



Baldwin 2-8-2 No.46224 at the Open Air Steam Locomotive Museum, Ankara, Turkey. Works No.64511 of 1942.

COLONEL HOWARD G. HILL AND HIS TWO LOCOMOTIVES

BY DAVID HARRIS

It is a popular misconception amongst British railway enthusiasts that the World War II Baldwin 2-8-2 and USA 0-6-0 tank locomotives were designed and procured by the United States Army Transportation Corps. This is not so. The procurement was done by the Chief of Engineers, US Army, by the personnel of the Railway Branch, Office.

Major Lewis T. Ross was Chief Engineer, assisted by Reserve Officer Captain Howard G. Hill, Chief of Branch Walker Redmon (a civilian and long-term member since before 1926) and a young stenographer, Raymond Baxter. It was Captain Hill who designed the Baldwin 2-8-2s and 0-6-0 tank locomotives.

It was on 29th July 1940 that H. G. Hill was ordered to active duty as a reservist to the Railway Branch, Office, Chief of Engineers, US Army, Washington, DC. He was the first reserve officer at that time to be ordered to active duty from railroad work. He was commissioned a First Lieutenant in the Reserve on 1st May 1923 because he had previous railroad experience: he started his career as an apprentice machinist in the workshops of the Texas & New Orleans Railroad and after five years became a mechanical engineer.

The Railway Branch occupied one large wing on the first floor of the new War Department building at 23rd Street and Virginia Avenue, NW (North West quadrant of Washington DC). One of the first jobs Major Ross asked Hill to undertake was to study the design of a 2-8-0 steam locomotive and six types of freight wagon, all intended for military railway use. This equipment had been undergoing development, designs and detailed drawings having been produced for about fifteen years! The drawings were examined carefully by Hill, who gave his opinion to Major Ross that considerable revision was required to make them suitable for use on

rough military railroads.

However, no action was taken at the time. It was a few months later that 24 of the wagons in their original design form were delivered to Claiborne-Polk Military Railway, this being a training facility in central Louisiana. There they were tested in conditions that might be found in active service, on poor track. Each wagon had four semi-elliptical springs which were so inflexible that derailments were frequent. So unsuitable were they that they were placed on a length of isolated track and used as static storage units, with no more being built.

In March 1941 Captain Hill was promoted to the rank of Major and he frequently acted as Chief of the Railway Branch. In April 1941 Ross, now a Lieutenant-Colonel, instructed Major Hill to prepare a requisition for the purchase of eight 2-8-0 steam locomotives "to use up available funds before the end of the fiscal year". The requisition was processed and the locomotives were built by the Lima Company to the design on the prepared drawings. These drawings were produced prior to July 1940 by the Corps of Engineers.

Another locomotive design had been prepared, also by the Corps of Engineers. This was an internal combustion mechanical transmission 0-4-0 with jackshaft drive to the four coupled wheels. The pneumatic clutch was a new and untried design. Again, no thought had been given to military service conditions of working on poor track. A quill-type drive was needed (but not fitted) for absorbing the shocks from the driving rods. Only one locomotive was built for trial purposes but its preliminary trials showed it to have an

unsatisfactory performance – it disappeared quickly and was never seen again!

On 13th September 1941 while Major Hill was acting as Chief in the absence of Lieutenant-Colonel Ross, Major R. Hart-Davies, Royal Engineers, British Army staff, came into the office. He presented a Lend-Lease requisition for 50 Pershing 2-8-0s for use by the British Army in the Middle East. Their primary use was to be on the Iranian State Railway which railway ran from Bandar Shahpur at the head of the Persian Gulf northwards through Tehran to the Caspian Sea port of Bandar Shah. A large amount of supplies for the Russian Army was carried by this route. This was a line with rails weighing between 67–75lb per yard only, with severe gradients and curves and with a maximum height above sea level of 6,800ft. Bridge loadings were low and the ambient temperature reached 133 degrees Fahrenheit. The feed water in tender tanks became hot and required special injectors, while in addition the atmosphere was dust and sand laden, meaning bearings would need maximum protection.

Major Hart-Davies said of the Pershing 2-8-0s, "these were jolly good locomotives". Major Hill commented that the Pershings were good First World War locomotives, but for World War II a new design with modern improvements was required. He stated that he would not approve an order for obsolete locomotives. He suggested a lightweight locomotive with a wide firebox over a trailing truck in order to provide greater boiler capacity – very necessary on the long Iranian gradients. Major Hart-Davies objected, saying "We do not use trailing trucks in England." Major Hill then reached a book from the shelf,



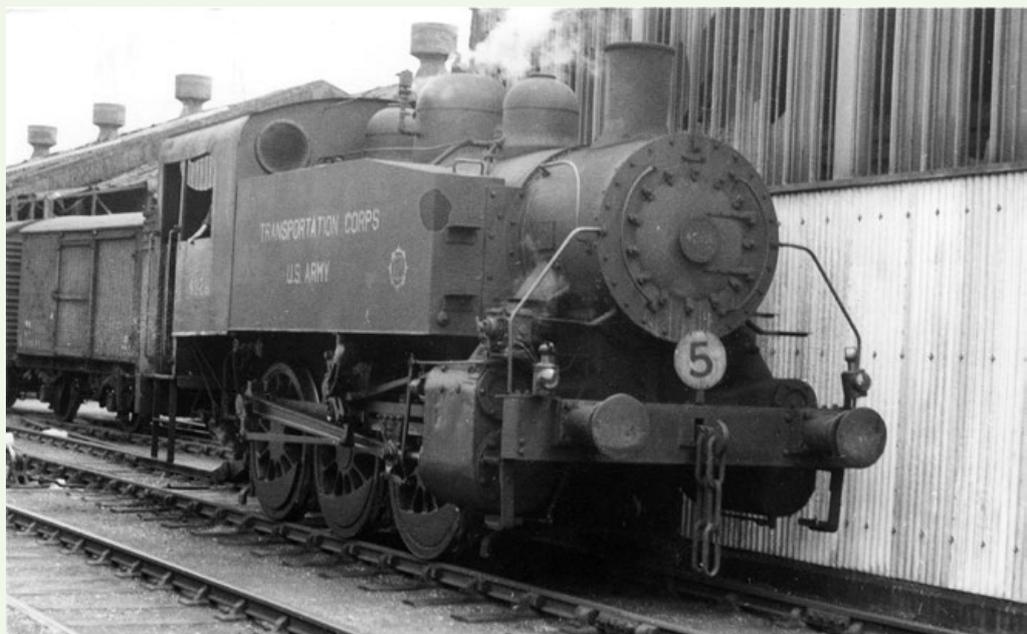
British Locomotive Types, published in 1937. This showed locomotives of the four British companies with either two- or four-wheeled trailing trucks!

As there was a great degree of urgency with the assignment Major Hill suggested they visit the principal locomotive builders in order to find out if they had recently built a 2-8-0 type of suitable weight and size for which drawings, patterns and templates were available to permit rapid production. Major Hart-Davies approved of this and travel orders were obtained and seats booked on the Pennsylvania train that night. It was Major Hart-Davies's third night in the USA and the journey in the Pullman dining car was an eye-opener for him. After British wartime rations the Pullman dinner was marvellous, while he was impressed by the size and speed of the locomotives.

Next morning they visited the Lima Company where they were met by the Vice-President of Engineering who, upon hearing their requirements, took them to the Drawing Office. He showed them drawings of the 2-8-0 from the April 1941 requisition, but it needed the boiler moving to improve the centre of gravity. The cylinders needed redesigning, plus other modifications, in order to produce a satisfactory locomotive. Eight redesigned locomotives were built by Lima, but they only did yard work!

It was an inescapable conclusion that the fifteen years of design works prior to 1940 had only produced one unsatisfactory 2-8-0, one useless petrol-mechanical 0-4-0 and six types of freight wagon which derailed easily! Therefore before any rolling stock and locomotives could be built for World War II use, new designs would have to be proposed and this duty was assigned to Major Hill, who considered it a privilege.

The Lima Company had nothing suitable so the two men went on to the American Locomotive Co., Schenectady, NY; again there was nothing suitable for the Middle East. They continued down to Eddystone to see if the Baldwin Locomotive



0-6-0T No.4326 at Southampton Docks on 30th June 1948. Built by the Vulcan Iron Works of Wilkes-Barre, Pennsylvania, in 1943, it was purchased by the Southern Railway in 1946 and later became BR No.30074. (T. J. Edgington)

Co. could help but it too had no suitable 2-8-0 design. Major Hill asked Charles Krause, one of its design engineers, about suitable 2-8-2 designs. Krause first produced a photograph and then a drawing of a lightweight 2-8-2, only two of which had been built in 1924 for the Montana, Wyoming & Southern Railroad. These two locomotives were mainly used for hauling coal. They had 56in diameter driving wheels, 22in x 28in cylinders, 185psi boiler pressure giving 38,000lb of tractive effort and weight on driving wheels of 153,760lb. So close was this design to what Major Hill had in mind that he telephoned the master mechanic of the Montana, Wyoming & Southern and enquired about performance and reliability and learned that they were satisfactory in every respect.

Before leaving the works Major Hill made some swift calculations and asked Krause to produce a line diagram for a 2-8-2. It was to be similar to the one just studied, but to embody

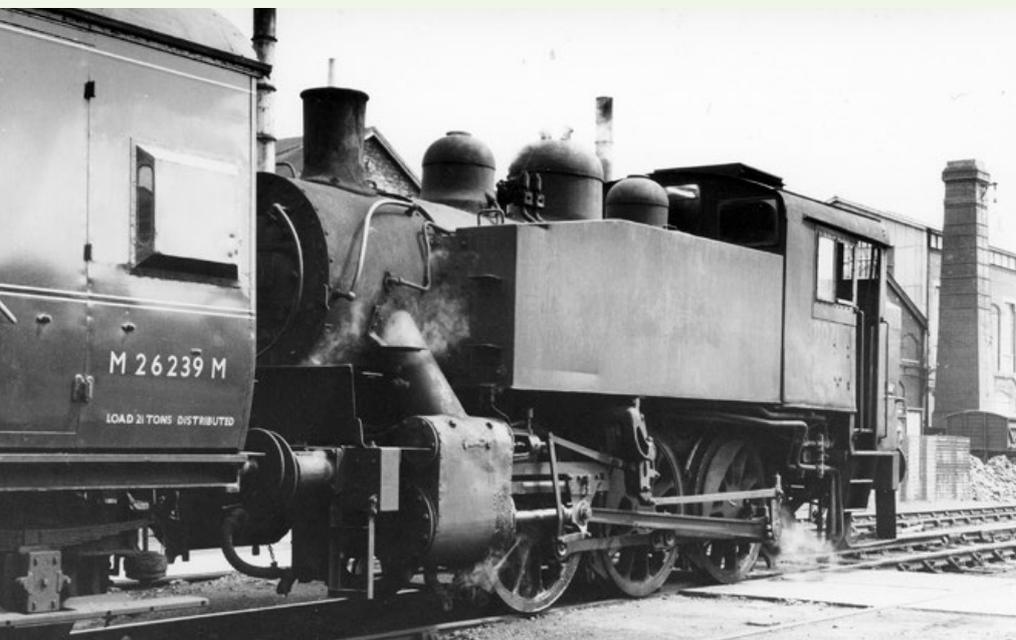
the necessary changes to meet Middle East requirements. Larger diameter driving wheels would be needed than those on the base model – as well as giving a slower piston speed to reduce wear, on certain railways (Turkish for example) lineside objects could be hit by the back end of the main driving rod. This would not be provided by 56in diameter driving wheels – therefore 60in was specified. Boiler pressure was 200psi; axle load was limited to 36,000lb. Major Hill received the diagram from Baldwin Company on 17th September 1941.

In different operating conditions this would have been a fine machine. It had cylinders 21in x 28in, driving wheels 60in diameter, a conical boiler and a combustion chamber 33in long. Boiler pressure was 220psi which at 85% Mean Effective Pressure gave a tractive effort of 38,500lb. However, the weight on the driving wheels was estimated to be 160,000lb and this weight would exceed the bridge loading limits. Major Hill rejected this submitted design owing to the weight of the locomotive plus the inclusion of a combustion chamber, which would make maintenance difficult in the field where workshop facilities were limited.

On 21st September 1941 a new diagram arrived from Baldwin, upon which Major Hill exclaimed "Just what the doctor ordered!" The general dimensions were the same, but now the boiler was a 'straight-top' of 200psi pressure, no combustion chamber and a tractive effort of 35,000lb at 85% MEP. The weight on the driving wheels was estimated at 144,000lb which was within the prescribed limits. A copy of this diagram was sent promptly to the Ministry of Supply in London where the design was quickly approved. Meanwhile, Major Hart-Davies submitted a requisition for a further 150 locomotives to that design to be built on this order, making a total of 200 locomotives.

Immediately the diagram was approved Colonel Ross ordered Major Hill to concentrate on the preparation of design details and complete the specification for the locomotives.

'USA' tank as Southern Region No.30071 shunting stock at Eastleigh on 9th May 1964. (T. J. Edgington)



This would include types and makes of all the ancillary equipment, such as injectors, lubrication pumps, valves etc. However, as soon as word got out that the Baldwin Company had received this large order, all the sales representatives from the equipment companies descended on the Railway Branch, Office. The office was a large open room and screens were erected around Major Hill's desk to 'insulate' him from the sales representatives. Another officer at a nearby desk interviewed the salesmen – some of whom pounded on his desk and insisted on seeing Major Hill – but to no avail.

When Major Hill prepared his specifications he referred to special equipment and ancillaries by brand or manufacturer's name. The items were selected for their suitability, not to give any one manufacturer the business. However, salesmen or company executives threatened to contact their congressman or the Chief of Engineers. Colonel Ross and Major Hill had to go over the specifications with a Colonel Supply Officer who read back to them every detail of every item; when he came to the Hennessy Mechanical Journal Lubricator he insinuated that a lot of business was going to the Hennessy Company. Colonel Ross spoke quickly and forcefully, saying "You should not have made that statement, Colonel! It was entirely uncalled for!"

The subsequent decision not to name parts by the manufacturer resulted in extra work in producing the specification orders. A detailed technical description had to be written omitting brand or manufacturer's name. By specifying mode of construction and method of working only, each item could be identified as coming from a specific manufacturer. The revised specification consisted of 40 single-spaced typewritten pages and, when completed, was sent to the Supply Branch for purchase orders to be prepared.

The Baldwin Company was asked to build thirteen coal burners and 57 oil burners, making 70 in total. The American Loco Co. was asked for fifteen coal burners and 45 oil burners, making 60 in total, while the Lima Co. built six coal burners and 64 oil burners, totalling 70 – thus making the grand total of 200 locomotives. All the coal burners were for Egypt.

A great regret of Major Hill was that *he never saw one* of these 2-8-2s before they were shipped to the Middle East! He had planned to go to Eddystone on Sunday 29th March 1942 to see one being test run in the yard at Baldwin's – but was marooned in Alexandria, Virginia, by 20in of snowfall. The next day he had to leave for Mexico City on a new assignment as Chief, US Mission on Mexican Railways.

In the early part of 1943 excellent reports of the capabilities of these locomotives were sent back from the field of operation. 584 2-8-2s were built for Indian Railways during the years 1943, 1945 and 1948 to the 5ft 6in gauge, thus making a class total of 784 locomotives.

Major Hart-Davies visited the Railway Branch, Office, on Friday 7th November 1941, bringing a Lend-Lease requisition for 50 Baldwin World War I shunting locomotives (switchers) of 0-6-0 notation. At a meeting with Colonel Ross later that same day Major Hill stated that he thought a new design would be better. The requisition also contained a request for several

Late in their careers several 'USA' tanks received Southern-style malachite green livery for their roles as works shunters. Departmental Stock No.DS236 (formerly No.30074) was photographed at Lancing Carriage Works on 21st August 1963.
(Roy Hobbs)

thousand freight wagons of four- and eight-wheel design and Colonel Ross ordered Major Hill to give priority to this requisition.

The 0-6-0 shunting tank had to be rugged, simple and easy to maintain and repair in the field, so special materials and economy devices were sacrificed to achieve this. The locomotive was designed in a few hours by Major Hill. For the freight wagons he decided that the eight-wheeled ones should conform to the Association of American Railroads and Interstate Commerce Commission standards. The brakes, coupling gear, buffers etc were designed to British/Continental standards, as was the loading gauge. The four-wheeled ones were treated similarly.

Nearly 450 0-6-0 shunters were built by the Porter Company, the Vulcan Company and the Davenport-Besler Company, seeing service in Great Britain, the continent of Europe and in North Africa. At a later date Major Hill was promoted to Colonel.

In 1957 H. C. Casserley produced a book entitled *The Observer's Book of Railway Locomotives of Britain* in which he attributes the 0-6-0 design to the US Army Transportation Corps. The writer of this article has a personal letter dated 24th December 1969 from Colonel Hill to the writer's late friend L. C. Brooks, in which Colonel Hill says he is somewhat disturbed by a leaflet that Brooks had sent him about a new preserved railway in England where they were perpetuating the myth by calling them '0-6-0 USATC' locomotives! In his letter Colonel Hill explains that The Transportation Corps was set up by US War Department General Order No.38, dated 31st July 1942. The personnel of the Railway Branch, Office, Chief of Engineers, were not transferred to the new organisation until 23rd November 1942. By this time most of the two types of locomotive had already been built and shipped overseas!

