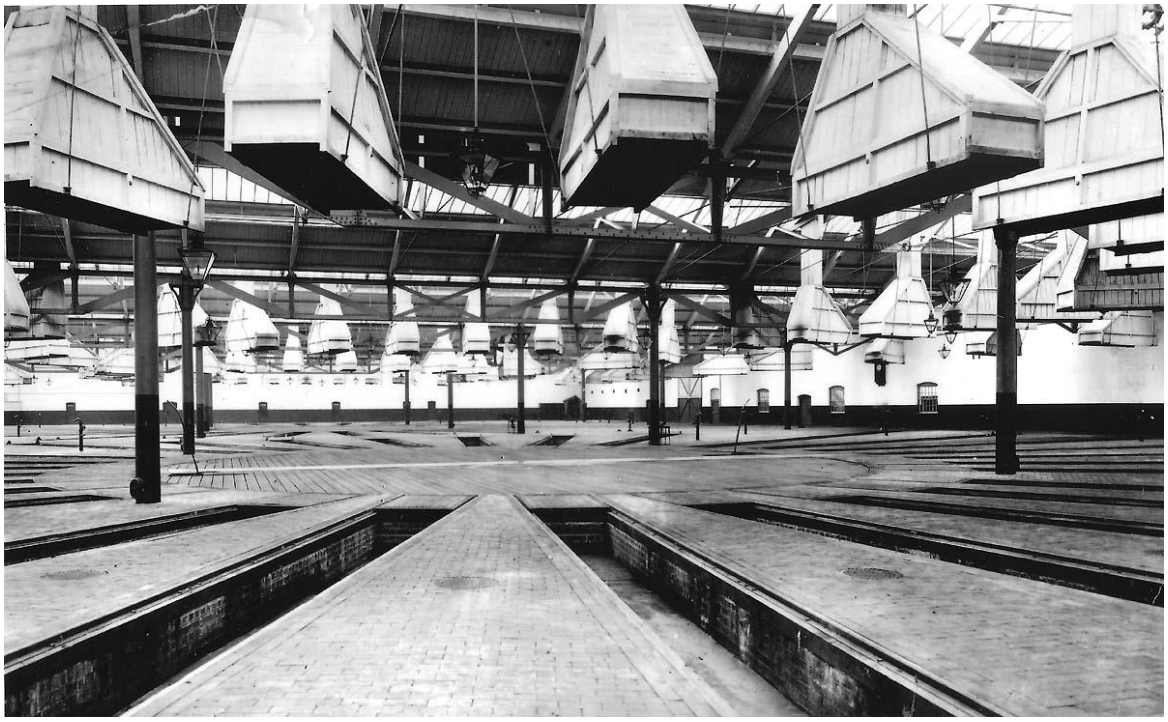
The Tyseley Turntables

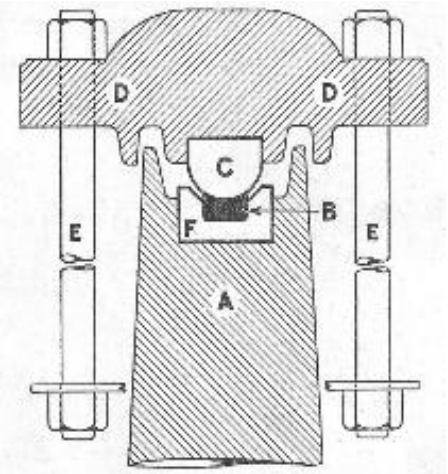
Tyseley Locomotive Depot (TYS) opened in July 1908, replacing an earlier four road straight type Engine Shed at Bordesley. The new depot was built to a standard modular design introduced by the Great Western Railway's Chief Mechanical Engineer - Mr GJ Churchward and was similar to that built at their main Old Oak Common Locomotive Depot outside London (except that Tyseley only contained two Running Sheds). These two Running Sheds were contained in a single building, 220 feet (67.0m) by 360 feet (109.7m). Space was reserved behind the building for another pair of Running Sheds. The Running Shed nearest the main line was designated the Passenger Shed and the other the Goods Shed. Each was centred on a turntable with twenty eight roads of varying length radiating out in a star pattern. According to the Great Western Railway magazine, the new Locomotive Depot at Tyseley could provide accommodation for approximately thirty-six tender and twenty-eight tank engines. In practice these numbers were exceeded almost immediately. In 1908 Tyseley shed had 72 allocated locomotives, increasing to 106 allocated locomotives in 1930 and 116 allocated locomotives in 1947.

Inside the Running Sheds, each road was provided with an examination pit below and one or two smoke troughs above. The standard examination pit depth was two foot, six inches (762mm) measured from the rail level and the pit width was three foot, eleven and half inches (1207mm). The pit walls were constructed from faced blue Staffordshire engineering brick on a concrete base. These walls were one foot, one and half inches (343mm) wide supporting bridge type rails on longitudinal timbers. The dimensions of these timbers were twelve inch (305mm) wide by six inch (152mm) deep. The base of the examination pits were covered in blue brick paving laid with a shallow slope to a channel along the middle of the pit. The channel drained any water into the covered catch pits placed approximately thirty feet (9.14m) apart.



Around each turntable a six inch (152mm) water ring main supplied water to hydrants, which were provided adjacent to every pit. Hoses could be attached to these hydrants for filling and washing out the locomotive boilers. The smoke troughs above each road varied in length between ten and fifteen feet (3.05 – 4.57m). They were three foot (914mm) wide at the bottom with a one foot, six inch (457mm) square chimney at the top. The smoke troughs were constructed entirely of wood (including the fastenings) to resist attack by sulphurous gases. The boarding was ¾ inch (19mm) timber with a 3 inch (76mm) by 2 inch (51mm) framing. Each smoke trough was suspended from the roof principles by four wrought iron straps.

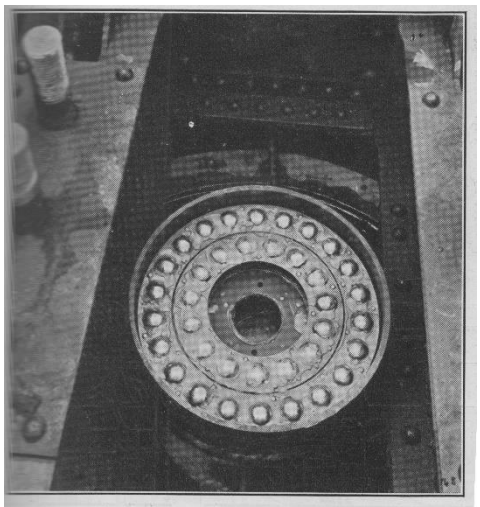
Both the turntables were manually operated. Their diameter was 65 foot (19.81m) and they were a centre-pivot under-girder type with the turntable pit fully decked with timber boards. Provision was made to adapt the turntables for electrical operation and it is believed that this was carried out in 1934, when £652 19s 2d was spent on the two turntables at Tyseley.



A. Top of cast-iron centre-post.
B. Bronze bearing cup.
C. Half-round steel stud.
D. Cast-iron cap.
E. Suspension bolts for carrying engine cradle.
F. Steel holder for bronze cup.

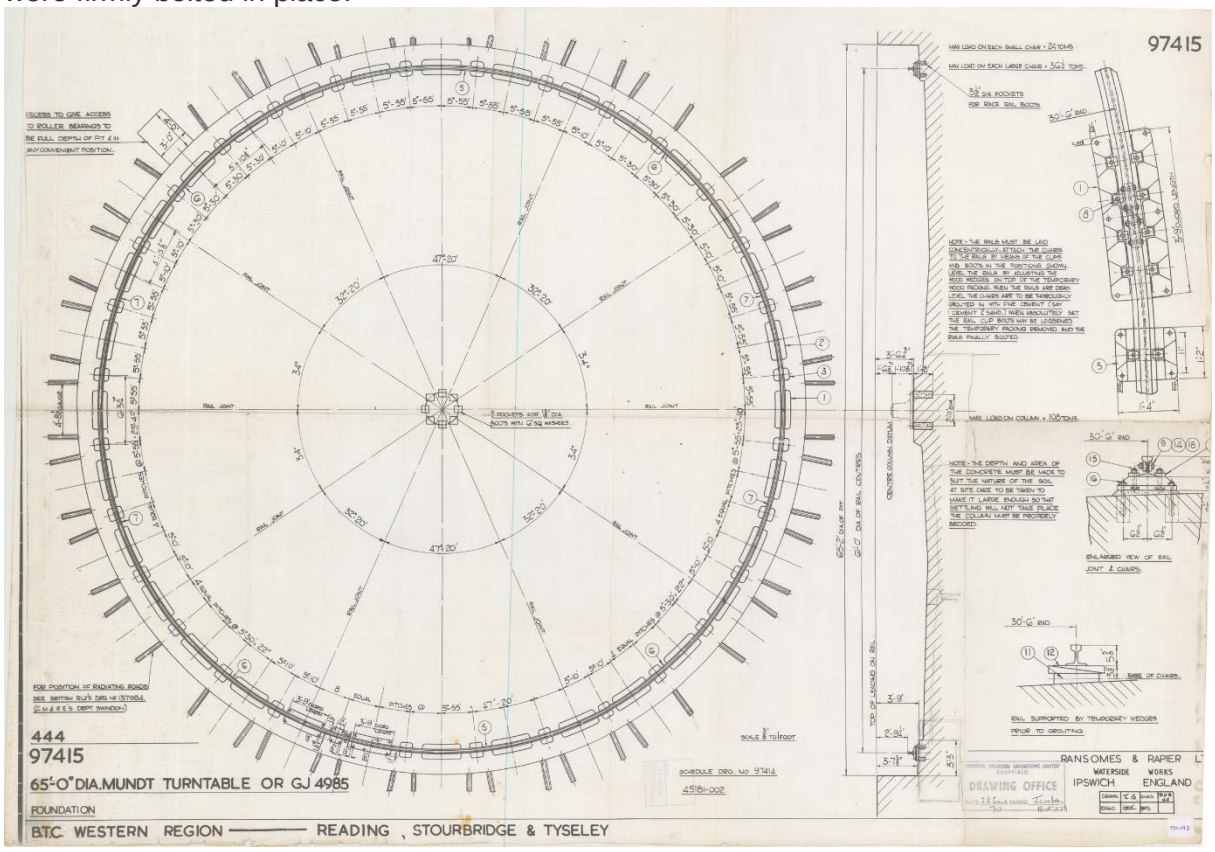
The engine platform of the turntable weighed about forty tons. This was balanced on a fixed ‘centre-post’ which revolved on a cup and ball bearing in an oil bath. This arrangement is shown in the drawing. The top of the centre post carried a piece of very hard phosphor bronze with a cupped upper surface in which the three inch (76mm) diameter ball of the bearing revolved. This ball was a half round steel stud firmly held in a large cast iron cap situated at the centre of the turntable and onto which the engine cradle was bolted by eight suspension bolts. These bolts allowed the turntable height to be adjusted to quarter of an inch (6mm) above the tracks leading to the turntable. The point of contact between the ball and cup was less than one and a half square inches (9.7cm^2), but allowed a balanced load of 175 tons to be pushed round by a single man. A centre balanced turntable had a circular track or race-rail around the edge of the turntable pit, but this only acted as a guide rail and was not designed to carry any load.

With the introduction of heavier and longer locomotives (such as the Castle and King classes) issues arised with the centre balance turntables. The need to balance the weight on the centre point, meant that the full diameter of the turntable could not always be utilised. Additionally the foundation requirements from a single concentrated load point and the need for substantial supporting girders for the engine platform were expensive. Alternative improved turntable designs, which were cheaper to construct were therefore investigated. A design by a Dutch engineer (M Mundt) used a strengthened outer race-rail to support some of the load on the turntable platform. By distributing the load across three points, the load on the centre pivot was roughly halved (to a maximum design load of 108 tons). This arrangement also allowed the platform girders of the engine cradle to be reduced in size, which meant a shallower turntable pit was possible. Improvements in steel technology allowed the centre pivot cup and ball arrangement to be replaced with a ball-bearing ring. This spread the load over a greater surface area reducing the wear.



Special SKF Double Ball Race in Centre of Mundt Turntable.

To ensure the load on the turntable was shared correctly, it was important that the outer race-rail was perfectly level. The race-rail comprised sections of curved standard mainline 96lb / yard rail forming a 61 foot (18.59m) diameter ring. The sections of rail were joined with diagonally cut joints and these joints were each supported along their length in special extended cast-iron chairs. The special chairs were spaced so that the load on any individual chair could not exceed 36.5 tons. Notes on the race-rail construction drawing No.97415 specified that temporary wooden wedges should be used to adjust the height of the race-rail until it was level. These were then set in a weak concrete mix, before the chairs were firmly bolted in place.



The drawing also shows that adjacent to one road there was a recess on the outside of the turntable pit. This is to give access for maintaining the roller bearings of the outer race-rail carriage wheels. At each end of the turntable platform is a fixed carriage with a pair of flangeless wheels. These wheels carry the end load, while rotating on the race-rail. They have cast steel centres with hardened steel tires shrunk on. Each wheel has a steel axle held between a pair of roller bearings.

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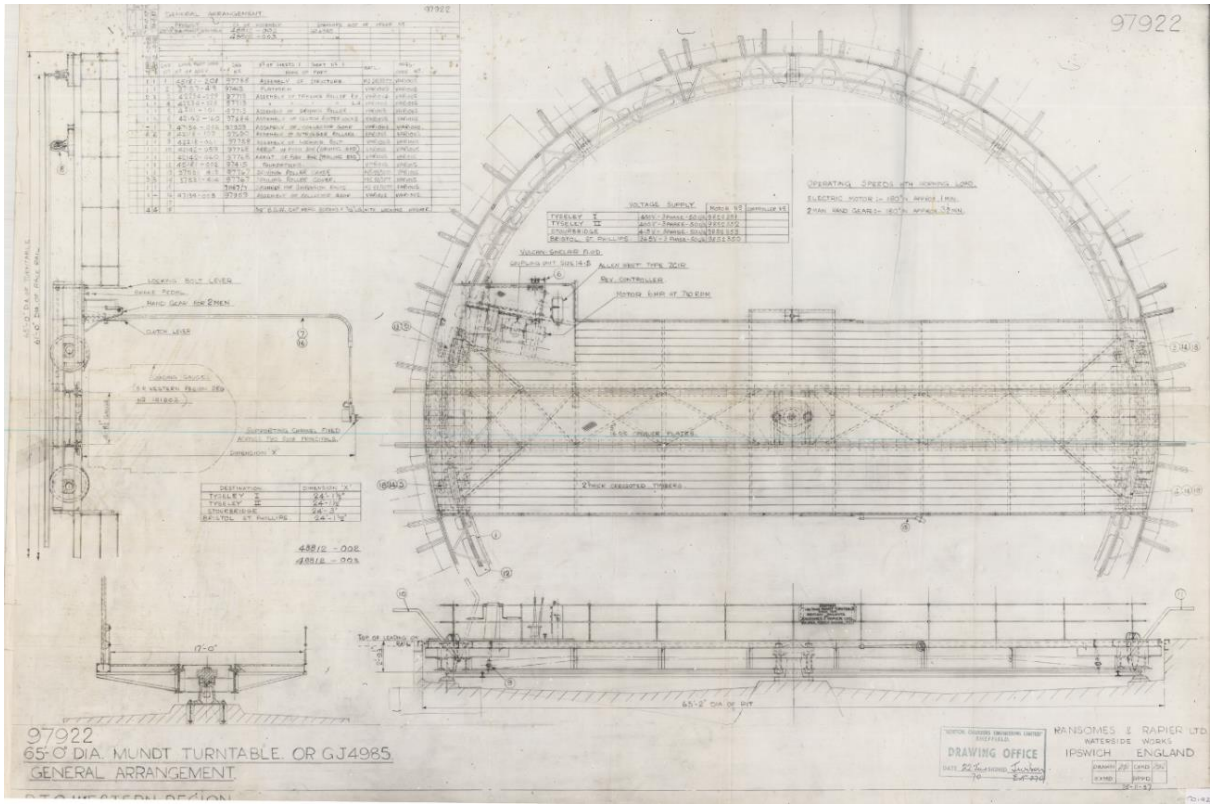
Although Mundt turntables had a bar at each end of the platform to facilitate them being pushed around by hand, this facility was generally only used when the turntable was empty. Any unbalanced load on the platform greatly increased the effort required. The turntables were therefore provided with mechanical winch gear, operated by two people using removal windlass's. In addition a 6 h.p. electric motor was mounted under the engine platform. The motor could fully rotate the turntable in two minutes. A clutch allowed the motor to be disconnected from the drive mechanism when manual turning methods were being used. The photograph shows the three phase motor and clutch arrangement located under the Tyseley turntable platform.

Each end of the turntable platform has a rectangular steel locking bolt. This can slide to engage with one of a series of steel lined pockets in the side of the turntable pit. These pockets are located in the centre of each road allowing the platform to be locked in position once it had been correctly aligned. A single lever adjacent to the control cubical operates both the locking bolts. When the locking bolt was engaged an interlock prevented the motor being engaged. The photograph shows one of the platform floor plates removed to disclose the locking bolt.

Finally rather than board the entire turntable pit, a fence, which turned with the engine platform protected the edge of the shallow pit and both sides of the engine platform.

An opportunity for the Great Western Railway to install its first Mundt turntable came in 1931. The UK was suffering from the world depression and in a bid to reduce unemployment, the government introduced the Development (Loan guarantee and Grants) Act (1929). The Great Western Railway took advantage of this scheme to invest in various new infrastructure projects, which included the construction and renewal of a number of locomotive depots. In 1931, a 65 foot (19.81m) Mundt turntable was installed at Cardiff Canton Locomotive Depot as a trial. This turntable was manufactured by Ransome & Rapier Ltd of Ipswich, who had procured the UK rights to sell Mundt turntables.



After the Second World War had ended, the railways were nationalised and on 1st December 1954 the British Transport Commission published a programme for the 'Modernisation and Re-equipment of British Railways'. Although this report stated that 'Steam must be replaced as a form of motive power, electric or diesel traction being rapidly introduced...', it was realistic in recognising that this would take some time to complete. The report also identified that a substantial proportion of the existing steam locomotive fleet was of modern design with a useful service life of forty plus years. It concluded that where complete steam depots could not be eliminated (particularly those supporting large freight depots) capital expenditure to modernise these would be inescapable. An estimated sum of £10 million was included to cover this expenditure.

British Railways (Western Region) placed order GJ 4985 (contract No.1114-M&E) for four 65 foot Mundt turntables from Ransome and Rapier Ltd. These were to replace centre-pivot under-girder turntables at the Locomotive Depots at; Tyseley (x2), Stourbridge and St Phillips, Bristol. All these were in Locomotive Depots with standard Churchward turntable sheds. A General Arrangement drawing dated 25th November 1957 listed these sites, giving the details of the electric power available at each locations. A second, later but undated, drawing detailing the race-rail construction (Dwg No.97415), substituted the turntable at St Phillips Bristol Depot with Reading Depot. In 1959, one of these Mundt turntables was installed in the passenger running shed at Tyseley Locomotive Depot. A second Mundt turntable was installed at Reading, but it is unknown where the other Mundt turntables were installed.

Considerable care was needed during the installation of Mundt turntables, as it was critical that the load on the platform was shared correctly between the centre pivot and the race-rail. Typically turntables were pre-assembled for testing at the manufacturer's works, where they were operated while loaded to 125% of their design load. The deflection in the main girders under the platform was measured and compared to measurements taken before the test. These measurements were then repeated after the load had been removed to identify if there had been any permanent deformation. In 2018, Vintage Trains was contacted by Mr D Webb. He had worked in the 'Crane Section' of the Drawing Office at Swindon in 1959 and

remembers travelling to Tyseley to witness the acceptance tests on the new Mundt turntable. He remembers two Castle class locomotives being arranged head-to-head on to the turntable. A length of piano wire was then stretched taught across the turntable pit to allow the deflection of the platform girders to be measured at several points.

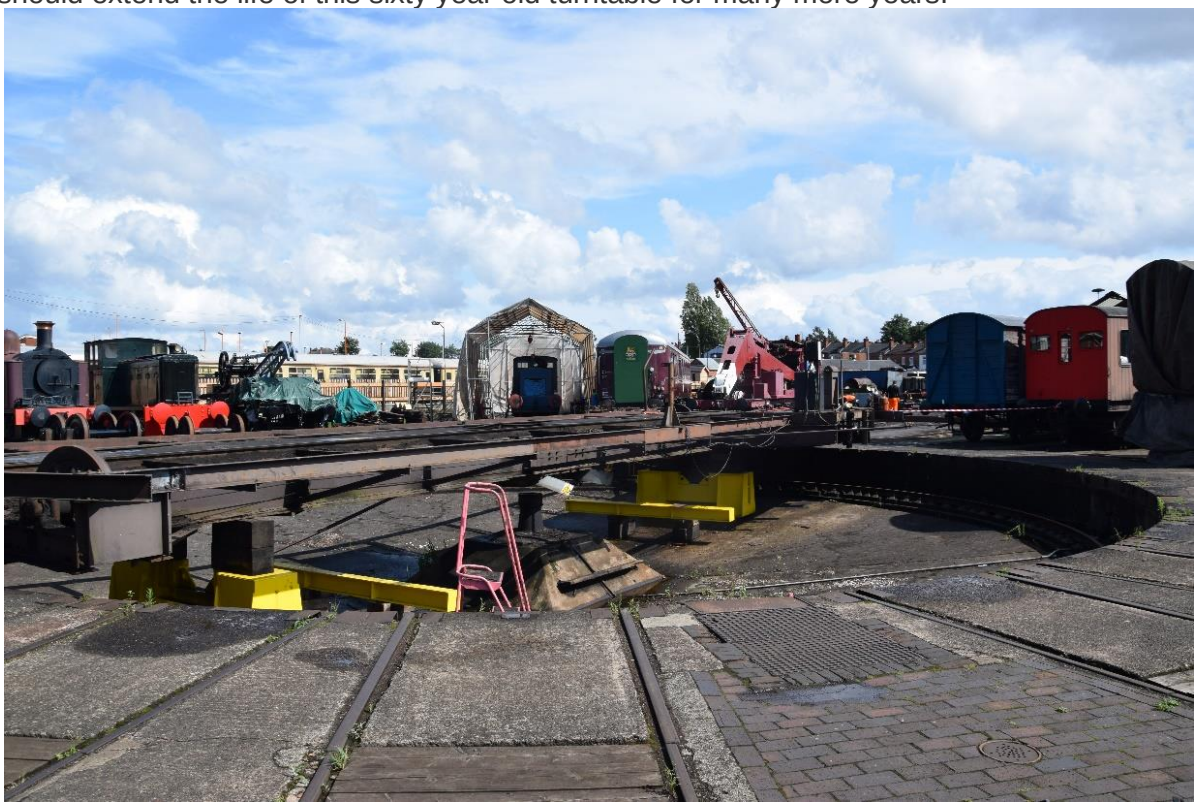
In the same year that the turntable was installed, a review of progress of the Modernisation Plan resulted in a more radical report by the British Transport Commission. This proposed speeding up the end of steam motive power. Many unprofitable lines, stations and services were closed and this reduced the number of steam locomotives required. New Diesel Multiple Units (DMUs) displaced the 2-6-2T Prairie tank locomotives from the suburban passenger trains, and Diesel shunting locomotives displaced the 0-6-0T Pannier tanks. As the number of steam locomotives allocated to Tyseley gradually reduced, the Depot was reallocated to the London Midland region in September 1963 That year the Goods running shed was demolished and a corrugated steel sheet wall was erected to protect the remaining shed. In November 1966, Tyseley shed was officially closed by British Railways and in 1969 the Passenger running shed was also demolished leaving the Mundt turntable exposed to the elements.

Pat Whitehouse took this photograph inside the Passenger shed at Tyseley on Monday 6th March 1967. No.7029 'Clun Castle' is standing on the Mundt turntable in the Passenger running shed, posing for the artist Terence Cuneo. The previous day the locomotive had hauled the last steam train from Birkenhead to Birmingham Snow Hill.

From 1966, when '7029 Clun Castle Ltd' was formed, their namesake locomotive found a home at Tyseley. Initially the preservation group negotiated with British Railways for use of their facilities, including the rights to store their locomotive in the Passenger running shed. After setting up a registered charity 'Standard Gauge Steam Trust' a long term lease for the site was obtained from British Railways. Work then started to transform the derelict site. The pits around the turntable were gradually cleared of debris and repaired. The brick floor paving of the shed was re-laid on the existing ash base. Tyseley volunteers cleared the blocked drainage pipes from the turntable pit and examination pits. In 1993, the track was removed from the main roads over the two pits on either side of the turntable. These two ash-pits were then rebuilt and the rails re-laid.

The electric power for the Mundt turntable's motor had originally come from a rotary joint in the running shed roof. With the shed building demolished there was no electric power and the turntable could only be turned using the hand winch gear. This lasted until 1994, when the increase in operations at Tyseley, prompted Bob Meanley to propose the reconnection of the turntable's electric drive mechanism. The turntable motor was removed for examination and overhaul by Dowding & Mills. The control electrics were also refurbished and where necessary components were replaced. A new electric power cable was installed to the turntable together with a collector system at its base to supply the motor.

The turntable has been an ideal platform to show off the preserved locomotives at the regular Tyseley Open Days. During 2018 it was identified that the turntable required major refurbishment and its use was restricted. Fortunately a generous legacy allowed this required refurbishment to start. The photograph shows the turntable platform raised out of its pit at the start of August 2019. It is hoped that the turntable will soon be back in full working order for future Tyselley Open Weekends. With regular maintenance, this refurbishment should extend the life of this sixty year old turntable for many more years.



Volunteer Archivist – Robert Ferris (August 2019)

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