

HISTORY OF ELECTRIC TRAMWAYS IN BRISBANE.

Presentation at Queensland Institute of Engineers by J.E.Morwood. M.E., F.I.F.E.,
F.I.E. Aust. on 29 (sic) February 1970.

Introduction

It seems appropriate now that the last electric tram has run in Brisbane, to write the history from an engineering point of view, of electric street tramways in this city from their inauguration on 21 June 1897, to their demise on 13 April 1969.

Beginnings

The Tramways Act of 1882, passed by the Queensland Government, authorised either registered companies or local authorities to construct tramways, subject to approval. Under this Act the Metropolitan Tramway and Investment Company Limited was registered in November 1883 and received the necessary approval from the Municipal Council and from the Government.

In October 1884, a contract was let by the Company for the construction of six and a half miles of double track from Woolloongabba to Breakfast Creek with branches to the Exhibition Building and to New Farm.

At the same time eighteen tramcars were imported from America. In the words of the "Brisbane Courier" of the day they "are constructed of cedar and mahogany, highly polished, and are fitted with all the latest improvements. They are mounted on steel springs, making the motion almost imperceptible." The single deck cars seat 16 passengers and the double deckers 40.

Opening of the service was on 10th August 1885, when four magnificent roan horses pulled the first car from Victoria Bridge to the Exhibition, carrying a number of Brisbane chief citizens. Normally each car was drawn by two horses, an extra horse being used on steep grades. The initial service required a total of 100 horses.

Wagonettes carrying eight passengers each were added during the following year to extend the service from Breakfast Creek to the Hamilton Hotel. Eventually horse drawn trams ran on rails from the City to Exhibition, Breakfast Creek, Bulimba Ferry, New Farm, Logan Road and West End.

Brisbane Tramways Company

On 30 September 1895, a company newly formed in London, called the Brisbane Tramways Company Limited, purchased the horse car system for £105,200 with the intention of converting it to electric operation and extending it. The electrical equipment for the tramcars

was ordered from the General Electric Company of America who sent Mr J. S. Badger to install it. He remained in Brisbane for 27 years, most of the time as General Manager and Managing Director of the Company.

The official opening of the electric system took place on 21 June 1897, when a tramcar was driven by Mr Badger from Logan Road, Woolloongabba, to the southern end of Victoria Bridge. The service commenced with 20 tramcars running on 15 miles of track, electricity being supplied from a power station in Countess Street.

The Company extended the system by laying tracks and obtaining tramcars until the end of 1922 there were 181 tramcars and more than 42 miles of tramway routes. The dates of the various extensions were as follows: -

- 1897 - Logan Road, Paddington, Red Hill.
- 1899 - Ipswich Road, Ascot.
- 1901 - Kelvin Grove, Clayfield.
- 1902 - Wharf Street, Upper Edward Street.
- 1903 - Lower Edward Street, East Brisbane.
- 1904 - Toowong, Rosalie.
- 1908 - Dutton Park.
- 1914 - Greenslopes, Kedron, Merthyr Road.
- 1915 - Coorparoo, Cracknell Road.
- 1917 - Grey Street, Adelaide Street, Ann Street.

It is understandable that during the last five years of the Company's life, little track work and few tramcars were built. Until then, however, its expansion kept pace with the growth of population and the spread of residential development. Undoubtedly the Company gave excellent service to the citizens of Brisbane for many years. The shareholders of the Company also did well from the venture.

The 1912 Strike

On 19 January 1912, a three-week strike of tramway men commenced, the principal item of dispute being the desire of the men to wear a Tramway Union badge while on duty. A reduced service was operated by Company officers with some motormen and conductors who did not join the strikers. Feelings ran high and a large number of civilians were sworn in by the Police Department as special constables. New employees were taken on by the company and quickly trained but none of the original strikers was taken back until after the Tramway Trust began operating in 1923. A few years after the strike the Federal Arbitration Court granted the men the right to wear their union badges.

Early Power Stations

The first power station was located in Countess Street and was commissioned in 1897 with three Robey cross-compound horizontal non-condensing steam engines, each driving a 300kW 550-volt D.C. generator by means of a 17 foot diameter flywheel and belt being 3 feet wide and 90 feet long. Four hand-fired boilers at 150 lb steam pressure supplied steam to the

engines. The 150 feet high brick chimney of this power plant was a feature of the Brisbane landscape for over thirty years.

The first extension to the plant in 1902 was a 400 kW McIntosh and Seymour vertical compound steam engine direct connected to a D.C. generator and complete with surface condenser and cooling tower. Nos. 5 and 6 boilers were installed and were followed shortly afterwards by no. 7 boiler which was the first one with a mechanical chain grate stoker. A major advance in power plant machinery was made just before Christmas 1908 when a Parson's turbine set was put into service. This was originally a 500 kW set running at 3000 r.p.m. directly coupled to a high speed D.C. generator. Commutator and other troubles led to the replacement of the generator portion by a 600 r.p.m. generator with double reduction helical gearing. The condenser of this turbine obtained its cooling water through a pipeline from a pumping station on the riverbank.

In 1911 the first of two B.T.H. 750 kW turbo-alternators was installed, each six-phase alternator being electrically coupled to a rotary converter giving 550 volts D.C. The other two similar units followed in 1913 and 1915. No. 8 boiler complete with chain grate stokers and induced draft fan was installed in 1912. No. 9 boiler, the last to be installed in this plant, went into service in 1914. It was a three drum land type B & W boiler of 6000 sq. ft. heating surface, complete with chain grate stoker, superheater and induced draft fan. This boiler had a capacity of 30,000lb steam per hour and due to its better efficiency and high steam temperature carried a large share of the load during its 14 years life.

As the tramway system spread out into the suburbs, it was not possible to supply all the energy at 600 volts from one point in Countess Street. In July 1913, the first of two producer gas engines went into service at Light Street, off Breakfast Creek Road beyond the Valley Junction. These were large vertical engines running at 200 r.p.m., one having six cylinders driving a 450kW D.C. generator and the other eight cylinders with a 600 kW D.C. generator. These engines with their coke-fired producers required a considerable amount of maintenance but they formed an important point of power supply for 15 years till they were finally scrapped in 1928.

A feeding point for the system on the south side of the river was provided in 1915 by transferring two of the three original Robey engine sets from Countess Street to a galvanised iron building in Logan Road. They were connected to a barometric condenser complete with wooden cooling tower. Two new B & W double drum land type boilers, fitted with chain gates, induced draft fans and economisers, were installed to supply steam. These two Robey engines had a running life of thirty years, being finally scrapped in 1928.

Tramway Trust

At the end of the First World War it was obvious that the tramway system had become a necessity for mass transport of the people and it was generally felt that it should be owned and operated by a public body rather than a private company. In June 1920 the Queensland Government appointed a Tramway Valuation Board to value the assets of the company, a figure of £1,063,231 being eventually arrived at. Other valuations, however, arrived at a higher figure.

The Brisbane Tramway Trust was brought into being by an Act of Parliament which received Royal Assent on 14 October 1922, and the Trust took over ownership and control on 1 January 1923, the purchase price being subsequently agreed at £1,400,000. The company had naturally been unwilling to spend much money on capital assets such as track work and rolling stock, and therefore expansion of the system was small during the last few years of its control, although this immediate post-war period was one of rapid growth in Brisbane's development. The Trust therefore had considerable leeway to make up in a vigorous manner. Many sections of track needed replacement, duplication of single tracks was urgent, additional tramcars were needed to cope with the increasing population and the repair workshops and car depots were inadequate. The fifteen horses used for track maintenance were disposed of and the stables in Countess Street were dismantled. Fifteen motor vehicles were purchased to replace them.

During the Trust's three years of office, 14 miles of track were re-laid with heavier rails, 6 miles of single track were duplicated and nearly 8 miles of extensions were completed. The principal extensions were as follows ---

- 1923: Exhibition Loop.
- 1924: Ashgrove.
- 1925: Camp Hill, Cavendish Road, Lutwyche, Balmoral, West End, Oriel Park.

Contracts were let during 1925 for the construction of new workshops at Boomerang Street, Milton and for the building of car sheds and depot offices at Ipswich Road. Remote control of points was introduced at busy city intersections to improve safety of cars and personnel. Other innovations by the Trust were passenger shelter sheds, advertising in trams and a Suggestions Board scheme.

City Council Control

The Greater Brisbane Act was passed by Parliament in October 1924 and on 1 October 1925 the new Brisbane City Council took over control and administration of the area previously covered by twenty cities, towns and shires. The Act required that the tramway system be handed over by the Trust to the new Council, and this was done as from the 1 December 1925. From that date the system has been administered by a Committee of Aldermen of the Council.

At the time of the Council's acquisition of the system there were 50 miles of tramway route and 225 tramcars. The Council continued the work of expansion, which had been initiated by the Trust and carried out extensions as follows ---

- 1926 - New Farm Park, Holland Park, Newmarket.
- 1928 - Grange.
- 1929 - Kalinga.
- 1930 - Rainworth.
- 1935 - Ashgrove, Balmoral.
- 1937 - Bardon, Moorooka, Doomben.
- 1940 - Stafford, Salisbury.
- 1947 - Chermside.
- 1948 - Belmont.
- 1949 - Enoggera.

- 1951 - Mount Gravatt.

The move to Coronation Drive

Headquarters of the Tramways Company was in Countess Street on land leased from the Railways Department and this included a wooden Head Office building on the street frontage, a steel framed workshop building behind the offices and a brick constructed powerhouse on the street frontage south of the offices.

Transfer to the new workshops at Milton took place during the first half of 1928. The old workshops were then dismantled and the recovered material was used to build a new wood working shop and a new track workshop on the Milton site. A new office building to form the headquarters of the Tramways and Power House Department of the Council was built on River Road (now Coronation Drive) using very large bricks and materials salvaged from the powerhouse building in Countess Street. This office was completed in October 1929 and the Countess Street site handed back to the Railways Department.

Substation system

An adequate system of power supply to the trams was a matter for urgent attention by the Trust in view of the high cost of generation and the limited output of the three existing power stations at Countess Street, Logan Road and Light Street. It was obvious that the only economical method of feeding power to the trams would be a modern power station generating at high voltage alternating current and transmitting power to a number of substations at strategic points throughout the system.

Such a substation system was designed and implemented as soon as practicable. As a first step, additional power was obtained by temporary purchase from the City Electric Light Company at two points. One was from a rotary converter in the company's Boundary Street substation which became available due to the gradual change of power in the city from D.C. to A.C., and the second was by purchase of energy at high voltage at Light Street for conversion to 600 volts D.C. through a second hand motor generator unit obtained by the Trust from Sydney.

At the same time tenders were called for substation plant and orders were placed for two 100kW automatic rotary converter units for the Russell Street substation in South Brisbane and one 500kW automatic mercury arc rectifier for the Windsor substation. These three units were placed in service in February 1927, taking high voltage supply temporarily from the City Electric Light Company until the Council supply was available from New Farm Power House in mid 1928.

Orders were also placed for three 1000 kW manually controlled rotary converters for a substation to be built at Ballow Street near the Valley Junction. This substation was centrally located for the whole system and therefore was developed as the only one with operating staff, all other substations being automatically operated with supervision through pilot wires from the central substation. The substation workshop and maintenance personnel were also located at the Valley Junction substation.

These converters, together with one each at Logan Road and Petrie Terrace substations, and a 1000 kW mercury arc rectifier at Newstead substation were put into service in July 1928 when supply became available from the New Farm Power House. Commissioning of these substations units allowed the three obsolete power stations at Countess Street, Logan Road and Light Street to be shut down and dismantled and the equipment sold, mostly for scrap value.

The growth of the tramway system during the years of Council ownership is indicated by the increase in power substation plant from 8,500kW in 1928 to 24,200 kW total capacity in 1955. Ten rotary converters, all of the same size, were installed in various substations between 1927 and 1943.

In the meantime the mercury arc rectifier was beginning to replace the rotary converter as a means of converting alternating current to direct current for traction purposes as it is more efficient, lower in first cost, lower in maintenance costs due to the lesser moving parts. Experience with the two rectifier units at Windsor and Newstead led to the installation from 1935 onwards of fifteen rectifier units, two of which were of the sealed glass bulb type, four of the demountable steel tank type with vacuum pumping gear and the remaining nine of the sealed pumpless steel tank type. The last one to be installed was in 1955 at Coorparoo Substation.

Track work

Older sections of the track were laid with rails weighing 55lb. per yard but the company replaced these with 83lb. rails. When the Trust took over in 1923, a vigorous programme of track relaying and duplication was commenced using British Standard 96lb. grooved tramway rails on straights with rail weighing 103lb. on curves. For some years standard wooden sleepers were used.

However, a more permanent method of track construction with less maintenance was developed by using steel ties in lieu of sleepers with the whole of the track, except on curves, set in solid concrete. Standard railway rails were used with a groove in the concrete for the wheel flange, and guard plates were bolted to the rails on curves to form a groove. Relaying of long sections of track in concrete not only improved the running of the trams but also formed an excellent road surface for other road vehicles.

Early tramcars

The earliest electric tramcars were converted from the older horse-drawn cars and also some new electric cars were locally built. In the twenty-five years of the Brisbane Tramways Company's control the fleet was increased from 20 to 181 tramcars, most of these being built in Brisbane with imported electrical equipment.

The cars were of various sizes and types ranging from the combination car with seating capacity for 34 persons, through the 10 bench and 12 bench cars seating 50 to 60 persons respectively, to the centre aisle car seating 56 persons but with a capacity to carry 90 persons including standees.

When the Trust took over in 1923 there were about 30 of these centre aisle cars or Dreadnoughts, as they were popularly called. They were the first cars to have the conductor

operating entirely inside the car instead of from the running board. Their disadvantage was that the entrances and exit were at the ends only, causing them to be slow in loading and unloading. However, since more cars were urgently needed and no other designs in detail were available at the time, the Trust made immediate arrangements for the construction of a further 26 of these cars, mostly by private Brisbane firms.

Drop Centre tramcars

One of the first tasks of the Trust was to initiate the design of an entirely new type of tramcar to give greater seating capacity, good protection from the weather and faster loading and unloading. With some assistance from the Sydney tramway undertaking, the first drop centre type of tramcar was designed and one prototype was built in the Trust's workshop, using trucks and under frames from New South Wales. After successful trial of this car in service, tenders were called for the construction of 30 similar cars. Contracts were let to T. Gardiner of Newmarket, Brisbane for the building of 15 car bodies, with underframes by Evans Deakin Ltd. and to Meadowbank Manufacturing Co., Sydney for 15 car bodies and underframes.

All the trucks were built by the Government Dockyard, Newcastle, and the motors and control equipment imported from England and U.S.A. Each car was fitted with two bogie trucks, each being of the maximum traction type with one axle mounted motor per truck.

The first drop centre car was completed in January 1925 and was a marked success from their beginning. During 1925 there were 21 of this type of car put into service. When the Council took over from the Trust, construction of this type was continued, most of them being built in the Department's own workshops at Boomerang Street, Milton. Except for two years during the depression of 1931-32, a number of new cars were built every year, the last one of this type being produced in 1939. A total of 191 cars of the drop centre type were built, the later ones having many improvements over the earlier ones. During this period air brakes were first introduced and also safety glass windscreens for protection of the motormen.

Modern tramcars

In October 1936, the Council approved the design and construction of a new type of tramcar. Larger than the drop centre type, wholly enclosed from the weather and fitted with four motors and equal wheels. The design was carried out in the Department's design office and a prototype car no. 400 was built in the Department's workshops. This car went into service in late 1937 and was tried out on all routes with distinct success and satisfaction acceptance by the public.

Known as the "400" or "Streamlined" type this car became the standard modern vehicle and proved to have very low maintenance costs. The frame of this car is of integral construction with no separate underframe and is made of all welded light rolled steel sections, considerable saving in weight being effected. The car overall is 49 feet and the weight is 15 ½ tons. This car became known as the F.M.Class tramcar as it was the only type having four motors.

Construction of this car continued, with a short interruption during the war, until 1960 by which 147 cars of this type were in service. They provided the bulk of the regular all day services on all lines.

In September 1962, a disastrous fire destroyed the Paddington tram depot in which about one fifth of the tram fleet was lost. This event hastened the conversion of some routes to buses but it was evident that a few new tramcars would still be needed. Some trucks, wheels and other parts were salvaged from the Paddington fire and using these, eight new tramcars of the modern F.M. type were built in 1964. These were given the title "Phoenix" bearing witness to the mythical bird rising from the ashes of its own funeral pyre.

Trolley buses

The trolley bus is a vehicle in which the body follows motor bus design but the power plant is an electric motor under the floor fed from a pair of trolley wires through trolley poles. Its advantages over the motorbus are the facts that it uses electric energy generated from locally produced coal and that it is a silent vehicle with smooth running qualities and absence of exhaust smell. Its disadvantage is that it is limited to a specific route along which is installed a relatively complicated overhead structure.

Thirty trolley bus chassis were purchased in 1949 and were fitted with locally made bodies. An initial service between the Botanical Gardens and Gregory Terrace was inaugurated in August 1951. This route includes some steep hills for which the trolley bus is particularly suitable as it can draw a large amount of power from the power station through the trolley wires.

In November 1955, trams were withdrawn from the Cavendish Road route and were replaced by a trolley bus service running from Cavendish Road over the Story Bridge to Prospect Terrace.

A depot for storage and maintenance of trolley buses was established on land opposite the tramway workshop, and was connected to Normanby Junction by suitable trolley wires.

In November 1968 (actually, March 1969 Ed.), the trolley buses were replaced by diesel buses in order to give greater flexibility of operation and routing in accordance with the adopted scheme of future roadways.

Motor buses

The rapid development of the internal combustion engine and its use in road transport led to the use of motorbuses in Brisbane early in the century, most of these being owned and operated by private individuals. From 1923 they were licensed and controlled by the Tramway Trust and generally served districts not served by trams. By 1925 there were 40 such licensed vehicles.

In 1925 the Trust purchased eleven petrol bus chassis and arranged for locally made bodies to be built on them. These buses ran from the City to Grange and Kalinga and also from the Valley to Teneriffe, the general purpose being to pioneer prospective tram routes. However, the cost of petrol was high, the roads were poor and many uneconomical trips were run, resulting in a considerable financial loss. The Council ceased operating these buses in November 1927, and sold the fleet.

In July 1940, the Council again commenced operating buses but this time with the introduction of diesel fuel and better road surfaces, together with a greater population, they were more successful. The first buses to be used were twelve Albion vehicles with Gardiner diesel engines and they operated over the newly built Story Bridge.

In 1948 the Council was granted approval to acquire the licenses of the twenty bus services being run at the time by private operators between the suburbs and the city, including the purchase of the 67 vehicles being used. The Council disposed of all petrol-driven vehicles and introduced more comprehensive services on the routes. Further modern vehicles were purchased and by 1951, the total fleet consisted of 155 diesel buses, most of which were equipped with fluid flywheels and self-changing gearboxes.

Growth and decline of the tramcar

In 1925 the number of passengers carried per annum by the trams was about 82 million. The number dropped somewhat during the depression years until at the beginning of the War in 1939 it had risen again to about 92 million. During the War years due to petrol rationing and other causes, the passengers per annum rose rapidly to 160 million for the year 1944/45.

After the War the increasing use of the private motorcars and the growth of the Council's bus fleet gradually reduced the number of tram passengers to 110 million in 1950 and about 80 million by 1960. By 1969 when the tramway services were finally discontinued the annual number of tram passengers had dropped to 46 million. The annual number of bus passengers at the same time was 30 million, which showed a very considerable decline in the use of public transport during recent years.

The decision to discontinue the use of trams in Brisbane in favour of a complete motorbus system was made in June 1968. This decision was inevitable in view of the adopted scheme of future highways and expressways for the city of Brisbane and the replacement of Victoria Bridge by a concrete structure without tram tracks.

Conclusion

For seventy-two years the electric tramcar has been the basic means of public street transport for the city of Brisbane and has filled this role with undoubted distinction and general satisfaction. It has now been superseded by more modern and flexible means of transport. However, as the city grows still further, it may be that the tram's big brother, the suburban electric railway system will become of major significance in carrying the people of Brisbane to and from their homes and about their daily business.

Acknowledgements

Thanks are due to the Brisbane City Council, Transport Department, for a considerable amount of the information included in this paper.

The Brisbane Tramway Museum Society
ACN 009 793 604