24 railwaymen were killed while on duty and a further 97 injured, all these casualties taking place in eleven companies: Great Eastern (38), Midland (37), Great Northern (19), London and North Western (11), South Eastern and Chatham (5), Great Central (4), North Eastern (2), Great Western (2), East London (1), Lancashire and Yorkshire (1), London and South Western (1).¹

¹ 66,356 men were called to the colours in 1914 and by the end of the war 30 per cent of the staff had enlisted, and had largely been replaced by women.

Special Wartime Traffic in Great Britain

EMERGENCY RAIL traffic schemes in Britain came into operation at six o'clock on the evening of 16th November, 1914, as a result of expectations that the Germans would make an attempt at invading our eastern coasts. Eight hundred and forty special trains were suddenly required to be made up and held in readiness for the conveyance of troops in force to camps to be located on the east coast from points as far away as Wales.

Within a matter of hours the trains had been marshalled from stock of suitable dimensions to allow it to pass through bridges and tunnels of all the standard-gauge systems in the country, but though the expected invasion never materialized, the trains were stabled at various stations all over the country, ready for rushing off when and where required. Eventually, in view of Governmental lack of knowledge as to where an invasion – if any – was likely, it was decided to amass seventy trains of five different standard formations at a 'camp' located almost in the centre of England, from which they could be dispatched at a moment's notice in emergency.

Later, this scheme was modified, Great Britain being divided into seven operational, or forward sectors, and two rearward sectors, with a troop regulating station to each sector at its most advanced point. Standard routes and specially integrated time-tables were drawn up, of which the important features were flexibility and simplicity, and the efficiency of the scheme was tried out by the military authorities in August, 1916, and in February, the following year, on both of which occasions it proved completely

successful. Fortunately, however, the looked-for invasion never materialized and the arrangements in which the railways of Britain were to take such an important part were never put to the test of actual war. Had invasion, however, taken place, all railway plans were in hand to cope with the emergency. Military hospitals would have been evacuated by special ambulance trains running east to west; railway telegraphs would have been destroyed along the coastline from Dungeness to Scotland; the civilian population of east coast towns would have been evacuated; and special arrangements made in respect of Dover and Folkestone.

But now to an emergency traffic scheme which was actually put into practice during World War One – the running of the Euston–Thurso ‘Daily Naval Special’ to cope with the transport of naval personnel to and from London and the south, to and from the bases of the British Fleet on the northern and eastern shores of Scotland and on the Orkney Islands.

With its through journey of 717 miles, this fourteen-coach train, which ran in each direction every weekday, constituted the longest-distance through train ever to be regularly booked in Britain, and during the two years it ran (from 15th February, 1917, until 30th April, 1919), it carried over half a million passengers – almost exclusively naval men.

Considered impracticable at first, for three months the train was routed from Carlisle to Perth over the Caledonian Railway, but as from 21st May, 1917, the North British Railway’s ‘Waverley’ route was substituted, the normal summertime journey taking 21 hours 30 minutes and 22 hours 20 minutes, in the northerly and southerly directions, respectively. During winter months the trains left their departure points three hours earlier.

Naval personnel from Harwich, Dover, Chatham, Brighton, Portsmouth and Southampton were conveyed to London by special trains to rendezvous at Euston; men from Plymouth, Devonport, Exeter, Bristol, Cardiff, Barry, Pembroke and Milford Haven, and Birkenhead, joined the

Euston-Thurso Special at Crewe; men from Liverpool connected it at Preston, and those from Barrow and Stranraer at Carlisle. Personnel from Hull, Newcastle-on-Tyne and Berwick travelled north to join the 'Daily Naval Special' at Edinburgh, and those from the Kyle of Lochalsh picked it up at Dingwall.

Composed entirely of corridor coaches the trains boasted sleeping accommodation for officers and iron-barred, locked compartments for naval prisoners who had overstayed their leave or committed a breach of discipline. There were, however, no feeding arrangements on the trains, light refreshments being served by voluntary workers at stations at which stops were made, viz.: Crewe, Preston, Carlisle, Hawick, Edinburgh, Inverkeithing, Perth (General), Inverness, Alness, and Invergordon.

With its average quota of about three hundred passengers, the train sometimes ran into difficulties during the winter season, when the problem was not that of getting to Thurso on time, but of even arriving there at all! Even without the snowstorms and gales for which the Highland Railway line between Perth and Inverness is well known, the crossing of the 1,484-ft.-high Druimuachdar Summit, in the bleak and desolate country between Dalwhinnie and Dalnaspidal, in itself constituted a challenge to timekeeping. But the fate of the 'Daily Naval Special' which left Euston on 12th January, 1918, shows clearly the incredible conditions that a succession of gales and blizzards can produce.

On this particular occasion, the snow-plough sent on ahead of the Special became stuck in a 10-ft. snowdrift ten miles south of Thurso, and then the double-headed Special itself ground to a halt and got frozen up. With no dining-car on the train, food began to run short, and as some engines carrying baskets of bread on their tenders failed to get through, the 300 Naval men, nursing sisters, and members of the Women's Royal Naval Service, left the train in a blizzard and tramped ten miles across country in the snow to Thurso!

To keep the line clear was vital, so later in the day a

triple-headed train left Inverness for the scene of the blockage with a relief party of 100 men, but so bad was the weather that even the snow-plough-fitted engines became buried, and it was over a week before the Naval Specials could get nearer to Thurso than Invergordon. None the less, apart from such unusual delays, the Specials covered their 700-mile journeys with excellent timekeeping – a feature due in no small measure to the close co-operation between the Highland, London and North Western, and North British Railways. Credit is also due to the Great Western Railway, which enabled the run from Plymouth to Thurso (834 miles) to be done in 28 hours 10 minutes, with one change of coach – at Crewe.

Incidentally, it is well worthy of placing on record that the little Highland Railway, with its 485 miles of track,¹ bore a proportionately heavier load during World War One than any other railway company in Britain. Traversing as it does the most rugged, mountainous, bleak and desolate region in the British Isles, the line was essentially a 'summer' railway which depended for its main revenue on tourist traffic, yet within a few months after the outbreak of hostilities, it was suddenly called upon to furnish exceptional transport services for the British Navy and for national defence. Yet the company never failed in its well-nigh superhuman task, over 1,000 special trains being run during the war, including those conveying King George V and Lord French to Invergordon Naval Base and Dockyard.

The village of Invergordon with its tiny wayside station grew up as the war progressed, until the traffic became prodigious, traffic between Russia and Britain even being handled. It is in this latter respect that the famous 'Russian troop mystery', of the 1917s was born, it being mooted that 50,000 Russian soldiers were conveyed by special trains from Scotland to an unknown destination – and with the train blinds drawn!

Actually, what happened was that during October, 1917, 3,000-odd Russian soldiers arrived at Invergordon and were

¹ Of this total 411 miles were single track.

thence dispatched south in seven special trains to camp at Winchester, on their way to France. Three hundred Russian refugees and a quantity of bullion and specie, followed in another special, and other specials conveying troops, refugees, and mails from Eastern Europe ran southwards from Invergordon in July, 1918, and September, 1919. Bullion from the Bank of England was dispatched from Invergordon overseas several times during the war, trains of special bullion vans being used for the journey to the north.

Special trains were also needed for the transport of stupendous quantities of steel cables, anchors, and timber baulks required for the construction of the anti-submarine-boom defences at Scapa Flow; whilst to cope with the coal traffic brought about by the increase in sea-going risks to coasting vessels, thousands of coal specials were run, the wagons being borrowed from various Scottish and English railway companies. The South Eastern and Chatham, for example, loaning 150 for use on the Kyle of Lochalsh line, on which the excessive gradients and curves limited the length of a goods train to twelve wagons loaded with mines brought to the Kyle by American ships. Four locomotives for working the heavily-graded line were also borrowed from the London and South Western Railway.

The Caledonian Railway's initiation into emergency special train-running took place within a few days of the outbreak of hostilities, 342 military and naval specials being made-up and handled during the first month of the war, during which the transport of thousands of guns – from 18-in. 100-tonners to 8 $\frac{3}{4}$ -pounders – and the carriage of explosives to the eighteen explosives, shell and cartridge factories located on the system, also required the running of a continuous stream of special trains. Some of these trains were composed entirely of ether tankers, gunpowder vans, cordite vans, and cordite-paste vans. The conveyance of the latter highly dangerous explosive constituted such a grave risk that special steam-heated, dustproof vans in which an

even temperature was maintained, had to be used for its transport in trains of not more than seven vehicles.¹

On all the other railways of the country the story of special traffic is the same, everything from chewing-gum for members of the United States Naval Forces, to 190-ton guns and thousands of 35-ton 'tanks' making up the heterogeneous loading of the tens of thousands of special trains run by the various companies. Some idea of the prodigious amount of such traffic handled can be gained from the following table, which shows the number of 'specials' run by the various railways during the war:

S.E. & C.R.	102,155	(Including 283 'Extra Specials.')	*
L.S.W.R.	58,859		
L.B.S.C.R.	53,376		
G.W.R.	33,615		
N.E.R.	24,172		
L.N.W.R.	33,470	(Including 10,000 out-of-gauge loads).	
G.E.R.	24,000		
L. & Y.R.	10,564		

* Known as 'Imperial "A"' specials, these trains were held in readiness at Charing Cross Station for instant conveyance of Very Important Persons to Folkestone or Dover, *en route* for France. (The 76-mile journey to Dover was done in 80 minutes).

Different railway companies had different problems to meet by way of the provision of special trains, it not being merely the transport of hundreds of thousands of soldiers, and sailors. Horse transport, for example, presented quite a problem, indeed, on the London and North Western alone, over a quarter of a million were disembarked at Liverpool alone, and over double that number handled during the war over the company's entire system.

¹ In spite of the prodigious amount of explosives handled by the railways of Britain during the war (nearly 3,000,000 tons by the L.B.S.C.R. alone), not a single incident involving personal injury took place, and only very slight damage to railway property. The collision between two ammunition trains in Redstone tunnel (L.B.S.C.R.) failed to result in an explosion though blocking the tunnel for two days.

L.N.W.R. freight trains travelled a total of almost a hundred million miles during the war, carrying 'tanks' and sea-mines from Birmingham; $1\frac{1}{2}$ million tons of 'T.N.T.' and gun-cotton from Queensferry, near Chester; over a million tons of salt from Middlewich; 56 million yards of Service uniform cloth from Huddersfield; $10\frac{3}{4}$ million filled hand-grenades from the tiny station of Fenay Bridge and Lepton, in West Yorkshire; and well over a million tons of picric acid, 'T.N.T.' and poison-gas from pre-war dye-works at Deighton, in the same area. Half a million tons of limestone from the Peak District and 15,000 tons of barytes from Longcliffe; 1,600 tons of ration-books from Harrow and 5,000 tons of Government stationery from Wolverton; over a million cylinders of poison-gas, tear-gas, hydrogen gas, and sulphur chloride from Runcorn; and over 2,000 tons of army boots in 377 wagons from London to Liverpool, *en route* for Russia and Serbia; 55,000 tons of motor tyres were taken to and from the R.A.S.C. tyre depot at the L.N.W.R.'s Camden Station.

And so it was with all the railways of the country during the war, special passenger and freight traffic assuming phenomenal proportions due to the immense production from industrial establishments. But the focal point of all railway activities was undoubtedly the systems of the South Eastern and Chatham, the London, Brighton and South Coast, and the London and South Western Railways; this being due to the fact that they included the ports nearest to the Western Front – Dover, Richborough, Folkestone, Newhaven, Southampton and Plymouth; together with many smaller harbours which were used in emergency.

To cope with the prodigious and almost instantaneous expansion of traffic on the South Eastern and Chatham Railway, improvised traffic control systems were set up at London Bridge Station in October, 1914, and at Dartford in February, the following year, whilst regulators were stationed at various points to deal with the handling of the hundreds of trains from other companies' systems. Existing

sorting sidings soon became blocked with loaded and empty wagons, which had to be stabled on one road of branch-lines, the passenger traffic on which had to be worked single-line. Hither Green Sidings being hopelessly inadequate, auxiliary marshalling yards were laid at Chiselhurst, Eltham and Grove Park, while dozens of new siding roads were laid at Plumstead and in the area of Woolwich Arsenal, whence tens of thousands of tons of freight for the British Expeditionary Force were dispatched during the duration of the war. In the same locality, at Well Hall, the building of the 1,000-house Government estate to house the 70,000 people employed at the Arsenal, entailed the fitting in of trains carrying over twenty-five million bricks from Fletton, on the Great Northern Railway.

So great was the pressure of freight traffic on a railway primarily planned as a passenger line with big holiday traffic, that even Cannon Street Station was converted into an auxiliary freight depot to still further facilitate the interchange of traffic between north and south. On 1st May, 1918, the station was closed to passenger traffic from 11.0 a.m. until 4.0 p.m. from Monday to Friday, and from 3.0 p.m. on Saturdays until midnight on Sundays, during which hours freight-train crews and engines were exchanged with but little delay. Nearly 6,000 freight trains were worked under this arrangement before normal working was resumed in November, 1918.

The disproportionate amount of goods traffic on the lines of the S.E. & C.R. inevitably resulted in a shortage of goods guards which even the reduction in passenger services made on 1st January, 1917, did not materially make good. Moreover, the company was short of over 5,000 men, representing nearly a quarter of its staff, on the outbreak of the war. Goods shunters, too, were at a premium, and even porters, lamp men, ticket collectors and guards were pressed into service to do this vital job. Shortage of signalmen was largely met by the introduction of twelve-hour duties and the reduction of the minimum age limit from twenty to eighteen years for a relief signalman. Closing of many little used

signal-boxes also effected a saving of signalmen, as did the complete closure of eighteen minor branch-lines.¹

It was the exceptional increase in the South Eastern company's freight traffic which brought about the creation of the new cross-Channel port of Richborough, which was constructed between Ramsgate and Sandwich – near to Minster Junction, in Pegwell Bay. At first the port was a small one designed to handle cross-Channel barge traffic without complicating the already intense freight traffic being shipped from Dover, but by the middle of 1916, it had developed into a regular depot from which stores and even personnel could be shipped overseas; and by early in 1917, steel barges were being built there and railway wagons from France being repaired and re-shipped to Calais and Dunkirk. Much war salvage from France was also dealt with by the port.

It was largely due to the imagination and practical knowledge of two British Railway Managers – Sir Guy Granet of the Midland Railway and Sir Sam Fay of the Great Central Railway – that Richborough was adopted as the site for the English terminal of the cross-Channel train-ferry service, to Calais and Dunkirk on 10th February, 1918. Three steamers, each of 3,654 tons displacement, had four 270-ft.-long tracks on their train-deck, capable of accommodating fifty-four ordinary 10-ton wagons. Between its opening date and the close of 1918, the port handled over a quarter of a million tons of freight, including armoured lorries and cars, locomotives of standard and 60-cm. gauge, 'tanks', and thousands of railway wagons. After the war the port degenerated into a dump for salvage brought from the battlefields of France.

An immense amount of munitions and war stores were

¹ Appledore–Lydd, Becken–Norwood, Beckenham–Crystal Palace, Catford Loop, Canterbury–Whitstable, Crowhurst–Bexhill, Dunton Green–Westerham, Elham Valley Line, Elmers End–Hayes, Gravesend (West Street), Holborn (Low Level)–Moorgate Street, Nunhead–Crystal Palace, Nunhead–Greenwich Park, Otford–Sevenoaks (Tubs Hill), Paddock Wood–Hawkhurst, Sandling Junction–Sandgate, and Woodside–Selsdon Road.

also shipped from the London, Brighton and South Coast Railway port of Newhaven, which, with its staff of 2,500, was taken over by the Government in August, 1914, and not released from restrictions until 2nd December, 1918.¹ Littlehampton, too, was used for shipment abroad of munitions and food abroad, brought by special trains from all parts of the country.

Southampton, on the L.S.W.R. was early converted into the Government's 'No. 1 Military Embarkation Port', the entire dock area being closed to civilian traffic on the outbreak of war. The dispatch of the first British Expeditionary Force has already been noted, but as the war progressed, the port was called upon to provide special trains for handling incoming Canadian and United States troops, the latter also arriving at Barry, Newport (Mon.), Cardiff, Avonmouth, Liverpool, Holyhead, Glasgow and Plymouth. Those landing at Southampton were conveyed by 1,600 special trains to camps at Winchester, Romsey, Bordon, Bulford, Wareham and Fovant, whilst those landing at other ports were frequently brought south by special trains to meet up at the same or other camps, of which there were no fewer than 176 served by the L.S.W.R.

The setting up of scores of wartime depots, dumps, and factories in remote country districts necessitated the running of special workmen's trains and an increase in the passenger-handling facilities of the stations concerned. Woolston, Holton Heath, Bideford, Oxshott, Rowland's Castle, and several ammunition depots on the Cattewater (Plymouth) branch are examples of special constructions or additions being made to meet wartime conditions. New and extensive sidings were also laid out at Eastleigh, Netley, Bursledon, Stockbridge, and many other stations to the extent of many miles; whilst at Wool, a special loading-bank and sidings were constructed for dealing with 'tanks'.

In the 59,000 special trains run during the war by the

¹ Six million tons of freight was shipped from Newhaven during the war, including nearly half that weight of explosives; nearly 20,000 special trains being used to work the traffic in and outward alone.

company, some 20 million officers and men were transported, together with $1\frac{1}{2}$ million horses, and over 4,000 ammunition trains composed of 171,000 wagons of shells and explosives. Over 10,000 ambulance trains, carrying nearly two million invalids and attendants were also handled by the company.

It is not generally known that a train ferry service similar to that operating at Richborough Port, was brought into use at Southampton five days before the signing of the Armistice, with Cherbourg as the French port contacted. A train ferry had already been in use from Southampton to Dieppe as from February, 1918. Alterations at the Town Quay, Poole Harbour, in the event of the channel ports being captured by the enemy during the grave military situation existing in June, 1918, were rendered unnecessary by the defeat of the Germans and the passing of the contemplated emergency.

Wartime Railways in Egypt, Mesopotamia, Palestine, Macedonia and Central Africa

BY THE time World War One broke out, the long-cherished Germano-Turkish dream of a railway from Berlin to Baghdad via Constantinople (Istamboul), was rapidly becoming a reality. A line was being laid from the Turkish railway system at Bulgurlu, to Nisibin, in Upper Mesopotamia – a point 130 miles north-west of Mosul, and another section had been constructed from Baghdad for seventy miles to Samara and Tekrit, on the River Tigris to link up with the Nisibin section; thus leaving a gap between the two sections of some 250 miles.

After the fall of Kut-el-Amara, with the surrender of Major-General Sir Charles Townsend, on 30th April, 1916, British prisoners captured by the Turks were occupied on the Nisibin section and in the difficult terrain in the Taurus and Amanus mountains, where they were engaged on tunnelling until the cessation of hostilities in 1918.

Before 1915, then, there were only seventy miles of railway in Lower Mesopotamia – the line from Baghdad to Tekrit, and when, on 11th March, 1917, General Sir Stanley Maude captured the former town, several Cassel-built German locomotives and much freight rolling-stock was rounded up on the isolated section of line; three of the engines, however, having previously been wrecked by the Turks.

By July, 1919, the British Forces had laid about seven hundred and fifty miles of strategic standard and narrow-gauge lines in the area, the permanent way materials and rolling-stock for which were supplied by India. The first

two sections to be constructed after the occupation were from Basran to Nasariyah, on the River Euphrates, via Zubier, and from Basran to Amara, on the River Tigris, via Qurnah. Later came lines from Kut to Baghdad, and Baghdad to Hillah, on the Euphrates, via Babylon; both of which lines opened up rich agricultural country. Other lines were laid from Baghdad to Dhibban, on the Euphrates, via Feluja, and another from Baghdad to Khanikin, on the Persian border, by way of a new bridge over the Diala River. The former of these lines was constructed for supplying troops occupying the Middle Euphrates Basin.

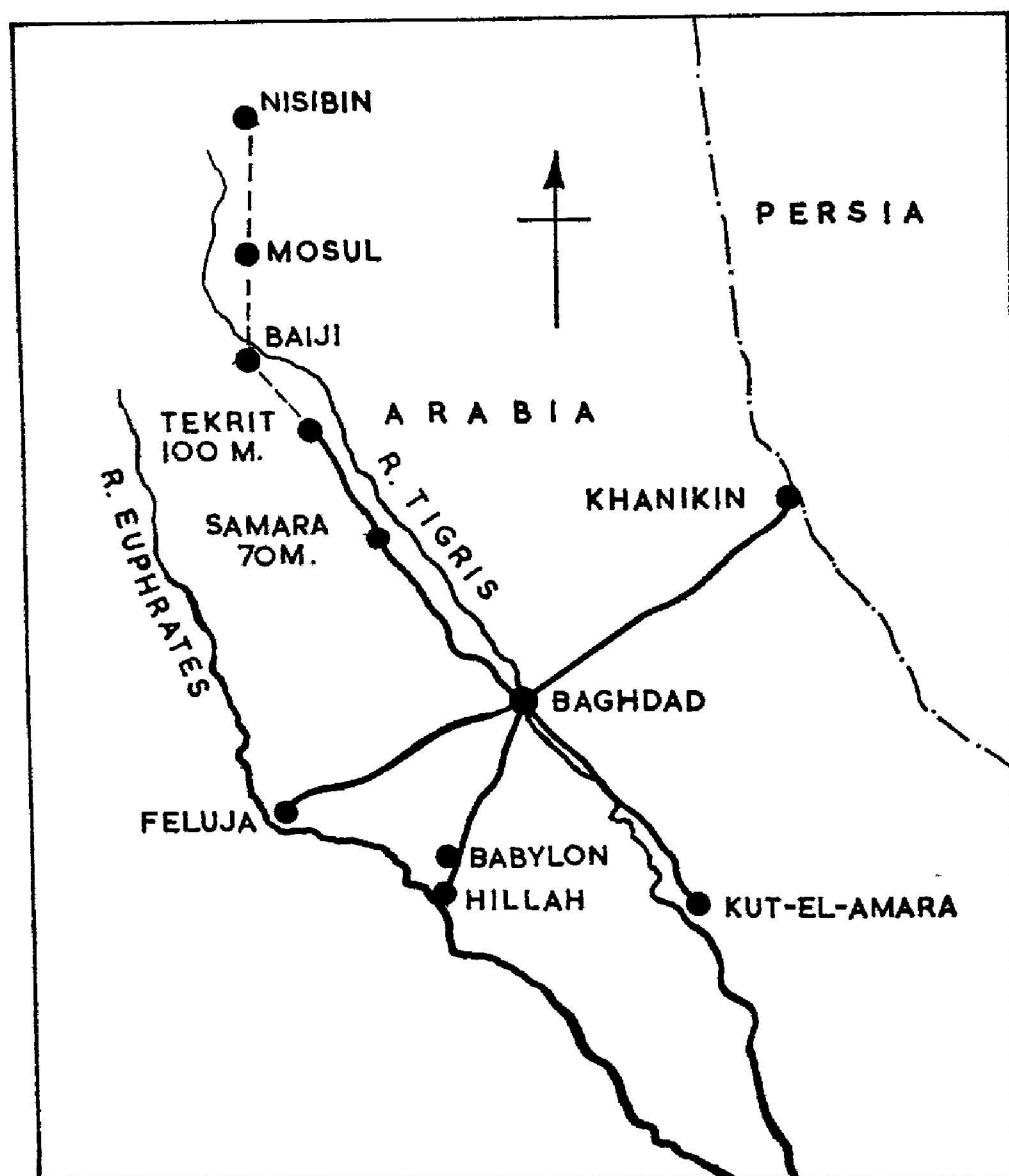
The line from Baghdad to Basrah crossed the Euphrates near Museyib and then traversed the plain of that river by way of Kerbela and Ur of the Chaldees. Incidentally, the development of the port of Basrah was one of the most noteworthy railway features of the Mesopotamian campaign, for during the period from July, 1917, until March, 1920, no less than two and a quarter million tons of stores were unloaded from over 1,600 ships.¹

By 1920, the Baghdad-Nisibin section had been pushed on beyond Tekrit to Baiji, eighty miles south of Moseul, on the Tigris - 150 miles from Baghdad, and over this completed section, not only freight, but passenger traffic was carried, in iron cattle-trucks with galvanized roofs, or in open wagons, in which passengers either roasted or froze, according to the weather and time of day! Civilian passengers were accepted upon a fare-paying basis.

Strangely enough, the construction of these railways was instigated by the fall of Kut-el-Amara, for just as Lord Kitchener had avenged General Gordon's death by driving a railway towards Khartoum, so did General Maude's engineers avenge General Townsend's surrender by pushing a railway towards Baghdad. The courage and determination of the troops responsible for this railway of victory along the banks of the Tigris, resulted in the speed of its construction

¹ The railways constructed during the campaign were made over to the Civil Authorities in 1920, becoming the property of the Iraqi Government in 1936.

RAILWAYS IN WARTIME



Railways of the Mesopotamian Campaign during World War One.

being unparalleled in the annals of overseas wartime railway building.

There was much preparatory work. First, a great embankment was thrown up to hold back the floods for which the river was famous. These extended from Magil to Shaiba, with a sandbagged dyke branching off to Basrah. Then, after the line had been laid, not only were deep-water wharves constructed at Basrah, but waterworks and railway depots begun to appear where before was only bare desert.

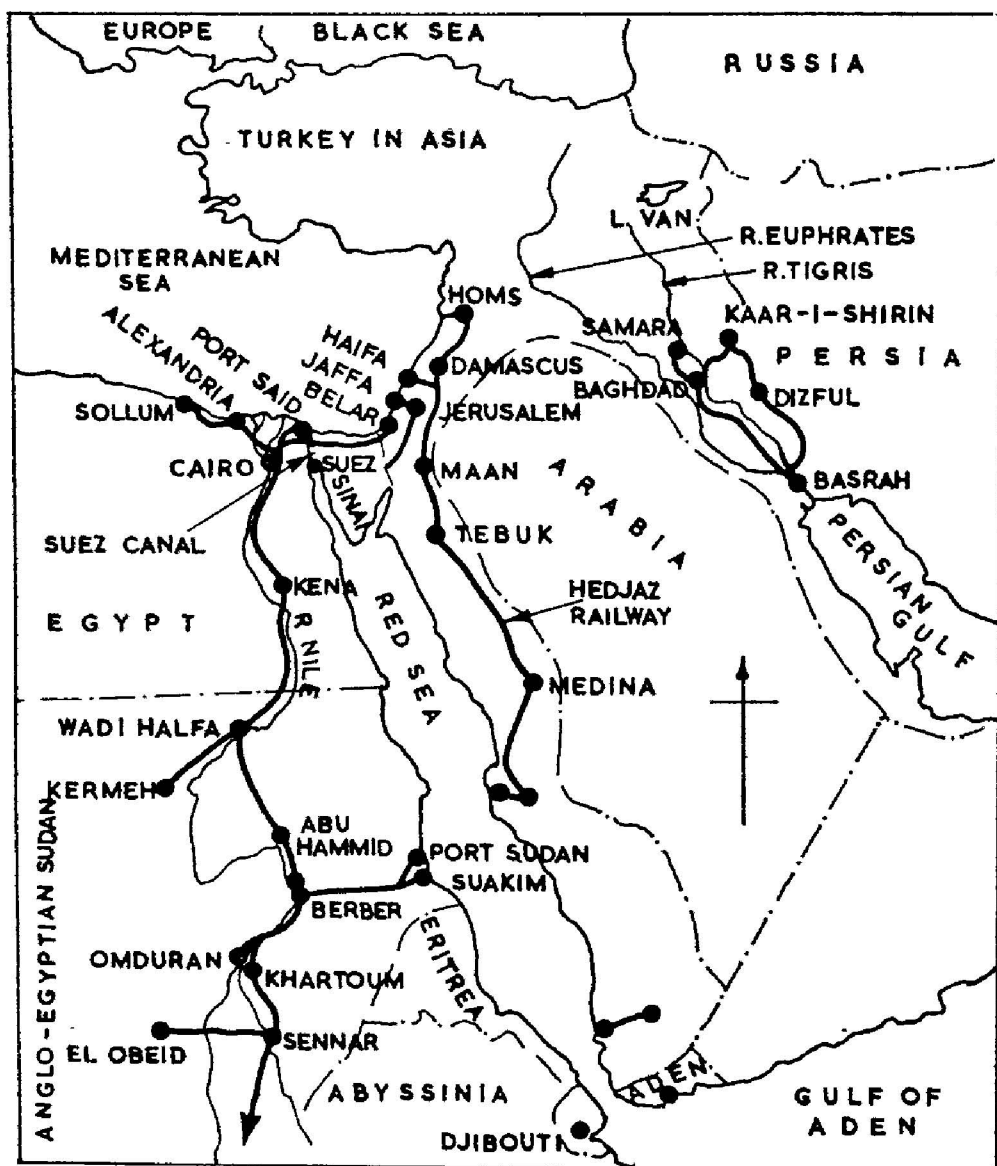
Similarly, in the Suez Canal area of Egypt, General Sir Archibald Murray, with his headquarters at Ismalia, was building military railways, with the co-operation of the Arabs. By May, 1916, over 250 miles of narrow-gauge lines had been laid alongside the Suez Canal, and thence to strategical points near by.¹ A standard-gauge line was also commenced from the fortified town of El Kantara, on the Canal, to reach the Mediterranean Coast at Bir-el-Romani, and later Katia; whence it followed the ancient camel-track across the desolate Desert of Sin – a short distance from the coast, which it reached at El Arish.

The railway was the main thing upon which General Murray relied for the success of his campaign, and, as in Mesopotamia, speed of construction was vitally essential. But laying even a light railway across the shifting sand-dunes of the Desert of Sin was no easy task, and many times, between Oghratina and Bir-el-Abd, the engineers were compelled to collect armfuls of desert scrub to help to bind the sand to form a road-bed. Nevertheless, under such unbelievable working conditions, the average rate of construction was two-thirds of a mile each day – including the laying of water pipe-lines from which the gangs drank as they fought their way ahead in a region where even the water was brackish and undrinkable.

After General Murray's victory at Rafa, in January, 1917, more permanent way and rolling-stock was obtained from India, and the line pushed ahead with all speed over the

¹ Motor-cycles, with wheels removed, were mounted on platelayers, trollies to form light, flexible automotive power units.

RAILWAYS IN WARTIME



Railways of the Egyptian campaign of 1917.

Egypt-Palestine border from El Arish to Rafa, and on to Dier-el-Belar.¹ Then, after the battle of Gaza (17th April, 1917), the British entered Palestine on 22nd May, and a two-day Anzac camel-corps raid was made on the Turkish railway lines between Beersheba and El Auja, twenty miles

¹ The Kantara-Rafa Railway was purchased from the British Government by the Egyptian Government on 1st April, 1948, after being worked by the Palestine Railways.

of which was wrecked completely. A few days later the Turks made a reprisal raid – this time by airmen who landed alongside the Kantara–El Arish line at Salmena, near Bir-el-Abd. There they left their aeroplane and attempted to cut the line by placing dynamite cartridges on the rails, but were spotted by the British and beat such a hasty retreat that they left their aeroplane and explosives behind. In the end they were taken prisoner.

On 30th June, 1917, General Allenby took over command from General Murray, and immediately put into operation a policy of bombing the Turkish railways in Palestine almost continuously, and as his army advanced, he made it the first task to connect up Turkish railways with his supply railway from Egypt, as soon as they were captured. Most of these harrying raids brought about reprisal railway raids on the Egyptian–Palestine railway, and often even on Cairo itself, whence General Murray had earlier transferred his headquarters.

During the war, the Turks constructed a 105-cm. (3 ft. 5½ ins.) line from Massudich to Tulkarem and also converted the Jerusalem–Lydda section of the Jerusalem–Jaffa line to that gauge, while dismantling the Jaffa–Lydda section. The British Army later converted the whole narrow-gauge line from Jerusalem to Jaffa to standard gauge, while at about the same time the Hedjaz Railway, south of Maan, in Transjordan, was considerably damaged by troops operating under Colonel Lawrence. This latter section from Maan to the Saudi Arabia frontier at Kalat al Mudawara remained derelict until the late 1950s.

The success of the British campaign which resulted in the occupation of the last German possession in Africa – German East Africa, was brought about by the intense military pressure brought to bear on the railways of that colony.

The 788-mile, metre-gauge Central Railway from Dar-es-Salaam to Ujiji and Kigoma, on Lake Tanganyika, had only been completed three months before the outbreak of war at a cost of £5,800,000, and it, together with the Usambara Railway, in north-east German East Africa, were

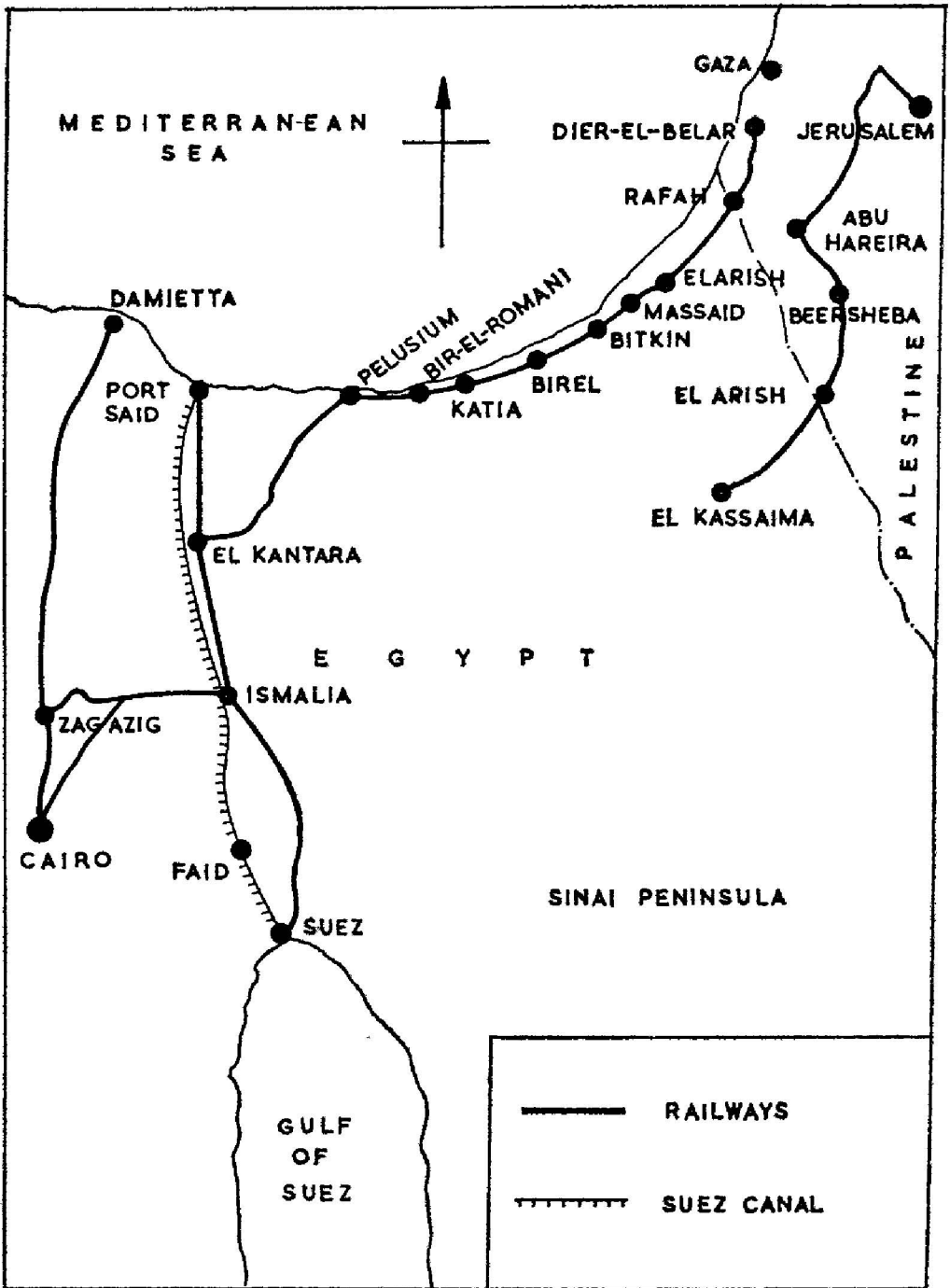
the only railways in the German colony. The latter line, which was separated from the Central Railway by 100 miles, was captured by General Smuts in his campaign of 1916 and used by him as a base for future operations in the country.

Obviously, without possession of the Central Railway, the subjugation of the territory was impossible, so the Germans systematically wrecked it by blowing up every bridge and culvert. But General Smuts's troops were not to be outdone, and though it was impossible to rebuild the bridges strongly enough in the time available to carry the heavy German locomotives that had been used on the line, they were patched up with timber trestles by the South African pioneers to carry up to about six tons. At the same time some large Napier motor lorries were fitted with flanged wheels set to the correct gauge, so that they could be run on the railway tracks.

But for this ingenious solution to the problem, and the effective emergency transport it provided, General van Deventer, who was in charge of the railway offensive, could never have succeeded in his campaign, which resulted in the whole of the Central Railway being in British occupation by General Smuts's three divisions on 26th August, 1916.

Dar-es-Salaam passed into British hands virtually undamaged, on 4th September, but the Germans had had the foresight to run all the locomotives and rolling-stock off the quayside and then to blow up the harbour works and railway station. A large floating-dock and several ships were also sunk, thus effectively stopping ships from loading or unloading at the docks. With the fall of Dar-es-Salaam, the whole of the Central Railway as far eastwards as Sandara was in British hands, the line being quickly restored to service and operated by more converted motor-lorries, which hauled ambulance and freight trains quite satisfactorily as far as Tabora and Dodoma (300 miles westward from Dar-es-Salaam). Boats for use on Lake Tanganyika were also transported in sections from the coast on converted motor-lorry-drawn trains, and British Forces in the area around the lake

WARTIME RAILWAYS IN EGYPT AND MESOPOTAMIA



Railways of the British advance from El Kantara to Gaza,
World War One.

were kept supplied with food and military stores by the same method.

West of Sandara, the railway was captured from the Germans by joint British and Belgian troops before the close of September, 1916, the Belgians transporting railway material across Lake Tanganyika to Kigoma or Ujiji, running their first troop supply train on 25th August. The two railways of German East Africa took some three months to capture, the whole territory being cleared of the enemy by 1st December, 1917.¹

¹ The Central Railway of German East Africa eventually became part of the Tanganyika section of the East African Railways and Harbours.

War Clouds Again

THE ARMISTICE between the Allies and Germany was signed in dining-car No. 2419 of the International Sleeping Car Company, which was attached to the train of French Marshal Foch in the Forest of Compiègne.¹ That was on 11th November, 1918, and between that date and the early 1930s, the railways of Britain – indeed, most of the railways of Europe – were greatly modified in organization and modernized in operational techniques. August 15th, 1919, saw the transfer by Act of Parliament of the transport functions of the Board of Trade to the new Ministry of Transport, formal transfer taking place on 23rd September, 1919, and 19th August, 1921, the Royal Assent given to the Railways Act of that year, which resulted in the formation of the four British main-line railway companies; amalgamation and absorption of 123 separate companies taking place on 1st January, 1923.

On the technical side, the years between the wars witnessed the construction and putting into operation of vast main-line electrification schemes on the Southern Railway; the opening of the Harwich–Zeebrugge and Dover–Dunkerque train-ferry services; and the mass introduction of semi-automatic signalling in many parts of the country; whilst on 1st July, 1933, the London Passenger Transport Board began its operating life.

For the best part of twenty years the railways of Britain had

¹ In 1921 this coach was placed in the courtyard of the Invalides, in Paris as a memorial. In 1927 it was returned to Compiègne, where it remained housed until the Franco-German armistice of 22nd June, 1940.

been modernized and improved in their function of peacetime transport instruments, but at no time did financial considerations permit of the introduction of uneconomic measures to enable them to meet abnormal conditions such as well might be brought about by the advent of another full-scale war. Indeed, Franco's civil war in Spain, which commenced on 10th July, 1936, and the contributions to it by German and Italian war specialists, had resulted in a flood of speculations as to the vulnerability of railways under full-scale air bombardment, proving as it did that even the mere cutting of wires by explosives or sabotage could lead to grave traffic dislocation and even a major disaster.

It was largely due to ignorance and unreliable speculations about the effects of modern warfare on railways, which led, in 1936, to the railway companies of Britain petitioning the Government for permission and financial assistance to develop alternative communication systems. They even suggested short-wave radio, but this was immediately vetoed as interfering with military and naval efficiency. Indifference and 'red tape', together with the faint hope that war would never come also hampered emergency technical developments.

Again, early in 1937, the General Managers of the railways were in touch with the Government in respect of the enormous operational problems which were inevitably to arise in the event of a major European conflict, but no decisive statement was made by the 'powers that be' until September, 1938, when the fate of Czecho-Slovakia hung in the balance. The Government then stated that they would take control of the four main-line companies and of the London Passenger Transport Board under the Defence of the Realm Act; which Act would be passed just as soon as they considered the country was in danger. Obviously, no recourse would be made to the old Regulation of Forces Act of 1871, as had been the case at the outbreak of World War One. At the same time (1938) a governmental advisory committee was set up to secure public safety and the maintenance of essential services and supplies.

Less dilatory, however, was the development of Air Raid Precaution schemes and preparations for the speedy repair of railway bomb damage, A.R.P. being well under way by 1937, by which date training schemes were in force by which one in ten railwaymen had been trained by the outbreak of war. True, military demands prevented the Government from rendering much assistance to the railways by way of equipment and appliances, such as anti-poison-gas protective clothing, but 200,000 oilskin suits to cope with mustard-gas were provided. Gas cleansing centres were also built during 1938 and 1939 and seventy-three breakdown trains specially equipped for decontamination work at remote places.

In the field of bomb damage repairs, 1938 saw the construction by the railway companies of standardized 'Meccano'-like bridge parts, special mobile cranes, oxy-acetylene and electric-arc metal cutting and welding gear, spare tracks and permanent-way materials sufficient to relay twenty-two miles of track, 130 crossings, and 130 switch-sets. All this material and equipment was distributed at various key centres, of which there were ten on the London Midland and Scottish Railway; which company were also sufficiently progressive to institute, in 1938, a series of experiments in which the effects of high-explosives were assessed by actually blowing up disused bridges and rebuilding them with standardized materials. Such bomb-damage drill soon proved its swiftness, efficiency and thoroughness under the extenuating circumstances of full-scale war.

In January, 1939, the railway managers again put forward to the Government their proposal for increasing and duplicating telephone and telegraph wiring circuits to the extent of some 21,000 miles, and at long last obtained sanction to go ahead with the work. War broke out seven months later and speculations were soon to become realities.

Meanwhile international affairs were drifting towards a fresh crisis, the previous one having ended with the Munich Agreement, and August, 1939, saw the passing of the Emergency Powers Defence Act, which cited as essential

traffics A.R.P. stores and equipment; coal (for power-stations, gasworks, sewage works, waterworks, coke ovens, blast furnaces, iron and steel works and ship bunkering); farm livestock, farm feeding-stuffs, human foodstuffs (grain, flour, sugar, potatoes, meat, and perishables); petrol, fuel oil and lubricating oil; medical equipment and stores; pit-props; and telegraph and telephone stores and equipment.

Then came the memorable month of September, 1939, on the third day of which Great Britain and France declared war against Germany. But while international events were building up to this last stage of crisis, the London Passenger Transport Board closed nineteen tube stations and the Kennington-Strand section of their Northern Line to carry out special protective works, including the installation of quickly-operated flood-gates by the use of which any flooded section could be instantly isolated from the rest of the underground system.¹ This was the last major work of railway protection against wartime eventualities to be carried out before the outbreak of hostilities.

At midnight, 31st August-1st September, the railways of Britain came under the control of the Railway Executive Committee appointed by the Minister of Transport, as whose agent it was to act and give directions. This executive committee, which was formed in September, 1938, consisted of the chief executive officer of each of the four main-line companies and of the London Passenger Transport Board, with Sir Ralph Wedgwood as Chairman, and the railways controlled were the London, Midland and Scottish; the London and North Eastern; the Great Western; and the Southern - and any undertakings owned, leased or operated by them. Also included were the London Passenger Transport Board, the Kent and East Sussex Light Railway (agricultural traffic of the Rother Valley), the East Kent Light Railway (connecting the Kent Coalfield with the Southern Railway),

¹ The stations were re-opened at various dates between 15th November, 1939, and 9th January, 1940; and the Kennington-Strand and London Bridge-Moorgate lines on 17th December, 1939, and 19th May, 1940, respectively.

the Mersey Railway (connecting Liverpool with Birkenhead) and the Shropshire and Montgomeryshire Light Railway (linking Kinnerley Ordnance Depot with Shrewsbury and Llanymynach), and King's Lynn Docks and Railway (East Coast shipping facilities).

With its offices at Fielden House, Westminster,¹ the Railway Executive Committee made one of its first tasks the planning of a railway operational programme for the running of 4,300 special trains for evacuating to the country about one and a half million children and adults from the London area, it being thought that when war broke out there would be at least three months of continuous day and night air-raids. A great deal of consideration was also given to restricted railway lighting during 'blackout' periods and to Air Raid Precautions generally.

Nearly £13½ million were spent on Air Raid Precaution measures by Britain's railways, of which £7½ million consisted of Government grants. Signal-box protection and the rebuilding of lightly-built boxes in particularly vulnerable areas accounted for over £1¼ million; protection of staff and equipment of power-stations and sub-stations, together with complete duplication of control-rooms in many cases, for £317,000; and nearly £1½ million worth of civil engineers' material, signal and telegraph stores and Chief Mechanical Engineers' requirements such as timber baulks and joists for bridge repairs.

On 1st September, 1939, the Home Secretary issued an order putting the emergency lighting restrictions evolved by a special committee, after a series of 'blackout experiments in 1937, into effect. These restrictions enacted that all fixed lights at stations and yards² should be of very low intensity of illumination, greenish-blue in colour and screened so that no direct light was visible above the horizontal plane; whilst on trains, corridor, lavatory and compartment lamps

¹ The offices were later moved to the disused tube station at Down Street, as a precaution against possible air-raids.

² Signal-boxes had their lights shaded from windows and kept at minimum intensity. Fluorescent-painted levers were tried at Watford, illuminated with ultra-violet light, but the idea was not adopted.

of about ten candlepower had to be shrouded in a metal cylinder having an opening downwards of not more than $\frac{7}{8}$ in. in diameter. Both passenger stock and goods brake-vans were subject to the same restrictions, which were extremely severe. Over four million pounds was spent on the implementations of the committees recommendations in respect of lighting restrictions.

When, however, these restrictions were put in operation so many operational difficulties arose that improved standards of lighting were authorized by the Ministries of Home Security and Transport, providing that no direct light was visible outside train compartments; that blinds were drawn during blackout hours; and that all lights were extinguished in the event of an air-raid warning. It was not until December, 1944, that the Minister of Home Security agreed to normal train lighting, engine headlamps and cab side-screens, destination indicators on electric trains, and the illumination of electric train tail-lamps during air-raid warnings. Full lighting was also permitted on hooded colour-light signals, and on 11th May, 1945, normal railway lighting throughout the country, including the coastal areas, was restored.

During the five years and eight months during which these lighting restrictions had been in force, all sorts of technical complications arose, such as that brought about between April and September, 1944, when the Anti-aircraft Command threw smoke-screens from London Bridge to Barking and Woolwich and over Tilbury Docks, to hide the preparations being made for the invasion of France. Special rules had to be laid down for calling out fogmen only when the smoke layer descended to ground level; smoke being designated as 'fog' in the amended rule.

With regard to precautions against possible gas attacks, blister-gas and mustard-gas detector paint was painted on the outside of cab windows which would give a visual indication to the driver, who would communicate his finding to the signaller at the next box he passed by sounding his whistle continuously; at which signal the signaller would communicate with the train's next stopping-place, where it

would be duly decontaminated. Although Britain fortunately never suffered the horrors of gas attacks, the provision of competent precautionary measures against what might have been the enemy's last despairing effort to win the war, gave the entire staff of the railways of Britain a sense of adequate protection whilst carrying out their duties and boosted their morale at times when a railwayman's life was indeed not a happy one.

On the very day after war was declared, the liaison of the railways with the War Office was tested to the full; army and Royal Air Force mobilization beginning on 2nd September and lasting nearly a month. As in World War One, everybody in the country was on the move. Foreigners were returning abroad, holiday-makers returning home, and 10,000 Civil Servants going by train to Liverpool – their leave cancelled – to return to the Colonies. Government officials were also being transferred to hastily-requisitioned country houses, and the railway headquarters were meted out the same treatment, with consequent necessary rail travel – the L.M.S. to Watford, the L.N.E. to Hitchin, the G.W. to Aldermaston, and the Southern to Deepdene. Similarly the bullion and clerks of the Bank of England were evacuated to safer places, as were museum art masterpieces, priceless books and State records such as the Magna Charta.

Truly all Britain was on the move, yet in the midst of this fantastic game of musical chairs the railway companies were called upon to move whole regiments of men and equipment of the Territorial and Regular Armies from their summer training camps back to their home depots. At the same time the first contingent of the British Expeditionary Force was dispatched, between 1st and 2nd September by twenty-two special trains from the South, West, and Midlands, to King George V Dock at Glasgow for transport to France. The trains conveyed 10,000 troops and arrived at the docks at three-quarter-hour intervals.

The second contingent, which involved the use of 261 special trains to Southampton, lasted over a period of twenty-seven days (9th September–5th October), the trains

arriving at the docks at half-hour intervals from places as remote as Edinburgh and Richmond (Yorkshire); 102,000 men were entrained, together with all their baggage and fighting equipment of armoured vehicles and six-inch howitzers.

Meanwhile, between 12th and 19th September, thirty-four special trains, weaving their way through the jumble of other emergency traffic, brought 14,000 troops to Aldershot, whence a steady flow of reinforcements, stores and munitions passed by train to Southampton, Harwich, Avonmouth, Dover, and the south-western ports. Then again, between December, 1939, and May, 1940, men serving with the B.E.F. in France and Flanders were being sent home on leave at the rate of 1,000 per day, and during those five months no fewer than 1,429 special trains were run for conveying 421,000 men, special schedules being even arranged for troops in Iceland and the Orkney and Shetland islands by way of railway-owned ships.

December, 1939, also saw the arrival of the first contingent of Canadian troops in the Clyde, whence they were taken to depots in the South of England in seventeen special trains. Many other drafts from Canada were landed at Clyde ports, but after May, 1940, Liverpool was also used; the arriving ships being switched to one port or the other as they neared Britain. How clear it is, looking back over the intervening years, that the British Army could not have been mobilized, transported to, and maintained in France and Flanders without the railways and railway-owned ships of Britain.

Then in April, 1940,¹ 202 special trains rushed the Anglo-French Norwegian Expeditionary Force to the docks at Glasgow and Leith for embarkation to try and save Norway from Nazi domination. They were soon back, however, though they had actually started when news was received that Finland had agreed peace terms with Russia; but the following month Holland was added to the swelling list of overrun nations, and Britain became even more closely

¹ Hitler invaded Denmark and Norway on 9th April, 1940.

besieged. In high-up circles, it was thought that ports from Aberdeen to Portsmouth might well be blockaded by the enemy and that traffic might have to flow via the western harbours from Southampton to Mallaig and the Kule of Lochalsh, as had been the case in World War One. As it happened, events fully justified their forecast.

During that memorable winter, with its continued arctic conditions, imposed upon the railways a terrific additional operational strain just at the time when the very maximum of efficiency was required. Points froze up solid, as did the coal stored in outdoor dumps. Pick-up troughs showed a remarkable immunity to freezing due to the short headway of the continual streams of trains using them, but water-columns suffered severely because the brazier fires usually lighted to keep them free of frost, were not permitted to be used on account of Air Raid Precautions. Some idea of the severity of that winter can be gained from the fact that, on the L.M.S. alone, eighty-eight trains were stopped and eighty marshalling-yards put out of action—the latter being in part due to frozen points and in part to the slow running of wagons being shunted. Even the grease in their axleboxes froze. Then, when the thaw at last came, it brought with it serious flooding and landslides, such as that in Folkestone Warren.

During the winter of 1939–40, with its appalling weather conditions, civilian travel was discouraged by passenger services being cut by 50 per cent. This, however, did not stop them travelling by rail. Stations became congested and trains overcrowded, so the companies eventually settled for a 30 per cent cut. The 'Coronation Scot' had had its last pre-war run on 31st August, and now all competitive services were abolished, the L.M.S. handling all traffic to Glasgow, Perth and Inverness; the L.N.E. that to Edinburgh, Dundee and Aberdeen; and the London to Birmingham service being alternated between the L.M.S. and the Great Western.

Some idea of the rapid increase in Government railway transport requirements by special trains can be gained from the study of the following table:

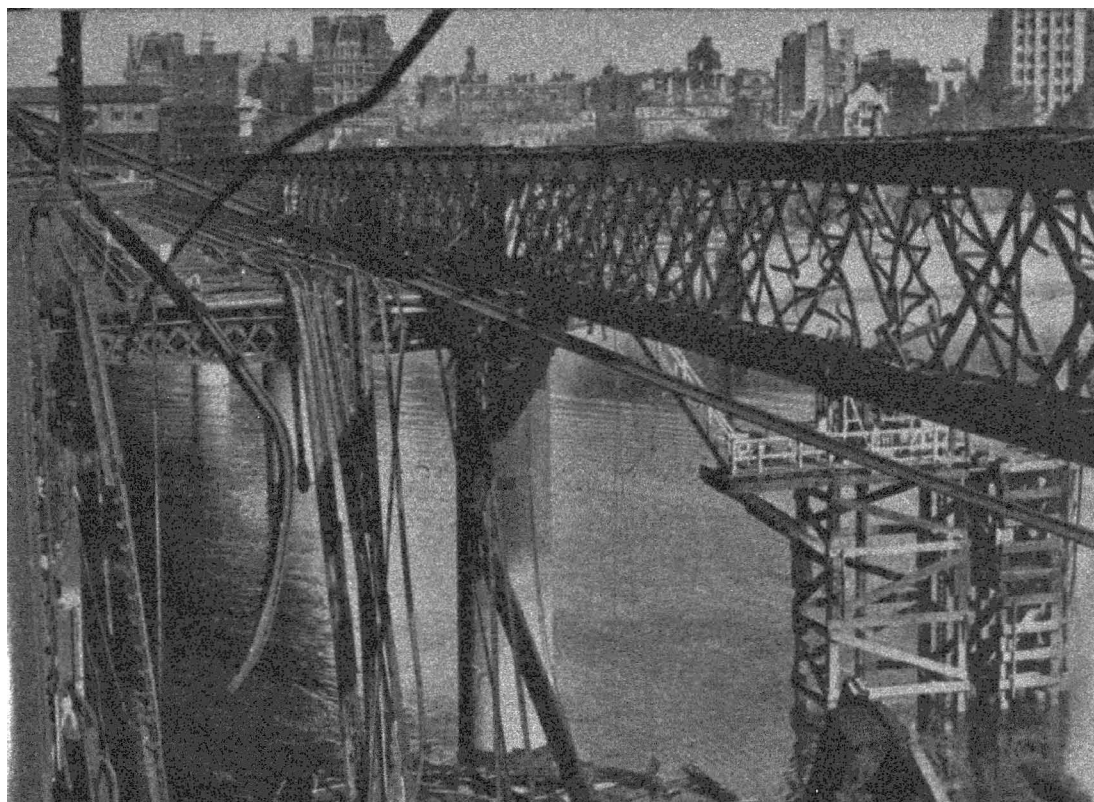
RAILWAYS IN WARTIME

Number of Special Trains Worked by British Railways on behalf of the Government during World War Two

	<i>Passenger</i>	<i>Freight</i>
1939 (From 1st September)	4,952	3,330
1940	24,241	20,888
1941	19,920	25,335
1942	30,148	34,769
1943	47,371*	45,583
1944	82,205	96,157
1945 (To 11th August)	49,777	53,873
	258,624	279,935
		258,624
Grand Total:		538,559

* Including eighty trains conveying prisoners of war to camps.

However impossible it may be to go into the minutae of the workings of the railways of Britain during the nine months from the declaration of war until the near disastrous epic of Dunkirk, no account, however brief, would be complete without some reference to the rather mysterious financial side of the transaction between the British Government and the railway companies it controlled. Obviously, it was impossible for the companies to charge the Government at so much per head for troops and at so much per ton for stores and equipment, or indeed, to send in bills for every train they ran on the Government's behalf and to their instructions. Nevertheless, some financial Government guarantee was necessary, so a guaranteed minimum sum was set, together with a sliding scale of payments which would give all the companies a keen interest in profitable and yet economical working. This settlement, which was not worked out until the war had been in progress for four months, guaranteed the companies the following minima (in round figures):



The remains of Charing Cross Bridge after it was hit by a flying bomb in 1944

This 'Schools'-class locomotive took the full blast of a bomb and saved Cannon Street River Bridge from heavy damage





A familiar sight on the railways at the beginning of the war

Part of St. Pancras Station that was badly damaged after a bomb attack



WAR CLOUDS AGAIN

	£
London, Midland and Scottish	13,500,000
London and North Eastern	9,000,000
Southern	6,000,000
Great Western	6,000,000
London Passenger Transport Board	4,500,000
	£39,000,000

(Actually, £39,435,776)

This sum guaranteed the upkeep of 60,000 miles of track, 250,000 wagons, and passenger coaches sufficient to carry 2,500,000 passengers at any one time. The wages and salaries of some 650,000 railway workers were also assured.

In an entirely different sphere of railway operation – that of motive-power, the coming of war brought with it the pressing need for powerful tender freight locomotives to haul long, heavy trains, and a large stock from which the War Office could draw in case of emergency overseas was considered essential. Unfortunately, railway conditions in 1939 differed very considerably from those of 1914, for the companies had had a sharp decline in trade during the 1930s, culminating with a sharp set-back in 1938. None the less, at the outbreak of World War Two, the main-line companies had a stock of 19,512 locomotives consisting of 11,806 tender engines, 7,592 tank engines, and 114 petrol, diesel, electric, 'Sentinel', and narrow-gauge engines.

The Ministry of War Transport therefore decided to make up the deficit of heavy freight locomotives by demanding that all heavy engines built by the companies should be of the L.M.S. 2-8-0 tender type, and by autumn, 1940, the first batch were ready. One hundred G.W.R. 0-6-0 tender freight engines were also requisitioned by the War Department for use overseas, as were twenty diesel locomotives, which, incidentally, were lost to the enemy in the retreat from France. Forty-three heavy freight engines were supplied by the L.M.S. for hauling supplies to Russia over the Persian Railways, in company with ninety-two L.N.E.R. 2-8-0

engines of '0-4' class, and altogether, no fewer than 298 steam locomotives and forty-five other motive-power units were requisitioned by the Government for the period of the war.

Tighter engine rosters, longer periods between engine overhauls, lack of experienced fitting staff, shortage of materials, and engine overstrain due to coping with record traffic, inevitably resulted in the accumulation, by the end of 1943, of well over 3,000 locomotives in need of heavy repairs. Moreover, due to the obligation to keep a reserve of steam power to operate the electric trains of the Southern Railway and the London Passenger Transport Board in case of power-stations being put out of action by enemy action, over 200 veteran engines were kept in service by the main-line companies. Fortunately, the emergency never arose, but in any case, by 1942 the Southern Railway had completed arrangements for an emergency supply of electric current, and the veteran list was reduced to seventy-nine engines to cope, if required, with the handling of London's passenger services.

The year 1943 saw the appearance of the 'Austerity' 2-8-0 engines from the workshops of the Vulcan Foundry and the North British Locomotive Company; 950 such engines were running at home and overseas by April, 1945, as were 100 engines of similar design but of the powerful 2-10-0 wheel arrangement, for hauling exceptionally heavy freight trains over difficult roads.

December, 1942, witnessed the handing over to the G.W.R. at Paddington of the first American-built 'Austerity' 2-8-0 locomotive, nearly 400 such engines being later landed at Cardiff,¹ Glasgow, Hull, and London Docks, and later slightly modified for use by the U.S. Army Authorities for use in Britain. All these engines were hard at work by autumn, 1943, and a second lot consisting of 358, were imported just before the Allied invasion of Europe. Fortunate indeed it was that these locomotives arrived just when they

¹ 755 American 2-8-0s and 200 0-6-0s passed through the shops of the American Transport Corps at Ebbw Vale Junction.

were most wanted, for their use, both in Britain and on the other side of the Channel, helped the railway companies of Britain and France at a time when their own locomotive stock could not possibly have met the fantastically abnormal demand for self-contained railway motive power. During the war stocks of reasonably good loco coal fell to alarmingly small proportions, being at times so scanty that opencast coal, household coal, briquettes, and even gas coke was pressed into service. But though the use of such indifferent fuels inevitably resulted in poor steaming, lack of power, and bad timekeeping, the locomotives of Britain kept going and contributed their vital quota to the war effort which culminated in the tremendous and successful effort of 'D-day'.

On the freight rolling-stock side, the first Armoured Fighting Vehicle (A.F.V.) trains began to appear towards the end of 1940, each train consisting of two or three passenger coaches, a stores van, from five to nine 50-ton flat wagons ('war-flats'), and two ramp-wagons. Thirty-one such trains were run from stations in the Bedford area during October, 1941, and in February–March, 1943; during which latter period the largest military exercise ever carried out in England also entailed the use of 221 special trains for the assembly of the troops in the manoeuvres and 211 for their dispersal – which was carried out in half the time taken for their assembly.¹

¹ The entire railway working for these manoeuvres was organized by a Military District Control Office at Oxford.

The Evacuation of London – and the Miracle of Dunkirk

THE SHARE of the railways of Great Britain in that memorable episode of evacuating civilians – school-children and selected classes of adults – from the dangerous London area was a vital one, over 600,000 people being transported to safe areas on 1st September, 1939, and the succeeding three days, and over one-third of these being carried by special London Passenger Transport trains from London to connect with main-line special trains at suburban stations.¹

The complete railway plan, which was developed by the railway companies and various Government departments from a tentative scheme requiring 4,000 special trains and formulated in 1938, was ready two months before war broke out, and during September, not only were the children of the Metropolis evacuated, but those of seventeen other vulnerable areas.² But whereas 617,000 had been carried from London in 1,577 special trains, the 716,000 evacuees from the provincial zones required the running of 2,246 trains – excluding the large number of empty stock trains needed to cope with the emergency.

Ranging from three to thirteen years of age, the children were accompanied by school officials or by their mothers.

¹ L.P.T.B. buses and trams carried a further 345,000 people to suburban stations or direct to outlying districts.

² The following cities, towns, and zones were covered: Birmingham, Bradford, Hull, Leeds, Manchester, the Medway towns, Merseyside, Portsmouth, Southampton, Gosport, Runcorn, Widnes, Sheffield, Tees-side, Tyneside, Wearside, Dundee, Edinburgh, Glasgow, Clydeside, and Rosyth.

EVACUATION OF LONDON – MIRACLE OF DUNKIRK

Each one carried a gas-mask, a change of clothing, and some food, whilst three labels were tied to each child as a means of identification. It was a pathetically sad picture, for even though the children's faces were generally cheery, after all, they were leaving their homes and dear ones, who did not know for certain when or where they would meet again.

Some trains ran, with halts *en route*, to destinations two or three hundred miles away from the danger areas, and though as much as possible had been done in the short time permitted for detail arrangements, there were many headaches for the station staffs at the final points of detrainment in the reception areas, whither food had been previously brought by rail so that emergency rations could be supplied to the little travellers before they were ushered into their new billets.

But the evacuation did not stop at passengers, there were special consignments of very precious freight – art treasures and irreplaceable historic items – from Westminster Abbey, the British Museum, the Tate Gallery and the National Gallery. Most of these priceless things were conveyed by the L.M.S.R. to a remote destination in Wales, where specially-heated, air-conditioned accommodation had been provided for them in disused mines, where they remained 'for duration', safe from German bombs, thousands of feet below the granite mountains.

May, 1940, witnessed more mass migrations, this time of boarding school children from the South Coast to the North Midlands, Wales, the West Country, and even to Scotland. Similarly, schools were evacuated from the East and North-east Coast to Cumberland and Westmorland. Then in the autumn came heavy air attacks on London, which started another exodus from the Metropolis. This time the work of the railways was severely hampered by bomb damage, but none the less, this, and many other mass movements were efficiently coped with, even though the railways were already in the throes of moving Government departments and personnel, and even transferring food stores of meat, butter and tea from London Docks to destinations all over

the country. On the L.M.S. alone, thirty-nine special food trains were run between 31st August and 4th September, 1939, of which seven conveyed 1,600 tons of tea to the North of England.

After the first great evacuations of 1939, the railways of Britain handled another million evacuees in nearly 2,000 special trains during the six years, 1940-5, the last major scheme being that made necessary in 1944 by the flying-bomb attacks on London and South-eastern England, when over 375,000 were carried in 532 special trains. Patients from hospitals in the danger areas were cleared by casualty evacuation trains for which only skeleton time-tables could be arranged, but every train got through, even though they were run at limited speeds to ensure the maximum comfort of the patients they carried. Like most railway jobs, the casualty trains were made special 'team jobs', in which everybody had a hand. Even the engine drivers did their bit by starting and braking the heavy trains with the very minimum of jolting.

The earlier casualty trains of 1939, however, were three nondescript ones composed of odd stock and three old L.S.W.R. restaurant cars, which were converted at the Lancing Works of the Southern Railway and formed into trains at New Cross Yards. Later, however, 34 casualty trains - 6 G.W.R., 15 L.M.S.R., 10 L.N.E.R., and 3 Southern Railway - were formed and concentrated in berths near the Metropolis. The trains were numbered consecutively from No. 1 to No. 34, each being composed of nine vans, two brake-vans and one open coach.

As a postscript to the 1939 evacuations it may be said that the completion of the official scheme for the return of the children and mothers to London did not take place until August, 1945; though there had already been an unorganized drift back since autumn the previous year.

The ill-fated Norwegian Expeditionary Force had hardly been dispatched than the unfortunate turn taken by affairs on the Continent demanded the sudden evacuation of

EVACUATION OF LONDON – MIRACLE OF DUNKIRK

British and Allied troops from Flanders and France. The German armies were flooding across Northern France. The 'impregnable' Maginot Line was broken. Arras and Amiens had fallen, and by 17th May, 1940, all the ports of North-eastern France were closed. On 23rd May the railway officials and workmen of Boulogne reached England, then the port fell into enemy hands, to be shortly followed by Calais. The situation was critical and alarming. Instant action alone could save our armies from total destruction or captivity.

Most, if not all, railway operations, both of war and peacetime, are the subject of careful planning and timing, but in the hectic eight days of the Dunkirk evacuation, all train workings had necessarily to be improvised. No one knew the number of troops to be entrained at British ports; where the rescue ships would berth; nor even the rate of their landing; hence there could be no railway time-table or programme. The whole operation had to be infinitely flexible and capable of adjustment from minute to minute, as the memorable episode developed.

This, the greatest troop movement in railway history, began at dawn on 27th May, 1940, under the code-name 'Dynamo',¹ and by evening had been put in action; the Admiralty having collected a heterogeneous fleet of 220 naval vessels and 650 civilian coasters, steamers, barges, tugs and other small vessels for the purpose, the railways sole duty being that of carrying the troops to various destinations in England after they had been landed.

A pool of 186 Southern Railway locomotives was formed, together with a similar number of trains totalling 2,000 coaches,² which were stored in convenient sidings and goods-yards, which were cleared of all unnecessary vehicles. The

¹ Named after the large room deep-hewn in the East Cliff under Dover Castle, which was used as Naval H.Q. by Admiral Ramsay, who commanded the Dunkirk Operation. The room had housed the auxiliary electric lighting plant during World War One, and was thus named the 'Dynamo Room'.

² These 186 trains were provided by the four main-line companies as follows: G.W.R., 40; L.M.S.R., 44; L.N.E.R., 47; and S.R., 55 trains.

down line between Ashford (Kent) and Hothfield was also cleared and used for train stabling. These trains were handed over to the Southern Railway by the Great Western Railway at Andover Junction and Salisbury; by the L.N.E.R. via Banbury and Reading; and by the L.M.S.R. via Kensington and Addison Road; and though every effort was made to facilitate their progress with as little interference with normal traffic, the sudden influx of 186 trains upon an already overcrowded time-table was the cause of many operational 'headaches'.

The moment the telegrams bearing the word 'Dynamo' were received, the Divisional Superintendent at Orpington set up sub-control offices at Ashford, Chatham, Dartford, Dover Marine, Faversham, Haywards Heath, Chichester and Shalford; with Inspectors at Ashford, Faversham, Folkestone, Headcorn, Margate, Paddock Wood, and Ramsgate. The trains were sent to the landing-places, as required; were loaded, and dispatched to regulating points, where the military authorities decided upon their destination in respect of the reception areas in all parts of the country, or to intermediate control points such as Banbury or Reading. To expedite the latter, the whole line from Redhill to Reading was completely cleared of trains during the whole evacuation period.

Redhill was the nerve-centre of the operation, which was entirely controlled by telephone, trains being run from the Ashford-Hothfield stable-line to Ramsgate, Margate, Dover, Folkestone, Eastbourne, Newhaven, or Brighton, as required by the ships arriving at those ports and piers.¹ When Redhill traffic showed signs of congestion – and it often did – trains were routed via Faversham and Chatham, though only 19 per cent of the loaded Dunkirk trains passed through London.²

Some idea of the enormous task faced by the railways can

¹ Trains of empty stock were also held at Faversham, Queensboro, Margate and Ramsgate, and over three miles of reserve coaches were stored on the 'dead' line between Umlerleigh and Chapilton, in Devonshire.

² Eighty-one per cent of the Dunkirk trains passed through Redhill.

be gained from the fact that Folkestone handled 35,000 troops and 9,000 refugees; Ramsgate, 43,000 troops and 4,000 school-children; Margate, where the famous fun-fair 'Dreamland' was turned into an emergency clothing store, handled 38,000 troops and 2,000 civilians; whilst Dover, Newhaven, Brighton and Harwich accounted for the balance of 203,116, out of a total of 319,116 from all ports. Of this total, no fewer than over 200,000 were entrained and conveyed inland. Yet the whole operation was carried out without a hitch.

But there were many literal headaches for the operational staff however. Locomotive water once ran short at Redhill and the 300 tons of firebox ashes which accumulated at the engine-shed constituted a problem. Locomotive coal also ran short and special coal trains had to be dispatched thence from London - and without affecting more than possible the transport of the 6,000,000 tons of freight and 20,000,000 ordinary passengers which the Southern Railway continued carrying while 'Dynamo' was in operation.

'Southern' drivers and firemen were often on the footplate continuously for anything from eighteen to twenty-eight hours, and often Great Western 'Moguls' and 'Manors', arriving at Redhill from the west, were called in to haul trains to the coast and back. Conversely, during those eight hectic days, Southern locomotives were to be found as far from Redhill as Exeter!

As the small proportion of French to British troops evacuated might perhaps have given rise to inter-Allied friction, the proportion was increased, the French troops being taken west by train from the Channel ports, re-equipped, and sent back to France by way of Weymouth and Plymouth and Southampton. Tidworth, Bulford, Dorchester and Blandford were among the camps used by these transitory soldiers and officers.

The movement of such a vast number of passengers over diverse and unpredictable routings involved fitting the trains into the time-tables of the three other main-line groups. On the Great Western Railway, for example, 293 specials

RAILWAYS IN WARTIME

from Kent and Sussex ports passed over the system during the Dunkirk evacuation:

	<i>Officers and men carried</i>	<i>Special Dunkirk Trains</i>	<i>Other Special Trains*</i>
29th May (Wed.)	10,787	21	16
30th May (Thur.)	21,817	42	21
31st May (Fri.)	70,054	76	22
1st June (Sat.)	41,492	79	16
2nd June (Sun.)	15,392	29	17
3rd June (Mon.)	7,360	14	17
4th June (Tues.)	15,613	32	33

* Conveying evacuated French troops back to France by way of Weymouth and Plymouth, and including 12 'specials' from Weymouth and 19 from Southampton.

A fair proportion of the Dunkirk 'specials' dispatched to the North came by way of Oxford and Banbury, where they passed over the old Great Central line to Woodford and Leicester, where their weary passengers were treated to their first wash in weeks at special facilities hastily set up on the station platforms. Other trains from the Channel Ports passed through London to reach the old Great Central system at Neasden.

Altogether, during the evacuation period, ninety-five trains, carrying some 40,000 men, passed over some part of the L.N.E.R. system. Some of the Dunkirk ships arrived unannounced at Harwich, and to cope with the troops aboard them eight 'specials' were run at no notice direct from Parkeston Quay to the Midlands. It was the railway staff at Harwich which had the harrowing experience of witnessing one of these ships being sunk by enemy bombing just outside the harbour. The refugees, who were 'all in', were, however, rescued, and, still smothered in oil, were put straight into a 'special' to Liverpool Street. Railway annals make no mention of the state of the train after the event!

During, and immediately after the Dunkirk episode, the German advance turned westward along the North Coast of

EVACUATION OF LONDON - MIRACLE OF DUNKIRK

France, and the rescue of those troops who had not returned via Dunkirk, or had been taken prisoner, became imperative. To achieve this, operation 'Aerial' was put in action, G.W.R. and L.M.S.R. ships being dispatched to the little port of St. Valéry-en-Caux, eighteen miles west of Dieppe on 11th June. The venture was successful, though the ships were shelled from the cliff-tops, 1,700 men being evacuated, but the rescue of the 51st Highland Division from the same port, failed; as did further attempts to take men aboard at Cherbourg. Later, however, 80,000 were brought from Brest to Plymouth, and G.W.R. S.S. *St. Helier* brought 2,500 from St. Malo to Southampton.¹

As the Germans continued advancing westward, Cherbourg and St. Malo fell and it became impossible to defend the Channel Islands from invasion. They were thus immediately demilitarized and the total evacuation of their population was at first hoped for by the British Government. But such was not to be, though between 20th June and 28th June, some 25,000 were brought to Weymouth. On the latter day, however, the evacuation was brought to a sudden halt by the German bombardment of Guernsey and Jersey. Most of the Islands' cattle and half its potato crop were also brought to England.

During operation 'Aerial', most of the evacuated troops went to the West of England, but, like those of operation 'Dynamo', they had to be sorted into their units and re-formed. Moreover, they were scattered over the length and breadth of the country and the railway side of the sorting process was a very involved one, not made any easier by the threat of invasion and the early air attacks which later led up to the Battle of Britain. Such was the high pressure at which these un-time-tabled, impromptu train movements were made, that but few records were taken. All special train movements were ordered and relayed by telephone, yet they all went through with hardly any interference with the public time-tables. Indeed, this 'sorting' process might

¹ Other G.W.R. ships involved during the Dunkirk period were the *St. Andrew*, *St. David*, *St. Julien*, *Roebuck* and *Sambur*.

well be called the second phase of the evacuation of the B.E.F., dealing as it did with the complete redistribution of troops from reception centres to military depots, where they were organized and equipped afresh.

One such troop movement was made in Mid-June, 1940, when twenty-three special trains carried troops from Southern England to Stranraer, whence L.M.S.R. ships took them to Northern Ireland. Two years later, in January, 1942, a whole division was removed from the same place to make way for the first U.S. contingent, this move being spread over seventeen days. One of the forty-three 'specials' used was snowed-up by the exceptionally severe winter weather for twenty-four hours, north of Carlisle.

The speedy withdrawal of nearly one-third of a million troops from France and Flanders, and their dispersion by 620 special trains to all parts of the country at the average rate of one every eighteen minutes, left a disorganized army spread over Britain. The railways were immediately faced with the problem of providing to take the troops to military depots for reorganization and re-equipment – moreover, leave followed almost at once for almost every soldier, which added to the railway problems.

By October, 1940, the repercussions of this special traffic brought about inevitable railway congestion. Coal supplies were getting short in London and the South of England, and ships carrying steel and scrap were being detained a week in port because there were no empty wagons into which their cargoes could be unloaded. Refrigerator vessels were held up at West coast ports for want of insulated and refrigerated vans. The situation was critical, and as complaints grew more insistent, the matter was discussed at War Cabinet level; it being decided that existing railway facilities were inadequate; that Government-controlled traffic was being badly organized; that there was poor operational unity between the four main-line systems; and there was need for Government control of alternative inland transport systems in Britain – canals and roads.

Some mitigation of these failures was brought about

when the Ministry of War Transport, on the advice of the Railway Executive Committee, put all privately-owned vehicles other than special vehicles, into a common-user pool, to obviate excessive empty haulage. This decision, which involved over 580,000 wagons, took about two years to materialize into a proper wagon-regulating system. Operated by Inter-company Freight Rolling Stock Control, with offices at Amersham, Bucks, the scheme undoubtedly saved a situation which would have been disastrous to the later stages of the war effort, by which time the numbers of wagons destroyed by bombing or worn out by excessive, unserviced usage, had mounted alarmingly. Repair and rebuilding facilities were diminished and the freight haulage position became extremely grave, but in the end, 'D-day' came, and the end of the war was in sight — the tide had turned.

During the Dunkirk operation, and indeed, from that time until the end of the War, the Southern Railway was Britain's 'Front Line' railway. 'Sunshine Line' that it was, it was dive-bombed, bombed, 'doodle-bugged', 'rocketed', and blasted, as well as being in the 'tip-and-run' area of England and thus claiming the special interest of the enemy air-raiders from bases less than five minutes flying-time away. The Company's ships were also prominent in the operation, and by 2nd June, five had been sunk. Indeed, during the whole evacuation, twelve were sunk out of a pre-war fleet of forty-two vessels, those lost being *S.S. Brighton, Fratton, Lorina, Maid of Kent, Maid of Orleans, Minster, Normannia, Portsdown, Paris, St. Briac, Southsea* and *Tonbridge*.

An interesting sidelight to the dark days of Dunkirk, is the magnificent way in which the vital needs of the war-weary travelling troops were looked after by the railway staff of stations all over the country. At Headcorn Station, in Kent, for example, over 14,500 men were supplied with food, refreshment and cigarettes, the Royal Army Service Corps and the ladies of the little town working hand in hand to make the men's journey just that little bit easier. And at Tonbridge, where the station-master's wife collected over

£1,000 towards the rough and ready canteen set up, the over-all story was just the same.

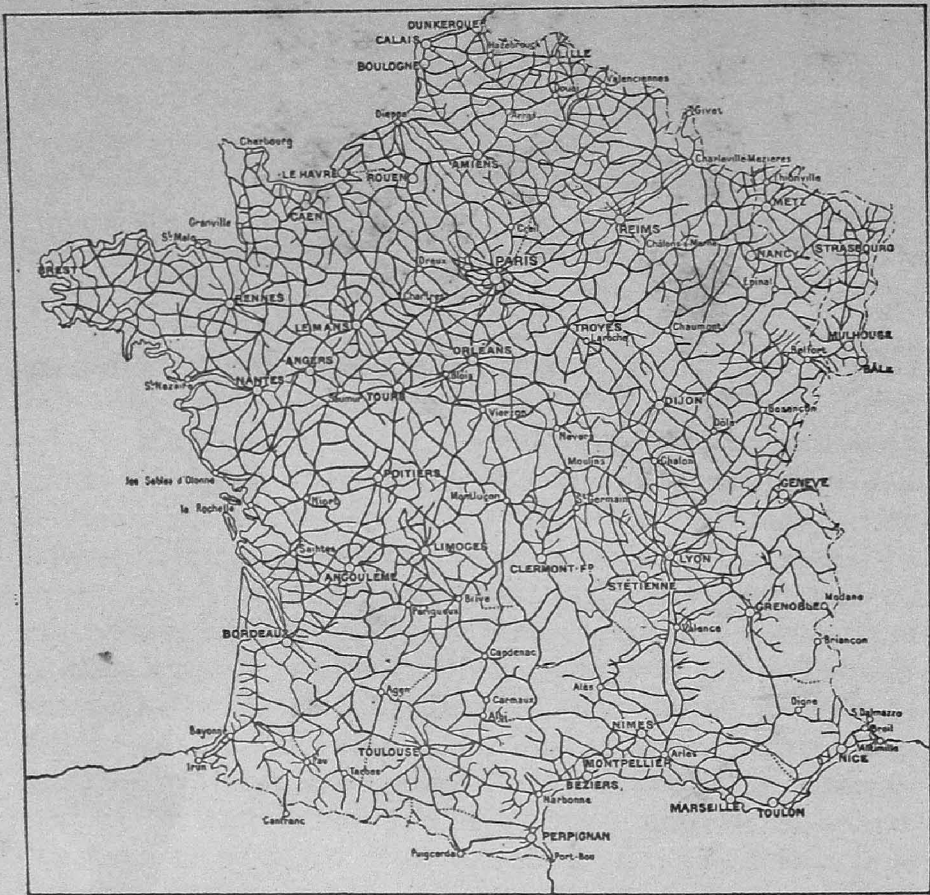
And so, with the aid of masterly handling by the railways, the sad operation 'Dynamo' was carried through without a single major hitch, in spite of its great magnitude; an operation the impromptu organization of which every railwayman may justly be proud.

The Railways of France in World War Two

FOR A PERIOD of twenty years after the cessation of hostilities at the end of World War One, the privately-owned main-line railway systems of France – the Est, Nord, Paris–Lyon–Méditerranée, the Paris–Orléans–Midi, the Etat, and Alsace–Lorraine lines – were devoting their energies to the repair of war damage and building up improved services. Between 1930 and 1937, however, the severe impact of mechanized road transport on railway revenue was beginning to be felt, and it was this, coupled with a general economic crisis, which decided the French Government to intervene in the direction of the affairs of the railways of the country. Nationalized railways already existed in certain other countries, so a national society known as the ‘Société Nationale des Chemin de fer Français’ (S.N.C.F.) was created under a decree of 31st August, 1937, which, as from 1st January the following year, amalgamated the private companies into one company – the French National Railway Company (S.N.C.F.). The smaller railway companies, however, remained under private control.

Within two years of its creation, S.N.C.F. was faced with the outbreak of another major war in which France was critically involved; war being declared by France and Great Britain against Germany on 3rd September, 1939. It immediately became apparent to those directing French railways activities that the whole structure of administration and control would have perforce to be modified completely before hostilities actually commenced. Fortunately, the unusual turn of events which produced the ‘phoney war’, of *‘drole de guerre’*, as the French termed the early period

RAILWAYS IN WARTIME



The Railways of France before World War Two – 1936

of inactivity, permitted a certain amount of emergency reorganization to be carried out. Minute plans had been drawn up during the inter-war years and these were put into effect when the preparatory transport arrangements were made for the mobilization of the French Army in August and September, 1939. As it was, everything went through without the unwelcome attentions of German bombers.

But the railways suffered from extensive centralization; a heritage – indeed, a constitution, dating from earlier days and having Paris as its centre of authority, upon which the provinces always relied for their direction in all matters

relating to the running of the system. So, with the view of saving time and money, whilst at the same time contributing to the general economy of the provinces, it was decided to decentralize all the major departments – particularly those dealing with the liaison between the railway and its customers.

As a consequence of this decision, until May, 1940, the railways of France escaped all bombardment, but very soon after the period of army mobilization, many expresses ceased to run and a reduced service of passenger trains was introduced; so by the summer of that year, a service almost substantial enough for comparison with that of peacetime was re-instituted, military and civilian transport needs being met without great difficulty.

As is well known, Germany invaded the Netherlands, Belgium and Luxembourg on 10th May, 1940. Soon the Low Countries were overrun, the railways of Holland being handed back to their original managers by the Germans on 15th July the same year. Then a lightning blow was delivered at Northern France, Paris falling to the invader on 14th June, and two days later, the French sought an armistice, which was signed with the Germans on 22nd June, and with the Italians on 24th June.

In the terms of the armistice, the railways of France were split into two parts, those of unoccupied France being under the control of the Vichy Government and those in occupied territory worked by a Paris civil administration subject to German control. The dividing line between occupied and unoccupied France ran from Geneva westwards to Dôle, Chalon-sur-Saône, Paray, Le Monial, Moulins, Bourges and Vierzon; thence to a point twenty kilometres east of Tours, then south, parallel to the Angoulême railway line to Mont de Marsan and St. Jean Pied de Port. All coastal lines were worked by the German military authorities, and the railways of Alsace and Lorraine were incorporated into the German State Railway (Deutsche Reichbahn).

During the months of May and June, 1940, when the invading armies turned the Maginot Line and advanced on

Paris, the railways were thrown into a state of disorder, stations, bridges and viaducts, suffering badly from enemy bombing and from damage done by the retreating French troops. In the meantime, however, S.N.C.F. successfully evacuated to Central France a substantial proportion of their own, and Belgian railway material, together with their Central Services personnel who were evacuated to the South.

After the armistice of 22nd June, 1940, S.N.C.F. once again endeavoured to put in hand the improvement of their railway network, with the main idea of evading, in every possible way, the tight German control, but with the protection of the supply of the essential needs of the country's economy also in mind. The temporary reconstruction of destroyed or badly damaged railway structures was thus immediately put in hand, damage being made good within the scanty limits of the raw materials, girders and cement in stock. Included in this emergency repair work was the rebuilding of the viaduct across the River Rhone at Longeray, which, after its second destruction, was not repaired again until more than three years later. Incidentally, the patching-up of certain bridges, viaducts, tunnels and stations on secondary routes was not given consideration – the lines were abandoned for the duration of the war.

In spite of the vigilance of the enemy railway officials and twice as many other military organizations, the railways of France succeeded in keeping control of the majority of their traffic during the whole period of German occupation; doubling their efforts to safeguard the food supplies of the country, while at the same time actively participating in the Resistance movement, which was eventually to culminate in the liberation of France. In fact, in spite of incredible difficulties of all kinds, they carried on, thanks to every railwayman's patriotism and, sad to relate, to the supreme sacrifice made by many hundreds of them. During those dark days before the liberation, every loyal railwayman, from those in executive positions to the humblest shunter and porter, was working for his country's ultimate victory – for freedom, at the price of his life, if he was found guilty of sabotage.

During the opening weeks of the occupation, it became quite clear that the Germans thought France to be a country which could be ground down, over-taxed, and exhausted of men and materials; and this was the policy they applied to the railways, the resources of which they ultimately almost completely drained – first materials and later S.N.C.F. personnel. Indeed, during the period 1940–44, 10,500 passenger coaches, 2,100 vans, 270,000 wagons, and more than 5,000 steam locomotives had been commandeered; which represented half the coaches and wagons, and one-third of the engines in running order.

Both the Germans and the Italians also thought to commandeer the French electric locomotives, but found that it was impossible to convert them from direct current machines working at 1,500 volts, to work on single-phase alternating-current (Germany) and three-phase alternating-current (Italy). Because of this, the electrified lines of France continued to be used to maximum capacity throughout the war, during which, however, nearly a thousand miles of overhead catenary was wrecked and twenty sub-stations out of a total of sixty-six, put out of action.

From 1942, the Germans demanded the deportation of many thousands of railwaymen, forcing them to work in the larger stations east of the Rhine, choosing the stations and goods-yards in industrial areas frequently subjected to air attacks. Over 20,000 of these unfortunate prisoners were never returned to France, in spite of many attempts made on their behalf by S.N.C.F.

In 1942, the railways suffered a protracted period of intense and systematic bombing by Allied aircraft, marshalling-yards, goods depots, important junctions, and hundreds of bridges and viaducts being ruthlessly attacked. Usually the Allied airmen signalled their arrival by dropping flares which warned the unfortunate railwaymen below to take cover before the bombing started. This warning system was universally recognized among railwaymen and hundreds of lives were saved by its use, and after a successful raid, weeks would pass before railway working could continue.

In 1943, an intensive campaign of railway sabotage was organized by the active members of the Resistance movement. Working in complete liaison with the railwaymen, they derailed German military trains; destroyed tunnels and bridges; annihilated scores of German security installations; and cut telegraph and telephone cables and overhead wires; besides working out complicated plans aimed at hampering the enemy's communications and harassing him in every possible way.

Under such chaotic working conditions, train routings had to be changed from day to day in many instances, from hour to hour. In Paris, for example, nobody knew from which station any particular train would depart, and for a long time, the Metro station of Denfert-Rochereau was turned into the main station for the Ouest, Sud-Ouest and Sud-Est main lines of S.N.C.F. Passengers were taken as far as Massy-Palaiseau on the Metro, where they changed on to the Ceinture,¹ whence the trains regained their respective main lines.

Later on, expresses did not run into the big termini of Paris, but made their point of arrival and departure a station some miles outside the city. From these temporary 'terminal' stations passengers were taken on in trains composed of very old rolling-stock. All this was bad for city workers, but it gave them some idea of the difficulties confronting S.N.C.F., but it also proved that the railways were doing the best they could to maintain the essential food and coal supplies to the large centres of population – particularly Paris.

Came 'D-day', when the Allied Armies of Liberation landed on the Northern Coast of France. At the time the railway situation was at its worst. With the exception of the roundabout run from Paris to Orleans, it was impossible to get from the capital to Rouen, Rheims, or the coast, while all the bigger towns and cities of the country were similarly isolated. In some cases, such as at Grenoble, Troyes, Stras-

¹ Le Grande Cienteure ring line round Paris was built as a direct result of the lack of transfer facilities experienced between the six main lines entering Paris, in the Franco-Prussian War.

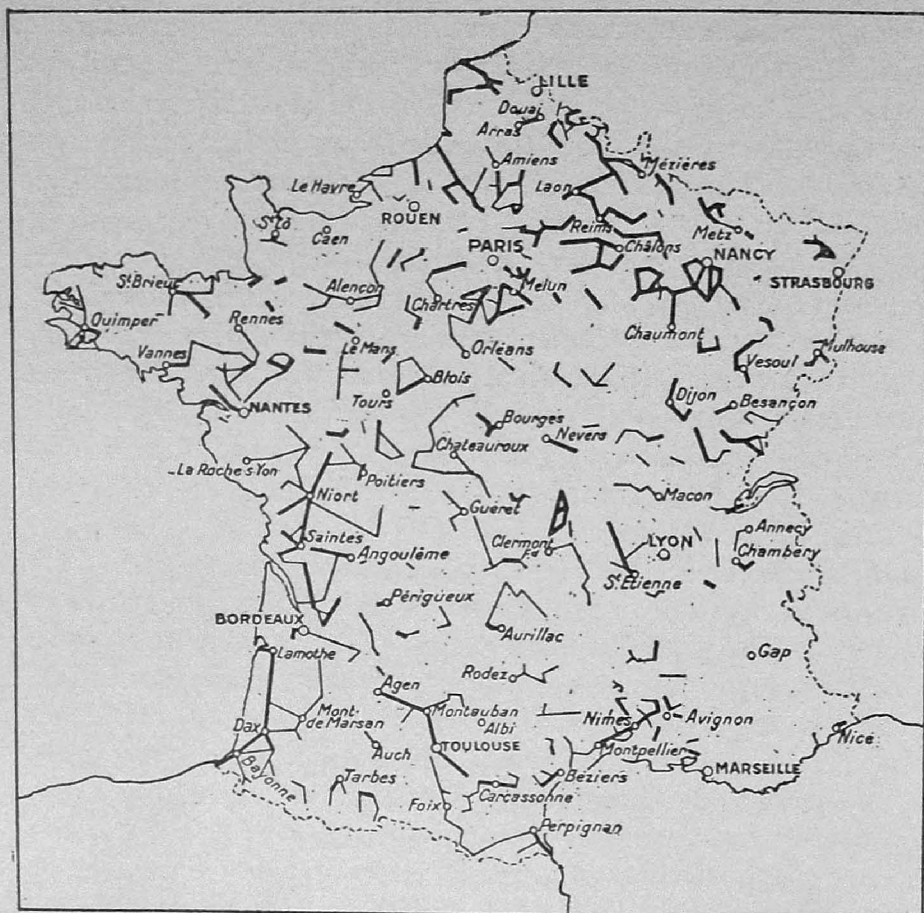
bourg and Rouen, railways had been completely annihilated and the cities only accessible by road. In fact, the railway system of the country had literally been blasted into isolated sections, one of the longest of which was the line southwards from Lamothe, a few miles south of Bordeaux, through Dax and Bayonne to the Franco-Spanish frontier.

The majority of bridges and culverts had also been destroyed, and train movements north of the River Loire were impossible. In some areas track discontinuity was so great that it was impossible for even the Germans to get anywhere, their military trains being shunted to and fro for days when attempting to bring up supplies and reinforcements. It was this, coupled with their shortage of petrol and oil, which brought about their ultimate defeat.

Unfortunately, the German retreat was accompanied by much vindictive and wanton destruction of railway property which had not any military or strategic importance, and this was their last attempt to systematically annihilate the railway economy of France. While in 1940, saboteurs of the French Underground movement were content to render bridges and viaducts unusable by damaging them in such a way that they could be repaired if necessary, the Germans, in their anger, carried out total destructions. For example, the very piers of such important big structures as the bridge over the River Loire at Montlouis, near Tours (on the Paris-Bordeaux line) were destroyed, there being nothing between the two banks of the river until after the Allied landings.

By summer, 1944, the year of France's liberation, the balance-sheet of her railway material was as follows: More than 100 large stations and nearly 1,000 smaller passenger stations entirely destroyed. Twenty-four of her largest marshalling-yards totally destroyed. Seventy-four large goods-yards destroyed out of a pre-war 130, and four large locomotive repair works out of the ten existing before the war, put completely out of action. Fifteen coach and wagon repair-shops out of a pre-war twenty destroyed, together with 668 signal-boxes; 8,750 miles of main-line tracks were

RAILWAYS IN WARTIME

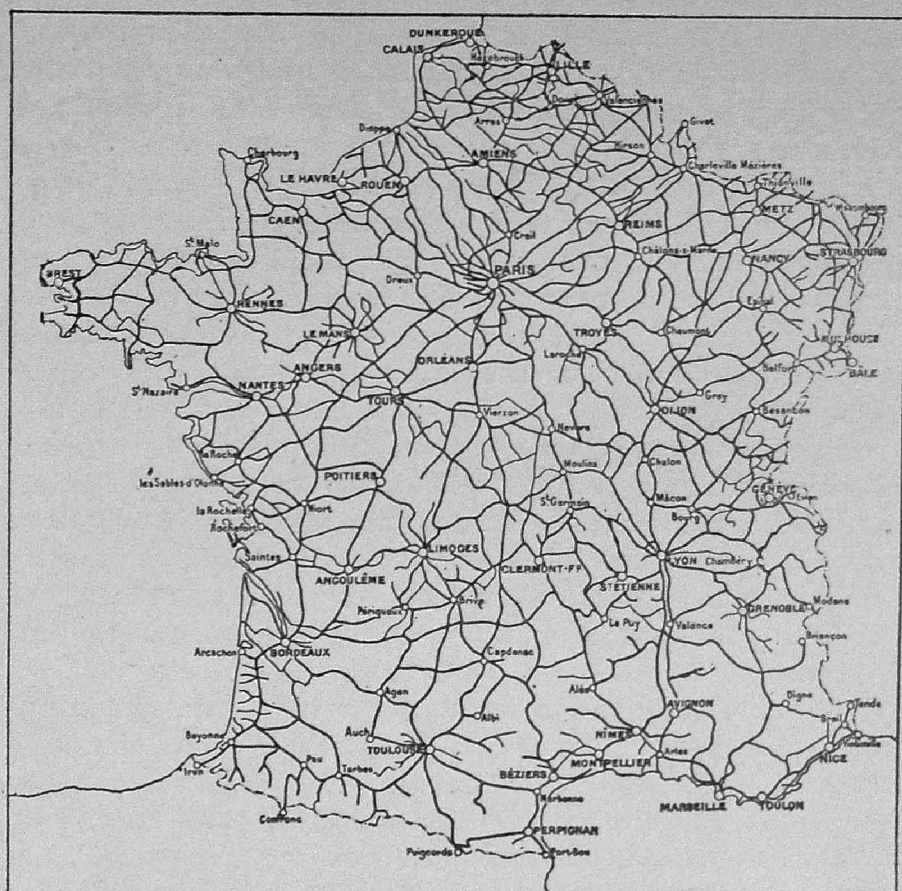


The Railways of France at the time of Liberation, 1944

rendered useless, largely by the wrecking of 2,603 bridges and viaducts; 931 main-line routes and 534 less important ones were thereby made unserviceable. Of these bridges, 127 were over 100 metres in length and of the viaducts, all were over 300 metres long, such as those at Maintenon and Barentin. On electrified lines, 5,000 miles were rendered useless by the wrecking of their overhead catenary systems, and out of 66 sub-stations, 20 were completely put out of action.

By the time the Allied armies were landing in France, the depredations of the Germans had reduced S.N.C.F.'s pre-war stock of 17,000 locomotives to 10,500, of which only a mere 3,000 were in working order, and of nearly half a

THE RAILWAYS OF FRANCE IN WORLD WAR TWO



The Railways of France after two years of concerted reconstruction, 1946

million wagons in service before the war, only 240,000 remained, of which 68,000 were unserviceable. Confiscation by the Germans, the work of French saboteurs, and Allied air bombardment were jointly responsible for these appalling losses of vital rolling-stock.

The problem facing S.N.C.F. was a double one: first, to build up stocks of raw materials, the shortage of which was general, and second, to repair the lines so as to assure that the people got their food and that the Allied armies were assisted as much as possible in their advance eastward. Thanks to the devotion and zeal of its officers, S.N.C.F. speedily got the trains going again in the most important

areas north and north-west of Paris. Bridges were temporarily rebuilt in wood or with army materials and the assistance of army engineers. For example, the line from Cherbourg to Caen was repaired by the Americans, who also controlled it and even put on some civilian trains as a good gesture which was more than appreciated by the local inhabitants.

Three days after the troops of General Leclerc entered Paris on 28th August, 1944, the first train entered Gare St. Lazaire station. It had come from Cherbourg by an extraordinarily roundabout route via Mézidon, Alençon, Le Mans, Chartres, Dreux and Maintenon; and a few days later, restoration of a skeleton suburban service permitted Parisian workpeople to get to and from the city more easily.

By 1st October, 1944, it was again possible to travel from Paris to Lyon, Marseilles and the coalfields of the North, while two months later saw the restoration of most of the main-line services, thus putting Paris once again in railway communication with the rest of the country. Terrific efforts were made to bring this about. For example, the big bridge on the Paris-Toulouse line at Orleans was repaired sufficiently to take slowed-down traffic by 20th November, 1944, while the day after, Maintenon Viaduct, on the Paris-Le Mans line was put in service, and on 25th November, the Nord line bridge across the River Oise at Verberie was carrying traffic.

The main line between Paris and Dijon, which had been cut at many points, including the blowing-up of Blaisy-Bas tunnel, was running again by 7th February, 1945, and three days later a temporary wooden bridge was opened across the River Loire at Montlouis; this very heavy constructional work permitting trains to run over the normal pre-war Paris-Bordeaux route. Indeed, the year 1944 and the commencement of 1945 was a period during which most of the main lines were re-established, and the end of the year 1945, the year 1946, and the spring of 1947, one during which most of the destroyed bridges and viaducts were permanently rebuilt.

By the beginning of 1948, French railways were beginning

THE RAILWAYS OF FRANCE IN WORLD WAR TWO

to look something like they did before the war, and it was at about this time that S.N.C.F. took a very important decision. If any particular line had been heavily used or very badly damaged to such an extent that it would not carry fast traffic, or that traffic had to slow down at points where damage had been exceptionally severe, it was considered uneconomical to attempt major repairs, particularly if these would be heavy. Such lines were considered impossible to reconstruct and were therefore abandoned.

By 1946, locomotives were being repaired at the rate of forty a day, and later, 1,500 new locomotives received from the United States and Canada were put into service.

Overture to Victory

AFTER DUNKIRK, events on the Continent moved with lightning swiftness. Less than three weeks after the start of the evacuation, Paris was occupied by the German troops and eight days later the French Government had signed an armistice with Hitler,¹ who had already invaded Denmark and Norway on 9th April, 1940. With hostile shores across the English Channel and the North Sea, Britain was faced with the imminent threat of invasion – perhaps on a large scale.

Under the lash of dire emergency, events in Britain also began to happen with incredible speed – events which inevitably affected the railways in one way or another. Precautionary anti-invasion measures were taken, including the formation of the Local Defence Volunteers (L.D.V.), which almost 100,000 railwaymen joined, the Southern Railway being possibly the first British public utility company to form its own battalion. The enthusiasm of the men was boundless, for during the whole war period, over 156,000 were enrolled.

To deny railway communications to the Germans in the event of a landing, hundreds of bridges,² including the Forth and Tay bridges, were mined preparatory to immediate demolition if necessary, even the Forth and Tay bridges being so treated. Later, anti-tank ditches and miles of concrete blocks appeared, over 1,000 such barriers being constructed, in conjunction with the military authorities,

¹ See Footnote p. 135, Chapter Twelve.

² No such elaborate steps were taken in the cases of the Royal Border Bridge and the vital roller-bridge at Northallerton.

across the strategic lines of Britain's railways. On the L.N.E.R., for example, ditches twenty-seven and twenty miles long, respectively, were dug flanking the main lines to Yarmouth and Aberdeen.

The railways also assisted the military by laying special tracks upon which travelled mobile coastal defence guns; adding additional decking to railway bridges to permit them to carry military road traffic if necessary; sowing minefields alongside stretches of coastal lines; erecting pillboxes and machine-gun posts, digging trenches, and erecting barbed wire entanglements at vulnerable points alongside the track.

Many precautionary measures were also taken in respect of the railways in the event of invasion, and in the formulation of these plans, due consideration was given to the confusion and congestion brought about on the Continent through the French authorities trying to remove too much rolling-stock ahead of the advancing German armies. So in Britain, locomotives alone were instructed to be moved, no locomotive or breakdown equipment was stabled overnight in coastal areas, Harwich engines, for example, being moved to Manningtree, and those of Hull and Scarborough to Selby and Malton, respectively.

As further precautions, every water-column and other vital item of line-side equipment was splashed with red paint at a vulnerable point, where it could be instantly immobilized in the event of enemy landings. Locomotives were to be derailed in emergency at the engine-sheds, vital valve-gear parts removed, and the lines destroyed at the outlet on to the main lines.

To guard against the destruction or seizure by the enemy of large stocks of petrol, no great quantity was permitted to remain overnight in a thirty-mile-deep coastal area extending from Plymouth to Newcastle-upon-Tyne. This restriction materially added to the difficulties of the railways by demanding that petrol supplies to this area had to be made during daylight hours. By reason of their geographical position, the railways which were most affected were the L.N.E.R. and the Southern.

RAILWAYS IN WARTIME

Apropos petrol supplies, in the early days of the war the vital fluid had been conveyed in odd tank wagons or in groups of tank wagons, which were run in ordinary freight trains from the West Coast ports to a dozen or more storage stations in Eastern England. From March, 1940, however, complete trainloads of petrol were programmed, the number of which rose from twenty-four in the first month on all four railway groups, to 120 per month in September, 1940, on the L.M.S.R. alone; and by September three years later, the number hauled by the latter company rose to almost 1,000 trains per month. This great movement of petrol took place in spite of the fact that in May, 1941, the construction of the first of seven east-to-west pipe-lines across England was begun. Indeed, the servicing of aerodromes with petrol was very greatly simplified when the total of 504 miles of pipe-lines had been constructed,¹ though over 47,000 tons of pipes, storage tanks and digging machinery had to be rail transported to bring about this added facility.

Then, for reasons which may be best elucidated by future historians, the threatened invasion of Britain never materialized. Maybe the cause of Hitler's decision not to invade was in no small part due to the movement of huge bodies of men to strategic areas, which took place in February and March, 1941. As usual, the railways had a big share in this 'rush-hour' traffic, just as they did in the complicated and mysterious troop movements of May the following year, when men, bridging materials, guns, tractors, and all the paraphernalia of war were brought from the remote Highlands of Scotland to the Isle of Wight – only to be taken back about three weeks later! The double journey may have seemed ludicrous to the railwaymen involved at the time, but three months later, on 19th August, came the abortive 'Operation Jubilee' – the unsuccessful landing by an Anglo-Canadian force at Dieppe, the only result of which was

¹ One pipe-line, over forty miles long was completed in thirty-six days – believed to be a world record.

the liberation and return to England of 340 natives of the town.

As the years of blood, toil, tears and sweat predicted by Prime Minister Churchill dragged on, tens of thousands of railway troop movements were made – from every conceivable place to every conceivable place, each movement needing the closest liaison with the military authorities and attention to the minutest detail. During 1943, for example, the L.M.S.R. alone carried no fewer than 51,392 parties of troops to specialized tank and armoured fighting vehicle training grounds in the North of Scotland; the A.F.V., or armoured fighting vehicle trains already mentioned being used to convey whole armoured divisions from south to north and back again.

Then, as from about August, 1940, came the beginning of the movement which eventually brought about the defeat of the enemy in North Africa and Tunisia. By November, 1942, this building-up of forces for transport to North Africa and the Middle East had increased in momentum to such an extent that 339 special trains were run for this purpose by the L.M.S.R. alone in thirteen days; the trains originating at scores of camps and depots scattered over England, Scotland, Wales, and even Northern Ireland.

The main ports used for the embarkment of the troops comprising 'Operation Torch', were: Clydeside (169 trains); Merseyside (173 trains); Avonmouth (12 trains); and South Wales (19 trains). Supposedly due to shipping contingencies and inadequacies, a tremendous amount of illogical, delaying and costly railway cross-haulage took place, troops being taken from Taunton to Glasgow; Liverpool to Avonmouth; and Preston to Newport, South Wales, for embarkation.¹

Large-scale military manoeuvres, leave trains, prisoner-of-war trains, and trains of repatriated British prisoners of

¹ Similar incredible and ridiculous railway cross-haulage persists today on a very large scale in freight traffic. The author has actually eaten fish in Cornwall that had travelled by rail from Grimsby, and the west-east and east-west rail traffic in potatoes in Southern England is well-known as being responsible for the very high prices charged for the vegetable.

war all added to the work done by the railways of Britain during those dark, tense years. Then in July, 1943, came the arrival of the first main contingent of United States troops, which, arriving in the Bristol Channel, the Clyde and the Mersey, were transported by train to camps all over the country.

And so four weary years dragged on, with Britain being frequently battered from the skies by a ruthless enemy. But by way of poetic justice, the very rubble produced by his air attacks on London in 1940 and 1941,¹ were used later to form the foundations for the runways of the scores of aerodromes built in East Anglia, from which British bombers left England to tear at the heart of Germany's railways and war industries. For four months, from April, 1943, three-quarters of a million tons of rubble from London bombed sites were taken to aerodrome sites in East Anglia by 1,700 trains.

After the rubble came demands for vast quantities of cement, slag, bricks and tarmac, and with their arrival came local traffic problems which seemed insuperable. It must be remembered that most of the stations in East Anglia had been built to deal only with local agricultural traffic, and now some of them were being suddenly called upon to handle over twenty-five times their normal pre-war tonnage. Moreover, farm produce was on the increase due to farms in the area redoubling their efforts to provide Britain with the food it so direly needed. The London and North Eastern Railway, in whose territory East Anglia lay, decided that the tremendous amount of extra traffic could not be dealt with unless additional sidings were laid. With eventual Ministry of War Transport approval, plans and estimates were dispensed with, and within three weeks, new sidings were in use at six sites and tarmac and slag being handled at the rate of 3,000 tons a day. Within a twelvemonth, over 46,000 wagons of airfield material had passed through those sidings, and when, in summer, 1942, American air personnel had to be transported to the newly-built airfields, the railways

¹ See Chapter Sixteen.

were ready for the task, the L.N.E.R. conveying 167,000 personnel to aerodromes in East Anglia alone.¹

Mention has already been made of the transport of petrol to East Anglian aerodromes, but it is interesting to note that *every* '1,000 bomber raid' needed 650 tank-wagons of petrol in 28 trains – roughly over two-and-a-half million gallons! And the bombs they carried? What did they mean to the railways? 362 wagons, in eight trains, carrying nearly 3,000 tons of bombs.² Such was the work of the railways of Britain and their staff – a magnificent effort without which the Anglo-American bomber offensive, with its 1,500,000 tons of bombs unloaded on the enemy, would have been a complete impossibility. Night and day, week in, week out, railwaymen of all grades saw to it that 'bomb specials' got through – 'regardless'.

By spring, 1944, although only a few top-ranking railway officials knew it, 'D-day' was drawing near. The vast operation on 'Overlord' had been conceived and planned to the minutest detail. Dozens of round-table railway conferences were held to decide time-tables and find paths for the continuous procession of special trains needed to carry our American allies from the ports at which they had landed to camps, and thence eventually to invasion marshalling centres near the coast, ready for embarkation to the Continent.

Speed and secrecy were the vital factors and the fantastic provisions made to ensure complete mobility are too numerous to mention. Whole trains of empty coaches and ambulance trains were stabled at strategic points, where erstwhile quiet country stations were speedily transformed into teeming centres of military activity. For example, one Southern one-train-a-day station near the South Coast finished up as a fully-fledged depot boasting its own tank engine and dealing with over 1,000 wagons a day.

¹ The 'softening-up' of German defences by allied bombing from British bases preparatory to 'D-day' (6th June, 1944), commenced in March, 1944.

² The average bomb-load of a composite force of 500 Flying Fortresses and 500 Liberators.

In the West of England, which was peacefully invaded by hundreds of thousands of American troops during the 'D-day' build-up, Drake's spirit kept constant vigil. Sleeping villages and quiet towns awoke and in place of the gentle agricultural traffic of peacetime, came days and nights when war traffic piled up to fantastic proportions and everything seemed to have a 'priority' label. The saga of these little stations where nothing ever happened in peacetime is one which perhaps may not be told in its entirety until half a century has passed.¹

Shadow factories and some of the largest aerodromes in the country were constructed in the outlying districts of the West of England, and the servicing of these with freight and personnel imposed a heavy burden on the railways, many stations with a pre-war passenger traffic which could be numbered on the fingers of both hands, being suddenly called to deal with hundreds of thousands of passengers and freight which increased many hundreds per cent. A few outstanding examples of such transformations may not be amiss.

At Dinton, the station serving the tiny valley village of that name, eight miles west of Salisbury, the 5,000 passengers using the station in 1938 had increased to 32,000 in 1943, and the number of wagons handled from 1,318 to nearly 10,000. At the quiet downland Wiltshire town of Tisbury, five miles further down the Southern Railway main line, passenger traffic rose from 16,300 (1938) to 73,000 in 1943, while wagons handled rose from 5,000 to 24,500; and still further down the line, Honiton Station's number of passengers rose from 48,000 in 1938 to well over a quarter of a million in 1943, wagon handling being more than doubled in number.

The old port of Exeter - Topsham, whose former glories included the furnishing of three stout wooden ships for Drake's fleet, had doubled its incoming, and trebled its outgoing passenger traffic by 1943; whilst at Woodbury

¹ Home Office and War Office records, dealing even with the 1914-18 war, are still not allowed to be published in full.

OVERTURE TO VICTORY

Road Station, also overlooking the Exe Estuary, there was the even more remarkable contrast between 16,000 passengers in 1938 and 255,000 in 1943!

In the heart of Dartmoor, in the shadow of Yes Tor, it was the same story – Bridstowe Station's 7,600 passengers became 50,000, and the number of wagons handled multiplied itself six times; while at Braunton, in North Devon, the 44,000 passengers of 1938 had increased to 200,000 in 1943, and freight was quadrupled. To achieve such fantastic figures station staffs often had to work right round the clock, but the spirit of the Men of the West was as strong and true during World War Two as ever it was in the days of the Spanish Armada. This was the railways' greatest hour. The whole nation was under test and if they had failed, there would have been no 'D-day' – and no Allied victory.

Not only from the military, but also from the railway, angle was speed the essential factor of this amazing get-together of men and arms, for two months only were allowed for the railways of Britain to carry out the concentration of troops and equipment at the invasion centres. The date finally fixed for the first movements was 26th March, 1944, and during the following two months, nearly 25,000 'invasion specials' were run – a number, which, by comparison with the 265,000 'specials' run during the previous fifty-five months of war, was indeed phenomenal.

May 10th witnessed the running of the first of a further 800 special trains – this time freight trains carrying stores, tanks, landing-barges, and a heterogeneous collection of heavy equipment. More than 30,000 wagons were needed for this work, excluding 6,000 special vehicles carrying out-of-gauge loads and moving only under special working arrangements.¹ Yet, specially labelled as they were, immediate priority was given to this vital traffic and not one wagon missed its appointed ship.

¹ Trains totalling 770 British and U.S. locomotives and rolling-stock for use on the Continent, formed a unique feature of 'D-day-Plus' train working. 21,000 wagons were also shipped overseas between 'VE-day' and 'VJ-day'.

As 'D-day' drew nearer, railway operations became more and more intense, until, during the three weeks before the dead-line, no fewer than 9,679 'specials' were run; the record week accounting for 3,636. And in all these movements, secrecy was not forgotten and many a long trainload of tanks and guns passed right under the nose of John Citizen, as he waited for his train to the City, without him being aware of any connexion with an impending invasion of the Continent. Rightly were these mysterious trains dubbed by railwaymen 'the Tarpaulin Armada', for it was under tarpaulin sheets that their war loads were concealed.

The month following 'D-day' (6th June, 1944) was the busiest the railways of Britain had ever experienced in their 140-year history. During those hectic thirty days they handled almost 18,000 special troop, military mail, and ambulance trains – 4,500 more than they had handled during the month preceding 'D-day'. So, with the Southern Railway bearing the greater part of the impact of 'D-day', the railways of Britain played their absolutely vital part in the greatest amphibian military operation in history – an operation, the aftermath of which was to strain their resources for many months to come, as they continued to transport by rail and ship to the Allied armies in Normandy the petrol and fuel oil; the food and sustenance needed to bring about victory.

Britain's Railways during the Blitzes

MENTION HAS already been made of the air-raid precautions made by railway civil engineers and of their plans for maintaining railway communications in an emergency, and as a result of their preparation they were never at a loss to cope with the most unexpected damage with the minimum of delay to traffic working. Indeed, by perfect co-operation between them and the operating departments, even extensive bomb damage and the consequent heavy engineering works involved were countered by the provision of alternative train routing.

It would require a score of books the size of this one to tell of the many thousands of recorded instances of railway bomb damage and of railwaymen's courage and heroism during the intense series of enemy air attacks with which they had to contend between June, 1940, and May, 1941 – the 'Year of the Blitz'. Only a brief resumé of some of the more important 'incidents' is possible – incidents in which trains were blown bodily from the track; signal-boxes blown to smithereens; locomotives blasted out of recognition; and quite large stations reduced to temporary shambles.

In 1940, London suffered most. The City knew what was in store for it, and in the late afternoon of 7th September, it came – in the form of 375 German bombers and fighters flying up the Thames from the East. On that glorious late summer afternoon and the evening that followed, Woolwich Arsenal, the great Becton gasworks, the docks at Millwall, Limehouse and Rotherhithe; the Surrey Docks; West Ham power-station; the City; Westminster and Kensington were heavily bombed, leaving a trail of desolation and fire.

Railway main lines east of Bromley-by-Bow were heavily damaged, whilst at West Ham an empty electric train received a direct hit and the platforms and tracks were so damaged that the station had to be closed for eleven months.

On the same day a high-explosive bomb fell on one of the 'up' main lines of the Southern Railway between Waterloo and Vauxhall, at a point where there are eight sets of tracks. It punctured the viaduct on which the lines are carried before reaching ground level and exploding, wrecking five sets of tracks and smashing a dozen motor-lorries parked in the viaduct arch. Traffic disorganization inevitably followed, but within ten hours, the two tracks farthest from the great hole in the viaduct were usable, three more being in service by 17th September; and the viaduct being repaired sufficiently for normal traffic by 1st October.

By six o'clock that memorable evening, the day raiders had gone, then some two hours later the first of the 252 night raiders that were to drone over London until half past four in the morning, appeared. Led to their dock targets by the huge riverside fires the day force had started, they fed the blazes with more H.E. and incendiary bombs, wrecking and setting on fire thousands of houses, factories, and the railway lines that run so plentifully near the river. At the conclusion of the twelve-hour bombardment, three of London's main-line terminal stations were out of action.

The following night the bomber procession began again; 200 bombers hammering the City of London and the East End for nine and a half hours. And so it continued for every night in that nightmare September. Railways and stations without number were hit; telephone exchanges put out of action; and gas, water and electricity mains cut – even hospitals and famous buildings were not spared in Hitler's plan for terrorizing London.

Through October, every night brought its air-raid on London, the worst one being on the 15th, when some 400 bombers dropped more than a thousand bombs on the capital, temporarily knocking out five main-line termini. Four days later, incendiaries set fire to the roof of the famous

Great Hall at Euston Station, while H.E. bombs wrecked platforms Nos. 2 and 3. St. Pancras Station was also hit for the third time in a single month, being on the last occasion, closed for five days.¹

From 7th September until 2nd November, London endured continuous air bombardment, during which, the most important, though not always the greatest amount of damage to railways, was that which brought about frequent and very extended hold-ups on the transfer routes between the four main-line companies and the Port of London Authority. Major interference with traffic exchange meant much more extra shunting to sort out the important priority traffic for dispatch by other and much more devious routes, which had the additional effect of blocking badly needed sidings with non-priority traffic until it could be handled. It must not be thought, however, that freight traffic alone suffered from the results of the chaos, for many of the heavily used suburban electric services of the Southern, L.M.S., and L.P.T.B. railways were also frequently seriously dislocated and often blocked. Indeed, no London worker during those hectic days, needed to offer any excuse for his late arrival at the office, but get to work they did, though late – and how? Only because of their own determination and the fantastic courage of the thousands of railwaymen who never faltered under the stark realities of the ‘blitzes’, and saved Britain’s railways from paralysis. The life of the nation was at stake and many railwaymen died at their posts keeping the lines open and traffic moving.

During the intense months of bombing, the Southern Railway suffered by far the most damage – particularly in the suburban area. Indeed, during the period September, 1940–May, 1941, no fewer than ninety-two ‘incidents’ occurred affecting the running lines between Waterloo and Queen’s Road Stations. This was the most bombed

¹ Five bombs fell on this station during night of 10th May, 1941, of which one was a 1,000 pounder which penetrated the basement and collapsed 20 ft. of King’s Cross tunnel under the station. Complete repairs were not finished until 7th June.

section in London, the next most intense area being the five and a half miles between Charing Cross and Cannon Street Stations and New Cross and New Cross Gate Stations (123 'incidents'); this being followed by that between Holborn Viaduct and Herne Hill Stations – a four-and-a-half-mile stretch which suffered sixty-two 'incidents'.

During the night of 19th April, 1941, a bomb hit Southwark Street Bridge (between Blackfriars and Elephant and Castle Stations), collapsing its 100-ft.-long main girders into the roadway and wrecking Blackfriars signal-box into the bargain. For a hundred yards on either side of the bridge the tracks were littered with debris and four electric and five other tracks were carried away. Yet the huge girders were cut up where they lay in the road and carried away, and within fifteen days a temporary bridge was in place and traffic resumed.

London Bridge Station, the low-level terminus side of which was partially destroyed, had the unhappy experience on 12th December, 1940, of having a delayed-action bomb fall alongside its 300-lever signal-box. The three signalmen were told to leave, but this they refused to do, saying that it was their duty to see the trains away and get waiting passengers to their destinations – and comparative safety. After working for half an hour, knowing that at any moment the signal-box might be blown sky-high, their work was completed and they left. The bomb was later removed and 'normal' running resumed.

It was on the Southern Railway that a rather battered leg of pork provided permanent-way engineers with their first clue as to the extent of damage caused by a bomb which fell on Surrey Docks on the night of 31st December, 1939–1st January, 1940. A bacon factory had received a direct hit from a bomb which penetrated the ground beneath the factory and finished up in a tunnel, where it exploded, blowing part of the contents of the factory – including the said leg of pork – out of one end of the tunnel!

Southern Railway London termini besides London Bridge also suffered. Waterloo, for example, was hit by sixty-six

BRITAIN'S RAILWAYS DURING THE BLITZES

Belfast	(1941)	15th April, 4th and 5th May.
Birmingham	(1940)	1st, 9th, 22nd November, 3rd and 11th December. (1941) 9th and 10th April.
Bristol	(1940)	24th November, 2nd, 4th, 6th December. (1941), 3rd and 4th January, 16th March, 11th April.*
Cardiff	(1941)	2nd January.
Clydeside	(1941)	13th and 14th March, 5th and 6th May.
Coventry	(1940)	14th November. (1941) 8th and 10th April.
Hull	(1941)	18th March, 7th and 8th May, 17th July.
Liverpool	(1940)	28th November, 20th, 21st, 22nd December. (1941), 13th and 21st March, 1st to 7th May (inclusive).
Manchester	(1940)	22nd and 23rd December.
Plymouth	(1941)	20th and 21st March, 21st, 22nd, 23rd, 27th, 28th, 29th April.
Portsmouth	(1941)	10th January, 10th March, 27th April.
Sheffield	(1940)	12th and 15th December.
Southampton	(1940)	23rd, 30th November, 1st December.
Swansea	(1941)	19th, 20th and 21st February.

Though London and the country at large suffered much railway damage as the result of bombing by piloted enemy aircraft, June, 1944, witnessed the start of the Metropolis's second ordeal by air – the 'flying-bomb'. Known variously as 'pilotless aircraft', 'buzz-bomb', 'doodle-bug', or 'V-1', the first of these flying missiles to fall in England dropped near Cuckfield Station, in Sussex, smashing the signal-box windows; and on 13th June, at 4.21 a.m., the first one fell on London, striking the L.N.E.R.'s four-track bridge over Grove Road, near Stratford, Essex. This was indeed the harbinger of things to come, for the damage was very serious and all tracks were not brought into use again for four days, during which period of rebuilding, trains were diverted from Liverpool Street to Fenchurch Street or terminated or started from Stratford.

The 'V-1s' came over at short intervals by day and by night, the real onslaught opening on the night of 15th–16th June, and continuing intermittently until 31st August,

RAILWAYS IN WARTIME

gradually decreasing in intensity as the launching sites along the Northern Coast of France were liberated by the advancing Allied armies. Some idea of the continuity of the attack can be gained from the fact that on 24th August the railways received thirteen 'imminent danger' warnings in three and a half hours!

As had been the case with ordinary bombing, the Southern Railway suffered almost as much as all the other main-line companies put together, the 'V-1s' falling on, or closely adjacent to railway property being distributed thus:

Southern Railway	528
L.N.E.R.	226
L.P.T.B.	149
L.M.S.	126
Great Western Railway	45
	1,074*

* Of this number, 74 were 'direct hits'.

One of the worst of many 'direct hit' incidents on the Southern Railway was that at which the bridge at Peckham Rye carrying the Holborn Viaduct to Nunhead line over the Victoria-London Bridge line was lifted by blast and demolished, nine and a half days of concentrated work were required to remove the debris and fit a new two-span, 110-ft.-long plate-girder bridge. Of this time, two days were spent in repairing, moving, and replacing high-tension traction-current and signal cables; this important work having to be done before the damaged bridge could be cut up by oxy-acetylene into handleable pieces for removal.

Even a resumé of the 'V-1' incidents on the Southern Railway is out of the question, but it may be said that in the vast majority of cases of flying-bomb damage to the railway, it was possible to resume traffic working within a few hours of the bomb falling, even though trains often had to proceed at walking pace. There is, however, one 'Southern' incident

which is more than worthy of some detailed description, referring as it does to the effect of a 'V-1' falling immediately ahead of an express train running at speed.

It happened one night in August, 1944, when the Kent Coast express from Victoria was running between Rainham and Newington in Kent. They were travelling at about 60 m.p.h. when the driver saw a 'V-1' come down and explode about two hundred yards ahead. He immediately slammed on his brakes, but before he could bring his train to a stand, it had reached Oak Lane bridge, which had been severely damaged by the explosion. Engine, tender, and the first coach passed over the structure, suffering no more than derailment about one hundred feet farther on, but the engine's weight brought down the bridge, with the result that the second coach was flung across the tracks; the third crashed across the gap; and the fourth came to rest with its leading end supported on one of the bridge abutments. It was a chaotic scene in which four bogies torn from the coaches were piled in the roadway beneath and the locomotive, tender and remaining coaches were scattered about the track on either side of the gap. Eight persons were killed, including a platelayer who happened to be on the bridge at the time, but in spite of the damage, the engineers had soon cleared up the mess, built a temporary bridge, and got the trains running again sixty-six hours after the 'V-1' fell.

It was on the Southern Railway that the railways suffered what is probably their greatest historical loss – that of the former power-house of the old Croydon Atmospheric Railway. This unfortunate incident took place when Forest Hill Station received a direct 'V-1' hit, which blasted the buildings around so seriously that they were too badly damaged for the station to be immediately reopened.

What is true of the hard-hit Southern Railway is also true of the L.N.E.R. and the L.M.S.R., which companies, together with the London Passenger Transport Board, took the major balance of the 'flying-bomb' attacks. In the case

of the Great Western Railway, the first serious incident occurred at its Minories (London) goods depot early in the onslaught, while the following day the G.W.R. and G.C.R. joint line was hit near Denham.

London Transport railways suffered serious damage when the viaducts carrying the Piccadilly and District tracks between Ravenscourt Park and Hammersmith received a hit which, though causing extensive chaos, was repaired sufficiently for trains to be run at 5 m.p.h. about twelve hours after the bomb fell. Unfortunately, two days later, another 'V-1' fell within a few yards of the first, causing further damage to the tracks, and although trains were kept running, it was not until six weeks had past that the speed restrictions could be removed. However, it was due to London Transport's first visit from a 'V-1' that they suffered rolling-stock damage when thirty-three coaches were blasted in their East Ham depot.

As is well known, a fresh source of disruption arose when, in September, 1944, rocket-bombs, or 'V-2s' as they were called, began to fall on London without a warning of any kind, and of the 358 incidents they caused, twenty-eight were direct hits, one of which demolished the underground freight yards at Farringdon Street, thus disorganizing meat arrivals and distribution at the adjacent Smithfield Market. In one of the thirteen rocket incidents causing damage to the L.M.S.R., the Germans claimed to have wiped out Euston Station, but fortunately, in one sense, some twenty years were to elapse before this grand old station was to be demolished to make way for a more modern structure.

All in all, the railways of Britain reported 9,239 'incidents' during the five and a half years they suffered the effects of air warfare, and of that number about one-third interfered only slightly with train running, the balance causing damage and serious delays – in 250 cases, amounting to more than a week. Rolling-stock also suffered; eight locomotives being reduced to scrap and nearly 500 damaged; 637 passenger vehicles being blown to smithereens and over

BRITAIN'S RAILWAYS DURING THE BLITZES

13,000 suffering repairable damage; and 3,321 wagons were completely wrecked and over 20,000 damaged.¹

And last, but not least, the unhappy loss of life among railwaymen during the attacks. 395 railwaymen were killed and 2,444 injured, the heaviest casualty roll being that of the Southern Railway, on which some 300 railwaymen and passengers were killed. In all, 893 railwaymen and others were killed on railway property, in spite of the fact that, by comparison with what took place on the Continent, the railways escaped any really serious major disaster.

¹ The most bombed British railway station was Poplar, in the East End of London, which suffered 1,200 high-explosive bombs, over 50,000 incendiary bombs, 43 flying bombs, and 9 rocket-bombs of which the last one fell in 1945.

Railways Abroad During World War Two

IT HAS been said that the railways of Greece suffered proportionately more damage than did those of any other country except Soviet Russia.¹ The country was invaded by Italy on 28th October, 1940, and almost instantly the railways were brought to a complete standstill by lack of raw materials, with the result that land communications were thrown into a state of complete chaos.²

Germany invaded Greece and Yugoslavia on 6th April, 1941, and until they leisurely withdrew in October, 1944, managed to keep the north-to-south line open, though it was many times put out of action by Allied and guerrilla forces. When the enemy withdrew, however, he carried out a very heavy programme of demolitions, destroying all bridges on the north-south line with spans of over 30 ft., and all large bridges and viaducts on the Peloponnese Railway. Moreover, at the time the country was liberated, over 90 per cent of the locomotives and rolling-stock had been destroyed, of which 80 per cent belonged to the Peloponnese Railway. All lines were not restored to service until the Edessa-Skydra section was opened on 1st December, 1950.

Before the war there were 1,350 miles of standard-, metre-, and narrow-gauge lines in Greece, together with 335 locomotives, 656 coaches and 5,586 wagons. But by the time Brigadier Brunskill arrived in Athens on 23rd February, 1941, to prepare for the arrival of the British Forces, there

¹ The Baskunchak to Leninsk line - the railway supply line to Stalin-grad is said to have been the most bombed railway in the world.

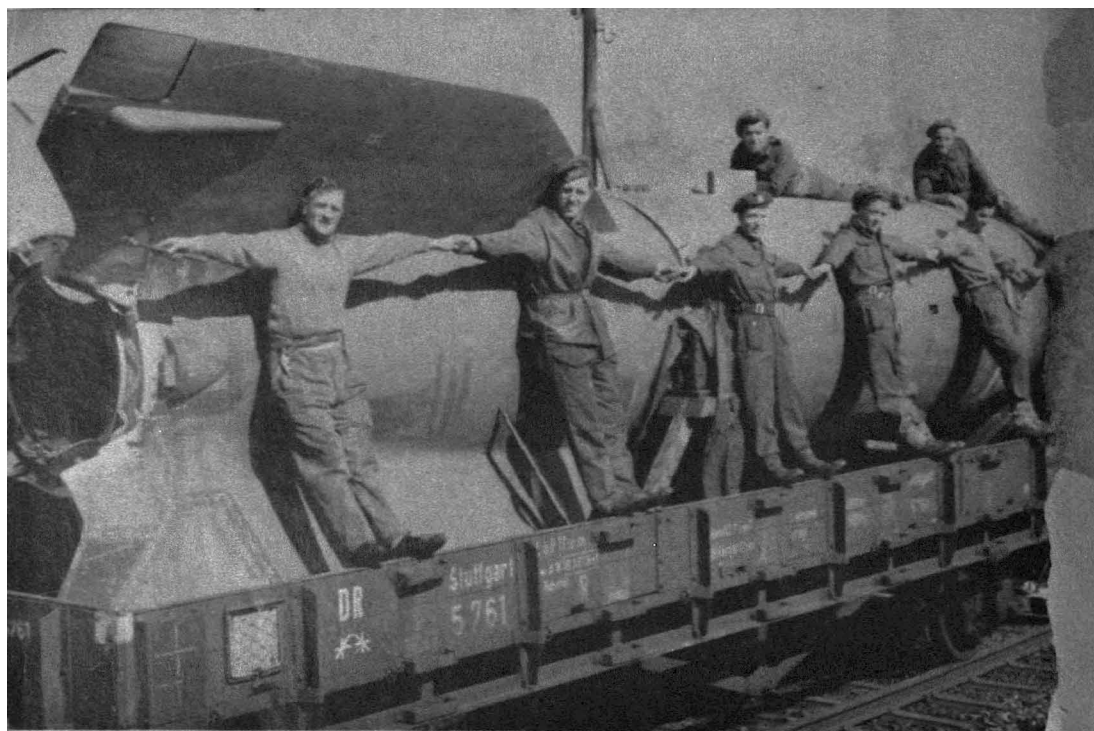
² Only four months earlier, the working of the Piraeus, Athens, and Peloponnese Railway had been taken over by the Hellenic State Railways.



Royal Engineers laying new track in Tunisia

German prisoners disembark from a train on their arrival in England





An undamaged V.2. rocket captured at Oyle while being carried on the railway

A ward on a British hospital train



were only 400 wagons available for his use, together with one seaport. The little port of Stilis, which was linked to Larnica by a standard-gauge line, was denied him because the Greeks wanted to use it in emergency for storing wagons withdrawn ahead of the German advance into Macedonia. At the time the Hellenic Railways were maintaining 100,000 Greek troops in Eastern Albania, supplying them through Florina.

Among the acts of railway sabotage carried out in Greece during the war, probably the most outstanding are those concerning the destruction of three large viaducts situated along the north-east side of the Giona Mountains in Roumelia. In order from north to south these were the Gorgopotamus, Asopos, and Papadia viaducts, which, in September, 1942, General Alexander considered it vital to destroy to immobilize the line between Athens and Salonica.

Plans of the Papadia and Gorgopotamus viaducts were obtained from Cairo and those of the Asopos viaduct from London, then the actual demolition work was carried out by Greek patriots with the assistance of ten British parachutists, including two sabotage experts; these being dropped at night from three Liberator aircraft. Gorgopotamus Viaduct, with its many 70-ft.-girder spans was the first to be demolished, after which the central steel arch of Asopos Viaduct was successfully wrecked. Papadia Viaduct, which had already been blown once during the withdrawal of Allied Forces in April, 1941, and then repaired by the Italians the following year, was not again destroyed on account of its exposed position not providing the necessary cover for the saboteurs.

In the case of Asopos Viaduct, however, the Germans soon got busy with repair work, employing Polish and Greek labourers who worked day and night for two months before the job was completed. The Germans had not counted with their forced labour gangs, for when they drove their first locomotive across the repaired bridge, the central pier collapsed, precipitating loco and span hundreds of feet into the ravine. Deliberate sabotage during construction had done its work. Two more months were needed to re-erect the fallen

span, so the Athens-Salonica line was out of commission for over four months.

The number of sabotage incidents such as those related is unknown and probably never will be known, but one and all they were devoted to assisting the Allied landings in Sicily, the exact date of which was not, at the time, known in Greece. For example, the line between Salonica and Larissa was cut at many places by British liaison officers assisted by guerrillas, and a large bridge destroyed near Dereli, in the hills north of Sperkhios River, the bridge collapsing just as a supply train was passing over it.

In Yugoslavia, which came under German domination at the same time as Greece, the story of railway destruction was much the same, though not so devastating. In 1938, the country boasted 4,556 miles of standard-gauge and 2,036 miles of narrow-gauge lines, but during the war, 56 per cent of the tracks; 80 per cent of the locomotives; 90 per cent of passenger and freight rolling-stock; 61 per cent of larger bridges and viaducts; 55 per cent of smaller bridges and culverts; and over half of the stations and freight-yards, were destroyed. This destruction was made as a result of what was virtually a race between the Germans, the Allied air forces, the National Army of Liberation, and the Partisan units.

At the time of liberation, no railway in the country was in working order, but after the war, provisional restoration was rapid, 75 per cent of the lines being reopened by November, 1945, in spite of the bottlenecks formed by destroyed bridges making a formidable difficulty when it was attempted to re-establish rail traffic. Some idea of the railway losses can be gained from the fact that 960 locomotives, 2,160 coaches, and 23,100 wagons were lost during the occupation.

In Czechoslovakia the story was much the same, the State Railways losing nearly 1,300 miles out of the 8,500 miles they had before the war.¹ Thousands of bridges, viaducts

¹ Czechoslovakia lost 2,285 miles of railway when the boundary territory of Sudetenland was ceded to Germany according to the Munich agreement of October, 1938.

and tunnels were severely damaged and had to be restored before services could be resumed.

Ever since 1903, when the Germans first revealed their intentions towards the Middle East, the story of Iraq (Mesopotamia) between the World Wars had been a complex one of diplomatic manoeuvre, patience and greed, and by the time Hitler came to power in Germany, he too cast envious eyes on Iraq, with its vital oilfields. At the beginning of 1941, Vichy-controlled Syria – a convenient stepping-off point for German fighting aircraft operating against Iraq – was too far from German-dominated Europe; hence the German Balkans drive of spring, 1941. As is well known, in April, 1941, they invaded Greece and their drive for the domination of Iraq had begun. Soon the enemy was thrusting towards Athens, whilst in Africa, they were crashing eastward and locked in a struggle with British and Commonwealth forces in Ethiopia. The German menace to the Middle East was increasing, and as the weeks went by, the enemy swarmed over Crete; surged towards Cairo; and entered Brest-Litovsk, on the Russian front. It was at this juncture that the British Government decided to send General Quinan to Iraq to develop the port of Basra and to develop the security of railways and all other means of communication from Baghdad to the Transjordanian frontier and northward to Mosul.

'British Troops Iraq',¹ as the force was at first called, found that the metre-gauge line between Basra and Baghdad (built during World War One) had been most effectively cut by the rebels, whilst the line to Syria and Turkey, being standard-gauge, would not take metre-gauge rolling-stock; thus through-running between Basra and Syria and Turkey was impossible. Great were the railway developments which would have to be made to cater for the transport and maintenance of the 'at least six divisions' of troops envisaged as necessary to meet the German threat.

Three miles up-river from Basra was Maqil, the terminus

¹ This force landed on 7th May, 1941, and it was not known as 'Paiforce' (Persia and Iraq Force) until September the following year.

of the Iraq State Railway, with its docks and sidings laid out for handling packed dates and a small quantity of general cargo; and behind the dockside buildings stretched a thousand miles of desert. Yet this was the port at which locomotives, rolling-stock, and the materials, tools and equipment for building railways would have to be landed. This was the port through which General Quinan had to start creating the defence of Iraq.

Soon ships began to reach Maqil and disgorge military stores for North Iraq, but these could not be forwarded because the line to Baghdad was in half a dozen pieces and within a few days the little docks were piled high. Then a rather antiquated armoured train was captured and put into repair by the efforts of the Royal Engineers working in a shade temperature of 100° F. With this vehicle in use, the reopening of the railway became feasible, the 'armoured train' covering repair parties as they slowly worked their way forward; and by 16th June a detachment was advancing on Baghdad by rail.

From Baghdad the troops then pressed on another 200 miles to Mosul, along the recently sabotaged metre-gauge railway, and eventually with the taking of Qamichliye, the whole of the railway as far as the Turkish frontier was in British hands. Then the advance was halted, for the men were short of food and rifles and nearly four hundred road vehicles were out of action by collisions in sandstorms, broken springs and enemy bombing. Trains of flat cars were sent up the line and came back loaded with wrecked British and captured Vichy lorries, and meanwhile the British were pushing into Palmyra; the British, Free French, Australians and Indians were heading for Aleppo and Damascus; with the British Navy moving steadily in their flank. By 12th July, the great German plans for Syria collapsed when an armistice was signed at Acre.

Long before they were thus thwarted in Iraq, the Germans' covetous eyes turned on Persia, where the largest source of petrol in the world, outside America, existed at the oilfields of Naft-i-Shah and Masjid-i-Sulaiman. Here they thought

the British Commonwealth could effectively be split in two. Here they could win the war outright, breaking a geographical link which was vitally important now that the Soviet Union had ranged itself against the Axis Powers. This wishful thinking had to be countered, and countered it was by the building of a railway to what has often been called the Back Door into Russia.

The shortest road distance from the port of Basha to the Russian-Persian border at Dzhulfa is over 1,000 miles – a thousand miles of treacherous, waterless deserts; of mountain ranges alternately snow-piled or blotted out with rainstorms; of malarious marshes and hostile, nomadic tribesmen. To build a connecting railway under such hazardous conditions would, in normal times, have taken the best of civil engineers about five years, yet, after Winston Churchill had promised the Russians they would get help, they were in no position to wait five years for it. The Germans had crashed across their western frontier and were pushing eastward. Speedy assistance was vital and an additional supply route to that to Murmansk and Archangel, would indeed be welcome. Not only so, from the Allied point of view, British resources would be insufficient to check the German advance should the Russian armies suffer a major defeat and the enemy swing south to try and cut the Iraq-Persian supply corridor.

Persia's tiny harbour of Bandar Shahpur, to which the 865-mile Trans-Persian Railway came down through the mountains via Teheran from the Caspian Sea, boasted only a single jetty where only two large ships could be berthed at one time. Speed in unloading was essential, so more ports had to be found, and railway developments proceeded at great pace. A branch-line was built from Samawa to Karbala, which was the terminal of the branch from Hindiya, and from Hindiya to Baghdad a standard-gauge track was laid, thus connecting the Hindiya depots direct with Mosul without break of gauge.¹ A barge wharf was also built on the east bank of the Tigris at Baghdad with a railway link

¹ The through standard-gauge line between Basra and Tel Kotchek, on the Syrian frontier was opened on 15th July, 1940.

from that city to the Khanaquin line, and an additional 125-mile line from Kut-el-Amara to Baghdad was finished in seven months. The terminal layout at Bandar Shahpur was also remodelled.

By now, ships from the United States and Britain were crowding towards Persia and it soon became evident that the Trans-Persian (Iranian) Railway, even after these developments, could never be adequately fed through one, or even two very poor ports. So a line was built from Ahwaz to the deep water of the Shatt al Arab at Khorramshahr – a line over flat country subject to flooding and needing many bridges and flood-culverts. Sleepers were cut from the Northern Persian forests and permanent way stores arrived from overseas, with which railway specialist units, working under shock-troop conditions laid many miles of sidings in the Shuaiba area and linked up a lighterage berth at Failiyah with the main line. When all this was finished, the railway to Russia was being fed from the sea by three ports instead of by one.

Thus it was that, with the possible defeat of the Allies well in mind, planners, surveyors, engineers and constructional companies created a port system 'from scratch' in a desolate country with an exceptionally cruel climate. Moreover, everything they required for the mighty job had to be brought some 15,000 miles by sea around the Cape of Good Hope. And, while the job was in progress, ships kept on bringing supplies, which were dumped anywhere and everywhere, thus adding to the general chaos.

By October, 1941, the one-time bottleneck at the ports had developed into one in which the railway itself was involved. As it was, it could carry only 200 tons of freight a day, while a dozen times that tonnage would have to be carried to be of any real use to the struggling Russian armies. Even with more locomotives and rolling-stock, there would have been a safe limit to the number of trains running in either direction on a single line; yet to have attempted to double the track throughout would have been a colossal task which would have taken many years. Additional

passing-places, marshalling-yards and storage sidings were the only obvious solution to the pressing problem – a problem which might be better understood by studying the terrain through which the line passes on its way to the Russian frontier.

One of the greatest railway engineering feats in the world, the Trans-Iranian Railway crosses 150 miles of sun-baked desert after leaving the mud-flats at Bandar Shahpur, then continues to wind upward through and across gorges with the 12,000-ft.-high peaks of the coloured fantasy of the Luristan Mountains for another hundred miles, boring through them by 130 tunnels until a height of 7,000 ft. is reached. Then for another 250 miles it falls some 3,000 ft. to Teheran, after which follows 300 miles of impossible railway country and the crossing of the Elburz Mountains on gradients as steep as one in thirty-six with another whole series of magnificent bridges, and straight and spiral tunnels. This, then, was the new life-line to Russia.

As has already been mentioned, new locomotives and rolling-stock were sent out from England to supplement the existing German Ferrostall engines, but when they arrived it was soon found that their injectors refused to deliver water to the boiler when the temperature of the tender water stood at over 103° F. So the tenders were painted white, which cured the trouble, but there were more problems. Persian water corroded the water-gauges; sand-boxes – so necessary on the mountain sections – proved too small; and steam pressure-gauges would not stand up to the excessive temperatures. Skilful doctoring and re-vamping was needed to get the engines into suitable state for tropical conditions and – oil-firing.

Then some Baldwin engines arrived from the United States, but these too had to be similarly treated. Screw couplings replaced buck-eye ones; coupling-rods, connecting-rods, and big-ends converted from oil to grease lubrication; and electric headlamps fitted for use in the many long tunnels. Stores were short and skilled men all too few, yet special tools were made out of old rails and gland packing

made from old tennis-nets purchased in Teheran bazaar. Everything was necessarily extemporized – it was completely impossible to organize on a long-term basis.

As to the wagons which arrived from England in sections, it was found to be impossible to use them in the mountain sections as they were not fitted with brakes. More wagons arriving from America in the summer of 1942 were also insufficiently braked and their couplings not strong enough to stand up to the one in thirty-six sections of the line. Only scientific checking of train-weights in the marshalling yards before they left on the journey, provided a solution to this braking problem. And as most of the shunters and pointsmen in the yards were illiterate, sorting had to be done by colour-coding the different roads and putting corresponding colour-splashes on every wagon to be sorted. Even in time-tables and operating rule-books, colour was used successfully to overcome the handicap of the language barrier.

On the civil engineering side, forty new passing-loops were blasted out of the rocks – some on one in sixty-six gradients, and many new sidings, crossovers and shunting-necks installed at Teheran, Andimishk, Ahwaz, Khorramshahr and Tanuma. It was a huge programme in which the Persians did the earthworks and the British laid the tracks. The supply of locomotive water was also a very real problem. There was more than enough, but most of it was so 'hard' that it soon started to fur the boilers of the engines. As a result, engines often had to wait for an hour or more in the mountain sections while water was sucked from a near-by mountain stream. This in turn made it impossible to plan traffic schedules exceeding the passage of eight loaded trains a day.

Guarding the mountain sections of the line was also a problem, an Indian Garrison Company watching and fighting to protect the line and to patrol the tunnels. Many were wounded and some lost their lives in the ghastly game of hide-and-seek with bandits and passing trains in the tunnels. Every loaded train carried its own armed guards and field security men who were linguists. Some idea of the

RAILWAYS ABROAD DURING WORLD WAR TWO

conditions under which this line was run can be gained from the fact that while the temperature in the mountain sections fell to many degrees below zero, at Andimishk Station, a few miles from the second hottest place in the world – Dizful, the shade temperature stood for weeks at 130° F. during the hottest Persian summer on record – 1942.

Locomotives ran short of water – had to leave their trains run on miles to tanks and return; scores of drivers and firemen went down with heat-stroke; sanding gear got jammed with the heat and drivers and firemen had to scatter sand by hand in front of spinning driving-wheels. Tunnel working too, was difficult in 1943, before some American diesel-electric locomotives arrived on the scene. Engine crews of the triple-headed steam trains were almost asphyxiated by the fumes of their engines until they learnt the trick of stoking up, opening the regulators, wrapping a wet cloth round their faces and climbing down on to the footsteps. Even then they sometimes nearly lost consciousness when one of the engines started slipping and filled the tunnel with deadly fumes. In such cases, the train had to be nursed back down the grade and another ‘rush’ made, perhaps three or four times before the tunnel was negotiated.

But the trains got through, even though often late. The Germans were at the gates of Stalingrad.¹ The Russians needed supplies and they were going to get them. And the railwaymen of ‘Paiforce’ saw to it that they did – 5,000,000 tons of it!

In the Far East – in Malaya and Burma, World War Two also had devastating repercussions on the railways, which, in the case of Burma, suffered further damage during the insurrections which took place a few months after the country’s independence had been declared on 4th January, 1948. Indeed, it was due to this insurgent activity that railway reconstruction after the Japanese occupation was so seriously retarded.

Soon after the fall of Burma and Malaya in 1942, the

¹ Stalingrad surrendered and 20,000 German troops were isolated, 31st January, 1943.

Japanese High Command decided that the line of communication between these two countries must be improved. Neither roads nor railways existed through the impenetrable jungle, and their first effort was to commence the construction of the now world-famous Burma-Siam Railway. To carry out the building of this 300-mile line the Japanese used a labour force composed of some 60,000 Allied prisoners of war and native Asians estimated conservatively at 500,000 the line being begun in October, 1942, and completed almost exactly a year later.

So ghastly were the living and working conditions among these unfortunate men that out of the 60,000 Allied prisoners of war, over 12,000 died along the railway track, their remains being buried in its acres of embankments; in its cuttings, sidings and wayside halts; whilst of the half-million natives, over one-fifth starved to death. Every trace of this line has now been covered by the ubiquitous jungle and of the line of P.O.W. camps strung out along its fever-ridden 300 miles, nothing remains.¹

A similar terrible state of affairs occurred during 1941-42 on the French Trans-Sahara Railway (Niger River to the Mediterranean). During this period the Vichy Government made 373 arrests for treason on behalf of the Germans. Of these unfortunate men, 344 were sent to work on the railway, together with foreigners who had previously enlisted in the Foreign Legion. There, under incredible working conditions, they starved and died, doctors being even forbidden to dress the wounds of their comrades – wounds which were caused by the constant floggings received from their guards.

For over two years the Japanese had the Malayan and Burmese railways mostly to themselves, and they used them. Then on 17th May, 1944, General Merrill's Marauders made a surprise attack on the Japanese-held airfield at Myitkynia, the northern terminal of the railway running southwards through Mandalay to Rangoon.¹ The struggle for Myitkynia

¹ A few of the cemeteries in the Myitkynia Station area have been rescued from the advancing undergrowth by the Imperial War Graves Commission.

Station was a fierce one in which the Japanese were forced back literally foot by foot, the last stages of the attack being fought out between the Allies in four freight vans and the enemy in the next four vans in the same train as it stood in the station goods-yard.

More Allied successes followed and by October, Lieut.-General Sultan's troops were marching down the 'railway corridor' alongside the main line from Mogaung to Naba Junction, near Katha on the Irawaddi River at the rate of two miles a day. It was the first time during the Burma Campaign that they had a railway running along the line of their advance, and they made good use of it, for as soon as they came to the line, American Engineers fitted flanged wheels to a couple of army jeeps and put them at each end of a half a dozen wagons to form a 'push-pull' train. Indeed, one of the sights of the Burma war was to see General Festing's smiling six-foot-six screwed into the leading jeep, driving his own Headquarters train!

Not long after, the R.E.M.E.s rummaged around and from salvaged Burmese railway wagons, some British motor engines and some Japanese gear-boxes, produced two admirable locomotives, which were appropriately named 'Windsor Castle' and 'Lancaster Castle'. Makeshift though they were, either of these 'Heath Robinson' power units would haul a dozen loaded wagons at 40 m.p.h. – providing the ruling gradient was downhill and there was a following wind!

During the latter stages of the Burma Campaign, the Bengal-Assam Railway was badly bombed, for railway traffic from India soon began to assume immense proportions. Through India, and west of the Bramahputra River, this traffic was the sole concern of the Indian Command, but once over the river it became the direct responsibility of the south-east Asia Command; to supply the needs of which a railway originally designed to cope with a few tea trains a day was suddenly required to shift 6,000 tons a day into Manipur and twice that weight into Ledo – west of the Burmese frontier, besides troop, leave, and medical trains.

'Movements and Transportation', which was the Allied Land Forces organization for shifting forward the ground supply for troops, handled over 2,500 tons of railway repair materials and also three 70-ton 'MacArthur' locomotives, which latter made the 300-mile journey by road from Dinapur railhead to the Burmese lines. Trailers were used, and an 18-ton mobile crane travelled with the convoy to lift the tail of the big engines round the bends in the road!

Railway communication along the Bengal-Assam railway in India, was very poor. The line ran from Chittagong, via Dinapur to Ledo, roughly parallel with the 'front' in Burma, but its distance away from it meant that it could only be tapped for supplies at Chittagong (for the Arakan sector of the front); at Dinapur (for the Manipur sector); and at Ledo (for the northern sector). Moreover, to reach any of these military railheads, the line from Calcutta, besides changing from standard gauge to narrow gauge, had also to cross the lower Ganges or the Bramahputra. As neither of these rivers were bridged, men and materials had to be detrained; often ferried downstream for many miles; and then re-trained on the eastern bank. Moreover, be it said that crossing a half-mile wide river running with an eight-knot current was no easy task, particularly in view of the fact that during monsoon weather it would rise 37 ft. in a few hours!

Howbeit, as the victorious campaign went on, roads were built from the three railheads to outposts on the frontier, some of them being driven through swamps and forests and others winding up precipices 8,000 ft. up in the clouds. But in spite of all odds, the railways of Burma got running again, though, as has already been mentioned, they were to suffer yet again when the country attained independence as a Republic.¹

¹ The Burma Railways were originally constructed by the Indian Government, and on the separation of India and Burma in 1937, they became autonomous - the Burma State Railways.

The Aftermath of the War

THE STORY of the reconnaissance, repair and operation of the railways of North-western Europe after the total surrender of the Germans on 'VE-day', 8th May, 1945, is an enthralling one far too long and involved to be dealt with in detail in this book; but some of the outstanding features of rail transport rehabilitation may be of more than passing interest. There was much to be done, for during the last five months of the war, the devastated railways of France and Belgium had been carrying twice as much freight for the military as for the civilian population, who had had to manage with only 15 per cent of their railways. Moreover, the total railway freight tonnage was only half what it had been before the war.

The survey, repair, and bringing into operation of a railway line of communication from the vicinity of Caen into Belgium and Holland was the first job of prime importance to be tackled by 21st Army Group Transportation Services, and this involved the repair or total rebuilding of over 100 bridges over the rivers Orne, Seine, Somme, Maas, Rhine and Ems, as well as over the as yet blocked Albert Canal. Later, came connexion between Antwerp and the Channel ports with Germany. This was a purely military line of communication, but the organization and rehabilitation of the railway system as applied to civilian transport in the liberated territories was left to the local civil governments working with assistance from the military when the latter organization required temporarily to use the lines for military purposes.

In Germany itself, however, where no indigenous local

or national government remained, the whole onerous responsibility for the restoration and running of the railways – and, indeed, the roads and canals as well – rested upon the Allied military authorities. Bearing well in mind that at the time of the German surrender, out of nearly 8,000 miles of railways in the British Zone alone, only 656 miles could be operated, due to over 1,300 bridges having been demolished.

The problem facing the victorious armies was a truly gigantic one of very pressing urgency – a problem much complicated by the fact that few or no German railwaymen were discovered west of the Rhine. Obviously, until that river had been crossed, indirect control of the German railways was out of the question. All seven pre-war bridges over the river in the British Zone had been destroyed, thus the selection of a railway crossing was governed by the choice of a site for a new bridge. A point near the German-Dutch frontier was eventually selected, where only a short length of new track would be needed to connect with the Arnhem-Emmerich-Wesel line on the north bank of the river, a line already existing to an oil refinery on the opposite bank. Work begun on the new 2,340-ft.-long bridge on 7th April, 1945, and was completed in the incredibly short time of one month and a day, through running over the 175 miles to Bremen being established on the opening of the bridge, the first train east of which had already run a fortnight earlier.

By now the conclusion of fighting had begun to transform the main task of the railways from one of maintaining fighting forces to the transport of Allied prisoners of war needing repatriation; to the movement of tens of thousands of displaced persons; to the returning of disbanded German soldiers to their homes, to the mines, or to work on the gathering-in of the harvest.¹ German war material had also to be moved and coal from the Ruhr had to be collected and distributed all over liberated Europe – and, indeed, in

¹ Nearly half a million people were moved by rail and road in this operation 'Barleycorn'.

Germany itself. In face of such weighty commitments, only the complete revival of the pre-war German railway network could suffice, and as such a revival was outside the bounds of possibility on a short-term basis, road, river and canal transport had to carry their share of the common effort.

The railway staff problem was eased when a hundred or so railway officials and senior staff of the German Ministry of Transport were located in two isolated trains in the Hamburg area, but it was as yet uncertain whether any central railway organizations run by German officials were to be constituted. Then, with the finding of another railway direction team at Oldenburg, German-operated controls were set up at Cologne, Wuppertal and Essen, and the direct operation of the German railways passed from the British Transportation Services to the Germans themselves.

Throughout June, July and August the amount of rail traffic increased, though under extremely congested conditions brought about by the single-line bridge at Bad Oeynhausen, over the River Weser, on the Lönne-Hanover line through the British Zone. Moreover, until the main line from Hanover, via Gottingen to Cassel could be brought into use, all traffic for the United States Zone had perforce to be routed over the overworked Löhne-Bad Oeynhausen-Hanover line. By the end of July, however, the Gottingen route was open and by mid-August the bridge across the Weser had been duplicated.

By now more troubles had begun to develop – the acute shortage of freight rolling-stock – particularly wagons, so marshalling-yards which had been reduced to a shambles by Allied bombers were combed for the wreckage of burnt-out and blasted freight rolling-stock, any of which that were repairable being hauled away across the bomb-cratered yards for manœuvring on to temporary rails. Tank transporters were ideal for bringing such vehicles from isolated railway tracks. Later, completely wrecked wagons were cannibalized to provide parts for building more wagons.

During those eventful days the most important rail-handled freights consisted of flour, wheat and biscuits from

Antwerp and Hamburg; potatoes from the Ruhr, Celle and Uelzen; and salt from Denmark; yet with the important exception of coal, the railways were able to meet all military government demands. In this respect, it was not only wagon shortage that was to blame, the delay in emptying wagons in countries receiving coal from Germany also contributed its quota to the difficulty. None the less, the hungry miners of the Ruhr were fed, if poorly, and the coal they hewed, without which food could not be processed, stored, or distributed. In fact, it may be said that the feeding of the civilian population of the British Zone revolved around the problem of feeding the Ruhr. Without the railways, inadequate as they were on their own, it would have been impossible to stop famine sweeping through this industrial area.

Small reserve stocks of meat, fish and fats were rounded up in Hamburg; stocks of sugar in Hanover; and these, together with trains of live cattle were run from Schleswig-Holstein to the half-starving Ruhr area. Later, 700 tons of butter, 500 tons of fruit and 6,000 tons of sugar from Magdeburg, followed, together with 1,300 tons of pedigree sugar-beet seed to produce the commercial seed from which to grow the source on which the whole of Western Germany depended for its sugar supply. In all, forty-six 'sugar evacuation' trains moved some 36,000 tons of this vital commodity.

A few days after the sugar referred to above had been removed from Magdeburg, that town became included in the Russian Zone and the major problem of feeding the populace of Berlin became an acute one, made all the more difficult by the fact that the railway bridge over the Elbe at Magdeburg had been demolished by Allied bombing. Food trains for the British Sector of Berlin thus had to be deviously routed from Antwerp, via Hanover and Helmstedt to the Russian Zone frontier, where they were handed over, the Russians working them to Magdeburg, where they were unloaded, shipped across the river, and reloaded on trains for Berlin. For one week in July, before a new bridge had

been built at Magdeburg, more trains were arriving at the Russian Zone than the Russians saw fit to allow to pass, and during this critical period 1,000 tons of food a day was brought to the British Sector from Brunswick by army road vehicles.

Such a complicated trans-shipment system would have been out of the question as regards coal transport, so during the early and critical period referred to, twenty-two trains loaded with over 18,000 tons of the vital fuel, found their way from the Ruhr to Berlin by way of Honebach and Leipzig; though after the reopening of the Magdeburg bridge, many took the shorter route. British and American food trains and Ruhr coal trains soon began to pile up at the Russian Sector frontier until, by the middle of August there were no fewer than thirty-two waiting in the freight-yards at Helmstadt and Brunswick. Within a fortnight, however, the position had improved and with no trains waiting, the British had sent 69,000 tons of coal in eighty-six trains, into Berlin; and had also carried over 94,000 tons of food, of which over 34,000 tons were potatoes.

Came the winter of 1945-46, and the German railwaymen knew their own railways well enough to realize that if the trains did not run, they themselves would also starve – and freeze. Coal and food were indeed vital, but they were by no means the only things with which the railwaymen had to contend. There were an estimated 11,000,000 refugees or displaced persons in the liberated countries, speaking twenty different languages, of which there were about 2,500,000 within the British Zone of Germany.

For most of these tens of thousands of unfortunates, repatriation – either west to east, or east to west – was their only thought; for many others how to avoid repatriation was their main consideration. But whatever the hopes of the individual, the railway authority's main headache was that whole trainloads could arrive unannounced and un-time-tabled at any hour of the day or night. And, often as not, they arrived starving and packed twenty or more to an open wagon, with only a 'jerry-can' of water, a bucket, and

perhaps a lighted brazier and a sprinkling of straw on which to sleep.

Moreover, that was not the only problem of the German 'eisenbahnhofmeister', for seeing around them in the station yards the now defenceless Germans at whose merciless hands they had for so long suffered, murder and food-looting were often quite common occurrences with which the station staffs had to deal before military controls or the re-armed German police were called in to restore order. Yet, from the whole of the scene of what had been the S.H.A.E.F. war theatre, nearly 2,000,000 persons had been transported home to their countries; whilst the Russians repatriated about 4,500,000 persons. And in this vast criss-cross movement of people, the railways of Germany, France, Belgium, Holland and Russia played a very significant part.

To rightly appreciate the conditions under which this work was carried out it must be remembered that for many months before 'VE-day' the Allied air forces had been doing everything within their power to bring the railways of Germany to a complete standstill. Precision bombing of bridges, viaducts, marshalling-yards, and freight rolling-stock had had the desired effect. But desolation was made even more desolate by the railway destruction carried out by the Germans themselves during the last weeks of the war, in the vain hope of halting or delaying the inexorable Allied advance. So it was that but for the aid of military engineers and materials, the reconstruction of the German railway system would have been carried out at a much slower pace, and with disastrous repercussions on the civil population at large.

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And so, down the years from the very inception of railways, in times of war railwaymen of all grades from the humblest platelayer to the top executive, have given of their best. Nor did they count the cost, for many tens of thousands of that loyal band paid the supreme price for their patriotism, locomotives like 'Valour' and 'Remembrance' being duly

decorated with appropriate plaques to keep their memory evergreen.

And for the future, what can be said of the rôle our railways may be called upon to play should there be yet a third holocaust? If the present wholesale closure of the railways of Britain continues at its present rate, previous history makes it only too clear that our inland transport conditions will inevitably be in a very chaotic state. Indeed, Britain at war, without her railways, does not bear thought.

By the same token, our mass transition from steam to oil-driven railway motive-power can, in the event of any future upheaval, place our country at the mercy of the nations from which we import our locomotives' lifeblood – oil. Today it can be truly said that Britain has all its transport 'eggs' in one basket, whilst home-produced coal, which does not demand precious shipping-space in wartime, is allowed to stock-pile to the tune of tens of millions of tons, being sold to the domestic user at a price over twenty times greater than it cost a century ago.

As to what are the underlying economics of such a state of affairs, who shall say? One thing is certain, however; taught in the cruel schools of the past World Wars. Without railways, Britain could have won neither conflict. At home and in almost all overseas theatres of war, the Allied campaigns could never have been brought to a successful conclusion without them; and this is just as true of Burma as it is of that grand railway epic, Dunkirk – British railways' finest hour.

APPENDIX ONE

Details of L.S.W.R. Locomotives sold to the War Office during 1914-18 War

Classes '395' and '496'.¹

Shipped to Palestine in 1916:

Nos. 71, 148, 159, 164, 166, 172, 395, 399, 401, 502
507, 510, and 513.

Shipped to Salonika (Serbian State Railways) in 1916:

Nos. 134, 157, 175, 435, and 511.

Shipped to Mesopotamia in 1917:

Nos. 156, 174, 402, 403, 443, 498, 500, 504, and 505.

Shipped to Palestine in 1917:

Nos. 27, 28, 30, 158, 396, 398, 438, 444, 497, 499, 501,
503, 508, and 514.

Shipped to Palestine in 1918:

Nos. 168, 434 (thence to Mesopotamia), 437 (thence to
Mesopotamia), and 512 (thence to Mesopotamia).

Shipped to Palestine in 1918, but sunk in transit:

Nos. 105, 165, 404, and 406.

Class '415'.²

No. 488 was sold to the Government for use at Ridham
General salvage depot, Sittingbourne, Kent (September,
1917). It was re-sold to the East Kent Railway in 1919,
where it worked as No. 5 until 1946, when it was re-
purchased by the Southern Railway to become No. 3488.
It was still in service in 1949.

¹ Designed by William Adams and built 1881-6, these 0-6-0 tender
classes had 5 ft. 1 in. driving-wheels, 17½ in. × 26 in. cylinders and were
affectionately known as 'Jumbos'.

² Designed by William Adams and built in 1885, these 4-4-2 tank
engines had 5 ft. 7 in. driving-wheels, 17½ in. × 24 in. cylinders, and
were known as 'radial tanks'.

*Details of L.B. & S.C.R. Locomotives lent to the War
Office during the 1914-18 War*

Class 'E-4'.¹

Shipped to France and worked behind the lines around Arras:

Nos. 470, 481, 498, 504, 506, 516, 518, 562, 563, 564, 565, and 580.

¹ Designed by Robert John Billington and built 1897-1903, these 0-6-2 tank engines had 5 ft. driving-wheels and 17½ in. × 26 in. cylinders.

APPENDIX THREE

Details of Ambulance Trains in Great Britain (Spring, 1915)

Two Great Central trains of nine bogie vestibule coaches converted from ordinary stock at short notice (fitted dual brakes).

One Great Eastern nine-coach train equipped at Stratford.

One Lancashire and Yorkshire train, fitted with telephones.

Four L.N.W.R. four-coach trains, each with three ward-cars and one administration coach.

Two Great Western trains.

One L.S.W.R. train of converted ordinary stock.

Two South Eastern and Chatham trains of converted stock.

Two Midland nine-coach trains (handed over to Royal Army Medical Corps).

One Great Southern and Western (Ireland) train with ward-cars converted from 50 ft. parcels vans (built at Inchicore Works).

One Great Northern (Ireland) nine-coach train of converted stock.

One North British seven-coach train of poorly-equipped stock.

There were also many North Eastern 'rest vans', fitted up from 15-ton covered goods wagons, and 'ambulance vans' from 25-ton covered wagons, which were intended for the conveyance of wounded by ordinary passenger trains from the north-east coast to Selby and York hospitals.

A 'Commissariat Train' was also designed by the G.E.R. at Stratford Works which could supply bread and roast or boiled meat every four hours to 2,000 men. Absolutely self-contained, the train was fed with steam from the locomotive and water from the tender, its make-up being: Boiling and steaming van, baking and roasting van, store van, staff van, butchers' van, refrigerator and guard's van.

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